2015 Environmental Resources Inventory

for

BOROUGH OF ROOSEVELT, NEW JERSEY

Prepared for:

Environmental Commission
Borough of Roosevelt
P.O Box 128
Roosevelt. N.J. 08555

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Executive Summary

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BOROUGH OF ROOSEVELT, NEW JERSEY

By J.M. Hartman, Ph.D.

Johnny Quispe

The Environmental Resource Inventory (ERI) is intended to aid the Environmental Commission in its advisory role by providing baseline documentation for the state of resources within the municipality. This summary reports important findings and a brief overview that will be explained more thoroughly within the 2015 Environmental Resource Inventory.

This study has relied on the use of GIS, as well as field visits. The data files, data dictionary, and ARCMaps will be given to the Borough of Roosevelt, with some basic instructions, for future use. Files that allow printing of the final maps and other materials, such as the data sheets from the Stream Assessment, will also be included in the data transfer.

In the time since the last Natural Resource Inventory (1993-1995), Roosevelt has made progress in protecting farmland and managing growth. Now there are new challenges for protecting the natural resources of the Borough. The forests are aging and changing; it is time to develop and implement a forest management plan so that habitat value and biodiversity can be maintained or increased. The plan needs to include invasive species management, because the current pattern of increasing coverage of invasive plants will limit the long term habitat quality and biodiversity of this resource.

1. Forest Health & Invasive plant species distribution

    a. Like the rest of New Jersey, Roosevelt is seeing an increased amount of invasive plant species in its forests. Through our assessments we have found the most common invasive species to be *Microstegium vimineum* (Japanese stiltgrass)*, Loicera japonica* (Japanese honeysuckle)*, Rosa multiflora* (multiflora rose)*, Berberis thunbergii* (barberry)*,* and *Elaeagnus umbellate* (autumn olive)*.*
    b. Given the amount of dominant invasive plant species cover found, the Environmental Commission should work towards the management of invasive species through the creation of a Forest Management Plan, training of volunteers, and documentation of species distribution in order to slow down the spread of invasive species.
    c. An increase in invasive plant species may result in a change in the composition of the forest. There are observable changes to the forest that are a result of

hydrological change and an increase in invasive species. *Microstegium vimineum* is the most widespread invasive observed and is rapidly growing along edges and areas where trees have died or blown down.

At the kick-off meeting for this study, the citizens of Roosevelt mentioned a variety of concerns about the streams and flooding patterns in the community. It is important that Roosevelt develop a storm water management plan that reflects the environmental priorities of the community. An inventory and map is needed, illustrating the current stormwater infrastructure – especially the points where stormwater flows in to the streams. Through an assessment of Empty Box Brook, we identified areas of concern.

There are many areas of stream bank erosion and sediment deposition in Empty Box Brook.



1. Stream Structure

    a. The reduction of flow, increase of sedimentation, and flooding of Empty Box Brook were major concerns for the residents of Roosevelt (ERI 38). Assessments were completed and documented along Empty Box Brook in which 125 observations of erosion were recorded, primarily in the streams and tributaries east of Valley Road.
    b. There was no evidence that the beaver dam, previously found on Empty Box Brook, was to blame for the significant amount of erosion. Instead, this may be attributed to a change in the hydrology of Roosevelt and its surrounding areas. The recent development of Millstone Township may be contributing a

substantial amount of storm-water runoff and sediment that is collecting in the eastern segments of Empty Box Brook.

c. Our assessment covered a portion of Empty Box Brook and does not provide a complete overview of the site. In order to completely characterize and delineate the source of sedimentation there should be further surveys conducted throughout the rest of the Empty Box Brook. This can be completed by trained volunteers and other community groups.

Five basic recommendations are made in the last section of this report:

- Preparation of a forest management plan has become critical.
- Invasive plant monitoring and management is needed.
- Stream restoration funding programs should be considered.
- Stormwater input from Millstone Township should be investigated
- A study of Roosevelt's storm water system is needed.

Each of these recommendations are related to additional documentation and ongoing management of Roosevelt's natural resources. There are sources for grant funding for some and there are many opportunities for local volunteer efforts. Protecting these natural resources has long been a part of the Roosevelt community, as evidenced by the farmland protection that has been achieved, the growth of the Fund for Roosevelt, and the online, ongoing documentation of species in the Borough (http://njcc.com/~ret/Roosevelt/natureso.html). Continued evolution of the community's efforts to understand and protect it historical and natural resources requires development of multigenerational involvement from the community and adoption of many new technologies.

Simply put –"Keep up the good work!" but make sure that a broad range of community members stay informed and involved.

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Acknowledgements

I would like to acknowledge many people for their assistance in this project, and to offer my heartfelt apology if I have left off someone's name. First, I would like to mention my admiration for the many members of the Roosevelt community who have documented and protected the natural and cultural history of this wonderful and unique place. Every resource that we could evaluate has benefitted from the long term commitment of the community. I respect and appreciate the decades of hard work and determination represented in the current status of your environment.

Next, I must acknowledge the many ways in which the members of the Environmental Commission contributed to the development of the study and its documentation. During the development of the report, they provided edits, corrections, insights and important questions. Louis Esakoff, Eitan Grunwald, Diane Lowrie, Christina Oatis, Michael Ticktin, Mary Tulloss, and Stacey Bonna – thank you all for the time and thought you invested in this endeavor and for your direct participation in field work and careful comments of your own observations. I especially want to acknowledge Eitan Grunwald for his persistent interest and help; Ann Kassahun, Secretary to the Environmental Commission, for her detailed notes; and Mayor Beth Battel for facilitating the contract and accepting comments on issues related to the ERI. Several people participated in field work; Beth Battel, Eitan Grunwald, Jill Lipoti, and Mary Tulloss significantly improved the amount and quality of data collected. Many others shared time, observations, editing, and advice. This list includes Beth Battel, Bob Clark, Karyn Grunwald, Tim Hartley, Jill Lipoti, Isaac Menda, Mary Tulloss, and Rod Tulloss. From this list, I must give special recognition to Rod Tulloss and the comprehensive record of environmental notes he maintains on his website. Whether we needed to decide what invasive species to list or what areas might have the most interesting ecological systems, Dr. Tulloss had already documented much of the important information. His valuable records allowed us to maintain a low budget (because re-doing his work could not meet the standard he had set) and to focus on developing data about the changes in Empty Box Brook.

Roosevelt Borough retains Thomas Planning Associates and the Roberts Engineering Group. Thomas A. Thomas, PP, T. Andrew Thomas, P.P., A.I.C.P., and Carmela Roberts, PE, CME were generous in sharing their previous work and in answering questions. We hope we have done justice with their contributions.

Finally, much this work was generated by student interns who often went above and beyond their job requirements to understand the environment of Roosevelt and the concerns of the residents. Specifically, Ellen Oettinger organized and oversaw the GIS database development, Teddy Aretakis and Ari Salant collected and summarized the stream study data, and Johnny Quispe evolved from field assistant to co-author during the period of this project.

Jean Marie Hartman

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INTRODUCTION

The Environmental Resource Inventory (ERI) is intended to aid the Environmental Commission in its advisory role by providing baseline documentation for the state of resources within the municipality (ANJEC 2013). The previous inventory was completed in three parts during 1991-1993 (Hartman et al. 1993). Since that time, the use and applications of geographic information systems (GIS) and availability of digital data has changed the process of compiling resource information dramatically.

This report summarizes the results of a comprehensive resources analysis of Roosevelt Borough. The first step was to create an ARC GIS 10.1 database with a series of relevant data. This was supplemented by field work that confirmed land use classifications. Extensive effort was committed to evaluating portions of Empty Box Brook's condition. In addition, surveys of invasive plant species were conducted. Field work was conducted from July through November 2014.

BACKGROUND

The 1993 report provided a comprehensive resource analysis of Roosevelt Borough. The first phase provided a set of overlay maps to the Environmental Commission of the Borough. These maps documented basic physical features, such as topography, geology, and soils as well as the pattern of land-use and land cover at the time. The second phase delivered more detailed information about the community ecology of the open space and added cultural resource information. The third phase synthesized the results of the first two phases and provided guidelines that were intended to be useful for planning Roosevelt's future growth.

In its discussion of planning issues, the 1993 report states:

> *Roosevelt has changed in size and shape from its original plan. However, enough of the garden community character is still in place that it is listed in the National Register of Historic Places. Much of what gives the community its character is the result of the original design. For instance, the alignment of buildings along the roads creates a unique set of views as one walks or drives along the streets. The high environmental quality of the area is still intact because of the greenbelt system that protected extensive wetland*

areas. The rural character of the community results from the uncurbed roads and the informal social gathering that occurs around the post office.

This observation remains appropriate to the community, as does the concluding section on "Resource Management":

Roosevelt is rich in cultural and natural resources. It will benefit the community over the long term if these resources can be carefully managed while the inevitable changes and growth occur. The community's history and heritage are part of Roosevelt's genius loci. The first steps towards protecting these have taken place with their documentation and inclusion in the Historic Register. Based on the survey results, we suggest that discussion regarding subdivision design and building design be included in the Planning Board's agenda before additional growth occurs.

Visual characteristics were consistently rated as important by residents. The sequence of spaces upon approaching Roosevelt from the north were repeatedly mentioned as a significant gateway to the community. Changes in land use along the visual corridor will severely impact the rural character of the community. The impact of such changes will become increasingly important as adjacent areas become subdivisions. A detailed review of visual impact should be required in conjunction with any development proposals.

The natural resources of the community have largely been managed with a "hands-off" approach. Litter removal, fines for dumping garbage and yard waste, and removal of exotic species will become increasingly important as the population density in and around Roosevelt continues to increase. Most of this effort can be focused at the forest edges, since the forest and wetland interior are in good repair at this time. We understand that there is an ongoing, voluntary, litter removal effort. Additional support for this effort might be beneficial. Removal of exotic species from the forest edge must also be given priority. Several invasive vines and woody species are beginning to dominate the forest edge. These will become increasingly difficult to manage as they become more common. Eventually, they will also impact the forest interior as they invade naturally occurring disturbance gaps.

There was discussion concerning removal of some of the dead plant material during one of the Environmental Commission Meetings. This must be undertaken with care. If the material is yard waste, it is reasonable and desirable to remove it. If the material is the result of natural regeneration of the forest, its removal may be detrimental to a variety of animals and some plants that utilize dead plant material during part of their life cycle.

However, there are changes in the population of Roosevelt, in the condition of the forests and streams, and the pressure for land development that must be considered today. With several existing developments already within the 300ft stream buffers (Map 1.) and with little real estate to develop it is important to thoroughly examine any future requests for development within Roosevelt and adjacent to Roosevelt.

Map 1. Stream Buffer and Current Land Use. "Land Use" refers to the NJDEP 2007 data set that classifies land use and land cover from satellite images. Thus, the presence of a building or appearance of land clearing work may cause a property to fall into the "Urban" category and possible hay meadows will fall into "Agriculture". Several properties are within 300' of the streams in Roosevelt. This recommended buffer size is appropriate to the high water quality and Category 1 Stream Classification.

APPROACH

The Association of New Jersey Environmental Commission states: Two New Jersey state laws give environmental commissions the authority and responsibility for conducting ERIs.

> The Environmental Commission Enabling Legislation (N.J.S.A. 40:56A) states that: *A...commission organized under this act shall have power to conduct research into the use and possible use of the open land areas of the municipality.... It shall keep an index of all open marshlands, swamps and other wetlands, in order to obtain information on the proper use of such areas, and may from time to time recommend to the planning board, or, if none, to the mayor and governing body of the municipality, plans and programs for inclusion in a municipal master plan and the development and use of such areas.*
>
> The Municipal Land Use Law (MLUL) (N.J.S.A. 40:55D-1 et seq.) requires municipalities to have a land use plan element in their master plan, *"including but not necessarily limited to, topography, soil conditions, water supply, drainage, flood plain areas, marshes, and woodlands...." (N.J.S.A. 40:55D-28b(2)).*
>
> In other words, it is expected that this document will assist the Roosevelt Environmental Commission in its role of advising the municipality regarding its management of natural resources and the potential impacts of changes in land use and development. In order, allow future updates, results will be provided in digital, as well as printed, formats.

Scope of work

The primary purpose of this update is to identify any significant changes since the last NRI, especially any that might be detrimental, and to recommend appropriate responses. Our process included:

- Review of previous NRI
- Collection of digital information that can be used in a GIS platform, specifically including at least the following from NJDEP:
  - Recent land use/land cover categories
  - Geology
  - Soil Classification
  - Topography
  - Vegetation

  plus the following derived layers:
  - Wildlife habitat
  - Cultural resources
  - Sub watersheds, streams
- Meet with the Roosevelt Environmental Commission and interested parties to learn about issues and concerns
- Site visits to verify conditions

- Site visits to determine health of wetlands, forests, greenways, and other natural areas, with specific focus on invasive species, dumping, and other indicators of disturbance
- Synthesis of field observations with GIS maps
- Review current reports on remediation
- Compose a report (1) reviewing the character and distribution of natural resources and (2) making recommendations regarding the management of the natural resources.
- Meet with the Environmental Commission for feedback on the first draft
- Present the final report to the Environmental Commission, or other appropriate Municipal Board in a slideshow format that can be posted on the web as a supplement to the printed and digital copy of the report and supporting documents.

The team attended an Environmental Commission Meeting when this project was launched (see minutes for the Wednesday, June 18, 2014 meeting). The overall goal of the project was described as "to gain information on how to respond to current changes/conditions, identify any problems/threats with the environment, to be able to work with the Borough Council and Planning Board, and to be able to focus priorities to plan/protect the environment as needed" (Grunwald, meeting minutes).

The common concerns expressed by the participants at that meeting focused on changes they are seeing in Empty Box Brook. In addition, concerns about these topics were voiced:

- stream water levels
- access to trails
- fewer deer
- fewer bats
- fewer butterflies
- fewer dragon flies
- decline of oak-beach-hickory forest
- increase of invasive plant species
- loss of some ecosystems and their functions
- tick population
- poison ivy
- allowing pets outdoors and without leashing

Of course, we cannot launch individual studies on each of these issues. We did adjust our work plan to focus on:

- Stream structure, especially Empty Box Brook
- Forest health
- Invasive plant species distribution

INVENTORY AND OBSERVATIONS

We are in an Age of Digital Data. In the process of gathering data and developing it into useable information about Roosevelt, we have collected digital files from NJDEP, EPA, the U.S. Census Bureau, and Monmouth County. In addition, we have reviewed the 2001 Roosevelt Borough Master Plan, the 1993 Roosevelt Borough Natural Resources Inventory, and many other resources. This report attempts to present a balance of information without an excess of repetition. In doing so, data is often presented in Appendices rather than in the flow of the main text. Other information is referenced to the original reports. All data and copies of reports will be presented to the Borough of Roosevelt for an archive. Our hope is that the maps presented in this document will be updated and re-done as needed for future planning and problem solving.

ROOSEVELT IN CONTEXT

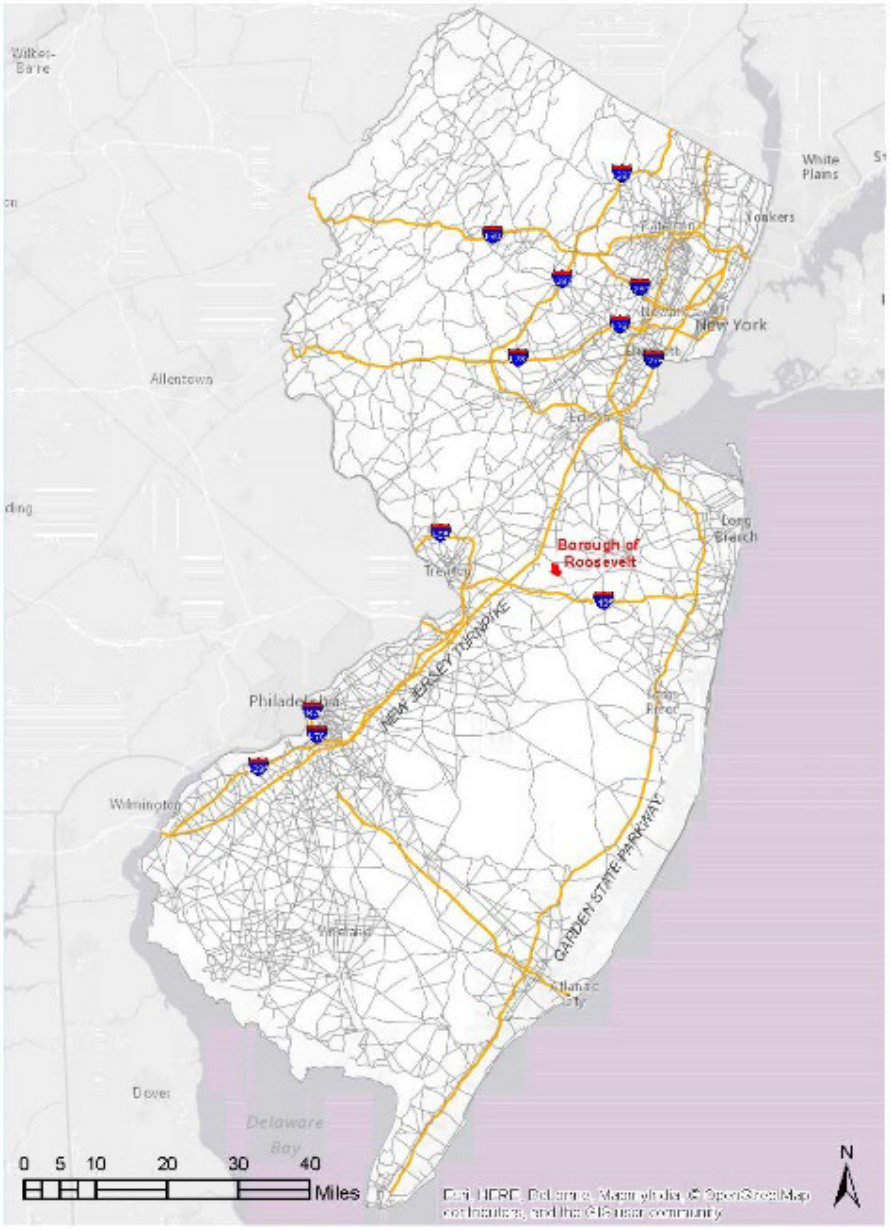
Roosevelt, NJ, is a Borough in Monmouth County (Map 2 & Map 3). It is approximately 1.92 sq. mi. in area with less than 0.1 square mile of open water. The Borough was established on May 29, 1937, by the State of New Jersey Legislature. The history of the Borough is documented by several resources, including:

- Borough of Roosevelt Historical Collection: History of Roosevelt, New Jersey. Rutgers University Libraries. http://www.libraries.rutgers.edu/rul/libs/scua/roosevelt/rstory.shtml
- Natural, Social, and Historic Resources of the Borough of Roosevelt, Monmouth County, New Jersey. Fund for Roosevelt, Inc. http://njcc.com/~ret/Roosevelt/natureso.html
- New Jersey and National Registers of Historic Places - Monmouth County. NJ DEP - Historic Preservation Office. March 1, 2011. p. 12.

Thanks to the inclusion of Roosevelt on the both the State and National Registers of Historic Places (as the Jersey Homesteads Historic District), the historic plan of the Borough and its architecture remains largely intact.

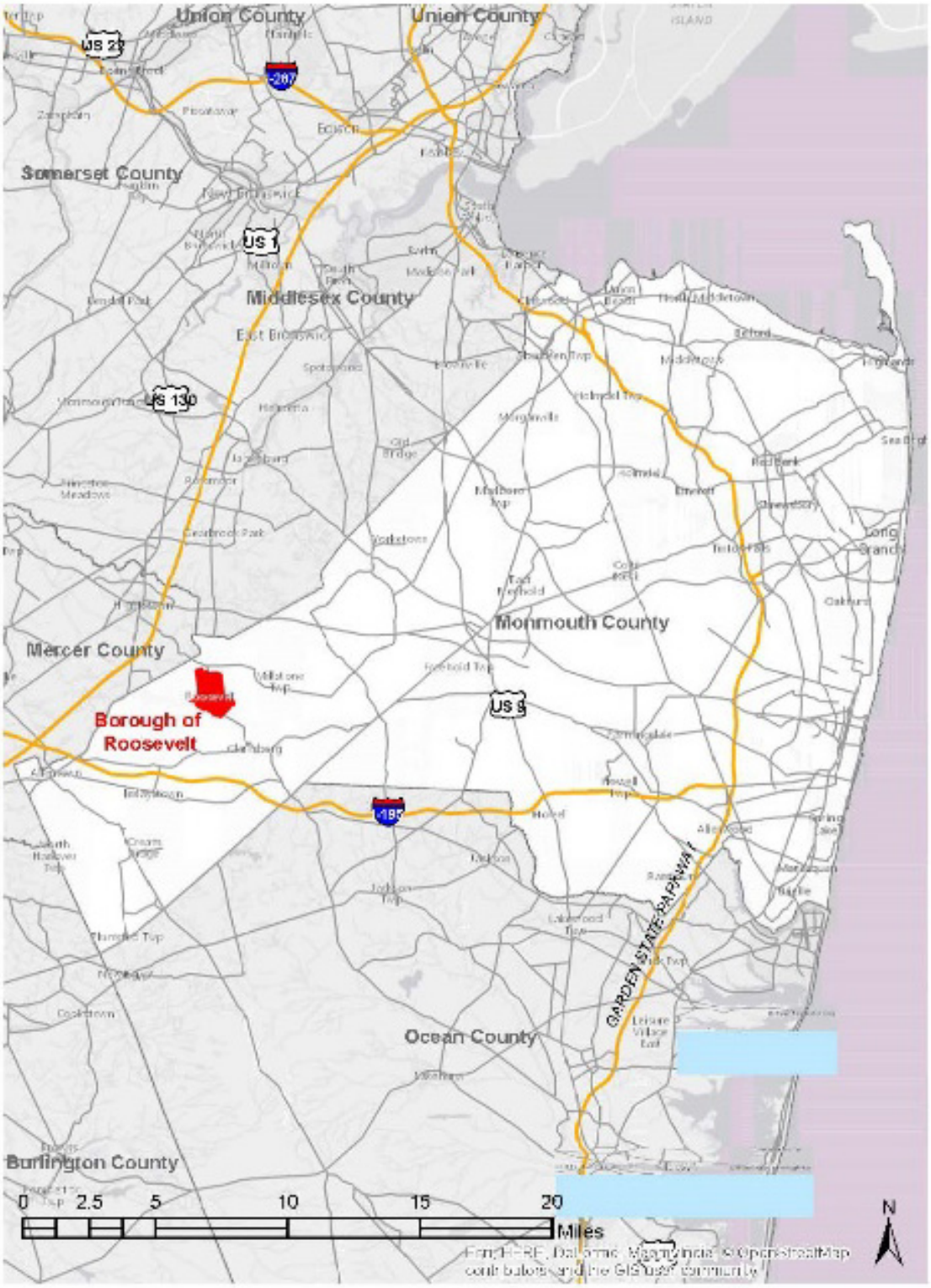
However, the setting of Roosevelt in the midst of family farms and the wetlands of the Assunpink Wildlife Management Area has changed as the neighboring municipalities have grown (Map 4). The population size has remained close to 900 for over twenty years (882 in 2010 census) and the small number of students in the Roosevelt Public School (Pre-K through sixth grade) reinforces the sense of community with small classes and community events.

The location of Roosevelt between two townships with increasing population densities (Millstone Twp.'s population has quadrupled since 1970 and Upper Freehold's has grown 2.5 times since 1970) creates pressure on Roosevelt's through streets and natural resources (Maps 2, 3, and 4).

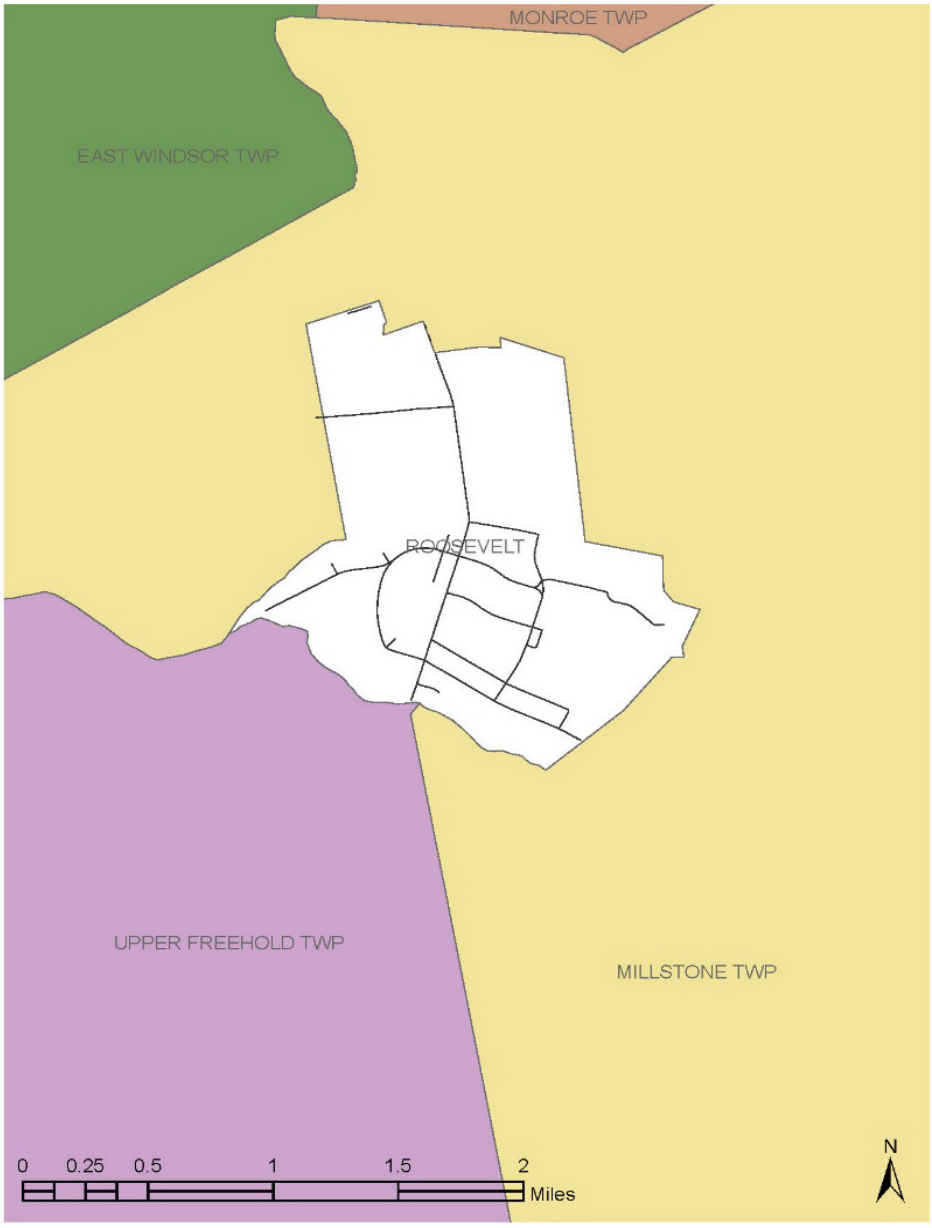


Map 2. Roosevelt is located within an hour commute of many centers of employment.

Distance to:			
New York City	53.6 mi.	New Brunswick	24.1mi.
Philadelphia	50.6 mi.	Asbury Park	30.5mi.
Camden	52.7mi.	Freehold	14.3mi.
Newark	44.6mi.	Morristown	59.2mi.



Map 3. Roosevelt is located near major transportation routes and yet enjoys a small town ambiance.

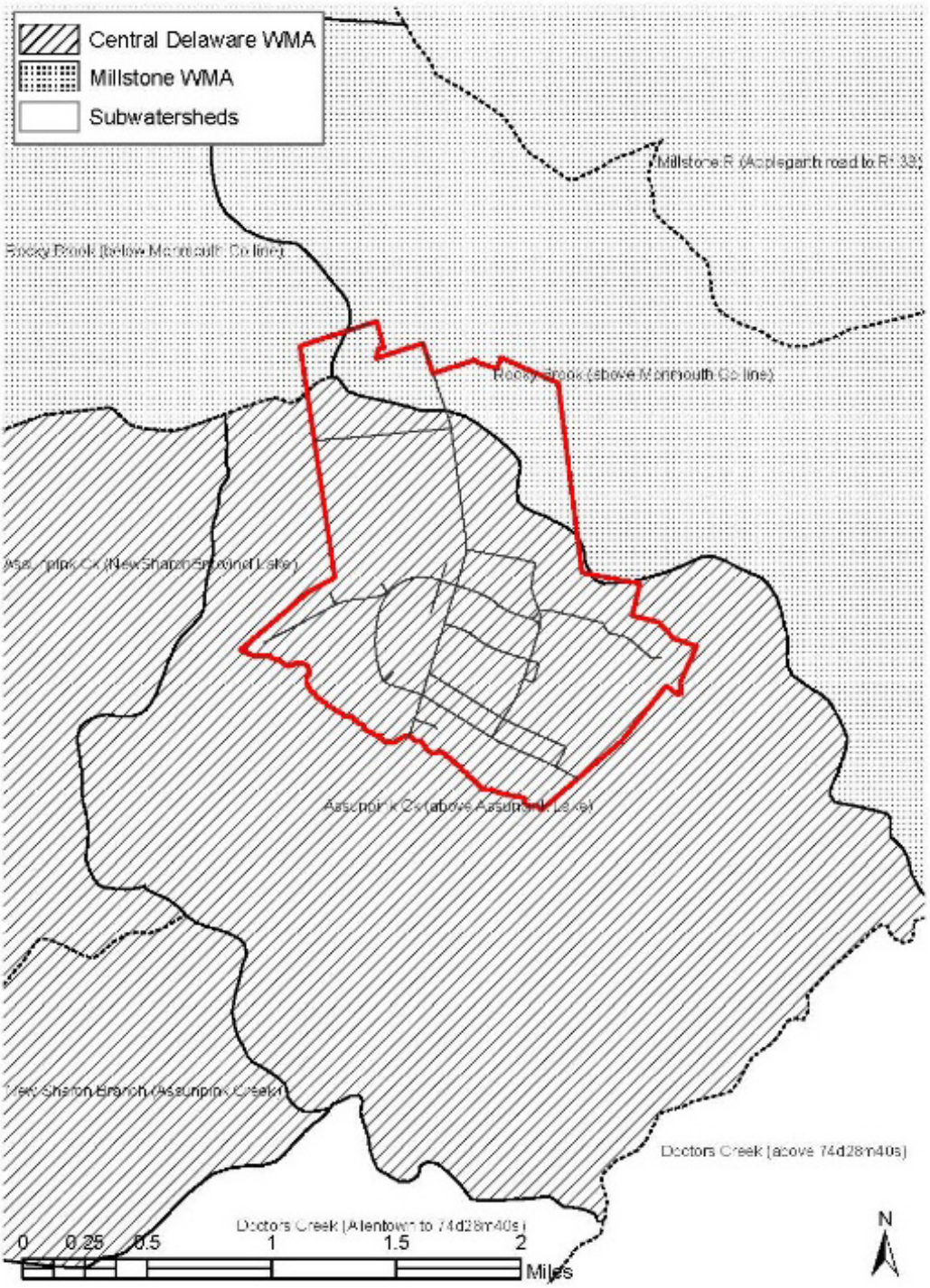


Map 4. Roosevelt sits between the boundaries of Millstone Township and Upper Freehold Township.

Community	Population		%Change
	1970	**2010**	
Roosevelt	814	882	8.35%
Millstone Twp.	2,535	10,566	317%
Upper Freehold Twp.	2,551	6,902	171%
East Windsor Twp.	11,736	27,190	132%
Monroe Twp.	14,071	36,129	157%

Roosevelt's waterways are headwaters for two distinct watershed management areas: the Central Delaware WMA along the northeast portion of the boundary and the Millstone WMA for about 80% of the Borough's land area (Map 5).

Watershed headwaters are especially important to the maintenance of downstream water quality. The land use practices and land cover of Roosevelt, therefore, have larger scale impacts outside of the Borough. Both of the sub-watersheds that Roosevelt straddles are in the upper reaches of their watershed management areas and therefore should be considered headwater systems.



Map 5. Roosevelt is in two sub-watersheds. Rocky Brook (above Monmouth Co line) is in the Millstone Watershed Management Area and Assunpink Creek (above Assunpink Lake) is in the Central Delaware management area. (Map derived from NJDEP Watershed Management Area Layer, 2007).

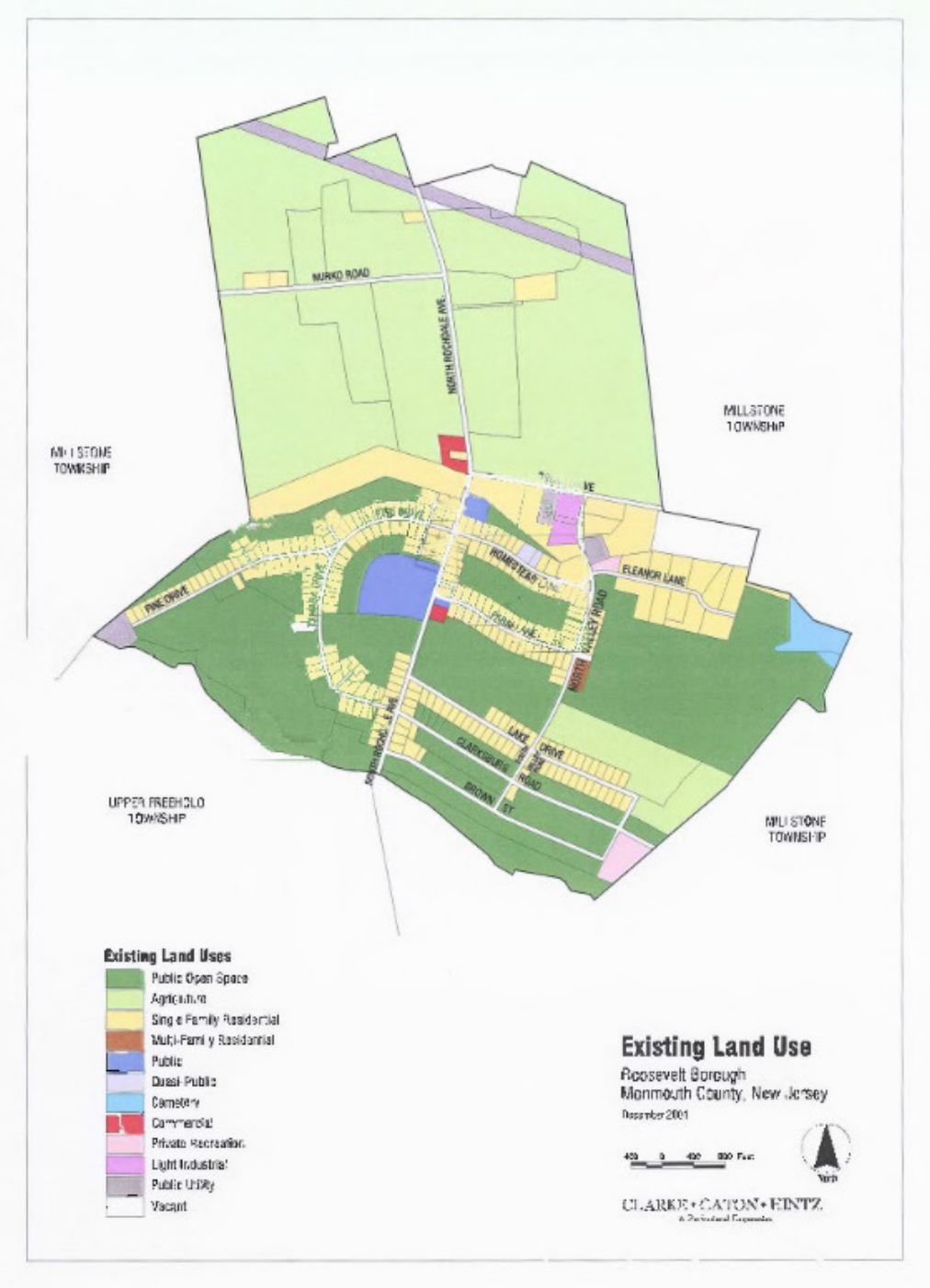
ROOSEVELT BUILT STATUS and RESOURCES

The 2012 Master Plan for the Borough of Roosevelt shows that existing land use and zoning are largely in accordance with one another (Map 6, Map 7, Map 8, Map 9). The data used for the majority of the resource maps that follow will show similar patterns, because there has been little change in the zoning and little building in the Borough.

No mapped well location or size data nor septic system data or monitoring information was found. These are important in the areas of the Borough that are not served by the public system. Individual well owners should occasionally be reminded how to have their water quality checked and their septic system function inspected for their own health and for the health of the local natural resources.

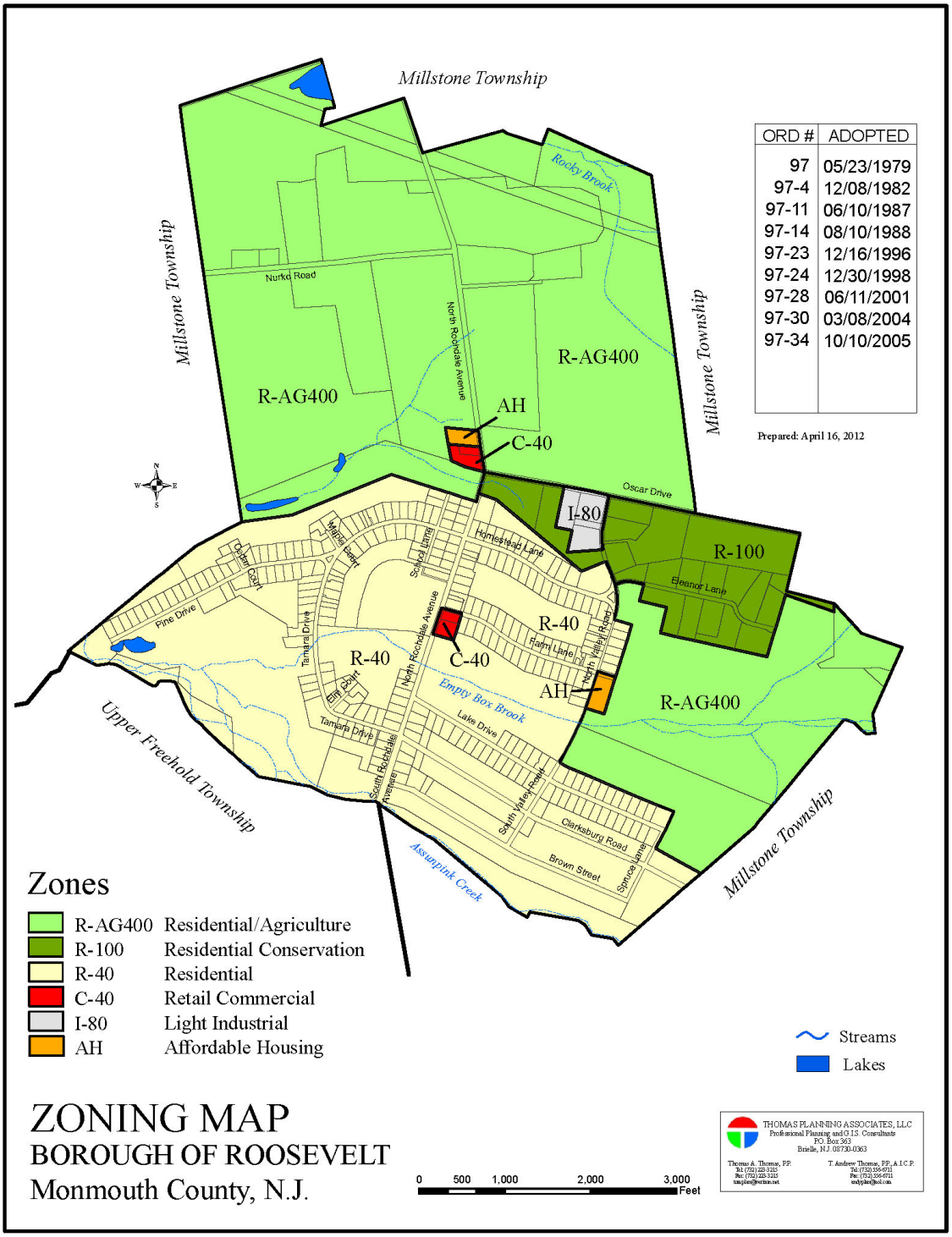
Today, the public water system and the sanitary sewer system (Map 10 and Map 11) serve most of the population of the Borough. Current storm drain and storm sewer pipe locations were not available for this study. Because storm sewer pipes often release into streams, it is critical that these data be mapped. Further, if there is impact on stream morphology associated with storm drainage, small mitigation efforts can often protect the stream from development of major erosion problems.

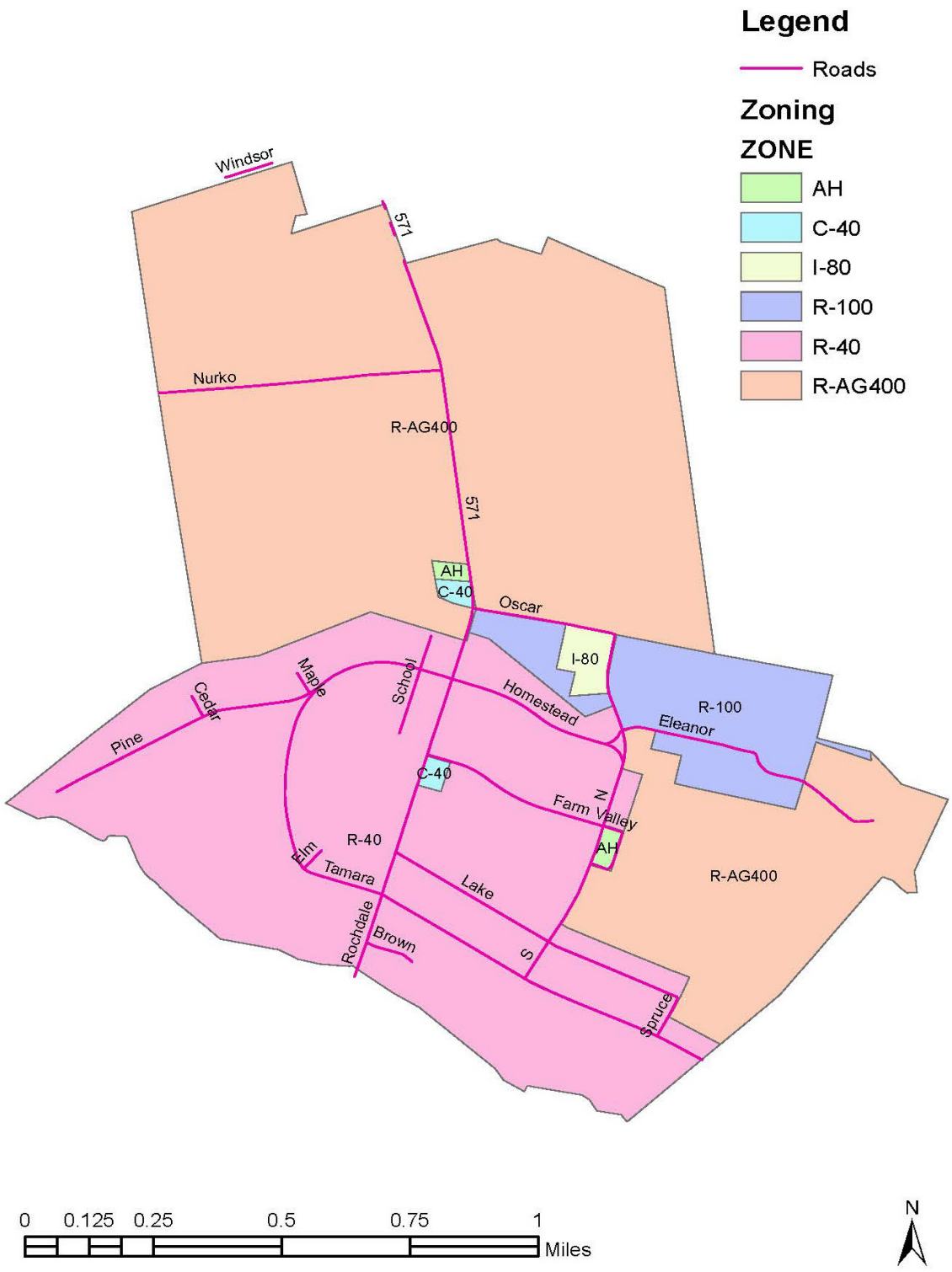
Map 6. 2001 Existing Land Use. Map produced by Clark, Canton, Hintz.



Map 7. Existing Land Use, based on NJDEP's 2007 Land Use Land Cover Classification. A more detailed look at categories of Land Use types follow.

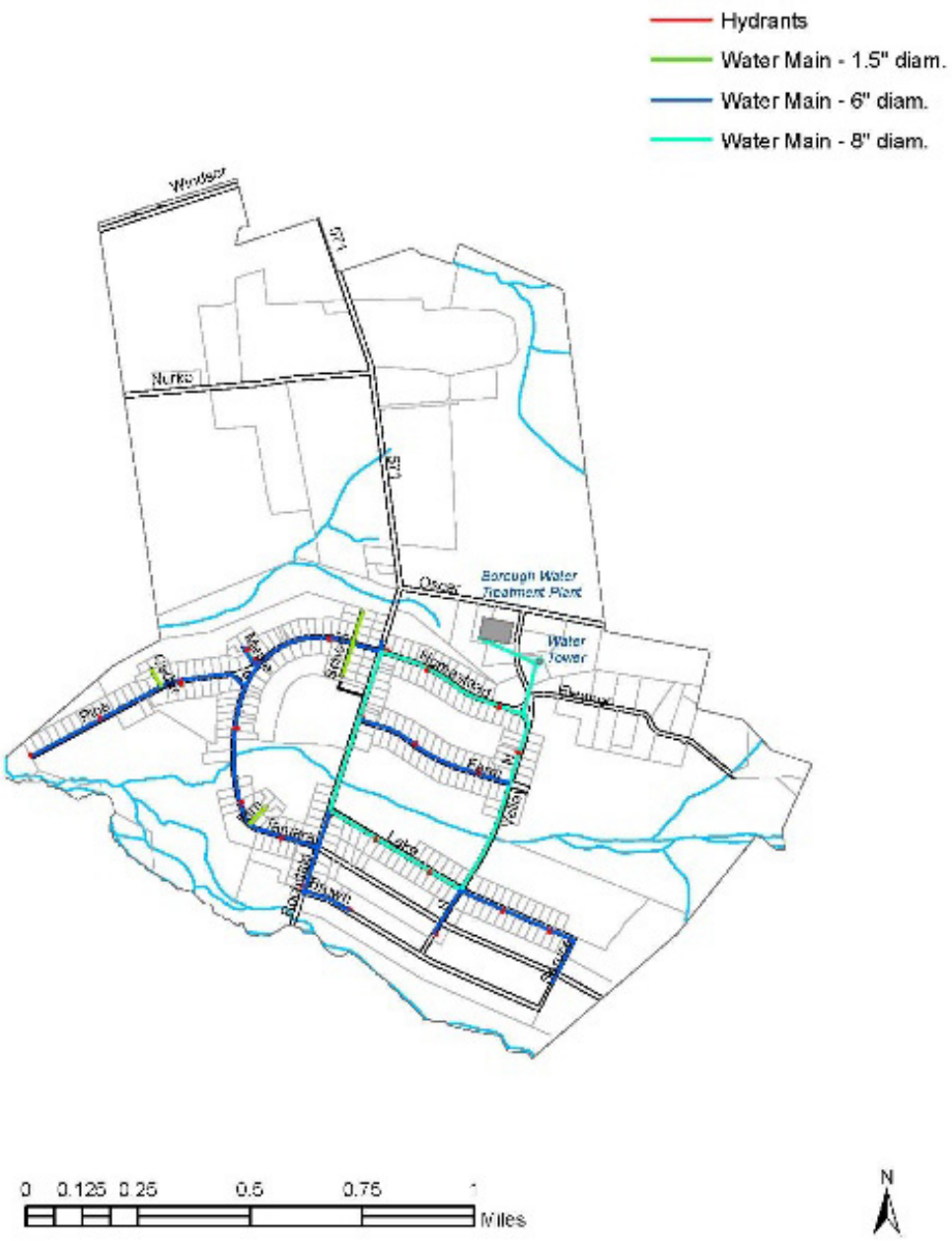
Map 8. 2012 Existing Zones. Map produced by Thomas Planning Associates LLC.





Map 9. Current zoning map from NJDEP GIS data (2007) appears to agree with the map produced by Thomas Planning Associates LLC for Roosevelt Borough.

Map 10. Sanitary Sewer pipe distribution. (Derived from CAD drawing supplied by Roberts Engineering Group, LLC.)



Map 11. Public Drinking Water pipe distribution. (Derived from CAD drawing supplied by Roberts Engineering Group, LLC.)

PHYSICAL RESOURCES

An Environmental Resource Inventory usually starts from the ground up. In this section a series of maps and captions summarize the physical resources. Most of these resources are the same as they were in the 1993 Natural Resource Inventory and the 2001 Master Plan. They are included here because they are part of the Geographic Information System data that is being provided to the Borough.

There are five maps for this section.

The first two show the geologic formations and surficial lithology (Map 12 and 13) found in Roosevelt. Bedrock Geology influences the distribution of aquifer and development of landform. An excellent map describing the bedrock geology is available from the National Geologic Database (http://ngmdb.usgs.gov/Prodesc/proddesc_19458.htm). The relationships between surface geology and bedrock geology is tight, because the region is dominated by coastal plain sediments. The relationships between geology, drainage patterns, stream systems and vegetation are generally influenced by the texture of the materials and the presence/absence of clay in the material.

The Topographic Map (Map 14) shows the form of the land surface. Specifically, most of the Borough is at an elevation between 120' and 170'. On the south-eastern side of the Borough there are relatively steep slopes that reach or exceed 250'. The points where streams flow out of the Borough account for the lowest elevations, ranging down from 120'. In fact, most of the area below 130' is wetland.

Soil is the thin surface coating of the earth capable of supporting vegetation. Because many environmental processes are linked within the soil zone, soils themselves can often reveal substantially more about an area than any other natural factors. Consequently, accurate soils mapping is an important planning tool (Steiner 1991). Table 1 lists the current classifications of soil types for Roosevelt. Note that the name of a soil type is repeated in the table when there are areas with different slopes associated with the type. Soils that overlay a particular parent material (or bedrock) have similar physical and chemical characteristics that are used to classify them into soil series, i.e. soils which share a similar vertical profile, but which differ in texture of the surface layer or subsoil material (Tedrow 1986). Different soils demonstrate different suitability and potential for human uses. Within a series, soils may vary in slope, wetness, degree of erodability, and other characteristics related to their use and management (Jablonski and Baumley 1989). Landscapes generally have a distinctive proportional pattern of soils, called a soil association, which defines the overall characteristics of the soil types found in the area (Jablonski and Baumley 1989). A soil association normally consists of one or more major soil series and at least one minor soil series and is named for the major soils. Roosevelt has two associations: Freehold- Shrewsbury-Tinton Association and Humaquepts-Frequently Flooded-Manahawkin Association (See Appendix A for more information).

Within Roosevelt, the upland soils are primarily loam or sandy loam, when classified by texture (~480 acres). The areas where most of the historic housing occurs tend to be on "Urban Land Complex" and usually identified as sandy loam. The areas with elevations over 200' tend to have the sandiest soil types. Less than 6 acres in Roosevelt is categorized as an udorthent; this category indicates urban fill with a slight slope. About 1 acre of this is found on the site of the Borough's sanitary treatment facility

and the remaining area in the southernmost corner and in the Assunpink Wildlife Management Area. The pattern of wetlands aligns with Humaquepts; these are soils with a sand or loam texture and frequent flooding (Map 15).

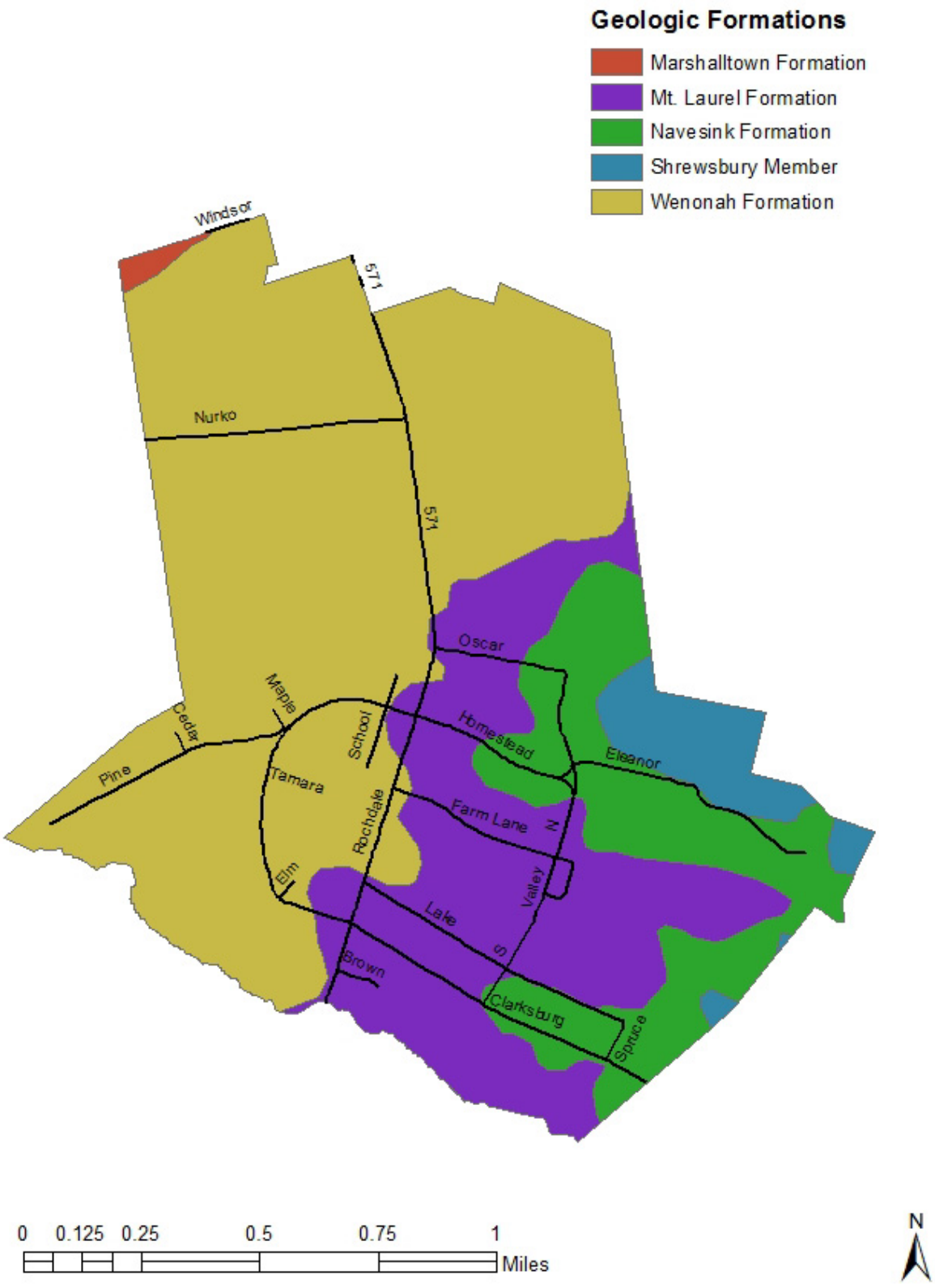
In addition, groundwater recharge rates are shown in (Map 16). The groundwater re-charge rate rates are associated with specific soil types and include ranges that may reflect seasonal variation or topographic variation within the soil type; that is why the ranges appear to overlap. Both groundwater and many aquifers rely on water re-charge from precipitation. Because of the coarse texture of most of the soils in Roosevelt, most of the Borough has re-charge rates of over 8" per year. These areas are usually above 140' elevation and are agricultural or other plant communities. There are two types of land that have 8"or lower recharge rates. Wetlands and waterbodies (lakes and streams) do not recharge ground water because they are (usually) saturated. Built areas, such as roads and home sites often have significant impermeable surfaces (roofs, concrete, etc.) or very compacted soils. Compaction of soil generally reduces the airspaces in the mineral soil that are necessary for water movement and storage. Building of the original homes may not have had as much impact on compaction of soils as current techniques. Additional soils maps are in Appendix A: Soil Distributions and Descriptions.

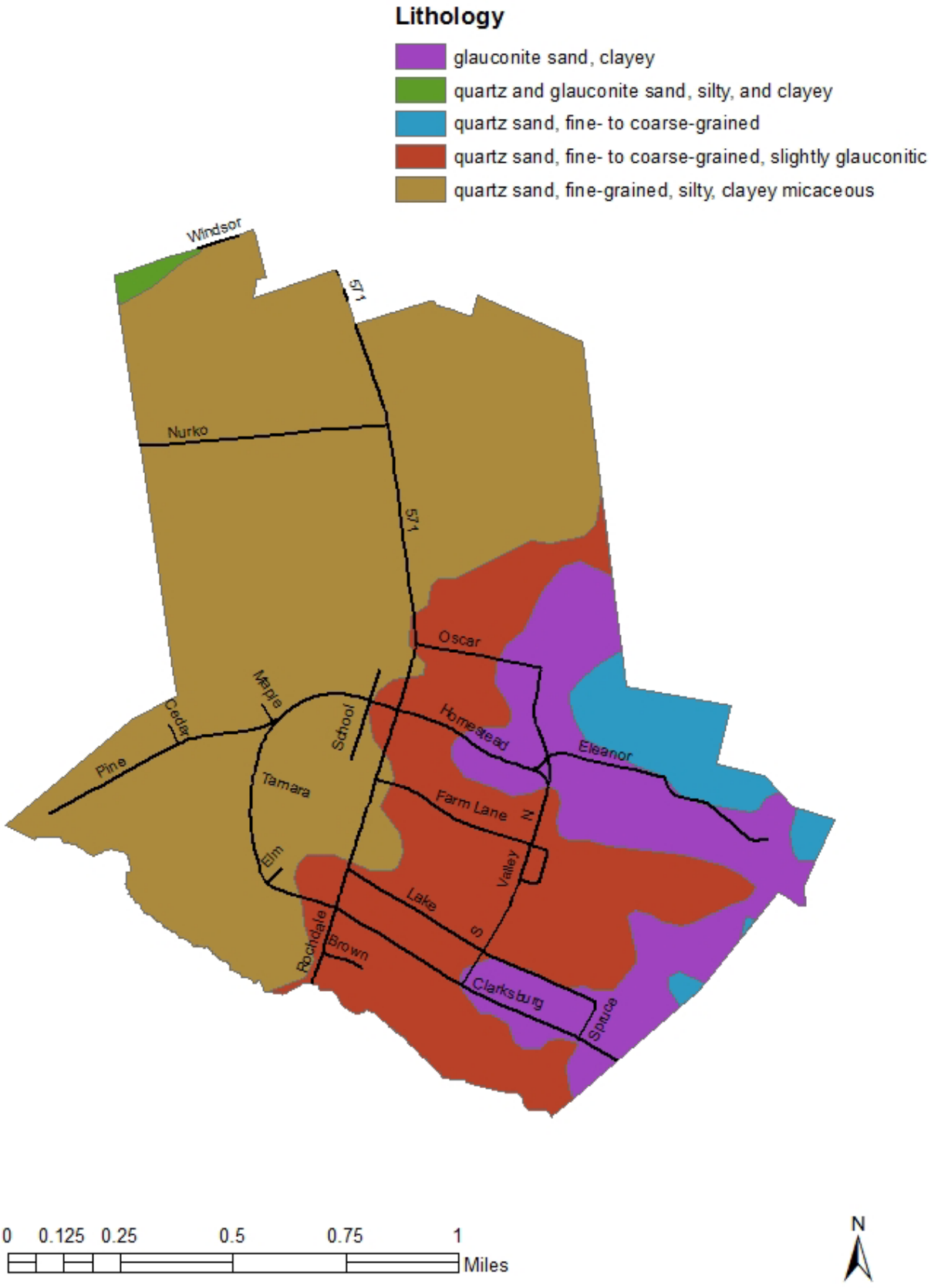
Soils are part of the physical resources as well as biological because they are defined both by the physical components generated by their geological source and by the way biological activity creates their structure and zones.

Table 1. Soil Types, descriptions, and acreage.

Soil type	Abbreviation	Description	Acres
Colemantown loam	CoeAs	0 to 2 percent slopes, occasionally flooded	4.3
Collington sandy loam	CokB	2 to 5 percent slopes	30.4
Collington sandy loam	CokC2	5 to 10 percent slopes, eroded	28.2
Evesboro sand	EveE	15 to 25 percent slopes	0.8
Freehold loamy sand	FrfB	0 to 5 percent slopes	36.3
Freehold loamy sand	FrfC	5 to 10 percent slopes	25.5
Freehold sandy loam	FrkB	2 to 5 percent slopes	179.9
Freehold sandy loam	FrkC	5 to 10 percent slopes	9.6
Freehold sandy loam	FrkC2	5 to 10 percent slopes, eroded	15.1
Freehold sandy loam,	FrkD2	10 to 15 percent slopes, eroded	17.6
Freehold sandy loam,	FrkE2	15 to 25 percent slopes, eroded	7
Freehold-Urban land complex	FrrC	0 to 10 percent slopes	104.4
Holmdel sandy loam	HocA	0 to 2 percent slopes	14.9
Holmdel sandy loam	HocB	2 to 5 percent slopes	108.7
Holmdel-Urban land complex	HofB	0 to 5 percent slopes	49.6
Humaquepts	HumAt	0 to 3 percent slopes, frequently flooded	129.6
Klej loamy sand	KkgB	0 to 5 percent slopes	4.1
Pits		sand and gravel	5.5
Shrewsbury sandy loam	ShrA	0 to 2 percent slopes	206.4
Tinton loamy sand	ThgB	0 to 5 percent slopes	150.1
Tinton loamy sand	ThgC	5 to 10 percent slopes	52.1
Tinton loamy sand	ThgE	10 to 25 percent slopes	55.7
Udorthents,	UdaB	0 to 8 percent slopes	5.3
Water			3.5
Woodstown sandy loam	WoeB	2 to 5 percent slopes	2.5

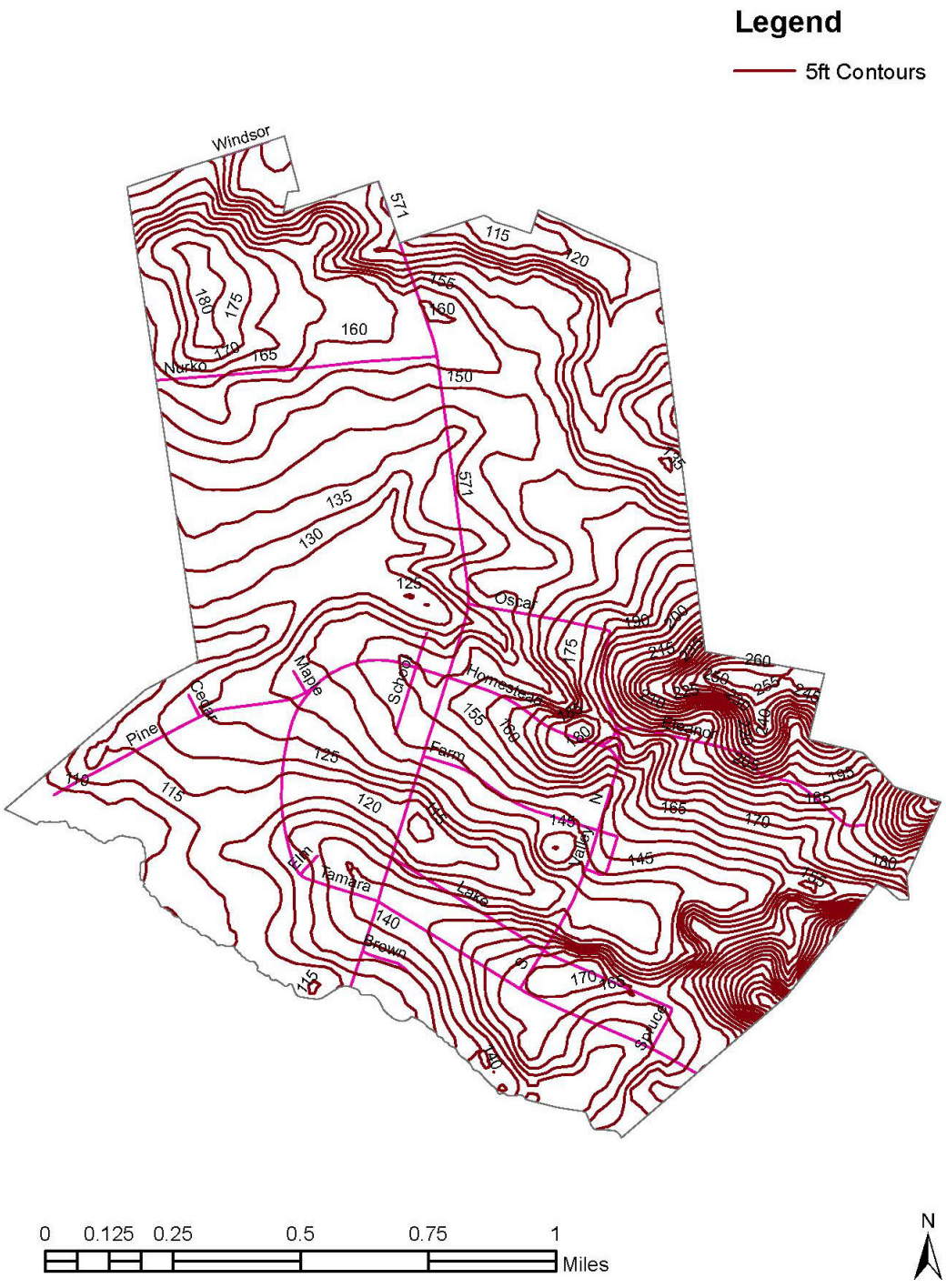
Map 12. Geologic formations found within the Borough of Roosevelt (NRCS).



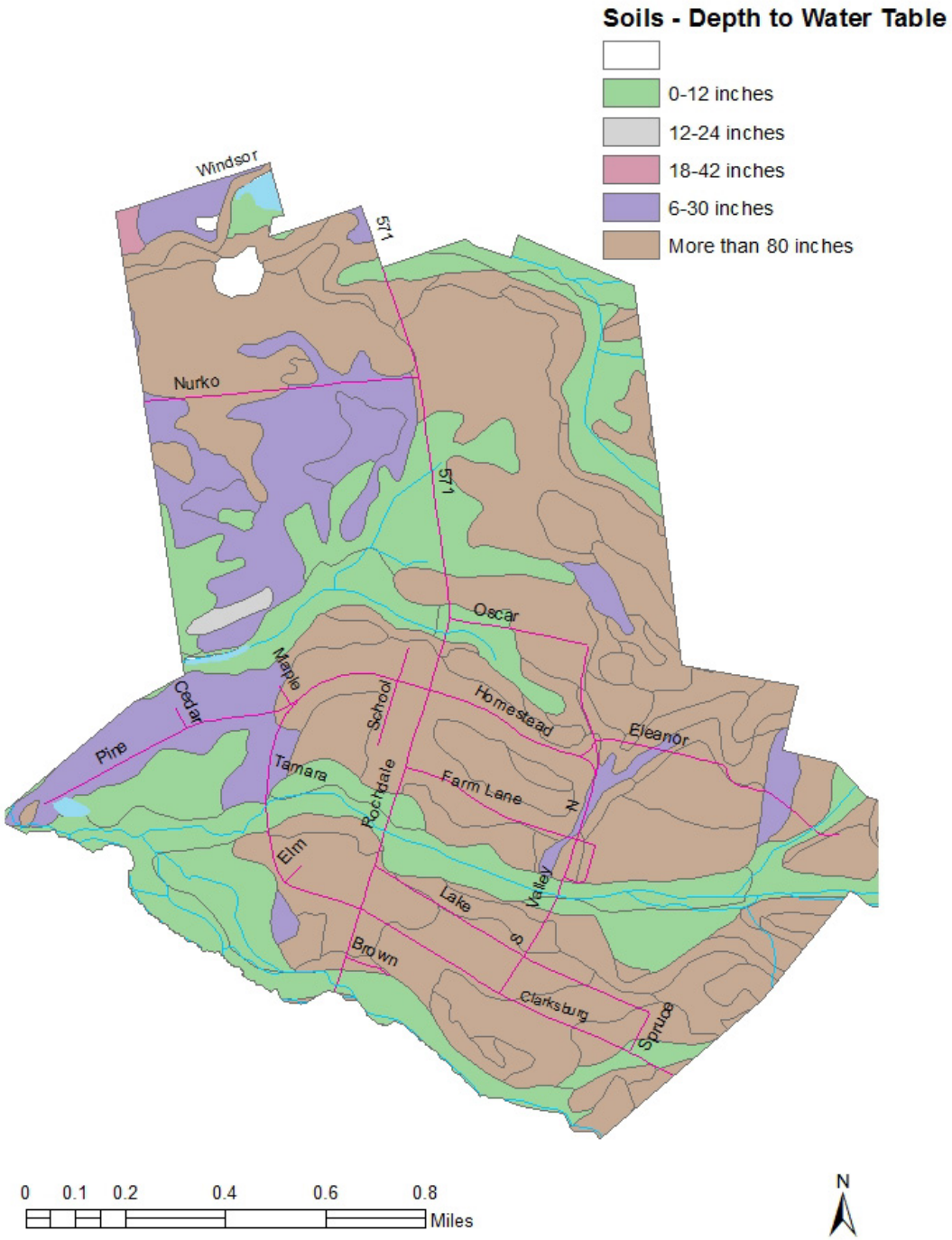


Map 13. Lithology refers to the physical characteristics of geologic formations. (NRCS)

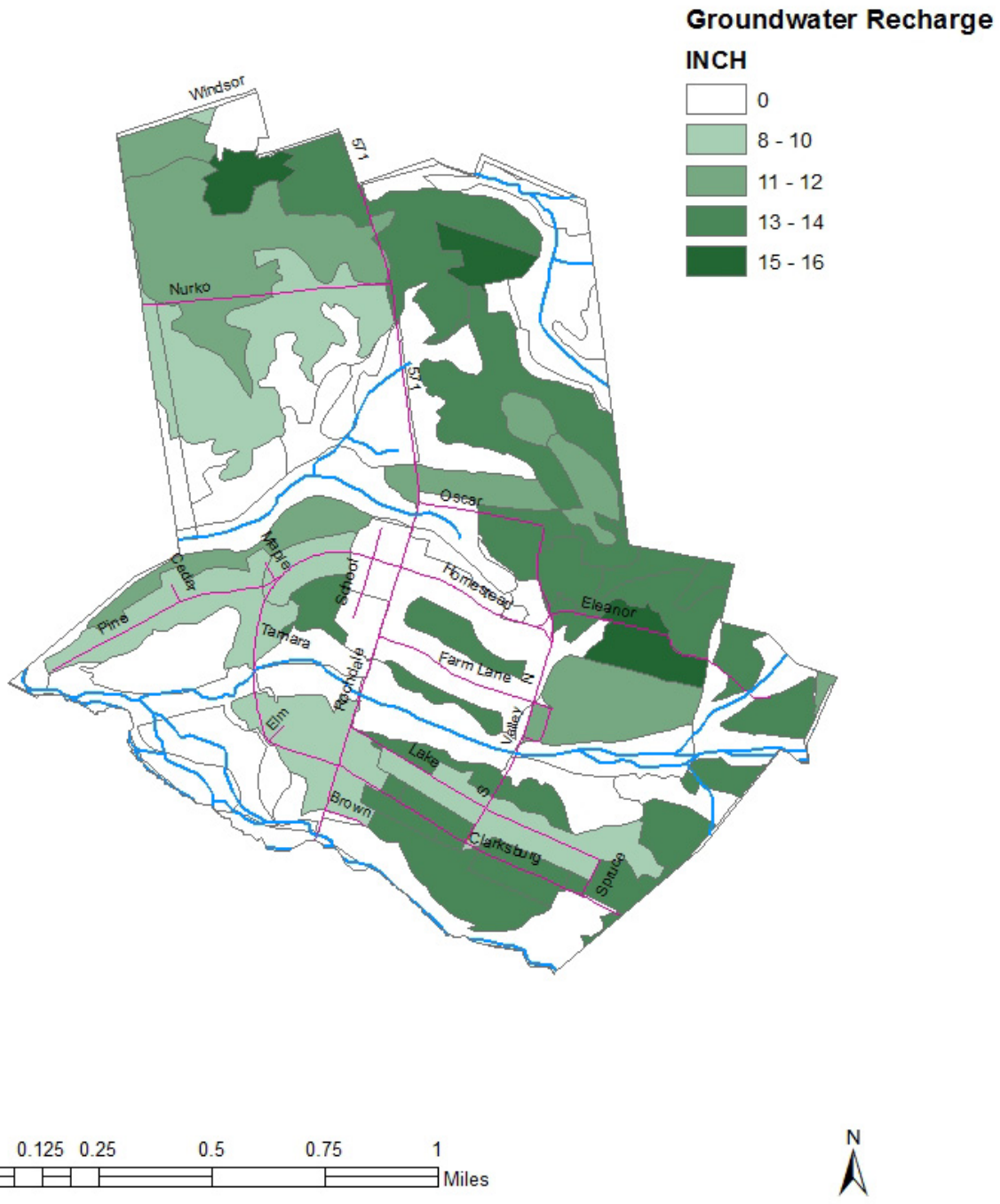
Map 14. Topography. Contours are shown at five foot intervals. Areas where the contours are very close indicate steep slopes. Most of the Borough has a slight slope, but two areas on the eastern side show significant slope. The highest elevations in the Borough are at the top of these steeper slopes.



Map 15. Soil Depth to Groundwater. The areas where the water table is within 12 inches of the soil surface tend to be wetlands. Note that there are overlapping categories; this is because each depth is relevant to the range of depths to groundwater for individual soil types. In other words, groundwater may seasonally be 6-36 in depth in forested wetlands while its range is 12-24 inches in some upland soils (NRCS). Usually groundwater is highest in the spring and lowest during the early fall (NRCS).



Map 16. Groundwater Recharge in inches per year. (NRCS)



BIOLOGICAL RESOURCES

Developed Land

Land use often dominates biological resources, so in this section Map 17 is first and shows developed land. This analysis is based on the NJDEP land classification system completed in 2007. Generally, the number and types of species found in built areas is influenced by the proportion of the land that is impermeable (e.g. buildings, roads, parking areas, highly compacted soil), the land management regimen (e.g. mowing preferences, gardening preferences, garden design, playing fields).

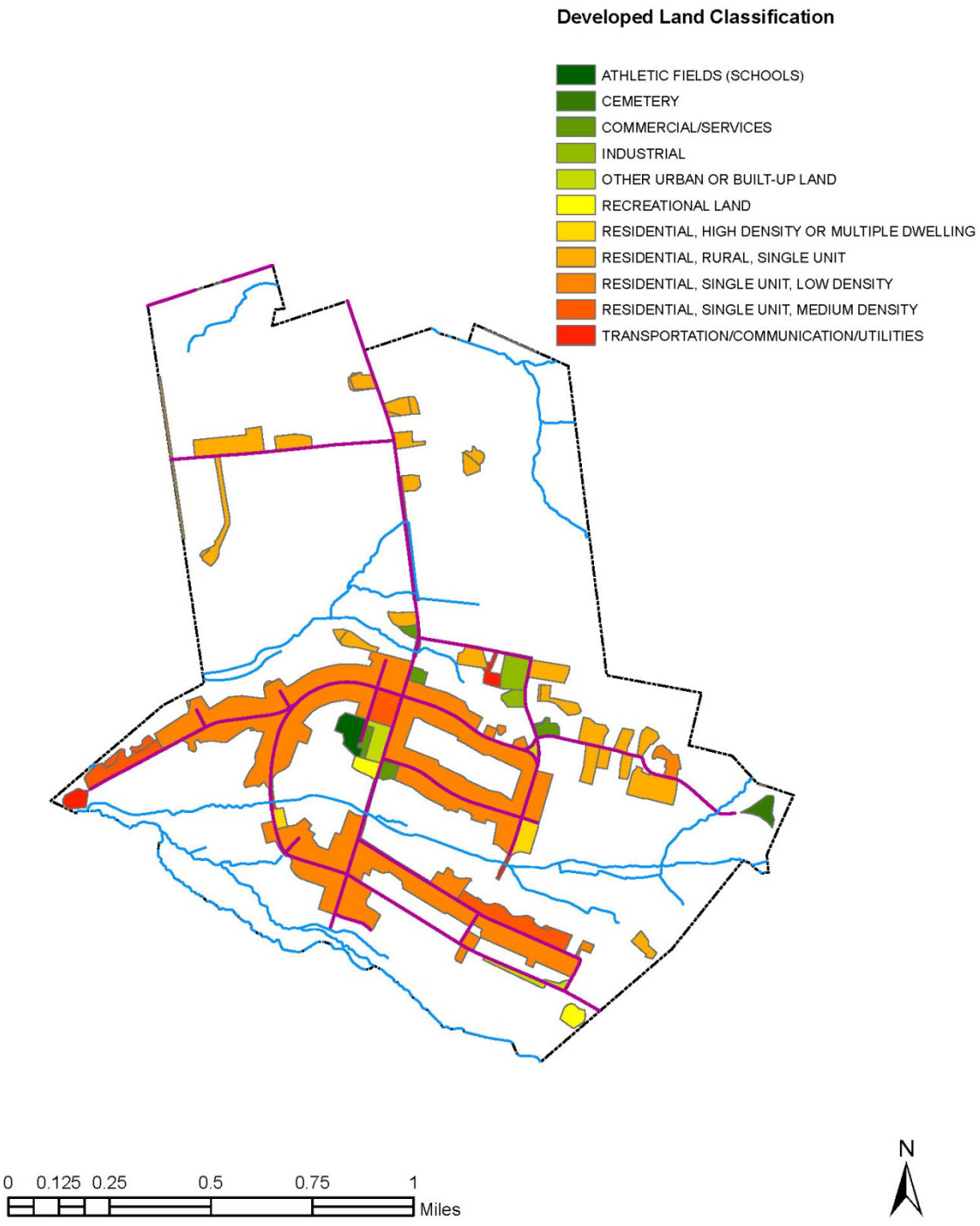
Even without a detailed survey of private property, one can make predictions that common urban birds and small mammals occur. The numbers of these animals are often depressed if pets are allowed to roam or populations of feral pet species build up. In many of the residential areas, the trees and shrubs adjacent to the green belt have been allowed to grow. There seems to be a great deal of variability in how the ground plane of the green belt is cared for; in some cases it is allowed to go wild, other areas are mowed, and, in some, lawn waste, woody clippings, and other debris are dumped. This debris, along with some invasive species, may increase the chance of fire moving through the wooded areas.

Agricultural Land Uses and the Managed Rights-of-Way

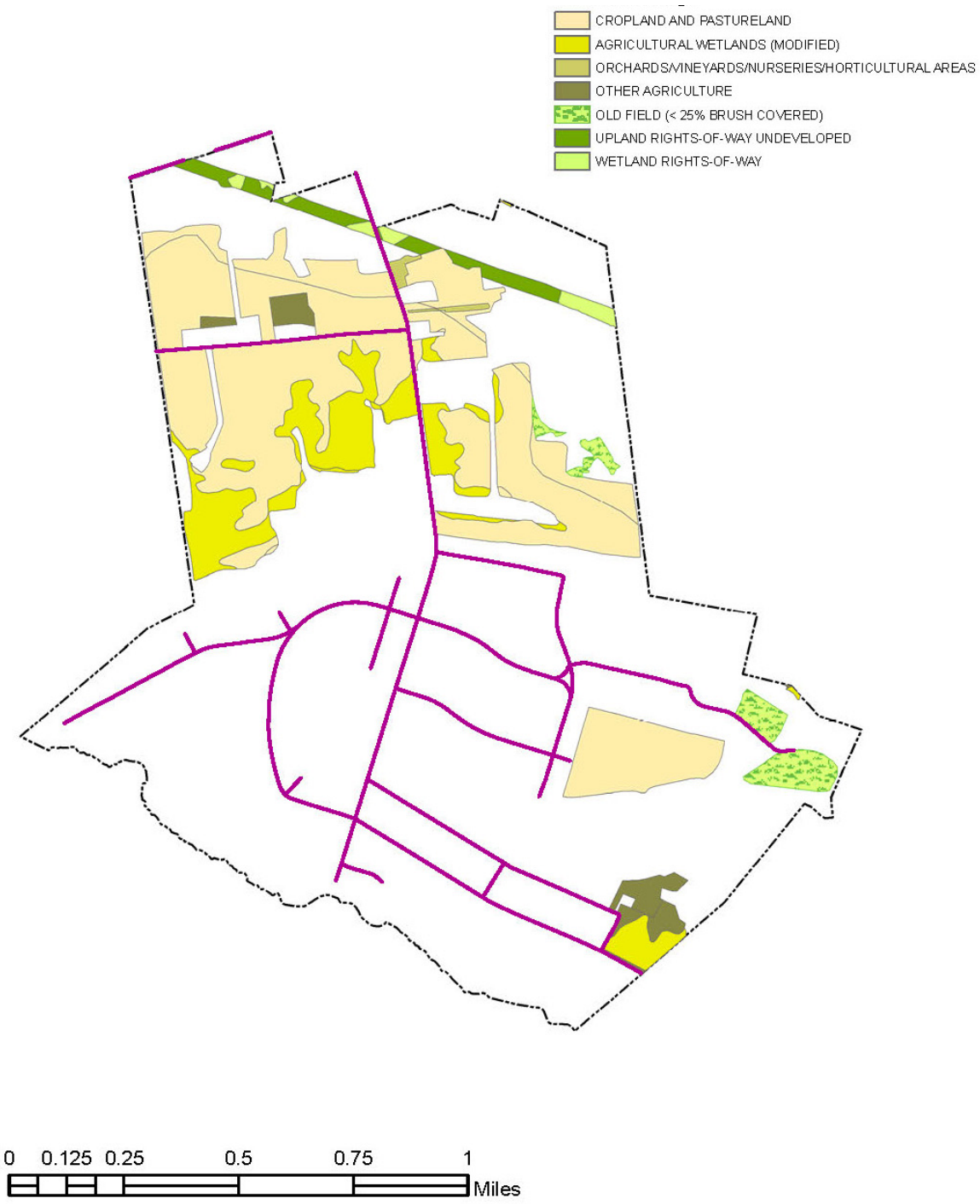
Map 18 shows agricultural land uses and the managed rights-of-way that cut across the northern portion of Roosevelt, based on the 2007 NJDEP land use land cover classification. The occurrence of old field vegetation indicates some change from active agriculture. The current agricultural land is 417 acres, about 34% of the total 1,235 acres within the Borough (based on NJDEP 2007 classification). Note that this includes acres that are visually interpreted as agricultural use and does not include portions of farm property that are built-up or forested. This leads to a bit of confusion, because the acreage that is counted in zoning includes all land within property boundaries (including built-up land and forested land. Based on zoning data, 535 acres have been preserved since 1993, including 270 acres for public use. This means that the land is protected from subdivision and development of additional residences. Around 119 acres of unpreserved farmland remain as of the time of this report.

Management of the power line right of way should be monitored. The safety of the power lines requires that vegetation be kept low. Because of the location of this portion of this system in headwaters near Rocky Brook, it is important that the management does not use some common types of herbicides. This is especially important because wetlands make up a significant portion of the managed area. It would be helpful if the Environmental Commission were copied on planned maintenance by the owners of the powerlines. This would help them monitor that the best management practices required by NJDEP are, in fact, in use (http://nj.gov/bpu/about/divisions/energy/veg.html).

Map 17. Developed Land Classification



Map 18. Agricultural Land and Managed Right-of-Ways.



Natural Vegetation Communities

The Borough of Roosevelt is characterized by a relatively high diversity of vegetation types (Map 19). The maintenance of this diversity helps to ensure the perpetuation of indigenous wildlife species. Large areas of undisturbed natural vegetation also contributes to the overall environmental quality of the Borough. This report examines and revises the biodiversity and spread of invasive species within Roosevelt.

Photo 1. Aerial photograph of Roosevelt, New Jersey, USA, taken between 1936 and 1938. At that time, forested land was primarily associated with the stream system. Most of the area had been clear-cut prior to this photo. Very few trees or shrubs occur outside of the greenbelt. The source file states that the photo is of the Jersey Homesteads (located near Hightstown). http://hdl.loc.gov/loc.pnp/fsa.8e04537

Today, deciduous woody vegetation dominates the landscape of Roosevelt. This includes the successional vegetation that has grown to cover the green belt area around the historic residential zone. In addition, the forested wetlands maintain an important buffer around the streams and have expanded since the initial settlement of the Borough. Although the cover of shrublands is relatively low, their presence near forested wetlands is a sign of ongoing

expansion of forests and buffer vegetation for the wetlands. This is a positive trend for wildlife and stream protection.

The approximate extent of wetlands within Roosevelt Borough is 412 acres (i.e. approx. 30% of the Borough). This is determined from examination of the Monmouth County Soil survey, the National Wetlands inventory maps, NJDEPE freshwater wetlands maps, Monmouth County aerial photography, and field surveys. The legal extent of wetlands on any property within the Borough can only be determined using a detailed field delineation following guidelines set down in The Federal Manual for Identifying and Delineating Jurisdictional Wetlands (January 1989) and FRESHWATER WETLANDS PROTECTION ACT RULES (N.J.S.A. 13:9B-1 et seq.; Date last amended: February 2, 2015, http://www.nj.gov/dep/rules/rules/njac7_7a.pdf) as the technical basis for delineating wetlands in New Jersey.

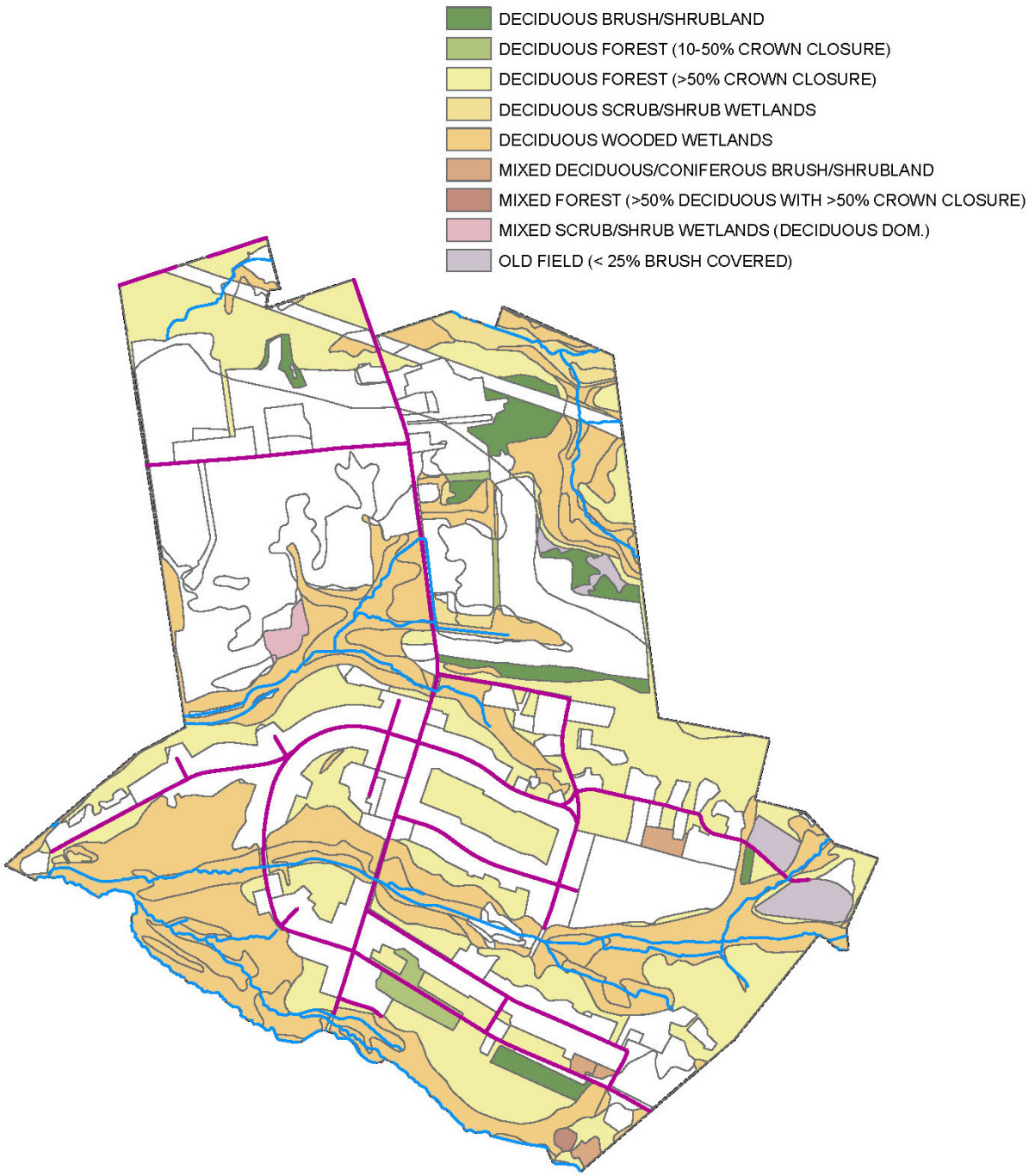
Wetland community classification, based on the Cowardin System as applied for the U.S. Fish and Wildlife Service National Wetland Inventory classification system, is shown in Map 20. This system recognizes broad classes of wetland communities on the basis of the source of water and the form of the vegetation, especially as it relates to the successional stage of the dominant vegetation.

Map 21 displays the same wetland patterns but the categories are the land cover classes applied by the NJDEP during the development of the 2007 GIS digital data library (http://www.nj.gov/dep/gis/lulc07shp.html). Note the paucity of herbaceous wetlands (these are probably early succession communities, but herbaceous wetlands can also indicate wetter conditions). Also, comparison of Maps 18 and 20 helps emphasize the excellent protections of wetlands by the upland forest expansion.

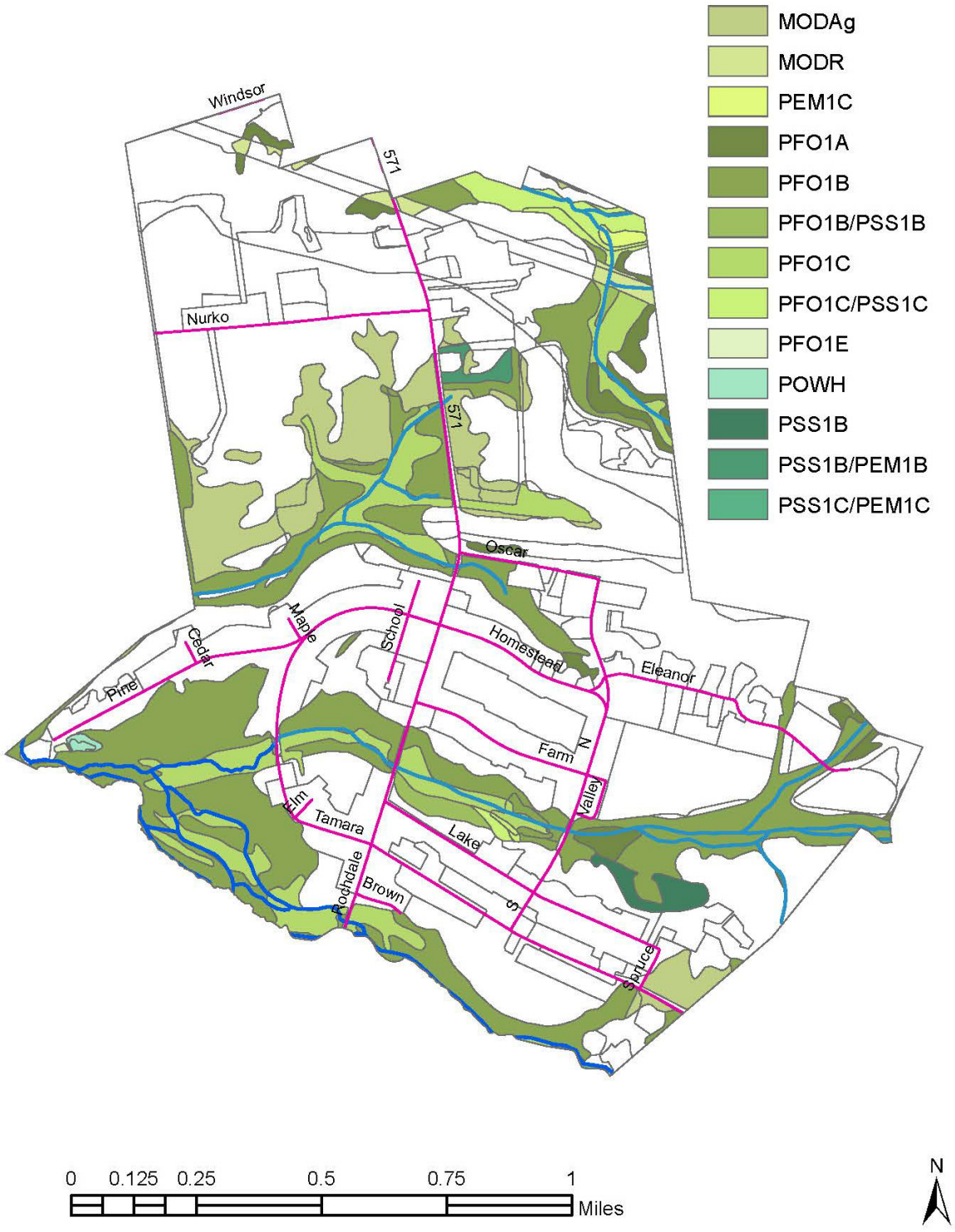
Map 22 adds a one hundred and fifty foot buffer around the wetlands. Comparison of the extent of the woody vegetation in Map 19 shows that a good portion of the buffer area is forest or shrubland. Obviously, a buffer around the modified agricultural wetlands is not to be expected to be forested when active agriculture is in place. Practices such as organic farming or no till field management can minimize sediment and fertilizer runoff to the forested wetlands and streams.

In general, Roosevelt contains potential habitat for many species of concern because of its adjacency to the Assunpink Wildlife Management Area and because of the land stewardship that has been practiced throughout its history. As an example, Map 23 shows data developed by NJDEP (http://catalog.data.gov/dataset/wood-turtle-crtical-areas-in-new-jersey-njdep-nj-woodturtle) as part of their landscape project. Further information concerning all of the species that were studied is available in a 2013 report titled PROTOCOLS FOR THE ESTABLISHMENT OF EXCEPTIONAL RESOURCE VALUE WETLANDS PURSUANT TO THE FRESHWATER WETLANDS PROTECTION ACT (N.J.S.A. 13:9B-1 ET SEQ.) BASED ON DOCUMENTATION OF STATE OR FEDERAL ENDANGERED OR THREATENED SPECIES (http://www.nj.gov/dep/landuse/download/fw_016.pdf).

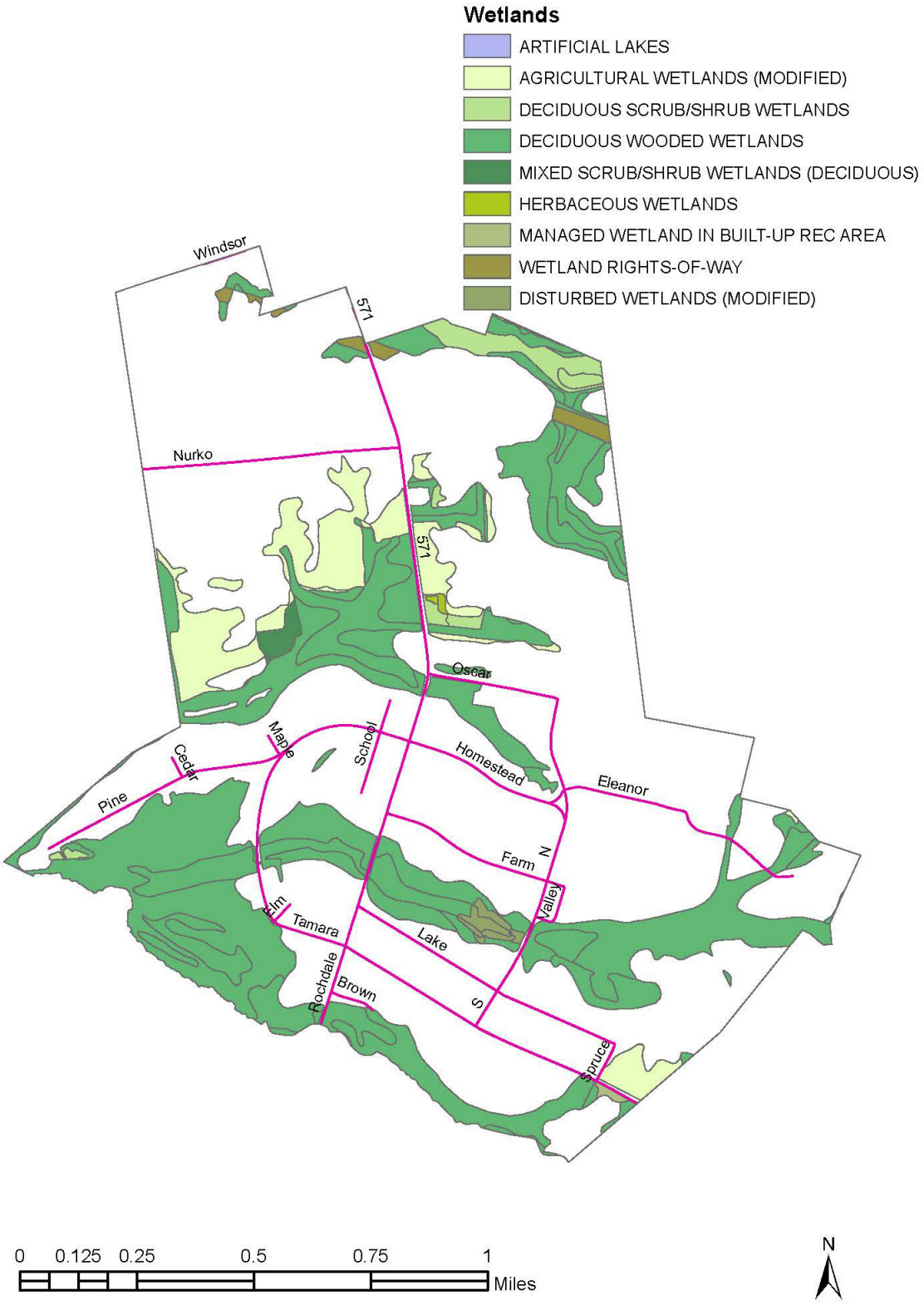
Map 19. Natural Vegetation Communities (NJDEP 2007).



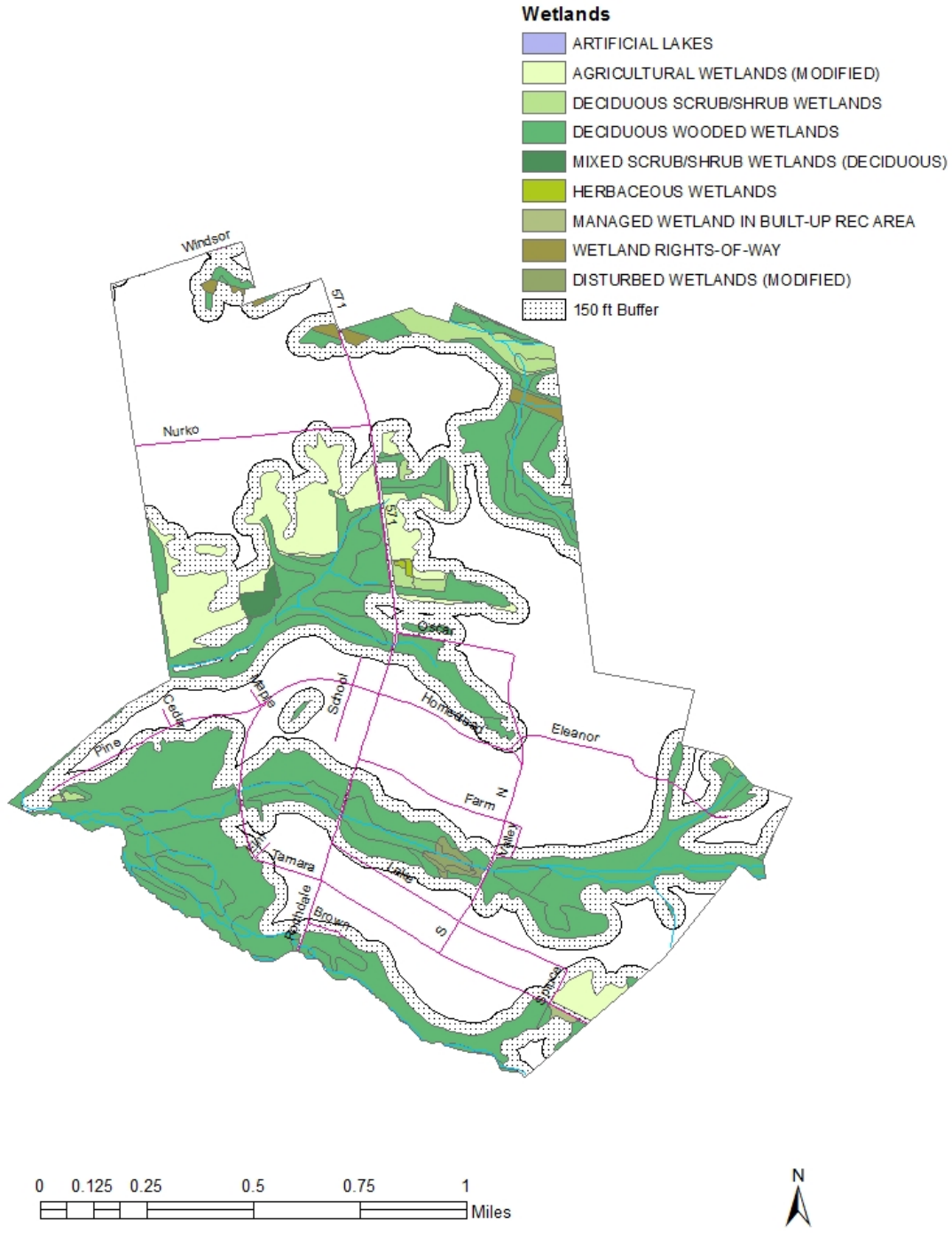
Map 20. Cowardin Wetland Classes (NJDEP 2007).



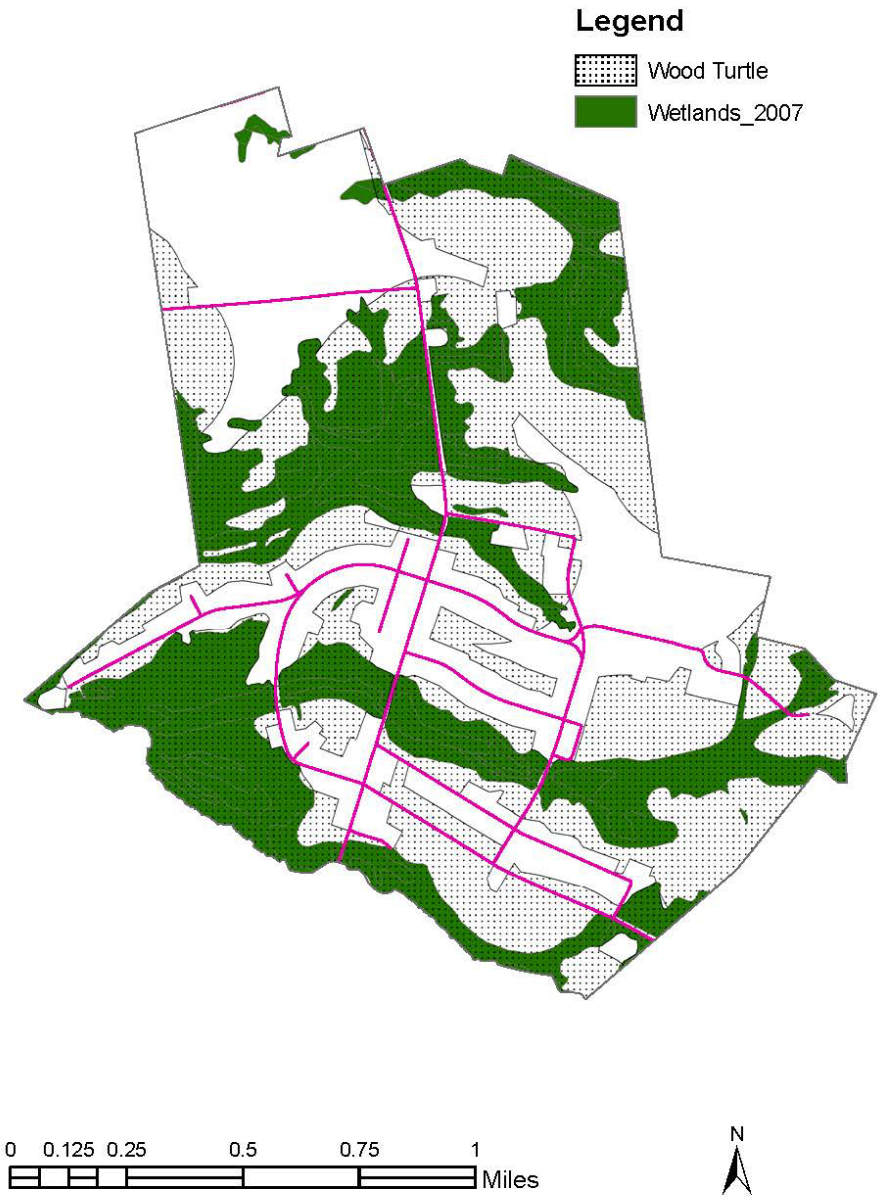
Map 21. Wetland Plant Communities (NJDEP 2007).



Map 22. Wetland Buffer of 150 feet (calculated on NJDEP wetland areas 2007).



Map 23. Potential Wood Turtle Habitat (Based on NJDEP Wood Turtle Habitat Model).



ISSUES OF CONCERN

During the Environmental Commission Meeting on June 18, 2014, numerous concerns and observations were shared about the environmental changes that seem to be occurring in Roosevelt. Four that are appropriate to the scope of this report were identified:

- Forest health
- Invasive plant species distribution
- Stream structure, especially Empty Box Brook
- Storm water management

After further consideration and initial site visits forest health was considered a subset of invasive species distribution. Because there was no recent survey of storm sewers or outflow pipes, the need for a storm water study is addressed in **RECOMMENDATIONS** (see next section)

Invasive Plant Species in Forests

The NJ INVASIVE SPECIES STRIKE TEAM (http://www.njisst.org/) has created a document titled "Target Species Fact Sheets - Plants Only" that describes species and includes photos to aid in recognition. We utilized this resource to conduct an initial evaluation of the distribution of invasive plant species in Roosevelt's forests. For simplicity, we used walking trails as a transect system and stopped at regular intervals to look for invasive plant species. The work was conducted on five field days, resulting in four sets of data along the woodland trail and one on the trail to the cemetery. One student intern, Johnny Quispe, conducted the plant identification on each day.

The data are summarized in Table 2. The first column lists the genus and species from the Strike Team list. The second column shows the percent of survey stops where the species was found. The next five columns report the number of times the species was found along a portion of the trail system. Note that *Microstegium vimineum*, Japanese stilt grass, was found at nearly 75% of the samples. Both *Lonicera japonica*, Japanese Honeysuckle, and *Rosa multiflora*, multiflora Rose, were each found at over 40% of the samples. These are obviously the most successful invasive species at this time.

They should be recognized as a warning regarding the health of the forest. Stewardship of the forest requires a forest management plan and a team of volunteers or staff who can consistently work to implement it. Photos 3 and 4 are inserted to show the *Microstegium vimineum*, Japanese stilt grass, dominance.

The Woodland trail system was walked and checked for the presence of invasive species. The Woodland Trails were checked starting on September 9th 2014 and continued into the first week of November. Every **20 paces** (or **40 steps.,** approximately every 100') starting from the beginning of the Woodland Trails a sample was taken. Specifically, any invasive plant species found within 10 feet of the trail was identified in the field and noted. Sample points were recorded in a field book and were taken using a Garmin GPS MAP and are available in the GIS data set.


Photo 2.


Photo 3.

NJ invasive species strike team maintains a variety of information regarding identification and eradication of invasive species with each plant description on their list and recommendation on herbicides are given (http://www.njisst.org). In general large scale use of herbicides require a permit or application licenses. I strongly recommend that you follow directions provided by NJ Invasive Species Strike Team (http://www.njisst.org/eradication.htm).

Flora Inventory

In addition, flora inventories were conducted for the meadow near the cemetery and the forested area of Footlight Farm. The meadow is located at the entrance of the cemetery. Every **20 paces** or **40 steps** (approximately 100'), starting from the edge of the field and wrapping around the edges was the sampled. All species present (native or invasive) were identified in the field and noted. All species found within **10 feet** of the sampling point were included in the identification process. At Footlight Farm, three edges of the forest area was sampled and then, when it became too wet, a fourth line bisected the vegetation. The results of the Inventories are available in Appendix B.

Identifications were based on nomenclature used in:

Newcomb's Wildflower Guide by: Lawrence Newcomb

Weeds of the Northeast. By Richard H. Uva

Table 2. Invasive plant species survey results. Note that species that were not found (grey cells) should be looked for and this list should be updated as new occurrences are found.

		Site	Woodland Trail 1	Woodland Trail 2	Woodland Trail 3	Woodland Trail 4	Cemetery Trail
#Samples		103	23	34	13	20	13
Genus species	**Common Name**	**Frequency %**					
Acer platanoides	Norway maple	4.85	0	3	1	0	1
Ailanthus altissima	tree of heaven	0.00	0	0	0	0	0
Albizia julibrissin	silk tree	2.91	1	1	1	0	0
Alliaria petiolata	garlic mustard	8.74	1	2	0	1	5
Ampelopsis brevipedunculata	porcelainberry	0.00	0	0	0	0	0
Berberis thunbergii	barberry	15.53	3	7	0	2	4
Carex kobomugi	Asiatic sand sedge	0.00	0	0	0	0	0
Celastrus orbiculata	Oriental bittersweet	7.77	0	1	4	3	0
Centaurea biebersteinii	spotted knapweed	0.00	0	0	0	0	0
Cirsium arvense	Canada thistle	0.00	0	0	0	0	0
Clematis terniflora	Sweet autumn clematis	0.00	0	0	0	0	0
Dipsacus fullonum	teasel	0.00	0	0	0	0	0
Elaeagnus umbellate	autumn olive	18.45	5	6	3	1	4
Eragrostis curvula	weeping lovegrass	0.00	0	0	0	0	0
Euonymus alata	winged euonymus	3.88	1	1	2	0	0
Hedera helix	English ivy	0.00	0	0	0	0	0
Lespedeza cuneata	Chinese bushclover	0.97	0	0	0	1	0
Ligustrum vulgare	privet	0.00	0	0	0	0	0
Lonicera japonica	Japanese honeysuckle	43.69	13	17	2	4	9
Lonicera morrowii	Morrow's honeysuckle	6.80	2	4	1	0	0
Lythrum salicaria	purple loosestrife	0.00	0	0	0	0	0
Microstegium vimineum	Japanese stiltgrass	73.79	15	27	11	11	12
Myriophyllum spicatum	Eurasian watermilfoil	0.00	0	0	0	0	0
Phragmites australis	common reed	1.94	0	0	2	0	0
Phytolacca americana	American pokeweed	1.94	0	1	1	0	0
Phalaris canariensis	canary grass	1.94	2	0	0	0	0
Polygonum cuspidatum	Japanese knotweed	0.00	0	0	0	0	0
Polygonum perfoliatum	Asiatic tearthumb	12.62	6	5	1	1	0
Polygonum sagittatum	arrowleaf tearthumb	0.97	0	0	1	0	0
Potamogeton crispus	curled pondweed	0.00	0	0	0	0	0
Ranunculus ficaria	lesser celadine	2.91	0	0	2	1	0
Robinia pseudoacacia	black locust	0.00	0	0	0	0	0
Rosa multiflora	multiflora rose	44.66	14	17	1	4	10
Rubus phoenicolasius	wineberry	0.97	1	0	0	0	0
Smilax rotondofolia	roundleaf greenbriar	1.94	1	1	0	0	0
Wisteria floribunda	Japanese wisteria	0.00	0	0	0	0	0
Number of observations			65	93	33	29	45
Average number of species found per stop			2.83	2.74	2.54	1.45	3.46

Stream Assessments

Several stream assessment approaches were reviewed. The Urban Subwatershed Restoration Manual No. 10 UNIFIED STREAM ASSESSMENT: A USER'S MANUAL (Kitchell, A., and T. Schuler 2005; http://www.cwp.org/online-watershed-library/cat_view/64-manuals-and-plans/80-urban-subwatershed-restoration-manual-series) provided clear directions, data sheets, and background information that are appropriate to the streams within Roosevelt. The manual was prepared for the Office of Water Management in EPA by the Center for Watershed Protection. Because the research was developed for a Federal Agency, it is available for free from the Center (http://www.cwp.org/). Copies of the forms can be found in Appendix C, along with a shortened Data Form Guide used to explain the methods of gathering data.

Empty Box Brook was the stream that was targeted to assess stream integrity. Assessments were performed between July 24th 2014 & August 14th 2014. The stream was observed and the following were documented:

- Severe Bank Erosion
- Channel Modification
- Impacted Buffers
- Storm water outfalls
- Trash and debris
- Utility impacts

Culverts under roads at stream crossings were assessed throughout the Borough. Next the team began conducting the assessment along Empty Box Brook, beginning near the sewage treatment plant. They stopped at point where the stream had been impacted by beavers. The assessment was re-started up-stream of the beaver impact, east of Valley Road. Historically this is a typical disturbance process that helps biodiversity and does not make a permanent change to upland flood patterns. However, elevations of some properties may cause short or long-term issues. Photo 4 shows the parts of Empty Box Brook and its tributaries that were part of the assessment.

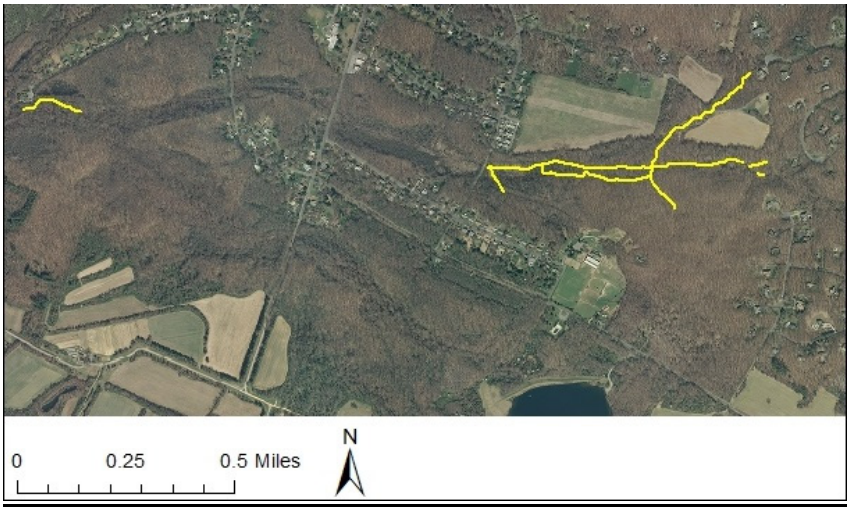


Photo 4: Stream Assessment Sample Area in Empty Box Brook.

Note that the area that was not sampled was very wet and a clear stream bed was difficult to find. In the eastern portion of Empty Box Brook, 125 observations of erosion were recorded. The most common process related to erosion severity was sediment deposition and the second most common was bank scour (Table 3, Photo 5 and 6). Table 4 shows the ease of access results of the evaluation. This metric is particularly useful when stream restoration is under consideration. Most samples are scored 1 or 2; this is considered difficult access. (The data sheet describes it as: *Must cross wetland, steep slope or other sensitive areas to access stream. Minimal stockpile areas available and/or located a great distance from stream section. Specialized heavy equipment required*.) This becomes important when proposals for stream restoration or remediation are made.

Table 3. Record of instances of erosion processes documented in the eastern portion of Empty Box Brook in Roosevelt. Severity of erosion was categorized in five levels with 1 indicating low severity and 5 indicating highest severity.

		Erosion Severity					
Process	**Count**	5	4	3	2	1	un-marked
headcutting	3	0	1	2	0	0	0
sediment deposition	54	2	8	29	13	2	0
bed scour	3	1	0	1	0	0	1
bank failure	1	0	0	0	1	0	0
bank scour	45	8	18	12	5	0	2
widening/sediment disposition/ bank failure	1	0	0	1	0	0	0
sediment disposition/ bank failure/bank scour	1	1	0	0	0	0	0
sediment disposition/ bank failure	1	0	0	0	1	0	0
aggrading/sediment deposition	15	1	3	7	4	0	0
sediment disposition/bank scour	1	0	0	1	0	0	0
Total	125						

Erosion Severity Guide

1- Grade and width stable: isolated areas of bank failure/erosion: likely caused by a pipe outfall, local scour, impaired riparian vegetation or adjacent use.

3- Downcutting evident: active stream widening, banks actively eroding at a moderate rate; no threat to property or infrastructure.

5- Active downcutting: tall banks on both sides of the stream eroding at a fast rate; erosion contributing significant amount of sediment to stream; obvious threat to property or infrastructure.

Table 4. Ease of access to the areas where instances of erosion processes. Ease of access to the areas was consistently low. Note that the columns titled "process" and "total count" show that the data points from Tables 3 and 4 are organized in the same way.

		Ease of Access					
Process	Total Count	5	4	3	2	1	unmarked
headcutting	3	0	0	0	0	3	0
sediment deposition	54	0	0	0	0	54	0
bed scour	3	0	0	0	0	3	0
bank failure	1	0	0	0	0	1	0
bank scour	45	0	0	0	0	45	0
widening/sediment disposition/ bank failure	1	0	0	0	0	1	0
sediment disposition/ bank failure/bank scour	1	0	0	0	0	1	0
sediment disposition/ bank failure	1	0	0	0	0	1	0
aggrading/sediment deposition	15	0	0	2	1	12	0
sediment disposition/bank scour	1	0	0	0	0	1	0

Ease of access guide:

1- Difficult access, must cross wetland, steep slope or other sensitive areas to access stream. Minimal stockpile areas available and/or located a great distance from stream section. Specialized heavy equipment required.

3- Fair access: Forested or developed area adjacent to stream. Access requires tree removal or impact to landscaped areas. Stockpile areas small or distant from stream.

5- Good access: Open area in public ownership, sufficient room to stockpile material, easy stream channel access for heavy equipment using existing roads or trails.

Photo 5. Examples of several Severe Bank Erosion Processes. Sample# ER17- Aggrading & Sediment Deposition.

Photo 6. Bank Scour Deposition Example (Sample# ER94).

OBSERVATIONS AND RECOMMENDATIONS

There are several community programs offered through NJDEP that might provide funding or assistance in addressing the following list (http://www.nj.gov/dep/grantandloanprograms/).

1.) The forest is changing. The density and frequency of invasive plant species is rising. The forest edges along roadways and between the greenway and private properties have increased trash and piles of plant debris. Trees that have been brought down by strong winds or winter storms have created a high pulse of woody debris. This provides habitat and other wildlife benefits, but a forest management plan that includes a consideration of fire hazards is needed.

Preparation of a forest management plan has become critical (http://www.nj.gov/dep/grantandloanprograms/nhr_csip.htm). There are standard practices for composing a management plan, e.g.:

www.**forest**asyst.org/**managementplan**.html
http://www.state.nj.us/dep/parksandforests/forest/stw_inc_prog.html

and NRCS, USDA, or County Extension Agent may be able to provide assistance setting one up or reviewing one that is generated by community members.

2.) Part of the change in the forest is the increase of distribution and number of invasive plants. It is important to determine if there are areas that not been invaded and begin to monitor them with a plan for removal if establishment is noticed. Once patches with minimal invasive coverage are identified, then a management strategy can be implemented for removal from surrounding areas. With some luck, a lot of hard work, and persistent vigilance, areas can be protected. However, full removal is unlikely and would probably be short lived. Training and guidance is readily available from the New Jersey Invasive Strike Team (www.njisst.org/). Their website announces training events and provides accurate and up to date resources.

3.) The streams in Roosevelt and the surrounding townships are headwaters of Watershed Management Areas 10 and 11. The Raritan Headwaters Association (http://www.raritanheadwaters.org/) provides good examples of water monitoring and stream restoration in a similar situation. The Stony Brook Millstone Watershed Association (http://thewatershed.org/) includes Rocky Brook and provides education and materials.

The Assunpink Watershed does not have a central association and Roosevelt is listed as a partner on the NJDEP Fact Sheet (http://www.nj.gov/dep/watershedmgt/DOCS/WMAFactsheets/WMA11.pdf). Maintaining a good relationship with the staff of the Wildlife Management Area is important because most of Roosevelt is in the headwaters of Assunpink Creek.

The Raritan Headwaters Association (http://www.raritanheadwaters.org/) has developed a volunteer monitoring program that could be replicated in Roosevelt. There are free training sessions and clear instruction manuals, developed by NJDEP) that they can recommend.

4.) There is evidence of significant erosion in the upper stretches of Empty Box Brook, east of the Borough boundary. We found no evidence that this was caused by the beaver dam. Rather, it seems possible that sediments and a substantial increase of in storm-water input is coming from an area in Millstone Township. This requires on site investigation and the cooperation of property owners in the neighborhood. If additional construction occurs, the erosion could worsen if this is the cause of the pattern that was observed. Either way, it could be very productive to look into stream restoration grants (e.g. http://www.nj.gov/dep/grantandloanprograms/lga_ccpg.htm that could address the erosion, sedimentation, and invasive species dominance that characterized the eastern portion of Empty Box Brook.

5.) A study or Roosevelt's storm water system is needed. This study should include a map of the current points of storm water collection, areas of collection, outflow points and projected outflows for a standard storm. This information is needed before any stream bank restoration work can be considered, because it is necessary for estimating hydrology of the stream systems during precipitation events.

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SUGGESTED LINKS

Borough of Roosevelt

http://njcc.com/~ret/Roosevelt/natureso.html

http://www.libraries.rutgers.edu/rul/libs/scua/roosevelt/rstory.shtml

Geology

http://ngmdb.usgs.gov/Prodesc/proddesc_19458.htm

Invasive Species

http://www.njisst.org/

http://www.njisst.org/eradication.htm

http://nj.gov/bpu/about/divisions/energy/veg.html

Library of Congress

http://hdl.loc.gov/loc.pnp/fsa.8e04537

Soils

http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

http://ngmdb.usgs.gov/Prodesc/proddesc_19458.htm

http://www.nrcs.usda.gov/wps/portal/nrcs/site/soils/home/

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Watersheds

http://www.raritanheadwaters.org/

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APPENDIX A

BOROUGH OF ROOSEVELT

SOILS DISTRIBUTION AND DESCRIPTIONS

For additional information:
http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

- Read the instructions
- Click on the Green Circle
- Select an area and continue following the instructions to see the soil classification for the area of interest.

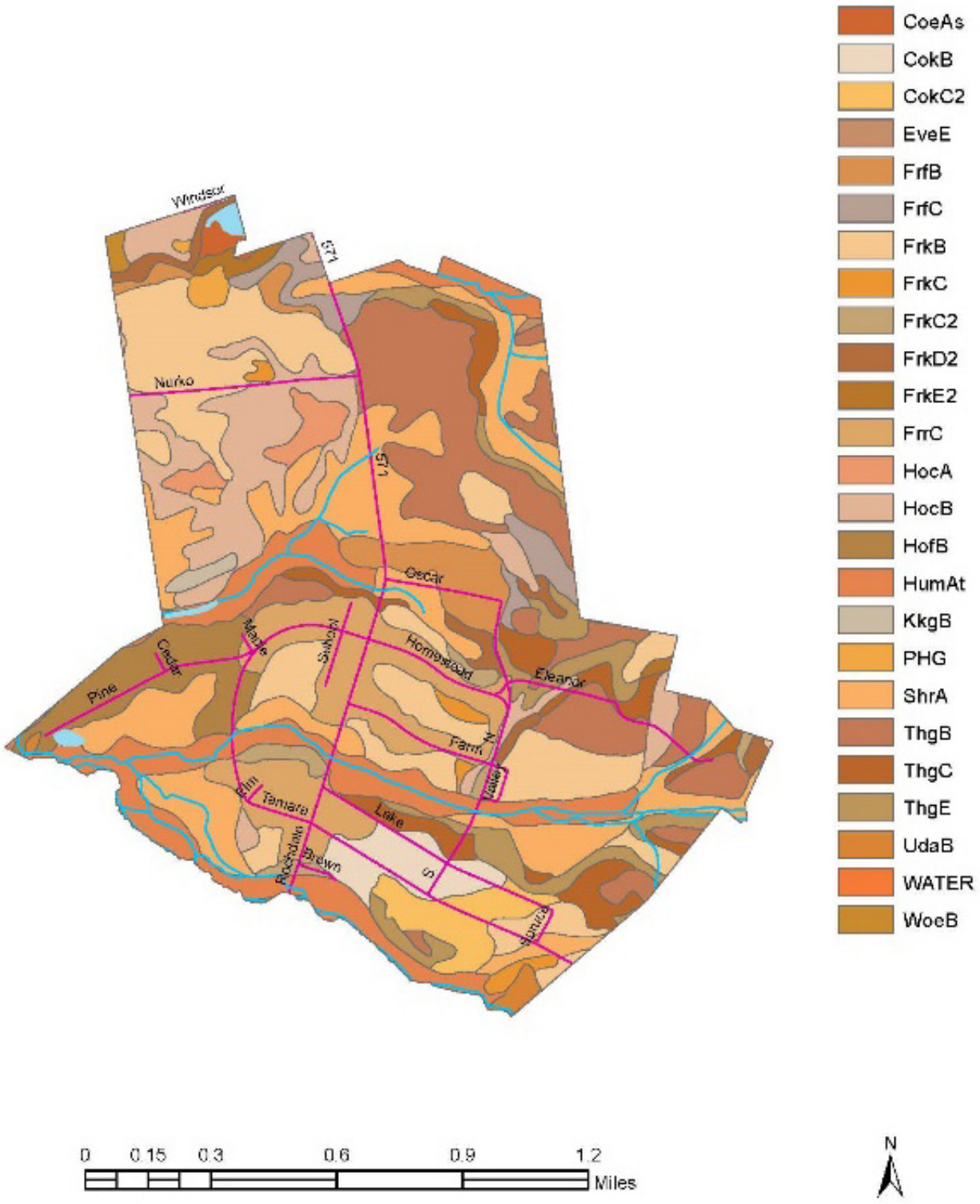
http://www.nrcs.usda.gov/wps/portal/nrcs/site/soils/home/
http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/
Select topics of interest (e.g. Hydric Soils, Urban Soils, Maps, World Soil Resources)

The Borough of Roosevelt consists of the following major soils (NRCS Web Soil Survey):

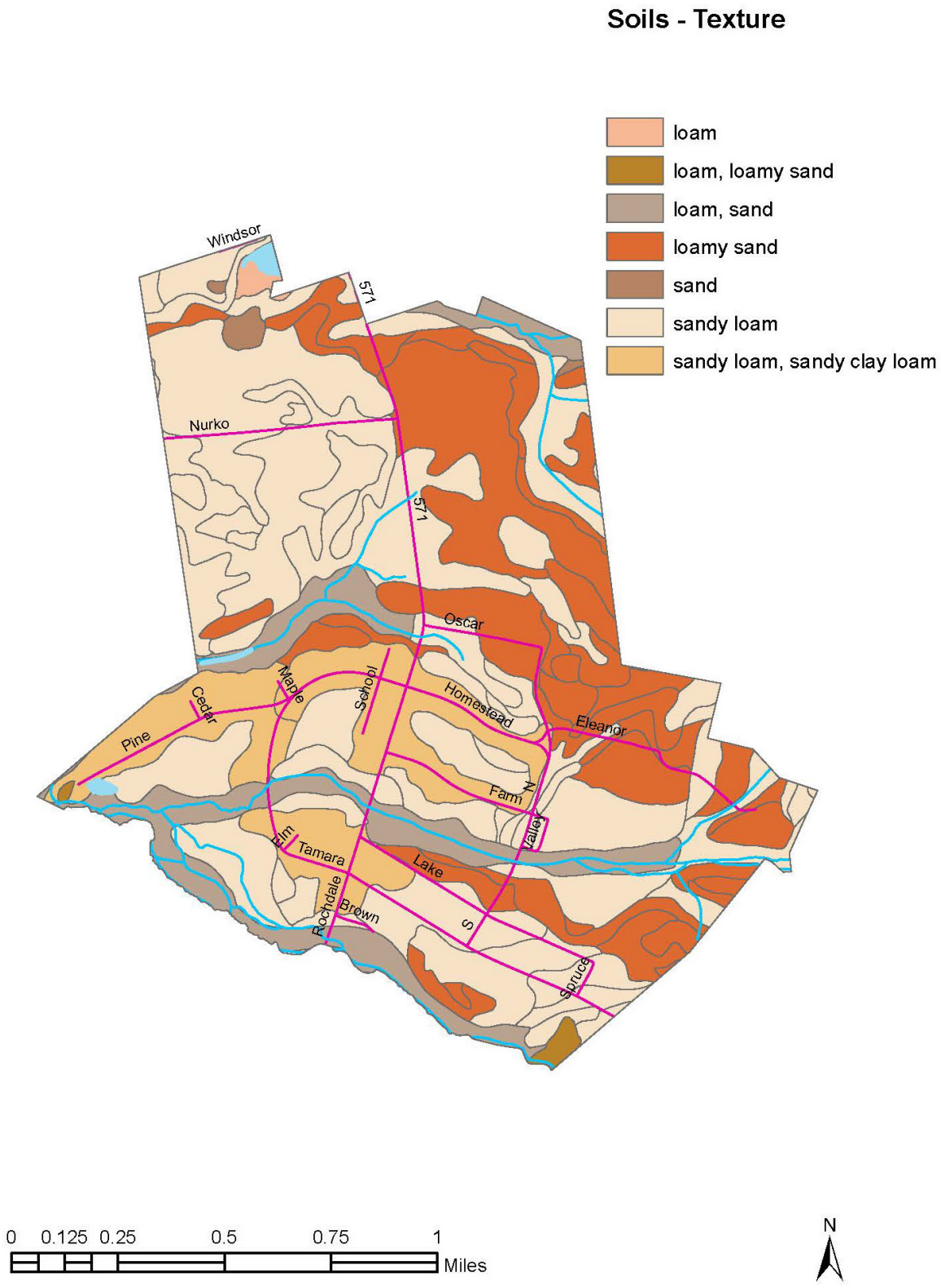
Soil type	**Abbreviation**	**Description**	**Acres**
Colemantown loam	CoeAs	0 to 2 percent slopes, occasionally flooded	4.3
Collington sandy loam	CokB	2 to 5 percent slopes	30.4
Collington sandy loam	CokC2	5 to 10 percent slopes, eroded	28.2
Evesboro sand	EveE	15 to 25 percent slopes	0.8
Freehold loamy sand	FrfB	0 to 5 percent slopes	36.3
Freehold loamy sand	FrfC	5 to 10 percent slopes	25.5
Freehold sandy loam	FrkB	2 to 5 percent slopes	179.9
Freehold sandy loam	FrkC	5 to 10 percent slopes	9.6
Freehold sandy loam	FrkC2	5 to 10 percent slopes, eroded	15.1
Freehold sandy loam,	FrkD2	10 to 15 percent slopes, eroded	17.6
Freehold sandy loam,	FrkE2	15 to 25 percent slopes, eroded	7
Freehold-Urban land complex	FrrC	0 to 10 percent slopes	104.4
Holmdel sandy loam	HocA	0 to 2 percent slopes	14.9
Holmdel sandy loam	HocB	2 to 5 percent slopes	108.7
Holmdel-Urban land complex	HofB	0 to 5 percent slopes	49.6
Humaquepts	HumAt	0 to 3 percent slopes, frequently flooded	129.6
Klej loamy sand	KkgB	0 to 5 percent slopes	4.1
Pits,		sand and gravel	5.5
Shrewsbury sandy loam,	ShrA	0 to 2 percent slopes	206.4
Tinton loamy sand,	ThgB	0 to 5 percent slopes	150.1
Tinton loamy sand,	ThgC	5 to 10 percent slopes	52.1
Tinton loamy sand,	ThgE	10 to 25 percent slopes	55.7
Udorthents,	UdaB	0 to 8 percent slopes	5.3
Water			3.5
Woodstown sandy loam	WoeB	2 to 5 percent slopes	2.5

This data was produced using the online Web Soil Survey developed by NRCS and accessed at:
http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

Map A.1 Soil classifications (NRCS).



Map A.2 Soil Texture (NRCS).



Map A.3 Soil Hydric Classification (NRCS).

NRCS SOIL DESCRIPTIONS

This list is in alphabetic order by soil class names. Abbreviation for the soil class is listed after the name and corresponds to the abbreviations fond on Map A.1.

Colemantown loam-CoeAs

The Colemantown, occasionally flooded component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on depressions, drainageways, flats on North Atlantic coastal plains. The parent material consists of glauconite bearing fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is very high. Shrink-swell potential is moderate. This soil is occasionally flooded. It is occasionally ponded. A seasonal zone of water saturation is at 6 inches during January, February, March, April, May. Organic matter content in the surface horizon is about 3 percent. Non-irrigated land capability classification is 3w. This soil meets hydric criteria.

Collington sandy loam-CokB

The Collington component makes up 80 percent of the map unit. Slopes are 2 to 5 percent. This component is on fluviomarine terraces on North Atlantic coastal plains. The parent material consists of glauconite bearing loamy fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2e. Irrigated land capability classification is 2e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Collington sandy loam-CokC2

The Collington, eroded component makes up 85 percent of the map unit. Slopes are 5 to 10 percent. This component is on knobs, hillslopes, North Atlantic coastal plains. The parent material consists of glauconite bearing eolian deposits and/or glauconite bearing fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Evesboro sand- EveE

The Evesboro component makes up 95 percent of the map unit. Slopes are 15 to 25 percent. This component is on low hills on coastal plains. The parent material consists of sandy eolian deposits and/or sandy fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not

flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria.

Freehold loamy sand-FrfB

The Freehold component makes up 80 percent of the map unit. Slopes are 0 to 5 percent. This component is on low hills, North Atlantic coastal plains, knolls. The parent material consists of glauconite bearing loamy eolian deposits and/or glauconite bearing loamy fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2s. This soil does not meet hydric criteria.

Freehold loamy sand-FrfC

The Freehold component makes up 85 percent of the map unit. Slopes are 5 to 10 percent. This component is on low hills, North Atlantic coastal plains, knolls. The parent material consists of glauconite bearing loamy eolian deposits and/or glauconite bearing loamy fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Freehold sandy loam-FrkB

The Freehold component makes up 85 percent of the map unit. Slopes are 2 to 5 percent. This component is on North Atlantic coastal plains, low hills, knolls. The parent material consists of glauconite bearing loamy eolian deposits and/or glauconite bearing loamy fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Freehold sandy loam-FrkC

The Freehold component makes up 90 percent of the map unit. Slopes are 5 to 10 percent. This component is on hillslopes, knolls, North Atlantic coastal plains. The parent material consists of glauconite bearing loamy eolian deposits and/or glauconite bearing loamy fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or

restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Freehold sandy loam-FrkC2

The Freehold, eroded component makes up 85 percent of the map unit. Slopes are 5 to 10 percent. This component is on North Atlantic coastal plains, knolls, hillslopes. The parent material consists of glauconite bearing loamy eolian deposits and/or glauconite bearing loamy fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Freehold sandy loam- FrkD2

The Freehold, eroded component makes up 90 percent of the map unit. Slopes are 10 to 15 percent. This component is on hillslopes, North Atlantic coastal plains, knolls. The parent material consists of glauconite bearing loamy eolian deposits and/or glauconite bearing loamy fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 0 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Freehold sandy loam-FrkE2

The Freehold, eroded component makes up 85 percent of the map unit. Slopes are 15 to 25 percent. This component is on North Atlantic coastal plains, hillslopes, knolls. The parent material consists of glauconite bearing loamy eolian deposits and/or glauconite bearing loamy fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Freehold-FrrC

The Freehold component makes up 60 percent of the map unit. Slopes are 5 to 10 percent. This component is on low hills, North Atlantic coastal plains, knolls. The parent material consists of glauconite bearing loamy eolian deposits and/or glauconite bearing loamy fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or

restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Holmdel sandy loam- HocA

The Holmdel component makes up 85 percent of the map unit. Slopes are 0 to 2 percent. This component is on flats on North Atlantic coastal plains. The parent material consists of glauconite bearing loamy marine deposits and/or fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 27 inches during January, February, March, April, May, December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria.

Holmdel sandy loam- HocB

The Holmdel component makes up 85 percent of the map unit. Slopes are 2 to 5 percent. This component is on flats, low hills, North Atlantic coastal plains. The parent material consists of glauconite bearing loamy marine deposits and/or fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 27 inches during January, February, March, April, May, December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria.

Holmdel-HofB

The Holmdel component makes up 55 percent of the map unit. Slopes are 0 to 5 percent. This component is on low hills, North Atlantic coastal plains, flats. The parent material consists of glauconite bearing loamy marine deposits and/or fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 27 inches during January, February, March, April, May, December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria.

Humaquepts –HumAt

The Humaquepts, frequently flooded component makes up 85 percent of the map unit. Slopes are 0 to 3 percent. This component is on river valleys on North Atlantic coastal plains, flood plains. The parent material consists of loamy alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is

moderate. This soil is frequently flooded. It is frequently ponded. A seasonal zone of water saturation is at 6 inches during January, February, March, April, May, June, November, December. Organic matter content in the surface horizon is about 12 percent. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Klej loamy sand-KkgB

The Klej component makes up 90 percent of the map unit. Slopes are 0 to 5 percent. This component is on dunes on North Atlantic coastal plains. The parent material consists of unconsolidated sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 18 inches during January, February, March, April, December. Organic matter content in the surface horizon is about 85 percent. Below this thin organic horizon the organic matter content is about 2 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Shrewsbury sandy loam-ShrA

The Shrewsbury component makes up 85 percent of the map unit. Slopes are 0 to 2 percent. This component is on flats on North Atlantic coastal plains. The parent material consists of fine-loamy marine deposits containing moderate amounts of glauconite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 6 inches during January, February, March, April, May, June, October, November, December. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 3w. This soil meets hydric criteria.

Tinton loamy sand-THgB

The Tinton component makes up 85 percent of the map unit. Slopes are 0 to 5 percent. This component is on low hills on North Atlantic coastal plains. The parent material consists of sandy eolian deposits over glauconite bearing fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 3s. This soil does not meet hydric criteria.

Tinton loamy sand-ThgC

The Tinton component makes up 85 percent of the map unit. Slopes are 5 to 10 percent. This component is on ridges on North Atlantic coastal plains. The parent material consists of sandy eolian deposits over glauconite bearing fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a

depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 4s. This soil does not meet hydric criteria.

Tinton loamy sand-ThgE

The Tinton component makes up 85 percent of the map unit. Slopes are 10 to 25 percent. This component is on hillslopes, ridges on North Atlantic coastal plains. The parent material consists of sandy eolian deposits over glauconite bearing fluviomarine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Udorthents- UdaB

The Udorthents component makes up 100 percent of the map unit. Slopes are 0 to 8 percent. This component is on fills, low hills on uplands, cuts (road, railroad, etc.). The parent material consists of fill and/or disturbed original soil material. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. Nonirrigated land capability classification is 3w. This soil does not meet hydric criteria.

Woodstown sandy loam- WoeB

The Woodstown component makes up 80 percent of the map unit. Slopes are 2 to 5 percent. This component is on drainageways, flats on North Atlantic coastal plains. The parent material consists of old alluvium and/or sandy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 30 inches during January, February, March, April. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2w. This soil does not meet hydric criteria.

APPENDIX B

Plant Species Surveys

	Site:	% Frequency	Field by Cemetary around edge	NRI Front of Field by Cemetary	NJ ISST list
	#Samples:	26	23	3	
Genus species	**Common Names**				
Acer platanoides	Norway maple	3.85	1	0	X
Acer rubra	red maple	3.85	1	0	
Acer saccharum	sugar maple	7.69	2	0	
Albizia julibrissin	silk tree	53.85	11	3	X
Apoccynum cannabinum	Indian hemp	19.23	4	1	
Artemisia vulgaris	mugwort	30.77	6	2	
Aster viminius	small white aster	57.69	14	1	
Asclepia syriaca	milkweed	3.85	1	0	
Berberis thunbergii	barberry	3.85	1	0	X
Betula lenta	sweet birch	11.54	3	0	
Carya ovata	shagbark hickory	3.85	1	0	
Celastrus orbiculata	Oriental bittersweet	3.85	1	0	
Elaeagnus umbellata	autumn olive	46.15	11	1	X
Euonymus alatus	winged euonymus	3.85	1	0	X
Fagus grandifolia	American beech	3.85	1	0	
Gnaphalium obtusifolium	sweet everlasting	76.92	17	3	
Juniperus virginiana	red cedar	3.85	1	0	
Juglans nigra	Eastern black walnut	3.85	1	0	
Lespedeza cappitata	bushclover	7.69	0	2	
Liderodendron tulipfera	tulip tree	0.00	0	0	
Lindera benzoin	spice bush	3.85	1	0	
Liquidambar styraciflua	American sweetgum	11.54	1	2	
Lonicera japonica	Japanese honeysuckle	76.92	20	0	X
Lonicera marrowii	Morrow's honeysuckle	15.38	4	0	X
Microstegium vimineum	Japanese stiltgrass	3.85	1	0	X
Miscanthus sinensis	Chinese silver grass	61.54	16	0	
Monarda punctata	spotted beebalm	3.85	0	1	
Onoclea senseblis	sensitive fern	34.62	9	0	
Parthenocissus quinquefolia	Virginia creeper	11.54	3	0	
Phytolacca americana	pokeweed	3.85	1	0	
Polygonum caespitosum	tufted knotweed	3.85	1	0	
Prunus serotina	black cherry	15.38	4	0	
Quercus velutina	black oak	11.54	3	0	
Rosa multiflora	multiflora rose	7.69	2	0	
Rubus allegheniensis	common blackberry	3.85	1	0	

Genus species	**Common Name**	% Frequency	Field by Cemetery around edge	NRI Front of Field by Cemetery	NJ ISST list
Rubus flagellaris	northern dewberry	7.69	1	1	
Rudbeckia spp.	black eyed Susan	23.08	4	2	
Smilax rotundofolia	roundleaf greenbriar	7.69	2	0	
Setari faberi	foxtail	7.69	1	1	
Solidago graminifolia	grass-leaved goldenrod	19.23	5	0	
Solidago patula	swamp goldenrod	26.92	4	3	
Taraxacum officinale	dandelion	57.69	14	1	
Tridens flavus	purpletop tridens	11.54	1	2	
*Trifolium s*p.	clover	26.92	6	1	
Viburnum dentatum	arrowwood	3.85	1	0	
Vitis labrusca	fox grape	23.08	6	0	
Sum of observations			190	28	
Average number of species found per stop			8.26	9.33	

APPENDIX C

Stream Assessments & Data Form Guide

Introduction to Data Forms

The data forms for the Roosevelt Environmental Resource Inventory (ERI) require basic summary and explanation in order for volunteers to sufficiently provide valuable information. The forms are useful tools for gathering consistent and coherent data for the stream assessment.

Basic Information and Materials

Information pertaining to date, time, and assessors are self-explanatory and are ubiquitous to all types of the stream assessment forms. Record coordinates using a GPS. Please do not use a cellphone in place of an actual GPS unit. Cellphones are often inaccurate by hundreds or even thousands of feet. Tape measures (the longer the better), a clipboard, pencils, a camera, and appropriate clothing will also be necessary.

Drawing a cross section of the stream may be useful for understanding the processes going on. Clear photos, organized photos are especially important. Label photos on the sheets in chronological order. After returning from the field, upload photos onto a computer. Organize the photos into a folder and label the folder with the date that the photos were taken. If multiple teams work on the same day, use a letter or number to indicate which folder of photos was taken by which team.

Forms

Severe Bank Erosion (ER)

The most frequently used form for our purposes is the Severe Bank Erosion sheet (ER). The ER form documents the impacts of erosion and sedimentation. Indicate which processes are taking place. Downcutting refers to when the bed (bottom) of the stream is eroding away. Widening refers to when the stream is getting wider. This is easily indicated by leaning trees on the banks of the stream. Headcutting refers to when a stream erodes due to the impacts of a waterfall. Aggrading occurs when sediment deposits in the stream reach above the water line. It is a specific kind of sediment deposition. Sediment deposition in general should be measured. A bed scour is essentially a hole in the bed of the stream, it often occurs after a headcut. A bank failure looks as though the bank has collapsed. A bank scour looks like a cut in the bank. Often a bank scour will expose roots of trees and shrub. Bank scours lack vegetation. Slope failure refers to the movement of rocks and debris due to a degrading slope.

Regardless of the process occurring, we use a standard set of measurement. Measure the length of the impact, as well as the height of the bank on the side of the impact. Estimate the angle of the bank. If the length of impact is long, it may be useful take

multiple measurements of height and angle. Average these measurements together or make a note of multiple measurements in the notes section. Measure the width of the stream at the bottom as well as at the top of the banks. If part of the stream bed is dry, measure the wetted width (the wet part), as well as the overall width (wet and dry). If the stream bed is completely wet, wetted width and bottom width will be the same number.

All other sections on the sheet are relatively self-explanatory. Please be sure to write down any interesting observations or patterns that you notice. Indicate a presence of invasive species and make a note of some the dominant trees, shrubs, and herbaceous plants. If you are filling out many sheets in a small area it is not necessary to do this every time.

Stream Crossing (SC)

Fill out the standard heading indicating date, assessed by, site ID, latitude and longitude. Choose the type of stream crossing (road crossing, railroad crossing, manmade dam, beaver dam, geologic formation) or indicate a kind not listed on the form. In Roosevelt one will likely only find road crossings. In indicate the shape, barrel (number of openings), primary material and whether it is aligned straight with the flow of the stream. Measure the barrel diameter and height (the opening), as well as the culvert length and width and the roadway elevation. Indicate whether the site requires restoration and if it serves to control the grade. Indicate if there is a blockage that would prevent the flow of fish and determine the severity of the blockage. In the notes section the plant species present and draw the site in plan and or section if useful.

Stormwater Outfalls

Fill out the standard heading indicating date, assessed by, site ID, latitude and longitude. Indicate which bank has the stormwater outfall (looking downstream). Indicate if there is water flow and what kind of flow (trickle, moderate, substantial, other). Indicate whether it is a closed pipe or an open channel and indicate the material it is made of (concrete, PVC/plastic, brick, earthen, other). Determine the shape if closed then circular or elliptical, if open then trapezoid or parabolic. Determine the number of pipes or channels and measure useful dimensions. Indicate whether it is submerged partially, fully, or not at all. Indicate the condition of the pipe, odors emitted, deposits or stains, and the vegetation density. If there is benthic growth determine the color. If there is a pool forming outside the pipe determine the conditions. For flowing pipes indicate the color of flow, turbidity, and presence of floatables. Indicate any other concerns and whether or not it needs to be restored. Indicate the severity of the outfall and the land use conditions. Add other notes or sketches that may be useful.

Trash and Debris

Fill out the standard heading indicating date, assessed by, site ID, latitude and longitude. Indicate the type of trash (industrial, commercial, or residential). Indicate the materials present and the source if known. Indicate whether it is in the stream and/or in the riparian area. If it is in the riparian area indicate which banks are impacted. Indicate the land ownership and estimate the number of pickup trucks needed to haul the debris. Indicate if restoration of the site will be necessary and the equipment needed (heavy equipment or trashbags). Indicate what kind of people may perform the cleanup (volunteers, local government, hazmat team, other). Indicate if known whether there is a dumpster within 100' of the site. Rate the clean-up potential with 5 being the simplest, and 1 being a complex cleanup. Add other useful notes.

Tool 17
Continuous Stream Walk Assessment Methods Field Sheets

This tool contains the field sheets to conduct the Center for Watershed Protection's Unified Stream Assessment (USA)and the Maryland Department of Natural Resource's Stream Corridor Assessment (SCA). Both are continuous stream walk methods that systematically evaluate conditions and identify restoration opportunities within the stream corridor. For more details on USA and guidance for completing the field forms, see Kitchell and Schueler, 2004.

Unified Stream Assessment (USA)

WATERSHED/SUBSHED:		**DATE:** ___/_____/___	**ASSESSED BY:**
SURVEY REACH ID:	**TIME:**___:____AM/PM	**PHOTO ID:** (*Camera-Pic #*) /#	
SITE ID (*Condition-#*): **OT-_____**	**LAT** ___°_____'_____" **LONG** ___°_____'_____" **LMK**_____		**GPS:** (*Unit ID*)

BANK: ☐LT ☐RT ☐ Head

FLOW: ☐ None ☐ Trickle ☐ Moderate ☐ Substantial ☐ Other:

TYPE:
☐ Closed pipe
☐ Open channel

MATERIAL:
☐ Concrete ☐ Metal ☐ PVC/Plastic ☐ Brick ☐ Other:
☐ Concrete ☐ Earthen ☐ Other:

SHAPE:
☐ Single ☐ Circular ☐ Double ☐ Elliptical ☐ Triple ☐ Other:
☐ Trapezoid ☐ Parabolic ☐ Other:

DIMENSIONS:
Diameter:_____(in)
Depth: _____(in)
Width (Top):_____(in)
" (Bottom):_____(in)

NOT APPLICABLE

SUBMERGED: ☐ No ☐ Partially ☐ Fully

CONDITION: ☐ None ☐ Chip/Cracked ☐ Peeling Paint ☐ Corrosion ☐ Other:

ODOR: ☐ No ☐ Gas ☐ Sewage ☐ Rancid/Sour ☐ Sulfide ☐ Other:

DEPOSITS/STAINS: ☐ None ☐ Oily ☐ Flow Line ☐ Paint ☐ Other:

VEGGIE DENSITY: ☐ None ☐ Normal ☐ Inhibited ☐ Excessive ☐ Other:

PIPE BENTHIC GROWTH: ☐ None ☐ Brown ☐ Orange ☐ Green ☐ Other:

POOL QUALITY: ☐ No pool ☐ Good ☐ Odors ☐ Colors ☐ Oils ☐ Suds ☐ Algae ☐ Floatables ☐ Other:

FOR FLOWING ONLY		
	COLOR:	☐ Clear ☐ Brown ☐ Grey ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:
	TURBIDITY:	☐ None ☐ Slight Cloudiness ☐ Cloudy ☐ Opaque
	FLOATABLES:	☐ None ☐ Sewage (toilet paper, etc.) ☐ Petroleum (oil sheen) ☐ Other:
OTHER CONCERNS:		☐ Excess Trash (paper/plastic bags) ☐ Dumping (bulk) ☐ Excessive Sedimentation ☐ Needs Regular Maintenance ☐ Bank Erosion ☐ Other:

POTENTIAL RESTORATION CANDIDATE ☐ no ☐ Discharge investigation ☐ Stream daylighting ☐ Local stream repair/outfall stabilization ☐ Storm water retrofit ☐ Other:

If yes for daylighting:
Length of vegetative cover from outfall: _____ft Type of existing vegetation:_____ Slope: _____°

If yes for stormwater:
Is stormwater currently controlled? ☐ Yes ☐ No ☐ Not investigated
Land Use description:_____
Area available:

OUTFALL SEVERITY: *(circle #)*	Heavy discharge with a distinct color and/or a strong smell. The amount of discharge is significant compared to the amount of normal flow in receiving stream; discharge appears to be having a significant impact downstream.	Small discharge; flow mostly clear and odorless. If the discharge has a color and/or odor, the amount of discharge is very small compared to the stream's base flow and any impact appears to be minor / localized.	Outfall does not have dry weather discharge; staining; or appearance of causing any erosion problems.
	5	4 3	2 1

SKETCH/NOTES:

REPORTED TO AUTHORITIES: ☐ YES ☐ NO

Severe Bank Erosion **ER**

WATERSHED/SUBSHED:		**DATE:** ___/_____/___	**ASSESSED BY:**
SURVEY REACH:	**TIME:**___:___AM/PM	**PHOTO ID** (CAMERA-PIC #):	/#
SITE ID: (*Condition-#*) **ER-**_____	*START* **LAT** ___°___'___" **LONG** ___°___'___" **LMK** _____ *END* **LAT** ___°___'___" **LONG** ___°___'___" **LMK** _____		**GPS:** (*Unit ID*)

PROCESS: ☐ Currently unknown

☐ Downcutting ☐ Widening ☐ Headcutting ☐ Aggrading ☐ Sed. deposition

☐ Bed scour ☐ Bank failure ☐ Bank scour ☐ Slope failure ☐ Channelized

BANK OF CONCERN: ☐ LT ☐ RT ☐ Both (*looking downstream)*

LOCATION: ☐ Meander bend ☐ Straight section ☐ Steep slope/valley wall ☐ Other:

DIMENSIONS:

Length *(if no GPS)*	LT_____ft	and/or RT_____ft	Bottom width _____ft
Bank Ht	LT_____ft	and/or RT_____ft	Top width _____ft
Bank Angle	LT_____°	and/or RT_____°	Wetted Width _____ft

LAND OWNERSHIP: ☐ Private ☐ Public ☐ Unknown

LAND COVER: ☐ Forest ☐ Field/Ag ☐ Developed:

POTENTIAL RESTORATION CANDIDATE: ☐ Grade control ☐ Bank stabilization ☐ No ☐ Other:

THREAT TO PROPERTY/INFRASTRUCTURE: ☐ No ☐ Yes (Describe):

EXISTING RIPARIAN WIDTH: ☐ ≤25 ft ☐ 25 - 50 ft ☐ 50-75ft ☐ 75-100ft ☐ >100ft

EROSION SEVERITY(*circle#*) Channelized= ☐ 1	Active downcutting; tall banks on both sides of the stream eroding at a fast rate; erosion contributing significant amount of sediment to stream; obvious threat to property or infrastructure.	Pat downcutting evident, active stream widening, banks actively eroding at a moderate rate; no threat to property or infrastructure		Grade and width stable; isolated areas of bank failure/erosion; likely caused by a pipe outfall, local scour, impaired riparian vegetation or adjacent use.
	5	4	3	2 1
ACCESS:	Good access: Open area in public ownership, sufficient room to stockpile materials, easy stream channel access for heavy equipment using existing roads or trails.	Fair access: Forested or developed area adjacent to stream. Access requires tree removal or impact to landscaped areas. Stockpile areas small or distant from stream.		Difficult access. Must cross wetland, steep slope or other sensitive areas to access stream. Minimal stockpile areas available and/or located a great distance from stream section. Specialized heavy equipment required.
	5	4	3	2 1

NOTES/CROSS SECTION SKETCH:

REPORTED TO AUTHORITIES ☐ YES ☐ NO

Impacted Buffer **IB**

WATERSHED/SUBSHED:		**DATE:** ___/____/___	**ASSESSED BY:**
SURVEY REACH:	**TIME:**___:____AM/PM	**PHOTO ID:** (*Camera-Pic #*)	/#
SITE ID: (*Condition-#*) **IB-_____**	*START* **LAT** ____°____'____" **LONG** ____°____'____" **LMK** _____		**GPS:** (*Unit ID*)
	END **LAT** ____°____'____" **LONG** ____°____'____" **LMK** _____		

IMPACTED BANK: ☐ LT ☐ RT ☐ Both

REASON INADEQUATE: ☐ Lack of vegetation ☐ Too narrow ☐ Widespread invasive plants ☐ Recently planted ☐ Other:

LAND USE:	Private	Institutional	Golf Course	Park	Other Public
(Facing downstream) LT Bank	☐	☐	☐	☐	☐ :
RT Bank	☐	☐	☐	☐	☐ :

DOMINANT LAND COVER:	Paved	Bare ground	Turf/lawn	Tall grass	Shrub/scrub	Trees	Other
LT Bank	☐	☐	☐	☐	☐	☐	☐:
RT Bank	☐	☐	☐	☐	☐	☐	☐:

INVASIVE PLANTS: ☐ None ☐ Rare ☐ Partial coverage ☐ Extensive coverage ☐ unknown

STREAM SHADE PROVIDED? ☐ None ☐ Partial ☐ Full

WETLANDS PRESENT? ☐ No ☐ Yes ☐ Unknown

POTENTIAL RESTORATION CANDIDATE ☐ no ☐ Active reforestation ☐ Greenway design ☐ Natural regeneration ☐ Invasives removal ☐ Other:

RESTORABLE AREA

	LT BANK	RT
Length (ft):	_____	_____
Width (ft):	_____	_____

REFORESTATION POTENTIAL: (*Circle #*)

Impacted area on public land where the riparian area does not appear to be used for any specific purpose; plenty of area available for planting		Impacted area on either public or private land that is presently used for a specific purpose; available area for planting adequate		Impacted area on private land where road; building encroachment or other feature significantly limits available area for planting
5	4	3	2	1

POTENTIAL CONFLICTS WITH REFORESTATION ☐ Widespread invasive plants ☐ Potential contamination ☐ Lack of sun ☐ Poor/unsafe access to site ☐ Existing impervious cover ☐ Severe animal impacts (deer, beaver, cattle) ☐ Other:

NOTES:

Stream Crossing **SC**

WATERSHED/SUBSHED:		**DATE:** ___/____/___	**ASSESSED BY:**
SURVEY REACH ID:	**TIME:**___:___AM/PM	**PHOTO ID:** (*Camera-Pic #*)	/#
SITE ID: (*Condition-#*) **SC-**____	**LAT** ___°____'____" **LONG** ___°____'____" **LMK**____		**GPS** (*Unit ID*)

TYPE: ☐ Road Crossing ☐ Railroad Crossing ☐ Manmade Dam ☐ Beaver Dam ☐ Geological Formation ☐ Other:

FOR ROAD/ RAILROAD CROSSINGS ONLY

SHAPE:
☐ Arch ☐ Bottomless
☐ Box ☐ Elliptical
☐ Circular
☐ Other:

 # BARRELS:
☐ Single
☐ Double
☐ Triple
☐ Other:

MATERIAL:
☐ Concrete
☐ Metal
☐ Other:

ALIGNMENT:
☐ Flow-aligned
☐ Not flow-aligned
☐ Do not know

DIMENSIONS: (*if variable, sketch)*
Barrel diameter: _____(ft)
Height: _____(ft)
Culvert length: _____(ft)
Width: _____(ft)
Roadway elevation:_____(ft)

CONDITION: (*Evidence of…*)
☐ Cracking/chipping/corrosion ☐ Downstream scour hole
☐ Sediment deposition ☐ Failing embankment
☐ Other (*describe*):

CULVERT SLOPE:
☐ Flat
☐ Slight (2^o – 5^0)
☐ Obvious (>5^o)

POTENTIAL RESTORATION CANDIDATE ☐ Fish barrier removal ☐ Culvert repair/replacement ☐ Upstream storage retrofit
☐ no ☐ Local stream repair ☐ Other:

IS SC ACTING AS GRADE CONTROL ☐ No ☐ Yes ☐ Unknown

If yes for fish barrier

EXTENT OF PHYSICAL BLOCKAGE:
☐ Total ☐ Partial
☐ Temporary ☐ Unknown

CAUSE:
☐ Drop too high Water Drop: _____ (in)
☐ Flow too shallow Water Depth:_____ (in)
☐ Other:

BLOCKAGE SEVERITY: *(circle #)*

5	4	3	2	1
A structure such as a dam or road culvert on a 3rd order or greater stream blocking the upstream movement of anadromous fish; no fish passage device present.		A total fish blockage on a tributary that would isolate a significant reach of stream, or partial blockage that may interfere with the migration of anadromous fish.		A temporary barrier such as a beaver dam or a blockage at the very head of a stream with very little viable fish habitat above it; natural barriers such as waterfalls.

NOTES/SKETCH:

REPORTED TO AUTHORITIES ☐ YES ☐ NO

WATERSHED/SUBSHED:		**DATE:** ___/____/___	**ASSESSED BY:**
SURVEY REACH ID:	**TIME:**___:____AM/PM	**PHOTO ID:** (*Camera-Pic #*) /#	
SITE ID: (*Condition-#*) **CM-_____**	*START* **LAT** ___°___'___" **LONG** ___°___'___" **LMK** _____		**GPS:** (*Unit ID*)
	END **LAT** ___°___'___" **LONG** ___°___'___" **LMK** _____		

TYPE: ☐ Channelization ☐ Bank armoring ☐ concrete channel ☐ Floodplain encroachment ☐ Other:

MATERIAL:		**DIMENSIONS:**
☐ Concrete ☐ Gabion ☐ Rip Rap ☐ Earthen ☐ Metal ☐ Other:	Does channel have perennial flow? ☐ Yes ☐ No Is there evidence of sediment deposition? ☐ Yes ☐ No Is vegetation growing in channel? ☐ Yes ☐ No Is channel connected to floodplain? ☐ Yes ☐ No	Height _____(ft) Bottom Width _____(ft) Top Width: _____(ft) Length: _____(ft)

BASE FLOW CHANNEL

Depth of flow _____(in)

Defined low flow channel? ☐ Yes ☐ No

% of channel bottom _____%

ADJACENT STREAM CORRIDOR

Available width LT_____(ft) RT_____(ft)

Utilities Present? ☐ Yes ☐ No

Fill in floodplain? ☐Yes ☐ No

POTENTIAL RESTORATION CANDIDATE ☐ Structural repair ☐ Base flow channel creation ☐ Natural channel design ☐ Can't tell ☐ no ☐ De-channelization ☐ Fish barrier removal ☐ Bioengineering

CHANNEL-IZATION SEVERITY: (*Circle #*)	A long section of concrete stream (>500') channel where water is very shallow (<1" deep) with no natural sediments present in the channel.	A moderate length (> 200') ,but channel stabilized and beginning to function as a natural stream channel. Vegetated bars may have formed in channel.	An earthen channel less than 100 ft with good water depth, a natural sediment bottom, and size and shape similar to the unchannelized stream reaches above and below impacted area.
	5	4 3	2 1

NOTES:

WATERSHED/SUBSHED:		**DATE:** ___/_____/___	**ASSESSED BY:**
SURVEY REACH ID:	**TIME:**___:___AM/PM	**PHOTO ID:** (*Camera-Pic #*) /#	
SITE ID: (*Condition-#*) **TR-**_____	**LAT** ___°_____'_____" **LONG** ___°_____'_____" **LMK** _____		**GPS:** (*Unit ID*)

TYPE: ☐ Industrial ☐ Commercial ☐ Residential	**MATERIAL:** ☐ Plastic ☐ Paper ☐ Metal ☐ Tires ☐ Construction ☐ Medical ☐ Appliances ☐ Yard Waste ☐ Automotive ☐ Other:	**SOURCE:** ☐ Unknown ☐ Flooding ☐ Illegal dump ☐ Local outfall	**LOCATION:** ☐ Stream ☐ Riparian Area ☐ Lt bank ☐ Rt bank	**LAND OWNERSHIP:** ☐ Public ☐ Unknown ☐ Private **AMOUNT** (*# Pickup truck loads*):	

POTENTIAL RESTORATION CANDIDATE ☐ Stream cleanup ☐ Stream adoption segment ☐ Removal/prevention of dumping
☐ no ☐ Other:

If yes for trash or debris removal	**EQUIPMENT NEEDED :** ☐ Heavy equipment ☐ Trash bags ☐ Unknown	**DUMPSTER WITHIN 100 FT:** ☐ Yes ☐ No ☐ Unknown
	WHO CAN DO IT: ☐ Volunteers ☐ Local Gov ☐ Hazmat Team ☐ Other	

CLEAN-UP POTENTIAL: (*Circle #*)	A small amount of trash (i.e., less than two pickup truck loads) located inside a park with easy access	A large amount of trash, or bulk items, in a small area with easy access. Trash may have been dumped over a long period of time but it could be cleaned up in a few days, possibly with a small backhoe.		A large amount of trash or debris scattered over a large area, where access is very difficult. Or presence of drums or indications of hazardous materials
	5	4	3	2 1

NOTES:

REPORTED TO AUTHORITIES ☐ YES ☐ NO

WATERSHED/SUBSHED:	**DATE:** ___/_____/___	**ASSESSED BY:**
SURVEY REACH ID:	**TIME:**___:____AM/PM	**PHOTO ID:** (*Camera-Pic #*) /#
SITE ID: (*Condition-#*) **UT-_____**	**LAT**___°_____'_____" **LONG** ___°_____'_____" **LMK:** _____	**GPS:** (*Unit ID*)

TYPE:	**MATERIAL:**	**LOCATION:**	**POTENTIAL FISH BARRIER:**	**PIPE DIMENSIONS:**
☐ Leaking sewer ☐ Exposed pipe ☐ Exposed manhole ☐ Other:	☐ Concrete ☐ Corrugated metal ☐ Smooth metal ☐ PVC ☐ Other:	☐ Floodplain ☐ Stream bank ☐ Above stream ☐ Stream bottom ☐ Other:	☐ Yes ☐ No	Diameter: _____in Length exposed: _____ft
			CONDITION: ☐ Joint failure ☐ Pipe corrosion/cracking ☐ Protective covering broken ☐ Manhole cover absent ☐ Other:	

EVIDENCE OF DISCHARGE:		
	COLOR	☐ None ☐ Clear ☐ Dark Brown ☐ Lt Brown ☐ Yellowish ☐ Greenish ☐ Other:
	ODOR	☐ None ☐ Sewage ☐ Oily ☐ Sulfide ☐ Chlorine ☐ Other:
	DEPOSITS	☐ None ☐ Tampons/Toilet Paper ☐ Lime ☐ Surface oils ☐ Stains ☐ Other:

POTENTIAL RESTORATION CANDIDATE ☐ Structural repairs ☐ Pipe testing ☐ Citizen hotlines ☐ Dry weather sampling
☐ no ☐ Fish barrier removal ☐ Other:

If yes to fish barrier, Water Drop: _____ (in)

UTILITY IMPACT SEVERITY: (*Circle #*)					
Leaking= ☐ 5	Section of pipe undermined by erosion and could collapse in the near future; a pipe running across the bed or suspended above the stream; a long section along the edge of the stream where nearly the entire side of the pipe is exposed; or a manhole stack that is located in the center of the stream channel and there is evidence of stack failure.	4	A moderately long section of pipe is partially exposed but there is no immediate threat that the pipe will be undermined and break in the immediate future. The primary concern is that the pipe may be punctured by large debris during a large storm event.	2	Small section of exposed pipe, stream bank near the pipe is stable; the pipe is across the bottom of the stream but only a small portion of the top of the pipe exposed; the pipe is exposed but is reinforced with concrete and it is not causing a blockage to upstream fish movement; a manhole stack that is at the edge of the stream and does not extend very far out into the active stream channel.
	5		3		1

NOTES:

REPORTED TO LOCAL AUTHORITIES ☐ Yes ☐ No

WATERSHED/SUBSHED:		**DATE:** ___/_____/___	**ASSESSED BY:**	
SURVEY REACH ID:		**TIME:**___:____AM/PM	**PHOTO ID:** (*Camera-Pic #*) /#	
SITE ID: (*Condition-#*) **MI-**_____	**LAT**___°_____'_____" **LONG** ___°_____'_____"	**LMK:** _____		**GPS:** (*Unit ID*)

POTENTIAL RESTORATION CANDIDATE ☐ Storm water retrofit ☐ Stream restoration ☐ Riparian Management
☐ no ☐ Discharge Prevention ☐ Other:

DESCRIBE:

REPORTED TO LOCAL AUTHORITIES ☐ Yes ☐ No

WATERSHED/SUBSHED:		**DATE:** ___/_____/___	**ASSESSED BY:**	
SURVEY REACH ID:		**TIME:**___:____AM/PM	**PHOTO ID:** (*Camera-Pic #*) /#	
SITE ID: (*Condition-#*) **MI-**_____	**LAT**___°_____'_____" **LONG** ___°_____'_____"	**LMK:** _____		**GPS:** (*Unit ID*)

POTENTIAL RESTORATION CANDIDATE ☐ Storm water retrofit ☐ Stream restoration ☐ Riparian Management
☐ no ☐ Discharge Prevention ☐ Other:

DESCRIBE:

REPORTED TO LOCAL AUTHORITIES ☐ Yes ☐ No

WATERSHED/SUBSHED:		**DATE:** ___/_____/___	**ASSESSED BY:**	
SURVEY REACH ID:		**TIME:**___:____AM/PM	**PHOTO ID:** (*Camera-Pic #*) /#	
SITE ID: (*Condition-#*) **MI-**_____	**LAT**___°_____'_____" **LONG** ___°_____'_____"	**LMK:** _____		**GPS:** (*Unit ID*)

POTENTIAL RESTORATION CANDIDATE ☐ Storm water retrofit ☐ Stream restoration ☐ Riparian Management
☐ no ☐ Discharge Prevention ☐ Other:

DESCRIBE:

REPORTED TO LOCAL AUTHORITIES ☐ Yes ☐ No

Reach Level Assessment **RCH**

SURVEY REACH ID: _____	**WTRSHD/SUBSHD:**	**DATE:** ___/____/___	**ASSESSED BY:**

START **TIME:**___:____AM/PM **LMK:** _____ **LAT**___°____'____" **LONG** ___°____'____" **DESCRIPTION:**	*END* **TIME:**___:____AM/PM **LMK:** _____ **LAT**___°____'____" **LONG** ___°____'____" **DESCRIPTION:**	**GPS ID:**

RAIN IN LAST 24 HOURS ☐ Heavy rain ☐ Steady rain ☐ None ☐ Intermittent ☐ Trace

PRESENT CONDITIONS ☐ Heavy rain ☐ Steady rain ☐ Intermittent ☐ Clear ☐ Trace ☐ Overcast ☐ Partly cloudy

SURROUNDING LAND USE: ☐ Industrial ☐ Commercial ☐ Urban/Residential ☐ Suburban/Res ☐ Forested ☐ Institutional ☐ Golf course ☐ Park ☐ Crop ☐ Pasture ☐ Other:

AVERAGE CONDITIONS *(check applicable)*

BASE FLOW AS % CHANNEL WIDTH ☐ 0-25% ☐ 50%-75% ☐25-50 % ☐ 75-100%

DOMINANT SUBSTRATE
☐ Silt/clay (fine or slick) ☐ Cobble (2.5 –10")
☐ Sand (gritty) ☐ Boulder (>10")
☐ Gravel (0.1-2.5") ☐ Bed rock

WATER CLARITY ☐ Clear ☐Turbid *(suspended matter)*
☐ Stained *(clear, naturally colored)* ☐ Opaque *(milky)*
☐ Other *(chemicals, dyes)*

AQUATIC PLANTS IN STREAM
Attached: ☐ none ☐ some ☐ lots
Floating: ☐ none ☐ some ☐ lots

WILDLIFE IN OR AROUND STREAM (Evidence of)
☐ Fish ☐ Beaver ☐ Deer ☐ Snails ☐ Other:

STREAM SHADING (water surface)
☐ Mostly shaded (≥75% coverage)
☐ Halfway (≥50%)
☐ Partially shaded (≥25%)
☐ Unshaded (< 25%)

CHANNEL DYNAMICS
☐ Unknown

☐ Downcutting	☐ Bed scour
☐ Widening	☐ Bank failure
☐ Headcutting	☐ Bank scour
☐ Aggrading	☐ Slope failure
☐ Sed. deposition	☐ Channelized

CHANNEL DIMENSIONS *(FACING DOWNSTREAM)*
Height: LT bank _____(ft)
RT bank _____(ft)
Width: Bottom _____(ft)
Top _____(ft)

REACH ACCESSIBILITY

5	4	3	2	1
Good: Open area in public ownership, sufficient room to stockpile materials, easy stream channel access for heavy equipment using existing roads or trails.	Fair: Forested or developed area adjacent to stream. Access requires tree removal or impact to landscaped areas. Stockpile areas small or distant from stream.		Difficult. Must cross wetland, steep slope, or sensitive areas to get to stream. Few areas to stockpile available and/or located a great distance from stream. Specialized heavy equipment required.	

REACH SKETCH AND SITE IMPACT TRACKING

Simple planar sketch of survey reach. Track locations and IDs for all site impacts within the survey reach (OT, ER, IB,SC, UT, TR, MI) as well as any additional features deemed appropriate. Indicate direction of flow

NOTES: *(biggest problem you see in survey reach)*

REPORTED TO AUTHORITIES ☐ YES ☐ NO

OVERALL STREAM CONDITION				
	Optimal	**Suboptimal**	**Marginal**	**Poor**
IN-STREAM HABITAT *(May modify criteria based on appropriate habitat regime)*	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
VEGETATIVE PROTECTION *(score each bank, determine sides by facing downstream)*	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 3	2 1 0
BANK EROSION (facing downstream)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Grade and width stable; isolated areas of bank failure/erosion; likely caused by a pipe outfall, local scour, impaired riparian vegetation or adjacent use.	Past downcutting evident, active stream widening, banks actively eroding at a moderate rate; no threat to property or infrastructure	Active downcutting; tall banks on both sides of the stream eroding at a fast rate; erosion contributing significant amount of sediment to stream; obvious threat to property or infrastructure.
	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 3	2 1 0
FLOODPLAIN CONNECTION	High flows (greater than bankfull) able to enter floodplain. Stream not deeply entrenched.	High flows (greater than bankfull) able to enter floodplain. Stream not deeply entrenched.	High flows (greater than bankfull) **not** able to enter floodplain. Stream deeply entrenched.	High flows (greater than bankfull) **not** able to enter floodplain. Stream deeply entrenched.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
OVERALL BUFFER AND FLOODPLAIN CONDITION				
	Optimal	**Suboptimal**	**Marginal**	**Poor**
VEGETATED BUFFER WIDTH	Width of buffer zone >50 feet; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, crops) have not impacted zone.	Width of buffer zone 25-50 feet; human activities have impacted zone only minimally.	Width of buffer zone 10-25 feet; human activities have impacted zone a great deal.	Width of buffer zone <10 feet: little or no riparian vegetation due to human activities.
	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 3	2 1 0
FLOODPLAIN VEGETATION	Predominant floodplain vegetation type is mature forest	Predominant floodplain vegetation type is young forest	Predominant floodplain vegetation type is shrub or old field	Predominant floodplain vegetation type is turf or crop land
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
FLOODPLAIN HABITAT	Even mix of wetland and non-wetland habitats, evidence of standing/ponded water	Even mix of wetland and non-wetland habitats, no evidence of standing/ponded water	Either all wetland or all non-wetland habitat, evidence of standing/ponded water	Either all wetland or all non-wetland habitat, no evidence of standing/ponded water
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
FLOODPLAIN ENCROACH-MENT	No evidence of floodplain encroachment in the form of fill material, land development, or manmade structures	Minor floodplain encroachment in the form of fill material, land development, or manmade structures, but not effecting floodplain function	Moderate floodplain encroachment in the form of filling, land development, or manmade structures, some effect on floodplain function	Significant floodplain encroachment (i.e. fill material, land development, or man-made structures). Significant effect on floodplain function
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Sub Total In-stream: _____ **/80** + Buffer/Floodplain: _____ **/80** = **Total** Survey Reach _____ **/160**

Photo Inventory

(By Camera)

Project: _____

Group: _____

Camera: _____

This field sheet is to be completed AS photos are taken in the field. The intent is to organize pictures taken on each camera. Fill out one sheet per camera (add sheets as needed). Only fill in Date/Reach/Location ID when you start in a new spatial or temporal location.

Date	Stream/ Reach	Location ID	Photo #	Description

Date	Stream/ Reach	Location ID	Photo #	Description

Comments:

(BACK)

CHANNEL ALTERATION CA

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
MM DD YY

Type: **Co**ncrete, **Ga**bion, **R**ip-**r**ap, **E**arth **C**hannel, **O**ther: _____

Bottom Width: _____ in **Length:** _____ ft.

Does channel have perennial flow? **Y**es **N**o

Is sediment deposition occurring in the channel? **Y**es **N**o

Is vegetation growing in the channel? **Y**es **N**o

Is it part of a road crossing? **No** **Ab**ove **Be**low **Bo**th

Channelized length above road crossing _____ ft.

Channelized length below road crossing _____ ft.

Severity	Severe	**1**	**2**	**3**	**4**	**5**	Minor	Unknown (**-1**)
Correctability	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)
Access	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)

CHANNEL ALTERATION CA

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
MM DD YY

Type: **Co**ncrete, **Ga**bion, **R**ip-**r**ap, **E**arth **C**hannel, **O**ther: _____

Bottom Width: _____ in **Length:** _____ ft.

Does channel have perennial flow? **Y**es **N**o

Is sediment deposition occurring in the channel? **Y**es **N**o

Is vegetation growing in the channel? **Y**es **N**o

Is it part of a road crossing? **No** **Ab**ove **Be**low **Bo**th

Channelized length above road crossing _____ ft.

Channelized length below road crossing _____ ft.

Severity	Severe	**1**	**2**	**3**	**4**	**5**	Minor	Unknown (**-1**)
Correctability	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)
Access	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)

EROSION SITE ES

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
MM DD YY

Type: **D**owncutting **W**idening **H**eadcutting **U**nknown

Cause: **Be**nd at steep slope, **P**ipe **O**utfall, Below **Ch**annelization, Below **R**oad **C**rossing, **Li**vestock, **L**and **U**se **C**hange Upstream, **O**ther: _____

Length: _____ ft. **Average exposed bank height:** _____ ft.

Present Land Use Left Side (looking downstream): **Cr**op field, **Pa**sture, **La**wn, **Pa**ved, **Sh**rubs & Small Trees, **Fo**rest, **M**ultiflora **R**ose, **O**ther _____

Present Land Use Right Side (looking downstream): **Cr**op field, **Pa**sture, **La**wn, **Pa**ved, **Sh**rubs & Small Trees, **Fo**rest, **M**ultiflora **R**ose, **O**ther _____

Threat to Infrastructure?: **Y**es **N**o **Describe**: _____

Severity	Severe	**1**	**2**	**3**	**4**	**5**	Minor	Unknown (**-1**)
Correctability	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)
Access	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)

EROSION SITE ES

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
MM DD YY

Type: **D**owncutting **W**idening **H**eadcutting **U**nknown

Cause: **Be**nd at steep slope, **P**ipe **O**utfall, Below **Ch**annelization, Below **R**oad **C**rossing, **Li**vestock, **L**and **U**se **C**hange Upstream, **O**ther: _____

Length: _____ ft. **Average exposed bank height:** _____ ft.

Present Land Use Left Side (looking downstream): **Cr**op field, **Pa**sture, **La**wn, **Pa**ved, **Sh**rubs & Small Trees, **Fo**rest, **M**ultiflora **R**ose, **O**ther _____

Present Land Use Right Side (looking downstream): **Cr**op field, **Pa**sture, **La**wn, **Pa**ved, **Sh**rubs & Small Trees, **Fo**rest, **M**ultiflora **R**ose, **O**ther _____

Threat to Infrastructure?: **Y**es **N**o **Describe**: _____

Severity	Severe	**1**	**2**	**3**	**4**	**5**	Minor	Unknown (**-1**)
Correctability	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)
Access	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)

EXPOSED PIPE EP

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
MM DD YY

Pipe is: Exposed across bottom of stream, Exposed along stream bank, Exposed manhole, Above stream, Other: _____

Type of Pipe: Concrete, Smooth Metal, Corrugated Metal, Plastic, Terra Cotta, Other: _____

Pipe Diameter: _____ in. **Length exposed:** _____ ft.

Purpose of Pipe: Sewage, Water Supply, Stormwater, Unknown, Other: _____

Evidence of Discharge?: **Y**es **N**o

Color: Clear, medium brown, dark brown, green brown, yellow brown, green, other: _____

Odor: Sewage, oily, musky, fishy, rotten eggs, chlorine, none, other: _____

Severity	Severe	**1**	**2**	**3**	**4**	**5**	Minor	Unknown (**-1**)
Correctability	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)
Access	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)

EXPOSED PIPE EP

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
MM DD YY

Pipe is: Exposed across bottom of stream, Exposed along stream bank, Exposed manhole, Above stream, Other: _____

Type of Pipe: Concrete, Smooth Metal, Corrugated Metal, Plastic, Terra Cotta, Other: _____

Pipe Diameter: _____ in. **Length exposed:** _____ ft.

Purpose of Pipe: Sewage, Water Supply, Stormwater, Unknown, Other: _____

Evidence of Discharge?: **Y**es **N**o

Color: Clear, medium brown, dark brown, green brown, yellow brown, green, other: _____

Odor: Sewage, oily, musky, fishy, rotten eggs, chlorine, none, other: _____

Severity	Severe	**1**	**2**	**3**	**4**	**5**	Minor	Unknown (**-1**)
Correctability	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)
Access	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)

PIPE OUTFALL PO

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
MM DD YY

Type of Outfall: Stormwater, Sewage Overflow, Industrial, Pumping Station, Agricultural, Other: _____

Type of Pipe: Earth Channel, Concrete Channel, Concrete Pipe, Smooth Metal Pipe, Corrugated Metal, Plastic, Other: _____

Location (facing downstream): left bank, right bank, head of stream, Other _____

Pipe Diameter: _____ in. **Channel width:** _____ ft.

Evidence of Discharge?: **Y**es **N**o

Color: Clear, medium brown, dark brown, green brown, yellow brown, green, other: _____

Odor: Sewage, oily, musky, fishy, rotten eggs, chlorine, none, other: _____

Severity	Severe	**1**	**2**	**3**	**4**	**5**	Minor	Unknown (**-1**)
Correctability	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)
Access	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)

PIPE OUTFALL PO

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
MM DD YY

Type of Outfall: Stormwater, Sewage Overflow, Industrial, Pumping Station, Agricultural, Other: _____

Type of Pipe: Earth Channel, Concrete Channel, Concrete Pipe, Smooth Metal Pipe, Corrugated Metal, Plastic, Other: _____

Location (facing downstream): left bank, right bank, head of stream, Other _____

Pipe Diameter: _____ in. **Channel width:** _____ ft.

Evidence of Discharge?: **Y**es **N**o

Color: Clear, medium brown, dark brown, green brown, yellow brown, green, other: _____

Odor: Sewage, oily, musky, fishy, rotten eggs, chlorine, none, other: _____

Severity	Severe	**1**	**2**	**3**	**4**	**5**	Minor	Unknown (**-1**)
Correctability	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)
Access	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)

FISH BARRIER FB

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
M M D D Y Y

Fish Blockage: **To**tal, **Pa**rtial, **Te**mporary, **Un**known

Type of Barrier: **Da**m, **R**oad **C**rossing, **P**ipe **C**rossing, **N**atural **F**alls, **B**eaver **D**am, **Ch**annelized, Instream **Po**nd, **D**ebris **D**am, **Ot**her: _____

Blockage because: Too **hi**gh Too **sh**allow Too **fa**st

Water drop: _____ inches (if too high)

Water depth: _____ inches (if too shallow)

Severity	Severe	**1**	**2**	**3**	**4**	**5**	Minor	Unknown (**-1**)
Correctability	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)
Access	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)

FISH BARRIER FB

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
M M D D Y Y

Fish Blockage: **To**tal, **Pa**rtial, **Te**mporary, **Un**known

Type of Barrier: **Da**m, **R**oad **C**rossing, **P**ipe **C**rossing, **N**atural **F**alls, **B**eaver **D**am, **Ch**annelized, Instream **Po**nd, **D**ebris **D**am, **Ot**her: _____

Blockage because: Too **hi**gh Too **sh**allow Too **fa**st

Water drop: _____ inches (if too high)

Water depth: _____ inches (if too shallow)

Severity	Severe	**1**	**2**	**3**	**4**	**5**	Minor	Unknown (**-1**)
Correctability	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)
Access	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)

INADEQUATE BUFFER IB

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
M M D D Y Y

Buffer inadequate on: **L**eft **R**ight **B**oth (looking downstream)

Is stream unshaded? **L**eft **R**ight **B**oth (looking downstream) **N**either

Buffer width left: _____ ft. **Buffer width right:** _____ ft.

Length left: _____ ft. **Length right:** _____ ft.

Present land use left side: **Cr**op field, **Pa**sture, **La**wn, **Pa**ved, **Sh**rubs & Small Trees, **Fo**rest, **M**ultiflora **R**ose, **O**ther _____

Present land use right side: **Cr**op field, **Pa**sture, **La**wn, **Pa**ved, **Sh**rubs & Small Trees, **Fo**rest, **M**ultiflora **R**ose, **O**ther _____

Has a buffer recently been established: **Y**es **N**o

Are Livestock present: **Y**es **N**o **Type:** **C**attle, **H**orses, **P**igs, **O**ther: _____

Severity	Severe	**1**	**2**	**3**	**4**	**5**	Minor	Unknown (**-1**)
Correctability	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)
Access	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)
Wetland Potential	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)

(Good wetland potential = low slope, low bank height)

INADEQUATE BUFFER IB

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
M M D D Y Y

Buffer inadequate on: **L**eft **R**ight **B**oth (looking downstream)

Is stream unshaded? **L**eft **R**ight **B**oth (looking downstream) **N**either

Buffer width left: _____ ft. **Buffer width right:** _____ ft.

Length left: _____ ft. **Length right:** _____ ft.

Present land use left side: **Cr**op field, **Pa**sture, **La**wn, **Pa**ved, **Sh**rubs & Small Trees, **Fo**rest, **M**ultiflora **R**ose, **O**ther _____

Present land use right side: **Cr**op field, **Pa**sture, **La**wn, **Pa**ved, **Sh**rubs & Small Trees, **Fo**rest, **M**ultiflora **R**ose, **O**ther _____

Has a buffer recently been established: **Y**es **N**o

Are Livestock present: **Y**es **N**o **Type:** **C**attle, **H**orses, **P**igs, **O**ther: _____

Severity	Severe	**1**	**2**	**3**	**4**	**5**	Minor	Unknown (**-1**)
Correctability	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)
Access	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)
Wetland Potential	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)

(Good wetland potential = low slope, low bank height)

IN OR NEAR STREAM CONSTRUCTION IC

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
MM DD YY

Type of activity: **Ro**ad, **R**oad **C**rossing, **U**tility, **Lo**gging, **B**ank **S**tabilization, **Re**sidential Development, **In**dustrial Development, **O**ther: _____

Sediment Control: **A**dequate **I**nadequate **U**nknown

If inadequate, why? _____

Is stream bottom below site laden with excess sediment? **Y**es **N**o

Length of stream affected: _____ ft.

Company doing construction: _____

Location: _____

Severity Severe **1** **2** **3** **4** **5** Minor Unknown (**-1**)

Contact office as soon as possible: ( )

IN OR NEAR STREAM CONSTRUCTION IC

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
MM DD YY

Type of activity: **Ro**ad, **R**oad **C**rossing, **U**tility, **Lo**gging, **B**ank **S**tabilization, **Re**sidential Development, **In**dustrial Development, **O**ther: _____

Sediment Control: **A**dequate **I**nadequate **U**nknown

If inadequate, why? _____

Is stream bottom below site laden with excess sediment? **Y**es **N**o

Length of stream affected: _____ ft.

Company doing construction: _____

Location: _____

Severity Severe **1** **2** **3** **4** **5** Minor Unknown (**-1**)

Contact office as soon as possible: ( )

TRASH DUMPING TD

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
MM DD YY

Type of trash: **Re**sidential, **In**dustrial, **Y**ard **W**aste, Flotables, **Ti**res, **Co**nstruction,
Other: _____

Amount of trash: _____ pick-up truck loads

Other measure: _____

Is trash confined to? **S**ingle site, **L**arge Area

Possible cleanup site for volunteers? **Y**es **N**o

Land Ownership: **Pu**blic **Pr**ivate **Un**known

If public, name: _____

Severity	Severe	**1**	**2**	**3**	**4**	**5**	Minor	Unknown (**-1**)
Correctability	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)
Access	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)

TRASH DUMPING TD

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
MM DD YY

Type of trash: **Re**sidential, **In**dustrial, **Y**ard **W**aste, Flotables, **Ti**res, **Co**nstruction,
Other: _____

Amount of trash: _____ pick-up truck loads

Other measure: _____

Is trash confined to? **S**ingle site, **L**arge Area

Possible cleanup site for volunteers? **Y**es **N**o

Land Ownership: **Pu**blic **Pr**ivate **Un**known

If public, name: _____

Severity	Severe	**1**	**2**	**3**	**4**	**5**	Minor	Unknown (**-1**)
Correctability	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)
Access	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)

UNUSUAL CONDITION OR COMMENT UC

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
M M D D Y Y

Type: (circle one) **Unusual Condition** **Comment**

Describe: **Od**or, **Sc**um, Excessive **Al**gae, **W**ater **C**olor/Clarity, **R**ed **F**lock, **S**ewage **D**ischarge, **Oi**l

_____

_____

_____

Potential Cause: _____

_____

Severity	Severe	**1**	**2**	**3**	**4**	**5**	Minor	Unknown (**-1**)
Correctability	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)
Access	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)

UNUSUAL CONDITION OR COMMENT UC

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
M M D D Y Y

Type: (circle one) **Unusual Condition** **Comment**

Describe: **Od**or, **Sc**um, Excessive **Al**gae, **W**ater **C**olor/Clarity, **R**ed **F**lock, **S**ewage **D**ischarge, **Oi**l

_____

_____

_____

Potential Cause: _____

_____

Severity	Severe	**1**	**2**	**3**	**4**	**5**	Minor	Unknown (**-1**)
Correctability	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)
Access	Best	**1**	**2**	**3**	**4**	**5**	Worst	Unknown (**-1**)

REPRESENTATIVE SITE RE

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
M M D D Y Y

	Optimal	Suboptimal	Marginal	Poor
Macroinvertebrate Substrata				
Embeddedness				
Shelter for fish				
Channel Alteration				
Sediment Deposition				
Velocity and Depth				
Channel Flow				
Bank Vegetation				
Bank Condition				
Riparian Vegetation				

Wetted width: Riffles: _____ in. **Runs:** _____ in. **Pools:** _____ in.

Thalweg depth: Riffles: _____ in. **Runs:** _____ in. **Pools:** _____ in.

Bottom type: Silts, Sands, Gravel, Cobble, Boulder, Bedrock

REPRESENTATIVE SITE RE

Map: _____ **Team:** _____ **Site:** _____

Date: ____/____/____ **Photo:** _____ **Survey:** _____
M M D D Y Y

	Optimal	Suboptimal	Marginal	Poor
Macroinvertebrate Substrata				
Embeddedness				
Shelter for fish				
Channel Alteration				
Sediment Deposition				
Velocity and Depth				
Channel Flow				
Bank Vegetation				
Bank Condition				
Riparian Vegetation				

Wetted width: Riffles: _____ in. **Runs:** _____ in. **Pools:** _____ in.

Thalweg depth: Riffles: _____ in. **Runs:** _____ in. **Pools:** _____ in.

Bottom type: Silts, Sands, Gravel, Cobble, Boulder, Bedrock

HABITAT ASSESSMENT
Rocky Bottom Streams

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
1. Attachment Sites for Macroinvertebrates (see page 67)	Well-developed riffle and run; riffle is as wide as stream and length extends two times the width of stream; cobble predominates; boulders and gravel common.	Riffle is as wide as stream but length is less than two times width; cobble less abundant; boulders and gravel common.	Run area may be lacking; riffle not as wide as stream and its length is less than 2 times the stream width; gravel or large boulders and bedrock prevalent; some cobble present.	Riffles or run virtually nonexistent; large boulders and bedrock prevalent; cobble lacking.
2. Embeddedness (see page 67)	Fine sediment surrounds and fills in 0-25% of the living spaces around and in between the gravel, cobble, and boulders.	Fine sediment surrounds and fills in 25-50% of the living spaces around and in between the gravel, cobble, and boulders.	Fine sediment surrounds and fills in 50-75% of the living spaces around and in between the gravel, cobble, and boulders.	Fine sediment surrounds and fills in more than 75% of the living spaces around and in between the gravel, cobble, and boulders.
3. Shelter for Fish (see page 67)	Snags, submerged logs, undercut banks, or other stable habitat are found in over 50% of the site.	Snags, submerged logs, undercut banks, or other stable habitat are found in over 30-50% of the site.	Snags, submerged logs, undercut banks, or other stable habitat are found in over 10-30% of the site.	Snags, submerged logs, undercut banks, or other stable habitat are found in less than 10% of the site.
4. Channel Alteration (see page 67)	Stream straightening, dredging, artificial embankments, dams or bridge abutments absent or minimal; stream with meandering pattern.	Some stream straightening, dredging, artificial embankments or dams present, usually in area of bridge abutments; no evidence of recent channel alteration activity.	Artificial embankments present to some extent on both banks; and 40 to 80% of stream site straightened, dredged, or otherwise altered.	Banks shored with gabion or cement; over 80% of the stream site straightened and disrupted.
5. Sediment Deposition (see page 67)	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from coarse gravel; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, coarse sand on old and new bars; 30-50% of the bottom affected; sediment deposits at stream obstructions and bends; moderate deposition in pools.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom affected; pools almost absent due to substantial sediment deposition.
6. Stream velocity and depth combinations (see page 67)	Slow (< 1 ft/sec)/shallow (< 1 ft); slow/deep, fast/deep; fast/shallow; all four combinations present	3 of the 4 velocity/depth combinations present; fast current areas generally predominate.	Only 2 of the 4 velocity/depth combinations are present. Score lower if last current areas are missing.	Dominated by 1 velocity/depth category (usually slow/shallow areas)
7. Channel Flow Status (see page 68)	Water reaches base of both lower banks and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; <25% of channel substrate is exposed.	Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
8. Bank Vegetative Protection (see page 68)	More than 90% of the streambank surfaces covered by natural vegetation, including trees, shrubs, or other plants, vegetative disruption, through grazing or mowing, minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by natural vegetation, but one class of plants is not well-represented; some vegetative disruption evident; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; patches of bare soil or closely cropped vegetation common; less than one half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation, disruption of streambank vegetation is very high; vegetation has been removed to 2 inches or less in average stubble height.
9. Condition of Banks (see page 68)	Banks stable, no evidence of erosion or bank failure; little potential for future problems.	Moderately stable; infrequent, small areas of erosion mostly healed over.	Moderately unstable; up to 60% of banks in site have areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank collapse or failure; 60-100% of bank has erosional scars.
10. Riparian Vegetative Zone Width (see page 68)	Width of riparian zone >50 feet; no evidence of human activities (i.e., parking lots, roadbeds, clear-cuts, mowed areas, or crops) within the riparian zone.	Width of riparian zone 35-40 feet.	Width of riparian zone 20-35 feet.	Width of riparian zone <20 feet.

HABITAT CHARACTERISTICS DEFINITIONS

Use the habitat characteristic (parameter) definitions and guidance that follows when completing the habitat assessment field data form. Rocky-bottom streams (Piedmont Streams) are generally fast moving streams with beds that are made up to gravel/cobbles/boulders in any combination and that have definite riffle areas.

1. ***Attachment Sites for Macroinvertebrates*** are essentially the amount of living space or hard substrates (rocks, snags) available for aquatic insects and snails. Many insects begin their life underwater in streams and need to attach themselves to rocks, logs, branches, or other submerged substrates. The greater the variety and number of available living spaces or attachment sites, the greater the variety of insects in the stream. Optimally, there should be a predominance of cobble, and boulders and gravel should be common. The availability of suitable living spaces for macroinvertebrates decreases as cobble becomes less abundant and boulders, gravel, or bedrock become more prevalent.

2. ***Embeddedness*** refers to the extent to which rocks (gravel, cobble, and boulders) are surrounded by, covered, or sunken into the silt, sand, or mud of the stream bottom. Generally, as rocks become embedded, the living spaces available to macroinvertebrates and fish for shelter, spawning, and egg incubation are decreased.

   To estimate the percent of embeddedness, observe the amount of silt or finer sediments overlying and surrounding the rocks. If kicking does not dislodge the rocks or cobbles, they may be greatly embedded. It may be useful to lift a few rocks and observe how much of the rock (e.g., 1/2, 1/3) is darker due to algal growth.

3. ***Shelter for Fish*** includes the relative quantity and variety of natural structures in the stream, such as fallen trees, logs, and branches, large rocks, and undercut banks that are available to fish for hiding, sleeping, or laying eggs. A wide variety of submerged structures in the stream provide fish with many living spaces; the more living spaces in a stream, the more types of fish the stream can support.

4. ***Channel Alteration*** is basically a measure of large-scale changes in the shape of the stream channel. Many streams in urban and agricultural areas have been straightened, deepened (e.g. dredged), or diverted into concrete channels, often for flood control purposes. Such streams have far fewer natural habitats for fish, macroinvertebrates, and plants than do naturally meandering streams. Channel alteration is present when the stream runs through a concrete channel; when artificial embankments, riprap, and other forms of artificial bank stabilization or structures are present; when the stream is very straight for significant distances; when dams, bridges, and flow altering structures such as combined sewer overflow pipes are present; when the stream is of uniform depth due to dredging, and when other such changes have occurred.

   Signs that indicate the occurrence of dredging include straightened, deepened, and otherwise uniform stream channels, and the removal of streamside vegetation to provide access to the stream for dredging equipment.

5. ***Sediment Deposition*** is a measure of the amount of sediment that has been deposited in the stream channel and the changes to the stream bottom that have occurred as a result of the deposition. High levels of sediment deposition create an unstable and continually changing environment that is unsuitable for many aquatic organisms.

   Sediments are naturally deposited in areas where the stream flow is reduced, such as pools and bends, or where flow is obstructed. These deposits can lead to the formation of islands, shoals, or point bars (sediments that build up in the stream, usually at the beginning of a meander) or can result in the complete filling of pools. To determine whether or not these sediment deposits are new, look for vegetation growing on them; new sediments will not yet have been colonized by vegetation.

6. ***Stream Velocity and Depth Combinations*** are important to the maintenance of aquatic communities. Restrictions to normal velocity and/or the filling of pools will affect the organisms living in the stream by reducing the dissolved oxygen that is available and by slowing down the movement of food items. Streams function best when the movement of water continually replenishes the supply of oxygen and food, and does not become stagnant.

Slow velocity is generally described as water moving **less than (<) 1 foot/second**

Fast velocity is generally described as water moving **greater than (>) 1 foot/second**

Shallow water is generally described as **less than (<) 1.5 feet**

Deep water is generally described as **greater than (>) 1.5 feet**

Four general categories of velocity and depth are optimal for benthic macroinvertebrate and fish communities. The best streams will have all four velocity/depth combinations and can maintain a wide variety of aquatic life:

(1) slow, shallow
(2) slow, deep
(3) fast, deep
(4) fast, shallow

Depth can be estimated by standing in the stream at various points. If the water level comes to below the bottom of your knee cap, it can be considered shallow. If it reaches above the bottom of your knee cap, consider it deep. Also, you can use the measuring rope to measure the length of your leg to the knee cap to judge depth.

To estimate velocity, use the measuring rope to mark off 10-foot areas of stream in the same general areas where you measured depth. Drop a twig in the stream and count the number of seconds it takes for the stick to travel the 10 feet. Generally it is best to do this in run and pool areas since velocity is difficult to measure in riffles as the twig may get caught up by rocks. Divide 10 by the number of seconds to determine velocity in "feet per second." For example:

If the twig took 6 seconds to travel the 10 foot distance, then divide 6 seconds into 10 feet, which is equal to 1.4 ft/sec. In this case, the velocity would be considered fast, as it is greater than 1 ft/sec.

Since water in riffle areas tends to have the greatest velocity, you can assume that riffle velocity is faster than velocity in either the run or pool areas you measure.

7. ***Channel Flow Status*** is the percent of the existing channel that is filled with water. The flow status will change as the channel enlarges or as flow decreases as a result of dams and other obstructions, diversions for irrigation, or drought. When water does not cover much of the streambed, the amount of living area for aquatic organisms is limited.

8. ***Bank Vegetative Protection*** measures the amount of the stream bank that is covered by natural (i.e. growing wild and not obviously planted) vegetation. The root systems of plants growing on stream banks help hold soil in place, reducing erosion. Vegetation on banks provides shade for fish and macroinvertebrates, and serves as a food source by dropping leaves and other organic matter into the stream. Ideally, a variety of vegetation should be present, including trees, shrubs, and grasses. Vegetative disruption may occur when the grasses and plants on the stream banks are mowed or grazed upon, or the trees and shrubs are cut back or cleared.

9. ***Condition of Banks*** measures erosion potential and whether the stream banks are eroded. Steep banks are more likely to collapse and suffer from erosion than are gently sloping banks and are therefore considered to have a high erosion potential. Signs of erosion include crumbling, unvegetated banks, exposed tree roots, and exposed soil. Bank failure and the subsequent collapse of portions of the stream bank is referred to as bank sloughing.

10. ***The Riparian Vegetative Zone Width*** is defined here as the width of natural vegetation from the edge of the stream bank. The riparian vegetative zone is a buffer zone to pollutants entering a stream from runoff; it also controls erosion and provides stream habitat and nutrient input into the stream. A wide, relatively undisturbed riparian vegetative zone reflects a healthy stream system; narrow, far less useful riparian zones occur when roads, parking lots, fields, lawns and other artificially cultivated areas, bare soil, rocks, or buildings are near the stream bank. The presence of "old fields" (i.e., previously developed agricultural fields allowed to convert to natural conditions) should rate higher than fields in continuous or periodic use. In arid areas, the riparian vegetative zone can be measured by observing the width of the area dominated by riparian or water-loving plants, such as willows, marsh grasses, and cottonwood trees.

APPENDIX D
PREVIOUS WATER QUALITY DATA

Ambient Surface Water Monitoring

The Monmouth County Department of Health (MCHD) monitors 55 representative sites throughout Monmouth County on a rotating basis. Measurements are performed in the field and at the laboratory.

Select a location below to see the results of a stream in your area:
Standards can be found on the NJDEP's website .

< 2006 Historical (◉)
2007 + Stream table: Ambient Streams ( )
2007 + Lakes table: Ambient Lakes ( )

Select Location:
Please Select Location | Search

Showing results for: ASSUNPINK CREEK, UPPER FREEHOLD

Site	Collection Date	Fecal	Ammonia	Phosphorus	Ph	Tot. Suspended Solids	Turbidity	SWQS	Salinity ppt	Temperature C
4	11/29/2006	< 10			6.8	2.8	4.7	FW2-NT	0.1	11.3
4	9/7/2006	120	0.23	0.04	6.46	6	7.15	FW2-NT	0.1	20.9
4	6/15/2006	30			6.38	4.8	6.17	FW2-NT	0.1	21.3
4	2/23/2006	10	0.05	0.05	7.37	3.2	5.26	FW2-NT	0	4.2
4	11/14/2005	70			6.27	2.4	3.08	FW2-NT	0.1	13.2
4	9/14/2005	210	0.16	0.14	6.71	8	12.9	FW2-NT	0	20.8
4	6/1/2005	60			6.65	6.8	9.84	FW2-NT	0.1	11.8
4	3/16/2005	10	0.15	0.062	6.71	4	3.95	FW2-NT	0.1	6.9
4	12/16/2004	10		0.12	6.8	5.6	3.3	FW2-NT	0.1	2.9
4	9/21/2004	110			6.7	2.4	12.1	FW2-NT	0.1	16
4	6/10/2004	250	0.23	0.15	6.48	13.6	15.9	FW2-NT	0.1	30.8
4	2/5/2004	< 10			6.88	2	12.8	FW2-NT		
4	12/16/2003	10			6.7	5.6	5.2	FW2-NT		
4	9/9/2003	50	0.14	0.08	6.6	7.2	13.1	FW2-NT		
4	6/17/2003	60			8.9	8.4	6.53	FW2-NT		
4	3/18/2003	10	0.14	0.09	6	4.4	3.1	FW2-NT		
4	12/18/2002	< 10			6.4	4	3.3	FW2-NT		
4	10/1/2002	160	< 0.05	0.09	6.6	4.4	10.2	FW2-NT		
4	3/5/2002	< 10	< 0.1	0.09	6.9	4		FW2-NT		
4	12/4/2001	70			6.9	2		FW2-NT		
4	10/30/2001	100	0.42	0.12	6.16	2		FW2-NT		
4	6/5/2001	60			6.72	12		FW2-NT		

4	3/14/2001	10	0.19	0.44	5.7	30		FW2-NT		
4	12/5/2000	10						FW2-NT		
4	10/3/2000	70	0.28	0.08				FW2-NT		
4	6/6/2000	1670						FW2-NT		
4	3/7/2000	100	< 0.05	0.06				FW2-NT		
4	12/21/1999	20						FW2-NT		
4	10/5/1999	400	< 0.03	0.086				FW2-NT		
4	6/15/1999	380						FW2-NT		
4	3/2/1999	< 10	0.13	0.06				FW2-NT		

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Site	Collection Date	Fecal	Ammonia	Phosphorus	Ph	Tot. Suspended Solids	Turbidity	SWQS	Salinity ppt	Temperature C
4	11/29/2006	< 10			6.8	2.8	4.7	FW2-NT	0.1	11.3
4	9/7/2006	120	0.23	0.04	6.46	6	7.15	FW2-NT	0.1	20.9
4	6/15/2006	30			6.38	4.8	6.17	FW2-NT	0.1	21.3
4	2/23/2006	10	0.05	0.05	7.37	3.2	5.26	FW2-NT	0	4.2
4	11/14/2005	70			6.27	2.4	3.08	FW2-NT	0.1	13.2
4	9/14/2005	210	0.16	0.14	6.71	8	12.9	FW2-NT	0	20.8
4	6/1/2005	60			6.65	6.8	9.84	FW2-NT	0.1	11.8
4	3/16/2005	10	0.15	0.062	6.71	4	3.95	FW2-NT	0.1	6.9
4	12/16/2004	10		0.12	6.8	5.6	3.3	FW2-NT	0.1	2.9
4	9/21/2004	110			6.7	2.4	12.1	FW2-NT	0.1	16
4	6/10/2004	250	0.23	0.15	6.48	13.6	15.9	FW2-NT	0.1	30.8
4	2/5/2004	< 10			6.88	2	12.8	FW2-NT		
4	12/16/2003	10			6.7	5.6	5.2	FW2-NT		
4	9/9/2003	50	0.14	0.08	6.6	7.2	13.1	FW2-NT		
4	6/17/2003	60			8.9	8.4	6.53	FW2-NT		
4	3/18/2003	10	0.14	0.09	6	4.4	3.1	FW2-NT		
4	12/18/2002	< 10			6.4	4	3.3	FW2-NT		
4	10/1/2002	160	< 0.05	0.09	6.6	4.4	10.2	FW2-NT		
4	3/5/2002	< 10	< 0.1	0.09	6.9	4		FW2-NT		
4	12/4/2001	70			6.9	2		FW2-NT		
4	10/30/2001	100	0.42	0.12	6.16	2		FW2-NT		
4	6/5/2001	60			6.72	12		FW2-NT		

4	3/14/2001	10	0.19	0.44	5.7	30		FW2-NT		
4	12/5/2000	10						FW2-NT		
4	10/3/2000	70	0.28	0.08				FW2-NT		
4	6/6/2000	1670						FW2-NT		
4	3/7/2000	100	< 0.05	0.06				FW2-NT		
4	12/21/1999	20						FW2-NT		
4	10/5/1999	400	< 0.03	0.086				FW2-NT		
4	6/15/1999	380						FW2-NT		
4	3/2/1999	< 10	0.13	0.06				FW2-NT		

Ambient Surface Water Monitoring

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< 2006 Historical | 2007 + Stream table: Ambient Streams | 2007 + Lakes table: Ambient Lakes

Select Location:

Please Select Location | Search

Showing results for: ASSUNPINK CREEK, UPPER FREEHOLD

Site	Collection Date	Fecal	Enterococci	Ecoli	Turbidity	Total Suspended Solids	pH	Specific Conductivity	Disolved Oxygen	Total Phospherous	Salinity ppt	Temperature C	SWQS
4	8/5/2011		0	190			0	142.7	4.25	0	0	21.5	FW2-NT
4	7/29/2011		0	640			6.98	154	6.13	0.05	0	22.8	FW2-NT
4	7/22/2011		0	350			0	154	5.49	0	0	26.1	FW2-NT
4	7/15/2011		0	70			0	141.5	5.76	0		21.3	FW2-NT
4	7/8/2011		0	150			0	139.2	4.51	0	0	24.4	FW2-NT
4	6/17/2011		0	0			6.75	0		0.13	0	21.9	FW2-NT
4	8/18/2010		0	0	0	0	6.73	0		0.1	0	21.5	FW2-NT
4	7/1/2010		0	60	0	0	0	123.6		0	0	19.7	FW2-NT
4	6/24/2010		0	130	0	0	0	123.6		0	0	25.1	FW2-NT
4	6/17/2010		0	130	0	0	0	172.4		0	0	21.9	FW2-NT
4	6/10/2010		0	230	0	0	6.48	115.3		0.11	0	19	FW2-NT
4	6/3/2010		0	180	0	0	0	105.1		0	0	25.1	FW2-NT
4	4/1/2010		0	0	6.3	2	6.88	107.4		0	0	13.7	FW2-NT
4	9/24/2009		0	810	8.2	6	6.42	135.4		0.1	0	22	FW2-NT
4	6/3/2009		0	190	13.8	10	6.79	138.5		0.1	0	20.8	FW2-NT
4	3/25/2009		0	48	7.45	6	6.59	152.8		0	0	6.5	FW2-NT
4	12/9/2008	10		10	3.6	6	6.83	131.6				2.9	FW2-NT
4	9/18/2008	100		110	10.4	7.6	100	143.6		0.09		18.6	FW2-NT
4	6/18/2008	10		160	16	10.4	6.53	132.5		0.11		21.8	FW2-NT
4	3/13/2008	10		10		8.4	6.78	124				7.1	FW2-NT
4	12/20/2007	180				5.6	6.93	127.3				4.7	FW2-NT
4	9/13/2007	150				13.2	6.76	132.1		0.09		19.1	FW2-NT
4	5/31/2007	70				11.2	6.6	128.3		0.1		22.6	FW2-NT
4	3/14/2007	10				2	7.22	130				9.9	

Rapid Bioassessment Results for Local Waterbodies

Search by: ○ Waterbody ○ Watershed

Waterbody: Assunpink Creek, Above Rising Sun Lake

Watershed: Select Water Shed Submit

Biological Assessment	NJIS Score	Habitat Assessement	Habitat Score
Non-impaired	24-30	Optimal	16-20
Moderately Impaired	9-21	Suboptimal	11-15
Severly Impaired	0-6	Marginal	6-10
		Poor	0-5

Rapid Bioassessment Sites	**Sample Date**	**NJIS Score**	Habitat Assessment Score
Assunpink Creek, Below Assunpink Dam @ Assunpink Water Shed Site Code:PARK 4	4/24/2001	12	19.1

If you would like more information on the types of macroinvertebrates that determined the NJIS Score or further details on the habitat assessment of the streams, please email: Claire Condie.

Rapid Bioassessment Results for Local Waterbodies

Search by: ○ Waterbody ◉ Watershed

Waterbody: Assunpink Creek, Above Rising Sun Lake

Watershed: Select Water Shed | Submit

Biological Assessment	NJIS Score	Habitat Assessement	Habitat Score
Non-impaired	24-30	Optimal	16-20
Moderately Impaired	9-21	Suboptimal	11-15
Severly Impaired	0-6	Marginal	6-10
		Poor	0-5

Rapid Bioassessment Sites	**Sample Date**	**NJIS Score**	Habitat Assessment Score
Empty Box Brook, Pine Drive (Upstream of STP), Roosevelt @ Assunpink Water Shed Site Code:115	11/1/2002	21	14.9
New Sharon Branch, Imlaystown-Heightstown Rd, Upper Freehold @ Assunpink Water Shed Site Code:NewShar	11/4/2002	21	15.4
Buckhole Creek, Rt. 526, Upper Freehold @ Assunpink Water Shed Site Code:Buck	11/20/2002	18	13.1
Empty Box Brook, Pine Drive (Upstream of STP), Roosevelt @ Assunpink Water Shed Site Code:115	5/16/2000	12	9
Assunpink Creek, Above Rising Sun Lake @ Assunpink Water Shed Site Code:PARKSUN	5/3/2001	27	17.2
Assunpink Creek, Below Assunpink Dam @ Assunpink Water Shed Site Code:PARK 4	4/24/2001	12	19.1
Empty Box Brook, Pine Drive (Upstream of STP), Roosevelt @ Assunpink Water Shed Site Code:115	4/30/2002	30	15.7
Buckhole Creek, Rt. 526, Upper Freehold @ Assunpink Water Shed Site Code:Buck	5/1/2002	15	15.8

New Sharon Branch, Imlaystown-Heightstown Rd, Upper Freehold @ Assunpink Water Shed Site Code:NEWSHAR	5/3/2002	21	13.6
Creek above Rising Sun Lake, Assunpink Wildlife Management Area, Allentown @ Assunpink Water Shed Site Code:ParkSun	5/7/2002	24	17.5
Empty Box Brook, Pine Drive (Upstream of STP), Roosevelt @ Assunpink Water Shed Site Code:115	5/15/2001	30	16.9
Empty Box Brook, Pine Drive (Upstream of STP), Roosevelt @ Assunpink Water Shed Site Code:115	10/28/1999	0	13.1
Empty Box Brook, Pine Drive (Upstream of STP), Roosevelt @ Assunpink Water Shed Site Code:116	10/28/1999	0	11.8
Buckhole Creek, Rt. 526, Upper Freehold @ Assunpink Water Shed Site Code:92	11/1/1999	0	11.3
Empty Box Brook, Pine Drive (Upstream of STP), Roosevelt @ Assunpink Water Shed Site Code:115	10/31/2000	27	15.5
Empty Box Brook, Pine Drive (Upstream of STP), Roosevelt @ Assunpink Water Shed Site Code:115	10/19/2001	21	158
Assunpink Creek, Above Rising Sun Lake @ Assunpink Water Shed Site Code:PARKSUN	11/14/2001	21	191
If you would like more information on the types of macroinvertebrates that determined the NJIS Score or further details on the habitat assessment of the streams, please email: Claire Condie.			