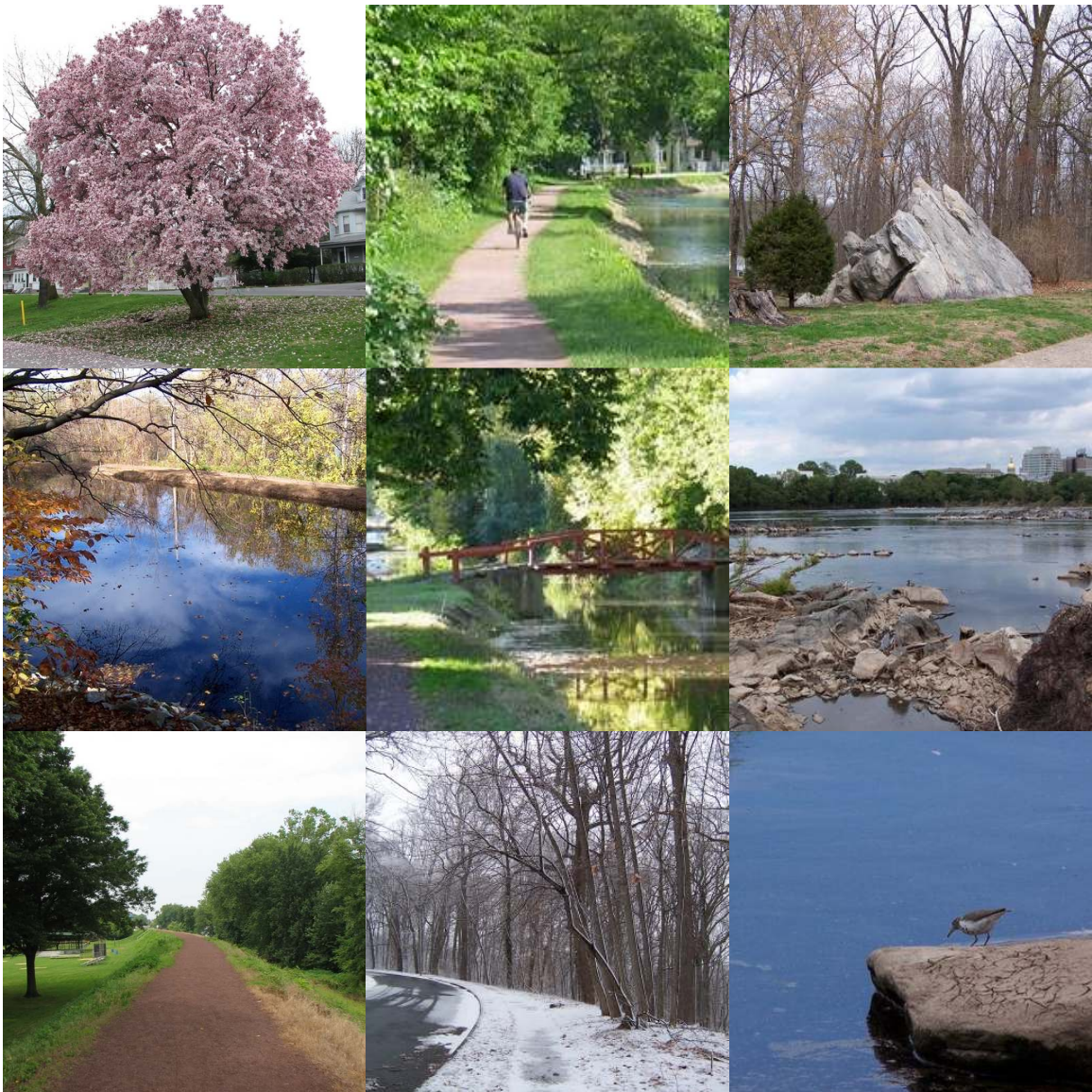




Borough of Morrisville Open Space Plan 2009



Prepared by the Morrisville Environmental Advisory Council



Borough of Morrisville Open Space Plan 2009

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Some wording used in the Borough of Morrisville Open Space Plan includes direct excerpts from the Morrisville Comprehensive Plan 2009 that may not be cited.



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Executive Summary

The benefits of open space cannot be downplayed. The most successful communities incorporate green space into all of their designs. Current research and practice are showing that open space conservation and economic development are not two opposing sides; they are concepts that can work synergistically to bring well-being to a community.

Homebuyers want neighborhoods that have access to parks, playgrounds, natural areas and trails. Businesses are attracted to locations that provide customers and employees with the quality of life that environmentally sensitive design brings. Together, these forces can create an energetic, prosperous and sustainable community.

Morrisville Borough has many valuable features that make it a unique and special town. It is an important link and gateway between Pennsylvania and New Jersey. Also, the wide variety of architecturally interesting homes, the historic and natural landmarks, and its special place along the Delaware River and the Delaware Canal are all treasures that make Morrisville a community that is vibrant, full of potential and a good place to live.

Careful development of our open space is critical to the revitalization of Morrisville. The location on the Delaware River provides an increased opportunity to have a balanced blend of city and nature. Both are essential in creating a community that is not only economically viable, but is a place in which people want to live. The natural, historic, and cultural resources of Morrisville should be vigorously preserved and protected as treasures for the future generations who choose to call Morrisville their home.

The ultimate goal of any community open space plan is to protect and preserve the public health and safety. Drinking-water quality, air quality, flooding and physical health are public health and safety issues. Proper local use of open space resources has a direct and positive effect on all of these. Naturally planted areas help filter runoff for water protection and reduce air contaminants. They absorb rainfall and high river waters to prevent and reduce

flood damage. Good open space availability encourages residents to get out and be active, promoting healthy lifestyles.

We are learning that reducing the carbon footprint is vital to minimize the effects of climate change. A piece of land left undeveloped uses little or no energy. Trees and other plants absorb carbon dioxide, helping to cool the planet, and trees provide shade in summer, cooling the area in which they stand. Natural open areas are low cost and low impact.

Benefits of Open Space

- Provide cleaner air, cooler temperatures, and zero energy consumption.
- Provide needed habitat for birds, fish and animals.
- Provide space for plants and trees.
- Provide for recreation opportunities like sitting areas; parks and playgrounds; natural and waterfront areas for birdwatching; paths for walking, running and biking; water access areas for fishing, canoeing, kayaking and boating.
- Provide spaces of green for future generations.
- Improve the image of the neighborhood and increase neighboring property values.
- Reduce crime and create calming effect.
- Preserve natural scenic beauty.
- Encourage walkable, active community.
- Attract people and businesses to the region, stimulating the economy.
- Filter stormwater runoff for a cleaner river.
- Reduce the impact of flooding by protecting undeveloped floodplain properties from development and by preserving and enhancing natural vegetation on these properties.
- Preserve locations of natural and historical importance, encouraging the use of pre-existing structures and features.

Morrisville has a few open space parcels that need to be optimized, through either park plan development, or protection and restoration. Morrisville is blessed with a variety of open space resources, and the Delaware River is the largest. Morrisville sits at the head of the tidal area, which creates a unique riparian ecosystem.

An important piece of the Borough of Morrisville Open Space Plan 2009 (MOSP) is establishing open space linkages both within the Borough and with other communities. The plan demonstrates how Morrisville open space links active recreational northern Williamson Park with the canal towpath, the southern riverfront, to historical and residential areas, as well as the business districts. Our community is walking and biking friendly and allows easy access to Manor Park and other smaller open land parcels. Morrisville is uniquely located in that our

greenways are connected to Lower Makefield to the north and Falls Township riverfront to the south. Partnering with Falls Township will help to ensure coordinated riverfront protections and goals. There are trail plans that extend the connections throughout the region, to New Jersey and other parts of Bucks County.

The two most vulnerable open space areas in Morrisville are the southern end of Williamson Park to Bridge Street and the southern riverfront section from Bridge Street to the border with Falls Township. A combination of land acquisition, zoning changes, restorative planning, community partnerships and adequate funding will need to occur in order to ensure protection of these areas.

The MOSP is required to address how best to manage and maintain current resources. Protection of open space and natural resources can be achieved by strengthening the language in Borough ordinances and the effective enforcement of current ordinances. The development of maintenance and usage policies of publicly owned lands is necessary to insure that the land is being used in ways that are consistent with the Comprehensive Plan, the MOSP and the need for environmental protection and preservation.

All land acquisition and public land use is approved by Borough Council and administered by the Borough Manager. The MOSP is meant to provide Borough Council, the Borough Manager and the Public Works Department with a logical and practical framework for open space and land management by providing concrete actions that can be taken to meet our community's vision and goals.

The MOSP supports the principles laid out in the Morrisville Comprehensive Plan:

"Park, recreation, and open space resources are an important part of a community's identity and overall quality of life. Open space contributes to the Borough's small town character, preserves the natural ecosystems upon which we depend, and provides an attractive setting in which to live and work. Park and recreation facilities provide an avenue for residents to interact and recreate and help create a sense of community. Park and recreation resources are an underlying strength of Morrisville and should be a key component of future revitalization efforts".



Fred Kerner



Borough of Morrisville Open Space Plan 2009

Community Background

Morrisville Borough is located on the eastern border of Bucks County, Pennsylvania along the Delaware River across from the state capitol of New Jersey, Trenton. Primarily developed as an industrial manufacturing town during the period of 1900 to 1929, the Borough has a genuine small town structure and feel, with a variety of traditional housing stock, historic and healthy green space, and a compact and accessible downtown district. This authentic hometown quality is one of Morrisville's predominant characteristics. Another important and formative characteristic is its riverfront location.

Morrisville Borough was one of the earliest settlements in Bucks County. Located at the Falls of the Delaware, Morrisville is the northernmost navigable point on the river. It was likely the site for camps of the Lenni Lenape, as well as early Europeans. The first county seat, Crewcorne, is believed to have been located in or near Morrisville. The Graystone site, located in the northeast corner of the Borough, was the starting point of the survey of the first tract of land purchased by William Penn from the Indians in 1682. Morrisville was named for Robert Morris, a financier of the American Revolution. Also, George Washington stayed at Summerseat in December 1776 while planning the attack that would change the course of the Revolutionary War. Later, a post office was established in 1795, and the Borough was incorporated in 1804.

Industry came to Morrisville in the 1770s when the first mills were built, taking advantage of the water power supplied by the adjacent falls in the Delaware River. These industries grew, and by the twentieth century Morrisville was a significant manufacturing center for rubber, plastics, and tile. The most intense periods of residential land development in the Borough occurred in the early and middle decades of the 20th century in response to this industrial expansion, giving Morrisville its mix of colonial, early suburban and post - war tract housing. During the last half of the twentieth century many of these plants closed, and industrial activity in the Borough diminished significantly. The Borough and its industrial base have been affected by the rise and fall of the U.S. Steel Works at Fairless, an industry that once employed 10,000 people in neighboring Falls Township but which is now in the process of being redeveloped following the departure of U.S. Steel.

Transportation has always been a leading factor in the development of Morrisville. The main colonial road between Philadelphia and New York City passed through Morrisville because it was the site of a ferry crossing on the Delaware River. The first wooden bridge across the Delaware at Morrisville was completed in 1806, and a bridge for passenger steam rail was opened in 1851. The Delaware Canal, which parallels the river and passes through the Borough, was completed in 1832. It was constructed to transport coal from the anthracite coal regions of northeast Pennsylvania past the unnavigable Falls of the Delaware. The canal flows south to Bristol, where the coal was downloaded to ships for transport by river to Philadelphia and other destinations. Morrisville has remained an important transportation site into the twenty first century, as the location of four bridges spanning the Delaware River, most significantly the U.S. Route 1 bridge and the Pennsylvania Railroad bridge.

Morrisville's population nearly doubled during the twentieth century, growing from 5,368 in 1930 to 10,023 in 2000. The Borough lost nearly 13 percent of its population from 1970 to 1980, as the industrial sector contracted. It now exhibits the population stability or loss that often characterizes older, built-up communities. The U.S. Census Bureau 2006 population estimate for Morrisville, the most recent available, puts the population at 9,746, for a loss of 2.8 percent from 2000.

Table 1. Morrisville Population Characteristics	
Population	10,023
Median age	35.7
Households	4,154
Average household size	2.41
High school graduates	86%
Race and ethnicity:	
White	76%
African-American	19.1%
Hispanic	4.8%
Asian	1.2%
Median household income	\$43,095

U.S. Census 2000

Morrisville Borough contains approximately 1.4 square miles of land. Current land use is provided in Table 2:

Table 2. Land Use Characteristics (2007)

Land Use	Acreage	Percentage*
Single-family residential	442.6	48.2%
Multifamily residential	58.2	6.3%
Mining and manufacturing	55.2	6.0%
Commercial	85.8	9.4%
Transportation and utilities	64.9	7.1%
Government and institutional	63.4	6.9%
Parks, recreation, open space	56.3	6.1%
Vacant	91.2	9.9%
Total	917.6	100.0%

Source: Bucks County Planning Commission

*Total does not equal 100 percent due to rounding

Almost half of the Borough is dedicated to single-family residential land use. Single - family residential uses are located throughout the Borough, with the majority located north of the Route 1 corridor. Multifamily land use comprises about 6.3 percent of the total Borough acreage; most of this acreage is located in the Plaza Boulevard and Melvin Avenue area, along West Trenton Avenue, and interspersed in individual buildings along Bridge Street and downtown. Mining and manufacturing land use comprises 6.0 percent of the Borough and is located at the Staley property in the southeast along the Delaware River, at the Toll Brothers site along South Pennsylvania Avenue, and along Nolan Avenue. Commercial land use, which makes up 9.4 percent of the Borough's land use, is focused along Bridge Street, Philadelphia Avenue, Pennsylvania Avenue (near its intersections with Bridge Street and Philadelphia Avenue), the west end of West Trenton Avenue, and East Trenton Avenue. Transportation and utilities land use has about 64.9 acres, government and institution has about 63.4 acres, and park and recreation land use has about 56.3 acres. Transportation and utilities land use are located throughout the Borough, the vast majority within rights - of - way. Government and institutional land use primarily consists of municipal buildings, churches, the Morrisville Cemetery, Morrisville High School, Grandview Elementary School, and M. R. Reiter Elementary School. Park and recreation land use consists of the Delaware Canal, Graystones, Manor Park Playground, and Williamson Park.

Vacant land uses consist of small parcels throughout the Borough, Morrisville Lake, and several larger parcels adjacent to the Toll and Staley sites. The Borough contains no agricultural land use.

Morrisville has many valuable features that make it a unique and special town. It is an important link and gateway between Pennsylvania and New Jersey. Also, the wide variety of architecturally interesting housing, the historic and natural landmarks, and its special place along the Delaware River and the canal are all treasures that make Morrisville a community that is vibrant, full of potential and a good place to live.

Being a riverfront community, floods are as integral to the community of Morrisville as the geology and climate. It is an issue and factor that must be addressed here at length. Situated just above a dramatic bend in the river, upon the stone fall-line which creates the Falls of the Delaware, Morrisville is very prone to flooding. The eastern border of the Borough is primarily floodplain of varied elevation. The river has yearly icejams in the winter months and thaw freshets in the early spring.

The most devastating flood in the recent history of Morrisville was in August of 1955. This flood was the result of hurricanes Connie and Diane. Though 400 lives were lost along the banks of the Delaware, Morrisville was spared by a stone, concrete, and earthen dike built fifteen years prior. Commonly known as "the levee," it was designed by the Army Corps of Engineers.

The Autumn months can also produce freshets of destruction, the most notably catastrophic of which was in 1903 (prior to the construction of the dike), which caused significant flooding both inside and outside the Borough.

The damage that floods can cause to Morrisville has been severely abated by the dike, which has served us well as a great protector against the ravages of flooding. However, as we learned in the summertime floods of 2005 and 2006, the river was able to breach the canal in Yardley (north of Morrisville) which let the floodwaters into Morrisville, via the canal, behind the dike, submerging Williamson Park and much of Delmorr Avenue, and threatening the homes of Central and Park Avenues. Only through an ingenious and expensive effort which lasted for many days was greater disaster averted. The level of floodwater was kept from rising further into the town by returning the water via a battery of gasoline-powered pumps and 10 inch hoses which carried the floodwater up and over the dike, back into the swollen Delaware.

To avoid flooding such as occurred in 2005 and 2006, improved stormwater management and floodwater abatement programs upriver from Morrisville are needed. The increased level of impervious surfaces associated with overdevelopment north of Morrisville is suspected as a major cause of worsening

floodwaters. Unfortunately, due to the path of the Delaware and our unique location, Morrisville will continue to bear the brunt of stormwater and flooding that other communities can avoid.

The southern end of town, below the Lower Trenton Bridge (aka Trenton Makes Bridge), is not protected by the dike, is primarily floodplain for hundreds of feet beyond the riverbank, and has no floodwater protection at all. The houses along South Delmorr Avenue, as well as the Staley property and the Morrisville Municipal Authority (MMA) Wastewater Treatment Plant are greatly endangered during flood events. Any future development of our floodplain areas should generally be avoided in the interest of public safety, both for the residents of Morrisville Borough and for those communities which we may impact downstream from us. Morrisville should engage in best management practices regarding stormwater and floodplain protection. In doing so, we shall serve as a powerful example of proper stewardship and a shining example to other riverfront communities.

Careful development of our open space is critical to the revitalization of Morrisville. The location on the Delaware River provides an increased opportunity to have a balanced blend of city and nature. Both are essential to creating a place that is not only economically viable, but is a place in which people want to live. The natural, historic, and cultural resources of Morrisville should be vigorously preserved and protected as treasures for the future generations who chose to call Morrisville their home.



Todd White



Borough of Morrisville Open Space Plan 2009

Goals and Objectives

The Borough of Morrisville Comprehensive Plan 2008 (MCP) provides a guide for the MOSP in establishing our vision, goals and objectives:

"Morrisville residents value recreation and the environment, with a deep understanding of their intrinsic relationship with the Delaware River. Widely known for its parks and system of trails as well as festivals and community events, the Borough has an abundance of recreational and cultural opportunities. Its historical resources, including Graystones and Summerseat, convey the story of Morrisville and establish it as an authentic community with a real sense of place and history."

---from the Community Vision Statement, MCP

The MCP is based on the concept of "Smart Growth" and open space plays a key role:

"Open space preservation supports smart growth goals by bolstering local economies, preserving critical environmental areas, improving our community's quality of life, and guiding new growth into existing communities."

---MCP

Current practice is now showing us that residential and commercial development is not enough to sustain a successful community. Residents want and need green space as well:

"Park, recreation, and open space resources are an important part of a community's identity and overall quality of life. Open space contributes to the Borough's small town character, preserves the natural ecosystems upon which we depend, and provides an attractive setting in which to live and work. Park and recreation facilities provide an avenue for residents to interact and recreate and help create a sense of community. Park and recreation resources are an underlying strength of Morrisville and should be a key component of future revitalization efforts."

---MCP

The ultimate purpose of the MOSP is the protection of the public health and safety, as well as our quality of life. This vision can be achieved by proper land management of the Delaware River watershed to prevent flood damage, to protect our water supplies and natural habitats within the Borough, as well as insuring the availability of a variety of appropriate recreational opportunities in our parklands.

Enumerated below are seven distinct and primary goals (and supportive objectives) of the MOSP 2009.

1. Maintain Existing Open Space

- Develop maintenance and usage guidelines, standards, and procedures.
- Develop formalized park and recreation plans to ensure that a balanced variety of recreational opportunities are available on public land.

2. Expand the environmental infrastructure within the Borough.

- Identify and acquire any suitable, privately owned and available open space properties, or obtain conservation easements on said properties if acquisition not available.

3. Protect and restore suitable open space properties.

- Re-zone suitable unprotected public open space properties as natural lands preservation zoning (CS-2).
- Seek funding sources for restoration of properties zoned CS-2

4. Preserve, protect and restore the Delaware Riverfront.

- Provide public access
- Preserve natural features
- Preserve floodplains
- Provide riparian restoration
- Protect native species

5. Encourage environmentally sensitive plantings and land management of all open space land and buffers.

- Provide educational and other supportive assistance to private landholders, Borough officials and employees, and the Department of Public Works.
- Formalize best practice guidelines for open space properties.

6. Be aware of future opportunities and information related to open space management (in preparation for future actions relating to acquisition, restorations, or ongoing management practices).
 - Develop park plans in readiness for future implementation.
 - Monitor upcoming opportunities and deadlines for sources of fiscal support.
 - Monthly EAC discussion of OSP opportunities and ongoing projects.
7. Encourage and promote the educational opportunities of open space properties. This includes highlighting their natural and historical significance.
 - Create connections between historical, environmental, social, educational and other community organizations through interaction in regular reviews, projects, and discussions of open space usage and policy.



Bill Setzer



Borough of Morrisville Open Space Plan 2009

Inventory of Protected Land

Land protection in Morrisville is governed through the use of zoning. There are two levels of protection:

CS-1 Community Service District: The purpose of this district is to provide for the orderly growth of community services within the Borough and to provide reasonable standards for development.

CS-2 Community Service Natural Lands Preservation District: The purpose of this district is to provide for the protection and preservation of natural lands for the benefit of all Borough residents.

Current lands protected through CS 1 and CS2 zoning are shown in Table 3. Other undeveloped land not in private ownership is shown in Table 4.



Todd White

Table 3. Protected Land

Tax Map Parcel #	Name	Location	Ownership	Public Access	Level of Protection	Size (acres)	Description	Facilities and Condition
24-009-210	Williamson Park	Delmorr Avenue	Borough	yes	CS 1	40.8	Park and recreation area	Play areas, play equipment, picnic areas, ball fields, basketball and tennis courts, scenic walking trail, community pool (quasi-private, located within park). Vacant land at southern end needs incorporation into park. Tennis and basketball courts in disrepair.
24-012-077-1	Manor Park Playground	E. Cleveland Avenue	Borough	yes	CS 1	1.2	Playground	Play equipment, picnic tables. Good condition. Unused fenced area (old ice hockey rink) in disrepair.
24-006-309*	Delaware Canal State Park	Bisects through Borough	State	yes	State protected	16.4	Park	Towpath and canal
24-007-031 to 045	Graystone Woods	Crown Street	Borough	yes	CS 2	6.1	Open space	Significant historic and natural resource, wooded
24-12-88-2		Delmorr and Philadelphia Avenues	Borough	yes	CS1	2.1	Open space	Vacant - mowed, grassy area
24-007-60		Between canal and River Road, northern section of Borough	Borough	no, not suitable for activity	CS 2	1.03	Open space	Wetlands. Recent canal work has damaged native species.

* Delaware Canal State Park has multiple parcels: 24-006-310, 24-008-626, 24-008-627, 24-009-060, 24-009-129

Table 4. Undeveloped Land Not In Private Ownership

TMP #	Owner	Acreage
24-8-50	Delaware River Joint Toll Bridge Commission	0.15
24-8-51	Delaware River Joint Toll Bridge Commission	0.16
24-9-226	Delaware River Joint Toll Bridge Commission	3.56
24-9-271	Delaware River Joint Toll Bridge Commission	0.42
24-9-393	Delaware River Joint Toll Bridge Commission	2.77
24-12-79	Municipal Authority of Morrisville	2.35
24-12-79.1	Municipal Authority of Morrisville	0.72
24-12-89	Pennsylvania Railroad Company	4.58
24-8-49	Morrisville Borough	0.58
24-8-570	Morrisville Borough	0.8
24-10-237-2	Morrisville Borough	0.05
24-10-274-1	Morrisville Borough	6.53
24-10-275-3	Morrisville Borough	1.15
24-12-67	Morrisville Borough	1.32
24-12-81	Morrisville Borough	13
24-12-83	Morrisville Borough	1.6
24-12-83-1	Morrisville Borough	1.2
24-12-84	Morrisville Borough	2.3



Borough of Morrisville Open Space Plan 2009

Inventory of Vulnerable Resources

Chapter 5, Natural Resources, of the Morrisville Comprehensive Plan provides the detailed information required for this section. It is excerpted in the following pages with additional EAC comment regarding riparian corridors shown **in bold**.

The following two paragraphs will describe additional issues not addressed in the Comprehensive Plan regarding our vulnerable natural resources.

In 2008, the Delaware River Basin Commission classified the non-tidal Delaware River, known as the “lower Delaware,” between River Miles 209.5 (the downstream boundary of the Delaware Water Gap National Recreation Area) and 134.4 (approximately at the Calhoun Street Bridge near the head of the tide at Morrisville) as Significant Resource Waters. This means that the northern portion of the Delaware River in Morrisville has been determined to have exceptionally high scenic, recreational, ecological and water supply value and is now protected by Special Protection Waters anti-degradation regulations.

The potential flooding of Delmorr Avenue and Williamson Park remains a concern, having flooded twice in recent years. Without massive emergency pumping during the last high water event in June 2006, extensive flooding would have reoccurred. Flood waters could overflow from the canal, if excess water is unable to be drained into the river. Current plans by DCNR for remedial canal projects to the north are expected to alleviate or minimize the problem.

Natural Resources

Chapter 5

---Excerpted from the Morrisville Comprehensive Plan

Natural resources serve not only to help maintain the character of a place and enhance the quality of life, but understanding their importance also is crucial for helping guide land use planning and future development. This chapter provides an inventory of the existing important natural resources in the borough that should be protected and regulated including wetlands, floodplains, trees, as

well as other topics of environmental concern for an urbanized municipality such as air quality and water quality.

Significant Natural Areas

Bucks County contains a diversity of unique natural features. These natural features harbor flora and fauna, some of which are not found anywhere else in the Commonwealth. In 1999, an inventory was performed to identify and rank the most significant natural areas remaining in the county, including those in Morrisville Borough. This survey, titled *Natural Areas Inventory of Bucks County, Pennsylvania (1999)* was conducted by the Morris Arboretum of the University of Pennsylvania (Ann F. Rhoads and Timothy A. Block) for the Bucks County Commissioners, and is intended to provide guidance for implementation of natural areas protection component of the Bucks County Open Space Initiative.

Specifically, the inventory analyzed sites based on thirteen criteria which address various aspects of biology, ecology, hydrology, and geology. Based on the evaluation of these sites against various criteria, sites were Categorized based on their significance and uniqueness ranging from the highest ranked Priority 1 sites, which include sites of state-wide and county-wide significance based on the uniqueness or exceptionally high-quality of the natural features they encompass, through the lowest ranked Priority 4 sites, which are characterized as sites with biological or ecological importance at the local level. In Morrisville Borough two Priority 3 sites were identified: Graystones and the Head of the Delaware Estuary/Tidal Shores at Welcome Park. These two sites are also mentioned in the *Natural Bucks County: Guide to Public Natural Areas*. The guide describes the location and amenities of this area, highlighting rare plants and animals and unique geological features. In addition to Graystones and Welcome Park, this guide also identifies the Delaware River Levee along Williamson Park as an additional natural area.

Graystones, an outcrop of Chickies Quartzite, marks the intersection of the Fall Line with the Delaware River. This site also has historical significance as the starting point of the survey of the initial purchase that William Penn made from the Native Americans in 1682. As mentioned in the *Morrisville Borough Open Space Plan (2000)*, this site, in addition to its historical significance, also contains a seven-acre remnant stand of mature Red oak – mixed hardwood forest. As cited in the *Lower Delaware River Conservation Plan (1999)*, a river conservation plan prepared as an outgrowth of the *Lower Delaware River Management Plan* in conjunction with the *Lower Delaware National Wild and Scenic River Study*, this is one of only two remaining old growth woods in Bucks County.

The Tidal Shores at Welcome Park natural area provides access to the upper end of the Delaware Estuary and marks the upstream limit of the tide in the river. The riverbank, including areas south of Bridge Street to the south border of

Morrisville, consists of a freshwater intertidal zone which is alternately inundated and exposed as the tide rises and falls twice daily. The *Morrisville Borough Open Space Plan (2000)* identifies several specialized plants in this habitat including many-flowered mud-plantain (*Heteranthera multiflora*), swamp beggar ticks (*Bidens bidentoides*), and water-hemp ragweed (*Amaranthus cannabifolius*), all critically imperiled in the state and identified as endangered and threatened plants in Pennsylvania.

The Delaware River Levee at Williamson Park provides a vantage point from which to view the rocky portion of the river bed resulting from erosion where the river crosses the Fall line rock formation. As noted in the *Natural Areas Inventory of Bucks County*, the tidal portion of the Delaware River provides habitat for several rare animals including Atlantic and Shortnosed sturgeon, nesting Osprey and Peregrine falcons, and Redbelly turtles. Fresh water tidal marshes harbor 13 rare plant species and also serve as nursery areas for fish.

The role of these significant natural areas, specifically their contribution to open space, and the opportunities they provide for recreational opportunities, will be discussed in additional detail in other chapters of this plan.

Geologic and Groundwater Resources

The geology of an area, although seldom seen except for surface outcrops, is the foundation of the natural features of a community and influences development choices. The underlying bedrock of an area has an influence on the type of soil formed, and in conjunction with the hydrologic cycle, is responsible for the changes in elevation, steep slopes, locations of streams, and orientation.

Morrisville Borough lies within a geologic area called the Fall Zone. The Fall Line, representing the inner boundary of the Atlantic Coastal Plain, defines the point where the tide stops due to a change in geology resulting in a rise in the land surface. Within the Fall Zone, areas to the south and east of the Fall Line are the loose sands and gravels characteristic of the Atlantic Coastal Plain, while the areas to the north tend to be characterized by the metamorphic and sedimentary rocks of the Piedmont. However, due to erosion in certain areas of surface deposits that extend beyond the Fall Line and the Atlantic Coastal Plain, the true line has been blurred, hence resulting in the term Fall Zone. The geologic formations underlying Morrisville Borough are described below.

Morrisville Borough has five major geologic formations: Chickies Quartzite, Felsic Gneiss, Mafic Gneiss, Wisconsin Pleistocene, and Pre Wisconsin Pleistocene. Groundwater supplies largely depend upon geology, surface characteristics, water use, and seasonal precipitation. The capacity of aquifers to transmit and store water is directly related to the specific physical and chemical properties of

the geologic formations which underlie the borough. The descriptions and water bearing characteristics of the borough's geologic formations are described below:

Chickies Quartzite – Quartzite is a metamorphic rock formed when sandstone is exposed to extreme heat and pressure. It is hard, dense rock that weathers slowly and forms prominent narrow hills and ridges. It contains poor groundwater supplies.

Felsic Gneiss – Fine - grained granite gneiss is a metamorphic rock that is resistant to weathering but shows good surface drainage, and median groundwater yields are below 20 gallons/minute.

Mafic Gneiss – Medium to fine - grained gneiss is a metamorphic rock that is highly resistant to weathering but shows good surface drainage.

Wisconsin and Pre - Wisconsin Pleistocene – Unconsolidated sands and gravels that generally yield good to excellent supplies of groundwater. The highly porous nature of this aquifer also poses a high risk of contamination due to rapid percolation of septic systems and sources of pollution.

Soils

Soils are one of the most important natural features to consider when making planning decisions because the type of soil influences the vegetative land cover, which in turn affects the quality and quantity of groundwater, wildlife diversity, erosion rates, and the overall aesthetic nature of the landscape.

A total of eight different soil types are located throughout Morrisville Borough. Of this total, three different soil types represent the majority of all soils. The most prevalent types are the Urban Land-Matapeake Complex (0 to 8 percent slopes), Urban Land Occasionally Flooded, and Urban Land (0 to 8 percent slopes) with Urban Land-Matapeake Complex being the predominant soil type in the Borough.

Urban Land soil types are pervasive throughout Morrisville Borough. The soils and foundation materials are highly variable. Urban structures and works cover so much of this land that identification of the soils is not practical. Most areas have been smoothed and the original soil material has been disturbed, filled over, or otherwise destroyed prior to construction.

Urban Land - Matapeake Complex, 0 to 8 percent slopes, is composed of about 65 percent urban land, 25 percent Matapeake soil and similar inclusions and 10 percent contrasting inclusions. Urban Land is land covered by streets, parking

lots, buildings and other structures that obscure the soils. Matapeake soils are yellowish brown silt loams underlain by gravelly loamy to coarse sands that are dark yellowish brown. Urban Land has rapid runoff rates due to highly impermeable surfaces and low levels of erosion. Matapeake soils are well drained with a seasonal high water table greater than 72 inches. Runoff from these soils is moderate and the potential for erosion is moderate. In those areas where slopes exceed 4 percent, the erosion potential is considered high (USDA 1996).

Other soil types represented in Morrisville Borough include Urban Land-Chester Complex (0 to 8 percent slopes), Urban Land_Chester Complex (8 to 25 percent slopes), Udorthentsgravelly, Nanticoke-Hatboro silt looms, and Delaware loam (0 to 3 percent slopes).

Hydric Soils

Hydric soils are poorly drained, seasonal wet soils that are found in stream valleys, forested wetlands, and other low-lying areas and depressions. They are formed under anaerobic conditions, and because of their ability to support wetland vegetation, are often used as initial indicators of wetlands. Hydric soils are highly sensitive to land disturbances and unsuitable for most development purposes as they are not generally suitable for supporting structures. Of the soil types within Morrisville Borough, and identified in the *Morrisville Borough Open Space plan (2000)*, the Nanticoke-Hatboro silt loams located along the Delaware River are classified as hydric soils. According to the *Lower Delaware River Conservation Plan*, there are 34 acres of hydric soils in the borough, representing 3 percent of the total acreage in the borough. The subdivision and land development ordinance lists hydric soils as one of three defining parameters of wetlands, which are described in more detail later in this chapter.

Floodplain Soils

Floodplain soils are alluvial soils found in low lying areas that are subject to periodic flooding. These soils closely correspond to existing creeks, tributaries, and drainage ways. These soils are considered unsuitable for most development purposes because of the flooding potential. In some cases, well-drained floodplain soils may be substituted for agricultural, recreational, park, or open space uses. For the purpose of the zoning ordinance, the areas considered to be floodplain are those areas identified as the 100-year floodplain from the Federal Flood Insurance Study or those areas containing floodplain soils, whichever is greater. Floodplains are discussed in more detail later in this chapter.

Surface Water Resources

The borough's surface water resources include the Delaware River, the Delaware Canal, Mill Pond, Morrisville Lake, and a variety of unnamed streams. All of these water resources are important because they provide significant environmental, recreational, and economical benefits to the borough and lower Bucks region. These resources accommodate stormwater runoff, provide for groundwater recharge and wildlife habitat, and contribute to the array of scenic resources.

The Delaware River is the borough's most valuable natural resource for many reasons including recreational, scenic qualities, and wildlife habitation. Because of this, it is important to protect this resource from residential and commercial expansion which, if left unrestricted, could threaten the environmental stability and beauty of the river. As mentioned above, the *Natural Bucks County: Guide to Public Natural Areas* and the *Natural Areas Inventory of Bucks County, Pennsylvania* both speak to the significance of the river. Additionally, as cited in the *Lower Delaware National Wild and Scenic Study Report*, the Delaware River Shore area in Morrisville is a critical habitat area, primarily due to the vegetation along the river providing valuable habitat for birds and other animals, and shade for fish in the river.

The river and its banks function not only as natural resources worthy of continued protection, but also serve as recreational resources, providing for a variety of recreational opportunities. The incorporation of riverfront activities, trails, and other recreational opportunities is consistent with the objectives of the *Delaware River Heritage Trail Study (2003)*, as well as the *Bucks County Waterfront Revitalization Plan*. As noted in the *Morrisville Borough Open Space Plan*, the borough is unique in terms of the large amount of riverfront land that is in public ownership which results in greater public access opportunities relative to other waterfront communities.

The Delaware Canal, constructed between 1827 and 1832 to transport coal from the Upper Lehigh Valley to Philadelphia, New York, and other eastern seaboard destinations, is a scenic, recreational, and historic resource. Delaware Canal State Park, which stretches between Easton and Bristol, is heavily used and is valued for its scenic character. The towpath of the canal is used as a hiking and bicycle trail and has been designated a National Heritage Hiking Trail. The proposed East Coast Greenway Project, which would include the Morrisville stretch of the Delaware Canal towpath, seeks to develop the nation's first long-distance, city-to-city, multi-modal transportation corridor for cyclists, hikers, and other non-motorized users. Additionally, the entire Delaware canal is a registered National Historic Landmark.

Mill pond, located along Bridge Street, adjacent to the Holiday inn and 7-Eleven, is a remnant of the old rubber mill. The pond appears to be an underutilized resource in the community. Due to its central location and the access it provides to the adjacent Delaware Canal, Mill Pond is a key site that should be capitalized on through acquisition and restoration.

The other water body in the borough is the Morrisville Lake, located in the southwest corner of the borough. This lake is on the site of an old quarry pit, and as identified in the *Morrisville Borough Open Space Plan*, has the potential to become a recreational facility for the borough. However, given the industrial history of the property and adjacent sites, an environmental assessment would need to be conducted, and appropriate action undertaken, prior to allowing public access to the site.

The zoning ordinance has established restrictions relative to open waterways and prohibits development or filling of open waterways unless approval is obtained from the Pennsylvania Department of Environmental Protection.

Watersheds/Streams

A watershed consists of all the land and waterways that drain into the same main body of water. Smaller watersheds join with other watersheds to drain into larger watersheds; hundreds of watersheds, including those that cover Morrisville Borough, ultimately drain into the Delaware River. The drainage of water resources through a watershed includes groundwater as well as surface water.

The entirety of Morrisville Borough is within the Delaware River (South) watershed. The borough also contains a small tributary to the Rock Run basin, located in Falls Township, in the northwest portion of the borough. Additionally, the borough contains a variety of unnamed streams. At the borough line with Lower Makefield Township, an unnamed stream empties into the Delaware River. As cited in the *Lower Delaware River Conservation Plan*, a number of small seeps and drains empty into the Delaware River along the riverfront south of Bridge Street and continuing to the borough boundary with Falls Township. Similarly, a tidal wetland area occurs between Bridge Street and the Route 1 expressway and has a small stream flowing into it. Additionally, other small streams may have been directed into culverts and buried as the borough developed. When these streams do surface, such as may be the case with some of the streams identified, they are often channelized with stone walls to prevent destruction to adjacent properties, resulting in the streams losing their natural character, and few areas of native riparian vegetation remain.

To address the threats to the various streams, the zoning ordinance has established restrictions that no open waterways shall be developed or filled without the approval of the Pennsylvania Department of Environmental

Protection. Guidelines for the protection of the Delaware River (South) watershed is provided for via the *Lower Delaware River Conservation Plan*, the *Lower Delaware River Management Plan*, the *Delaware River Basin Commission Comprehensive Plan*, the *Water Resources Plan for the Delaware River Basin*, as well as the activities of the Delaware Riverkeeper Network and the Morrisville Borough Environmental Advisory Council. These various plans were developed to aid in the protection of the watershed and mitigate potential impacts from development.

Chapter 93 of the Pennsylvania Code establishes surface water quality standards. These standards require that all named surface water bodies be classified based upon use and water quality. The anti-degradation aspect of Chapter 93 specifies that, once classified, existing water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected. These criteria are used to establish waste discharge permit limits. The Delaware River is classified as a Warm Water Fishery (WWF) and Migratory Fishery (MF). The Warm Water Fishery designation means it is a water body that supports fish, plants and animals that thrive and prefer warmer temperatures (above 70 degrees F) such as bass and sunfish. Warm water fishes such as bass, perch, white suckers and many other species are abundant year-round; and the fish community is supplemented annually by major migrations of American Shad, American Eel, and River Herring. Owing to its free flowing character and good water quality, the Delaware River is a major sport-fishing draw for anglers who seek these migratory species. The Migratory Fishery designation Migratory Fishery (MF) means that fish use this "designated" waterway to travel to and from the ocean to reproduce. Any discharges to the Delaware River are required to comply with the standards and limits established as part of the Pennsylvania Code specific to Warm Water and Migratory Fisheries.

Riparian Corridors

Development and activities that remove vegetation from riverbanks and streambanks create a variety of negative consequences on watercourses. **Plants along stream banks anchor soil in place with their roots, take up water for their own use during the growing season and mechanically slow the runoff of surface water into streams. The absence of vegetation along stream banks increases soil erosion, which damages both the stream banks and the habitat of fish and other wildlife in and around streams and rivers. When runoff is not slowed by plants on the stream banks, not only soil, but also herbicides used in lawn care, sediment from construction activities, and oils, salts and other contaminants from streets are able to flow directly into the watercourse when it rains. Without the vegetative buffer, runoff from adjacent areas more quickly enters the watercourse, increasing the likelihood and severity of flooding.**

An effective zoning technique for reducing these impacts is to establish riparian buffer zones. A riparian buffer zone is the normally vegetated or wooded area occurring along a watercourse. Generally, the larger the buffer, the better it is able to protect the watercourse and species that depend on it. Morrisville Borough currently has no standards for riparian buffer zones.

Wetlands and Floodplain Resources

Wetlands

Typically, wetlands occur as marshes, swamps, bogs, or seasonal vernal ponds. Often they are undrained, saturated soils that support wetland vegetation where the water table is at or near the surface or where shallow water covers the area due to permanent or seasonal inundation of surface or groundwater. Some wetlands are easily identified because the presence of water is obvious. However, other wetlands such as vernal ponds are subject to seasonal flooding resulting in surface water not being present year - round.

The protection of wetlands is important for several reasons. Wetlands play a key role in maintaining and improving water quality by filtering out chemical and organic wastes. Wetlands store water during storms and floods, thereby reducing hazards to life and property; provide groundwater recharge; and are important habitats for many threatened or endangered plants and animals. The National Wetlands Inventory indicates wetlands along the Delaware Canal State Park at the Lower Makefield Township line; along the Delaware River between the Lower Trenton Free Bridge and the Route 1 Bridge (inlet area); and in the area of Morrisville Lake. However, the inventory maps identify only very large wetland areas, and there are certainly other areas of the borough that are wetlands but which do not appear on the large-scale inventory maps. According to the *Lower Delaware River Conservation Plan*, there are 143 acres of wetland areas in the borough.

The Morrisville Borough zoning ordinance requires that marshes and wetlands be left intact and that no development, diverting, filling, or piping shall be permitted. In addition to local protection standards, wetlands are regulated by the U.S. Army Corps of Engineers and the Pennsylvania Department of Environmental Protection under the aegis of the Federal Clean Water Act and various state laws. The Corps requires a permit to disturb wetlands greater than one acre in size. State and/or federal agencies that permit wetlands disturbance may require that the loss of wetlands be mitigated by the creation of wetland areas elsewhere. The Pennsylvania Department of Environmental Protection also regulates wetlands under Chapter 105 Rules and Regulations administered by the Bureau of Dams and Waterways Management. Although the borough zoning ordinance prohibits the development, filling, piping or diverting of wetlands and marshes, there are currently no provisions limiting the

extent to which wetlands margins can be disturbed. Consideration should be given to implementing ordinance provisions to define wetland margins, specify those uses allowed in the wetlands areas, and specify the extent to which other uses may disturb the wetlands margins. Wetland margin areas are often defined as an area that extends 100 feet from the wetland boundary or to the limit of hydric soils, whichever is less (in no case shall the margin be less than 50 feet). The extent to which other uses may disturb wetlands margins is often defined as a maximum of 20 percent disturbance.

Given the strict regulations in place prohibiting the development and destruction of wetlands, threats to wetlands come primarily from the secondary impacts of development. Grading and development near wetlands causes these resources to suffer the loss of hydrologic function and critical wildlife species. The destruction of adjacent vegetation and the construction of impervious surfaces increase the amount of stormwater runoff and decrease the natural capacity of the wetland to handle water volumes, runoff speed, and pollutants.

Additionally, changing the topography of the site surrounding the wetland affects the direction of stormwater runoff and can lead to either increased or decreased amounts of water reaching the wetland. An increase in stormwater runoff may overburden the ability of the wetland to deal with floodwater and pollutants by continually inundating it. Conversely, reduced stormwater runoff may affect the hydrologic functions of a wetland and threaten its continued existence. Even if the topography of surrounding sites remains unaltered, a wetland may still have its hydrologic functions affected by the increased impervious surfaces and stormwater channeling.

Floodplains

Floodplains are relatively flat or low - lying areas adjacent to surface waters where flooding has occurred in the past and will likely occur in the future. During periods of heavy rains and high stream flow, floodplains provide temporary storage for floodwaters, reducing flooding threats to adjacent areas and providing a slower, more consistent flow of water. The *Bucks County Natural Resources Plan* notes that floodplains that support natural vegetation help trap sediment from upland surface runoff, stabilize stream banks for erosion control, and provide shelter for wildlife and proper stream conditions for aquatic life.

Federal Emergency Management Agency (FEMA) flood maps for Morrisville Borough identify specific floodplains in the borough. The areas identified include the following:

- North of the Calhoun Street Bridge, the area between the Delaware Canal State Park and Delaware River

- South of the Calhoun Street Bridge, the river side of the levee
- South of Bridge Street and north of East Philadelphia Avenue, the area up to and just across Delmorr Avenue
- South of East Philadelphia Avenue, the area extending back to Riverview Avenue and Riverside Drive, including all of the Staley property

The Pennsylvania Floodplain Management Act (Act 166 of 1978) requires municipalities identified by the Flood Insurance Administration (FIA) as having flood prone areas to participate in the National Flood Insurance Program (NFIP). Under the administration of the Department of Community and Economic Development (DCED), flood prone municipalities are required to adopt ordinances that meet NFIP standards for regulating development in the floodplain. The Federal Emergency Management Agency (FEMA) mapped 100-year floodplain areas in the borough and identified these in the Flood Insurance Study dated April 4, 2004. Those areas identified by this study are considered to be floodplain within the borough. According to the *Lower Delaware River Conservation Plan*, there are 203 acres in the floodplain area in the borough, representing 16 percent of the total acreage in the borough.

Disturbance of floodplains for development purposes increases the dangers of floods, destroys vegetation, reduces the opportunity for groundwater recharge, disrupts wildlife habitats, and adversely impacts other environmental benefits of this natural resource. In recognition of this, the borough has incorporated provisions into the zoning ordinance to ensure the protection of floodplains. Specifically, the zoning ordinance delineates areas within the floodplain to include the Floodway, defined as the area of a floodplain designed to carry and discharge flood waters of a flood of the one-hundred-year magnitude, and the Flood fringe, defined as the portion of the floodplain which can be regarded as suitable to accommodate limited building construction without significant effect upon one-hundred year flood elevations. The ordinance specifies that encroachments, including fill, new construction, substantial improvements, and other development within the Floodway Zone that would result in any increase in flood levels during the one-hundred year flood are prohibited.

Floodplain limitations do not preclude all development. These areas may be ideal for passive or low impact recreational uses, such as wildlife and nature preserves, trails, and picnic grounds. Allowing for these types of uses in floodplain areas is consistent with the goals and objectives identified in the *Morrisville Borough Open Space Plan* (2000) that identified Morrisville's waterfront as a resource to provide recreational opportunities, providing that wildlife habitats are still protected. Providing for a greenway and trail system for recreational purposes along the Delaware River is also consistent with the

objectives of the *Delaware River Heritage Trail Study (2003)*; the recommendations of the *Bucks County Open Space Task Force (2007)* which proposed designating a portion of the county's Municipal Open Space funding be designated to riverfront municipalities for the purpose of acquiring land or conservation easements for recreation and natural resources purposes; and the *Bucks County Waterfront Redevelopment Plan (2005)* which recommended a continuous public riverwalk be created along the Delaware River; increased riverfront gateways and corridors; and additional open space and active recreation opportunities be provided at river's edge.

Moderate and Steep Slopes Resources

The majority of Morrisville Borough is characterized by a diversity of topography ranging from nearly level along floodplain areas adjacent to the river, to moderately sloping topography along much of the Fall Zone, to more steeply sloping areas in the Graystones area. Topography can have a profound influence on development capacity, stormwater runoff, and site erodibility. The grade and soils present on moderate and steep slopes are a result of the vegetation, underlying geology, and precipitation levels. Maintaining the right balance through proper vegetative cover and minimizing development reduces the danger to public health and safety posed by unstable hillsides.

Development on steep slopes accelerates erosion by removing or disturbing the established groundcover and topsoil. Removal of the vegetation destroys the groundcover that absorbs rainwater, anchors soil, and buffers or dissipates the impact of rainfall on topsoil. Erosion produces sediment that pollutes surface water. Over time, accumulated sediments narrow stream channels and fill ponds. This process restricts the capacity of waterways to handle flood flows and increases the incidence and severity of flooding. The majority of the steeply sloping areas in Morrisville Borough are located in the Graystones area which is dominated by soil type Urban land, Chester Complex (8 to 25 percent slopes).

Generally, slopes of 0 to 8 percent are suitable for most types of development. Residential development is also possible, though less desirable, for 8 to 15 percent slopes. If development is permitted to occur on 15 to 25 percent slopes, it should allow for dwellings and other structures to be placed away from steep slope areas. Any slope above 25 percent should be restricted to parks, forests, or open space. The zoning ordinance restricts the development of areas with slopes of 8 percent or greater as shown in the table below:

Table 14. Steep Slope Regulations	
Slope	Allowable Disturbance
8 to 15 percent	No more than 50 percent
15 to 25 percent	No more than 30 percent
25 percent or steeper	No more than 15 percent

Woodlands

The trees and woodlands that exist in Morrisville Borough add to the visual attractiveness of the borough and provide a habitat for wildlife. In addition to the visual benefits that trees and wooded areas provide, they also play an important role in the ecological balance and well-being of the environment by reducing erosion from runoff, stabilizing stream banks, providing wildlife habitats, creating buffers between the built environment, providing recreational opportunities, reducing pollution by absorbing carbon dioxide, and aesthetically enhancing the environment. Vegetative cover also enhances groundwater recharge by reducing the volume and rate of runoff. When woodlands are located in environmentally sensitive areas, such as steep slope areas, along tributaries and wetlands, even minor disturbances can lead to serious environmental degradation.

While Morrisville is a developed borough, it has several wooded areas that serve functional and aesthetic purposes. The original vegetation in Morrisville borough consisted of a variety of hardwood species. A seven-acre remnant stand of this type of hardwood forest remains today around Graystones which includes oaks, tulip tree, beech, white ash, and other hardwoods. In addition to the hardwood forest near Graystones, Morrisville has wooded areas along the Delaware River; along the Delaware Canal; residential wooded areas concentrated in the northeast portion of the borough; a wooded area to the west of the borough sewage facility plant; and a wooded buffer area along the Route 1 corridor. Both the residential and larger wooded areas in Morrisville contribute to the scenic quality of the borough as they provide natural enclaves in the midst of an otherwise developed area.

The wooded areas along the Delaware River, being somewhat denser and more extensive than the residential woodlands, provide a natural buffer and slow erosion of the banks of the river. Given the unique setting of the borough on the border between the Atlantic Coastal Plain and the Piedmont Regions, the area contains a diversity of trees and shrubs both within the River Birch Swamp Maple forest found along the Delaware River, and the Sweet Gum-Willow Oak forest community occurring along the Atlantic Coastal Plain. The River birch-Swamp maple forest usually occurs on low-lying tracts and on the floodplains of streams, and predominately comprises hardwoods. Some of the

species associated with the River Birch-Swamp Maple forest community include silver maple, red maple, box elder, white oak, swamp white oak, sycamore, river birch, white ash, black walnut, red osier, and a variety of willow. Characteristic species found in the Sweet Gum-Willow Oak forest community include willow oak, sweet gum, laurel magnolia, common highbush blueberry, coast pepperbush, and red chokeberry.

In addition to these wooded areas, the borough benefits greatly from the wide diversity of trees contained throughout the borough. To aid in the preservation and ongoing maintenance of these trees, the borough contracted with Temple University to conduct an inventory and assess the current conditions of trees in selected areas in the summer of 2007. The *Street Tree Inventory Report: Morrisville, PA* revealed the following information relative to the 1,075 trees surveyed:

- The tree population is dominated by London planetree (15 percent), Pin oak (15 percent), Norway maple (14 percent), and Eastern White Pine (6 percent).
- The 1,075 trees were distributed among 36 genus and 59 tree species.

While this inventory suggests that Morrisville Borough has a relatively diverse tree population, it also revealed the following issues that need to be addressed:

- Almost 45 percent of the trees were classified as being either dead, or in poor to fair condition indicating that despite regular tree maintenance by the borough, a significant percentage of trees have structural defects, damage from disease, and crown thinning or imbalance. Unfortunately, those classified as poor (12 percent) or dead (1 percent) will be cost prohibitive to restore and will ultimately be lost.
- Despite a diversity of trees, two genus, *Acer* sp. (maple), and *Quercus* sp. (oak) are each more than 20 percent of the total population. As cited by Frank Santamour of the U.S. National Arboretum Agricultural Research Service, in his study entitled *Trees for Urban Planting: Diversity, Uniformity, and Common Sense* (1990, to guard against the possibility of large-scale devastation by both native and introduced insect and disease pests, no single species should account for more than 10 percent of the total tree population.

The borough's zoning ordinance and tree protection ordinance standards in the subdivision and land development ordinance are currently the two tools used to provide for the protection of woodlands. Specifically, the zoning ordinance stipulates that areas of forest or mature stands of trees are to be left intact where possible and that if trees are to be removed, that no more than 40

percent of such areas may be developed and/or cleared. The tree protection standards contained in the subdivision and land development ordinance requires that prior to construction, a tree protection zone be delineated and clearly marked and protected by a forty-eight inch high wooden snow fence. These standards also regulate the types of activities that can occur within and/or nearby the tree protection zone.



Todd White



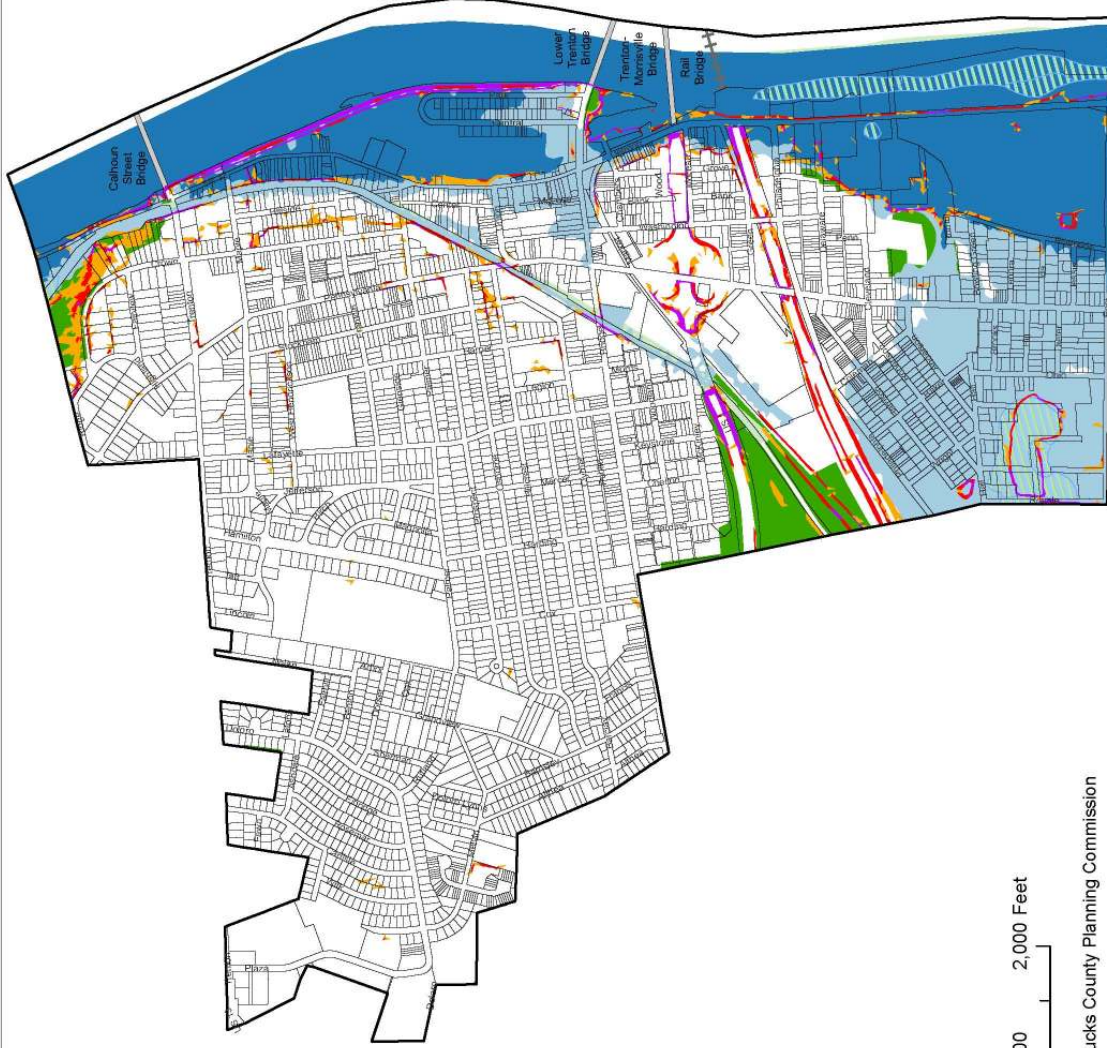
Fred Kerner



Deborah Colgan

Map 2 Natural Resources

- Wetlands
- Area of 100 Year Flood
- Area of 500 Year Flood
- Floodplain Soils
- Woodland Area
- Slope
 - 8 to 15 Percent
 - 15 to 25 Percent
 - 25 Percent and Greater



Morrisville Borough
Bucks County, Pennsylvania

Prepared by: Bucks County Planning Commission



Borough of Morrisville Open Space Plan 2009

Open Space Linkages

Delaware Canal State Park

The 60-mile long Delaware Canal towpath extends from Easton to Bristol and is a National Recreation Trail. Once trod by mule teams pulling cargo-laden boats along the canal, the towpath is used today by walkers, joggers, bicyclists, cross-county skiers and bird watchers.

The canal enters Morrisville from Lower Makefield Township, and flows south as it parallels the Delaware River and River Road (Route 32). After the canal proceeds under Trenton Avenue, restroom facilities are available to the public. The canal and towpath bisect the Borough, as they travel away from the river through a residential area, through the downtown business district, and then for approximately 1 mile through an isolated, undeveloped tract of land between Route 1 and the railroad tracks, as it enters Falls Township. The towpath is discontinued here and the canal enters an underground culvert beneath a large hill and more railroad tracks which interfere with further passage south. Currently, DCNR has studies underway for projects that may eventually reopen the towpath and the canal at this point so that both pedestrians and boaters may proceed further south toward Bristol Borough.

The Morrisville Public Library, the Morrisville Borough Hall, Williamson Park, the Actors Net Theatre, and the Downtown Business District are all conveniently located within short walking distances from the canal. Easy access to the canal and towpath is available to the general public at many points throughout the Borough. Many privately owned residential properties also adjoin the canal and towpath and enjoy the special scenic and ecological benefits thereof.

North of Trenton Avenue, the Delaware Canal path also runs adjacent to Morrisville's preserved Graystone Woods, enhancing the opportunity for natural habitats at this location. The canal and towpath are nestled here between climax forest and undeveloped wetlands. These open space properties on both sides of the canal are zoned CS-2 (Natural Lands Preservation). This area, along the northeast corner of the Borough, is especially scenic, home to much wildlife, and is significant as roosting area for birds during spring and autumn migrations.

Delaware and Lehigh Drive Scenic Byway Route

The Delaware and Lehigh Scenic Byway is a motor route which seeks to highlight the historic, cultural, and natural features of communities from Easton to Bristol. It generally parallels the Delaware River and canal. Participating municipalities (including Morrisville Borough) have adopted special signage ordinances prohibiting off-site advertising within 600 feet of the designated route in an attempt to preserve and enhance the scenic beauty. It is an attempt to create continuity between adjacent municipalities and to promote tourism. The route enters Morrisville from Lower Makefield Township along River Road (Route 32).

The Scenic Byway Route is proximal to historic Graystone Woods, then passes historic Calhoun Street Bridge, the Actors Net Theatre, the Morrisville Delaware River Levee, Williamson Park, the Morrisville Millstone Monument, the Robert Morris Plaza, also proximal to historic Summerseat, and finally heads south into Falls Township via Pennsylvania Avenue.



The Delaware and Lehigh Scenic Byway and the Delaware Canal towpath through Morrisville, PA

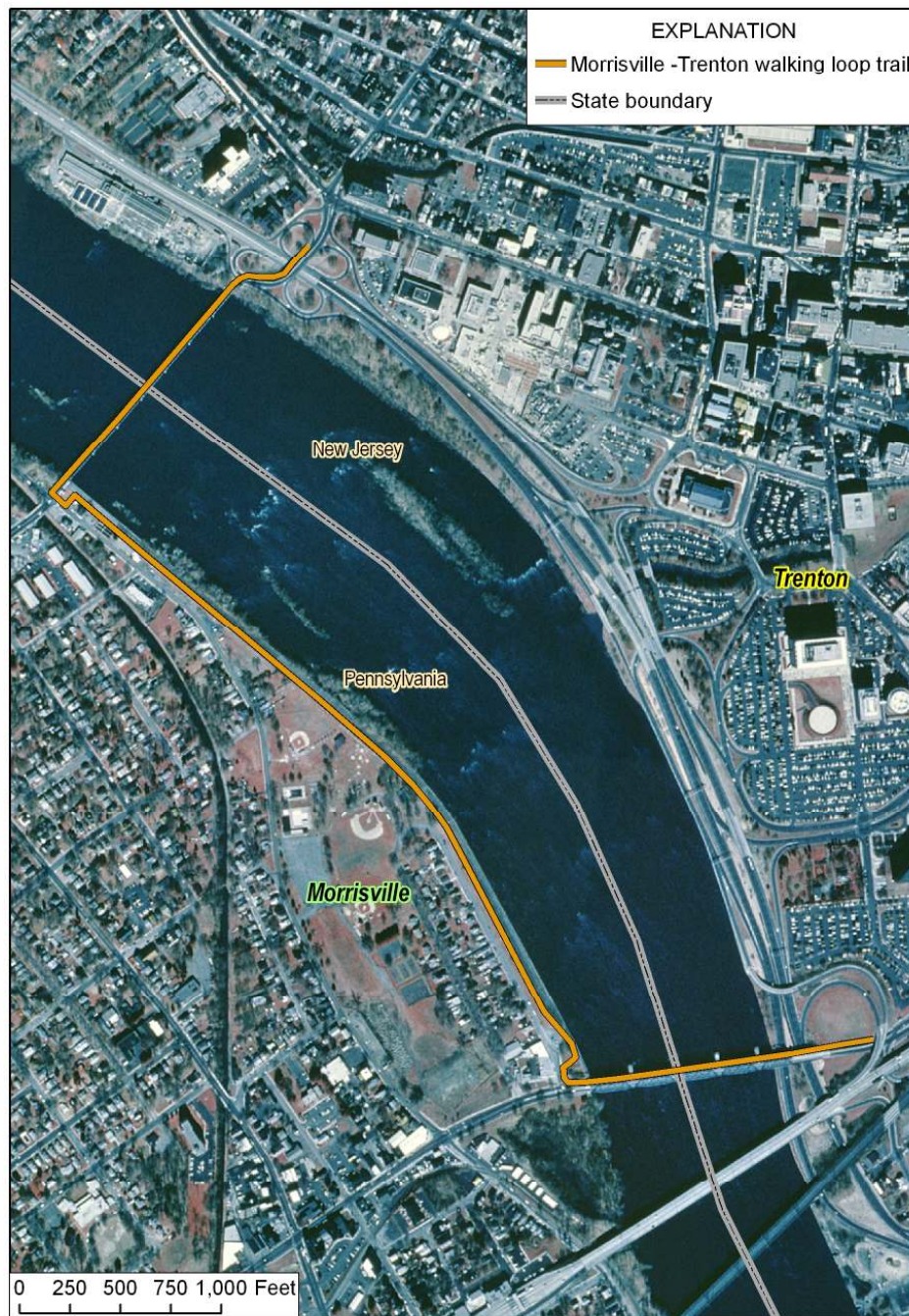
Morrisville levee walking path

The path atop Morrisville levee connects the Calhoun St. Bridge and the Trenton Makes Bridge, both of which have pedestrian lanes. This path provides a fine unobstructed view of the Delaware River and is used by walkers, joggers, birdwatchers and the occasional cyclist. Benches that face the river are placed at intervals along the path, so users may sit and watch the river and the wildlife on it. Various species of ducks, Canada geese, turtles, hawks, cormorants, gulls, kingfishers, great blue herons and fish may be viewed from the levee path. Occasionally, a beaver may be seen in the river. Sturgeon, eels and other fish may occasionally be seen from the Calhoun St. Bridge. The levee path can be accessed at street level at the two bridges, by flights of stairs located at various points along its length and by a gravel ramp from Park Avenue. near its southern end. At its northern end, near the Calhoun Street Bridge and W. Trenton Avenue, the Delaware Canal towpath and the public restrooms can be accessed by crossing Delmorr Ave. The southern portion of the levee path runs along the eastern side of Williamson Park, close to picnic tables and pavilions. The path connects the two business districts of Morrisville, on Bridge St. and Trenton Ave., and is just across Delmorr Ave. from the Actors Net Theater.

Morrisville - Trenton walking trail loop

An informal, but heavily used walking loop exists between Morrisville and Trenton, NJ. It is an unofficial but longstanding route created and used mostly by NJ State employees out for lunchtime exercise. The trail uses the Calhoun Street Bridge, connects to the walking path atop the Morrisville levee, and returns to Trenton via the Trenton Makes Bridge, to the south. This loop is convenient to Williamson Park, the Morrisville Library, the Morrisville Borough Hall, and to both business districts in Morrisville.

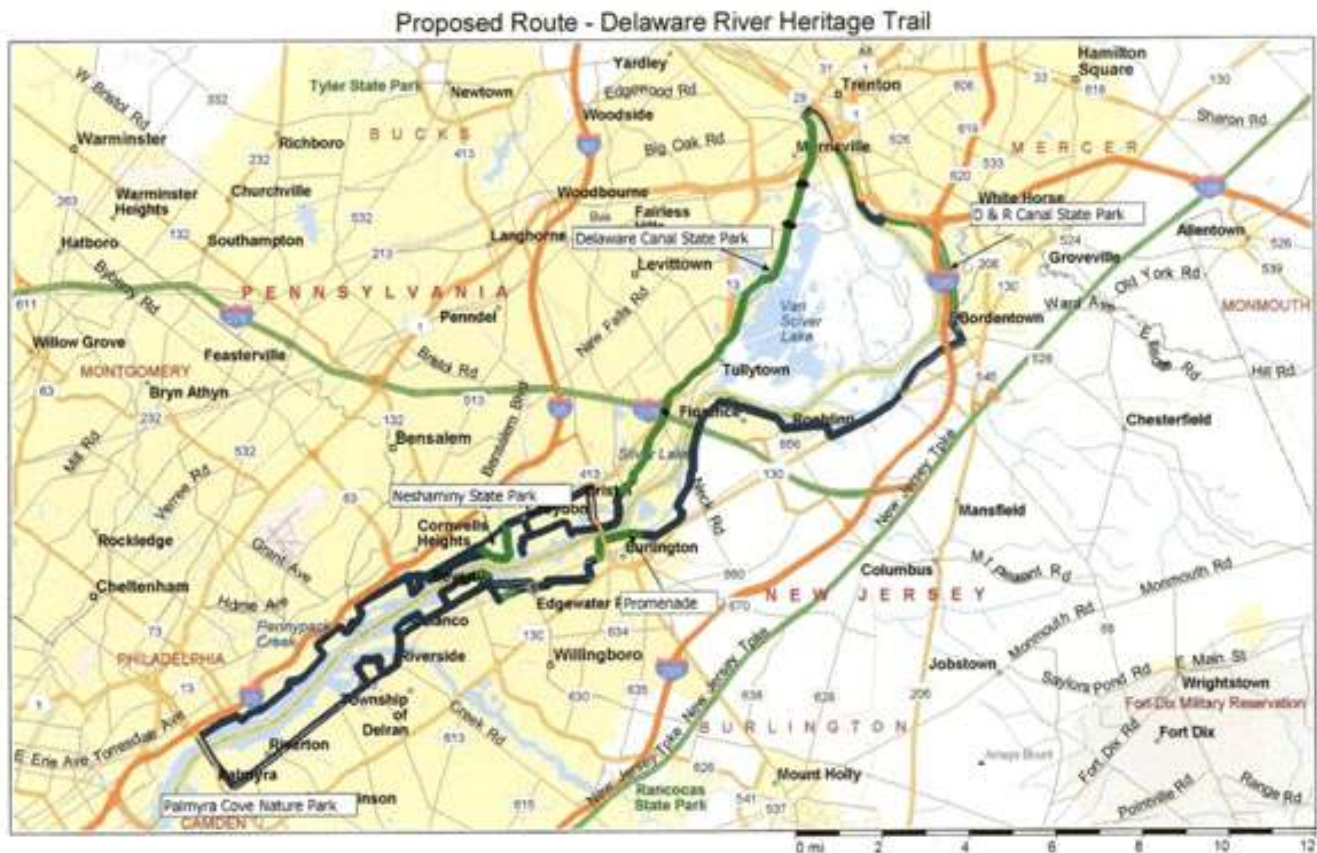
Some of these walkers instead choose to head north on the towpath, looping up and around Graystones, through a residential neighborhood in Lower Makefield and then back down Crown Street, enjoying the natural ambience and scenic beauty associated with this northeast corner of the Borough.



The Morrisville-Trenton walking loop trail along the levee and bridges in Morrisville, PA

Delaware River Heritage Trail

Delaware River Greenway Partnership has been working to develop the Delaware River Heritage Trail in both New Jersey and Pennsylvania as a walking and bicycling trail that links the river communities and provides the means to appreciate the river area's heritage. The Pennsylvania side of the trail would start in the north at the Calhoun Street Bridge. The Calhoun Street Bridge includes a pedestrian walkway that is heavily used by walkers and cyclists between Trenton and Morrisville. All of Morrisville's section of the trail will be on the Delaware Canal State Park towpath with a stone-dust surface that easily accommodates walking and cycling. The path is disrupted at the railroad lines; how the trail will continue into Falls Township still needs to be addressed.



East Coast Greenway Pennsylvania Bike Route “E”

The ECG and the bike route propose to use the same route as the Delaware River Heritage trail. Because of the current obstructions along the Delaware canal, maps show a current route that follows roadways. This route starts at the Calhoun Street Bridge and travels west along Trenton Avenue out of Morrisville.

East Coast Greenway

The East Coast Greenway enters Morrisville, Pennsylvania from Trenton, New Jersey over the Calhoun Street Bridge. It follows PA Bike Route E for much of the 80-mile route, passing through lower Bucks County, Philadelphia and Delaware County, and then crosses into the State of Delaware near Marcus Hook.

Travelers pass through a series of small towns and neighborhoods on the northern end of the route before the Greenway goes directly through downtown Philadelphia

Pennsylvania Bike Route E

Also known as the Pennsylvania segment of the East Coast Greenway, the current 52-mile long roadway based version takes the cyclist through the heart of Philadelphia. It will be shifted gradually to off-road facilities as they are developed. It's a convenient connection between Trenton, NJ and Wilmington, DE and connects with BicyclePA Route S along the Schuylkill Trail.



The East Coast Greenway and Pennsylvania Bike Route E, through Morrisville, PA

Delaware River Water Trail

Tidal Delaware River Trail

Three-quarters of the non-tidal Delaware River, which stretches from Hancock, New York to Trenton, New Jersey, has been included in the National Wild and Scenic Rivers System. The Delaware is a great shared resource and it is hoped that the water trail will help to promote it as such, to preserve its natural ecology, and to help bring people together around the common goal of protecting it for the enjoyment of existing and future generations.

The Delaware River Water Trail has been proposed by the Delaware River Greenway Partnership for the Delaware River. When completed, the trail is expected to enhance the recreational boating experience on 220 miles of the Delaware River from Hancock to Trenton. It will integrate land and water trails into a comprehensive recreational system.

The Tidal Delaware River Trail encourages boating in the tidal areas of the Delaware River from Morrisville to Marcus Hook. A three section map has been developed by the DCNR and other parties for those who seek further information.

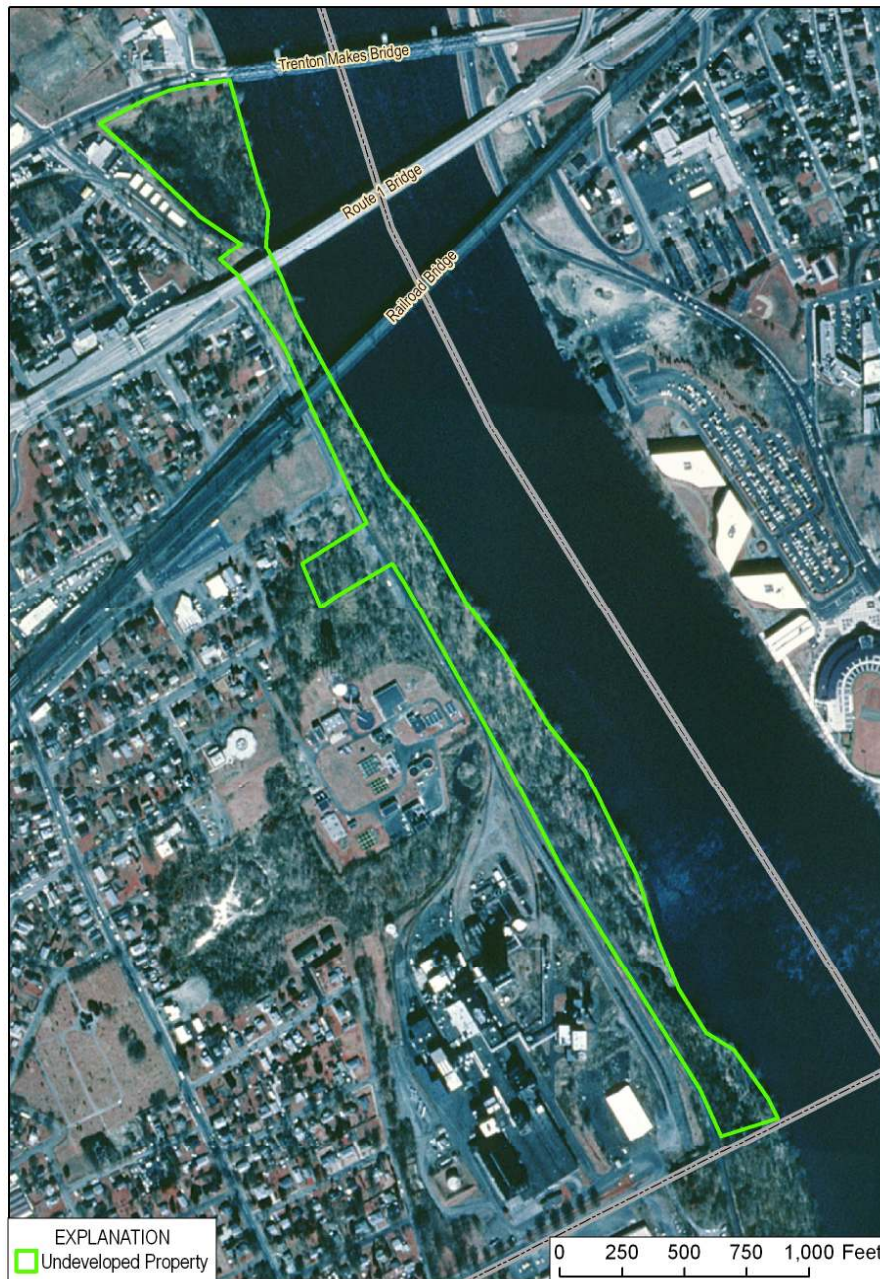
A paddler's put-in and take-out has been identified near the railroad bridge for both trails.



Canoe and kayak access areas in the vicinity of Morrisville, PA

Southern riverfront area

The undeveloped riverfront area south of the Rt 1 and RR bridges is less than one mile long, but provides an ideal environment for a low impact trail that could be incorporated into a riverfront riparian buffer restoration. This trail could link southward to the Falls Township riverfront and northward towards the levee path, Williamson Park, or the canal path. As a walking trail along the river through undeveloped woods, it would provide a recreational opportunity that is rare and disappearing along the Pennsylvania side of the river. Preservation of Borough owned parcels and cooperation with the MMA on land management practices would increase the natural habitat for plants, animals and birds. It would remain an important natural riverfront treasure.



Undeveloped property along the southern river front, Morrisville, PA



Borough of Morrisville Open Space Plan 2009

Analysis of Resources

According to the guidelines suggested by the Bucks County Open Space Program, any potential land acquisition and open space improvement opportunities should be evaluated and assessed using the following criteria:

- Consistency with goals and objectives of the MOSP
- Potential risk of development
- Linkage potential
- Availability of funding
- Willingness of landowner to sell at fair or below market price
- Public access potential and value

As other acquisition needs and opportunities occur Morrisville shall use these criteria to evaluate the open space potential of any parcel or improvement.

To prioritize these criteria is difficult, but we believe that all acquisitions and improvements, most importantly, must be consistent with the goals and objectives of the MOSP to even be considered. If the proposed acquisition additionally shows strong value in meeting any or all of the other criteria, then that property should be considered for acquisition before the opportunity disappears. Undeveloped open space is a commodity that is quickly disappearing; Morrisville is well advised to act upon current public interest in preserving additional open space for the community today and for future generations.

Two areas in Morrisville should be prioritized for acquisition as open space and improvement activities. Both areas contain multiple parcels that are at high risk of development, could provide strong value as community resources consistent with the goals and objectives of the MOSP, and are located in key areas as linkages of open space both within the community of Morrisville and with neighboring communities in New Jersey and Falls Township. A combination of land acquisition, zoning changes, restorative planning, community partnerships and adequate funding will subsequently need to occur in order to insure protection of these areas.

Parcels at the southern boundary of Williamson Park; Located along Bridge Street, Delmorr Avenue and Central Avenue.

In addition to adjoining Williamson Park, they are adjacent to the Trenton Makes Bridge, the Morrisville riverfront levee, the Millstone Monument, the downtown business district, and also very proximal to the Robert Morris Plaza, historic Summerseat, a riverfront tidal inlet and the southern riverfront area.

These parcels were recently targeted by a private builder/developer for commercial development of an office building. Plans were dropped when the Borough Council would not offer official endorsement for the project or sell the developer adjoining undeveloped property to expand the project size.

Additionally, the stormwater drainage system for Williamson Park is located beneath the largest of these parcels, which also makes commercial development of this land critically problematic. Preservation as open space will ensure the protection and easy maintenance of this important stormwater system.

The largest parcel of property here is currently owned by the Delaware River Joint Toll Bridge Commission and was offered to the previous developer at (or below) fair market value, and may still remain enticing to other private developers for possible acquisition and development plans of a similar sort. Acquisition and preservation of this parcel by the Morrisville Borough as open space is more consistent with the vision of the current Morrisville Comprehensive Plan and is consistent with the Goals and Objectives of the MOSP.

Parcels along the southern Delaware Riverfront between Bridge Street and Post Road

Unique to the Borough in its topography and easy pedestrian access potential, these lands are floodplain and should be preserved and protected in their natural states. Development of floodplains is not in the best interest of public safety and conflicts with the vision, goals and objectives of this MOSP. Preservation of these floodplain parcels in their natural state as open space will provide unique and valuable educational opportunities for future generations, an abundant source of roosting for flocks of birds during important seasonal migrations, a balanced area of habitat for native wildlife species that rely upon the river for survival, and a proper riparian buffer that will help to purify and protect the water quality of the river. It has become increasingly apparent during the last decade that private and commercial developers seek to capitalize on riverfront properties with disregard to the benefits of riverfront preservation as enumerated above. Preservation of riverfront property in its natural state will likely become a rare commodity in generations to come, and

will be regarded as a rare treasure found in only a few communities (Morrisville will be one of these).

There are other open space parcels in Morrisville that may meet the MOSP criteria for acquisition or improvements. However, any application submitted to the Bucks County Municipal Open Space Program for acquisition or improvements must meet the goals and objectives of the MOSP.

These riverfront properties should be targeted by the Borough for immediate acquisition as open space. They are currently at high risk for development. Preservation supports the goals and objectives of the MOSP. Being floodplain, they are critical to the public safety and poorly suited for development. In regard to linkage value, they are located in strategic proximity to other open space areas within Morrisville such as Williamson Park at the bridge gateways to New Jersey, and with open space riverfront in Falls Township.



Deborah Colgan



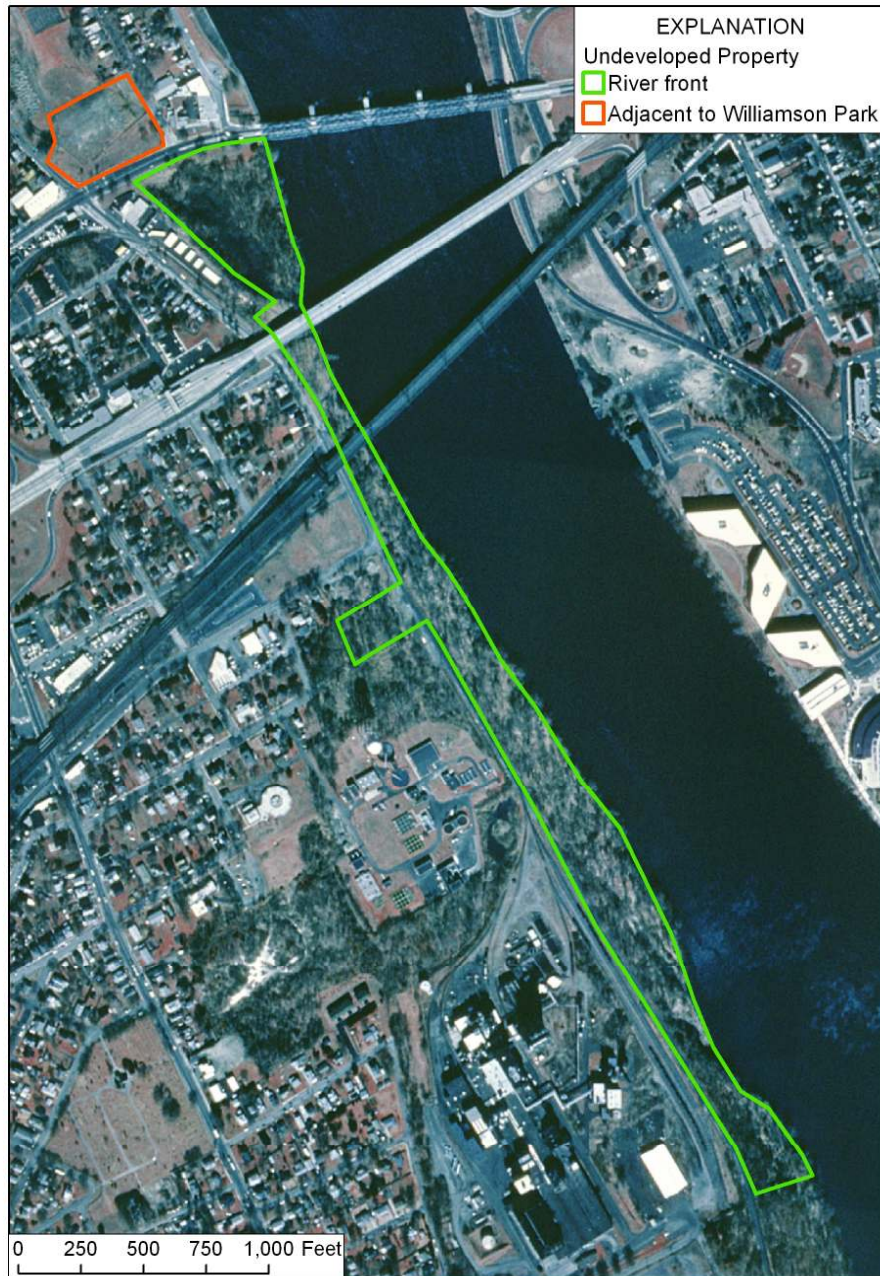
Fred Kerner



Deborah Colgan



bing.com/maps



Undeveloped properties near Williamson Park and along the river front, Morrisville, PA



Borough of Morrisville Open Space Plan 2009

Non-Acquisition Tools and Techniques

Non-Acquisition Tools and Techniques

"Local governments in Pennsylvania have primary responsibility for land use planning under Pennsylvania Act 247, Municipal Planning Code (MPC). The MPC authorizes municipalities to plan and zone for the protection of natural and agricultural resources. Given this power, municipalities have a unique opportunity to incorporate open space preservation into their overall land use planning efforts. Open space and its role in defining the character of a community should be an integral component of a municipality's comprehensive plan and land use regulations.... Municipalities are encouraged to incorporate regulatory techniques such as zoning and subdivision provisions that aim development away from important natural resources. By coordinating open space planning with broader community planning decisions, municipalities are better able accommodate development in a way that preserves, protects, and enhances the environment".

---Bucks County Open Space Program Guidelines

Protection of open space and natural resources can be achieved by strengthening the language in Borough ordinances and the effective enforcement of current ordinances.

Examples include:

- Tree ordinances and regulations
- dumping
- stormwater ordinances
- construction erosion control techniques
- planted buffers

In addition, the development of maintenance and usage policies of publicly owned lands is necessary to insure that the land is being used in ways that are consistent with the Comprehensive Plan, the MOSP and the need for environmental protection and preservation.

Examples include:

- Locations of sports fields and other active recreation activities
- Locations for passive uses such as walking, biking and picnicking
- Other acceptable uses such as community gardening
- Signage policies on public property
- Development of environmentally sound maintenance strategies, such as careful mowing schedules and best management practices in natural areas to minimize native species destruction



Bill Setzer



Borough of Morrisville Open Space Plan 2009

Government Organization and Financing

Morrisville Borough is governed by the Borough Council, which consists of 8 members and the Mayor. There is a part-time Borough Manager who runs the day-to-day operations. The Borough Manager creates the annual budget, which includes land acquisition, recreation and maintenance funds. Council, working through the public comment session, adjusts and approves it. All land acquisition and land use decisions are made by the Council. Morrisville has a Public Works Department that carries out the maintenance of Borough property and other projects for which they are equipped and trained. The Morrisville Police Department provides security and additional emergency services are provided by the Morrisville Fire Department and Morrisville Ambulance Squad.

Other groups that assist Council in the management of parks and open space include:

- Environmental Advisory Council
- Planning Commission
- Public Works Department
- Zoning Hearing Board
- Recreation Advisory Board
- Arts and Events Committee



Bill Setzer



Borough of Morrisville Open Space Plan 2009

Action Plan

The MOSP lists specific action steps to implement its goals and objectives. The entities responsible and a prioritization schedule are provided in the following pages.

These strategies provide a practical and realistic framework to achieve our ultimate vision of a healthy and prosperous community.




Carol Siminski




Tracy Carluccio




 MORRISVILLE OPEN SPACE 2009 ACTION PLAN						
	Recommended Action	Entity Responsible*	Time Frame			
			S	M	L	O
1	Prepare a formal Park and Recreation Plan. The highest priority is Williamson Park, including southern end.	EAC,RAB,PWD, A&E,BC,PC	x			
2	Continue organizing and implementing tree planting projects.	EAC,PWD,BC				X
3	Establish improved relationship and interaction with DCNR regarding mowing schedules, native plant species restoration, and water level in the Delaware Canal State Park within the Borough.	EAC,BC				X
4	Promote recreational projects and opportunities while preserving the maximum amount of green space.	EAC,RAB,BC				X
5	Develop and define maintenance standards for all publicly owned open space properties.	EAC,PWD,BC	X			
6	Work with Borough entities (i.e., MMA, EMS, FD, EDC, Library, Historical Society, etc.) to preserve open space, create restoration projects, and plant buffers.	ALL				X
7	Promote annual open space clean up and restoration efforts (i.e., Graystones, riverfront).	EAC,PWD,BC				X
8	Encourage environmentally sensitive plantings and land management of all open space properties.	EAC,PWD,BC				X


*See Key on last page

 MORRISVILLE OPEN SPACE 2009 ACTION PLAN						
	Recommended Action	Entity Responsible*	Time Frame			
			S	M	L	O
9	Replant and restore open space parcel next to leaf dump, between Riverview Avenue and railroad spur.	EAC,PWD,BC	X			
10	Develop and define usage criteria for open space properties.	EAC,PWD,BC	X			
11	Establish regular and continued communication with Bridge Commission and Railroad regarding natural lands preservation and usage of their riverfront properties	EAC,BC				X
12	Consider alternative uses of open space such as community gardens and other garden projects, farmers market, outdoor theatre, dog park, etc.	EAC,RAB,BC				X
13	Develop erosion abatement plan for area by the pedestrian bridge on the Canal at E. Palmer Avenue and any other identified parcels.	EAC,PWD,BC		X		
14	Enhance Morrisville Lake by evaluating conditions and opportunities.	EAC,PWD,BC,PC			X	
15	Analyze proposed cell tower projects on or adjacent to open space properties.	EAC,PC,BC	X			
16	Continue to acquire and restore priority parcels through the county's program and other funding sources.	EAC,PWD,BC				X
17	Work with agencies and private landowners to develop conservation easements.	EAC,BC		X		X
18	Work with the Public Works Department to establish improved planting and aesthetic maintenance of riverfront levee embankment.	EAC,PWD,BC	X			

*See Key on last page

 MORRISVILLE OPEN SPACE 2009 ACTION PLAN						
	Recommended Action	Entity Responsible*	Time Frame			
			S	M	L	O
19	Pursue zoning changes for appropriate parcels for conservation as natural land preservation (CS 2).	EAC,PC,BC	X			
20	Promote relationships between EAC, DCNR, EDC and other interested stakeholders to highlight educational and recreational opportunities at northern riverfront areas.	ALL				X
21	Develop maintenance standards for wetland areas.	EAC,PWD,BC	X			
22	Define and develop maintenance standards for all CS-2 properties.	EAC,PWD,BC	X			
23	Create agreements with MMA to maximize natural preservation of their riverfront properties.	EAC,BC		X		
24	Work with private property owners to create waterfront riparian buffers.	EAC,PWD,BC				X
25	Identify river access locations.	EAC,PWD,BC	X			
26	Update open space plan as new information becomes available.	EAC,BC				X
27	Revitalize the Mill Pond as a key park site (with linkage and historical value) through acquisition and restoration. Establish public access to the Mill Pond.	EAC,EDC,RAB, BC				X

*See Key on last page

 MORRISVILLE OPEN SPACE 2009 ACTION PLAN						
	Recommended Action	Entity Responsible*	Time Frame			
			S	M	L	O
28	Support efforts to unblock areas of the canal south of the borough.	EAC,BC				X
29	Establish more stringent regulations relative to the protection of forests and plant species in environmentally sensitive areas such as floodplains, steep slopes, wetlands, and wetlands margins.	EAC,BC			X	
30	Establish riparian buffer zones along watercourses to be protected by ordinance.	EAC,PC,BC		X		
31	Adopt the recommendations contained in the 2007 Morrisville Tree Management Plan relative to updating the tree protection ordinance; training; increasing community involvement; improving species diversity; implementing a formal planting program; and establishing a pruning program	EAC,PWD,BC	X			X

KEY

A&E = Arts and Events Committee
 BC= Morrisville Borough Council
 EAC = Environmental Advisory Council
 EDC = Economic Development Corporation
 PC = Planning Commission
 PWD = Public Works Department
 RAB = Recreation Advisory Board



Todd White



Deborah Colgan



Deborah Colgan



Deborah Colgan

RESOLUTION NO. 866

WHEREAS, the Council of the Borough of Morrisville recognizes that the Borough contains open space and natural areas that contribute to the quality of life and economic health of our community which are worthy of preservation; and

WHEREAS, the Bucks County Commissioners have renewed funding of the Bucks County Open Space Program through a referendum overwhelmingly passed by voters on November 6, 2007, the purpose of which is to protect in perpetuity those natural resource areas and farmlands deemed essential to preserve the unique character of Bucks County; and

WHEREAS, the Bucks County Open Space Program provides an allocation of funding for protection of open space resources by municipalities provided that the municipality first prepares an approved municipal open space plan; and

WHEREAS, the Borough of Morrisville, wishes to participate in the Municipal Grant Program; and

NOW THEREFORE, the Council of the Borough of Morrisville, Bucks County, Pennsylvania hereby resolves that the Borough Open Space Plan, dated September 21, 2009, prepared in compliance with the Municipal Open Space Plan Guidelines distributed by the Bucks County Open Space Program, has been discussed at a public meeting and is hereby adopted in its entirety in the form attached hereto, as the official Open Space Plan of the Borough of Morrisville; and

BE IT FURTHER RESOLVED, that a certified copy of this Resolution to be attached to, and made part of said Open Space Plan, and furthermore, that the Borough of Morrisville intends to take actions as appropriate to implement the goals of the Open Space Plan.

This Resolution has been duly prepared and adopted by the Governing Body of the Borough of Morrisville in public meeting held this 21st day of September, 2009.

ATTEST:

Morrisville Borough

Dorothy M. Gaydula
Signature

Dorothy M. Gaydula

Ass't Borough Secretary

BY: Nancy Sherlock
Signature

Nancy Sherlock

President of Borough Council

Thomas Wisnosky
Signature

Thomas Wisnosky

Mayor

I hereby certify that the foregoing is a true and correct copy of the Resolution No. 866
enacted by the Council of the Borough of Morrisville, County of Bucks on the 21st
day of September, 2009.