Executive Summary
Little Neshaminy Creek River Conservation Plan

Little Neshaminy Creek at Forks of the Neshaminy

September 2007

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Pennsylvania Coastal Zone Management Program
FINAL REPORT

"Little Neshaminy Creek River Conservation Plan"
Final Report
September 2007

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The views expressed herein are those of the author(s) and do not necessarily reflect those of the U.S. Department of Commerce, NOAA, the PA DEP nor any of their sub-agencies.

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Introduction and Background

The Little Neshaminy Creek River Conservation Plan (LNRCP) represents the culmination of a multi-year joint planning effort involving state, county and local organizations for the 43 square-mile portion of the Neshaminy Creek Watershed extending from Montgomery Township, Montgomery County to Warwick Township, Bucks County. Pennsylvania's Rivers Conservation Program was developed to conserve and enhance river resources through preparation and accomplishment of locally initiated plans. The program, funded through the Community Conservation Partnership Program of the Pennsylvania Department of Conservation and Natural Resources (PA DCNR) provides technical and financial assistance to municipalities and river support groups to carry out planning, implementation, acquisition, and development activities.

A Rivers Conservation Plan identifies significant natural, recreational, and cultural resources. Issues, concerns, and threats to river resources and values are determined locally as part of planning, as well as recommended methods to conserve, enhance, and restore Pennsylvania's many streams and rivers. Important outcomes of the River Conservation Planning Process are to improve watershed-related activities, to educate the public about watershed issues and to encourage resource protection and stewardship.

Study Area Location

The Little Neshaminy Creek Study Area is the 43 square mile sub-watershed of the Neshaminy Creek situated in southwest Bucks County and southeast Montgomery County as shown in Figure 1, Regional Context Map.

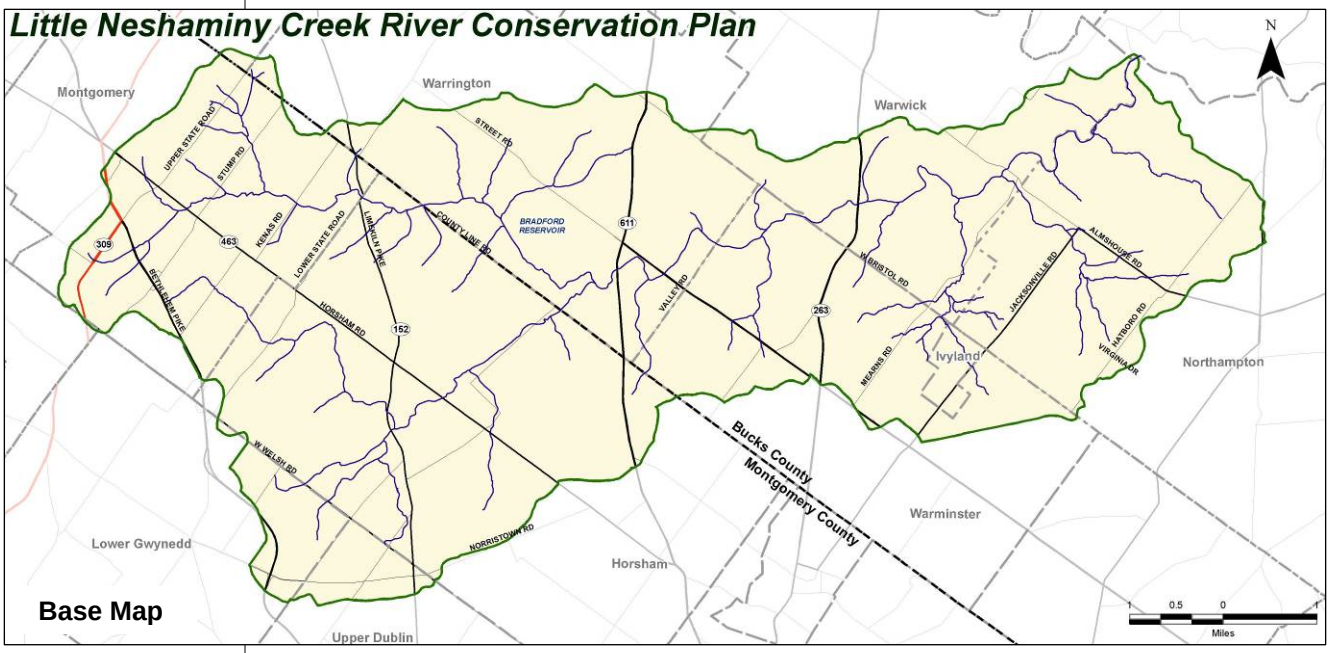
Figure 1 – Regional Context

The Little Neshaminy Creek flows in an easterly direction from its headwaters in Montgomery Township for approximately 16 miles to its confluence with the main stem of the Neshaminy Creek in Northampton, Wrightstown and Warwick Townships, as shown in Figure 2.

Park Creek is the major tributary to the Little Neshaminy Creek and flows in an easterly direction from its headwaters in both Lower Gwynedd and Upper Dublin Townships through Horsham Township for approximately 6 miles where it joins the Little Neshaminy just over the county line in Warrington. The watershed flows through nine municipalities including Horsham, Lower Gwynedd, Montgomery, and Upper

Dublin Townships in Montgomery County and Ivyland Borough, Northampton, Warminster, Warrington and Warwick Townships in Bucks County.

Figure 2 – Little Neshaminy Creek Base Map



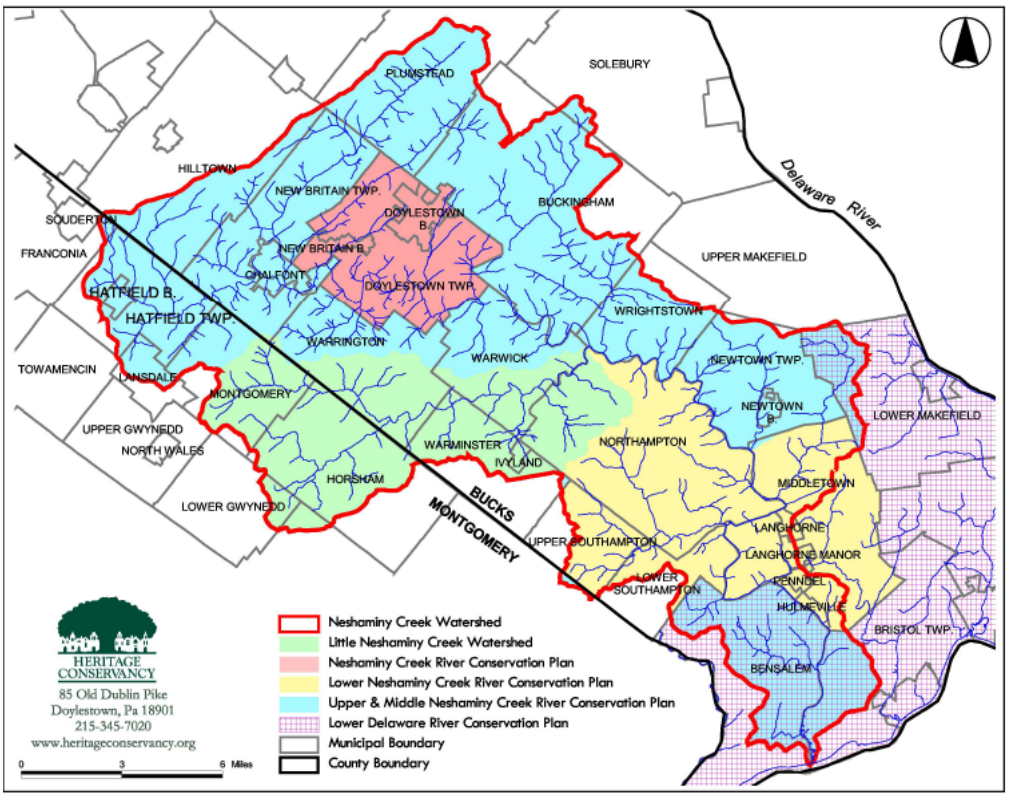
Planning History

The Little Neshaminy Creek Watershed is the last remaining section of the Neshaminy Creek Watershed that has not been included in a river conservation or watershed management plan. The Little Neshaminy Plan will complete plan coverage for the entire 232 square mile Neshaminy Creek watershed.

In 2005, Heritage Conservancy completed the *Lower Neshaminy Creek River Conservation Plan* and has completed two other River Conservation Plans (RCP) for portions of the Neshaminy Creek Watershed. The *Lower Delaware River Conservation Plan* Included the 4.5 mile portion of the Neshaminy Creek from the Bristol\Bensalem border to the Delaware River. The *Neshaminy Creek River Conservation Plan* focused on the portion of the Neshaminy Creek in the vicinity of Doylestown Township. In 2003, the Delaware Riverkeeper Network completed the River Conservation Plan for the Middle and Upper Neshaminy Creek.

Figure 3 shows the Little Neshaminy Creek Watershed in relation to the surrounding sub-watersheds which have previously been studied under PA DCNR's River Conservation Program.

Figure 3 – Neshaminy Creek River Conservation Plans



The Little Neshaminy and Park creeks have been the focus of extensive federal, state and local efforts to protect and improve watershed resources. A number of these studies were reviewed and summarized in the RCP and include:

- PA DEP, Total Maximum Daily Load (TMDL) Assessment of Little Neshaminy Creek Watershed, December 2003.
- PA DEP, Watershed Restoration Action Strategy (WRAS) State Water Plan Subbasin 02F Neshaminy Creek Watershed Bucks and Montgomery Counties. Updated May, 2004.
- Delaware River Keeper Network, Little Neshaminy Watershed – Watershed Assessment and Restoration. February 2003.
- Aqua Link, Inc., Little Neshaminy Creek & Bradford Lake Watershed Assessment, Prepared for PA DEP and Bucks County Conservation District, June 2005.

A full listing of studies and plans reviewed as part of this RCP are referenced in the bibliography included in the full draft plan.

The Planning Process

A steering committee for the Little Neshaminy Creek River Conservation Plan was established in October 2004, and is comprised of watershed stakeholders, local, county, and state governmental agencies, environmental groups and utilities. The purpose of the steering committee is to identify the important river related values and issues of concern to be included in the RCP, as well as proposing management options for the watershed.

Community participation is a key component of the RCP process. Through several outreach events and meetings, the RCP sought input from residents to identify important resources and issues in this watershed. This information helped guide the RCP's planning team to develop a range of management options to benefit the watershed stakeholders. The following meetings or events were held during the development of the plan:

Public Meeting – Warrington Township on March 10, 2005

Public Meeting 1 – On March 10, 2005 the residents of the Little Neshaminy Creek Watershed were invited to a public meeting in Warrington Township to introduce the plan and seek input on issues and concerns of the watershed. Participants viewed numerous maps, had the opportunity to ask questions, and participated in an exercise to identify issues and concerns on a variety of topics.

Public Meeting 2 – On May 29, 2007, a second public meeting was held at the Warminster Township municipal building. The purpose of the meeting was to share the draft RCP via presentations by the planning team and municipal representatives. The draft management options were presented and participants were asked to review and provide comment. All participants were provided with a copy of the draft executive summary and draft management options. Prior to the meeting, all steering committee members were provided with full copies of the entire draft plan. The full plan was posted on the Heritage Conservancy website and websites of several of the watershed municipalities. Hard copies of the full draft were also provided to both county planning commission offices for public access and review. This meeting initiated the 30-day formal public review period.

Public Meeting 3 - A final public meeting will be held to present the final plan and will include an event to highlight a current restoration project in progress.

Other Outreach Events

In June 2005, Heritage Conservancy in cooperation with Horsham Township conducted a Riparian Buffer Restoration activity with over 65 middle-school students along the Park Creek in Kohler Park. Students were educated on the benefits of riparian buffers and were given the opportunity to help plant trees, shrubs and herbaceous plantings along the stream.

June 2005 - Riparian Buffer Restoration in Park Creek in Kohler Park with local students.

In February 2006, watershed stakeholders were invited to a meeting of the Neshaminy Alliance to discuss broad issues impacting watershed residents throughout the two-county area. Discussions included the state of the

watershed, the proposed Act 167 stormwater management plan update and flood mitigation.

A short public survey was developed and distributed to watershed municipalities in 2006. Municipalities and organizations were asked to distribute the paper copies and provide links on their websites for the on-line version of the survey. The survey was posted on the Heritage Conservancy website. A special website page was also developed to provide information on the watershed and planning activities.

In addition to these events, HC staff made presentations to the Park Creek Watershed Association and the Warrington Township Environmental Advisory Committee meetings to gain input on implementation projects.

A total of 5 steering committee meetings were held at different intervals throughout the project to work on the goals and objectives, management options and other aspects of the plan.

Regional Implementation and Listing on the PA Rivers Registry

Once the river conservation plan is approved, the municipalities and other partners will be responsible for prioritizing and implementing projects. One of the final requirements of the planning process is to have municipalities endorse the plan and commit to implementing the recommendations. The last official responsibility of the steering committee is to see that the plan is presented to their municipal governing bodies and request endorsement of the plan and its recommendations.

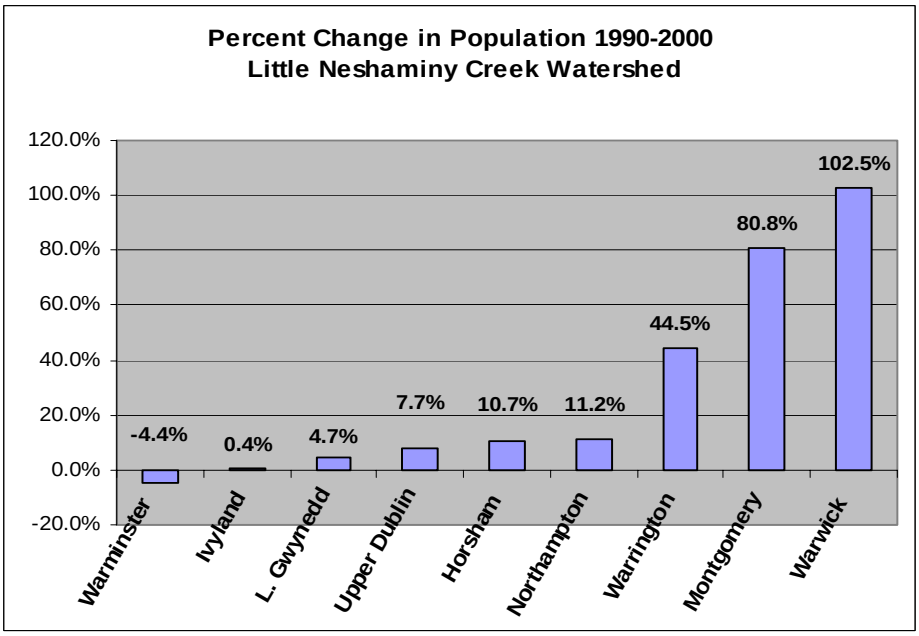
Study Area Characteristics

Demographic Trends

As shown in Figure 4, US Census data reveals that the watershed municipalities have experienced varying degrees of growth over the past decade. Much of the growth that has occurred over the past decade has been in the most sensitive areas of the watershed such as in Montgomery Township within the creek's headwaters and in Warwick Township located in the rural and relatively undeveloped "Forks of Neshaminy" area.

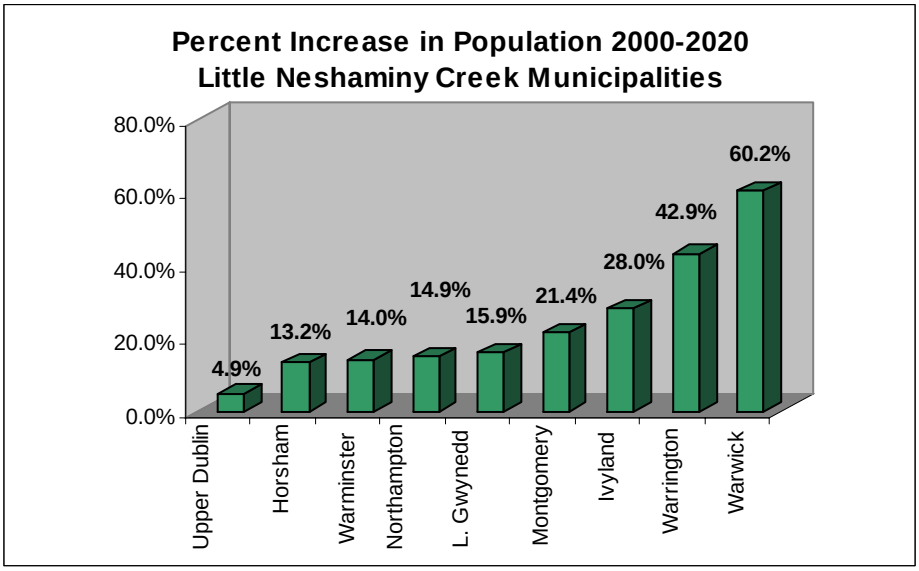
Forecasts developed by the Delaware Valley Regional Planning Commission and updated in March 2005 indicate that collectively the population of the municipalities within the Little Neshaminy Creek Watershed will increase by about 40,446 people or 22% overall growth from 2000 to 2020. This is illustrated in Figure 5.

Figure 4 – Change in Population – 1990-2000



Source: US Census Data, 1990 & 2000.

Figure 5 – Percent Increase in Population



Sources: US Census Data, 1990 and 2000. Forecasts by Delaware Valley Regional Planning Commission (Population and Employment Forecasts, 2000-2030, Regional Data Bulletin, Revised No. 73, March 2005)

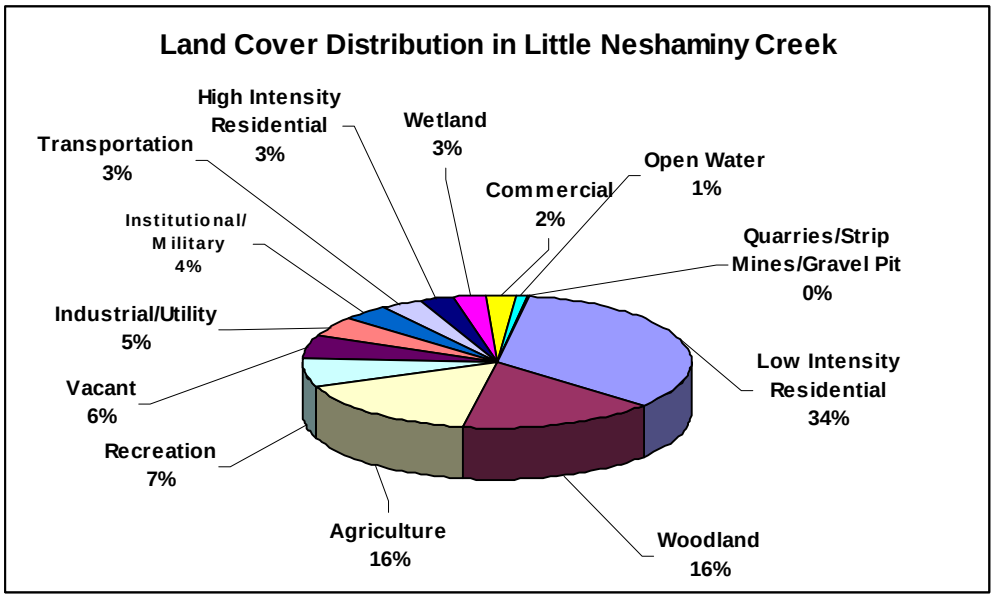
To varying degrees over time, home buying has been attractive in this area, and thus municipalities continue to be faced with development pressure and the desire to accommodate reasonable growth, but in a sustainable manner. The demographic indicates that those municipalities who are growing rapidly tend to

have a greater percentage of children under 18, which has implications for school districts across the watershed. With increased population growth, additional land is utilized for housing, institutional, and commercial development, which places additional stress on the watershed health by reducing woodland and open space areas and increasing impervious surfaces.

Land Resources of the Little Neshaminy

According to the land cover information obtained from the 2000 DVRPC Land Cover data, the highest single land cover type in the watershed is Low Intensity Residential at 34.0%, followed by Woodland at 16.7% and Agriculture at 16.2%. The distribution of various land cover in the watershed is shown in the following graphic.

Figure 6– Land Cover Distribution



Source: Delaware Valley Regional Planning Commission, 2000 Land Cover

Impervious Cover

As the intensity of development increases, so does the generation of nonpoint source water pollution, or polluted runoff. A good indicator of the intensity of development in a given area is the amount of impervious surface. Impervious surfaces like asphalt, concrete and roofing increase the volume and velocity of the runoff. In addition, by blocking the infiltration of water and its associated pollutants into the soil, impervious surfaces interfere with natural processing of nutrients, sediment, pathogens and other contaminants, resulting in degradation of surface water quality.

Studies have shown that the greater the impervious surface coverage in a watershed, the greater the potential degradation of that watershed's water systems. Studies conducted at the Center for Watershed Protection determined that when watershed imperviousness reaches about 10%, stream quality

indicators are impacted, and when watershed impervious cover reaches about 25%, stream degradation occurs.

According to an evaluation conducted by the Delaware Riverkeeper Network as part of their *Little Neshaminy Watershed Assessment and Restoration* study, the average overall watershed impervious cover in the Little Neshaminy was estimated to be 24% in 2000. In comparison, impervious cover in 1970 was estimated to be about 15%. While this number is an average throughout the watershed, there are still sub-areas within the watershed that maintain low impervious cover (5-10%) such as in the vicinity of the Forks of Neshaminy, where there are still a number of rural, agricultural properties. This area has also been a focus of concentrated land preservation which has contributed to keeping lands free from intensive development.

Woodlands

Large parcels of wooded land provide contiguous habitat for wildlife and educational opportunities to learn about flora and fauna of forest communities. These areas are important in replenishing groundwater resources and absorbing and filtering stormwater runoff. According to the land cover information from 2000, woodlands represent about 16% of the land cover in the Little Neshaminy Creek or 4,600 acres. Most of the existing woodlands in the watershed are located along the main stem of the Little Neshaminy within Warwick and Northampton Townships and along the Bradford Reservoir in Warrington. Other contiguous areas can be found in Horsham Township along the Park Creek and its tributaries

Soils

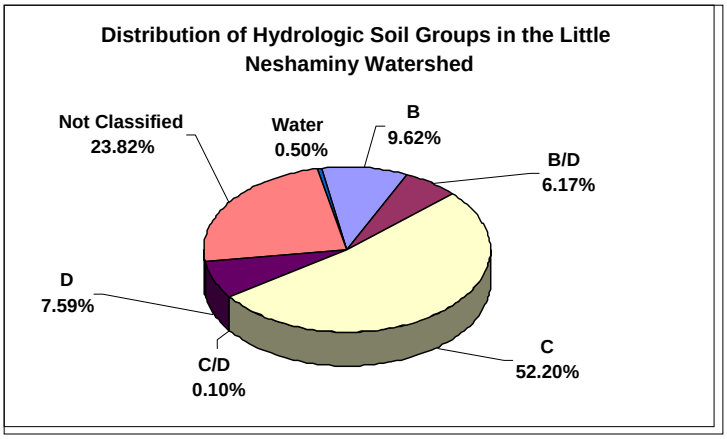
Soil characteristics have a direct impact on the way land is used and developed. They help determine an area's suitability for farming and building, as well as answer questions regarding potential drainage problems and erosion. The most common soil types in the study area are Urban Land-Penn complex (1,955 acres), Penn channery silt loam (1,613 acres), and Chalfont silt loam (1,496 acres).

Hydrologic Soils Groups

Unclassified refers to soils that are so disturbed that the HSG value can not be determined.

Hydrologic soil groups (HSG) are used by soil scientists to indicate the minimum rate of infiltration of bare soil after prolonged wetting. Soils are classified into four categories (A, B, C, and D) based upon the rate at which water enters and moves through them. "A" soils have properties that allow for rapid infiltration (low runoff), while "D" soils have properties that allow for very slow infiltration (high runoff). The majority of soils in the Little Neshaminy Creek are classified as "C" Soils (52.2%), followed by unclassified (23.91%). The abundance of soils with low infiltration and moderate to high runoff rates can lead to increased stormwater runoff, based on land cover and also contribute to the watershed's characteristic of being flashy during storm events. This means that stream levels can rise quickly in response to rainfall events and fall very quickly, once the rain stops.

Figure 7 – Hydrologic Soil Group Distribution



Source: Natural Resource Conservation Service Soils

Water Resources

Water Quality Designations and Impairments

A stream's ability to support aquatic life, provide drinking water and to function as a recreational resource is all dependent on its water quality. The designated use for the Little Neshaminy Creek and its main tributary, Park Creek and several unnamed tributaries are Warm Water Fisheries (WWF) and Migratory Fisheries supporting such fish as the American eel. The PA DEP is required by the Federal Clean Water Act to list stream segments in the state that are not meeting their designated use. This list is commonly referred to as the 303(d) list.

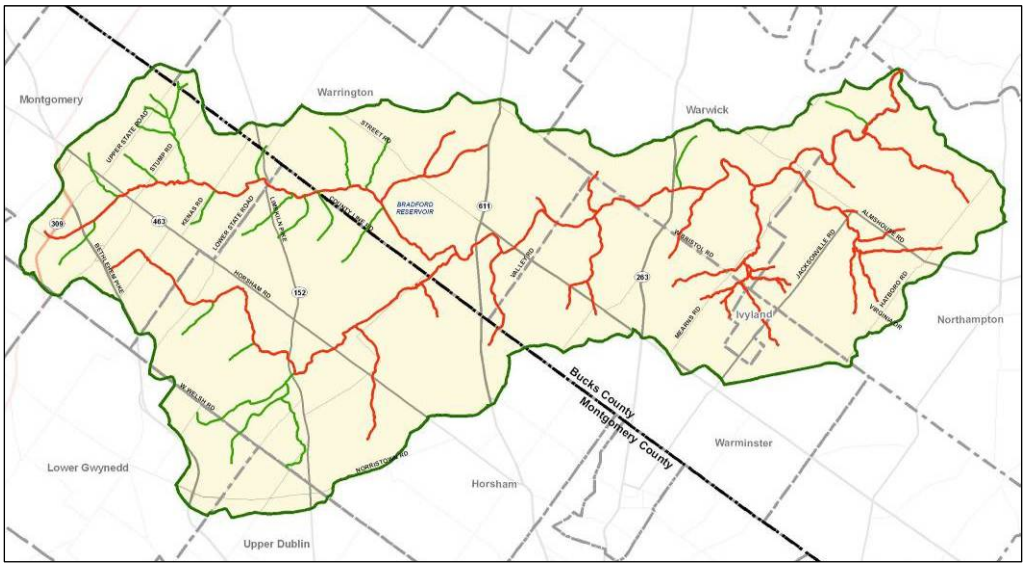
The Neshaminy Creek is a Category I FY 99/2000 priority watershed under PA DEP's Unified Watershed Assessment, which identifies priority watersheds needing restoration. The 43-square miles of the Little Neshaminy Creek watershed are on the Section 303d[1] list of impaired waters due to water and flow variability and siltation from urban stormwater runoff as well as nutrient inputs from municipal point source discharges[2].

In 2003, nutrient inputs into Bradford Reservoir, a PL-566 flood control lake, led to an algae bloom that caused widespread taste and odor complaints from customers of Aqua PA , which operates a drinking water treatment plant on the main stem Neshaminy.

Figure 8 – Impaired Stream Segments of the Little Neshaminy and Park Creeks

1 Section 303(d) of the US Clean Water Act

2 (PA DEP *draft* Watershed Restoration Action Strategy – WRAS 7/31/01*) (Exhibit B: Watershed Assessment Map*).



Source: TMDL Assessment for Neshaminy Creek Watershed 303(d) list of impaired streams. (PA DEP -December 2003) Red = impaired (non-point and point sources)

Also in 2003, the Delaware Riverkeeper completed a study that identified stream morphology changes within the watershed that have been caused by increased stormwater flows. Streams have changed courses and have highly eroded banks, exposed soil and damaged native vegetation, leaving the watercourses in overall poor health.

The economic climate within the watershed has increased the demand for all types of development. Some types of development can contribute to diminishing the riparian buffers and other natural vegetative areas traditionally used by nature to filter pollutants. With this also comes a decrease in the aesthetic appeal of the stream valleys and loss of habitat as undeveloped land becomes more scarce and expensive. Although Bucks and Montgomery Counties and individual municipalities have developed programs to provide money to protect open space, it is often difficult to keep pace with development in the region.

Riparian Buffer Areas

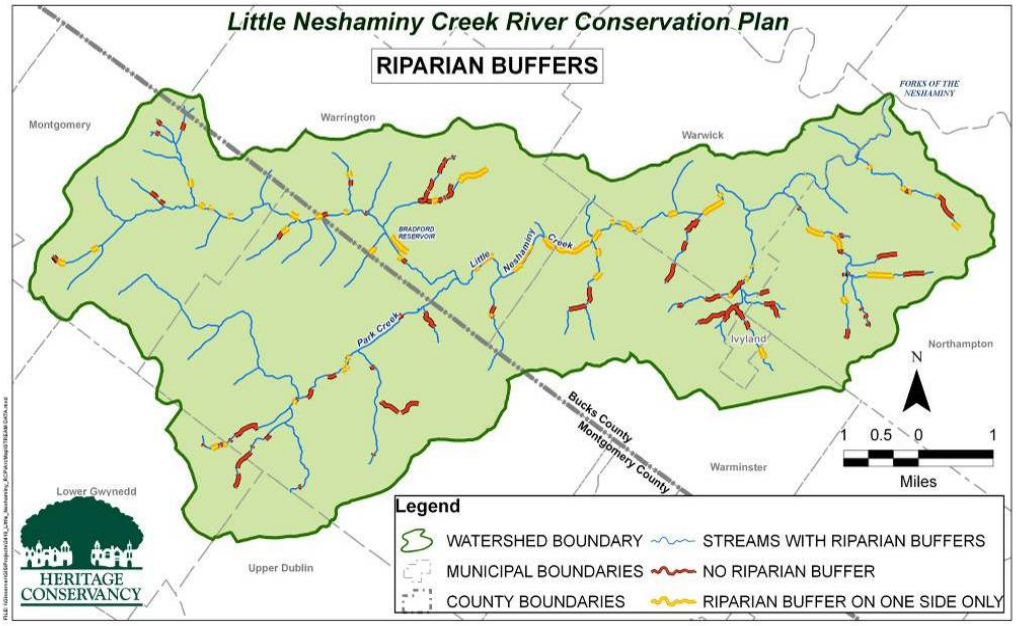
Riparian buffers act as a natural filter of stormwater and stabilizer of stream banks to help reduce erosion usually through areas of vegetation that grow along the stream banks. Proper riparian vegetation can hold the soil intact and remove excess nutrients and pollutants before they reach the water. In addition, riparian buffers slow the velocity of stormwater. The vegetation helps shade the streams allowing for more sustainable aquatic life, as well as supporting habitat and cover for wildlife. These buffers are often overlooked by landowners but are key to providing a healthy and stabilized stream environment. However, this can change with the continued use of education, ordinances, and the enforcement of these ordinances.

In 2002, Heritage Conservancy analyzed the Riparian Buffer Status of four watersheds in Southeastern Pennsylvania, including the Neshaminy Creek

Watershed. As shown in Figure 9, numerous stream segments lack buffers on one or both sides of the stream. On-site investigations should continue to be utilized to determine the exact stream corridor situation and for possible candidate sites for restoration or planting programs.

Park Creek from Kansas Road Bridge following major storm in June, 2006.

Figure 9 – Riparian Buffer Assessment



Source: Heritage Conservancy Riparian Buffer Assessment, 2003

Water Supply

The majority of residents and businesses are served by public water and sewer utilities, although private wells and septic systems may still be in use in some areas. The public water utilities that service the area are local or county municipal authorities that rely on both groundwater and purchased surface water for supply.

The study area lies within the Delaware River Basin Commission's Groundwater Protection Area of Southeastern Pennsylvania. This protection act serves to protect water resources in the Triassic Lowland region of the Delaware River Basin with regulations on water withdrawals, and to promote water conservation.[3] Increased development has led to increased groundwater withdrawals while at the same time decreased infiltration into the water table; all of this has led to reduced stream base flow into the creek and its headwater tributaries. This reduction in base flow negatively impacts aquatic life and reduces the ability for streams to filter and assimilate pollutants and treated municipal waste.

[3] Delaware River Basin Commission. *Ground Water Protected Areas in Southeastern PA*. October 29, 1961 Amendments include 1999

Non-point Source Pollution and Stormwater Regulations

A variety of non-point source pollution (NPS) affects the Little Neshaminy Creek sub-basin, consistent with a variety of land uses. Siltation has resulted from land construction and impairment by stream flow variability from stormwater runoff. Construction activities associated with rapid urbanization are a major source of high sediment loads during storm events. Erosion and stormwater runoff continue to carry sediments and nutrients to the stream and Bradford Reservoir. In-stream erosion from high velocity storm flows is another significant source of sediment entering the stream.

Within the last few years, since the NPDES, Phase II regulations have taken effect, stormwater issues have become an important topic of discussion at the municipal level and technical information has become more available. However, it will take time to reduce the impairments that have resulted over many years. The increased incidences of major storm events have also increased the frequency of damaging flood events in the region. However, there is optimism that, with increased diligence of municipal officials and oversight by planning commissions and EACs, future development and redevelopment will include effective stormwater Best Management Practices or BMPs and more attention to the non-structural aspects of good design and planning.

The updated PA Act 167 Stormwater Management Plan for the Neshaminy Creek will include water quality standards and criteria that will help address some of the degradation occurring in the watershed.

Biological Resources

Significant Wildlife and Natural Areas

The Little Neshaminy contains a wide diversity of biological, hydrological and ecological resources. A review of the Natural Area Inventories of both Bucks and Montgomery Counties noted four specific areas of statewide or local significance. In Bucks County, these include the Bradford Reservoir in Warrington and the Forks of Neshaminy (where the Little Neshaminy meets the Main Stem Neshaminy) in Warwick. Priority sites in Montgomery County include the seasonal wet fields of the Willow Grove Naval Air Station and a mixed hardwood forest area along Keith Valley Road in Horsham.

Cultural Resources

Recreation, Parks and Open Space

The majority of parks located within the study area are municipally owned. There are 45 municipal parks that make many recreational resources available for public use, including playing fields, hiking trails, picnic areas, tennis and volleyball courts, and playground equipment.

There is one County–owned park within the study area, (Bradford Dam Park) located in Warrington Township and one State Park, (Graeme Park) located in Horsham Township. Bradford Dam Park is a 280-acre park that includes the 22-

acre Bradford Lake Reservoir. Graeme Park is owned and operated by the Pennsylvania Historical and Museum Commission and supported by the Friends of Graeme Park. The 44-acre park includes the Keith House, constructed in 1722, which was the summer home of the Provincial Governor Sir William Keith.

Willow Knoll Playground in Warrington, PA

Approximately 1,400 acres within the study area are preserved as parks and open space and 1,346 acres are in use as public and private golf courses. An additional 330 acres are preserved by Heritage Conservancy. Ten golf courses (five public and five private) are located within the study area, with the majority located in Horsham Township. At 280 acres, Bradford Dam Park is the largest tract of preserved open space in the study area.

County and Municipal Funding for the Conservation of Open Space, Farmland and Natural Areas

Over the years, both counties and several of the municipalities have raised money for the protection of important land resources. In 1993, the Montgomery County Board of Commissioners budgeted $100 million over a ten year period for these purposes. Many municipalities appropriate their own funds for financing parks and recreation programs. Others utilize funds from the county open space programs for open space protection. All of the other funding programs were approved by voter referenda. The table below summarizes these referenda in the municipalities of the Little Neshaminy Creek.

Open Space Bond Referenda in Little Neshaminy Creek Municipalities		
Municipal Referenda	**Amount Raised***	**Year**
Lower Gwynedd Township	2.0 million	1994
Northampton Township	5.0 million	1998
Upper Dublin Township	30.0 million	2006
Warrington Township	2.1 million	1995
Warwick Township	1.5 million	2000
	5.0 million	2003
	7.0 million	2006
County Referenda	**Amount Raised***	**Year**
Bucks County	3.5 million	1994
	59.0 million	1996
Montgomery County	150 million	2003
Source: HC Analysis, 2007		

"Much of the history of any region is intimately connected with the streams that pass through it."

The Rev. D.K. Turner, Hartsville, PA - "The Little Neshaminy", presented at Galloway's Ford Meeting, June 20, 1897.

Historic and Archaeological Resources

Before European settlement, in prehistoric times, the Little Neshaminy Watershed was occupied by indigenous people. The earliest of these were the Paleo-Indians who came to North America from Asia beginning around 12,000 B.C. The predominant tribe of Native Americans at the time of European settlement was the Lenni Lenape. The impact of Native Americans on the area remains in the form of numerous archaeological sites from prehistoric times. Also, the name Neshaminy is a Native American word that means the place where we drink twice. The European settlers began constructing mills, establishing farms, building roads and rail lines, and starting towns and villages.

The Pennsylvania Historical and Museum Commission (PHMC) maintains the list of sites recorded in the Pennsylvania Archaeological Site Survey (PASS) files. There are 35 archaeological sites recorded in the PASS files within the study area.

The study area contains one National Historic Landmark (Graeme Park), six National Register Listed sites, one listed historic district (Ivyland Borough Historic District) and 36 National Register eligible resources. Many communities within the watershed have established local historic commissions and maintain lists of locally significant historical sites, which may not have been evaluated for listing on the National Register. Although not listed in this plan specifically, these resources were determined to have historical significance to the local community and efforts should continue to preserve and maintain these local resources. Communities should also consider having locally significant sites evaluated for National Register eligibility.

Keith House at Graeme Park

The Archeological and Historic Resources of this watershed help define the area's character and provide a great source of pride and tradition for the community. From early Indian settlements to colonial homesteads to aviation centers, these properties and lands are valuable for the information they provide now, and will continue to provide to future generations. It is therefore important to continue to preserve and protect these resources utilizing the tools available to us, including Federal and State programs and through stewardship provided by residents who volunteer on historic commissions, boards, and friends groups.

Ivyland Historic District

Moland House Painting

GOALS AND OBJECTIVES

The initial RCP goals and objectives were identified by the steering committee during the planning process. These goals and objectives were further refined throughout the course of the project and general actions added.

Goal 1 – Water Quality - Protect and improve the surface and ground water quality in the Little Neshaminy Creek Watershed to improve recreational opportunities, wildlife habitat, and sources of drinking water.

Objective – *Improve in-stream habitat.*

Actions:

- Increase streamside vegetation to increase canopy cover and moderate stream temperature.
- Promote sustainable land use practices to reduce impervious cover and increase infiltration of stormwater.
- Improve protection of headwaters.
- Reduce nutrient and sediment loadings to watershed.
- Develop and distribute educational materials to all landowners related to the proper care and management of streamside properties.

Objective – *Protect existing riparian areas and improve those lacking sufficient riparian corridors.*

Actions:

- Increase riparian protection in areas lacking sufficient vegetated buffers (50% canopy cover, and 50 foot width forest buffer).
- Develop and adopt riparian corridor protection ordinances, in all watershed municipalities if one has not been adopted.
- Improve land management practices for streamside properties.
- Purchase land or conservation easements in riparian zones to limit development and restrict uses.

Objective – *Improve Water Quality in Bradford Lake Reservoir.*

Actions:

- Implement in-lake management practices recommended in Little Neshaminy and Bradford Lake Watershed Assessment:
    - Sediment dredging
    - Aeration
    - Algal control using algaecides
    - Aquatic plant control methods
    - Aquatic herbicides (if dredging not performed)
    - Annual mechanical harvesting of water chestnut if lake is not dredged and aquatic herbicides are not applied to lake.
- Implement Bradford Lake restoration activities to eliminate sources of taste and odor compounds impacting downstream drinking water treatment plants.
- Design and construct forebay/constructed wetland structure to improve water quality of Bradford Lake.
- Implement watershed best management practices recommended in Little Neshaminy and Bradford Lake Watershed Assessment:
    - Bank Stabilization and Protection

- Streambank Stabilization
- Riparian buffers
- Stormwater retrofits
- Conservation and nutrient management plans for all farms located within watershed.

- Implement institutional practices recommended in Little Neshaminy and Bradford Lake Watershed Assessment.
  - Establish a Watershed Association.
  - Develop and adopt a municipal lawn fertilizer ordinance for all municipalities within the watershed.
  - Increase landowner education and continue annual water quality monitoring

Objective – *Protect drinking water sources.*

Actions:

- Institute wellhead protection programs.
- Reduce demand on drinking water sources through residential water conservation programs.
- Support efforts of local watershed groups to improve and protect water quality in the watershed.

Objective – *Support water quality recommendations of the Little Neshaminy Watershed Assessment and Restoration.*

Actions:

- Initiate cooperative projects to fulfill plan recommendations.
- Increase water quality monitoring through establishment of small network of channel reference sites.
- Explore alternative management of grass or turf areas of publicly owned lands.
- Explore stormwater retrofits within suburban campus and industrial lands.
- Initiate projects to restore Stage V streams and priority reaches. Priority reaches are:
  - ✧Kemper Park, Warminster – Valley Road to Bristol Road
  - ✧Downstream of Meetinghouse Road – Warwick – Bristol Road Bridge to below downstream bend.
  - ✧Park Creek along Keith Valley Road – Horsham – Horsham Park to County Line Road.

Objective – *Prioritize water quality projects for implementation.*

Actions:

- Support efforts of local watershed groups to improve and protect water quality in the watershed.
- Convene meeting of watershed municipalities, water utilities, wastewater utilities and DEP to explore cooperation meeting federal mandates.

Objective – *Increase water quality monitoring in Park Creek and Little Neshaminy Creek.*

Actions:

- Train, recruit, and educate volunteer water quality monitors.
- Collect and analyze lake and stream samples for nitrogen, phosphorus, total suspended solids, and oil/grease.

Objective – *Encourage programs to increase vegetative cover throughout watershed.*

Actions:

- Develop and implement residential, municipal and public education programs that address the benefits of naturalized land for water management and air quality.
- Initiate reforestation projects on certain public lands.
- Educate and encourage homeowners, businesses, religious and non-profit organizations to plant as much soil-retaining, water holding vegetation on land presently in turf or lawn.
- Increase the number of street trees in developed areas of the watershed.
- Increase forested riparian buffers adjacent to stream tributaries.

Goal 2 – Stormwater Management - Improve the way stormwater is managed in the watershed to reduce flooding, protect stream baseflow and maintain the hydrologic balance.

Objective – *Reduce stormwater runoff volume.*

Actions:

- Increase infiltration through use of appropriate BMPs.
- Reduce impervious cover of new development through conservation design practices which increase opportunities for infiltration of stormwater runoff.
- Encourage use of conservation design in redevelopment projects.

Objective - *Improve water quality of stormwater.*

Actions:

- Perform stormwater basin assessments to determine candidate sites for retrofits or naturalization.
- Retrofit and/or naturalize BMPs where possible to promote infiltration and improvements in water quality.
- Utilize treatment wetlands and innovative BMPs as educational tools for the public, municipalities, and agencies.
- Install innovative BMPs on public and school district lands to be used as demonstration sites.
- Provide incentives for developers to utilize pervious paving, bio-retention islands, green roofs and other low impact development technologies in new and redeveloped sites.
- Encourage the use of stormwater BMPs in all types of development as recommended in the Pennsylvania Stormwater BMP Manual.
- Adopt and enforce water quality standards and criteria within the updated Neshaminy Creek Act 167 plan (when approved).
- Prepare conservation and nutrient management plans for active farms.

Objective – *Update Land Use Practices and Ordinances to include water quality standards and criteria.*

Actions:

- Update natural resource protection ordinances to support better stormwater management.
- Review and update Subdivision and Land Development Ordinances to support low-impact development techniques to reduce impervious cover in new and infill developments.

- Require installation of naturalized stormwater BMPs to improve water quality in all new developments.
- Eventually adopt the stormwater management model ordinances of the updated Act 167 Stormwater Management Plan for the Little Neshaminy Creek in all watershed municipalities.

Objective – *Improve stormwater management programming and financing.*

Actions:

- Support efforts to research requirements of establishing stormwater utility.
- Coordinate stormwater management, conservation and preservation efforts between organizations and municipalities throughout the Neshaminy Creek watershed.
- Implement and fund programs to identify and retrofit existing stormwater detention basins to improve water quality function.

Goal 3 – Mitigate impacts from Floods

Objective – *Reduce impacts from flooding on economic, historic and natural resources.*

Actions:

- Sponsor study to remap 100-year floodplain to account for upstream development as in Pennypack Creek.
- Strengthen existing ordinances to place more restrictive controls on 100- year flood zone and flood fringe areas.
- Reduce exceptions to existing ordinances allowing encroachment and building in floodplains and wetlands.
- Regulate alluvial soils.
- Purchase flood prone properties for conversion to public open space.
- Improve existing stormwater infrastructure.
- Encourage protection of existing wetlands and natural floodplain areas through conservation easements.

Objective - *Determine procedures for removal of debris and obstructions in the stream.*

Action:

- Establish dialog with Penn DOT, DEP, NRCS and Army Corps of Engineers to determine and coordinate procedures for removal of obstructions and debris in streams, including obstructions upstream and downstream from existing bridges.

Objective - *Improve management of flood prone properties.*

Actions:

- Purchase flood prone properties for conversion to public open space.
- Ensure proper management of acquired land through property management plans.
- Support park department staff person to address property management.

Objective - Reduce zoning and building exceptions in sensitive areas.

Actions:

- Provide training to zoning hearing boards regarding the cumulative effects of exceptions and increased impervious surface on the hydrologic cycle of the watershed.
- Develop handbook for zoning hearing boards educating them about cumulative impacts of impervious surfaces and offer recommendations of measures that can mitigate environmental damage.

Goal 4 – Protect Cultural Resources of the Watershed.

Objective - *Identify and protect archaeological and historical resources of the watershed.*

Actions:

- Identify significant historic and archaeological properties to be protected.
- Conduct a comprehensive municipal survey of historic properties, if a survey has not been conducted.
- Nominate historic resources that have been determined eligible for the National Register of Historic Places to the National Register.
- Adopt or strengthen historic preservation ordinances.
- Promote adaptive re-use of historic structures.
- Strengthen support of local historic preservation and Native American organizations.

Objective – *Preserve significant scenic views and view sheds.*

Actions:

- Identify scenic views to be maintained.
- Adopt or strengthen scenic preservation ordinances.

Objective – *Link important cultural and natural resources.*

Actions:

- Implement BCPC and MCPC proposed greenway networks.
- Develop trails, bike paths and greenways linking important natural and historic resources.

Goal 5 – Protect the Natural Resources of the Watershed.

Objective – *Identify and conserve sensitive natural resources of the watershed.*

Actions:

- Conduct or update municipal environmental resources inventories (ERI) to identify and prioritize natural areas.
- Update municipal comprehensive plans to include protection of natural resource priority areas.
- Review and strengthen natural resource protection ordinances for wetlands, floodplain, groundwater recharge areas, priority natural areas (NAI), woodlands, and forests, ponds, lakes, hydric and alluvial soils.
- Protect most sensitive areas through acquisition or conservation easement.
- Restore and protect riparian vegetation along streams in the watershed.
- Restore and protect aquatic communities, habitats, and stream channels.
- Restore and protect natural floodplains.
- Remove references to invasive species in zoning and subdivision ordinances.
- Review examples of ordinances that include the removal of non-native species such as in Upper Makefield Township.

Objective – *Protect groundwater resources and stream base flow.*

Action:

- Identify important groundwater recharge areas and protect as open space.

Objective – *Reduce damage to natural areas.*

Actions:

- Control invasive and exotic plants and animals.
- Institute measures to reduce damage from Canada Geese and White Tailed deer.
- Control illegal ATV use on open spaces.

Objective – *Implement riparian and stream restoration projects where effective.*

Actions:

- Restore streambanks and riparian buffers along priority reaches in the watershed as identified in Little Neshaminy Creek Watershed Assessment and Restoration Plan:
    - Kemper Park, Warminster – Valley Road to Bristol Road
    - Downstream of Meetinghouse Road – Warwick – Bristol Road Bridge to below downstream bend.
    - Park Creek along Keith Valley Road – Horsham – Horsham Park to County Line Road.
- Continue to monitor and assess streambank conditions for additional riparian and restoration sites

Objective – *Support sustainable land management practices on community open spaces.*

Actions:

- Promote invasive plant and animal control, reduced mowing schedules, and other environmentally sound management practices for community held open spaces and common areas.
- Address illegal ATV in community open spaces.
- Promote use of vegetated buffers around BMPs and ponds to discourage use by Canada Geese.

Objective – *Protect prioritized NAI and ERI sites and identified sensitive lands.*

Actions:

- Enact stricter resource protection regulations in designated NAI, ERI, and conservation areas.
- Protect NAI areas, ERI sites and sensitive lands through acquisition or conservation easements.
- Sponsor training sessions on the use of conservation easements for open space protection.

Objective – *Link important cultural and natural resources.*

Actions:

- Implement BCPC and MCPC proposed greenway networks.
- Develop trails, bike paths and greenways linking important cultural and natural resources.

Goal 6 – Maintain & Enhance the Recreational Opportunities, and the Parks and Open Space Resources of the Watershed.

Objective – *Improve connectiveness and management of open spaces throughout watershed.*

Actions:

- Link greenways throughout the watershed.
- Support implementation of BCPC and MCPC proposed greenway networks.
- Develop trails, bike paths and greenways linking important natural and historic resources.
- Encourage multi-municipal trail linkages among existing park systems.

Objective – *Implement parks, recreation and open space plans.*

Actions:

- Prioritize large parcels for open space acquisition or conservation easement.
- Update existing municipal parks, recreation and open space plans if over 5 years old.
- Implement recommendations of existing municipal and county open space plans.
- Specify and implement stewardship plans on existing community open space areas.

Objective – *Increase and improve municipal passive and active recreational facilities.*

Actions:

- Maintain and improve playground and recreational facilities.
- Increase passive recreation opportunities for residents through acquisition and management of natural open spaces.
- Improve bike path and bike trail network throughout the watershed and park systems.

Objective – *Improve access points to the creek for recreation.*

Actions:

- Identify potential public access points.
- Identify and install canoe and kayak access points to the Little Neshaminy Creek.
- Develop access points utilizing sound environmental design practices to serve as educational sites.

Objective – *Promote sustainable land management practices on community open spaces.*

Actions:

- Specify and implement stewardship plans for public open spaces and all park land.
- Encourage naturalization of open spaces.
- Create fund for purchase of trees, shrubs and meadows grasses to be used by municipalities, schools and organizations for re-vegetating or naturalizing open spaces.
- Promote invasive plant and animal control, reduced mowing schedules, and other environmentally sound management practices for community held open spaces and common areas.

- Address illegal ATV in community open spaces.
- Promote use of vegetated buffers around BMPs and ponds to discourage use by Canada Geese.
- Encourage participation in the Audubon Cooperative Sanctuary Program for existing golf courses and other types of property in watershed.

Goal 7 – Increase participation in Education & Conservation Activities.

Objective - *Promote and enhance the understanding of the historic, cultural, spiritual, economic, and natural resources of the watershed among residents and business owners, religious and non-profit organizations.*

Actions:

- Develop programs and materials to educate homeowners, business owners, religious and non-profit organizations on water quality practices at home and land management techniques for those with property along riparian areas.
- Educate and encourage homeowners, businesses, religious and non-profit organizations to plant as much soil-retaining, water holding vegetation on land presently in turf or lawn.
- Coordinate outreach and education with municipal NPDES II program requirements.
- Promote hands-on environmental education to residents and businesses via programs such as tree planting, stream clean-ups, and stream visual assessments.
- Educate farmers on preparing conservation and nutrient management plans for active farms.
- Post educational signage at stream crossings, naturalized areas, public open spaces and historical sites.

Objective - *Promote and enhance the understanding of the historic, cultural, economic, and natural resources of the watershed to municipal officials.*

Actions:

- Promote educational programs for municipal officials, staff, boards, and commissions on the link between land use practices and natural resource protection.
- Evaluate alternatives to low-density, sprawl forms of residential development. Research, distribute and implement model ordinances for consideration by the municipalities.
- Create Environmental Advisory Councils in all watershed municipalities that do not currently have them.
- Provide information, such as maps and fact sheets for the use of key decision-makers.
- Create resource materials for use by municipalities regarding the benefits of using native vegetation in landscaping and residential gardens.
- Encourage municipalities and school districts to adopt policy to use native vegetation in facility landscaping.

Objective - *Promote and enhance the understanding of the historic, cultural, economic, and natural resources of the watershed among elementary and secondary school students.*

Actions:

- Promote service learning programs at Elementary and Secondary schools to teach students about basic stream ecology.
- Identify or provide access to the creek for school groups.
- Work with school districts to coordinate, in partnership with non-profit organizations, curricula on the creek's resources.
- Promote service learning programs and coordinate curricula on the creek's resources for youth education at religious & non-profit organizations with property along riparian areas.

Objective - *Promote and enhance the understanding of the historic, cultural, economic, and natural resources of the watershed to the development community.*

Action:

- Educate development community on the economic and environmental benefits of conservation design and low-impact development techniques.

Goal 8: Encourage Sustainable Economic Development Practices.

Objective - *Promote Conservation Design and sustainable land use practices in new development within watershed communities.*

Actions:

- Revise or update comprehensive plans, zoning and subdivision ordinances to encourage the use of conservation design and low-impact development techniques to reduce impervious surfaces.
- Encourage the use of stormwater best management practices as recommended in Pennsylvania's Stormwater Best Management Practices Manual.

Objective - *Promote Conservation Design and sustainable land use practices in redevelopment and/or infill development activities within the watershed communities.*

Actions:

- Work cooperatively to identify economically viable adaptive reuse options for the NAS JRB Willow Grove facility which incorporate conservation design principles.
- Encourage reduction in imperious surfaces in redevelopment projects.
- Promote adaptive re-use of existing underutilized or vacant facilities.
- Promote the use of green roofs and rain gardens in highly developed areas.
- Promote use of stormwater BMPs as recommended in Pennsylvania's Stormwater Best Management Practices Manual.

Goal 9: Improve Watershed-Wide Plan Coordination and Integration.

Objective – *Integrate Little Neshaminy RCP recommendations with the management options and recommendations of the adjacent River Conservation Plans and other studies and assessments completed or underway for the entire Neshaminy Creek Basin.*

Actions:

- Establish plan clearinghouse to provide single repository and database for previous Neshaminy Creek plans, studies and assessments.
- Review and integrate all RCP goals and actions.

- Coordinate watershed-wide activities through Neshaminy Alliance to avoid duplicative efforts.
- Review status of previous and ongoing studies within the watershed.
-

Objective - *Improve coordination among watershed organizations and stakeholders to prioritize and implement recommendations of RCPs and other watershed studies.*

Actions:

- Coordinate efforts between municipalities, water and wastewater utilities to cooperatively address SDWA, Act 167, NPDES Phase II and TMDL for Little Neshaminy Creek Watershed to capitalize on efforts.
- Support efforts of local watershed groups to improve and protect water quality in watershed.
- Implement water quality recommendations of Little Neshaminy Watershed Assessment and Restoration.

Objective – *Integrate goals of RCP with municipal plans and land use ordinances.*

Actions:

- Promote integration of RCP goals with comprehensive plans, open space and recreation plans, zoning and subdivision ordinances of municipalities within the watershed.
- Encourage multi-municipal planning among the municipalities.
- Investigate funding and other incentives.

Goal 10: Improve Neshaminy Creek River Conservation Plan Implementation Resources.

Objective – *Establish a structure, mechanism or information system for continued cooperation and securing funding for projects and programs to maintain and enhance the historic, cultural, economic, and natural resources of watershed.*

Actions:

- Organize working group to encourage plan project implementation.
- Identify leadership and establish a structure or information system to facilitate the implementation of the river conservation plan.
- Provide copies of the river conservation management plan to each municipality and the legislators whose districts encompass the corridor along with a summary of funding needs.
- Promote public support for conservation funding.
- Sponsor public information sessions on municipal funding initiatives for open space and watershed initiatives.
- Build the capacity (volunteers, staff, resources, etc.) to implement the river conservation plan.
- One year after the adoption and approval of the river conservation plan, hold a meeting of the advisory committee and other interested parties to evaluate progress on the implementation projects. After five years, meet to evaluate progress on the priority projects and activities and conduct update if warranted.

Management Options and Action Plan

The main purpose of the Little Neshaminy River Conservation Plan is to set forth a guidance document to direct implementation projects in a coordinated

manner to preserve and enhance the resources of the watershed. Many projects may involve resources well beyond the capability of local watershed organizations or municipalities to undertake on their own, thus the plan will identify lead organizations as well as potential partners who may be able to provide needed financial and/or technical assistance to help accomplish the projects.

In order to continue the work of the plan and improve inter-municipal communication, it is proposed that the local environmental leaders continue to meet on a formal basis to discuss implementation strategies, watershed issues and guide regional projects recommended in the plan. Strong cooperation and communication is needed among municipalities within the Little Neshaminy Creek watershed as well as within the adjacent Neshaminy Creek River conservation plan watersheds to raise awareness of projects affecting adjoining communities and to share information regarding upcoming funding opportunities. The Neshaminy Creek Watershed Alliance was formed for this specific reason and is one possible entity to coordinate watershed projects.

Management Options Matrix

On the following pages, the list of goals and objectives has been expanded to identify primary partners, supporting partners and projected implementation timing. The table identifies the roles each partner can play in planning and implementing conservation actions. Implementation timing has been generally determined based on the complexity and funding requirements of the recommended actions. As with any planning effort, the actual timing of a proposed action can be affected by other variables such as state or national economic policies, political will, and unrelated projects requiring limited municipal resources.

Table 22 - Little Neshaminy RCP Management Options Matrix				
Objectives	**Conservation Actions**	**Primary Partners**	**Supporting Partners**	**Projected Implementation**
1. Water Quality Goal: Protect and improve the surface and ground water quality in the Little Neshaminy Creek Watershed to improve recreational opportunities, wildlife habitat and sources of drinking water.				
Improve In-Stream Habitat	• Increase streamside vegetation to increase canopy cover and moderate stream temperature • Promote sustainable land use practices to reduce impervious cover and increase infiltration of stormwater • Improve protection of headwaters • Reduce nutrient and sediment loadings to watershed • Develop and distribute educational materials to all landowners related to the proper care and management of streamside properties.	Municipalities, DEP, DCNR, BCCD, MCCD	PAF&BC	2-5 years
Protect Existing Riparian Areas and improve those lacking sufficient riparian corridors.	• Increase riparian buffer protection in areas lacking sufficient vegetative buffers (50% canopy cover and 50 foot width forest buffer) • Develop and adopt riparian corridor protection ordinances, in all watershed municipalities if one has not been adopted. • Improve land management practices for streamside properties • Purchase land or conservation easements in riparian zones to limit development and restrict uses.	Municipalities, DCNR, DEP, BCCD, MCCD,	HC, BCPC, MCPC	2-5 years
Improve Water Quality in Bradford Lake Reservoir	• Implement in-lake management practices recommended in Little Neshaminy and Bradford Lake Watershed Assessment. • Implement Bradford Lake restoration activities to eliminate sources of taste and odor compounds impacting downstream drinking water treatment plants. • Design and construct forebay/constructed wetland structure to improve water quality of lake. • Implement watershed best management practices recommended in Little Neshaminy and Bradford Lake Watershed Assessment. • Initiate projects to stabilize and protect streambanks and establish riparian buffers ✧Implement institutional practices recommended in Little Neshaminy and Bradford Lake Watershed Assessment. ✧Establish watershed organization for the lake.	BCDPR, BCCD, Warrington Township, water quality consultants	BCPC, DCNR, DEP	2-5 years

Table 22 - Little Neshaminy RCP Management Options Matrix

Objectives	Conservation Actions	Primary Partners	Supporting Partners	Projected Implementation
	✧Develop and adopt a municipal lawn fertilizer ordinance for all municipalities within the watershed. Increase landowner education and continue annual water quality monitoring.			
Protect drinking water sources	• Institute wellhead protection programs • Reduce demand on drinking water sources through residential water conservation programs • Support efforts of local watershed groups to improve and protect water quality in the watershed	Water utilities, municipalities, DEP BCDPR; BCCD, MCPHS	BCPC, MCPC, DCNR, PAF&BC	2-5 years
Support water quality recommendations of the Little Neshaminy Watershed Assessment and Restoration	• Initiate cooperative projects to fulfill plan recommendations • Increase water quality monitoring through establishment of small network of channel reference sites • Explore alternative management of grass or turf areas of publicly owned lands • Explore stormwater retrofits within suburban campus and industrial lands • Initiate projects to restore Stage V streams and priority reaches. Priority reaches are: ✧Kemper Park, Warminster – Valley Road to Bristol Road ✧Downstream of Meetinghouse Road – Warwick – Bristol Road Bridge to below downstream bend. ✧Park Creek along Keith Valley Road – Horsham – Horsham Park to County Line Road.	BCDPR, DRK, HC, BCCD, MCCD, MCPHS, PCWA, water quality consultants	DEP, BCPC, MCPC, Municipalities	Ongoing
Prioritize water quality projects for implementation	• Support efforts of local watershed groups to improve and protect water quality in the watershed • Convene meeting of watershed municipalities, water utilities, wastewater utilities and DEP to explore cooperation meeting federal mandates.	Watershed groups, Neshaminy Alliance, municipalities, utilities	DEP, DCNR	2-4 years
Increase water quality monitoring in Park Creek and Little Neshaminy Creek.	• Train, recruit and educate volunteer water quality monitors. • Collect and analyze lake and stream samples for nitrogen, phosphorus, total suspended solids, and oil/grease.	DRK, Park Creek Watershed Association, Municipalities	BCCD, MCCD, Municipal EACs	1-2 years
Encourage programs to increase vegetative cover throughout watershed.	• Develop and implement residential, municipal and public education programs that address the benefits of naturalized land for water management and air quality	BCCD, MCCD, HC, PEC, Municipalities, PCWA	DCNR, DEP, SEFRA	1-2 years

Table 22 - Little Neshaminy RCP Management Options Matrix				
Objectives	**Conservation Actions**	**Primary Partners**	**Supporting Partners**	**Projected Implementation**
	• Initiate reforestation projects on certain public lands. • Educate and encourage homeowners, businesses, religious and non-profit organizations to plant as much soil-retaining, water holding vegetation on land presently in turf or lawn. • Increase the number of street trees in developed areas of the watershed • Increase forested riparian buffers adjacent to stream tributaries.			
2. Stormwater Goal: Improve the way stormwater is managed in the watershed to reduce flooding, protect stream base flow, protect stream quality, and maintain the hydrologic balance.				
Reduce stormwater runoff volumes	• Reduce residential stormwater run-off through the promotion and use of rain barrels, rain gardens and increased homeowner education on water conservation. • Encourage disconnection of roof-top runoff drains from storm sewer systems. • Provide incentives for developers to utilize pervious paving, bio-retention islands, green roofs and other low impact development technologies in new and redeveloped sites.	Municipalities, HC, BCPC, BCCD, MCPC, MCCD, PEC	DEP	1-2 years
Improve water quality of stormwater	• Perform stormwater basin assessments to determine candidate sites for retrofits or naturalization • Retrofit and/or naturalize BMPs where possible to promote infiltration and improvements in water quality • Utilize treatment wetlands and innovative BMPs as educational tools for the public, municipalities and agencies • Install innovative BMPs on public and school district lands to be used as demonstration sites • Provide incentives for developers to utilize pervious paving, bio-retention islands, green roofs and other low impact development technologies in new and redeveloped sites. • Encourage the use of stormwater BMPs in all types of development as recommended in the Pennsylvania Stormwater BMP Manual. • Adopt and enforce stormwater quality standards and criteria of	Municipalities, HC, BCPC, BCCD, MCPC, MCCD, PEC	DEP, Consultants, DVRPC, Universities	2-5 years

Table 22 - Little Neshaminy RCP Management Options Matrix

Objectives	Conservation Actions	Primary Partners	Supporting Partners	Projected Implementation
	Neshaminy Creek Act 167 Stormwater Management Plan. • Prepare conservation and nutrient management plans for active farms.			
Update Land Use Practices and Ordinances to include water quality standards and criteria.	• Update natural resource protection ordinances to support better stormwater management • Review and update Subdivision and Land Development Ordinances to support low-impact development techniques to reduce impervious cover in new and infill developments. • Require installation of naturalized stormwater BMP's to improve water quality in all new developments. • Eventually adopt the stormwater management model ordinances of the updated Act 167 Stormwater Management Plan for the Little Neshaminy Creek in all watershed municipalities.	Municipalities, Heritage Conservancy, PEC, BCPC, MCPC		1-2 years
Improve stormwater management programming and financing.	• Support efforts to research requirements of establishing stormwater utility • Coordinate stormwater management, conservation and preservation efforts between organizations and municipalities throughout the Neshaminy Creek watershed • Implement and fund programs to identify and retrofit existing stormwater detention basins to improve water quality function.	Municipalities, BCPC, Local Municipal Authorities, MCPC, PEC, Neshaminy Alliance	State Legislators, DEP	
3. Flood Impact Reduction Goal: Mitigate impacts from floods				
Reduce impacts from flooding on economic, historic and natural resources.	• Sponsor study to remap 100 -year floodplain to account for upstream development as in Pennypack and Tacony creek watersheds • Strengthen existing ordinances to place more restrictive controls on the 100-year flood zone and flood fringe areas. • Reduce exceptions to existing ordinances allowing encroachment and building in floodplains and wetlands. • Regulate alluvial soils • Purchase flood prone properties for conversion to public open space. • Provide training to zoning hearing boards regarding the	Municipalities, BCPC, MCPC, ACE, DEP, FEMA, PEMA	Universities	1-5 years

Table 22 - Little Neshaminy RCP Management Options Matrix				
Objectives	**Conservation Actions**	**Primary Partners**	**Supporting Partners**	**Projected Implementation**
	cumulative effects of exceptions and increased impervious surface on the hydrologic cycle of watershed. • Improve existing stormwater infrastructure. • Encourage protection of existing wetlands and natural floodplain areas through conservation easements.			
Determine procedures for removal of debris and obstructions in the stream	• Establish dialog with Penn DOT, DEP, NRCS and ACE to determine and coordinate procedures for removal of obstructions and debris in streams, including obstructions upstream and downstream from exiting bridges.	ACE, DEP, Penn DOT, Municipalities, PAF&BC	State Legislators	1-2 years
Improve management of flood prone properties	• Purchase flood prone properties for conversion to public open space. • Ensure proper management of acquired land through property management plans • Support park department staff person to address property management.	BCDPR, BCCD, MCPHS, MCCD, HC	NRCS, FEMA, PEMA	Ongoing
Reduce zoning and building exemptions in sensitive areas.	• Provide training to zoning hearing boards regarding the cumulative effects of exceptions and increased impervious surface on the hydrologic cycle of the watershed. • Develop handbook for ZHBs educating them about cumulative impacts of impervious surfaces and offer recommendations of measures that can mitigate environmental damage.	HC, PEC, BCPC, MCPC	DCED	1-2 Years
4. Cultural Resource Identification and Protection Goal: Protect Cultural Resources of the Watershed.				
Identify and protect archaeological and historic resources of the watershed.	• Identify significant historic & archaeological properties to be protected • Protect and maintain historic & archaeological resources. • Conduct a comprehensive municipal survey of historic properties, if a survey has not been conducted. • Nominate historic resources that have been determined eligible for the National Register of Historic Places to the National Register. • Adopt or strengthen historic preservation ordinances. • Promote adaptive re-use of historic buildings.	Historical Societies, Municipalities, HC	BCPC, MCPHS, DCED, PHMC	1-2 years

Table 22 - Little Neshaminy RCP Management Options Matrix

Objectives	Conservation Actions	Primary Partners	Supporting Partners	Projected Implementation
	• Strengthen financial and operational support of local historic preservation and Native American organizations.			
Preserve significant scenic views and view sheds	• Identify scenic views to be maintained. • Adopt or strengthen scenic preservation ordinances.	Municipalities	BCPC, MCPC	1-2 years
Link important cultural and natural resources	• Implement BCPC and MCPC proposed greenway networks. • Develop trails, bike paths and greenways linking important natural and historic resources.	Municipalities, BCPC, MCPC, Land Trusts, MCPHS	DCNR, DVRPC	2-5 years
5. Natural Resource Identification and Protection Goal: Protect the Natural Resources of the Watershed				
Identify and conserve sensitive natural resources of the watershed.	• Conduct or update municipal environmental resources inventories (ERI) to identify and prioritize natural areas. • Update municipal comprehensive plans to include protection of natural resource priority areas. • Review and strengthen natural resource protection ordinances for wetlands, floodplain, groundwater recharge areas, priority natural areas (NAI), woodlands, and forests, ponds, lakes, hydric and alluvial soils. • Protect most sensitive areas through acquisition or conservation easement. • Restore and protect riparian vegetation along streams in the watershed. • Restore and protect aquatic communities, habitats and stream channels. • Restore and protect natural floodplains. • Remove references to invasive species in zoning and subdivision ordinances. • Review examples of ordinances that include the removal of non-native species such as in Upper Makefield Township.	Municipalities, HC, BCPC, MCPC	DCNR	2-5 years
Protect groundwater resources and stream baseflow	• Identify important groundwater recharge areas and protect as open space.	Municipalities, BCPC, MCPC, HC		2-5 years
Reduce damage to natural areas	• Control invasive and exotic plants and animals. • Institute measures to reduce damage from Canada Geese and White Tailed deer.	BCDPR, BCCD, MCCD, MCPHS, Municipalities, HC,	NRCS, DCNR, SEFRA	1-2 years

Table 22 - Little Neshaminy RCP Management Options Matrix				
Objectives	**Conservation Actions**	**Primary Partners**	**Supporting Partners**	**Projected Implementation**
	• Control illegal ATV use on open spaces.	Police Departments		
Implement riparian and streambank restoration where effective	• Restore streambanks and riparian buffers along priority reaches in the watershed as identified in Little Neshaminy Creek Watershed Assessment and Restoration Plan: ✧Kemper Park, Warminster – Valley Road to Bristol Road ✧Downstream of Meetinghouse Road, Warwick – Bristol Road Bridge to below downstream bend. ✧Park Creek along Keith Valley Road, Horsham – Horsham Park to County Line Road. • Continue to monitor and assess streambank conditions for additional riparian and restoration sites	BCCD,BCDPR,MCCD, MCPC, HC, PCWA, Municipalities	DRKN, DEP, DCNR	Ongoing
Support sustainable land management practices on community open spaces	• Promote invasive plant and animal control, reduced mowing schedules, and other environmentally sound management practices for community held open spaces and common areas. • Address illegal ATV in community open spaces. • Promote use of vegetated buffers around BMPs and ponds to discourage use by Canada Geese.	BCCD, BCDPR, MCCD, MCPHS, NRCS, PSCE, DCNR		Ongoing
Protect prioritized NAI and ERI sites and identified sensitive lands.	• Enact stricter resource protection regulations in designated NAI, ERI and conservation areas. • Protect NAI areas, ERI sites and sensitive lands through acquisition or conservation easements. • Sponsor training sessions on the use of conservation easements for open space protection.	Municipalities, Land Trusts	DEP, DCNR	Ongoing
Link important cultural and natural resources	• Implement BCPC and MCPC proposed greenway networks. • Develop trails, bike paths and greenways linking important cultural and natural resources.	Municipalities, BCPC, MCPC, Land Trusts, MCPHS	DCNR, DVRPC	2-5 years
6. Recreational, Park and Open Space Resources Goal: Maintain and enhance recreational opportunities and the parks and open space resources of the watershed.				
Improve connectiveness and management of open spaces throughout the watershed	• Link greenways throughout the watershed. • Support implementation of BCPC and MCPC proposed greenway networks • Develop trails, bike paths and greenways linking important	Municipalities, BCPC, MCPC, Land Trusts, MCPHS	DCNR, DVRPC	2-5 years

Table 22 - Little Neshaminy RCP Management Options Matrix

Objectives	Conservation Actions	Primary Partners	Supporting Partners	Projected Implementation
	natural and historic resources. • Encourage multi-municipal trail linkages among existing park systems.			
Implement Parks, Recreation and Open Space Plans	• Prioritize large parcels for open space acquisition or conservation easements • Update existing municipal recreation, parks & open space plans. • Implement recommendations of existing municipal and county open space plans. • Specify and implement stewardship plans on existing community open space areas.	Municipalities, BCPC, MCPC, BCDPR, MCPHS	DCNR, HC	2-5 years
Increase and improve municipal passive and active recreation facilities	• Maintain and improve playground and recreational facilities. • Increase passive recreation opportunities for residents through acquisition and management of natural open spaces. • Improve bike path and bike trail network throughout the watershed and park systems.	BCDPR, BCPC, MCPC, MCPHS	DVRPC,DCNR	2-5 years
Improve access points to the creek for recreation.	• ID potential public access points • Identify and install canoe and kayak access points to the Little Neshaminy Creek. • Develop access points utilizing sound environmental design practices to serve as educational sites.	Municipalities, BCDPR, MCPHS	DCNR	1-2 years
Promote sustainable land management practices on community open spaces	• Specify and implement stewardship plans for public open spaces and all park land. • Encourage naturalization of open spaces. • Create fund for purchase of trees, shrubs and meadows grasses to be used by municipalities, schools and organizations for revegetating or naturalizing open spaces. • Promote invasive plant and animal control, reduced mowing schedules, and other environmentally sound management practices for community held open spaces and common areas. • Address illegal ATV in community open spaces. • Promote use of vegetated buffers around BMPs and ponds to discourage use by Canada Geese. • Encourage participation in the Audubon Cooperative Sanctuary	BCDPR, BCCD, MCCD, MCPHS, NRCS, PSCE, DCNR	HC, BCPC, MCPC DCNR	2-5 years

Table 22 - Little Neshaminy RCP Management Options Matrix				
Objectives	**Conservation Actions**	**Primary Partners**	**Supporting Partners**	**Projected Implementation**
	Program for existing golf courses and other types of property in watershed.			
7. Watershed Resources Education & Outreach				
Goal: Increase Participation in Education and Conservation Activities				
Promote and enhance the understanding of the cultural, spiritual, economic and natural resources of the watershed among residents, business owners, religious and non-profit organizations.	• Develop programs and materials to educate homeowners, business owners, religious and non-profit organizations on water quality practices at home and land management techniques for those with property along riparian areas. • Educate and encourage homeowners, businesses, religious and non-profit organizations to plant as much soil-retaining, water holding vegetation on land presently in turf or lawn. • Coordinate outreach and education with municipal NPDES II program requirements. • Promote hands-on environmental education to residents and businesses via programs such as tree planting, stream clean-ups, and stream visual assessments. • Educate farmers on preparing conservation and nutrient management plans for active farms. • Post educational signage at stream crossings, naturalized areas, public open spaces and historical sites.	Municipalities, DEP, DCNR, Watershed Associations, local institutions	BCCD, MCCD, BCPC, MCPC	1-2 years
Promote and enhance the understanding of the cultural, economic and natural resources of the watershed to municipal officials.	• Promote educational programs for municipal officials, staff, boards and commissions on the link between land use practices and natural resource protection. • Evaluate alternatives to low-density, sprawl forms of residential development. Research, distribute and implement model ordinances for consideration by the municipalities. • Create Environmental Advisory Councils in all watershed municipalities that do not currently have them. • Provide information, such as maps and fact sheets for the use of key decision-makers. • Create resource materials for use by municipalities regarding the benefits of using native vegetation in landscaping and residential	DEP, DCNR, Watershed Associations, HC, PEC.	BCPC, MCPC, BCCD, MCCD	1-2 years

Table 22 - Little Neshaminy RCP Management Options Matrix

Objectives	Conservation Actions	Primary Partners	Supporting Partners	Projected Implementation
	gardens. • Encourage municipalities and school districts to adopt policy to use native vegetation in facility landscaping.			
Promote and enhance the understanding of the cultural, economic and natural resources of the watershed among elementary and secondary school students.	• Promote service learning programs at elementary and secondary schools to teach student about basic stream ecology. • Identify or provide access to the creek for school groups. • Work with school districts to coordinate, in partnership with non-profit organizations, curricula on the creek's resources. • Promote service learning programs and coordinate curricula on creek's resources for youth education at religious and non-profit organizations with property along riparian areas.	DCNR, DEP, BCDPR, MCPHS	Watershed Organizations, religious and non-profit organizations.	1-2 years
Promote and enhance the understanding of the cultural, economic and natural resources of the watershed to the development community.	• Educate development community on the economic and environmental benefits of conservation design and low-impact development techniques.	DEP, DCNR, Land Trust, BCCD, MCCD	Watershed Organizations	Ongoing
8. Sustainable Economic Development Goal: Encourage sustainable economic development practices.				
Promote conservation design principals and sustainable land use practices in new development within watershed communities.	• Update municipal comprehensive plans, zoning and subdivision ordinances to encourage the use of conservation design and low impact development techniques to reduce impervious surfaces. • Encourage the use of Stormwater Management Best Management Practices as recommended in the Pennsylvania's Stormwater Best Management Practices Manual.	Municipalities, BCCD, MCCD, BCPC, MCPC	DEP, DCED	Ongoing
Promote conservation design principals and sustainable land use practices in redevelopment and/or infill development activities within the watershed communities.	• Work cooperatively to identify economically viable adaptive reuse options for the NASJRB Willow Grove facility which incorporate conservation design principles. • Encourage reduction in impervious surfaces in redevelopment projects. • Promote adaptive re-use of existing underutilized or vacant facilities. • Promote the use of green roofs and rain gardens in highly	Municipalities, BCPC, MCPC	DEP, DCED	Ongoing and long term.

Table 22 - Little Neshaminy RCP Management Options Matrix				
Objectives	**Conservation Actions**	**Primary Partners**	**Supporting Partners**	**Projected Implementation**
	developed areas. • Promote use of stormwater BMPs as recommended in Pennsylvania's Stormwater BMP Manual.			
9. Plan Integration and Coordination Goal: Improve watershed-wide plan coordination and integration.				
Integrate Little Neshaminy RCP recommendations with the management options and recommendations of the adjacent RCPs and other studies completed or underway for the entire Neshaminy Creek Basin.	• Establish plan clearinghouse to provide single repository and database for previous Neshaminy Creek plans, studies and assessments. • Review and integrate all RCP goals and actions. • Coordinate watershed-wide activities through Neshaminy Alliance to avoid duplicative efforts. • Review status of previous and ongoing studies within the watershed.	Neshaminy Alliance, PEC, HC	BCPC, MCPC, Municipalities, DEP, DCNR	Ongoing
Improve coordination among watershed organizations and stakeholders to prioritize and implement recommendations of RCPs and other watershed studies.	• Coordinate efforts between municipalities, water and wastewater utilities to cooperatively address SDWA, Act 167, NPDES Phase II and TMDL for Little Neshaminy Creek Watershed to capitalize on efforts. • Support efforts of local watershed groups to improve and protect water quality in watershed. • Implement water quality recommendations of Little Neshaminy Watershed Assessment & Restoration.	Neshaminy Alliance, Utilities, Municipalities	BCPC, MCPC, DEP, PEC, HC	2-5 years
Integrate goals of RCP with municipal plans and land use ordinances.	• Promote integration of RCP goals with comprehensive plans, open space and recreation plans, zoning and subdivision ordinances of municipalities within the watershed. • Encourage multi-municipal planning among the municipalities. Investigate funding and other incentives.	Municipalities, Neshaminy Alliance, BCPC, MCPC	DCED	1-2 years
10. Plan Implementation Goal: Improve Implementation Resources				
Establish a structure, mechanism or information system for continued funding for projects and programs to maintain and enhance the	• Organize working group to encourage plan project implementation • Identify leadership and establish a structure or information system to facilitate the implementation of the river conservation	Steering Committee Members, Neshaminy Alliance	HC, PEC Agencies	1-2 years

Table 22 - Little Neshaminy RCP Management Options Matrix				
Objectives	**Conservation Actions**	**Primary Partners**	**Supporting Partners**	**Projected Implementation**
resources of the watershed.	plan. • Provide copies of the river conservation management plan to each municipality and the legislators whose districts encompass the corridor along with a summary of funding needs. • Promote public support for conservation funding. • Sponsor public information sessions on municipal funding initiatives for open space and watershed initiatives. • Build the capacity (volunteers, staff, resources, etc.) to implement the river conservation plan. • One year after the adoption and approval of the river conservation plan, hold a meeting of the advisory committee and other interested parties to evaluate progress on the implementation projects. After five years, meet to evaluate progress on the priority projects and activities and conduct update if warranted.			

Abbreviations: ACE – Army Corps of Engineers, BC – Bucks County, BCAS – Bucks County Audubon Society, BCCD – Bucks County Conservation District, BCDPR – Bucks County Dept. of Parks and Recreation, BCPC – Bucks County Planning Commission, BCHD – Bucks County Health Department, BHWP – Bowman's Hill Wildflower Preserve, DCED – Pennsylvania Department of Community and Economic Development, DEP – Pennsylvania Department of Environmental Protection, DCNR- Pennsylvania Department of Conservation and Natural Resources, DRBC – Delaware River Basin Commission, DRK – Delaware River Keeper Network, DVRPC – Delaware Valley Regional Planning Commission, FEMA-Federal Emergency Management Agency, HC - Heritage Conservancy, MC – Montgomery County, MCCD – Montgomery County Conservation District, MCPC – Montgomery County Planning Commission, MCPHS – Montgomery County Department of Parks and Heritage Services, NPS – National Park Service, NRCS – Natural Resources Conservation Service, PAF&BC – Pennsylvania Fish and Boat Commission, PEC – Pennsylvania Environmental Council, PCWA - Park Creek Watershed Association, PEMA-Pennsylvania Emergency management Agency, PSCES – Penn State Cooperative Extension Services, PHMC – Pennsylvania Historical and Museum Commission, SEFRA - Southeast Forest Resources Association, USGS – US Geological Service, US EPA – US Environmental Protection Agency