Closing the Missing Link on the Assunpink Creek Greenway

prepared by

The Delaware Valley Regional Planning Commission

January 2000

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This project was made possible through DVRPC and a Mercer County Green Links Project Implementation Grant, part of the New Jersey Urban Forestry Demonstration Project, New Jersey Department of Environmental Protection, Community Forest Program, and through a grant provided by the U.S. Forest Service and secured by former U.S. Senator Bill Bradley. DVRPC is funded by federal grants from the U.S. Department of Transportation's Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), the Pennsylvania and New Jersey Departments of Transportation as well as by DVRPC's state and local member governments. The authors, however, are solely responsible for its findings and conclusions, which may not represent the official views or policies of the funding agencies.

Created in 1965, the Delaware Valley Regional Planning Commission (DVRPC) is an interstate, intercounty and intercity agency which provides continuing, comprehensive and coordinated planning for the orderly growth and development of the Delaware Valley region. The region includes Bucks, Chester, Delaware, and Montgomery counties as well as the City of Philadelphia in Pennsylvania and Burlington, Camden, Gloucester, and Mercer counties in New Jersey. The Commission is an advisory agency which divides its planning and service functions between the Office of the Executive Director, the Office of Public Affairs, and three line Divisions: Transportation Planning, Regional Planning, and Administration. DVRPC's mission is to emphasize technical assistance and services and to conduct high priority studies for member state and local governments, while determining and meeting the needs of the private sector.

The DVRPC logo is adapted from the official seal of the Commission and is designed as a stylized image of the Delaware Valley. The outer ring symbolizes the region as a whole while the diagonal bar signifies the Delaware River flowing through it. The two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey. The logo combines these elements to depict the areas served by DVRPC.

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And to all the other residents who offered their input regarding problems and solutions for protecting the Assunpink Missing Link.

Executive Summary

The Assunpink Creek Greenway Missing Link Plan has been developed as a "how-to" guide for Lawrence and Hamilton Townships, Mercer County, the state, the Assunpink Creek Watershed Association, the Delaware and Raritan Greenway, Inc., and residents interested in protecting the creek environment and people's enjoyment of it. The greenway plan extends between the Mercer County Park and the City of Trenton. This area was chosen for study because it is the "missing link" in greenway activity from the creek's headwaters in Monmouth County to its mouth at the Delaware River.

Through research, analysis and public outreach, four main issues have come forth. In addition to identifying these issues, the plan attempts to provide a rationale for why they are important, and it proposes recommended actions that, if implemented, will serve to address them.

I. *ISSUE: Half the length of the Assunpink is largely preserved as parkland and several efforts are underway to protect remaining portions of the stream corridor. Formal establishment of a greenway through Lawrence and Hamilton Townships would complete the green link from the Assunpink's headwaters to its mouth.*

Major Recommended Actions

1. **The Delaware and Raritan Greenway, Lawrence and Hamilton Townships, Mercer County, and the Lawrence Township Conservation Foundation** should follow the Conservation Package to preserve a minimum 300 foot wide riparian buffer along the creek. (pages 49-54)

2. **Hamilton Township** should consider adopting a stream buffer setback requirement similar to Lawrence Township's. (p. 31)

II. *ISSUE: The water quality of the Assunpink Creek within the greenway study area is good, but it is threatened by additional development occurring in the watershed that will increase stormwater runoff and threaten vital floodplains and wetlands that filter out pollution before it reaches the stream.*

Major Recommended Actions

1. **Concerned residents** should re-establish the citizen water quality monitoring effort in conjunction with the **Assunpink Watershed Association and Delaware Riverkeeper Network**. (p. 27)

2. **Hamilton Township** should prioritize stormwater management and adopt an updated ordinance addressing water quality and groundwater recharge as well as runoff rates. (P. 36)

3. **The Assunpink Watershed Association and local environmental commissions** should produce and distribute information on good land stewardship. Examples are in Appendix C. (pp. 41 and 73)

III. *Issue: A trail developed along the Assunpink Creek Missing Link Greenway would connect two popular regional facilities:*

1. *Mercer County Park with the D&R Canal Towpath*
2. *The D&R towpath with the Trenton Assunpink Greenway along the Hamilton side.*

These trails also have the potential to link up with at least 5 other proposed trails in the area.

Major Recommended Actions

1. **The Delaware and Raritan Greenway, Inc, Lawrence and Hamilton Townships, Mercer County, and the Lawrence Township Conservation Foundation** should follow the Conservation Package to preserve a minimum 300 foot wide riparian buffer along the creek. (Pages 49-54)

2. Sponsors, namely the **Lawrence Greenway Committee and Hamilton Environmental Commission**, should take on the role of overseeing trail development in their municipalities between the county park, canal towpath, and Trenton Assunpink Greenway. (p. 48)

3. **Lawrence Township Greenway Committee, Hamilton Township Environmental Commission, and Mercer County Planning Division** should coordinate connections with the other five trails in the area. (p. 55)

IV. *Issue: Whitehead Dam has been breached and is continuing to fall apart. The dam's deterioration is easing flooding upstream, with no negative impacts downstream. The present situation is unsightly and unpredictable. The dam should either be fully repaired, partially repaired with a weir, or removed.*

Major Recommended Actions

1. **The Assunpink Watershed Association, Delaware Riverkeeper Network, D and R Greenway, Mercer County Division of Planning, Mercer County Division of Engineering, Ewing-Lawrence Sewage Authority and Lawrence and Hamilton Townships** should form a "Whitehead Dam Task Force" to develop and implement a restoration project for the Whitehead Pond area. The project should include a panel of experts in restoration ecology, hydrology, flooding and dam construction to determine the best solution for Whitehead Dam. (p. 40)

It is hoped that the *greenway planning process*, which involved numerous meetings with the public and conversations with public officials and residents, as well as the plan itself, will raise awareness and concern for the environmental, recreational and quality of life issues facing the Assunpink, as well as encourage residents, associations and local officials to seek creative and cooperative solutions *to close the Assunpink Greenway's Missing Link.*

Chapter 1
Introduction

Chapter 1
INTRODUCTION

Background

The study area for the *Assunpink Creek Greenway Missing Link Plan* extends between the Mercer County Park and the City of Trenton, where the creek forms the boundary between Hamilton and Lawrence Townships. This area was chosen for study because it is the missing link in what could ultimately be a continuous greenway system between the creek's headwaters and its mouth. In addition, this area provides the unique opportunity to connect two major recreational facilities: the Mercer County Park and the Delaware and Raritan Canal Towpath.

The entire Assunpink Creek is 25 miles long, beginning in Monmouth County and traveling westerly through rural, suburban, and then urban land, where it empties into the Delaware River at Trenton. The creek is serene and beautiful in spots, hidden and forgotten in patches, and sadly mistreated in places. Almost 200 years ago, significant funding was invested in attempting to make the Assunpink navigable, as part of a water trade route between Trenton and New Brunswick. That attempt was a failure, but was the seed from which the Delaware and Raritan Canal grew. Today, considerable funds and attention are again being paid to the Assunpink, but this time efforts are aimed at protecting the natural environment of the stream corridor.

Fortunately, land along half the length of the creek is already largely preserved in the Assunpink and Van Ness Wildlife Management Areas; in Mercer County Park and Tatum Park; in Hamilton Township owned streamside land; and in the Delaware and Raritan Canal Park and other state owned land. Several efforts are underway to protect remaining portions of the stream corridor. Washington Township is working to protect the Assunpink through the agricultural preservation program, a transfer of development rights program, and Green Acres funding. West Windsor Township is working with the Mercer County Planning Division to protect the remainder of the stream outside the county park. And the City of Trenton is actively working on reclaiming land along the Assunpink to create an urban greenway using Federal Emergency Management Agency (FEMA) and Green Acres funding. Formal establishment of a greenway through Lawrence and Hamilton Townships would complete the green link from the Assunpink's headwaters to its mouth. (See Map 1 on the following page.)

Trail provisions along this portion of the creek could connect the popular Mercer County Park and the Delaware and Raritan Canal towpath, and would also provide opportunities to connect with the proposed Trenton Assunpink Greenway, Delaware River Heritage Trail, Lawrence-Ewing greenway, Camden Amboy rail-to-trail, and Revolutionary War Trail, providing a very impressive trail network for Mercer County residents.

The purpose of this plan is two-fold: first, to recommend ways to protect the Assunpink Creek through Hamilton and Lawrence Townships using a variety a conservation tools; and second, to present the basis for a trail connection along this portion of the creek. Implementation of the greenway plan will help protect water quality, wetlands, floodplains, and wildlife habitat; it will enhance recreation by providing connections to and between Mercer County Park, the D&R Canal Park, and five other proposed trails in the area; and, because it is located in a heavily populated area, the greenway has the potential to be enjoyed and appreciated by many people.

Why a Greenway?

But why a greenway along the Assunpink? A greenway is like a ribbon of open space linking natural, cultural, and recreational resources together. Due to its linear nature, a greenway corridor passes through a variety of communities, connecting people to open space. It is the perfect response to preserve what is special about the Assunpink. A greenway established along the Assunpink can provide many benefits. It can preserve the environmental features in the area, and thereby provide natural protection from flooding, improve water quality and provide a hospitable corridor for wildlife migration. It can offer scenic relief from the urban landscape, preserve the integrity of historic sites and nostalgic places, and enhance people's enjoyment of the creek. As the common thread tying municipalities together, it can also improve intermunicipal communication and cooperation. In addition to these benefits, a greenway can raise individual property values as well.

Although it may sound like a tall order, a greenway implemented with community support really can provide all the benefits mentioned above. Realization of some of the benefits may be subtle, such as improved water quality over time. Other benefits are intrinsic, such as the protection of certain rare or endangered species. Still others may be taken for granted, such as a lack of flooding. Yet all these benefits can be generated from implementing the primary intent of the greenway: to create and maintain a clean, green open space buffer along both sides of the Assunpink Creek.

Assunpink Watershed

The entire Assunpink Creek watershed is 91 square miles and covers 11 municipalities in Mercer and Monmouth Counties. (See Map 2.) Land cover ranges from heavily urbanized in Trenton to suburban in most watershed townships to rural in the easterly municipalities. The Shabakunk, Little Shabakunk and Shipetauken Creeks in Lawrence Township and Miry Run in Hamilton are major tributaries flowing into the Assunpink within the study area. A number of impoundments exist along the Assunpink and its tributaries for flood control and recreational purposes.

One of the particular objectives of the greenway planning effort is to raise residents' awareness of greenway and water quality issues. Through an independent effort, an Assunpink Watershed Association (AWA) formed at the same time the greenway study was launched. Although the

ASSUNPINK CREEK GREENWAY STUDY

Map 1 – STUDY AREA

ASSUNPINK MISSING LINK STUDY AREA

MERCER COUNTY AND WEST WINDSOR TOWNSHIP GREENWAY EFFORT

WASHINGTON TOWNSHIP GREENWAY EFFORT

CITY OF TRENTON ASSUNPINK GREENWAY PROJECT

LAWRENCE

WEST WINDSOR

CRANBURY

MONROE

EWING

HIGHTSTOWN

EAST WINDSOR

TRENTON

HAMILTON

WASHINGTON

MILLSTONE

Roosevelt

Morrisville

FALLS

BORDENTOWN

Allentown

UPPER FREEHOLD

CHESTERFIELD

MERCER COUNTY PARK

VAN NESS WILDLIFE MANAGEMENT AREA

WILLIAM TATUM PARK

ASSUNPINK WILDLIFE MANAGEMENT AREA

ASSUNPINK WILDLIFE MANAGEMENT AREA

New Jersey Turnpike

Assunpink Creek

Shabakunk Creek

Delaware & Raritan Canal

Assunpink Creek Greenway

Parkland

0 .25 .5 1

Miles

The Assunpink Creek Greenway Project is a partnership between the Delaware Valley Regional Planning Commission and the Delaware and Raritan Greenway, Inc. For more information, please contact Patty Elkis, Greenway Project Manager at DVRPC: 215-592-1800.

Funding is provided by DVRPC and the Mercer County Green Links Project Implementation Grant, part of the NJ Urban Forestry Demonstration Project, NJDEP, Division of Parks and Forestry, State Forestry Services, Community Forest Program, and through a grant provided by the U.S. Forest Service and secured by Senator Bill Bradley.

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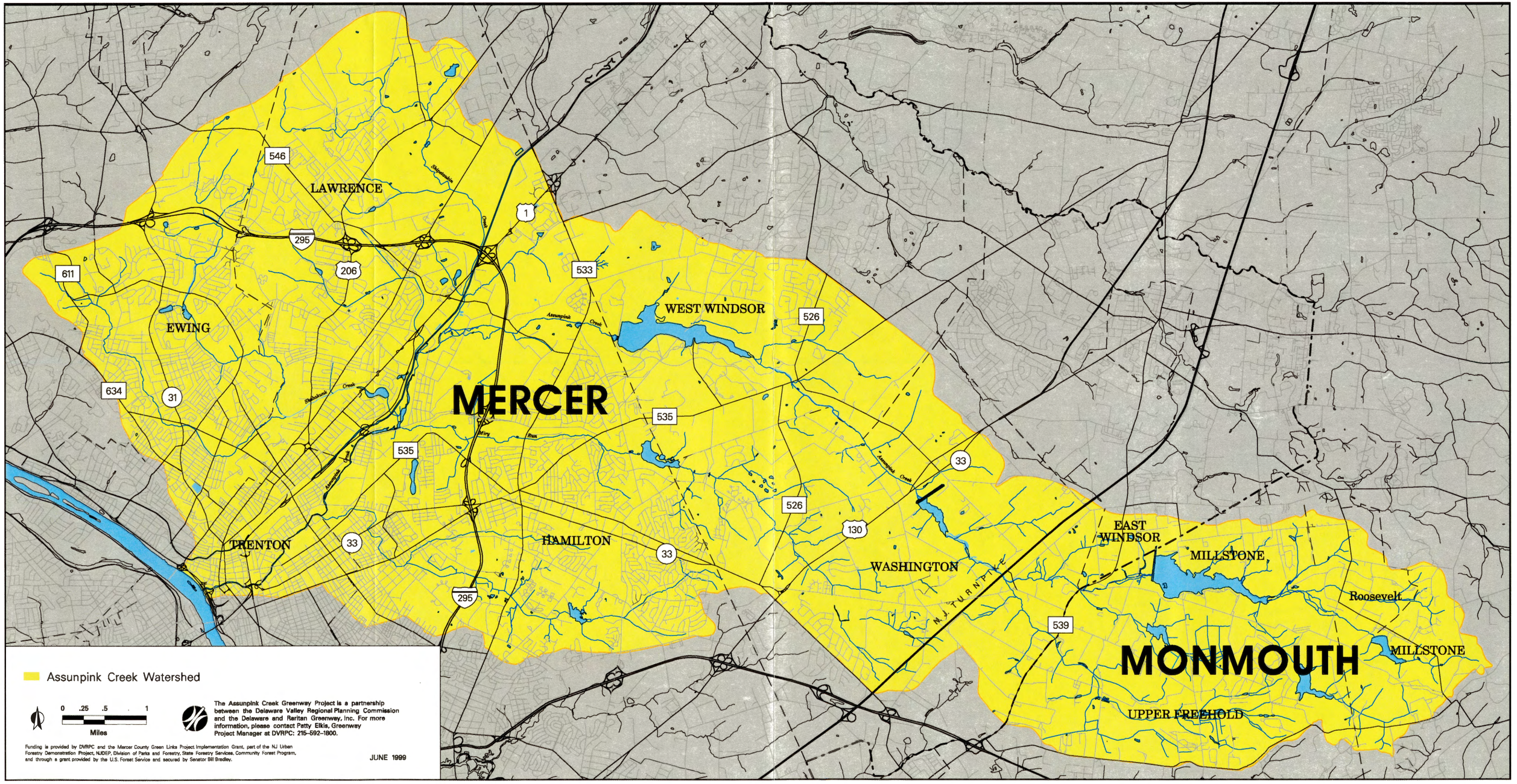
ASSUNPINK CREEK GREENWAY STUDY
Map 2 – ASSUNPINK CREEK WATERSHED



Assunpink Creek Watershed

0 .25 .5 . 1
Miles

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watershed association's territory of interest is much wider than the greenway study area, many of the issues and concerns are mutual. As many of the issues and recommendations of the Assunpink Creek Greenway Plan are pertinent throughout the watershed, the AWA can play an important role by spreading this information and advocating for broader implementation of the recommendations, as appropriate.

Study Purpose in Regional Context

The Assunpink Creek Greenway Missing Link Plan is a follow-up study to the Open Space Element of DVRPC's Year 2020 Land Use and Transportation Plan. The open space element within the plan identified areas throughout the region, such as the Assunpink Creek and other environmentally sensitive stream corridors, proposed for open space preservation to provide both natural resource protection and recreational opportunities. Although the nine-county region covered in the DVRPC plan contains more than 1.5 million acres of open space, only about 250,000 acres are currently protected as public parks. The Year 2020 Proposed Open Space Network (see Map 3) presents a proposed open space network sufficient in area to meet the region's recreational needs through the year 2020 and beyond. It also designates for protection woodlands and upland habitat areas that provide an environment for plants and animals, and the river and stream corridors and wetlands that supply clean water for drinking and habitat for fish, plants and other wildlife. This and other DVRPC greenway implementation plans are intended to be "how-to" guides, containing the necessary data base of information, analysis, community input, recommendations, and designated responsible parties to translate the broad goal of preserving open space into concrete implementation strategies.

Relationship to State, County and Local Plans

The intent of the *Assunpink Creek Greenway Missing Link Plan* is consistent with and supported by the 1997 New Jersey State Development and Redevelopment Plan Reexamination Report and Preliminary Plan (Reexam Report); the 1994 New Jersey Open Space and Outdoor Recreation Plan; the Mercer County Open Space and Recreation Plan, as amended August 5, 1998; the Mercer County Green Links Plan, and Lawrence and Hamilton Township open space plans.

In the 1997 Reexam Report, proposed planning goals and strategies reflected in the Assunpink Creek Greenway Plan include conserving the State's natural resources and preserving and enhancing areas with historic, cultural, scenic, open space and recreational value by using collaborative planning, design, investment and management techniques.

In the 1994 State Open Space and Outdoor Recreation Plan, one of the primary objectives is to preserve sufficient open space for current and future public use and to utilize the environmental protection amenities of open space to protect important natural and historic resources for the maintenance and enhancement of the quality of life in New Jersey. It is also the specific policy of

the State of New Jersey to establish a greenway network through cooperative regional initiatives with local governments and nonprofit land trusts and by legislative, planning and financial efforts.

County efforts also support preservation of the Assunpink Creek. Mercer County voters approved raising the county open space tax from one cent to two cents per one hundred dollars ($100) of assessed value, which is expected to provide about $4 million annually for open space acquisition and development of recreation facilities. The goals of the Assunpink Greenway Plan, namely to preserve the environmentally sensitive stream corridor and to provide recreational opportunities such as trails, boat launches and fishing spots that are compatible with the natural values of the greenway, are supported by the goals and objectives of the Mercer County Open Space and Recreation Plan.

In addition, the Assunpink Greenway Plan is consistent with the goals and objectives of the Mercer County Green Links Plan, produced by The Regional Planning Partnership (formerly known as MSM Regional Council). The Green Links Plan identifies green links throughout Mercer County that connect open space and cultural resources, including the Assunpink Creek Greenway study area. Mercer County Green Links Plan goals are reflected in the Assunpink Greenway Plan, such as promoting multi-functional links that connect people, wildlife, sites and communities within the county; improving the natural resource planning process through increased communication and coordination between the public, private and nonprofit sectors; and elevating awareness of the vital role that green infrastructure plays in building sustainable communities.

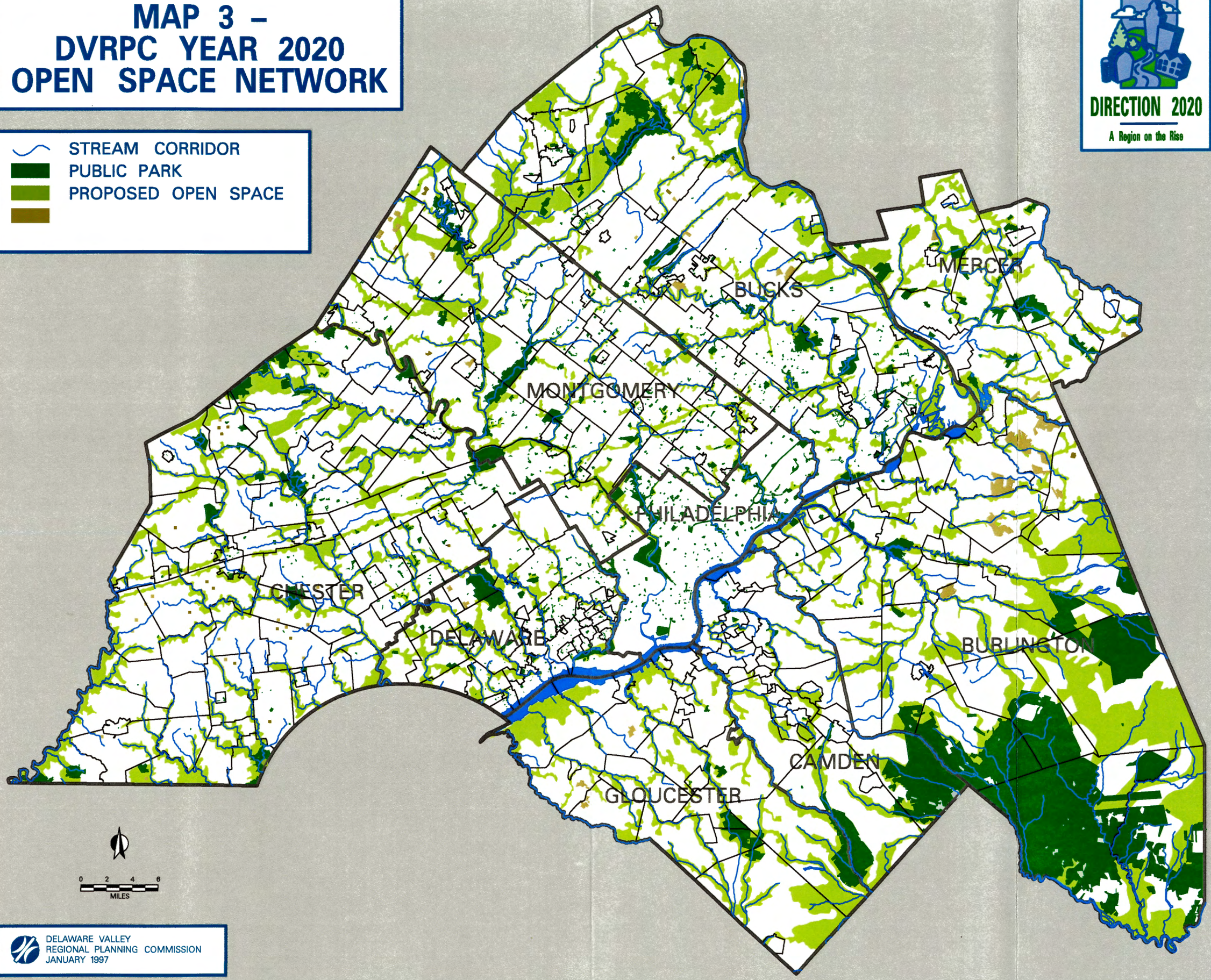
Both Lawrence and Hamilton Townships have recognized the importance of natural areas and have developed policies to protect them in their Master Plans. Lawrence Township's Master Plan Goals (1995) as they relate to the Assunpink Greenway include establishing a greenway network to preserve stream corridors, connect existing and planned open space parcels, and provide pedestrian and bicycle linkages in appropriate places; actively pursuing the protection of privately-owned environmentally sensitive land through fee simple acquisition, land trust dedication, conservation easement or other means during the development review process; and exploring ways to improve water quality of storm water runoff , such as the creation of a regional storm water management plan. In November 1999 Lawrence Township residents overwhelmingly voted for an open space tax of one cent per one hundred dollars ($100) of assessed value, which is estimated to raise about $230,000 per year. Collecting the tax makes Lawrence eligible for the Planning Incentive Program of Green Acres, which offers a 50% grant (instead of a 25% grant). See page 66.

Hamilton Township's Recreation Master Plan Map dates from 1980. Within the greenway study area, a neighborhood park between Laura and Evelyn Avenues and the Assunpink Creek, and one between Assunpink Boulevard and the creek, were proposed, but all lands are under private ownership and no action has been taken. More recently, the township has been focusing preservation efforts in the Trenton/Hamilton Marsh and Crosswicks Creek Greenway area with assistance from the Delaware and Raritan Greenway, Inc. and Mercer County. Presently, the township is creating a new map of publicly owned lands to be used for open space planning purposes throughout the municipality, including the Assunpink Creek Greenway area. Hamilton voters rejected a proposed 5 cent/$100 assessed value tax for open space in 1998.

MAP 3 – DVRPC YEAR 2020 OPEN SPACE NETWORK

DIRECTION 2020
A Region on the Rise

STREAM CORRIDOR
PUBLIC PARK
PROPOSED OPEN SPACE



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MILES

DELAWARE VALLEY
REGIONAL PLANNING COMMISSION
JANUARY 1997

Greenway Planning Partners

The Assunpink Creek Greenway Project is a partnership between DVRPC, the Delaware and Raritan Greenway, Inc. (D and R Greenway), a steering committee comprised of representatives from Hamilton and Lawrence Townships, Mercer County Planning Division, the Delaware and Raritan Canal Commission, the Assunpink Watershed Association, New Jersey Green Acres Program and New Jersey Office of Natural Lands Management, the Lawrence Township Conservation Foundation and Friends of the Lawrence Greenway, the Delaware Riverkeeper Network, municipal staff from adjacent communities of Trenton and Washington Township, and residents of the area.

Greenway Planning Process

The Assunpink Creek Greenway Project involved extensive mapping, data collection and analysis, inter-agency coordination and public meetings and outreach.

Mapping

Mapping involved creating a base map of all streamside parcels and nearby parks in the DVRPC geographic information system (GIS), and utilizing the GIS to show land use, natural features, ownership, historic resources, type of open space, composite zoning, and areas proposed for conservation and trails. These maps are included in the report and were critical to the planning analysis and to depict the study area at meetings with the Assunpink community.

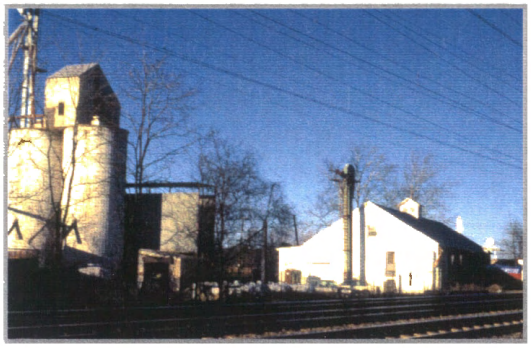
Data Collection and Analysis

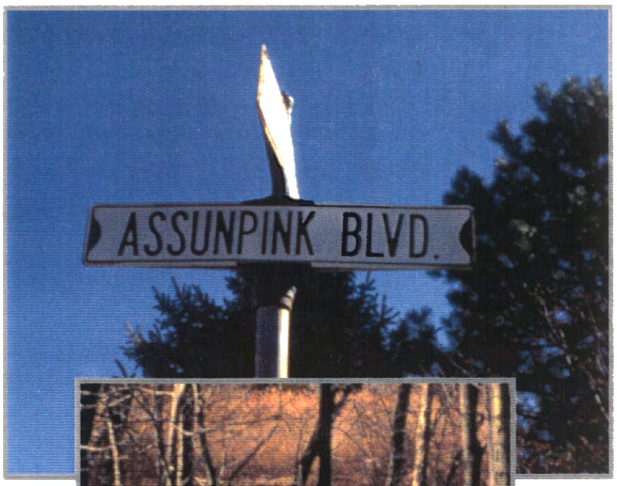
Data on environmental conditions (water quality, flooding conditions, rare species), land use (existing and anticipated changes), recreational facilities (parks, trails, boating, fishing), historic resources, and plans and regulations concerning the area were researched and analyzed.

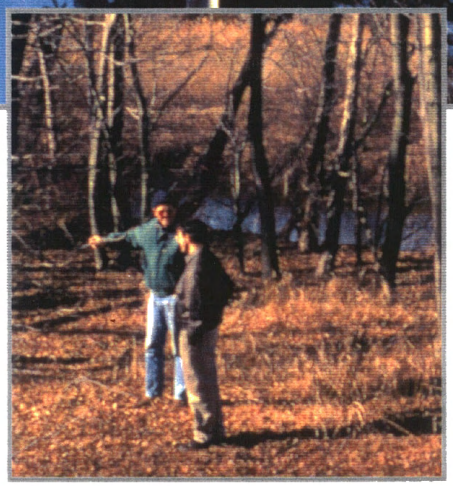
Inter-agency Coordination and Public Outreach

Public input from residents and coordination with municipal, county, state agencies and private organizations were important components of the plan's development. Introductions to the Assunpink Greenway Plan were made to the Lawrence and Hamilton Township Planning Boards and to the Lawrence Township Conservation Foundation. Several meetings were held with the Assunpink Watershed Association and the steering committee. Two public meetings were held; the first in January of 1998 to present initial findings about the study area and to elicit feedback on concerns and issues from local residents and municipal officials; the second in March of 1999 to present the preliminary recommendations, and again hear feedback. Recommendations were also presented to the Lawrence Township Planning Board in March and the Hamilton Township Environmental Commission in May of 1999. Comments from each of the meetings, as well as from numerous conversations with streamside land owners and county and municipal officials and the other steering committee members were incorporated into this final plan, with the intent that the plan and its recommendations represent a consensus on what needs to be done to establish a greenway along the Assunpink.

Chapter 2
Land Use, Zoning and Ownership Patterns along the Assunpink Missing Link







Chapter 2
LAND USE, ZONING AND OWNERSHIP PATTERNS along the ASSUNPINK MISSING LINK

Land Use

Map 4 - Land Use was created by interpreting aerial photography taken in 1995 into seventeen land use categories. For the Assunpink, it shows that the predominant land uses are single family residential and woodlands. Industrial uses are found in Lawrence and Hamilton bordering Trenton, and commercial uses are generally found on Route 1 and on Quaker Bridge Road. With the exception of the industrial uses near Trenton, a wooded buffer hugs both sides of the creek in the remainder of the study area. The significant open lands in the study area are Bear Swamp (what looks like butterfly wings at the cross of Route 295 and the railroad); the Delaware and Raritan Canal lands and the Van Ness Wildlife Management Area. The Mercer County Park, just outside the study area to the east, protects about 3 miles of streambank and lakeside land. Only a few residential areas border the creek, the Whitehead Manor and Cornell Heights neighborhoods in Hamilton, and the Lawrence Square Village Apartments in Lawrence. Several tree farms, nurseries and mulching industries border the creek in the Baker's Basin and Basin Road area.

Zoning

Map 5 - Type of Zoning shows that most of the study area is zoned "Conservation" or "Industrial". The Conservation zoning in Hamilton permits farms, parks, recreation, conservation and detached homes on minimum lots of 5 acres. Five vacant, privately owned parcels in the study area are zoned Conservation, limiting their development potential. Lawrence Township's Conservation District permits municipal uses, parks, recreation and farming, and also contains a maximum impervious coverage limit of 15% for municipal uses and parks, 10% for farmsteads, and 5% for agriculture. All the parcels zoned for Conservation within the study area in Lawrence are either already publicly owned open space, or non-conforming (developed) uses.

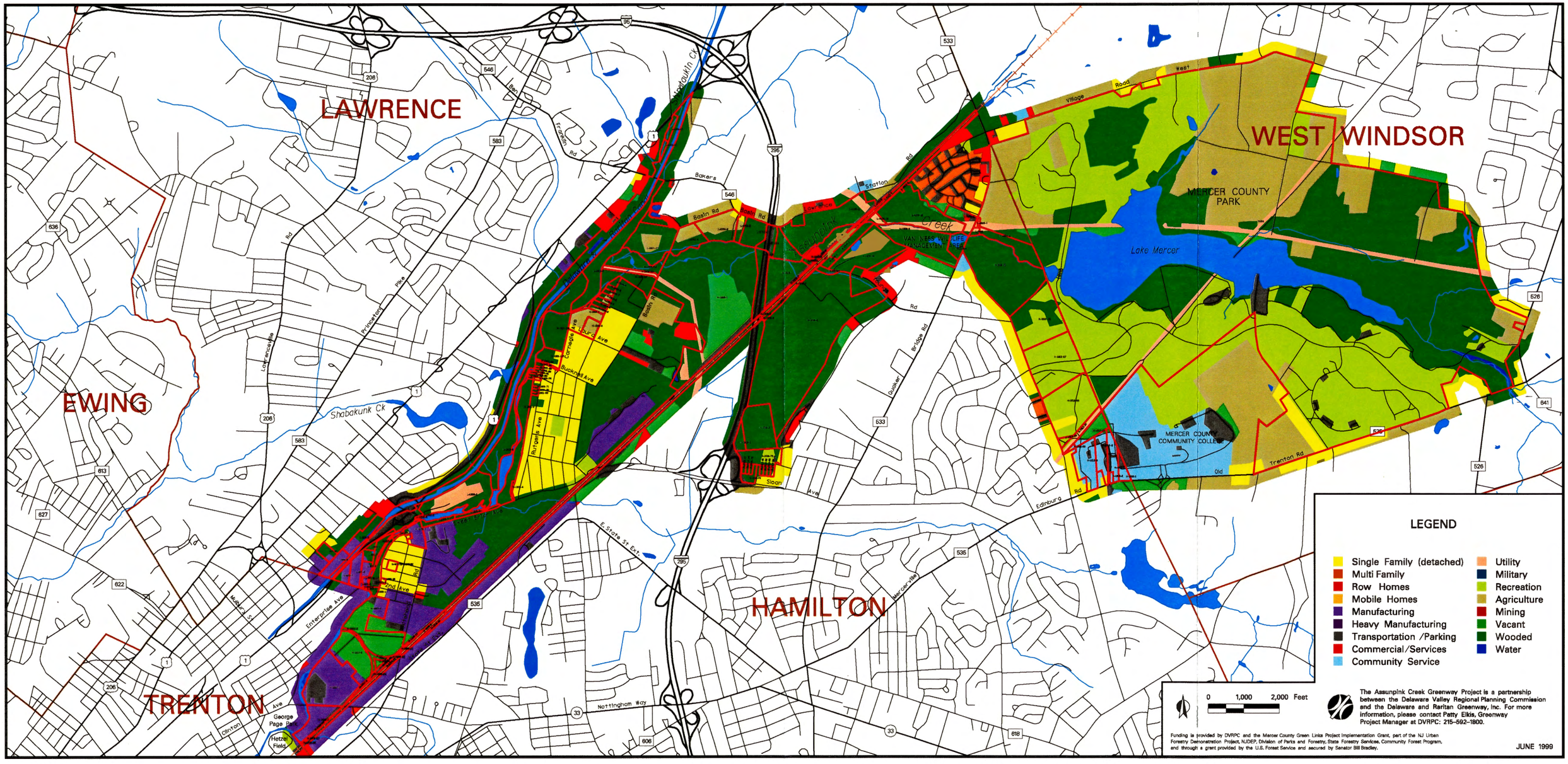
Lawrence has two different industrial districts in the study area; Limited Industrial - 1, along Baker's Basin Road, allowing offices, labs, manufacturing, residential and agricultural uses, and limiting impervious coverage to 5% for residential and 30% for non-residential uses. The Limited Industrial - 2 District near the Trenton border permits industrial parks and individual industrial uses, and allows up to 75% impervious coverage. Hamilton Township zones the area near Youngs Road and the railroad tracks Manufacturing, and the area close to Trenton, Industrial. Both districts are similar in that they permit up to 50% impervious coverage, and floor area ratios of 0.25.

Ownership and Open Space

As shown on Map 6 - Type of Ownership, about 60% of the land in the study area (not including Mercer County Park) is in public ownership, 5% in quasi-public ownership (utilities and homeowner association land) and 35% is in private ownership. About 75% of the streamside land is undeveloped (see Map 7 - Type of Open Space). Having so much streamside land in open space *and* in public ownership lends itself nicely to the prospects for completing the greenway. Of the open lands, 16% are parkland (not including Mercer County Park, which is outside the study area), 43% are community open space (generally publicly or quasi-publicly owned land that is not as accessible as parkland), 6% is farmland and 11% is vacant.

ASSUNPINK CREEK GREENWAY STUDY

Map 4 – LAND USE



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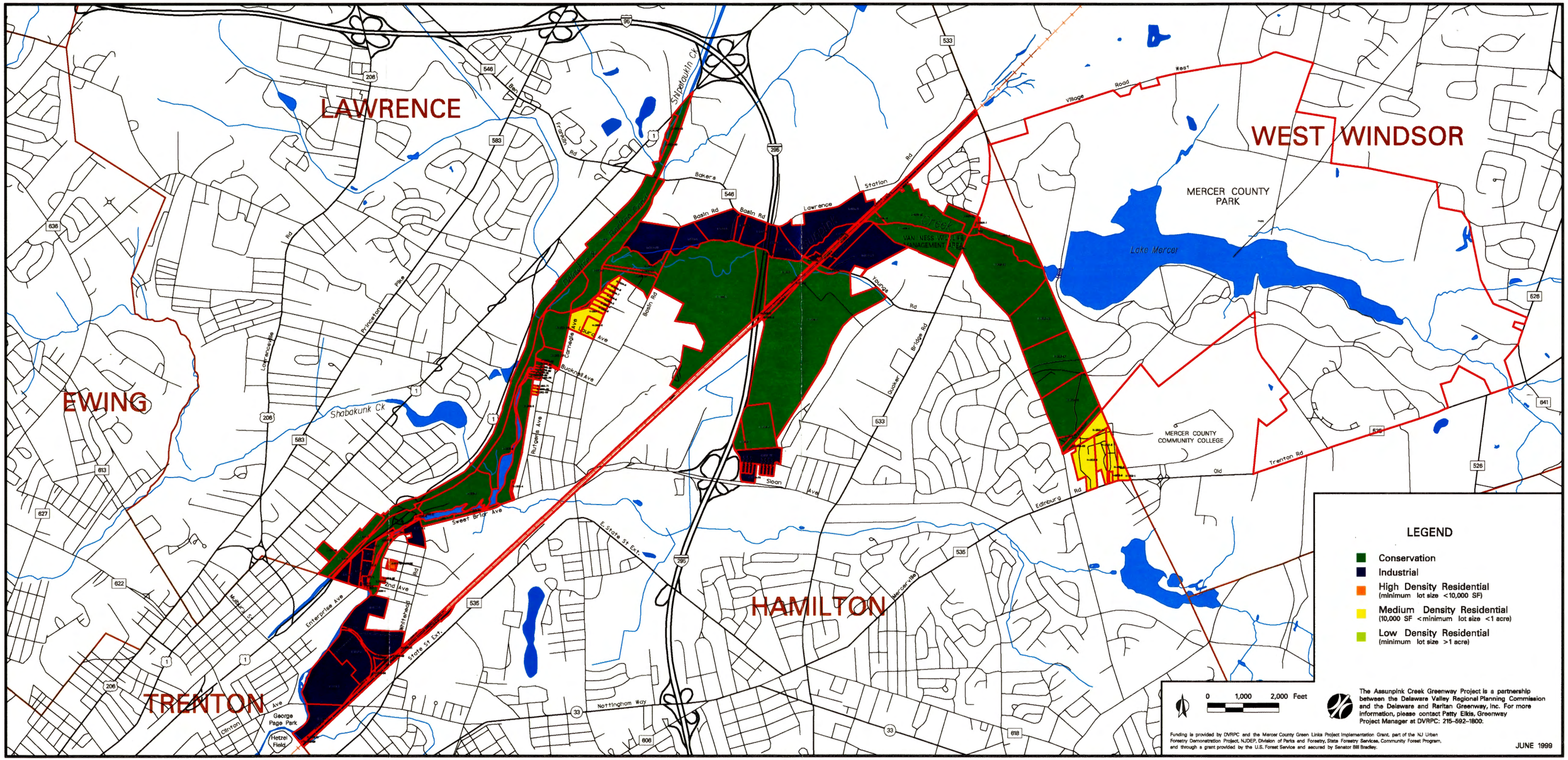
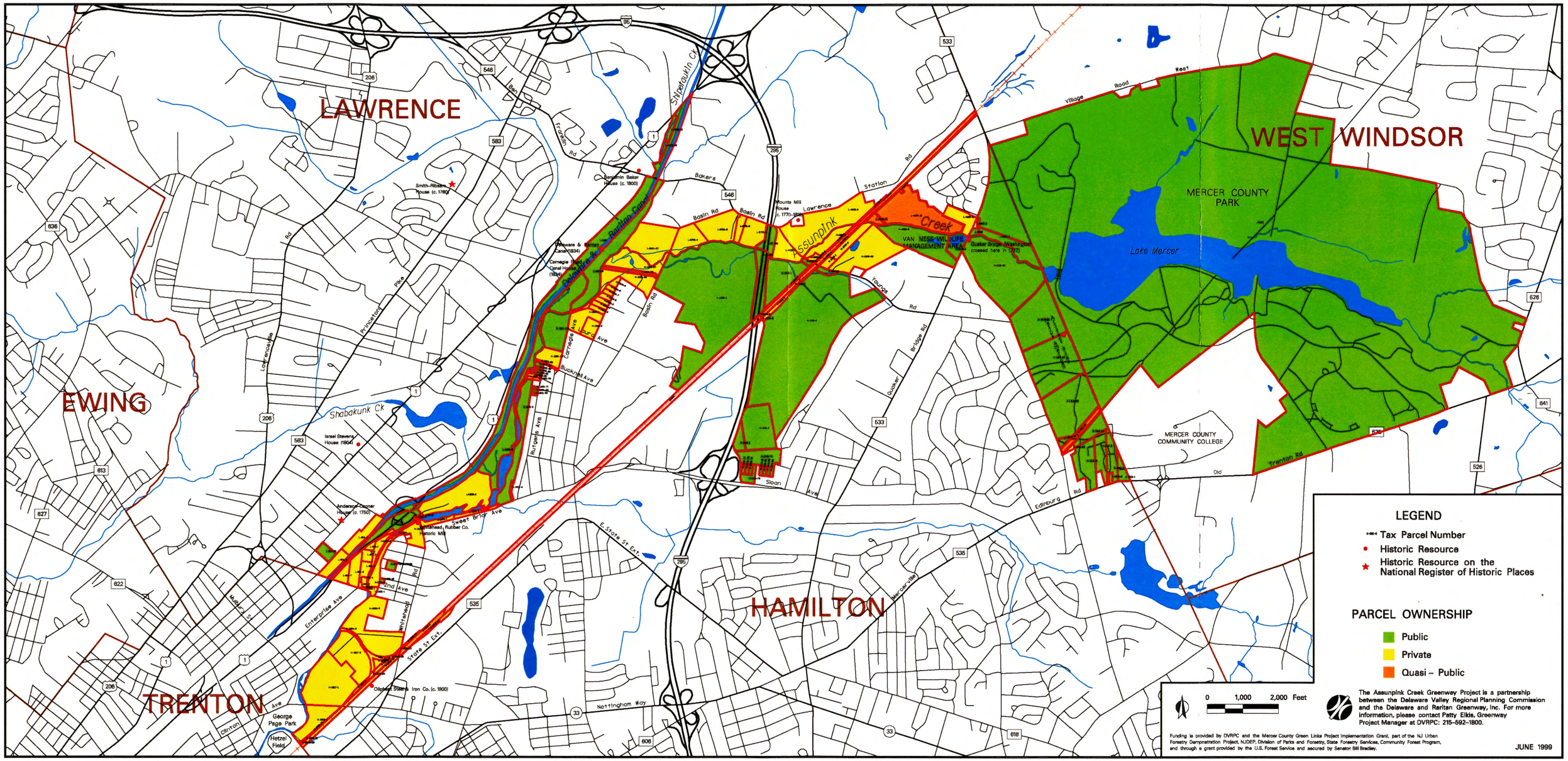
ASSUNPINK CREEK GREENWAY STUDY

Map 5 – TYPE OF ZONING



ASSUNPINK CREEK GREENWAY STUDY

Map 6 – TYPE OF OWNERSHIP



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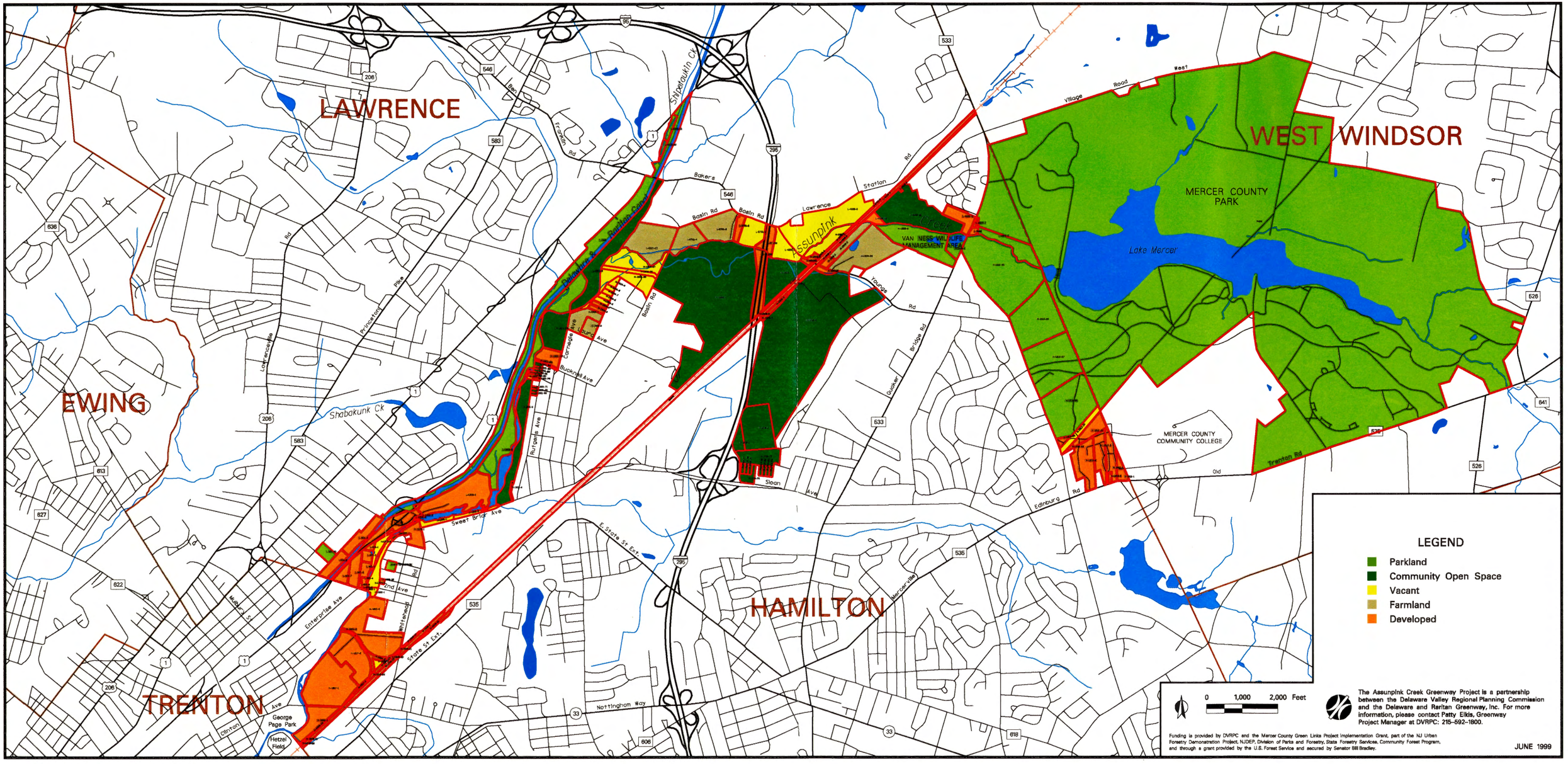
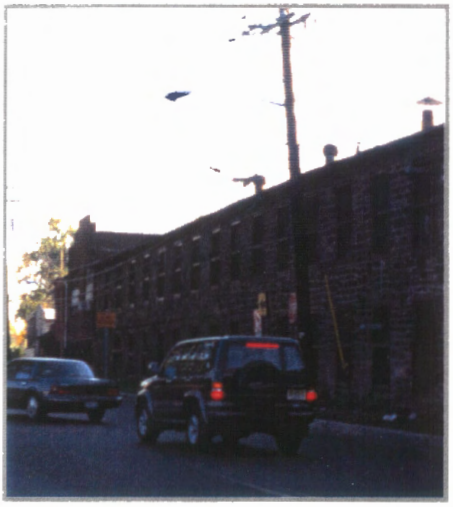
ASSUNPINK CREEK GREENWAY STUDY

Map 7 – TYPE OF OPEN SPACE



Chapter 3
Historic and Recreation Resources



Chapter 3
HISTORIC and RECREATIONAL RESOURCES

History and Historic Resources

The Assunpink Creek played a role in the Revolutionary War, especially during the "Ten Crucial Days". On December 8, 1776, the British occupied all of New Jersey and it looked like the Revolutionary War was over. By January 3, 1777, the British occupied only New Brunswick and Perth Amboy, and the Americans controlled the rest of the state. By the summer of 1777, not a single British soldier remained in New Jersey. The tide started to turn for the Americans during the "Ten Crucial Days" from December 25, 1776 to January 3, 1777. General Washington's army won the First Battle of Trenton over a supposedly invincible army on December 26, 1776. Then the Americans occupied the south bank of the Assunpink Creek in Trenton and used the creek as a barrier. The British charged the bridge over the Assunpink in Trenton three times during the Second Battle, on January 2, 1777, but the Americans successfully resisted. Realizing the British could cross the Assunpink farther upstream and come back to corner them against the Delaware, the American's took the offensive and made their way to Princeton to attack the British from behind. (www.barracks.org) "Quaker Bridge" is the site where General Washington and his army crossed the Assunpink the night before their victory at the Battle of Princeton on January 3, 1977. A stone monument marks the event today.

Structural historic resources in the Assunpink Missing Link vicinity are shown on the Map 6 - Type of Ownership Map on page 15. The most significant historic resource in the area is the Delaware and Raritan Canal, constructed to provide a fast, safe route between Philadelphia and New York City. The canal was begun in 1830 and completed 4 years later at an estimated cost of $2,830,000. The canal was one of America's busiest navigation canals for most of the century it operated. By the end of the 19th century, the speed and power of railroads overtook the popularity of the canal. The year 1932 was the canal's last shipping season. After it closed, the State of New Jersey took over the D&R Canal and rehabilitated it to serve as a water supply system. In 1973 the canal and its remaining structures were entered on the National Register of Historic Places. By 1974 over 60 miles of the canal and a narrow strip of land on both banks were made into a state park. (D&R Canal State Park brochure, NJ Division of Parks and Forestry, State Park Service)

Another noteworthy historic structure in the study area is the mill building in Hamilton Township at Whitehead Road. John Whitehead and Sons manufactured woolen goods at the original mill, which was destroyed by fire in 1852. That led to the erection of the present structure, which continued to produce woolen goods, including Union soldiers' uniforms during the Civil War. In 1870 the firm switched to the manufacture of rubber. Goodall Rubber Company bought the plant in 1925. Another company currently owns the mill complex. If at some point in the future the buildings are no longer used for manufacturing, the buildings would make an ideal historic interpretative center.

There are also at least five historic houses, including two on the National Register in Lawrence Township, near the study area. Many more historic resources occupy the banks of the Assunpink downstream in the City of Trenton, including a 19th century Afro-American burial ground.

Parks, Community Open Spaces and Trails

Mercer County Park, about 2600 acres, anchors the east side of the greenway study area and provides active ball fields, picnic areas, boating in Mercer Lake, a golf course, and an extensive trail network on the southern side of the lake. Continuing the park trail along the northern edge of Lake Mercer would allow bikers and hikers to do loops around the lake. Van Ness Wildlife Management Area, 103 acres, adjacent to Mercer County Park, provides hunter education classes and a trail on both sides of the creek connecting the dam at Mercer Lake with the area's entrance on Hughes Road. The Van Ness parcel on the west side of Quaker Bridge Road has a short trail several hundred feet in from the bank parking lot that is used by local fishermen.

The Lawrence Square Village Condominium Association owns a 38 acre tract of deed restricted open space along the creek between the small shopping center on Quaker Bridge Road and the railroad. This common open space area does not have any formal access to the creek, although there is a dirt path blazed from Joyner Court to the creek paralleling the railroad tracks.

The large open space areas appearing as butterfly wings at the cross of Route 295 and the railroad is known as Bear Swamp. This 375 acre wet area is owned by Hamilton Township. The triangular parcel in between (21 acres) was recently acquired by the township from a church that ran a camp retreat there, before it burned down over 20 years ago. Only the southern portion by Sloan Avenue is developed into parkland. The remainder has no public access, although trails exist on the western side leading from Basin Road to the power line easement.

As shown on Map 6 -Type of Ownership, much of the streamside land on the Hamilton Township side (about 41 acres), down to Sweet Briar Road, is owned by the Township, although it is not parkland. The large strip parallel to Rutgers Avenue is behind houses, with access points at the end of intersecting streets.

The Delaware and Raritan Canal Commission and New Jersey Department of Transportation own the open land between Baker's Basin Road and the Shabakunk Creek confluence with the Assunpink on the Lawrence side. The D&R towpath along the main canal goes from Trenton at Mulberry Street all the way to New Brunswick, and may be used by hikers, bikers and equestrians. Canoes, kayaks and small boats may be launched at any of the access points, and fishing is permitted the entire length of the canal. Trout are stocked at certain locations in early spring.

Areas like the Mercer County Park, Van Ness Wildlife Management Area, Bear Swamp and the D&R Canal Park not only provide natural area protection and recreational opportunities on their own, but as part of the greenway they are like anchors. These parks and large open spaces become

the resources that the rest of the greenway serves to link. For example, with respect to providing a hospitable corridor for wildlife, the greenway open space buffer along the creek provides the migratory corridor and the anchors provide the stopping grounds. In addition, the presence of large publicly owned lands ensures that significant open spaces will remain in an otherwise suburbanizing environment.

Only about 25 streamside parcels within the study are privately owned. Chapter 5 - The Conservation Package and Opportunities for Trail Connections on page 43, recommends options on conserving these lands. Options range from providing good stewardship information to interested streamside landowners, to seeking conservation easements, to acquisition. All conservation efforts will be voluntary, and occur piecemeal, overtime, as opportunities with willing landowners arise.

Fishing along the Assunpink Missing Link

The Assunpink Creek study area hosts three fishing spots stocked with trout at Quakerbridge Road, Youngs Road, and Carnegie Road. Whitehead Pond used to be stocked with channel catfish, but, according to a biologist with the NJ Division of Fish, Game and Wildlife, it will probably be taken off the hatchery's stocking list due to the changing conditions caused by the breached dam (telephone conversation with Pat Hamilton, March, 1999). The study area of the creek also harbors a fairly diverse assemblage of warm water fish. See the box below:

FISH FOUND in the ASSUNPINK CREEK MISSING LINK

Quaker Bridge Road	Youngs Road	Whitehead Pond
American eel	Redbreasted sunfish	White Sucker
White sucker	American eel	Carp
Golden shiner	Chain pickerel	Chub sucker
Redbreasted sunfish	White sucker	Goldfish
Tesselated darter	Pumkinseed	Brown bullhead
Chain pickerel		Large-mouth bass
Pumkinseed		Pumkinseed
Brown bullhead		Redbreasted sunfish
Fallfish		Golden shiner
Mudminnow		Grass pickerel
		Bluegill sunfish
		Black crappie

Source: NJ Division of Fish, Game and Wildlife, electrofishing data from 1971, 1972 and 1989

Canoeing the Assunpink

Several residents who attended the greenway public meetings, as well as members of the Assunpink Watershed Association and the steering committee have canoed the Assunpink and reported it to be a fun and worthwhile trip. A 1992 book titled Garden State Canoeing - A Paddler's Guide to New Jersey, by Edward Gertler, gives a trip description for the Assunpink between Route 130 and the mouth. The description says the trip from Route 130 to Whitehead Road is, "*surprisingly,* a mostly attractive canoe route". Between Mercer Lake Dam and Quaker Bridge Road is described as a "wild swamp passage". Below Quaker Bridge Road, "civilization begins to close in", but this segment is also described as easy and scenic, due to the wooded buffer. Beyond Whitehead Dam, the author warns that the segment is for the curious and adventurous, and that it could even be dangerous. This proved to be true for Michael Aaron Rockland, who wrote about his outdoor urban adventures in Snowshoeing through Sewers (1994). In his book, Rockland canoes from New York to Philadelphia, describing the Central Jersey to Philadelphia segment of his trip in a chapter titled, *Deliverance*. After a pleasant ride down the D&R Canal, he and a friend enter the Assunpink in Trenton, where the canal goes underground for more than a mile. Their adventures take off when they find themselves in a channelized waterway surrounded by graffiti-covered factories, artfully dodging discharge pipes sputtering steam or oozing smelly brown liquid. Above the gorge, three kids begin pelting them with rocks and other miscellaneous debris, with apparent intent to seriously maim. Only when a factory building built right up to the creek's edge prevents the kids from following them did they think they were safe, until they reached the turbulent entrance to a long, dark tunnel. They emerge on the other side unscathed, recommending hard hats and lantern helmets for any future trips. Canoeing this segment of the Assunpink is clearly only for those seeking to live dangerously!

TIPS on CANOEING the ASSUNPINK

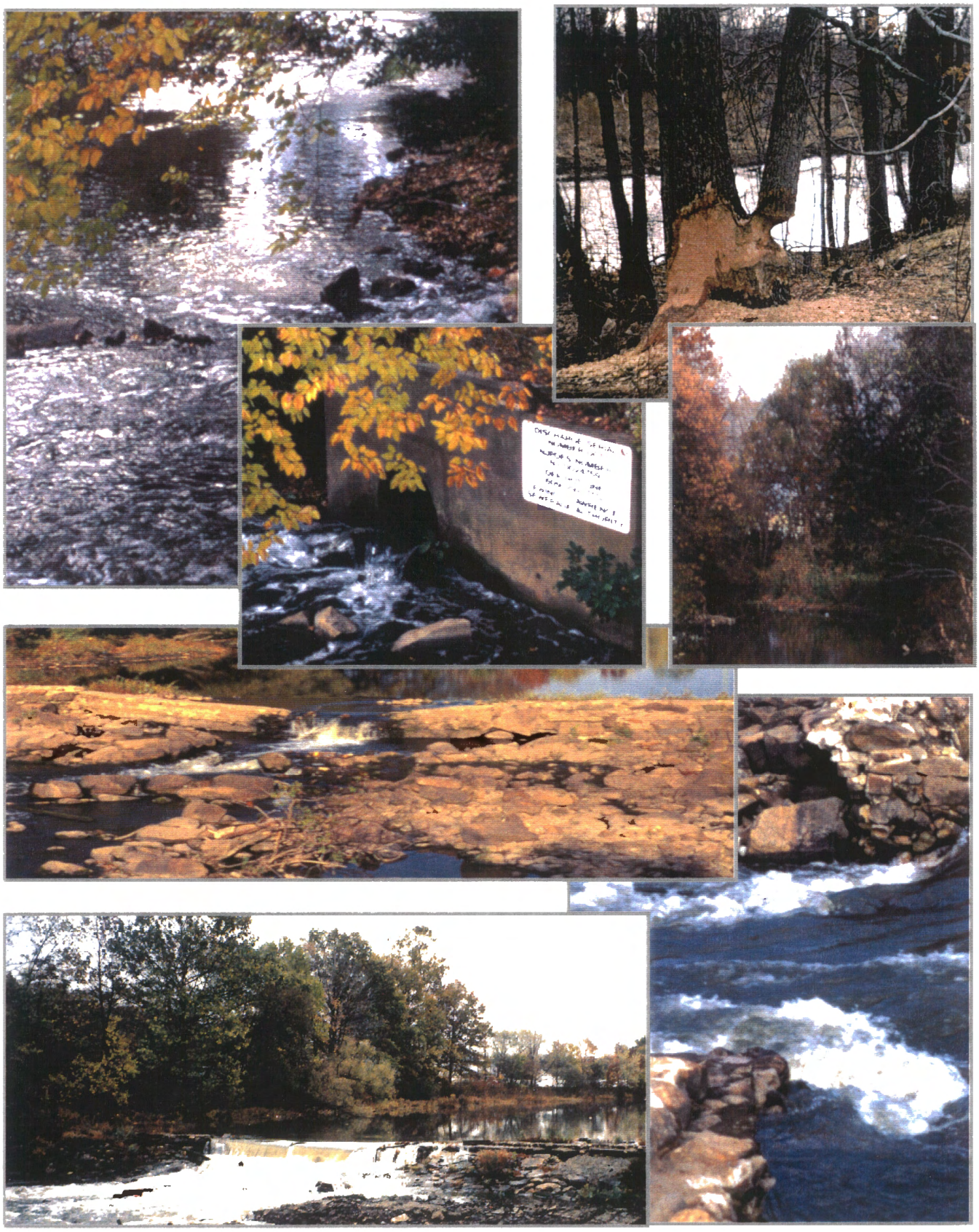
Best Times: High water is generally from November through April.

USGS Gauging Stations: In Van Ness off Hughes Drive - should read at least 4.3 feet; and at Chambers Street in Trenton - should read at least 3.7 feet.

Obstacles and Hazards: Dam at Lake Mercer - portage around structure; Sloping chute above Youngs Road - portage; the dam at Whitehead - portage. Lack of portage areas within Trenton commit canoers to continue through channelized sections with high walls, long tunnels and culverts, so avoiding high water periods and bringing equipment such as hardhats, lantern helmets, ropes and saws is recommended.

Sources: Edward Gertler, Garden State Canoeing - A Paddler's Guide to New Jersey, The Seneca Press: Silver Spring, MD: 1992, and Michael Aaron Rockland, Snowshoeing through Sewers, Rutgers University Press: New Brunswick, NJ, 1994.

Chapter 4
Environmental Conditions and Regulations Impacting the Assunpink Greenway



- Chapter 4 -
ENVIRONMENTAL CONDITIONS and REGULATIONS IMPACTING the ASSUNPINK GREENWAY

Stream Water Quality

The water quality of a creek such as the Assunpink is affected by two forms of pollution, point and nonpoint. Examples of point sources are sewage treatment plants or industries that discharge directly into a stream. Less obvious are the nonpoint sources, pollution that does not come from any one specific place but enters the stream after flowing over or under land within the watershed. A watershed is all the land that water flows across or under on its way to a particular stream. On its way, water travels over the surface of parking lots, streets, suburban lawns and farm fields, or it seeps into the soil and travels as ground water. Either way, water picks up pollutants such as sediments from construction projects, toxins from pesticides, and pathogens from human or animal fecal matter, and delivers them to the stream.

Water quality along the Assunpink has been monitored by at least three sources, the NJDEP, a team of biology professors from the College of New Jersey, and citizens working with the Delaware Riverkeeper Network.

New Jersey Department of Environmental Protection Water Quality Data
Through a cooperative arrangement, the New Jersey Geological Survey (NJGS) maintains detailed records of about 50 water quality parameters sampled and analyzed by NJDEP staff. Monitoring takes place at two sites on the Assunpink, at Clarksville (250 feet upstream from Quaker Bridge Road) and at Trenton (1.5 miles from the mouth, near Chambers Street bridge). Sampling at the two stations was not conducted on the same dates, but results from sampling events during equivalent months were chosen to be shown here for comparative purposes. Other noteworthy sampling events are also mentioned in the interpretation. Of the fifty parameters recorded, seven common measures have been selected for review here:

	11/96	6/97	11/95	6/96
Parameter		Clarksville		Trenton
pH	7.0	6.8	7.6	6.9
Dissolved Oxygen mg/l	10.2	7.4	10.7	6.5
Fecal Coliform MPN/100ml	110	20	790	>14000
Dissolved Chloride mg/l	11	14	23	9.1
Total Nitrogen mg/l	1.0	1.5	2.3	2.2
Total Phosphorus mg/l	.04	<.01	.2	.35
Lead ug/l	<1	NA	2	23

Overview of New Jersey Department of Environmental Protection Regulations and Recommendations Regarding Stream Water Quality

The New Jersey Department of Environmental Protection governs the protection and enhancement of the state's water resources through a number of water pollution control rules, regulations and programs. To more effectively administer the management needs of the state's water resources, DEP is currently shifting away from planning regions based on political boundaries toward planning regions based on watershed boundaries. Toward this end, DEP developed a Draft Statewide Watershed Management Framework document, which delineates watershed boundaries and proposes a phased, prioritized schedule for implementing watershed management activities throughout the state. The Assunpink Creek is in Area 11 - Central Delaware Tributaries. It is not one of the priority watersheds currently undergoing or planned to undergo study in the near future.

Management of water quality in the state's waterways is based on established water quality standards. These standards designate the use or uses to be made of the water and then set criteria and policies necessary to protect the uses, as well as the existing higher quality of some of the state's waterways. The Surface Water Quality Standards (N.J. A.C. 7:9B) as amended, April 1994, classify streams by their level of degradation, salinity, and their use, and establish procedures for limiting effluent discharges by stream classification. The entire Assunpink Creek is classified by the state as FW2-NT meaning freshwater class 2 - non-trout. Designated uses of FW2 classified waters include 1) maintenance, migration and propagation of the natural and established biota; 2) primary and secondary contact recreation; 3) industrial and agricultural water supply; 4) public potable water supply after such treatment as required by law or regulations; and 5) any other reasonable use.

New Jersey DEP operates a number of programs designed to regulate point and nonpoint sources of water pollution. The New Jersey Pollutant Discharge Elimination System (NJPDES) program regulates facilities and activities discharging or releasing pollutants into the surface or ground waters of the state. DEP is undertaking a major initiative to update and improve the NJPDES program, for the first time since it was delegated to the state in 1982, by moving to a watershed cycle for the issuance of discharge-to-surface water permits. The Stormwater Permitting Program requires facilities to prepare and implement a stormwater pollution prevention plan that eliminates all exposure between stormwater and industrial materials/activities, where such exposure is a major contributor to water pollution. A new NJDEP program integrates wetland protection and stormwater management by including wetlands in the definition of "surface waters" and proceeding to establish water quality requirements that must be met before stormwater can be discharged within a wetland or wetland buffer area. These requirements focus on mechanical methods for removal of solids from the stormwater. In addition, DEP and other government agencies cooperatively developed a *Stormwater and Nonpoint Source Best Management Practices (BMP) Manual* to provide detailed guidance on both preventing and reducing stormwater runoff that contributes so much to the nonpoint source pollution plaguing the state's waterways.

The New Jersey Department of Environmental Protection monitors and assesses water quality to establish baseline conditions, determine trends, and identify solutions to or further study water quality problems. A cooperative arrangement between the NJDEP and USGS provides a network of 78 nontidal sampling sites designed to assess whether streams are meeting their aquatic life use and primary contact (swimming) use support designations. Ambient chemical monitoring is now extensively supplemented by biological assessments of in-stream benthic macroinvertbrate communities. These communities are examined using USEPA's Rapid Bioassessment Protocols. From this, evaluations regarding the overall health of instream biota are estimated. These biological assessments are useful in directly assessing the aquatic life support designed use, as well as revealing the affect of toxic contaminants, and detecting chronic water quality conditions which may be overlooked by the short-term view provided by ambient chemical sampling. The bioassessments have been performed for all the major watersheds, including the Assunpink. Other monitoring activities include Compliance Monitoring, a continuing program, performed by the Water Compliance and Enforcement Program, of 24 hour compliance sampling at selected NJPDES facilities throughout the state to determine their compliance with permit conditions.

According to the NJ 1996 State Water Quality Inventory Report, recommendations for improving water quality in the state's waters include efforts to:

A. *Increase water quality monitoring activities.* As monetary support continues to be tenuous, a commitment should be made by the state to at least support the existing network of monitoring stations. It is also recommended that a broad-based intensive-survey monitoring program be implemented in the state, designed to supplement the existing ambient monitoring network. Unlike the fixed system, this intensive system would identify 1) specific sources of water pollution 2) the assimilation or removal of pollution by the stream environment, and 3) the effectiveness of specific water pollution control activities at a level of detail that is necessary to support watershed-based management activities. A critical aspect of this intensive work would be to support modeling directed to determine the assimilative capacity of the waterbody based on Total Maximum Daily Loads (TMDLs).

B. *Improve water quality through the implementation of Total Maximum Daily Loads (TMDLs).* Efforts should be made to have all pollutant limitations (point and nonpoint) based upon the water quality standards applicable to the respective receiving waters and the water's assimilative capacity.

C. *Control nonpoint source pollution more effectively.* NJ lacks a comprehensive framework for controlling NPS pollution, especially with regard to existing land uses. Failure to effectively implement such controls through a watershed-based approach will likely result in the failure of NJ efforts to attain and maintain compliance with water quality objectives.

Source: NJDEP NJ 1996 State Water Quality Inventory Report

PARAMETER INTERPRETATION

pH - is a measure of acidity or alkalinity. Values above 7 signify alkalinity, and values below 7 indicate acidity. For FW2 streams such as the Assunpink, values should be between 6.5 and 8.5. The pH levels were normal at both sampling locations.

Dissolved Oxygen (DO) - is necessary for respiration of aquatic plants and animals. The amount of oxygen dissolved in the water is one of the best indicators of the health of the water resource. Levels fluctuate during a 24 hour period, and also vary at different temperatures and levels of salinity - as temperature and salinity rise, dissolved oxygen falls. Since the criteria for FW2 streams is > 4.0 mg/l at any one time, overall water quality based on dissolved oxygen was very good at each sampling event. Little or no dissolved oxygen indicates unhealthy water, often due to excessive organic enrichment which causes algae blooms, or eutrophication, at the expense of other aquatic life.

Fecal Coliform- measures the level of bacteria in the water. For FW2 streams, levels should not exceed 200/100ml. Very low bacterial levels were recorded at Clarksville, but high levels were recorded at Trenton. The June 1996 sampling event at Trenton showing greater than 14,000 /100ml indicates extremely poor sanitary quality, probably due to municipal and industrial wastewater contributions to the creek, as well as nonpoint sources.

Chloride - is a salt usually associated with snow removal and salt treatment of icy roads. Levels should remain below 230 mg/l for FW2 streams. The samples taken indicate that chloride concentrations are well within the accepted range for the Assunpink Creek's classification. Even

the highest reading of 100 mg/l at the Trenton site in February 1996, possibly taken after a snow storm treated with road salts, is considered acceptable.

Nitrogen - Nitrogen makes up 80% of the air we breathe and is an essential component of proteins. In aquatic systems the inert gas is converted to useable forms by bacteria, which is then taken up by algae and other plants. Nitrates are essential to plant growth, but an overabundance leads to eutrophic conditions. High levels are usually due to improperly treated sewage and/or runoff from excessive fertilizing. (Citizen Water Quality Monitoring Manual, Delaware Riverkeeper Network) Levels at Trenton are considered high.

Phosphorus - Is found in two forms in aquatic systems - organic and inorganic - and is essential to the formation of DNA and proteins. Organic forms are readily available for reuse, while inorganic phosphorus is generally unavailable to organisms and can be found adhered to suspended solids. Phosphorus concentrations are normally low in unimpaired waters, but improperly treated sewage, over fertilization, and draining of wetlands can cause an abundance of phosphorus and result in high levels of plant productivity, referred to as cultural eutrophication. Under extreme conditions this can cause complete absence of oxygen. ((Citizen Water Quality Monitoring Manual, Delaware Riverkeeper Network) In FW2 streams, levels should not generally exceed 0.1. Levels are acceptable at Clarksville and excessive in Trenton.

Lead - Total recoverable lead should not exceed 5 ug/l. Both November readings shown are within acceptable ranges, but the June 1996 reading at Trenton of 23 ug/l indicates a severe problem needing further examination. Heavy metals such as lead rarely decompose in the water, instead attaching to soil particles and cycling through the ecosystem indefinitely. Heavy metals have been linked to cancer, developmental abnormalities, reproductive failure and even death.

These measured parameters show water quality able to support aquatic life at Clarksville with some limiting factors at Trenton. Combining chemical analysis with biomonitoring of macroinvertibrates gives an even more complete picture of the quality of water along the Assunpink.

Macroinvertebrate Analysis

Macroinvertebrates are animals which lack a backbone and are large enough to be seen with the naked eye, such as clams, mussels, snails, worms, crabs, and numerous insects. Macroinvertebrates are very useful for assessing water quality because they cannot move around much, and therefore cannot escape from changes in water quality. If and when pollution impacts a water resource, the macroinvertebrate populations are adversely affected and require considerable time to recover. It is therefore possible to assess the overall health of a water resource by determining the number and variety of organisms present. In general, the greater number and diversity of organisms the better the water quality. Macroinvertebrate surveys reflect past influences, and therefore give a more accurate picture of the health of the stream than chemical parameters, which generally only indicate water quality at the time of testing. Chemical analysis, though, can more accurately pinpoint the nature of a pollution problem. Source: *NJ Waterwatch Field Guide*

Biological monitoring along the Assunpink was conducted by NJDEP in March of 1992 and indicated that the macroinvertebrate community within the uppermost portion of the Assunpink Creek (in Monmouth County) was severely impaired, the biota in the area around Edinburg (just upstream of the Mercer County Park) appeared healthy, and the communities at Mulberry Street and Willow Street in Trenton were assessed to be only moderately impaired. (NJ State Water Quality Inventory Report 1996)

Professors Rockel and Rose Assessment of Water Quality

In the 1970s the Ewing Lawrence Sewage Authority (ELSA) was required to hire independent consultants to monitor environmental conditions of the Assunpink Creek in an effort to assess ELSA's impact on the creek system. A team of biology professors from the College of New Jersey, Dr. Edward G. Rockel and Dr. David Rose, were assigned the task, and have recently issued an informative report, "Analyses of the Ewing-Lawrence Sewerage Authority Environs: A 20 Year Summary, 1977 to 1996". Their research over the 20 year period covers chemical and biological monitoring, stream channelizations and impacts from changes in land use within the watershed. The study offers a very interesting, analytical and detailed analysis of conditions affecting the Assunpink ecosystem.

The thrust of the study's conclusions are that ELSA's impact on stream water quality is neglible. Instead, most negative impacts are caused by the surrounding level of development and associated impervious coverage which increases stormwater runoff and decreases groundwater recharge, and by the channelizations of the creek that have occurred over the years in an effort to reduce flooding. Together, these impacts have resulted in storm surges that scour the banks of the creek, followed by periods of low flow from lack of groundwater recharge. The channelizations move water more quickly through the waterway in an effort to reduce flooding, but they have the detrimental effect of reducing aquatic species habitat area and residency time of water in the waterway. This results in decreased reproduction of algae. Since algae are at the bottom of the food web, their reduction has a detrimental ripple effect.

Other noteworthy findings in the report include:

1. Since 1977, when the study began, the ELSA treatment plant has undergone significant modernizations including converting to high rate filters, dechlorination, and replacement of anaerobic sludge digesters with an alternate sludge removal (hauling) system. These renovations have benefitted the Assunpink's health.

2. The fact that the creek drains the Bear Swamp, which is rich in decaying plants, combined with the large number of impoundments that block flow contributes significant non-human (naturally occurring) coliform. Only Pond Run, one of the tributaries below the study area, showed occasional human-source fecal coliform pollution.

3. Macroinvertebrates and protozoa (single-celled "animals") used to be more common in the early years of the study. Most members of this group are bottom dwellers and were probably affected by

more frequent and intense water surges that scoured stream sides and bottom, removing the organisms and their habitat. However, most of the invertebrates present were indicators of clean streams.

4. Low algae diversity and population levels in the Assunpink are most likely due to rapid transport of water through the system and poor algae microenvironments due to shading and channelizations, rather than poor stream health. Eutrophicants such as nitrogen and phosphorus were often present at sufficient levels to support algal blooms, but the nutrients and the algae have such short residence time that blooms did not occur.

5. Of the heavy metals, only iron was found in relatively large quantities, but was thought to come from natural rather than human sources. Of the toxic metals, most were found in concentrations below federal public health guidelines, although greater concentrations of certain toxins probably exist buried at the stream bottom.

Delaware Riverkeeper Network Citizen Monitoring Program
The Delaware Riverkeeper Network had a volunteer monitoring site on the Assunpink Creek in Hamilton Township adjacent to the Enterprise Avenue bridge from June 1991 through April 1992. The summary values for the sampling period are shown below:

Parameter	Assunpink near Enterprise Avenue		
	Mean	Maximum	Minimum
pH	6.4	7.5	4.0
Dissolved Oxygen mg/l	8.8	12.8	5.5
Nitrate mg/l	2.49	3.96	1.32
Phosphate mg/l	.4	1.1	.2

Source: Delaware Riverkeeper Network

According to the Delaware Riverkeeper's Fact Sheet on the Assunpink Creek, which interprets these results, the pH, nitrate and dissolved oxygen (DO) readings are all within the range generally considered acceptable to support wildlife. High phosphate readings (>1.0) and wide swings (>50%) in DO saturation, however, show that the surface water is receiving a high pollutant load from external sources. Considering the sampling location, these probably include fertilizers and sewage effluent. These elevated readings correspond with visual observations of the presence of algae on several occasions by the volunteer monitor.

The data from the three sources show water quality in the Assunpink study area to be generally very good, but impaired in Trenton, and, surprisingly, at the headwaters. Although the water quality in the Assunpink Creek is generally good, the watershed is anticipated to undergo additional growth in the coming decade. New development increases stormwater runoff, sedimentation and other nonpoint source pollution, which eventually reaches the creek. New development may also threaten

and stress the floodplains and fresh water wetlands, whose function in filtering out pollutants before they reach the stream becomes even more paramount. Protecting these features from encroachment and limiting nonpoint source pollution is therefore imperative to improving water quality in the long term. **Therefore, the creek needs continued chemical and biological monitoring to identify problems and address them before significant degradation takes place. The information obtained from water quality monitoring should be complemented with proactive public outreach to municipal officials.** Water quality data can be used to influence land planning decision making and can provide impetus for land stewardship educational outreach.

Efforts to monitor the creek and clean it up are presently being organized by the Assunpink Watershed Association (AWA). In April, 1999 the AWA teamed up with New Jersey Community Water Watch to sponsor a stream clean-up of the creek at the Whitehead Pond area. A large group of volunteers, many of them students from nearby College of New Jersey, turned out on a cool, rainy day to remove numerous bags of garbage, tires, signs, container drums and other large debris from the banks of the creek. The president of the watershed association reported that water quality testing activities would be planned for the future.

Schools and Water Issues Education

Schools can also play a role in monitoring the water quality of the Assunpink and teach about water issues and local ecology at the same time. There are currently a variety of environmental programs available geared toward both students and educators. Selected high school students can learn how to assess the health of their watershed, determine its needs, and identify and implement a watershed enhancement project such as restoring a stream bank or re-creating wetlands as part of the Watershed Stewards Program, a leadership program sponsored by the Youth Environmental Society and the NJ DEP. Environmental enrichment activities are offered to teachers and youth leaders through Project Learning Tree Workshop, an award-winning supplemental environmental education curriculum that correlates with the NJ Core Curriculum Content Standards for Science. The Audubon Society has developed an elementary school level environmental curriculum called "Bridges to the Natural World" that has been used by teachers in more than 150 school districts statewide. The Society has also created a high school program called New Jersey Waters which fosters communications between neighboring schools who each monitor surface water quality in their area of the watershed.

Local schools' adoption of a water quality monitoring program along the Assunpink would provide another opportunity to monitor the creek's water quality on a regular basis, and simultaneously provide a lesson in civics by having students present data to public officials. Although many schools are participating in some environmental programs, many still are not. **Environmental Commissions and the Assunpink Watershed Association should urge local school boards to incorporate environmental education, including participation in hands-on stewardship activities, into the regular school curriculum.**

Flooding and Floodplain Management

All streamfront properties along the Assunpink are floodprone, as shown on Map 8 - Natural Resource Areas, which shows the 100 year flood delineations of the Federal Emergency Management Agency (FEMA). Left in their natural state, floodplains perform many important functions. Floodplains drain floodwaters, preventing serious on-site and downstream flooding and erosion which destroys property and endangers human life. Floodplains also naturally enhance water quality by filtering nonpoint source pollution, especially sedimentation and stormwater runoff, before they reach the stream. Moreover, floodplains provide ground area and passageway for wildlife to nest and migrate.

Because the floodplains along the Assunpink outside of Trenton have been largely undeveloped, they have been able to perform their natural function in absorbing floodwaters. This function, however, is at risk, since an assessment of local floodplain regulations revealed them to allow more development than has occurred.

Development in flood hazard areas (defined as 25% greater than 100 year flood delineations) along the Assunpink is subject to review and permitting by the state DEP and by the municipality where there are local floodplain ordinances in effect. The state issues Stream Encroachment Permits for development within the flood hazard areas of inland streams provided that the proposed development meets specific criteria, such as limiting the amount of fill that can be placed to facilitate proposed development to 20% of natural flood water storage, and adequately complying with stormwater runoff and water quality regulations.

Local floodplain ordinances allow municipalities to more closely control the amount and type of development they will accept in the fragile flood hazard areas in order to prevent flooding and its serious consequences to human life and property. A related type of ordinance called a "Stream Protection and Management Overlay Ordinance" can be used in conjunction with the floodplain ordinance to further protect the environmental values of streambank land. This type of ordinance is explained in the box on page 32.

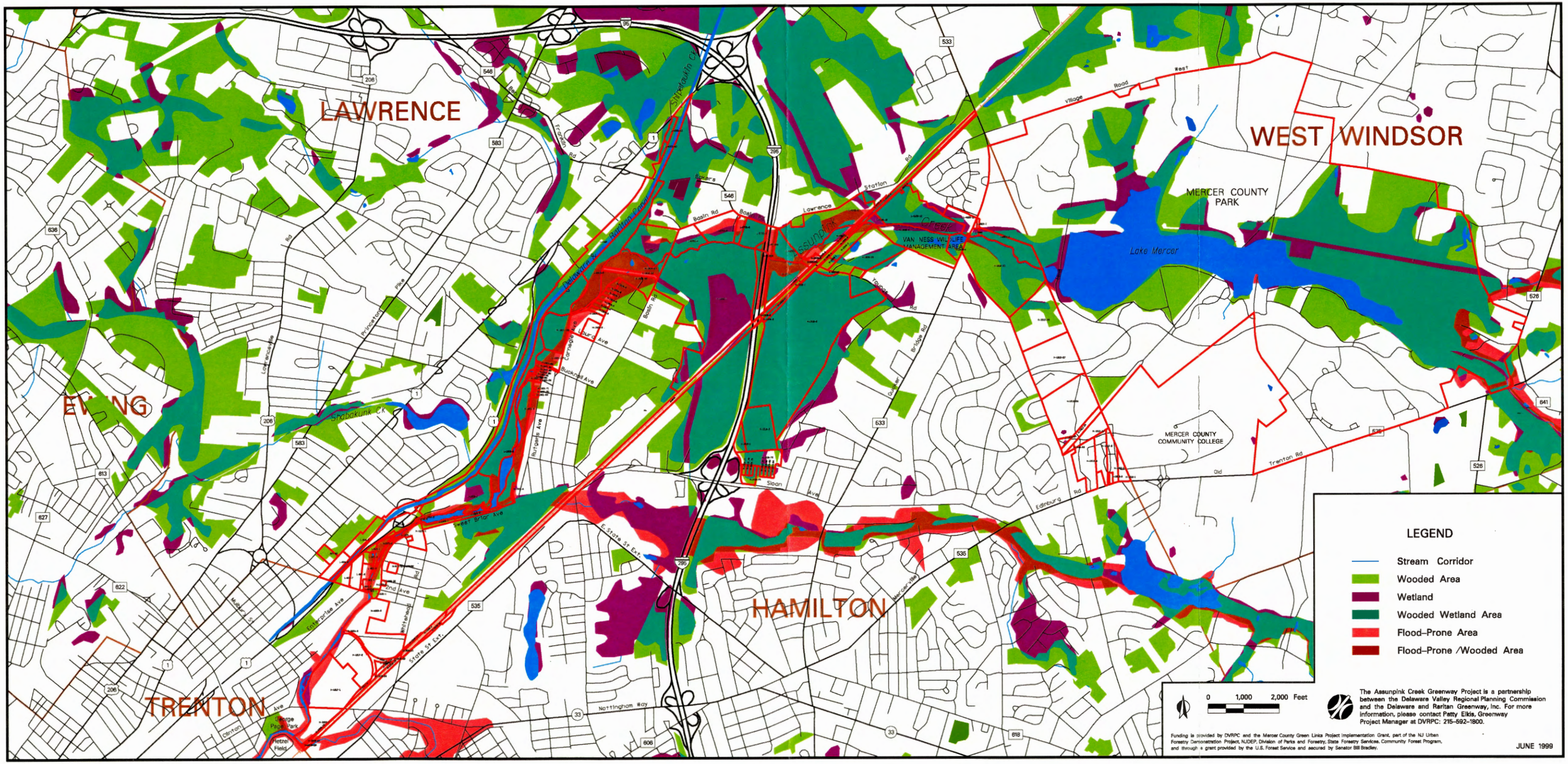
There are five basic approaches to local floodplain management. All are solidly supported by the New Jersey Municipal Land Use Law Section 40:55D-2 (Purpose of Act).

1) *Permit development in floodplain provided it meets state and federal guidelines for being floodproofed and not increasing water level of waterway.* Hamilton and Lawrence Townships use this approach.

2) *Permit development meeting conditions as above, but prohibit certain activities such as nursing homes, hospitals, jails, day care centers or similar uses where human life would be endangered in flood situations.*

ASSUNPINK CREEK GREENWAY STUDY

Map 8 – NATURAL RESOURCE AREAS



The Assunpink Creek Greenway Project is a partnership between the Delaware Valley Regional Planning Commission and the Delaware and Raritan Greenway, Inc. For more information, please contact Patty Elkis, Greenway Project Manager at DVRPC: 215-592-1800.

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3) *Permit limited development meeting conditions as above, but offer an incentive of a density bonus on the non-critical portion of the tract in exchange for not developing the floodplain.*

4) *Prohibit construction within flood hazard areas and provide a density bonus on a non-critical portion of the tract.*

5) *Prohibit development within the flood hazard area without offering density bonuses elsewhere on the tract.*

Floodplain ordinances that prohibit any development or impervious coverage in the floodplain better protect the entire stream system than those that permit even limited construction. This is because allowing development in flood hazard areas, albeit with a permit, disturbs the natural ability of floodplains to provide sufficient storage for floodwaters, and can have a cumulatively detrimental effect on downstream properties. Only by leaving floodplains in their natural vegetated state can the floodplain fully absorb floodwaters, filter pollution before it reaches the stream, and provide habitat for wildlife.

According to the 1994 U.S. Supreme Court's decision in the case of Dolan v. Tigard, protecting floodplains and prohibiting development that increases impervious surfaces are legitimate public purposes that can be supported due to the potential adverse effects from such development on the environment. A sufficient relationship between the development's impacts and any required dedications or limitations to development must be shown. However, the Section Chief of the Floodplain Management Section at NJDEP reports that floodplain ordinances that prohibit *any* development in a flood hazard area have been determined to be unconstitutional - the courts have ruled that where development is prohibited for this purpose the land effected must be acquired at fair market value. (Letter from Clark Gilman, P.E., 7/23/99)

Lawrence Township's floodplain ordinance seems to permit development in the floodplain provided it meets certain criteria, but the township does add another layer of protection with its *Stream Buffer* requirement (a variation of the Stream Protection and Management Overlay Ordinance described on page 32). This requirement reads, "There shall be no disturbance, including but not limited to, grading and the placement of buildings, within 100 feet of the 100 year flood plain of a stream along all stream corridors or from the upper bank for which a floodplain line has not been established, with the following exceptions:

1. For necessary storm water outfall structures and piping or the installation of plant material;
2. Up to 500 square feet of encroachment per lot or tract under single and separate ownership shall be permitted. (*S.430 Misc. Reqs, p. IV-164, Land Use Ordinance 1/28/98*)

Hamilton should consider adopting a stream buffer setback requirement similar to Lawrence Township's.

STREAM CORRIDOR PROTECTION AND MANAGEMENT OVERLAY ORDINANCE

The intent of the stream corridor overlay ordinance is to ensure that vegetated riparian buffers are maintained by requiring development to be set back from sensitive floodplain and wetland areas and by limiting the use and intensity of activities within the corridor. The overlay district is delineated on the zoning map on top of the existing zoning districts that may currently allow residential, commercial or industrial uses in order to target protection to sensitive stream corridors, regardless of permitted uses.

Buffer widths can vary, depending on intended function and slopes. In general, the Riparian Corridor Overlay should have two zones: Zone 1 would extend 25 feet from the edge of the stream, its purpose would be to provide for streambank stabilization, and the land within the zone should remain mostly undisturbed. Zone 2 of the overlay should generally extend a minimum of another 50 feet or to the limit of the floodplain, whichever is greater. Its main purpose would be to impede the flow of runoff, allowing increased infiltration in order to filter out nutrients and other nonpoint source pollution by uptake from the plants in the corridor. Depending on the community's goals, a wider buffer may be required. For example, according to Watershed Management Strategies for New Jersey (Cook College, 1989) the following buffer widths are suggested:

Function	Buffer from Water's Edge (in feet)
Sediment Control	50 - 200
Streambank Erosion Control	25 - 213
Nutrient Pollutant Removal	150 - 200
Reservoir Protection	75 - 300
Stream Temperature Control	25 - 200
Aquatic Species	25 - 50
Wildlife Habitat	200 - 300

Forested buffers have been scientifically proven to improve water quality, and are a less expensive and more beneficial way to improve water quality than building expensive treatment plants.

Model Stream Corridor Protection Ordinances and names of municipalities that have adopted them are available from the Association of New Jersey Environmental Commissions (ANJEC). The Montgomery County Planning Commission in Norristown, Pennsylvania has also produced an excellent model ordinance.

Wetlands

Wetlands cover a significant portion of the Assunpink riparian corridor and, due to their environmental value, are extremely important to protect. In their natural state, wetlands help control floods, reduce erosion, improve water quality, contribute to wildlife habitat, and provide open spaces that increase property values and enhance quality of life.

Many of these benefits were not known or appreciated until the 1970's and 1980's. By then, more than half the nation's marshes, swamps, and bogs had been filled, and the need to halt wetland loss was considered critical. Against this background, local, state and federal agencies responded by creating a series of regulatory programs.

Since wetlands are considered a critical natural resource, they are protected under a number of state laws and regulations, including the Freshwater Wetlands Protection Act of 1987 and the Wetlands Act of 1970 (saltwater). Federal acts regulating development in wetlands include the Clean Water Act, Rivers and Harbors Act, National Environmental Policy Act and Coastal Zone Management Act. The U.S. Army Corps of Engineers used to issue federal permits in cooperation with the USEPA, but this responsibility has been transferred to NJDEP. The definition of wetlands has historically been a contentious issue and is subject to change, along with the degree of rules governing wetland development.

In addition to regulating wetlands themselves, NJDEP also regulates Transition Areas or buffers around freshwater wetlands. Buffers are considered important to reduce developments' impact on wetlands. A permit is required for practically any activity proposed in a wetland. Permits allow limited types of activities in wetlands, provided specific permit conditions are met relating to their impact on the environment.

At the local level, municipalities which are proactive in wetland management rather than relying on state and federal oversight are often able to protect more of their wetlands. State and federal regulations may exempt wetlands under a certain size that are locally significant, especially when connected as a system, and the definitions and rules governing wetlands are still subject to change. For example, the Army Corps of Engineers has drafted controversial new guidelines regarding wetlands that opponents claim would open up thousands more acres of sensitive lands for development. (Philadelphia Inquirer article "New Rules are Offered on Use of Wetlands", by Joby Warrick, 2/2/98)

Hamilton and Lawrence Townships can enhance protection of their natural resource areas by incorporating performance zoning and net-out of resources techniques in their land development ordinances. (See box next page)

NATURAL RESOURCE PROTECTION

"Net-Out" of Resources

The technique of deducting environmentally constrained lands from development density calculations is often referred to as "net-out". To implement this, the policy for protecting the resource must first be established in the Master Plan. The simplest approach is to then amend the definition of lot area or developable area in all applicable sections of the zoning ordinance. Site plan submission requirements may also need to be amended to include identification of the natural resources and their acreage.

Performance Zoning

Another approach is performance zoning, a method of regulating the design and location of a development based on a site's specific characteristics and the particular impacts of the proposed development. The process involves first identifying the resources to be protected, which may include wetlands, floodplains, steep slopes, prime agricultural soils and historic features. After these areas are mapped and measured and then deducted from a site's development potential, the remaining areas may be developed at a density that is permitted by the zoning district. Requirements for maximum impervious coverage and minimum open space should also be included. Performance zoning can be very effective and equitable because it allows a portion of a tract to be developed while limiting the impact on the sensitive part.

Source: Chester County Landscapes Community Planning Handbook

Erosion and Sedimentation Control

Controlling erosion and sedimentation along the Assunpink is important to the overall health of the creek. Sedimentation entering the creek reduces its width, decreasing the surface area of the stream, and can impact fish life by clogging gills. Erosion and sedimentation entering the stream also increases the amount of phosphorus in the stream, leading to the proliferation of algae, at the expense of submerged aquatic life. Moreover, eroded soil and sedimentation in the stream reduce the stream's carrying capacity during floods. (Montgomery County Model Riparian Corridor Overlay District Ordinance, 1996)

All developments involving over 5,000 square feet of soil disturbance or more than one single family dwelling must be reviewed by the Mercer County Soil Conservation District for compliance with their standards. Townships may only issue permits for occupancy after the Soil Conservation District has issued a certificate of compliance to the developer. If a construction site is inspected and found in violation, the soil conservation district works with the developer to resolve the problem. Significant fines of up to $3,000/day and stop work orders may be issued for repeated violations. Since Mercer County's two to three inspectors are unable to check every construction site every day, it is important for township officials and residents to keep watch over construction sites, especially

large projects where the soil may be disturbed over a long period of time and would be subject to numerous rainfalls. Both townships have provisions for erosion and sedimentation control in their land development ordinances. Although regulations and enforcement are provided at the municipal and county levels, sedimentation was still reported to be a problem, mostly in the tributaries emptying into the Assunpink. **Township officials and neighbors should notify the Soil Conservation District if they suspect a problem.**

When erosion and sedimentation problems on development sites do occur it is often due to lack of knowledge of proper control measures by construction crews. Both the States of Delaware and Maryland require classes and certification for state-of-the-art sediment and stormwater control measures geared toward foremen responsible for on-site clearing and land disturbing activities during construction. The states also require at least one supervisory person with certification to be on location at each construction site. State staff report little resistance to the program, and positive feedback from both communities and the regulated contractors and developers. Incorporating a sediment and stormwater control certification program in New Jersey could improve compliance within the state.

Stormwater Management

Effective stormwater management is important to prevent flooding, to decrease the amount of runoff pollutants reaching the waterway, and to recharge groundwater. Stormwater drainage systems are generally designed to limit the rate of runoff from any new development to not exceed the rate of runoff that occurred before development. They do this by detaining rainwater on-site in basins or underground holding tanks and releasing the stormwater at a controlled rate equal to the predevelopment rate. Although the release *rate* is designed to be the same as before development, the *quantity* of stormwater is increased. This is because the impervious coverage associated with the development results in less water being absorbed directly into the ground with more water draining as surface runoff. The cumulative effect of many basins within a watershed releasing increased amounts of water over time can be damaging to the creek's banks (although it is obviously preferable to sudden flash floods that might occur without stormwater management facilities). In addition, the increase in runoff quantity has a detrimental impact on groundwater reserves and creeks' water quality .

In 1964, the Mercer County Soil Conservation District sponsored a watershed work plan for the Assunpink to address flooding problems exacerbated by inadequate channels. The workplan provided for land treatment measures on agricultural land, 5 floodwater retarding structures, 5 multi-purpose floodwater retarding-fish and wildlife structures, one multi-purpose - recreation structure (and basic recreation facilities) and 11.8 miles of stream channel improvements. Most of the improvements have been subsequently implemented, including the creation of Mercer County Park and the Assunpink Creek Wildlife Management Area in Monmouth County, at the creek's headwaters.

Despite these engineered solutions and the protection of floodplains in the Mercer County Park and Assunpink Wildlife Management Area, flooding has remained a problem. This is most likely due to the combination of increased urbanization, and consequent runoff, in the watershed, combined with the inadequacy of structural measures' ability to compensate for development in the floodplain elsewhere within the watershed. The structural modifications also have had a detrimental effect on water quality. Dams cause build-up of sediment within the man-made created lakes, and channelizations have a negative impact on aquatic species by increasing water flow speed and destroying habitat areas on the sides and bottoms of the creek.

To comprehensively address runoff issues statewide, NJDEP amended the Stormwater Management Rules to specify new technical standards for stormwater runoff water *quality* and *quantity*, and to establish criteria for *watershed control* of stormwater runoff from new and existing development. The basic premise behind the amendments is that watershed based planning and program implementation for stormwater runoff control, that moves beyond site-by-site calculations after land development projects are proposed and implemented, can more effectively manage runoff quantity and water quality at lower total cost.

In addition to the new rules, NJDEP also prepared a Nonpoint Source Pollution Best Management Practices Manual to serve as a guide for nonpoint source pollution and stormwater management. The manual demonstrates how to integrate nonpoint source pollution and stormwater management control practices into the development planning process. For example, it shows how to apply pollution prevention and on-site infiltration/aquifer recharge techniques through innovative site designs and other techniques, such as clustering, reducing street widths and the use of porous pavement during the site design stage of a development. The manual primarily presents guidance directed toward new development and redevelopment, but some of the procedures can also be applied to existing developments. Best management practice guidelines for road construction and maintenance are also included. (See box next page)

The New Jersey Residential Site Improvement Standards Stormwater Management Section applies to residential development in Lawrence and Hamilton, and each township also has a Drainage and/or Stormwater Management section in the land development ordinance. Lawrence Township's 1994 ordinance addresses water *quality* as well as runoff *quantity*, but the language in Hamilton Township's ordinance appears to only address runoff quantity, *not* quality. **Hamilton Township should prioritize municipal stormwater management by incorporating best management practices that address water quality and groundwater recharge as well as runoff rates.**

To be truly effective, stormwater management needs to be addressed on a watershed basis. The Mercer County Improvement Authority had applied for a grant from NJDEP to conduct such a plan, but it was not funded. In December, 1999, NJDEP announced the beginning of the move to watershed based planning for Management Area 11 - The Central Delaware Tributaries, which includes the Assunpink. The department set aside grant funds specifically dedicated to nonpoint source projects which can be implemented prior to the adoption of a formal "watershed management plan." Examples of projects are riparian restorations and stormwater management BMPs. The

Division of Watershed Management is seeking lists of potential projects for consideration in early 2000.

Presently, the City of Trenton floods along the Assunpink and the city is responding by desnagging the creek, buying out developed floodprone properties and returning them to open space, and floodproofing remaining structures. These efforts will surely lesson the problem, but the problem may not be able to be solved by the city alone, since most of the floodwaters originate from suburbanized areas of the watershed due to poorly coordinated stormwater management.

Local monitoring is needed to assess and record some of the visible impacts of stormwater runoff in the Assunpink vicinity. **Both Lawrence and Hamilton Townships' environmental commissions and the Assunpink Watershed Association should consider taking periodic walks after heavy rains to trace where litter and sediments, oil, grease and other pollutants go**. They may try to note, for example, whether trash is detained in catch basin gratings or ends up in the stream, and whether nonpoint source pollution accumulates in stormwater facilities and is then released in concentrated form into streams, or is filtered through the ground by natural or engineered drainage systems. **They can use their recorded observations to influence municipal policies on incorporating water quality as well as flood control provisions in the design of stormwater facilities.**

BEST MANAGEMENT PRACTICES
TO EFFECTIVELY CONTROL
STORMWATER RUNOFF QUALITY AND QUANTITY

Any watershed-based stormwater management plan should stress the following features of stormwater management planning:

1. Prevent stormwater runoff through innovative planning and site design techniques.
2. Guide development to be compatible with the natural features of the site.
3. Manage the inevitable runoff to meet water quantity and quality goals.
4. Select, design and maintain stormwater facilities properly.
5. Prevent pollution before it is created by limiting use of pesticides and fertilizers in the landscape and finding alternatives to road salts for deicing purposes. Periodic street vacuuming can help reduce inevitably created pollution before it reaches streams.
6. Retrofit developed areas to better control runoff quantity and quality. For example, extend the detention time of a basin to increase its solids settling capability and coordinate the timing of the outflow with other basins in the watershed to prevent downstream flooding; and install modified catch basin grating to reduce litter reaching streams whenever streets are resurfaced or new streets are constructed.

SOURCE: Stormwater and NPS Pollution Best Management Practices Manual, NJDEP, 1994

Another issue with stormwater management is how to fund capital improvements needed to fix runoff problems in existing developed areas. One solution that has become prevalent in the mid-west and is more recently being adopted in the eastern United States is the establishment of a *stormwater utility.*

A NEW IDEA - STORMWATER UTILITY

A stormwater utility funds local stormwater management programs through monthly or quarterly user-charges assessed on all property within a watershed. The user-charge is based on each parcel's contribution of stormwater flow to the local drainage system. The user-charge would cover local costs for operation and maintenance, basin planning, facility construction and program administration, similar to user-charges for other public utilities. Advantages of a stormwater utility include a stable, dedicated funding source for the proper planning, design, construction, operation and maintenance of stormwater facilities, ability to use this funding source as leverage for bond issues to finance large-scale capital improvements, and an equitable user fee based on runoff contribution rather than property value. Disadvantages include expensive start-up costs in determining parcel-based user fees, and public reluctance to what may be perceived as a new tax. In addition, establishing a stormwater utility in New Jersey would require state enabling legislation. The impetus for this possibility may come from the NJDEP watershed studies presently being conducted throughout the state, especially if finding a new technique for funding management of stormwater arises as a major issue.

Whitehead Dam

The status of the dam at Whitehead Pond is an important issue for the Assunpink Greenway. The dam was first built over 170 years ago to harness water power for the original Whitehead Mill. Since that time it has been breached and rebuilt several times. In 1980 the Army Corps of Engineers completed a Phase 1 Inspection Report under the authorization of the National Dam Inspection Act. Based on the inspection, the dam was reduced from a Class I - High Hazard Potential Structure to a Class II - Significant Hazard Potential Structure, which is a structure in poor condition with inadequate spillway capacity, which, should it fail catastrophically, would likely cause downstream property damage. Some, but not all, of the recommended remedial actions were implemented in 1982. By the winter of 1996, the dam began to breach again, and the current owner, Hamilton Transit, was directed to prepare plans for either the repair or permanent removal of the dam.

According to the file on Whitehead Dam at the NJDEP Division of Engineering and Construction, no repairs appear to have been carried out. The owner of the dam was given several extensions on the needed repairs due to the lack of damage resulting from the breach. In the spring and fall of 1996, the owner offered the dam and any portion of Whitehead Pond owned by them to the county, because the county was preparing to widen Whitehead Road bridge, and to Lawrence Township, because one half of the dam is in Lawrence. By the winter of 1999, the county bridge had been repaired and reopened, and the dam was further deteriorated, but ownership was not transferred.

According to the county engineer, the county is still considering whether to acquire the dam (as a donation). The Lawrence Township administrator had also been asked if Lawrence wanted it, but he declined the offer.

The current issue regarding the dam is twofold: 1) should the dam be fully repaired, partially repaired, or removed; and 2) who will take responsibility. Who takes on the responsibility will inevitably effect the outcome of the dam and Whitehead Pond.

Issue One : Fully repair, partially repair or remove the dam

Fully Repair

The status of the dam has potential impacts on flooding, wildlife habitat, recreation and scenery. Curiously, the dam provides little flood control for downstream floodprone Trenton, mostly because of inappropriate development in the floodplain and inadequate channels within the city. According to *The Flood Control Feasibility Study for the Lower Assunpink Creek Watershed*, prepared by the USDA Soil Conservation Service in 1982:

> "There are no suitable sites to store water in the lower part of the watershed. Whitehead Pond currently backs up water into the lower portions of Shabakunk Creek, Miry Run, Little Shabakunk Creek and Shipetauken Creek. Raising this dam to provide additional storage to protect areas downstream would inflict more damage upstream than it prevented." (p. 24)

In fact, the deterioration of the dam has not caused additional flooding downstream, and has eased flooding in the basements of residents upstream. Repairing the dam would be expensive, and it would need periodic maintenance. Although no figures were available for Whitehead Dam's repair, the American Society of Civil Engineers estimates that the average cost of modifying a dam to meet today's safety standards is $500,000, while the Federal Energy Regulatory Commission estimates a cost of $1.5 million per dam. (Beth Wade, "Bringing Down the Dams, " in June 1999 issue of *American City and County*) Dams also cause build-up of sediment, degraded water quality and restricted fish migration. However, repair of the dam would restore Whitehead Pond, which has been home to beavers, muskrats, turtles, fish and other wildlife for over 170 years, and which had been a popular fishing, swimming and boating pond for area residents.

Partially Repair

A partial repair with a weir could help reduce downstream flooding during minor storms, without negatively impacting upstream areas. The partial repair would also be expensive, although less so than the full repair, and would need periodic maintenance. The area would become more of a detention basin surrounded by wetlands than a pond.

Remove

Removing the dam also costs significant money, but much less than full repairs. Again, no figures were available for Whitehead Dam's removal, but as a reference, a much larger dam in West Bend, Wisconsin cost $68,000 to remove in 1988. (Beth Wade, "Bringing Down the Dams, " in June 1999

issue of *American City and County, p. 22)* Removal of the dam would have no impact on flooding downstream or upstream (it would be better for upstream than repairing the dam), and allowing the water to flow freely would improve water quality and fish migration. There is a national trend to remove dams that are no longer serving their originally intended purpose. However, many communities faced with this decision prefer the status quo, simply because they have never known any other condition other than the dam condition. Many people believe that there will be virtually no water left if the dam is removed, and, if the dam has been let down or breached, they fear the resultant mud flats, which are often smelly at first and devoid of any vegetation, will be a permanent situation. They also lament the loss of recreation and wildlife. However, the mud flats revegetate quickly, the river restores rapidly, and recreational opportunities from a reservoir can be replaced with opportunities on the restored stream, says Margaret Bowman, director of dam programs for American Rivers, a Washington DC- based conservation group (Beth Wade, "Bringing Down the Dams, " in June 1999 issue of American City and County, p. 32)

Issue Two: Who Will Take Responsibility

In light of the momentum of activity focused on the Assunpink Creek through the various greenway efforts, it makes sense to try to resolve the Whitehead Dam question now. To come up with the best alternative, **a group of interested parties, such as the Assunpink Watershed Association, Delaware Riverkeeper Network, Delaware River Basin Commission, D and R Greenway, Mercer County Division of Planning and of Engineering, Ewing-Lawrence Sewage Authority and Lawrence and Hamilton Townships should form a "Whitehead Dam Task Force" to develop and implement a restoration project for the Whitehead Pond area. The project should include a panel of experts in restoration ecology, hydrology, flooding and dam construction to determine the best solution.**

Related to the actual dam is the use of the Whitehead Pond area. This greenway plan recommends that the area between Sweet Briar Road and Whitehead Pond be acquired by Hamilton Township or the county as part of the trail connection. See page 52. **The "Whitehead Dam Task Force" should incorporate the trail component into their plan for the area.**

Staff from the Delaware River Basin Commission (DRBC) have expressed interest in organizing the "Whitehead Dam Task Force". The DRBC is currently involved with several other stream restoration projects in the basin. However, it would take a special resolution of the Commission to authorize staff to provide the detailed planning, design, and construction supervision such a project would demand. One of the tasks of the Task Force will be to identify funding sources for the project.

Wastewater Management

Improperly treated wastewater discharged into a stream can be a major source of pollution. The NJDEP administers the New Jersey Pollutant Discharge Elimination System (NJPDES), which regulates facilities and activities discharging or releasing pollutants into the surface and ground

waters in the State. All of the study area is served by either the Ewing Lawrence Sewage Authority (ELSA) or the Hamilton Township Department of Water Pollution Control. ELSA discharges to the Assunpink Creek just downstream of Whitehead Road Bridge. According to ELSA staff they are meeting their permit requirements. (Conversation with Michael Robert Post, ELSA chemist, March 1999). In addition, the results from Professors Rockel and Rose 20 year study show ELSA's impact on the Assunpink to be negligible (see pages 25-26).

NJDEP is currently undertaking a major initiative to update and improve the NJPDES program. In concurrence with the stormwater management watershed approach, the main focus of the NJPDES program improvement is a move to a watershed cycle for the issuance of discharge-to-surface-water permits. The watershed approach is intended to be a comprehensive program of planning, monitoring, modeling, total maximum daily load development and permitting, integrating both point and nonpoint source pollution controls, and public outreach. (NJ Water Quality Inventory, 1994)

Toxic Discharges

Up until 1991, the NJDEP maintained a program assessing waters where toxic discharges from point sources were suspected. These assessments are now supplemented with current fish-tissue surveys and instream biological community assessments. Neither the Assunpink Creek nor any of its lakes were identified in the program as waterbodies suspected of being impaired by toxics. However, Assunpink Lake (in the Assunpink Wildlife Management Area in Monmouth County) was listed as a waterway with advisories on Largemouth Bass and Chain Pickerel consumption due to elevated levels of mercury in their tissue. (NJ Water Quality Inventory, 1996)

Nonpoint Source Pollution

Nonpoint source pollution is a major cause of water quality problems in all the state's rivers and streams, including the Assunpink, and is a major concern for groundwater quality as well. Rainwater flowing over land or through stormwater sewer systems conveys most of the nonpoint source pollution affecting waterways. Since the Assunpink Creek landscape is becoming increasingly developed, the greenway plan will focus on urban and suburban nonpoint source categories rather than agricultural sources.

As mentioned above, NJDEP prepared a stormwater and nonpoint source pollution Best Management Practice Manual, and the department has recently set aside grant funds specifically dedicated to nonpoint source projects, such as riparian restorations, that can be implemented prior to a formal watershed management plan in Watershed Management Area 11 - the Central Delaware Tributaries. In addition, there are many actions that residential and commercial landowners can take to reduce nonpoint source pollution. For example, property owners should limit the amount of pesticides and fertilizers used in their yards, and they should properly dispose of hazardous household wastes. **The Assunpink Creek Watershed Association and local environmental commissions can help spread this information by producing and distributing information on**

good stewardship. Examples of stewardship outreach materials are shown in Appendix C. These can be adapted for the Assunpink, allowing the interested groups to spend more effort on distribution than on re-creating the information.

Endangered Wildlife and Habitat

Data from the Natural Heritage Program at the NJDEP indicates there may be twelve rare, threatened or endangered species inhabiting the Assunpink Creek study area. Eleven of the species are plants, and one is a rare animal, the vesper sparrow. The vesper sparrow and six of the plants are considered endangered at the state level, meaning their prospects for survival within the state are in immediate danger, requiring immediate assistance or extinction will probably follow. Two of the plants are even considered globally rare. The primary reason for most of these species pending demise is loss of habitat from encroaching development.

Almost 90 other rare species and natural communities have also been recorded by the state's Natural Heritage Program to survive at various locations within Mercer County. Since much of the Assunpink Creek above Trenton has good water quality with largely undeveloped streamside buffer areas, some of these county-recorded species may depend on the Assunpink Creek area for food, migration and nesting habitat. Streamside residents can help provide habitat for wildlife by planting native species whenever possible, which also tend to be less invasive.

Chapter 5
Conservation Package
and
Opportunities for Trail Connections

Chapter 5
CONSERVATION PACKAGE
and
OPPORTUNITIES for TRAIL CONNECTIONS

Conservation Rationale

This plan recommends that a vegetated, green buffer be maintained on both sides of the Assunpink Creek for water quality protection, flood control, wildlife habitat and recreational opportunities. Although a good portion of the streamside land is in public ownership, and zoning and environmental regulations limit development along the creek on privately owned streamside land, the greenway plan's goal is to preserve the riparian buffer in perpetuity through 15 primarily vacant or industrial properties, using conservation easements and acquisition. See Map 9. Conservation easements and/or acquisition of sensitive streamside land is ultimately preferred for several reasons. First, zoning and environmental regulations can change over time; they may not always provide the same level of protection from inappropriate development, and they may not always be enforced. Adding another layer of protection, through a conservation easement or acquisition of the land by a land trust or government entity, is not subject to changing regulations, and lasts forever. Second, acquiring land and easements *with public access* along the creek creates an opportunity for trail connections. A trail along this portion of the Assunpink is especially desirable because it would connect two popular regional parks (Mercer County Park and the D&R Canal Park) that are separated by only two miles of largely undeveloped stream corridor, and it could provide connections with at least five other proposed trails in the vicinity.

Implementation Process and Players

Lawrence and Hamilton Townships, Mercer County, the D and R Greenway, Inc and the Lawrence Township Conservation Foundation (LTCF) can all play an active role in formalizing the Assunpink Creek Missing Link Greenway. Representatives of these groups, as well as other interested members of the steering committee from agencies such as the D&R Canal Commission and Green Acres should continue to meet periodically to communicate about their recent planning and conservation efforts, and to strategize about forming the greenway. The Executive Director of the D and R Greenway has expressed interest in coordinating the effort.

There are numerous ways land can be acquired or eased. In some cases the land development or subdivision approval process triggers negotiations, in other cases the municipality, county or land trust may approach the landowner and negotiate an agreement to conserve the property. The box on the following page lists and describes conservation options.

CONSERVATION OPTIONS

1. Conservation Easement - a legal instrument by which a landowner limits, without relinquishing ownership, the development potential of property which has significant natural resources, open space or habitat value, and grants the right to conserve those values. A conservation easement goes with the land - all subsequent owners are bound by the restrictions, which are recorded with the deed and filed at the County Recorders Office. The land remains in private property, but the organization to which the land is eased, whether a private land trust or government agency, is responsible for monitoring compliance with the deed restrictions with current and future property owners. A conservation easement *with public access* allows people to enter the area for recreation. According to the NJ Landowners Liability Clause, landowners are released from liability so long as no fee is charged and the landowner does not willingly cause or ignore a hazardous situation. A conservation easement can substantially reduce the value of the property for real estate tax purposes and inheritance tax purposes, often enabling the land to remain in the family rather than be sold to pay inheritance taxes.

2. Fee Simple Acquisition - a government entity and/or land trust buys the land and becomes the owner. If sold at less than fair market value, the sale can provide tax benefits to the landowner.

3. Bargain Sale - a sale to a land trust or other qualified entity at less than fair market value. The difference between the sale price and the appraised fair market value qualifies as a tax deductible, charitable contribution.

4. Installment Sale - a mechanism by which the income from the sale of a property is spread over several years in order to help reduce capital gains taxes.

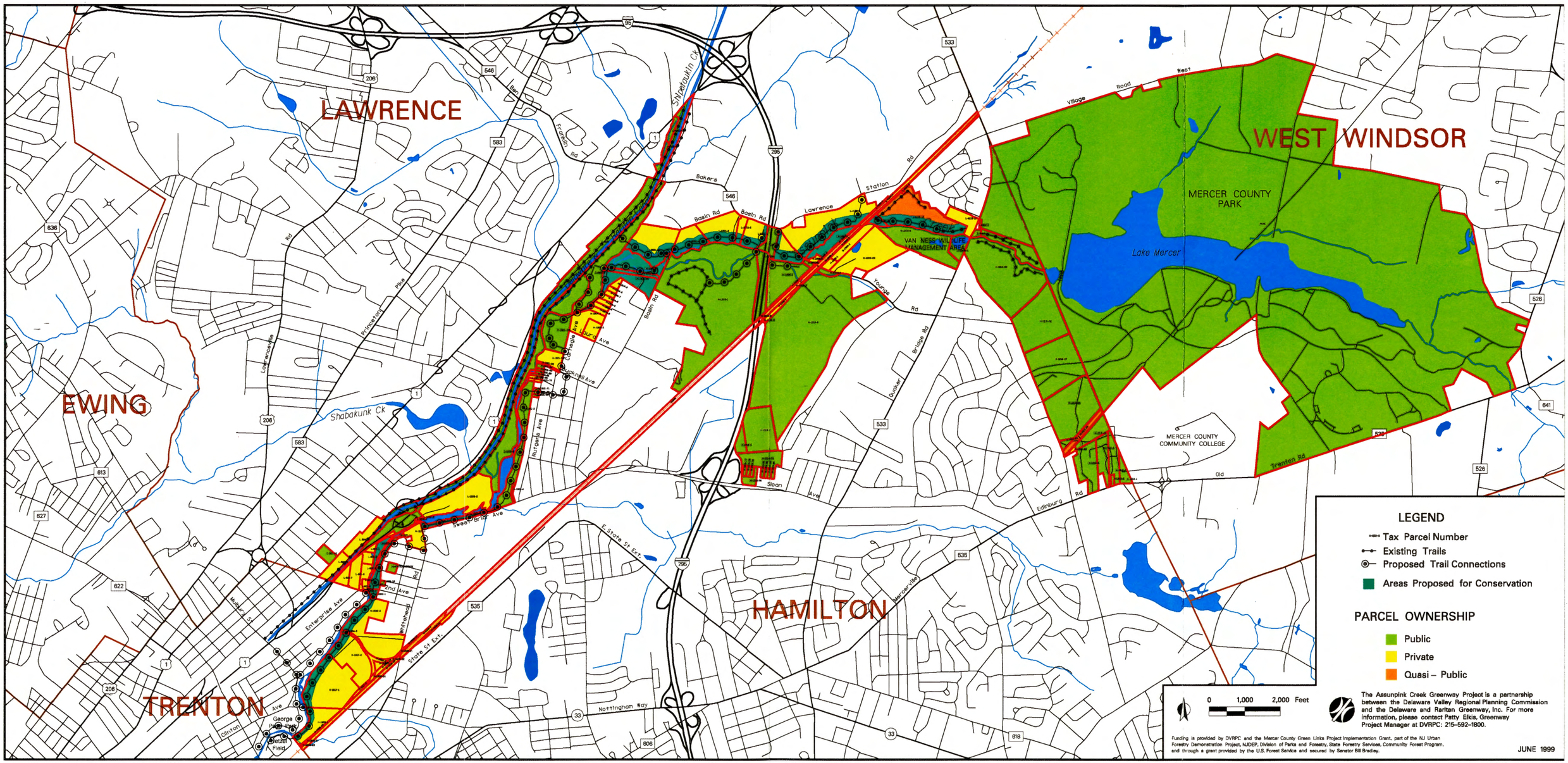
5. Donation - an outright gift, with or without charitable intent, for no financial renumeration. However, the value of the land given can serve as a tax deduction.

6. Reserved Life Estate or Remainder Interest - land is transferred to a land trust immediately but the owner reserves the use of the property for his or her lifetime. This permits the landowner to continue to live on the property and receive an income tax benefit during his or her lifetime. It can also benefit future generations by removing the value of the property from the estate, reducing inheritance taxes.

7. Bequest - the landowner conveys the deed of the property to a land trust at the time of his or her death. This removes the property from the estate for inheritance tax purposes. Including a conservation easement ensures that the property will be permanently protected.

Source: Adapted from Greenways, winter 1999 newsletter of the D and R Greenway Inc from an article written by Linda Mead, and from "Its No Longer Greek to Me- Land Conservation Terms Made Easy," a flyer put out by D and R Greenway, Inc.

ASSUNPINK CREEK GREENWAY STUDY
Map 9 – PROPOSED TRAIL & CONSERVATION LAND



The Assunpink Creek Greenway Project is a partnership between the Delaware Valley Regional Planning Commission and the Delaware and Raritan Greenway, Inc. For more information, please contact Patty Elkis, Greenway Project Manager at DVRPC: 215-592-1800.

Funding is provided by DVRPC and the Mercer County Green Links Project Implementation Grant, part of the NJ Urban Forestry Demonstration Project, NJDEP, Division of Parks and Forestry, State Forestry Services, Community Forest Program, and through a grant provided by the U.S. Forest Service and secured by Senator Bill Bradley.

JUNE 1999

Another tool that can assist townships in protecting significant lands through the land development approval process is an *Official Greenway Map*. Washington Township in Gloucester County adopted an Official Greenway Map that facilitated the dedication of several hundred acres of streamside land throughout the township.

OFFICIAL GREENWAY MAP

An official greenway map is essentially an ordinance, in map form, adopted by the municipality, that designates existing and proposed areas for open space protection. By identifying these areas on an official map, the municipality is announcing its intentions to preserve these areas for flood control, streambank stabilization, provision of wildlife habitat, and/or recreational facilities. Once adopted, the official greenway map gives notice to property owners and developers of the municipality's intentions, but does not in and of itself serve to acquire the land for public purposes.

The official map usually comes into play at the time a land development or subdivision is proposed. The municipality then has the option, for up to one year after final plan approval, to negotiate various ways to keep the land open. Types of preservation agreements that may be pursued include fee simple acquisition, purchase of easement, bargain sale and property donation. However, unless otherwise agreed upon, the law specifically states that the property owner is entitled to full market compensation.

Lawrence Township has not adopted an Official Greenway Map, but township officials stated that they use their Master Plan Conservation Map for the same purpose. Hamilton Township is working on updating their open space inventory map. **By incorporating areas proposed for preservation, Hamilton could adopt their new map as an Official Open Space and Greenway Map and facilitate their open space protection goals**.

Assunpink Trail Connection

The proposed trail connection along the Assunpink Missing Link can be viewed in two segments. Segment One criss-crosses the creek to provide a connection between the Mercer County Park and the D&R Canal Towpath at Carnegie Road. Segment Two connects the Assunpink at Carnegie Road with the Trenton Assunpink Greenway along the Hamilton side of the creek. Map 9 shows existing and proposed trail connections. While a public access route appears feasible along much of the length of the creek, there are several areas where obstacles must still be overcome. Further study to find solutions are needed for these areas.

Segment One Obstacles

1. Railroad crossing - Passage *under* the Amtrak railroad bridge will need to be secured. The current bridge has two tunnels. The south side is mostly dry and passable, but the trail needs to be on the north side to avoid trespassing on the Mercer Wrecking Company property, which has a small bit of stream frontage at Youngs Road. The north side tunnel

is under water, but there is a shelf along the inside of the tunnel wall. It may be possible to utilize this shelf through the tunnel as a crossing, but issues of ownership, liability, permitting and safety must be examined in more detail.

2. Route 295 - The culvert under Route 295 was completely under water at the time the steering committee hiked the proposed greenway trail in February, 1999. This was after some heavy rains, and it is possible that the large culvert is actually dry enough in the summer to walk through. In any case, this obstacle can most easily be avoided by walking up to Baker's Basin Road, going under the Route 295 bridge along the road, and then returning back down to the creek. This loop up to the road is only about 1,000 feet each way.

Segment Two Obstacles

1. Whitehead Pond - There is a narrow strip of land between Whitehead Pond and Sweet Briar Road proposed in the trail connection. As the dam continues to deteriorate, the stream will recede and this strip of land will widen. The status of Whitehead Dam will affect use of this land. See pages 38-40 for discussion of Whitehead Dam.

2. Property 1633/1 in Hamilton, on the border with Trenton, has a large manufacturing structure directly on the creek's right bank, probably prohibiting the trail option. Instead, the trail could cross Clinton Avenue into Trenton and join the Trenton Assunpink Greenway on the city side.

Implementation of the trail requires a sponsor to develop a consensus as to route, types of permitted uses, surface materials, canoe access, and other management issues. **It is recommended that the Lawrence Greenway Committee and Hamilton Environmental Commission take the lead in their respective municipalities, coordinating with each other, Mercer County, D and R Greenway, D&R Canal Commission, and other state departments.**

Pace of Greenway Implementation

Development of the greenway is expected to be piecemeal. As opportunities for access easements and acquisition occur, pieces can be added to the puzzle, until eventually all the pieces complete the greenway. The more segments that are added, the more impetus there will be to add the more challenging pieces. Trail development can also be segmented and still have value, because many people enjoy going on short walks close to home. In any case, as more links are added, trails are developed, and the entire system comes closer to fruition, more effort can be spent on working out the most severe obstacles, such as passage under the railroad bridge.

Conservation Package

The following describes, from east to west, the properties for which permanent protection measures along the creek are proposed, and their position in the proposed Assunpink Missing Link Trail. (Map 10 shows parcel identification numbers for reference.) The width of the area proposed for conservation depends on individual site characteristics. In general, a 300 foot wide buffer is recommended to accommodate stream buffer protection, wildlife habitat, and the trail. (See box on page 32). Suggestions for which entity should take the lead in implementation are also offered.

Block/Unit	Owner	Mailing Address	Acres	Land Use	Zoning
L-4103/12	Lawrence Square Village Condo Association	1 Simonelli Ct. Lawrenceville, NJ 08648	37.8	Common Open Space	Conservation
L-4103/13	Jersey Central Power & Light	P.O. Box 16001 Real Estate Dept Reading, PA 19640-0001	1.9	utility	Conservation

These parcels are a necessary link between Van Ness Wildlife Management Area and the remainder of the trail to the west. L-4103/12 is the common open space to the Lawrence Square Village Condominium Association. Although the land is presumably deed restricted from development, the issue of public access for non-residents needs to be researched and addressed. L-4103/13 has a small electrical box structure on it. An easement allowing public access across it would be needed.

The Lawrence Township Greenway Committee should work with the Condo Association and Jersey Central Power and Light to develop a mutually satisfying trail plan for these key parcels. The Greenway Committee created an official township greenway trail easement form for private property owners that they can use.

Block/Unit	Owner	Mailing Address	Acres	Land Use	Zoning
L- 4102/5	Wenczel Tile	200 Enterprise Avenue	41.2	Vacant	Industrial
L- 4101/1		Trenton, NJ 08638	9.5	Vacant	Industrial
H- 1507/1	Wenczel Tile	Klagg Avenue PO Box 5308 Trenton, NJ 08638	8.7	Vacant	Industrial

Wenczel Tile owns three parcels totaling almost 60 acres along both sides of the creek between Lawrence Station Road, Route 295 and the railroad tracks. According to aerial photograph interpretation and local's knowledge of the site, the company used the area for dumping tile waste, but did not manufacture the tiles nor build any structures on the parcels. The parcels do not appear to be in present use. They are reported tax delinquent. Public access along the creek through these

parcels is needed for the trail connection. In addition, a connection from the creekside trail up to Lawrence Station Road is recommended on parcel L-4102/5, as shown on Map 9, to provide a connection for the new large subdivision across the street on Lawrence Station Road.

Lawrence and Hamilton Townships should pursue acquiring these parcels due to their reported tax delinquency.

The D and R Greeenway should take the lead in approaching the next four landowners. In anticipation of availability of funds from Lawrence Township's dedicated open space tax, the D and R Greenway, Lawrence Township Conservation Foundation and Lawrence Township Greenway Committee should consider making a joint presentation to the Lawrence Township Council to use a portion of the funds to acquire land and/or easements on these properties, which are also proposed for a greenway and trail in the Township's Conservation Element of the Master Plan.

Block/Unit	Owner	Mailing Address	Acres	Land Use	Zoning
L- 3701/1	John Black	3901Crosswicks-Hamilton Square Rd., Robbinsville, NJ 08691	10.7	Vacant	Industrial

This parcel, adjacent to the west side of Rt. 295 and the creek, is entirely wooded with no apparent structures. Access through this parcel, from Bakers Basin Road to the creek, is needed for the trail connection.

Block/Unit	Owner	Mailing Address	Acres	Land Use	Zoning
L- 3701/2	Emilio DeAngelis	273 Bakers Basin Road Lawrenceville, NJ 08648	3.6	Residential	Industrial

This deep, narrow shaped parcel has a house on it close to the road. Public access along the creek would be needed for a trail connection along the north bank of the Assunpink. The other option is to provide a bridge across the Assunpink, and continue the trail westerly through Bear Swamp. Incidently, these two alternatives are not mutually exclusive. If both were to be realized, it would create another loop, augmenting the trail system.

Block/Unit	Owner	Mailing Address	Acres	Land Use	Zoning
L- 3701/3	L. Torma	267 Bakers Basin Road Lawrenceville, NJ 08648	17.2	Farm/Resid	Industrial

This parcel is listed as a qualified farm in the municipal tax assessment records. The parcel has a barn and house close to the road, and, from the aerial photograph, appears to have a driveway leading

all the way down to the creek. Public access along the creek is needed for the north bank trail connection.

Block/Unit	Owner	Mailing Address	Acres	Land Use	Zoning
L- 3701/4	Alfred Perna	265 Bakers Basin Road Lawrenceville, NJ 08648	12.1	Farm	Industrial

This parcel is listed as a qualified farm in the municipal tax assessment records. There are no structures on the lot. Public access is needed for the north bank trail connection.

Block/Unit	Owner	Mailing Address	Acres	Land Use	Zoning
L- 3601/20	Pine Run Christmas Tree Corp (New owner information not yet available)	300 Basin Road Hamilton, NJ 08619	37.2	Farm	Industrial

This wet and wooded parcel at the confluence of the Assunpink and Shipetauken Creeks was recently sold to the adjacent landowner to the north so that he can expand his mulch and concrete business. **When the new property owner submits a land development application to the township, Lawrence Township and the LTCF should request a conservation easement with public access along the creek.**

Block/Unit	Owner	Mailing Address	Acres	Land Use	Zoning
H- 1504/35	Sam and Elaine	300 Basin Road	17.4	Vacant	Conser-
H- 1504/37	Willard	Hamilton, NJ 08619	14.7		vation

This is a very wet parcel just below the confluence of the Shipetaukin and Assunpink Creeks. The PSE & G utility line runs across the lot. A very narrow "tail" of the lot squeezes between parcels on Evelyn Avenue and the creek, all the way down to Carnegie Road. This parcel is an important link in the proposed trail. The parcel is also quite beautiful in that it has a series of interconnected ponds and wet areas. Given that there are state owned lands across the creek, this parcel should also be owned by the state if and when it is incorporated into the greenway

The D and R Greenway has agreed to work with the landowner on conservation options.

Block/Unit	Owner	Mailing Address	Acres	Land Use	Zoning
H- 1501/1	Hamilton Transit Corp, Cntr Inc.	720 Sloan Avenue Hamilton, NJ 08619	2.8	Vacant	Conser-vation
1501/2	UNJRR & Canal Co-Nat'l RR Passenger Corp	400 N. Capitol St NW Washington, DC 20001	2.5	Vacant	Conser-vation

These two parcels are very narrow strips of land and wetlands between Sweet Briar Avenue and Whitehead Pond. They have virtually no development opportunity due to their wetness, narrowness and zoning classification. Access along these parcels is needed for the trail connection on the Hamilton side of the creek, as well as to improve access at Whitehead Pond. Parcel 1501/1 includes Whitehead Dam, which has been breached for several years and is continuing to fall apart. Mercer County has considered taking over the dam, but the County Engineer does not consider the area safe for public access and may not approve of the trail. The preferred outcome for Whitehead Dam must be agreed upon before the status of these lands can be determined. See pages 38 - 40 for discussion of the dam.

Hamilton Township and Mercer County should pursue acquiring these lots pending resolution of the Whitehead Dam problem.

Block/Unit	Owner	Mailing Address	Acres	Land Use	Zoning
H- 1571/2	DSC of Newark	70 Blanchard St Newark, NJ 07105	9.13	Vacant	Conser-vation

This vacant parcel straddles the creek just upstream of the Enterprise Avenue bridge. Its long narrow shape, proximity to the creek, and Conservation zoning severely limit development opportunities. Access along the Hamilton side would keep the trail off-street, but the trail could also go on Assunpink Boulevard, a quiet residential street paralleling the creek.

Hamilton Township should pursue acquiring this land to add to their streamside land inventory.

Block/Unit	Owner	Mailing Address	Acres	Land Use	Zoning
H- 1632/1	Demag Delaval Turbo Machinery	840 Nottingham Box 8788 Trenton, NJ 08650	1.2	Vacant	Conser-vation

This parcel, on the creek and Enterprise Avenue, is an overgrown, fenced off, unused parking lot. It is an eyesore in the neighborhood, and it contributes excess runoff into the creek. Ideally, the parking lot would be taken up and replanted with native species to absorb floodwaters and filter out nonpoint source pollution before it flows into the water, and to beautify the neighborhood.

The D and R Greenway, Mercer County and Hamilton Township should pursue reclaiming this parcel.

Hamilton Township and the D and R Greenway should pursue conservation easements with public access along the creek through the next 5 parcels in order to connect with the Trenton Assunpink Greenway:

Block/Unit	Owner	Mailing Address	Acres	Land Use	Zoning
H- 1632/5	Demag Delaval Turbo Machinery	840 Nottingham Box 8788 Trenton, NJ 08650	32.2	Industrial	Industrial

A large manufacturing plant and employee parking lot is sited on this parcel. The area between the parking lot and creek is a grassy lawn, mowed all the way down to the creek's edge. Planting native wetland species along the creek's buffer would reduce streambank erosion and better filter out pollutants before they reach the stream. It can also save the company time and money in their lawn care maintenance.

Block/Unit	Owner	Mailing Address	Acres	Land Use	Zoning
H- 1634/3	Consolidated Rail Corp.	PO Box 8499 Philadelphia, PA 19101	0.4	rail spur	Industrial

This small parcel is a rail spur off the Amtrak line serving the industrial complex. It is unclear how often, if ever, this freight line is used. Crossing issues will need to be resolved at some point, probably after access is gained from the adjoining parcels.

Block/Unit	Owner	Mailing Address	Acres	Land Use	Zoning
H- 1517/1	Demag Delaval	840 Nottingham Box 8788	22	Industrial	Industrial
H- 1517/2	Turbo Machinery	Trenton, NJ 08650	37		

A land development proposal was recently submitted to Hamilton Township for parcel 1517/2, and the township requested and received a 50 foot wide conservation easement along the creek. The township should ensure that public access is part of the easement agreement.

Block/Unit	Owner	Mailing Address	Acres	Land Use	Zoning
1633/1	IMO Delaval	1009 Lenox Drive	13	Industrial	Industrial

A large manufacturing building that is right on the creek takes up most of this parcel, and a small tributary feeds into the creek at the southern end of the parcel, creating the municipal border with Trenton. Hetzel Field, an anchor to the Trenton Assunpink Greenway, lies on the other side. Passage along the creek into Trenton on the Hamilton side would therefore be difficult. Instead, the trail could use the Clinton Avenue Bridge and connect with the Trenton Assunpink Greenway within the city.

Assunpink Trail Link to Nearby Trail Systems

Developing an Assunpink trail as described above affords an opportunity *to connect with five other trails in the area*, providing an extremely impressive network of trails for regional residents to enjoy. The five other trails are:

1. Trenton Assunpink Greenway - Trenton is reclaiming land along the Assunpink to develop a greenway linking up with the Delaware River Walkway. A conceptual master plan is underway by a consultant for the development of a park and recreation complex between the Assunpink and the Trenton Freight Yards, from Monmouth Street to Hetzel Field and George Page Park. The city is also looking into restoring the culverted section of the creek east of the Amtrak train station. Segment Two of the Assunpink Missing Link Trail will connect with the Trenton greenway in two ways: In the short-term, Mulberry Street serves as an on-street connection between the end of the D&R Canal towpath and George Page Park. In the long-term, access easements along the creek through the industrial properties will provide the connection. The City of Trenton Department of Recreation, Natural Resources and Culture and the Department of Housing and Development are overseeing the Trenton Assunpink Greenway Project, and an administrator from the USEPA has been assigned to facilitate and coordinate all the project's details.

2. Delaware River Heritage Trail - This proposed trail is envisioned as a loop extending from Morrisville to Philadelphia in Pennsylvania and Trenton to Palmrya in New Jersey, crossing the river via the Tacony-Palmyra and Calhoun Street Bridges. The foundation for the trail exists, but linkages are needed to connect waterfront parks, promenades, canal towpaths, railbeds and dike trails. Significant progress has been made on the New Jersey side. The National Park Service, Rivers, Trails and Conservation Assistance Program is coordinating this project.

3. Ewing-Lawrence Greenway - Envisioned by Ewing and Lawrence Townships Greenway Committees, this proposed trail would use NJDOT right-of-way from Princeton Avenue at the Brunswick Circle out past the College of New Jersey. The D&R Canal Towpath and Segment Two of the Assunpink Greenway are five to six blocks away.

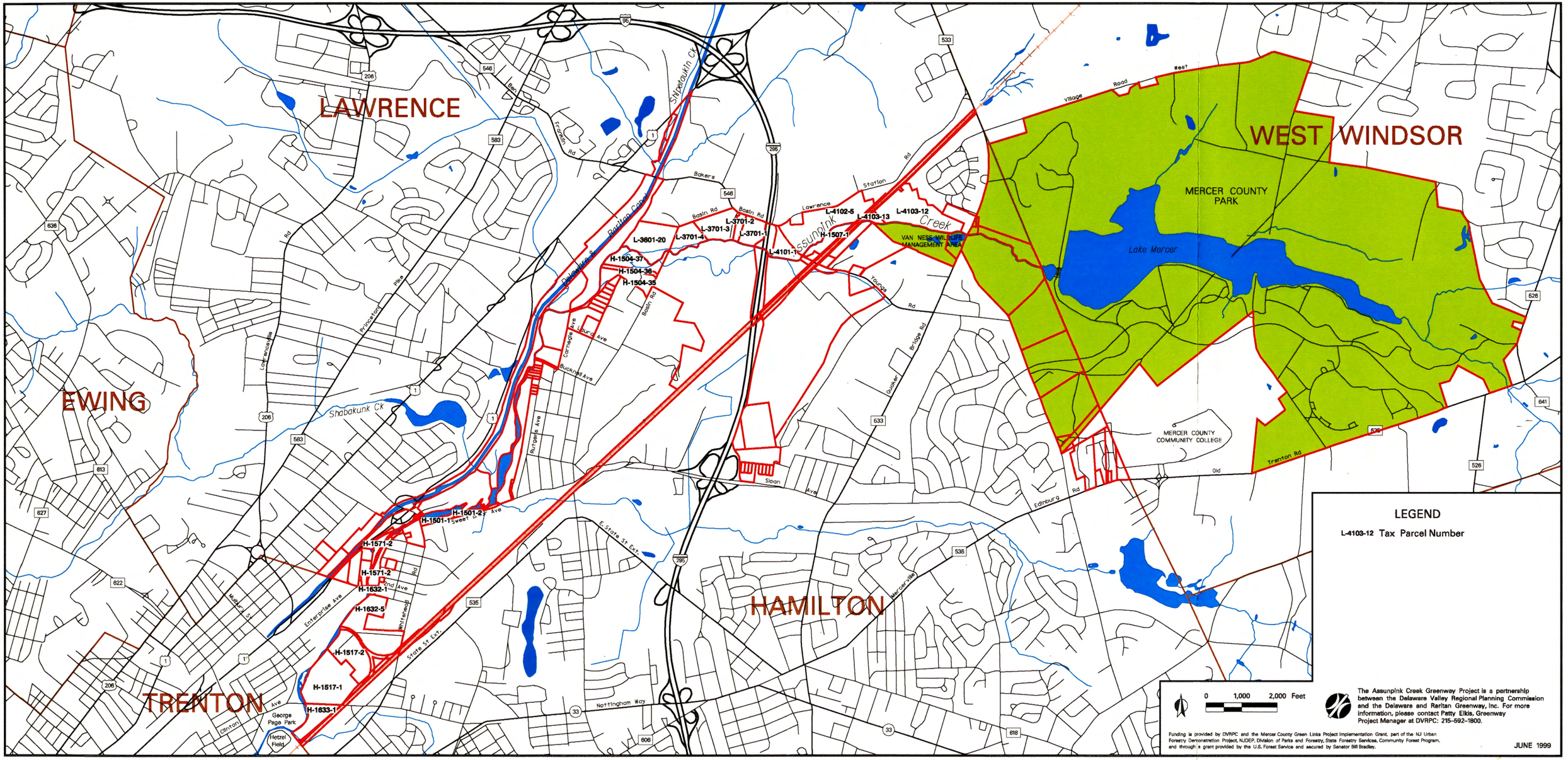
4. Camden-Amboy Rail-to-Trail - This project spearheaded by Washington Township would convert the abandoned rail line to connect Bear Brook, the Village of Windsor and Robbinsville within the township, and ultimately connect to Bordentown, from which it originates. The rail line crosses the Assunpink Creek, providing an opportunity for linkage.

5. Revolutionary War Trail - This state envisioned trail will ultimately connect Washington Crossing State Park with the Monmouth Battlefield, and Revolutionary War sites in between, such as the Assunpink at Quaker Bridge Road, where General Washington crossed on his night march from Trenton to Princeton. A stone monument currently marks the site.

The Lawrence Township Greenway Committee, Hamilton Township Environmental Commission and Mercer County Planning Division should coordinate connections with the other five trails in the area.

ASSUNPINK CREEK GREENWAY STUDY

MAP 10 – TAX PARCELS



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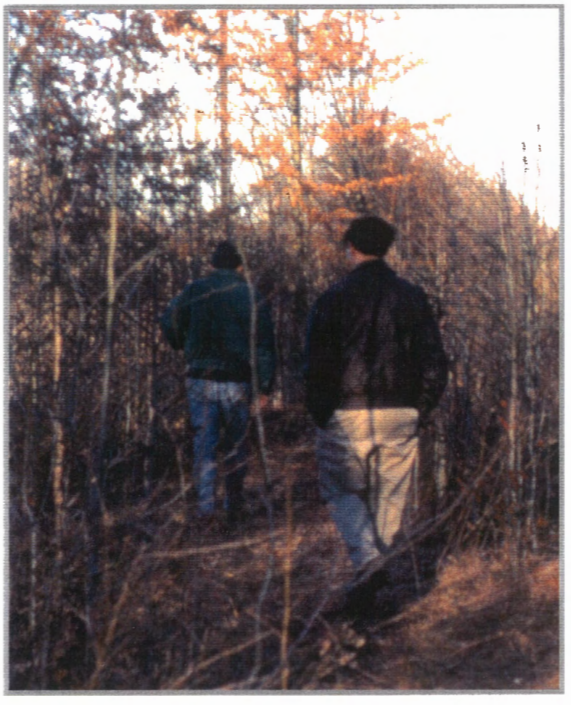
JUNE 1999

Chapter 6
Assunpink Greenway Missing Link
Major Issues, Goals and Recommended Actions



Chapter 6
ASSUNPINK GREENWAY MISSING LINK
MAJOR ISSUES, GOALS and RECOMMENDED ACTIONS

The combination of mapping, research, analyses and meetings with the steering committee and with the public elicited the following major issues and goals for the Assunpink Missing Link Greenway. Recommended actions for Lawrence and Hamilton Townships, Mercer County, the Delaware and Raritan Greenway, Inc., Assunpink Creek Watershed Association and local residents are given. **Each recommendation is based on analyses in the report on the noted pages.**

I. *ISSUE: Half the length of the Assunpink is largely preserved as parkland and several efforts are underway to protect remaining portions of the stream corridor. Formal establishment of a greenway through Lawrence and Hamilton Townships would complete the green link from the Assunpink's headwaters to its mouth.*

Goals

A. Conserve environmentally sensitive open space areas along the creek through acquisition and conservation easements with public access.

B. Strengthen land use regulations governing protection of ecologically important streamside lands.

Recommended Actions

1. **The Delaware and Raritan Greenway, Inc., Lawrence and Hamilton Townships, Mercer County, and the Lawrence Township Conservation Foundation** should follow the Conservation Package to preserve a minimum 300 foot wide riparian buffer along the creek. This will require a combination of land acquisition, conservation easements, and coordinated action among the planning partners. (pages 49-54)

2. **Hamilton Township** should consider adopting an Official Greenway Map to facilitate conservation of sensitive streamside lands. (p. 47)

3. **Hamilton Township** should consider adopting a stream buffer setback requirement similar to Lawrence Township's. (p. 31)

4. **Hamilton and Lawrence Townships** should consider strengthening protection of their natural resource areas by incorporating performance zoning and net-out of resources techniques in their land development ordinances. (p. 34)

II. *ISSUE: The water quality of the Assunpink Creek within the greenway study area is good, but it is threatened by additional development occurring in the watershed that will increase stormwater runoff and threaten vital floodplains and wetlands that filter out pollution before it reaches the stream.*

Goals

A. Protect the water quality of the Assunpink and surrounding tributaries.

B. Promote good land stewardship practices among residents and businesses in the Assunpink watershed.

C. Prioritize stormwater management at the municipal level and promote techniques that address water quality and groundwater recharge.

Recommended Actions

1. **Concerned residents** should re-establish the citizen water quality monitoring effort in conjunction with the **Assunpink Creek Watershed Association and Delaware Riverkeeper Network**. The information obtained from water quality testing should be complemented with proactive outreach to public officials. The data can be used to influence land planning decision making and can provide impetus for land stewardship education. (p. 27)

2. **Environmental Commissions and the Assunpink Creek Watershed Association** should urge local school boards to incorporate environmental education, including participation in hands-on stewardship activities, into the regular school curriculum. (p. 27)

3. **Township officials and neighbors** should notify the Soil Conservation District if they suspect an erosion or sedimentation problem. (p.35)

4. **Hamilton Township** should prioritize stormwater management and adopt an updated ordinance addressing water quality and groundwater recharge as well as runoff rates. (P. 36)

5. **Lawrence and Hamilton Townships' Environmental Commissions and the Assunpink Watershed Association** should consider taking periodic walks after heavy rains to trace where litter and sediments, oil, grease and other pollutants go. They can use their recorded observations to influence municipal policies on incorporating water quality as well as flood control provisions in the design of stormwater facilities. (p. 37)

6. **The Assunpink Creek Watershed Association and local environmental commissions** should produce and distribute information on good land stewardship. Examples are in Appendix C. (p. 41)

III. *Issue: A trail developed along the Assunpink Creek Missing Link Greenway would connect two popular regional facilities:*

1. *Mercer County Park with the D&R Canal Towpath*
2. *The D&R towpath with the Trenton Assunpink Greenway along the Hamilton side.*

These trails also have the potential to link up with at least 5 other proposed trails in the area.

Goals

A. Develop a trail connecting Mercer County Park and the D&R Canal Towpath along the Assunpink Creek.

B. Develop a trail connecting the D&R Canal Towpath at Carnegie Road with the proposed Trenton Assunpink Greenway along the Hamilton Township side of the creek.

C. Develop connections with the five other proposed trail systems: Trenton Assunpink Greenway, Ewing-Lawrence Greenway, Camden-Amboy rail-to-trail, Delaware River Heritage Corridor, and Revolutionary War Trail.

Recommended Actions

1. **The Delaware and Raritan Greenway, Inc, Lawrence and Hamilton Townships, Mercer County, and the Lawrence Township Conservation Foundation** should follow the Conservation Package to preserve a minimum 300 foot wide riparian buffer along the creek. (Pages 49-54)

2. Sponsors, namely the **Lawrence Greenway Committee and Hamilton Environmental Commission**, should take on the role of overseeing trail development in their municipalities between the county park, canal towpath, and Trenton Assunpink Greenway. They should coordinate with each other, the county, the D and R Greenway, D&R Canal Commission, and other state departments. (p. 48)

3. **Lawrence Township Greenway Committee, Hamilton Township Environmental Commission, and Mercer County Planning Division** should coordinate connections with the other five trails in the area. (p. 55)

IV. *Issue: Whitehead Dam has been breached and is continuing to fall apart. The dam's deterioration is easing flooding upstream, with no negative impacts downstream. The present situation is unsightly and unpredictable. The dam should either be fully repaired, partially repaired with a weir, or removed.*

Goal

1. Interested parties come to agreement on the best outcome for Whitehead Pond, taking into consideration flood control, water quality, habitat, recreation and scenery.

2. One of the interested parties takes responsibility for overseeing the implementation of the agreed upon outcome for the dam and pond.

Recommended Actions

1. **The Assunpink Watershed Association, Delaware Riverkeeper Network, D and R Greenway, Mercer County Division of Planning and of Engineering, Ewing-Lawrence Sewage Authority and Lawrence and Hamilton Townships** should form a "Whitehead Dam Task Force" to develop and implement a restoration project for the Whitehead Pond area. The project should include a panel of experts in restoration ecology, hydrology, flooding and dam construction to determine the best solution for Whitehead Dam. (p. 40)

2. The **"Whitehead Dam Task Force"** should incorporate the trail component into their planning for the area. (p. 40)

Appendices

Appendix A
LIST OF LOCAL CONTACTS

ANJEC
P.O. Box 157
Mendham, NJ 07945
201-539-7547
Sally Dudley, Executive Director

Assunpink Creek Watershed Association
620 Greenway Avenue
Ewing, NJ 08618
609-883-3897
Karen Sare, President

City of Trenton,
319 East State Street, 1st Fl,
City Hall Annex
Trenton, NJ 08608-1866
Office of Natural Resources
609-989-3255
Jean Shaddow, Director
Division of Planning
609-989-3604
Diane Strauss, Principal Planner
609-989-4238
Leah Yasenchak, Assunpink Greenway Coordinator

Delaware and Raritan Canal Commission
P.O. Box 539
Stockton, NJ 08559
609-397-2000
Jim Amon, Director

Delaware and Raritan Greenway, Inc
570 Mercer Road
Princeton, NJ 08540
609-924-4646
Linda Mead, Executive Director

Delaware River Basin Commission
PO Box 7630
25 State Police Dr.
W. Trenton, NJ 08628
609-883-9500 x.236
Paul Webber, Waterway Corridor Coordinator

Delaware Valley Regional Planning Commission
111 South Independence Mall East
Philadelphia, PA 19106
215-238-2838
Patty Elkis, Greenway Project Manager

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64 Lawn Park Avenue
Lawrenceville, NJ 08648
609-883-1737
Anne Demarais, Chair

Hamilton Township
2090 Greenwood Avenue
Hamilton, NJ 08650
609-890-3674
Allen Schectel, Planning Superintendent

Lawrence Township
P.O. Box 6006
Lawrenceville, NJ 08648
609-844-7071
Andy Link, Assistant Township Planner

Lawrence Township Conservation Foundation
44 Titus Avenue
Lawrenceville, NJ 08648
609-896-9714
Joyce Copelman, President

Mercer County Planning Division
County Administrative Building
640 South Broad Street
Trenton, NJ 08650
609-989-6545
Lisa Fritzinger, Principal Planner

Mercer County Soil Conservation District
508 Hughes Drive
Hamilton Square, NJ 08690
609-586-9603
William Brash, Jr., Director

Washington Township
1117 Route 130
Robbinsville, NJ 08691
609-259-3443
Bob Melvin, Director of Planning

NJ Department of Transportation
Transportation Equity Act for the 21st Century (TEA21) Enhancements Grants
609-530-3640
Robert Goslin, Local Aid Coordinator
609-530-8062
Bill Feldman, Bicycle and Pedestrian Coordinator

NJ Department of Environmental Protection
Office of Environmental Planning
CN 418
Trenton, NJ 08625-0418
609-633-1179
Waterwatch Program
609-984-3588
Environmental Education
609-984-9802
Office of Natural Lands Management
609-984-1339

Delaware Riverkeeper Network
P.O. Box 326
Washington Crossing, PA 18977
215-369-1188
Fred Stine, Outreach Coordinator
856-854-5108
Pollution Hotline
1-800-8-DELAWARE

Appendix B
LIST of GRANT OPPORTUNITIES for FUNDING OPEN SPACE PLANNING and ACQUISITION

COUNTY

1. Mercer County Open Space Trust Fund Tax Funds raised through the collection of a maximum tax of two cents per $100 of assessed valuation in any given year will be used for land acquisition and recreational facility development. This funding, estimated at about $4 million per year, will supplement the county's continued active participation in the State's Farmland Preservation Program and Green Acres land acquisition program.
Contact: Lisa Fritzinger, Principal Open Space Planner, Mercer County Division of Planning 609-989-6545

2. Public Lands Clean-Up Program
Eligible applicants: Volunteer Groups
Eligible projects: Litter clean-up and removal
Maximum grant: Small grants may be awarded to groups that work for a minimum of three hours cleaning up litter along streams or roads or in parks. Program provides vests and trash bags
Required match: Labor
Application Round: Ongoing throughout year
Contact: Clean Communities Program, Mercer County Improvement Authority 609-695-1200

STATE

Voters overwhelmingly approved a referendum in November 1998 to dedicate $98 million annually in dedicated state taxes toward land preservation over the next 10 years. A bill authorizing the spending, the Garden State Preservation Trust Act, was passed June 30, 1999, annually allocating $55.2 million for Green Acres acquisitions of open space, parks and greenway, $36.8 million for farmland purchases, and $6 million for historic preservation projects. The bill guarantees the distribution of $98 million each year for the next 10 years, eliminating the previous year-to-year uncertainty that used to bring land acquisitions to a halt when funding expired, until voters authorized additional bond acts. The legislation establishes the Garden State Preservation Trust, a nine-member board that will receive applications and approve projects submitted by Green Acres and the State Agriculture Development Committee twice a year.

1. New Jersey Green Acres Program
Eligible applicants: Municipalities and counties
Eligible projects: Open space acquisition and outdoor recreational facility development
Application Round: Varies

Project Categories:

a. Standard Program - Offers 2% loans over 20 years and grants (typically 75% loan, 25% grant), to finance eligible costs associated with the acquisition and development of recreation lands.

b. Planning Incentive Program - Offers 50% loan, 50% grant to those local governments that have enacted an open space tax and have adopted an open space and recreation plan. Lawrence voters passed a referendum for a 1 cent/$100 assessed value tax dedicated to open space in November 1999. Hamilton voters rejected a 5 cent/$100 assessed value tax in 1998.

c. Urban Aid Program -Offers 50% loan, 50% grant. This category is limited to acquisition and development projects sponsored by local units eligible to receive state aid pursuant to P.L. 1978, c. 14 (C.52:27D-178 et seq.) Neither Lawrence of Hamilton are eligible, but the City of Trenton is eligible.

d. Nonprofit Organization Program: The Green Acres Program also runs Green Trust Funding Rounds for nonprofit charitable conservancies. The program offers 50% grants, with the match being made with cash or a donation of land. Maximum grants are $500,000.

e. Tax Exempt Program: Program provides exemption from local property taxes to eligible nonprofit organizations which own recreation or conservation lands and open their private lands to the public.

Contact: Kevin Richardson 609-984-0500

2. New Jersey Local Coastal Planning Grant Program

Funds projects that promote sustainability and environmental protection in the coastal zone. The program is dependent on the availability of funds. For updated status of the grant program, call Dorrina Frizzera of the Coastal Planning Unit, Office of Environmental Planning, NJDEP, at 609-777-3251.

3. New Jersey Office of Environmental Planning Non-point Source Pollution Control and Management Implementation (Section 319(h) Grants)

Eligible applicants: Regional comprehensive planning or health organizations and coalitions of municipal, county governments and/or local or county environmental commissions, watershed and water resource associations, nonprofit organizations

Eligible projects:

a. Category I - Management Practices

Projects that implement BMPs which have been proven to work either in the proposed project area or in another area of similar environmental conditions

b. Category II - Education and Outreach to Critical Audiences

Projects that provide mechanisms that teach people to implement BMPs or NPS Pollution Management Programs
Maximum grant: At least $850,000 was available for State Fiscal Year 1999
Required Match: Funds in the amount equivalent to at least 20% of the total project amount required, and may consist of cash, in-kind services, or a combination of both
Application Round: Call for more information
Contact: Kimberly Cenno, Office of Environmental Planning at 609-292-2113

4. New Jersey Office of Environmental Services Matching Grants Program
Eligible applicants: Local environmental agencies
Eligible projects: Projects that promote the protection of natural resources by documenting those resources, preparing policy recommendations to protect those resources, and by preparing and disseminating information about the ways in which the public can participate in protecting the environment. Examples of previously funded projects include: natural resource inventories, water quality studies, master plan and zoning ordinance amendments, open space plans, greenway planning, and public education programs.
Maximum grant: $2,500
Required match: At least 50%
Application Round: Typical deadline is early December for awards in following year
Contact person: Dianne Shatin, Coordinator, 609-984-0828

5. NJDEP Clean Lakes Program
Eligible applicants: Municipal, county and regional government agencies
Eligible projects: Projects that improve the recreational water quality at *public* lakes
Maximum grant: Up to 70% USEPA funding for Phase I Diagnostic Feasibility Projects; up to 50% state funding for Phase I Diagnostic Feasibility Projects. Up to 50% USEPA funding for Phase II Implementation Projects; up to 75% state funding for Phase II Implementation Projects
Application round: typically September 1 each year
Contact: Bud Cann, Supervising Environmental Specialist, Water Monitoring Management, 609-292-0427

6. National Recreational Trails Act Projects - Administered through NJDEP, Division of Parks and Forestry, Office of Natural Lands Management
Eligible applicants: public agencies and nonprofit organizations
Eligible projects: Trail proposal must be located on land that is publicly owned or privately owned with a government agency holding an easement or lease for public access. Projects must be completed within 3 years.
Maximum grant: $15,000
Match required: 20% of total project, may be cash or fair market value of labor or materials
Application round: Varies yearly.
Contact: Celeste Tracy or Valerie Salice, Office of Natural Lands Management, 609-984-1339.

FEDERAL

1. National Parks Service Rivers, Trails and Conservation Assistance Program

Eligible applicants: Community groups, municipalities, partnerships
Eligible projects: Greenway plans, stream restoration, trail design, conservation workshops, inventories of natural, cultural and recreational resources
Maximum grant: Staff involvement (technical assistance) rather than financial assistance
Required match: Projects are undertaken as partnerships, and costs are shared with other organizations. Cost-sharing arrangements may involve money and/or in-kind services.
Application Round: On-going assistance offered to applicants developing proposals, July deadline for formal application for assistance
Contact: Robert Potter, Program Manager, 215-597-1787

2. Wetlands Reserve Program of the USDA Natural Resources Conservation Service (NRCS):

Eligible applicants: Landowners (NRCS determines final eligibility)
Eligible projects: Land with the potential to contribute to desired ecosystem functions and values fitting into one the following categories: agricultural lands with restorable wetlands, former or degraded wetlands occurring in range and forest production land, riparian areas that connect with protected wetlands along streams or other waterways, adjacent lands that will contribute significantly to the wetland functions and values, previously restored wetlands under a State or Federal restoration program, privately developed wetland areas meeting NRCS restoration standards
Maximum grant: The program offers landowners three options to choose from when enrolling: a permanent easement, a 30 year easement, and a cost-share agreement in lieu of requiring an easement. Easement payment is for the agricultural value of the land, an established payment cap, or an amount offered by the landowner. Restoration projects are fully funded by the NRCS for permanent and 30 year easements, and are funded 50 - 75% for non-easement agreements.
Required Match: 25-50% for non-easement agreements. Landowner is responsible for protecting and maintaining the wetlands within the boundaries of the easement. Public access to the easement area is not required. Acceptable uses of the land will be spelled out in detail and approved, and may include hunting, fishing, timber harvest, and haying or grazing, depending on the situation.
Application round: Ongoing, open sign-up in New Jersey began October 1, 1996.
Contact: Tim Dunne, Resource Conservationist, USDA, 908-735-0733

3. Environmental Protection Agency Environmental Education Grants Program

Eligible applicants: Government agencies, school districts, colleges or universities, nonprofit organizations, and noncommercial educational broadcasting entities
Eligible activities: Include, but are not limited to: Training educators; designing and demonstrating field methods, educational practices and techniques, including assessing environmental and ecological conditions or specific environmental issues or problems; designing, demonstrating or disseminating environmental curricula; and fostering international cooperation in addressing environmental issues and problems in the U.S., Canada and/or Mexico.

Maximum Grant: Approximately $3 million available for FY 98; 25% of available funds must go to small grants of $5,000 or less, maximum limit of $250,000 for any single grant.
Required Match: A minimum of 25% of total cost of project required
Application round: Varies yearly
Contact: Nan Ides, Project Officer. Customer Service hotline: 1-800-438-2474

FOUNDATIONS

1. Conservation Foundation American Greenways Dupont Award
Eligible applicants: Primarily nonprofit organizations, although individuals and local governments may apply
Eligible projects: Mapping, assessments, surveying, conferences and design activities, printed and audio-visual interpretative materials, building paths or bridges and other creative projects
Maximum grant: $2,500
Required Match: None
Application Round: Applications typically due December 31 of each year
Contact person: 703-525-6300

2. Dodge Foundation
Eligible applicants: Non-profit organizations with 501 (c)(3) status
Eligible projects: Projects that fit under the foundation's "Public Issues" category that focus on issues of sustainability, ecosystem preservation, energy conservation, pollution prevention and reduction, and environmental education and outreach that lead to enlightened environmental policy
Maximum grant: Grants generally range from $10,000 to $100,000
Required Match: None
Application Round: A one-page letter of inquiry by the applicant is encouraged to determine if a project falls within the foundation's guidelines. Applications for Public Issues Grants must be post-marked by September 15 of each year.
Contact: 201-540-8442

3. Environmental Endowment for NJ
Eligible applicants: Preference for nonprofits with 501(c)(3) designation, but other nonprofits also eligible
Eligible projects: Research, litigation, public education and other activities that will promote the conservation, preservation and improvement of the air, land, water and other natural resources
Maximum grant available: $20,000
Required Match: none
Application Round: Typically announced in November with applications due in January
Contact: Richard Sullivan, President, 609-737-9698

4. New Jersey Conservation Foundation Matching Mini Grant Program
Eligible applicants: Nonprofit organizations such as emerging land trust, citizen groups and greenway planning groups (organizations do not need nonprofit status)

Eligible projects: land planning, land acquisition, conservation easements
Maximum grant available: $5,000
Required Match: 50%
Application Round: Typically announced in October or November, applications due 4 to 6 weeks after announcement
Contact: Beth Davisson 908-234-1225

5. Pew Charitable Trust
Eligible applicants: Organizations classified as non-profit under section 501(c)(3) of the IRS Code, and as charitable under 509(a) of that Code
Eligible projects: Projects whose goals are to reduce the use and production of highly persistent toxic substances that adversely affect the environment and public health, and projects that halt the destruction and further degradation of forest and marine ecosystems in North America
Maximum grant: Majority of grants range from $50,000 to $250,000
Required match: None
Application Round: Proposals accepted year round and reviewed on rolling basis
Contact: Nahed Danial, 215-575-4744

6. Schumann Fund for New Jersey
Eligible applicants: Non-profit organizations with 501(c)(3) status
Eligible projects: Projects that support protection of natural resources, environmental quality and wildlife.
Maximum grant: No maximum was stated in the foundation's annual report, but previous environmental protection grants ranged from $10,000 to $80,000
Required match: No, but preference given to proposals indicating a high level of time and/or money contributed from the group to be served
Application Round: No yearly deadline; proposals are reviewed quarterly
Contact: 201-509-9883

7. Victoria Foundation
Eligible applicants: Non-profit organizations with 501 (c)(3) status
Eligible projects: For land acquisition - projects must be eligible for consideration by the State Green Acres Program, must have passed their initial screening process and must be in active consideration by Green Acres. Special consideration is given to projects that will protect wetlands and transition areas, farmland, critical wildlife habitats, headwaters, exceptional ecosystems, watershed lands, and aquifer recharge areas. Other eligible projects involve environmental education and leadership training, environmental research, public education and advocacy, and resource conservation in New Jersey..
Maximum grant: Land Acquisition - grants may be used toward all or part of the 50% match for Green Acres grants, usually up to $500,000. Other projects generally range from $8,000 to $50,000
Required match: Land acquisition - Green Acres grant; Other grants - No
Application Round: Ongoing
Contact: Nancy Zimmerman, 201-783-4450

8. William Penn Foundation
Eligible applicants: Non-profit organizations with 501(c)(3) status
Eligible projects: Projects that support the goals of promoting open space preservation, promoting development, maintenance and use of natural areas within the Philadelphia region, and that support environmental education
Maximum grant: Grants range from a few thousand to several million, depending on the size of the organization and the scope of the project
Required match: None, but the Foundation prefers to make grants for projects that receive support from several sources and that do not depend upon the Foundation for total funding
Application Round: Accepts grant requests throughout the year.
Contact: Geraldine Wang, 215-988-1830

Other sources of information on grants:

Environmental Grant Making Foundations, published by Resources for Global Sustainability, P.O. Box 22770, Rochester, NY 14692-2770. Telephone: 1-800-724-1857; Fax: 716-473-0968; e-mail: rgs@eznet.net; website: http:/home.eznet.net/~rgs. Costs about $90

The Mitchell Guide to NJ Foundations, published by Janet Mitchell, 430 Federal City Road, Pennington, NJ 08534-4209, 609-737-7224. The guide profiles 412 private foundations which donated more than $200 million to 18,000 charitable agencies.

Appendix C
EXAMPLES OF STEWARDSHIP BROCHURES

Much has been written about good land stewardship. The following materials have been included as examples of stewardship information designed for easy reproduction and dissemination. These flyers and pamphlets were developed, respectively, by:

1) The Media Area League of Women Voters in cooperation with the Darby Creek Valley Association and the Chester/Ridley/Crum Watersheds Associations;

2) The New Jersey Coalition for Alternatives to Pesticides and the NJ Environmental Federation, with printing costs funded by Whole Earth Center;

3) Jennifer Robinson, compiled from a 1994 newsletter of the Wildlands Conservancy, Emmaus, Pennsylvania.

4) Community Forest Network (CFN), authored by Don Zimar of The Care of Trees in Manasass, VA and Brain LeCouteur of the Metropolitan Washington Council of Governments. Call 202-962-3393 for more information

Another excellent source of information too lengthy to include here is "The Clean Water Book - Lifestyle Choices for Water Resource Protection" produced by the NJ Department of Environmental Protection, Office of Environmental Planning. Copies of this booklet can be obtained by calling Kyra Hoffman at 609-633-1179.

HOW TO CARE FOR YOUR STREAM

DO: ...plant trees and shrubs along your stream.

WHY: The roots of woody plants stabilize the banks and reduce erosion. Trees and shrubs also shade and cool the stream, which is better for fish.

DON'T: ...remove native vegetation from stream banks.

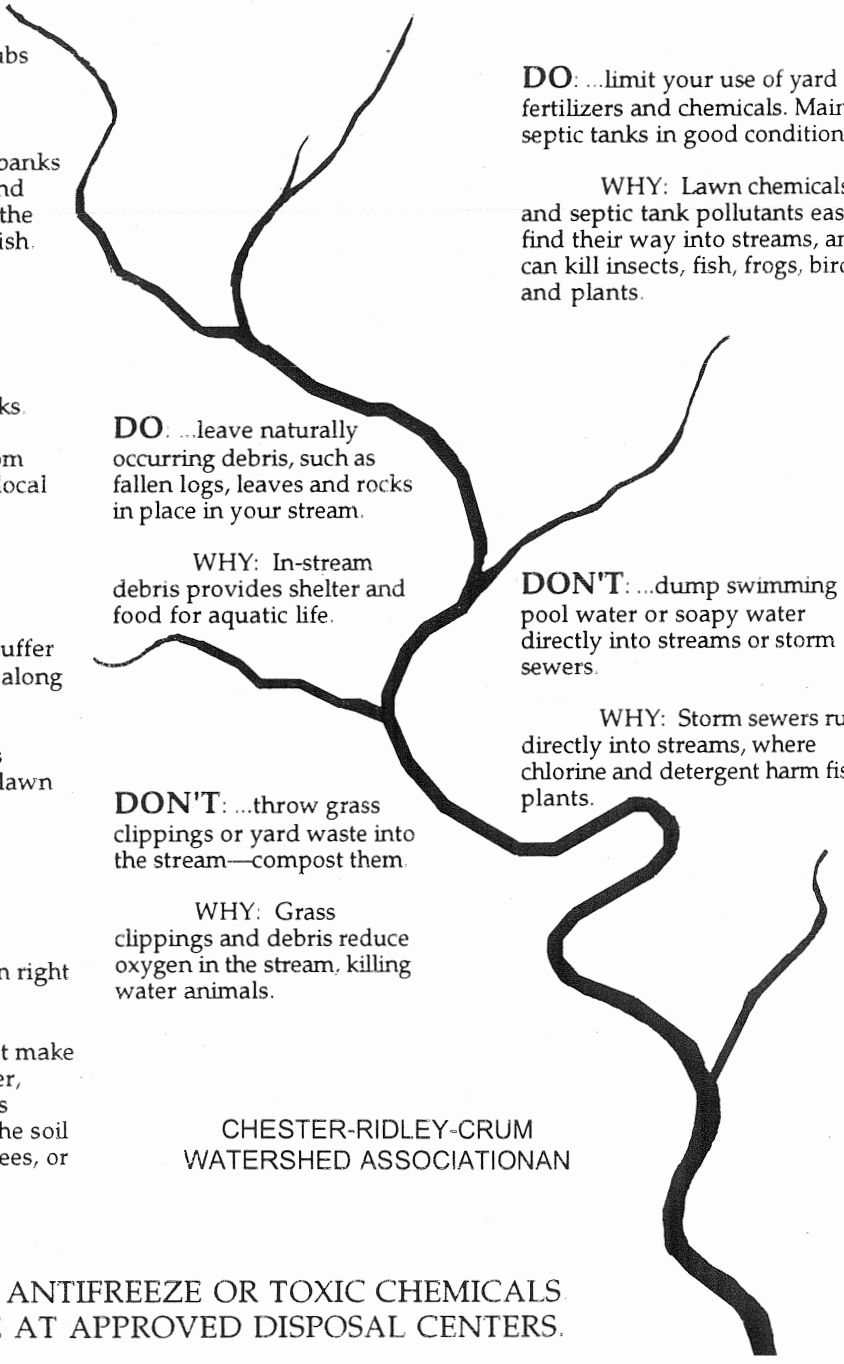
WHY: Leaf litter from native plants is part of the local food chain.

DO: ...maintain or create buffer zones (the wider the better) along streams and wetlands.

WHY: Buffer zones absorb water and filter out lawn chemicals, fertilizers and sediment.

DON'T: ...mow your lawn right up to the stream bank.

WHY: Turf does not make a good buffer. It sheds water, especially on slopes, and its shallow roots do not hold the soil as well as native grasses, trees, or shrubs.



DO: ...limit your use of yard fertilizers and chemicals. Maintain septic tanks in good condition.

WHY: Lawn chemicals and septic tank pollutants easily find their way into streams, and can kill insects, fish, frogs, birds, and plants.

DO: ...leave naturally occurring debris, such as fallen logs, leaves and rocks in place in your stream.

WHY: In-stream debris provides shelter and food for aquatic life.

DON'T: ...dump swimming pool water or soapy water directly into streams or storm sewers.

WHY: Storm sewers run directly into streams, where chlorine and detergent harm fish & plants.

DON'T: ...throw grass clippings or yard waste into the stream—compost them.

WHY: Grass clippings and debris reduce oxygen in the stream, killing water animals.

CHESTER-RIDLEY-CRUM
WATERSHED ASSOCIATIONAN

NEVER DUMP OIL, ANTIFREEZE OR TOXIC CHEMICALS.
DISPOSE OF THESE AT APPROVED DISPOSAL CENTERS.

EVERY LITTLE STREAM COUNTS . . .

The stream on your property may be a spring-fed rivulet, or a real creek. All are part of a single system, feeding into the Delaware River. Even the smallest stream supports aquatic plant and animal life, and is an important part of the water cycle. Every stream deserves to be cared for, and kept free of pollutants, to keep the whole system healthy.

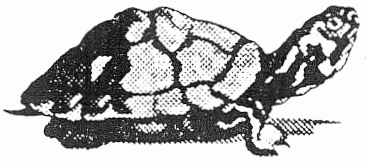
SOME HELPFUL DEFINITIONS:

A STREAM BUFFER or RIPARIAN BUFFER is a strip of land along a stream where trees, shrubs, and small plants are encouraged to grow. Recently scientists have learned the importance of buffers in keeping streams healthy.

The U.S. Forest Service now recommends a 50 foot buffer, free of all development, on each bank of a stream. Buffers of 300 feet or more are often used to protect the natural character of streams. On smaller properties, aim for a minimum of ten feet between your lawn and the stream bank. Even a single row of trees or bushes will help protect your stream.

NATIVE VEGETATION refers to plants that have always grown in this area. The animals in our streams use specific tree leaves for food and building material and thrive best when those species are present.

Non-native plants can contribute to a buffer zone by reducing erosion, but they may be invasive, and are less well suited to the existing food chain.



BEAUTIFUL AND HEALTHY:

We may be used to seeing streams edged by neatly mown grass. But running water offers an opportunity for imaginative landscaping. A buffer zone of trees, shrubs and ferns will add interest to your landscape and protect your stream. Here are some of the native species you might try:

Flowers: Purple stemmed aster; rose mallow; blue flag; yellow iris; cardinal flower; turtlehead; swamp milkweed; Joe-Pye weed.

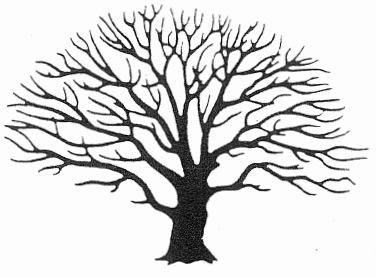
Ferns: Sensitive fern; cinnamon fern; royal fern.

Grasses & Sedges: Soft-stem bulrush; fringed, lurid or tussock sedge; big bluestem; cattails.

Woody Plants: Buttonbush; red-twig or silky dogwood; spicebush; Virginia sweetspire; shadbush; cranberry bush viburnum; red or black chokeberry; sweet pepperbush; inkberry and winterberry holly; common alder.

Trees: Many kinds of willow; river birch; ash; box elder; red maple; sweet bay magnolia.

Ask your local arboretum or nursery for information about these or other stream side plants.



WHO IS RESPONSIBLE FOR OUR STREAMS?

We all are! Most of us live upstream from someone else, and what we do affects others' water as well as our own. We need to work together to keep our streams clean and healthy. We are all stewards of the land.

Your township or borough is responsible for making regulations to protect the streams that run through it. These may cover development on steep slopes or flood plains, storm water management, sewers and septic tank regulations. Most streams run through more than one jurisdiction, and ordinances vary. Encourage local officials in towns along your stream to cooperate to protect it.

Local watershed groups work across municipal boundaries to monitor and enhance the various creeks in our area. You might want to start your own stream protection group, or contact:

Darby Creek Valley Association
P.O. Box 583
Lansdowne, PA 19050

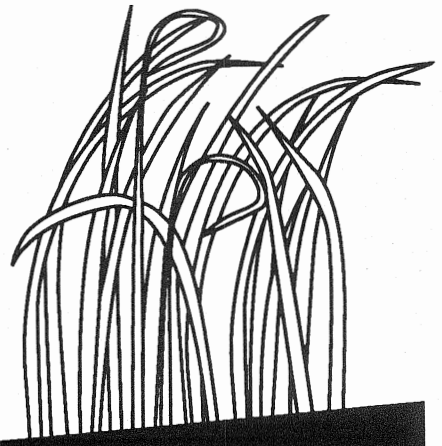
Chester/Ridley/Crum Watersheds Association
P.O. Box 972
Edgmont, PA 19028

Brandywine Valley Association
1760 Unionville-Wawaset Road
West Chester, PA 19382-6751

This pamphlet was developed by the Media Area League of Women Voters, in cooperation with the Darby Creek Valley Association and the Chester/Ridley/Crum Watersheds Association. Layout courtesy of Taylor Memorial Arboretum.

9/95

LAWN CARE



WITHOUT TOXIC CHEMICALS

ENVIRONMENTAL FEDERATION

Our thanks to Nancy Coleman & Susan Wolf of NJ Coalition for Alternatives to Pesticides and Jane Nogaki and Tom Moritz of the NJ Environmental Federation.

Printing costs funded by Whole Earth Center
A natural food store • 360 Nassau St.,
Princeton, NJ 08540 • (609) 924-7429

MONITOR THE LAWN

Identify problems:
Sufficient sunlight and air? Diseases? (eg. dollar spot, leaf spot) Pests? (Chinch bugs, etc.) Treat only the problems that exist and use alternative controls specific to the problem.

MOWING

Set mower 3"– 4." Taller grass chokes out weeds (like crabgrass).
To prevent compaction, rotate mowing pattern. Mow lawn as needed, never cutting more than 1/3 of leaf blade at a time, and leave grass clippings on lawn for nutrient recycling.

TEST SOIL FOR FERTILITY AND pH

Have soil tested each year.
Adjust pH to the needs of your lawn. Pulverized or pelletized lime should be added according to need determined by pH test results. Fertilize twice a year, once in the fall and once in the spring or fertilize four times a year at half/rate.

Use natural organic fertilizers; they feed the soil, and release slowly throughout the season. They enhance and encourage beneficial organisms which aerate soil and naturally break down thatch. Never fertilize in hot weather. Established lawns may need less frequent fertilization, especially with "cut it and leave it" practices.

PLANT PROPER VARIETIES OF GRASS

Choose appropriate grasses for your soil and light conditions. Re-seed bare spots, preferably in the fall. Over-seed (rake in) if grass plants are aging. You can contact the Rutgers Cooperative Extension Program for more information.

AERATE SOIL

Aeration helps prevent weeds and reduces compaction. Core aeration is ideal. Aerators can be bought or rented. A good supply of earthworms will aerate the soil adequately as long as there is no compaction problem.

REMOVE THATCH

Thatch is the accumulated dead material at the base of the grass. Rake frequently by hand or rent a thatching machine. Dethatch only if thatch is one inch or more. Organic fertilizers help break down thatch naturally. Worms do too!

REDUCE WEEDS

Use correct mower height. Re-seed bare spots preferably in the fall. In the spring, use seed soaked in water for 24 hours to speed up germination and mix with soil and sand in bare spots.
Identify weeds and establish tolerance levels. Hand dig weeds until competition by grass plants eliminates most weeds.

WATERING

If less than 1" of rain falls per week, water deeply and infrequently. This encourages deep root growth. Sandy soils and sloped lawns need more frequent watering. Water only in cool of morning. Lawns in full sun need more frequent watering.

ELIMINATE PESTS

Attract birds, "nature's insect control," by planting proper shrubs and by offering housing, water and food. Identify pests, then use biological pesticides specific to that pest. E.G. B.t. for leaf eating caterpillars; milky spore powder for the long-term control of Japanese beetle grubs. Use beneficial nematodes to control high populations of Japanese beetle grubs. Natural pesticides such as pyrethrum, rotenone and sabadilla are broad spectrum and toxic, but are short lived in the environment. They should be used with caution and only as a last resort, in accordance with label directions.

LAWN SERVICE

Avoid chemicals entirely. Get a written contract, specifying what chemicals the service will use. Reserve the right to cancel use of any chemical product. Don't let them treat problems that are not there!

LAWN CARE... WITHOUT TOXIC CHEMICALS

How to Care for Your Stream

by Jennifer Robinson

This valuable list of does and don'ts was taken from Wildlands, May/June 1994, the newsletter of the Wildlands Conservancy of Emmaus, Pennsylvania:

Don't remove native vegetation growing adjacent to the streams.

Why: Trees and shrubs shade the stream (trout require coolwaters for survival) and provide leaf litter which forms the base of the aquatic food web.

Do plant native trees and shrubs along unvegetated areas of the stream bank.

Why: the root systems of woody vegetation stabilize stream banks and prevent erosion.

Don't mow your lawn right up to the stream; allow at least a 5 to 10 foot buffer along the stream. (most experts recommend a minimumof 50 feet.)

Why: an unmowed, naturally vegetated streambank buffer helps prevent erosion and filters out lawn chemicals which are damaging to stream life.

Do limit your use of lawn chemicals such as fertilizers, pesticides and herbicides.

Why: these chemicals easily find their way into the stream and can kill stream life including vegetation, insects, fish and birds.

Don't throw your grass clippings (or any other refuse) into the stream.

Why: Grass clippings in the stream will cause water-quality problems and will suffocate fish and other aquatic organisms.

Do restrict livestock from streamside area.

Why: Trampled banks release sediment into the streams and fecal bacteria animal wastes can cause serious water-quality and health problems.

Don't dump used oil, antifreeze, etc. into storm drains.

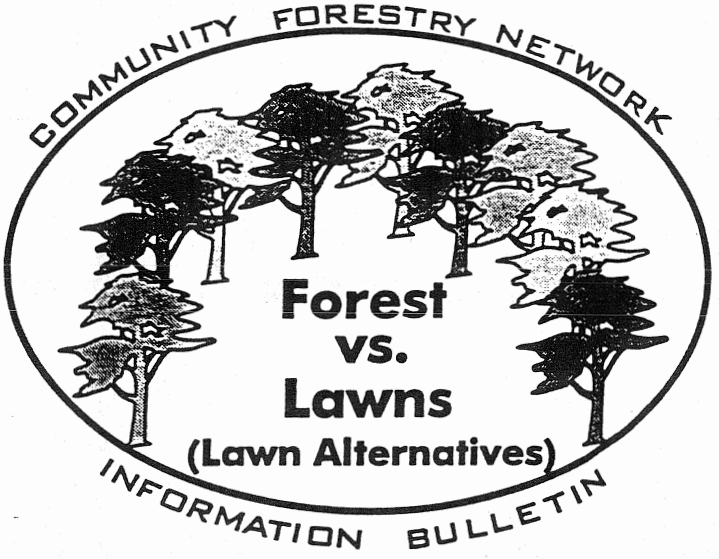
Why: These dangerous chemicals enter our streams through storm drains.

Don't remove stable, naturally occurring, instream debris, such as fallen logs.

Why: Instream debris holds rock fragments and organic particles for processing by aquatic animal life and provides cover and cooling shade for fish and other stream dwellers.

Do urge your local municipality to manage streamside parks in a more natural way.

Why: Many governing bodies believe that well-manicured parks are the only kind that are acceptable to residents. They need to hear a different opinion. In addition, mowing and manicuring requires large amounts of time, effort and taxpayer money.



REDUCE TURF AREA

"Americans love their lawns with a passion rarely seen in other countries; fifty-eight million Americans enthusiastically plant, weed, water, spray and mow an estimated twenty million acres of lawn." The passion for lawns has many impacts on our urban/suburban environments. Some of these impacts are:

- Loss of Forest Cover and Wildlife Habitat
- Air Pollution from Gasoline Powered Engines
- Pollution from Lawn Maintenance Chemicals
- Stress on the Municipal Water Supply

As land development carves up the landscape, fragments of the former landscape remain. Frequently, these fragments which consist of trees, shrubs and plants, are transformed into a grove of trees meeting a manicured lawn.

It is the goal of this Urban Forestry Information Bulletin to discuss how to best preserve these forest fragments in developed areas and present some environmentally sound and low cost/maintenance alternatives to grass or turf.

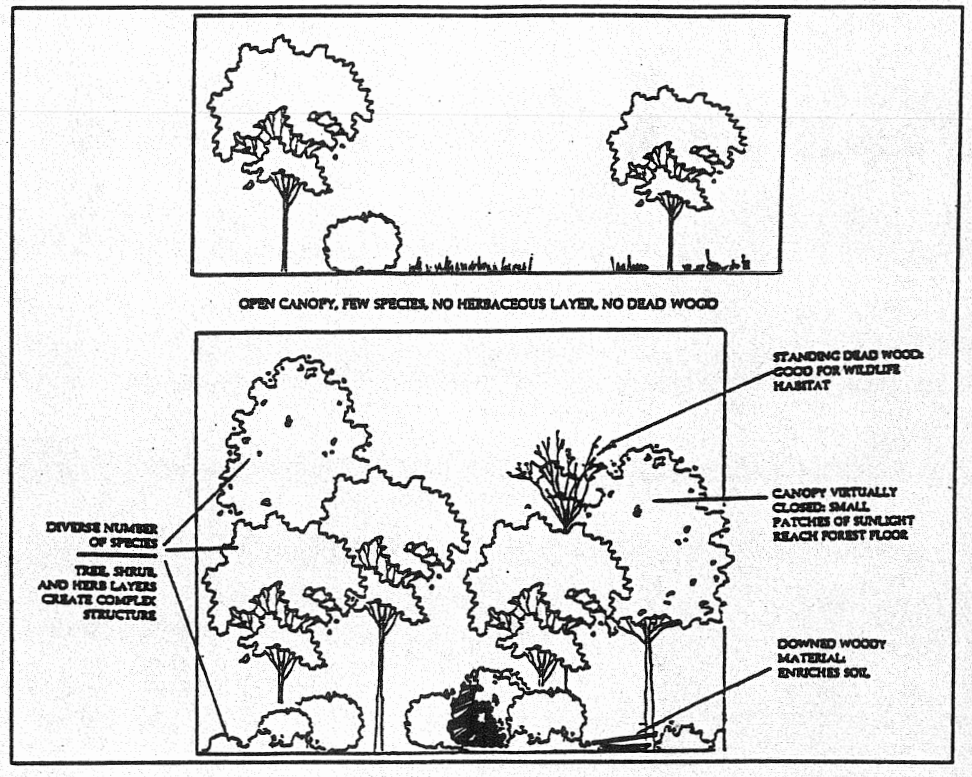
Impacts of Turf

Turf and other ground covers require maintenance which is generally incompatible with the needs of a forest ecosystem. Turf offers little or no wildlife habitat compared to the diversity of plants found in an existing forest.

Growing grass or turf management contributes to nonpoint source pollution by the residues of lawn fertilizer insecticides and herbicides applied to the lawn. Maintaining

turf also requires burning fossil fuels to power lawnmowers, and increases the volume of waste (clippings) sent to landfills.

Clearing or grading for the installation of turf and landscape plants destroys the existing plants and damages the remaining trees. Removing leaves and other fallen debris that comprise the forest "duff layer" interrupts the natural cycling of nutrients and water. Digging or tilling under trees [for the removal of understory and installation of turf or other plants,] can damage tree roots and causes a decline in tree health. Soil stockpiled under trees or added to help drainage whether (temporarily or permanently), can interrupt the balance of oxygen, moisture, and nutrient absorption to the tree's root system, and may result in tree decline and/or death. Select areas away from trees being preserved to stockpile soil and use natural or existing drainage contours to direct runoff.



Ground Covers

The ecology of forests is comprised of many integral components, including flora and wildlife habitat. It is important to consider the entire ecosystem for forest management planning. ***The best ground cover*** around trees and in forests is the type which most closely resembles the naturally occurring conditions. In general, our forests are characterized by a layered canopy structure consisting of large (overstory trees), smaller (understory trees), shrubs, and natural ground covers. The most prominent natural ground cover is leaf mulch. In deciduous forests, it is composed of deciduous leaves, in evergreen forests, it is primarily needles. Rainfall seldom creates runoff beneath a natural forest canopy due in part to high soil absorption rates, favorable soil conditions, and large amounts of water which are "sponged" or soaked up by the leaf mulch layers.

The best plants to grow under mature trees are species found in the natural leaf-mulch or "duff layer" of the forest floor. The horticultural industry is becoming increasingly successful at commercially producing more of the naturally occurring or native plants for enhancing natural landscapes. Ferns, woodland species wildflowers, understory shrubs, sedges, and mosses are now available through many nursery suppliers.

Unlike grass, very few *native* ground covers form dense blankets on the forest floor. Under normal circumstances, native ground covers tend to be randomly distributed, loosely arranged, overlapping patches of plant communities. Under moderate cultivation, some of these native plants will flourish and form a dense, uniform patch of vegetation.

Our forests have an understory comprised of mountain laurel, american holly, and other broad-leaved evergreens highly valued for spring blossoms, berries, screening, wildlife food and cover. There are also plants valued for their low to moderate growth habit and spring blossoms, such as wild azaleas, sweet-bay magnolia, flowering dogwood, redbud, and wildflowers. There are species of grasses, sedges, and ferns which also flourish in these undisturbed areas.

It is not necessary to limit ground cover selection to native plants. There are many introduced species which can add color, texture, and form. ***However, these introduced species need to be carefully scrutinized*** to avoid those with a tendency to take over or become "invasive." Some introduced species may offer the

opportunity to create a blanket effect without requiring excessive maintenance or containing invasive characteristics. Wildlife benefits of non-native species are typically less than native species.

Benefits of Natural Ground Cover

Maintaining diversity in plant communities is important because it provides balance and reduces the potential for any individual species to dominate the landscape.

Careful selection of alternative ground cover plantings will lead to reduced maintenance. Matching plant requirements to site characteristics to determine the ground cover selection will create a self-sustaining forest ecosystem. Occasional weeding, light fertilization, and supplemental watering may be required until the area has become established. Intensive turf maintenance activities such as mowing, pest treatment, dethatching, overseeding, aerating, and irrigation will also be eliminated.

Retaining the existing natural forest plants maintains the existing environmental character, enhances neighboring areas, and offers considerable environmental and financial advantages over turf and other ground covers. Maintenance requirements will reduce substantially over time for a properly planned and managed forest. More frequent use of turf alternatives will increase as communities discover the maintenance benefits and their importance to the environment.

Communities should focus on preserving as many components of the natural ecosystem as possible and consider the establishment of ground cover in terms of environmental enhancement through stewardship.

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For more information on CFN, call (202) 962-3393.

This bulletin was co-authored by Don Zimar of The Care of Trees in Manasass, Virginia and Brian M. LeCouteur of the Metropolitan Washington Council of Governments and the Community Forestry Network.

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NATURAL LANDS MANAGEMENT

CAUTIONS AND RESTRICTIONS ON NATURAL HERITAGE DATA

The quantity and quality of data collected by the Natural Heritage Program is dependent on the research and observations of many individuals and organizations. Not all of this information is the result of comprehensive or site-specific field surveys. Some natural areas in New Jersey have never been thoroughly surveyed. As a result, new locations for plant and animal species are continuously added to the data base. Since data acquisition is a dynamic, ongoing process, the Natural Heritage Program cannot provide a definitive statement on the presence, absence, or condition of biological elements in any part of New Jersey. Information supplied by the Natural Heritage Program summarizes existing data known to the program at the time of the request regarding the biological elements or locations in question. They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. The attached data is provided as one source of information to assist others in the preservation of natural diversity.

This office cannot provide a letter of interpretation or a statement addressing the classification of wetlands as defined by the Freshwater Wetlands Act. Requests for such determination should be sent to the DEP Land Use Regulation Program, CN 401, Trenton, NJ 08625-0401.

This cautions and restrictions notice must be included whenever information provided by the Natural Heritage Database is published.

DELAWARE VALLEY REGIONAL PLANNING COMMISSION

Publication Abstract

TITLE	Date Published: January 2000
Closing the Missing Link on the Assunpink Creek Greenway	Publication No. 00004

Geographic Area Covered: The study area for the greenway plan extends between the Mercer County Park and the City of Trenton, where the creek forms the boundary between Lawrence and Hamilton Townships in Mercer County.

Key Words: Greenway, open space, water quality, riparian corridor, trails, conservation easements, acquisition, public access, dams

ABSTRACT

This report is a "how-to" guide for Lawrence and Hamilton Townships, Mercer County, the state, the Delaware and Raritan Greenway, Inc., the Assunpink Watershed Association, and residents interested in protecting the creek environment and in establishing a trail connection between Mercer County Park, the Delaware and Raritan Canal Towpath and the Assunpink Creek Greenway project in Trenton.

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