NATURAL RESOURCE INVENTORY OF THE CROSSWICKS CREEK WATERSHED IN CHESTERFIELD TOWNSHIP

CHESTERFIELD TWP. ENVIRONMENTAL COMMISSION
BURLINGTON COUNTY, NEW JERSEY

October 13, 2006

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Prepared for:

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

BMP	Best Management Practice
TDR	Transfer of Development Rights
NRI	Natural Resource Inventory
USGS	United States Geological Survey
NGVD	National Geodetic Vertical Datum
cfs	Cubic feet per second
mg/L	Milligrams per liter
DO	Dissolved oxygen
USFWS	United States Fish and Wildlife Service
NJDEP	New Jersey Department of Environmental Protection
NWI	National Wetlands Inventory
GIS	Geographic Information System
NJSA	New Jersey Statutory Authority
NJAC	New Jersey Administrative Code

EXECUTIVE SUMMARY

AMEC Earth & Environmental, Inc. on behalf of the Chesterfield Township Environmental Commission conducted a Natural Resource Inventory (NRI) of the Crosswicks Creek watershed within the municipal boundaries of Chesterfield Township (the "study area"), with particular emphasis on the Crosswicks Creek riparian corridor. The objective of this study was to develop an NRI that could serve as an amendment or supplement to an existing planning document, *The Crosswicks Creek/Doctors Creek Watershed Greenway Plan* (FX Browne 2004). This amendment was needed to fill the Greenway Plan's data gap for Chesterfield Township.

The focus of the NRI was (1) natural and physical resource identification and (2) the evaluation of public access feasibility to Crosswicks Creek. The scope of the project included the compilation and organization of municipal landowner records, an on-water stream survey of the entire main channel within the municipality, a pedestrian survey of properties abutting Crosswicks Creek, the analysis of existing natural and physical resources data, and an evaluation of public access feasibility at select locations along the riparian corridor. The study was conducted from January 2006 to June 2006 with much assistance from the Chesterfield Township Environmental Commission and the U.S. Fish and Wildlife Service (USFWS).

The Crosswicks Creek watershed is situated in the Coastal Plain physiographic province with sediments that are predominantly Cretaceous sand, silt, and clay. The bedrock geology of the study area is composed of the Merchantville, Woodbury, Englishtown, Marshalltown, Wenonah, Mount Laurel, and Cohansey Formations; the surficial geology is composed of the Pensauken Formation, Marshalltown Formation, Colluvium and Alluvium Units, and Alluvium. The study area is underlain by 54 soil mapping units belonging to 19 soil series across nine soil associations. These soil series are Adelphia, Colemantown, Collington, Donlonton, Fallsington, Fluvaquents, Freehold, Holmdel, Keansburg, Keyport, Kresson, Manahawkin, Pemberton, Pits, Sassafras, Shrewsbury, Tinton, Urban, and Woodstown.

The study identified 280 plant species across 76 plant families along the riparian corridor. When combined with existing vegetation data reported by Rogers and Golden (1976) and Stein

(1992), a total of 400 plant species across 96 plant families are documented for the entire Township. A small portion of a high significance-ranked NJDEP Natural Heritage Priority Site is located around the Extonville Road bridge area; the majority of this site is located in neighboring Monmouth County to the east. The NJDEP Natural Heritage Program did not report any listed plant species to be documented in the study area.

The NJDEP i-Map data indicates the following resources are present within the study area: forested habitat for priority concern species (i.e. hermit thrush, *Catharus guttata*) suitable forested wetland habitat, suitable emergent wetland habitat, and grassland habitat for priority concern species (i.e. eastern box turtle, *Terrapene carolina*). A small bald eagle (*Haliaeetus leucocephalus*) foraging area is also mapped around the Iron Bridge Road area. Similarly, the results of inquiries by AMEC to the NJDEP and the USFWS indicated the occurrence of eastern box turtles and occasional transient bald eagles within the study area.

An evaluation of public and private properties abutting the Crosswicks Creek suggests that a Township-owned parcel identified as Block 106, Lot 17 one of a few likely candidate properties for the development of a public access point. The physical characteristics of this parcel coupled with its location with respect to a remnant ice house dam, present an amenable set of conditions for a canoe/kayak launch and a passive recreation/resting area. However, the volume and speed of motor vehicle traffic around the property entrance will require some consideration with regards to maintaining public safety. Alternatives include the establishment of a public access easement via adjacent private property(ies).

In addition to the Township-owned parcel, a small number of private properties may also be considered for the development of a public access point. These properties are as follows: Wm. Flemer's Sons, Inc. (Block 401, Lot 1.01), Greenberg (Block 400, Lot 2), Russo (Block 400, Lot 3.01), Gendron (Block 301, Lot 35.01), Katona (Block 301, Lot 26.01), and Palmer (Block 301, Lot 6).

In summary, the findings of the NRI indicate that the largely undeveloped Crosswicks Creek watershed within Chesterfield Township serves as an important greenway link between similarly undeveloped areas to the east and the ecologically-important Hamilton-Trenton-Bordentown

marsh to the west. The ecological value of this undeveloped watershed in Chesterfield is further increased by the amount of land that is farmland preserved and safe from development. Maintaining the integrity of this greenway through preservation, conservation, and public education and involvement is paramount.

~ Section 1 ~

~ Introduction ~

1.0 INTRODUCTION

Chesterfield Township is a sparsely developed rural community in northern Burlington County, New Jersey. The Township comprises three villages, Chesterfield, Crosswicks, and Sykesville, with large rural areas in between. It is bound to the north by Crosswicks Creek, which separates Chesterfield from Hamilton Township in Mercer County; to the east by North Hanover Township, to the south by Springfield Township; and to the west by Mansfield and Bordentown Townships. Agriculture and horse farming are the predominant land uses in this approximately 22 square mile municipality. Approximately one-third of the land area in Chesterfield has been permanently deed-restricted for agricultural use, and the Township ranks second among the state's 566 municipalities in farmland preservation with approximately 4,575 acres preserved.

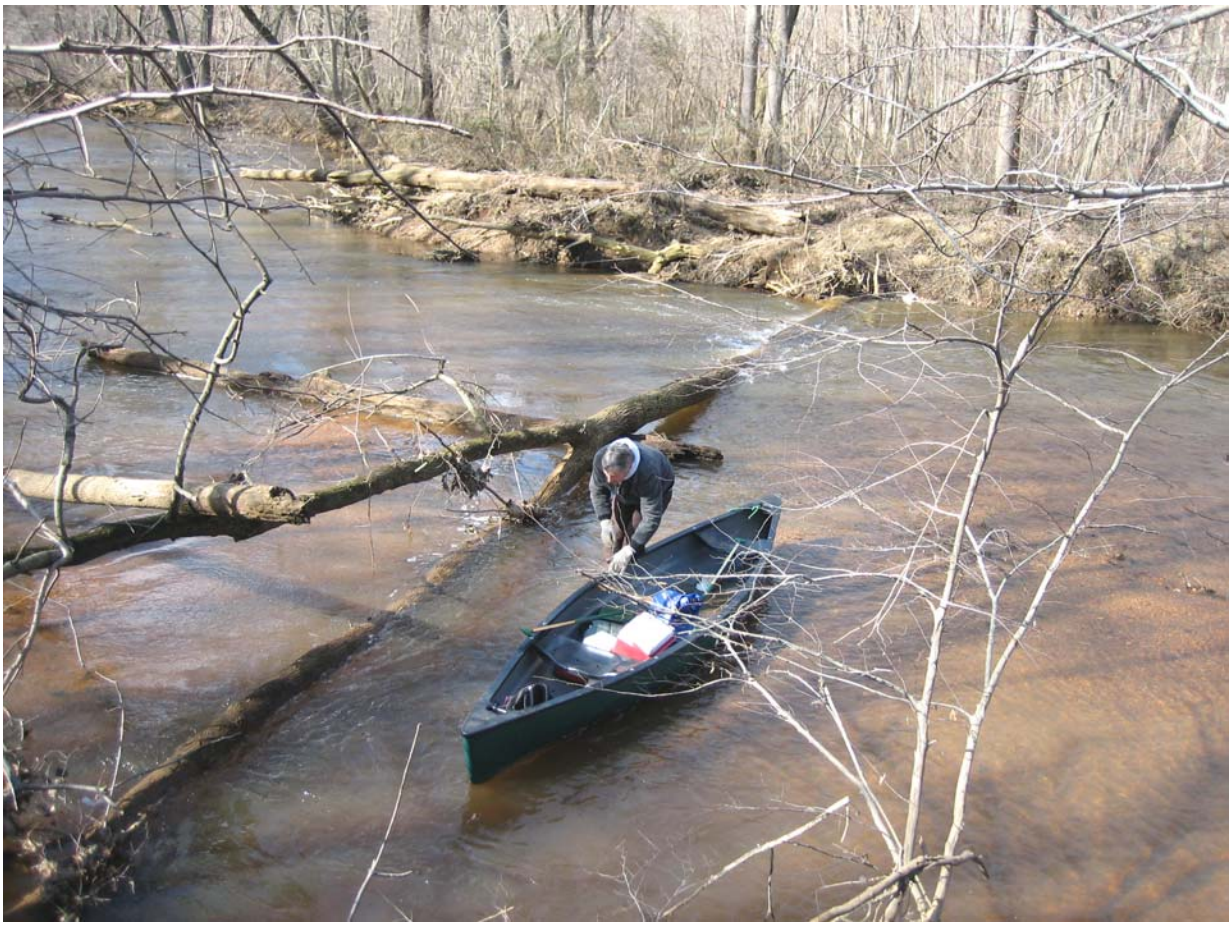
The Township is the winner of the New Jersey Environmental Excellence Award for Open Space Protection and Preservation, and the recipient of numerous awards and accolades for their careful and measured approach to land management. Like many rural municipalities in New Jersey, Chesterfield Township is subject to pressures for more intense development. However, the Township has effectively managed its lands over time, and has balanced land use rights with environmental conservation. For example, Chesterfield Township is one of two municipalities in New Jersey to have implemented a comprehensive Transfer of Development Rights (TDR) zone plan. In 1997, the Township Planning Board adopted a master plan which set forth a TDR strategy for future land use. Briefly defined, the development capacity of all the vacant, residentially-zoned land in the rural environs (a.k.a. the "sending area") is transferred to a 560-acre "receiving area" in a settlement called "Old York Village".

In 2001, a regional greenway planning group formed to develop a greenway plan for the Crosswicks Creek/Doctors Creek watershed (Doctors Creek is a major subwatershed within the larger Crosswicks Creek watershed). Crosswicks Creek is an approximately 25-mile long stream that courses through Burlington, Monmouth, Mercer, and Ocean Counties, beginning at the Fort Dix Military Reservation and Fort McGuire Air Force Base and flowing into the Delaware River at the City of Bordentown, near the Hamilton-Trenton-Bordentown Marsh. The watershed area is approximately 146 square miles.

The end product of the planning group's efforts was the 2004 Crosswicks Creek/Doctors Creek Watershed Greenway Plan (FX Browne 2004), a planning tool for land preservation and management (downloadable at www.marsh-friends.org). In Chapter 6 of the Greenway Plan, Chesterfield Township is identified as one of seven municipalities in the watershed that should contribute additional information to this existing plan as addendums.

In 2005, the Chesterfield Township Environmental Commission requested that AMEC Earth & Environmental, Inc. (AMEC) conduct a Natural Resource Inventory (NRI) of the Crosswicks Creek watershed and riparian corridor in order to produce the information that could be used as an addendum to the Greenway Plan. The Township requested that the NRI study focus on (1) resource identification and (2) the feasibility of public access to the stream. This document presents the findings of that study.

~ Section 2 ~



~ Methods ~

2.0 METHODS

The scope of work for this NRI was accomplished with much assistance from the Chesterfield Township Environmental Commission and cooperation from Chesterfield Township landowners. The scope included organizing existing municipal records, conducting an on-water stream survey of Crosswicks Creek followed by a pedestrian survey of select properties, and the compilation of existing and new natural resource data for the watershed. The details of these tasks are discussed below, following a description of the study area. **Appendix A** presents extensive photographs of the study area and **Figures 9A to 9D** present corresponding maps of the photograph locations.

2.1 Description of the Study Area

The study area for this project is the Crosswicks Creek watershed within the municipal boundaries of Chesterfield Township, with a particular focus on the riparian corridor (**Figures 1 and 2**). The eastern boundary of the study area is generally Province Line Road and the Monmouth County line for the stream, and the North Hanover Township line for the watershed. The southern boundary of the study area is generally the topographic ridge that runs through the near center of the Township. The western boundary of the study area is generally Groveville Road for the stream, and the Bordentown Township line for the watershed.

It should be noted that a relatively small portion of the Crosswicks Creek watershed is located at the southern tip of the Township (**Figure 3**). This small portion is often omitted from discussions of the watershed within the Township; nevertheless, the figures presented in this report depict that portion.

As described earlier, Crosswicks Creek is an approximately 25-mile long stream that courses through Burlington, Monmouth, Mercer, and Ocean Counties, beginning at the Fort Dix Military Reservation and Fort McGuire Air Force Base and flowing into the Delaware River at the City of Bordentown, near the Hamilton-Trenton-Bordentown Marsh. The watershed area is approximately 146 square miles. Starting from upstream, the following five road crossings are located within the study area:

- Extonville Road
- Iron Bridge Road (sometimes referred to as Harker Road on certain road maps)
- Church Street
- The New Jersey Turnpike
- Groveville Road

A United States Geological Survey (USGS) gaging station (ID No. 01464500) is located on the Hamilton Township side of the Extonville Road bridge. At this location, the drainage area is approximately 81.5 square miles. The gage datum is situated 29.94 feet above sea level (NGVD29). The estimated flood stage at this location is 12 feet. The discharge during the on-stream survey conducted on February 7, 2006 (see Section 2.3 below) was approximately 114 cubic feet per second (cfs), whereas by a later site visit conducted on June 23, 2006, the discharge was approximately 37 cfs.

As of June 2006, the Delaware River Keeper webpage reports the following measurements of surface water quality from their monitoring station in Groveville:

Parameter	Measurement
pH	6.0-7.5
Nitrates	0.44 – 4.40 mg/L
Phosphate	0.2 – 1.0 mg/L
Dissolved Oxygen (DO)	6.5 – 14.0 mg/L
Dissolved Oxygen Saturation	68.9 – 111.7%

Source: www.delawareriverkeeper.org/factsheets/crosswicks_creek.html

The webpage states that pH, DO, and DO saturation are in the range generally considered acceptable to support wildlife, and are similar to neighboring tributaries. However, the nitrates and phosphates are considered very high. These high concentrations may be attributed to heavy fertilizer use and potential animal waste inputs (www.delawareriverkeeper.org). More on this subject is presented in **Section 3.3** of this report.

2.2 Municipal Records Review

With the assistance of Chesterfield Township, all tax maps and contact information for landowners with properties abutting Crosswicks Creek were compiled. This information was gathered together in order to have contact information in one place which the Township could easily access. This contact information was also provided to AMEC in order to request consent to enter private properties as part of the resource identification component of this project. **Appendix B** presents the list of landowners with properties abutting Crosswicks Creek and the respective tax maps.

The records search identified 20 landowners. Seventeen of these landowners are private; the remaining three are the State of New Jersey, the New Jersey Turnpike Authority, and the Township of Chesterfield. Property sizes range from 0.24 acres (Block 105, Lot 8; Free Property) to 582 acres (Block 105, Lot 2.01; State of New Jersey). The largest privately-owned property is the Katona Farm (Block 301, Lot 26.01) at 200 acres. Of these creek-front properties, the following five are farmland preserved:

Block	Lot	Owner	Acreage
301	24.01	Catalfamo	69.93
301	26.01	Katona	200.67
301	35.01	Gendron	38.50
400	2	Greenberg	100.42
400	3.01	Russo	128.98
Total Farmland Preserved Acres along Crosswicks Creek			**538.50**

The above five properties are roughly contiguous with each other, spanning from Extonville Road downstream to a point approximately midway between Iron Bridge Road and Church Street, thus forming an important greenbelt along Crosswicks Creek.

2.3 Stream Survey

An on-stream survey was conducted in February 2006 in order to characterize the entire reach of Crosswicks Creek within the municipal boundaries. This survey was conducted via canoe by AMEC with assistance from Richard G. Henry, Ph.D., a biologist with the United States Fish and Wildlife Service (USFWS). This survey originated from the upstream Township boundary at Province Line Road to the downstream Township boundary at the Groveville Road, by Anchor Thread Park in historic Groveville, Hamilton Township, Mercer County. At the time of the survey, construction of a relatively new canoe launch was near completion at Anchor Thread Park; no canoe launch was available at the upstream end of the study area. The stream survey involved drifting downstream and recording observations of flora, fauna, wildlife habitat, physical resources, and potential environmental concerns. Photographic documentation was also conducted.

2.4 Pedestrian Survey

A pedestrian survey of the riparian corridor was also conducted to complement the stream survey and to provide additional details on the physical and natural resources present within. As discussed in Section 2.1, consent for AMEC to enter private properties was granted by numerous landowners during a scheduled Township Environmental Commission meeting. These properties were traversed on foot and, similar to the stream survey, observations of flora, fauna, wildlife habitat, physical resources, and potential environmental concerns were noted. Photographic documentation was also conducted.

2.5 Gathering of Existing Data

Existing natural resource data to supplement the information gathered in this 2006 NRI was obtained by contacting various agencies, institutions, organization, and individuals. This endeavor revealed a dearth of natural resource information for the Crosswicks Creek riparian corridor, relative to its headwaters and the Hamilton-Trenton-Bordentown Marsh. Nevertheless, much useful information was obtained from a review of the following Township-specific documents:

- *Chesterfield Township Natural Resource Inventory and Land Capability Analysis* (Rogers and Golden 1976)

- *A Survey of Rare Flora and Fauna in Chesterfield Township, Burlington County, New Jersey, 1991-1992* (Stein 1992)

2.6 Public Access Feasibility

The feasibility of public access was examined at various points along Crosswicks Creek. At this point in time, the Township is only considering the potential for low impact public access in the form of a canoe/kayak launch and pedestrian trails. Public access is currently limited to very small, isolated spots at the base of road crossings. These road crossings are narrow with no parking areas or shoulders and are therefore hazardous to users and motorists. Safe public access to the stream is realistically only possible by entering private property with consent from the landowner, via the Township-owned parcel (Block 106, Lot 17) located to the west of Church Street, or by the state-owned Right-of-Way. The use of Crosswicks Creek by the general public for passive recreation is viewed as a desired condition by local and state agencies; therefore, Chesterfield Township is carefully considering the ramifications of public access. An evaluation of public access feasibility was therefore a component of this NRI.

~ Section 3 ~

~ Geology and Soils ~

3.0 GEOLOGY AND SOILS

Chesterfield Township and the Crosswicks Creek watershed are situated in the Inner Coastal Plain physiographic section of the larger Coastal Plain physiographic province (Collins and Anderson 1994). The Coastal Plain physiographic province is characterized by unconsolidated sediments which range in age from Cretaceous to Miocene (135 to 5.3 million years old) that dip towards the coast and extend beneath the Atlantic Ocean to the edge of the Continental Shelf. The sediments of Chesterfield Township and the Crosswicks Creek watershed are predominantly Cretaceous sand, silt, and clay.

3.1 Bedrock and Surficial Geology

Starting from the west, the Pre-Quarternary geologic formations underlying the watershed are as follows (FX Browne 2004) (those underlying Chesterfield Township are boldfaced and marked with an asterisk):

- Potomac Group
- Magothy Formation
- **Merchantville Formation ***
- **Woodbury Clay (a.k.a. Woodbury Formation) ***
- **Englishtown Formation ***
- **Marshalltown Formation ***
- **Wenonah Formation ***
- **Mount Laurel Sand (a.k.a. Mount Laurel Formation) ***
- Vincentown Formation
- Composite Confining Unit
- Kirkwood Formation

In addition, as noted in Section 2.1 of this NRI, a small portion of the watershed occurs at the southern tip of the Township. This area is underlain by the **Cohansey Formation**. **Figure 4** presents a bedrock geology map of the Crosswicks Creek watershed.

Figure 5 presents a surficial geology map of the Crosswicks Creek watershed. Starting from the west, the surficial geology is as follows:

- Pensauken Formation (late Miocene to Pliocene)
- Marshalltown Formation to Shark River Formation, undivided (Upper Cretaceous to Eocene)
- Colluvium and Alluvium Unit 1 (Pleistocene)
- Colluvium and Alluvium Unit 2 (Pleistocene)
- Alluvium (Holocene)

These bedrock and surficial formations are all unconsolidated deposits that rest on consolidated basement rock, the Wissahickon Formation. This basement rock dips to the southeast and as a result, the basement's upper surface is 350 feet below sea level near Bordentown and 900 feet below sea level at Wrightstown (Rogers and Golden 1976).

3.2 Soils

FX Browne (2004) reports that the soils of the Crosswicks Creek watershed comprise the following soil associations:

- Keyport-Donlonton Association
- Freehold-Holmdel-Adelphia Association
- Woodstown-Sassafras Association
- Lakehurst-Lakewood-Evesboro Association
- Shrewsbury-Collington-Tinton Association
- Manahawkin-Atsion-Berryland Association
- Sassafras-Dragston Association
- Aura Association
- Galestown-Evesboro Association

The soil mapping units for the watershed are presented in **Figure 6**, and are as follows:

- Adelphia high glauconite variant, fine sandy loam, 2 to 5 percent slopes
- Adelphia loam, 0 to 2 percent slopes
- Colemantown loam, 0 to 2 percent slopes, occasionally flooded
- Collington fine sandy loam, 0 to 2 percent slopes
- Collington fine sandy loam, 2 to 5 percent slopes
- Collington fine sandy loam, 5 to 10 percent slopes
- Collington loam, 0 to 2 percent slopes
- Donlonton fine sandy loam, 0 to 2 percent slopes
- Donlonton loam, 0 to 2 percent slopes
- Fallsington fine sandy loam, 0 to 2 percent slopes
- Fallsington fine sandy loam, clayey substratum, 0 to 2 percent slopes
- Fluvaquents, loamy, 0 to 3 percent slopes, frequently flooded
- Freehold loamy sand, 0 to 5 percent slopes
- Freehold loamy sand, 5 to 10 percent slopes
- Freehold sandy loam, 5 to 10 percent slopes
- Freehold sandy loam, 5 to 10 percent slopes, severely eroded
- Freehold fine sandy loam, 0 to 2 percent slopes
- Freehold fine sandy loam, 2 to 5 percent slopes
- Freehold fine sandy loam, 5 to 10 percent slopes
- Freehold fine sandy loam, 10 to 15 percent slopes
- Freehold fine sandy loam, 15 to 25 percent slopes
- Freehold fine sandy loam, clayey substratum, 2 to 5 percent slopes
- Holmdel loamy sand, 0 to 5 percent slopes
- Holmdel fine sandy loam, 0 to 2 percent slopes
- Holmdel fine sandy loam, 2 to 5 percent slopes
- Holmdel fine sandy loam, clayey substratum, 0 to 2 percent slopes
- Holmdel fine sandy loam, clayey substratum, 2 to 5 percent slopes
- Keansburg fine sandy loam, 0 to 2 percent slopes
- Keyport fine sandy loam, 2 to 5 percent slopes

- Keyport loam, 0 to 2 percent slopes
- Keyport loam, 2 to 5 percent slopes
- Keyport loam, 5 to 10 percent slopes
- Keyport loam, 10 to 15 percent slopes
- Keyport loam, 15 to 25 percent slopes
- Kresson loamy sand, 0 to 5 percent slopes
- Manahawkin muck, 0 to 2 percent slopes, frequently flooded
- Pemberton sand, 0 to 5 percent slopes
- Pits, sand and gravel
- Pits, clay
- Sassafras fine sandy loam, 0 to 2 percent slopes
- Sassafras fine sandy loam, 2 to 5 percent slopes
- Sassafras fine sandy loam, 5 to 10 percent slopes
- Shrewsbury fine sandy loam, 0 to 2 percent slopes
- Shrewsbury fine sandy loam, clayey substratum, 0 to 2 percent slopes
- Shrewsbury ironstone substratum variant fine sandy loam, 0 to 2 percent slopes
- Tinton sand, 0 to 5 percent slopes
- Tinton sand, 5 to 10 percent slopes
- Tinton sand, thick surface, 0 to 5 percent slopes
- Urban land, clayey substratum, 0 to 8 percent slopes
- Urban land, sandy, 0 to 8 percent slopes
- Woodstown fine sandy loam, 0 to 2 percent slopes
- Woodstown fine sandy loam, 2 to 5 percent slopes
- Woodstown fine sandy loam, clayey substratum, 0 to 2 percent slopes
- Woodstown fine sandy loam, clayey substratum, 2 to 5 percent slopes

3.3 Best Management Practices

As indicated in **Section 2.1**, surface water quality measurements of the Crosswicks Creek have revealed high nitrate and phosphate concentrations, suggesting impacts resulting from heavy fertilizer use and animal waste inputs. Nitrogen in the natural environment is most typically

found as gaseous nitrogen (N_2), ammonia (NH_3 or NH_4), nitrite (NO_2), nitrate (NO_3), and nitrogen bound in organic compounds. Phosphorus in natural waters occurs as various types of phosphate in three classifications: orthophosphates (PO_4), polyphosphates (polymers of phosphoric acid), and organically bound phosphates. Pollution of surface waters by phosphorus as orthophosphates and inorganic nitrogen as nitrates and ammonia is a major concern in New Jersey. Rural and residential areas generate substantial amounts of these nutrients from commercial fertilizers, livestock manure, and dairy farming. Other sources include detergents and sanitary wastewater.

Both phosphates and nitrates are transported by ground water. Phosphates tend to combine with fine soil particles and remains locked in the soil until it is either utilized by plants or eroded away. In contrast, nitrates are more readily soluble in the soil. In late winter and also during heavy rains, nitrates pass through the root zone and into the underlying ground water, resulting in potential public health hazards. Phosphates and nitrogen present a problem in surface water environments by over-stimulating plant growth, which in turn can contribute to eutrophication and dense algal growth in aquatic environments. The greatest risk of eutrophication is in small agricultural ponds, urban lakes, and impoundments that have retention times of two weeks or more. High nutrient levels also promote the growth of dense mats of green algae that attach to rocks and cobbles in shallow, unshaded headwater streams (NJDEP 2004).

There is a number of existing management controls for non-point sources such as these, many of which are compiled into the "*New Jersey Stormwater Best Management Practices Manual*", typically referred to as the NJ "BMP Manual". As of the date of this report, the current version of the BMP Manual available to the public is dated April 2004 (NJDEP 2004). This document is downloadable at www.njstormwater.org. Some examples of BMPs listed in the manual that are applicable for use in the Crosswicks Creek watershed include, but are not limited to, the following:

- Preservation of natural areas
- Native ground cover
- Vegetative filters and buffers
- Minimizing land disturbance

- Impervious surface management
- Modifications to change "time of concentration" (Tc) of runoff
- Structural controls at source areas
- Development and implementation of watershed management plans

Best management practices can be used singly or in combination, and they do not need to be limited to those compiled by New Jersey. There are a number of other states and entities developing, formulating, revising, implementing, and improving BMPs across the United States. These BMPs can be evaluated for their site-specific use – matching BMPs to site-specific conditions is crucial for selecting the most appropriate BMP(s). It is important to note that Chesterfield Township already implements many BMPs through municipal planning, the adoption and update of zoning ordinances, the TDR plan, and public outreach to the residents of the Township. These broad-reaching management practices provide the important framework for the selection of site-specific BMPs.

One particular BMP that will be highly effective in the Crosswicks Creek watershed, and is in large part automatically being implemented by default, is a riparian setback. Although Chesterfield Township does not currently have a riparian setback ordinance, the topography and environmental constraints associated with the floodplain and riparian corridor along this stream has largely precluded much waterfront development to date. However, the adoption of a riparian setback will codify land use protections for the riparian corridor and further the existing benefits currently being experienced by the watershed.

The role that riparian corridors play in protecting surface water resources and public health has been well documented and researched; however, a recently updated report by the Chagrin River Watershed Partners, Inc. presents a thorough literature review of the latest research in riparian studies. A copy of this document, "*Riparian Setbacks, Technical Information for Decision Makers*" (CRWPI 2006) is presented in **Appendix C** and is also downloadable at the following web address:

www.crwp.org/model_ordinances/riparian_model.htm

~ Section 4 ~

~ Vegetation and Open Space ~

4.0 VEGETATION AND OPEN SPACE

Rogers and Golden (1976) categorized the vegetation in Chesterfield Township into the following six general types:

- Wetlands
- Lowland forests
- Upland forests
- Early successional fields
- Agricultural land
- Landscaped areas

All of the vegetation communities surveyed in the 2006 NRI fit into one of these six broad categories, with a majority of the areas characterized as wetlands, lowland forests, and agricultural land. Similar to the findings of Rogers and Golden (1976) and Stein (1992), the 2006 NRI found that the following tree species were relatively abundant and dominated many communities or stands in the watershed:

- Sweetgum (*Liquidambar styraciflua*)
- Tulip poplar (*Liriodendron tulipifera*)
- Red maple (*Acer rubrum*)
- American beech (*Fagus grandifolia*)
- Pin oak (*Quercus palustris*)
- Red oak (*Quercus rubra*)
- Black gum (*Nyssa sylvatica*)

Less frequently observed in the 2006 NRI which focused on the Crosswicks Creek watershed, but reported by Rogers and Golden (1976) to be abundant throughout the Township were the following species:

- Sugar maple (*Acer saccharum*)

- White oak (*Quercus alba*)
- Scarlet oak (*Quercus coccinea*)
- Swamp white oak (*Quercus bicolor*)
- Willow oak (*Quercus phellos*)

The USFWS National Wetlands Inventory (NWI) data for the study area indicates the following 28 community types to be present (**Figure 7**):

- PAB4Hx – palustrine, aquatic bed, floating vascular, permanently flooded, excavated
- PEM1A/PSS1A – palustrine, emergent persistent / scrub-shrub, broad-leaved deciduous, temporarily flooded
- PEM1C/PSS1C – palustrine, emergent persistent / scrub-shrub, broad-leaved deciduous, seasonally flooded
- PEM1A – palustrine, emergent persistent, temporarily flooded
- PEM1B – palustrine, emergent persistent, saturated
- PEM1C – palustrine, emergent persistent, seasonally flooded
- PEM1F – palustrine, emergent persistent, semipermanently flooded
- PFO1A/PEM1A – palustrine, forested, broad-leaved deciduous / emergent persistent, temporarily flooded
- PFO1C/PEM1C – palustrine, forested, broad-leaved deciduous / emergent persistent, seasonally flooded
- PFO1A/PSS1A – palustrine, forested, broad-leaved deciduous / scrub-shrub, broad-leaved deciduous, temporarily flooded
- PFO1C/PSS1C – palustrine, forested, broad-leaved deciduous / scrub-shrub, broad-leaved deciduous, seasonally flooded
- PFO1A – palustrine, forested, broad-leaved deciduous, temporarily flooded
- PFO1B – palustrine, forested, broad-leaved deciduous, saturated
- PFO1Bd – palustrine, forested, broad-leaved deciduous, saturated, partially drained/ditched
- PFO1C – palustrine, forested, broad-leaved deciduous, seasonally flooded

- PFO1Ch – palustrine, forested, broad-leaved deciduous, seasonally flooded, diked/impounded
- PFO1E – palustrine, forested, broad-leaved deciduous, seasonally flooded/saturated
- PFO1Ed – palustrine, forested, broad-leaved deciduous, seasonally flooded/saturated, partially drained/ditched
- PSS1A/PEM1A – palustrine, scrub-shrub, broad-leaved deciduous / emergent persistent, temporarily flooded
- PSS1C/PEM1C – palustrine, scrub-shrub, broad-leaved deciduous / emergent persistent, seasonally flooded
- PSS1A – palustrine, scrub-shrub, broad-leaved deciduous, temporarily flooded
- PSS1B – palustrine, scrub-shrub, broad-leaved deciduous, saturated
- PSS1C – palustrine, scrub-shrub, broad-leaved deciduous, seasonally flooded
- PUBFx – palustrine, unconsolidated bottom, semipermanently flooded, excavated
- PUBHh – palustrine, unconsolidated bottom, permanently flooded, diked/impounded
- PUBHx – palustrine, unconsolidated bottom, permanently flooded, excavated
- R2UBH – riverine, perennial, unconsolidated bottom, permanently flooded

The relatively higher resolution NJDEP Freshwater Wetlands map for the study area indicates the following 20 community types to be present, but encompassing more land area than the 28 community types mapped by the NWI (**Figure 8**):

- MODAg – modified agricultural
- MODD – modified disturbed areas
- MODL – lawns, stormwater management area
- MODR – modified right-of-ways
- PEM1B – palustrine, emergent persistent, saturated
- PEM1C – palustrine, emergent persistent, seasonally flooded
- PEM1E – palustrine, emergent persistent, seasonally flooded/saturated
- PFO1A – palustrine, forested, broad-leaved deciduous, temporarily flooded
- PFO1B – palustrine, forested, broad-leaved deciduous, saturated

- PFO1B/PEM1B – palustrine, forested, broad-leaved deciduous, saturated / emergent persistent
- PFO1B/PSS1B – palustrine, forested, broad-leaved deciduous, saturated / scrub-shrub, broad-leaved deciduous
- PFO1C – palustrine, forested, broad-leaved deciduous, seasonally flooded
- PFO1C-PEM1C – palustrine, forested, broad-leaved deciduous, seasonally flooded / emergent persistent
- PSS1A – palustrine, scrub-shrub, broad-leaved deciduous, temporarily flooded
- PSS1B – palustrine, scrub-shrub, broad-leaved deciduous, saturated
- PSS1B/PEM1B – palustrine, scrub-shrub, broad-leaved deciduous, saturated / emergent persistent
- PSS1B/PFO1B – palustrine, scrub-shrub, broad-leaved deciduous, saturated / forested, broad-leaved deciduous
- PSS1C – palustrine, scrub-shrub, broad-leaved deciduous, seasonally flooded
- PSS1C/PEM1C – palustrine, scrub-shrub, broad-leaved deciduous, seasonally flooded / emergent persistent
- PSS1C/PFO1C – palustrine, scrub-shrub, broad-leaved deciduous, seasonally flooded / forested, broad-leaved deciduous

For this NRI, on-the-ground vegetation surveys were conducted at each site visit which comprised the following dates:

- February 6, 2006
- February 7, 2006
- May 2, 2006
- May 3, 2006
- June 6, 2006
- June 21, 2006

Appendix D presents a table listing all of the plant species observed in the 2006 NRI, as well as those reported by Rogers and Golden (1976) and Stein (1992). (The sources of these data are

distinguished from each other in the table.). The 2006 NRI identified 280 plant species across 76 plant families. When combined with existing vegetation data for the Township, a total of 400 plant species across 96 families are documented.

4.1 NJDEP i-Map

An examination of the NJDEP i-Map GIS data indicates a portion of a Natural Heritage Priority Site to be located within the study area (see maps in **Appendix E**). The majority of this Natural Heritage Priority Site is located in the Crosswicks Creek watershed within Monmouth County to the east; however, a portion of it lies within Chesterfield Township around the Extonville Road bridge area. The Biodiversity Rank of this site is "high significance". The NJDEP i-Map GIS data also indicates the following resources to be present within the study area (see i-Map printouts in **Appendix F**):

- Forested habitat for priority concern species
- Suitable forested wetland habitat
- Suitable emergent wetland habitat
- Grassland habitat for priority concern species

The wildlife associated with these i-Map areas are discussed in Section 4.1. No State Open Space areas are located within the study area; the nearest State Open Space is located along the Crosswicks Creek in neighboring Bordentown Township.

4.2 Threatened and Endangered Plants

A NJDEP Natural Heritage Program inquiry response letter dated March 18, 1992 and presented in Stein (1992), reported the occurrence of the following listed plant species within the Township:

- Pumpkin ash (*Fraxinus profunda*) – state endangered
- Wand-like three-awned grass (*Aristida virgata*)
- Pale Indian plantain (*Cacalia atriplicifolia*) – state endangered

- Cranefly orchid (*Tipularia discolor*)

In a more recent inquiry response letter dated February 6, 2006, the NJDEP Natural Heritage Program does not report the occurrence of any listed plant species in the study area. It is important to note that the latter response letter focused on the Crosswicks Creek watershed and not the entire Township, as in the March 18, 1992 response letter. **Appendices F and G** present copies of the 1992 and 2006 response letters, respectively.

4.3 Evaluation of Existing Greenway

The Crosswicks Creek/Doctors Creek Watershed Greenway Plan (FX Browne 2004) reports a typical species assemblage for the riparian corridor that is similar to that described by Rogers and Golden (1976) and observed in the 2006 NRI. This riparian corridor around Crosswicks Creek and its tributaries is the foundation for establishing a high quality greenway throughout the greater Crosswicks Creek and Doctors Creek watershed. The vast area of undisturbed upland and wetland forests, interspersed with emergent and scrub-shrub wetlands that are situated along Crosswicks Creek within Chesterfield Township serves to link the intermittent greenway patches within Bordentown Township to the west, and North Hanover and Upper Freehold Townships to the east.

Specifically, the open space situated on large tracts of preserved farmland in the eastern portion of Chesterfield Township provides a contiguous greenway to large open space areas in Upper Freehold Township, primarily associated with Crosswicks Creek Park (a.k.a. Walnford Park). Furthermore, the open space situated on other private properties, state properties, and municipal properties in the western portion of the township are considered to be relatively safe from development, thereby linking the entire Crosswicks Creek riparian corridor within Chesterfield Township to the surrounding municipalities. Essentially, given the large land area of Chesterfield Township within the Crosswicks Creek corridor, it currently serves as a major link between the well-preserved headwater portions of the watershed and the ecologically valuable Hamilton-Trenton Marsh to the downstream.

~ Section 5 ~

~ Wildlife ~

5.0 WILDLIFE

Rogers and Golden (1976) present a traditional viewpoint of wildlife habitat requirements that generally holds true to this day. This viewpoint equates habitat diversity to wildlife diversity, emphasizing vegetation structure over plant species assemblage. Wetlands are reported to exhibit the highest diversity relative to the other community types in the Township. Much of the reasoning for this is because wetlands, by nature of their protection, compose large and contiguous areas for wildlife; subsequently, the combination of size, shape, and spatial pattern of habitat play a major role in determining wildlife use.

The proper combinations of habitat size, shape, pattern, composition, and location within the greater landscape are the characteristics that make the Crosswicks Creek watershed an important component for regional wildlife. As was discussed in Section 3.3, the Crosswicks Creek watershed and its inclusive riparian corridor serves as a vital link between the high-quality habitats located upstream of the Township, and the downstream Hamilton-Trenton marsh.

Appendix I presents a table of all the animal species observed in the 2006 NRI, as well as those reported by Stein (1992). The sources of these data are distinguished from one another in the table. A combined total of 127 animal species (88 bird species, 16 mammal species, and 23 herptile species) are reported.

5.1 NJDEP i-Map

As discussed in Section 3.1, an examination of the NJDEP i-Map GIS data indicates the following resources to be present within the study area (see i-Map printouts in **Appendix F**):

- Forested habitat for priority concern species
- Suitable forested wetland habitat
- Suitable emergent wetland habitat
- Grassland habitat for priority concern species

Examination of the NJDEP Landscape Project data indicates the following priority concern wildlife species to be associated with the above habitats (the NJDEP does not relate "suitable" habitat with specific wildlife species):

Habitat	Species	Status	Acreage	Landscape Project Link No.	Location
Forested	Hermit thrush (*Catharus guttata*)	Priority	3346.8	446	Along entire length of Crosswicks Creek riparian corridor.
Grassland	Eastern box turtle (*Terrapene carolina*)	Priority	521.123	15856	NJ State Reformatory properties

In addition to these mapped communities, a relatively small bald eagle (*Haliaeetus leucocephalus*) foraging area is located around the Iron Bridge Road crossing. This area is mapped by the NJDEP to encompass 36.796 acres (Landscape Project Link No. 189) (see map in **Appendix F**).

5.2 Threatened and Endangered Wildlife

An inquiry was made by AMEC to the USFWS New Jersey Field Office and the NJDEP Natural Heritage Program for the potential occurrence of federal and state listed species, respectively, within the Crosswicks Creek riparian corridor. The results of these inquiries are presented below.

5.2.1 USFWS Response

A USFWS response letter dated March 23, 2006 indicates that except for an occasional transient bald eagle (*Haliaeetus leucocephalus*), no other federally listed or proposed endangered or threatened flora or fauna under their jurisdiction are known to occur within the study area. **Appendix J** presents a copy of this letter.

5.2.2 NJDEP Response

A NJDEP Natural Heritage Program response letter dated March 18, 1992 and presented in Stein (1992), reported the occurrence of the following listed animal species within the Township:

- Tiger salamander (*Ambystoma tigrinum*) – state endangered
- Bog turtle (*Glyptemys muhlenbergii*) – state endangered
- Bobolink (*Dolichonyx oryzivorus*) – state threatened

In a more recent inquiry response letter dated February 6, 2006, the NJDEP Natural Heritage Program reports the occurrence of the eastern box turtle (*Terrapene carolina*), a special concern species, within the study area. As stated earlier in this report, **Appendices F and G** present copies of the 1992 and 2006 response letters, respectively.

~ Section 6 ~

~ Public Accessibility ~

6.0 PUBLIC ACCESSIBILITY

Visual observation of the riparian corridor during the on-stream survey indicated that there are a small number of private properties where it appears to be feasible that a public access canoe/kayak launch be located. Feasibility was initially defined only as the following combination of factors: (1) an acceptable slope for development (i.e. no steep slopes), (2) sufficient land area for a small canoe/kayak launch area, and (3) a stable stream bank – preferably an outside meander. This initial screening was then ground-truthed during the pedestrian survey for the properties for which access was granted by the landowner. The objective of the ground-truthing was to identify landscape and environmental features situated landward of Crosswicks Creek that may have not been visible from the stream. These anticipated features, which were indeed found on the properties, included steep slopes located farther landward and intervening wetlands and open waters (e.g. tributaries, drainages, vernal habitats).

These results indicated that potential locations for public access are available on various private properties; however, two major hurdles for the development of such public access include landowner consent and land use permitting. The potential for the development of a public access point on the Township-owned parcel located to the west of Church Street (Block 106, Lot 17) was also evaluated and compared to the potential for development of privately-owned parcels.

Knowledge of the properties and property owners located along Crosswicks Creek, coupled with an understanding of the myriad of issues faced by the landowners, the Township, the state, and the general public, is crucial to successfully managing the preservation, conservation, or use of Crosswicks Creek and its surrounding environs. Chesterfield Township has a long-standing tradition of balancing the complex and interacting factors associated with development pressure, public recreation, agricultural practices, and landowner rights. This section of the report does not attempt to discuss such issues - historical, current, or anticipated – but merely summarizes publicly available information regarding properties located along Crosswicks Creek.

It is provided as a starting point, if needed, to ensure that at a minimum these landowners are included in the dialogue concerning the future of this resource.

6.1 Township-Owned Parcel

Block 106, Lot 17 is an irregular-shaped waterfront parcel situated water-ward of various private residential properties that have frontage along Ward Road. The abutting properties to Lot 17 are as follows:

Block	Lot	Description
106	4.01	NJ Turnpike property
106	5	Private residence
106	10	Private residence
106	11	Private residence
106	16	Private residence

With the exception of issues pertaining to the current property entrance (discussed later), this property was considered to be the most suitable location for development as a public access point for the following reasons. A relatively wide, unpaved access road currently exists on the property, originating from Church Street and extending down to the stream. The lower end of this road widens into a broad and flat terraced area with ample waterfront coverage. This area is in line with a dilapidated ice house dam that extends from the Chesterfield Township shoreline to the Hamilton Township shoreline. This area consists of two terraces - the upper terrace is in line with the access road and the ice house dam; a terrace slightly lower in elevation is situated adjacent to and upstream of the access road.

However, since these terraces are located in line and upstream of the ice house dam, the development of a canoe/kayak launch at these locations would place the user in a potentially hazardous situation, particularly during high flow conditions. Even at low flow conditions the user would need to portage their craft around the dam, thereby negating the purpose of the launch. Therefore, it is recommended that an area separate from these terraces be considered for the canoe/kayak launch. A gently sloped area is located immediately downstream of the ice

house dam. A flat mid-channel bar composed of medium sand extends from the shoreline into the water at this location, suggesting non-erosive conditions. In addition, this reach of Crosswicks Creek exhibits a wide side channel on the Chesterfield Township side. This side channel most likely formed as a result of altered flows from the dam. The presence of the side channel at this location results in a small eddy offshore of the mid-channel bar. The user of a canoe or kayak at this location would therefore experience a relatively gentle upstream flow which would allow time to maneuver their craft into the main stem of Crosswicks Creek.

The entrance to the Township-owned parcel is situated right at the Church Road bridge approach. Ingress to this property by motorized vehicles will require a substantial deceleration for both north- and south-bound traffic, and possibly a wide turn for large south-bound vehicles. Ingress by pedestrians or bicycle traffic is not anticipated to have major issues other than the potential increased congestion by motorized vehicles as a result of traffic deceleration. Observation of the traffic along Church Road during the site visits indicated that a number of vehicles pass over the bridge at what appears to be speeds exceeding the posted speed limit. This suggests that traffic safety may be an issue for this entrance.

A public access easement along one or more properties that have frontage along Ward Road may provide a solution to this potential issue. Such an easement would extend from Ward Road in a north/northeast direction towards the Township-owned parcel. This easement may connect to the existing access road on the parcel, or extend directly to the location of the proposed canoe/kayak launch.

6.2 Privately-Owned Parcels

A small number of private properties were also identified as having the potential to provide low-impact public access points. As stated in the beginning of Section 6.0, the potential for public access was initially defined as the following combination of factors: (1) an acceptable slope for development (i.e. no steep slopes), (2) sufficient land area for a small canoe/kayak launch area, and (3) a stable stream bank – preferably an outside meander. The private properties identified by these criteria were as follows:

Property Owner	Block & Lot	Parcel Acreage	NJ State Plane Coordinates	Comments
Wm. Flemer's Sons, Inc.	Bl. 401 Lot 1.01	40	E 464,822 ft. N 475,106 ft. E 464,186 ft. N 474,770 ft.	Located on a shoreline point along the midpoint of the property. Located upstream of the Extonville Road bridge.
Greenberg	Bl. 400 Lot 2	100	E 462,170 ft. N 476,144 ft.	Located on a shoreline point near the eastern side of the property.
Russo	Bl. 400 Lot 3.01	129	E 463,257 ft. N 475,390 ft.	Located on an outside meander, waterward of a large hardwood swamp.
Gendron	Bl. 301 Lot 35.01	38.5	E 458,549 ft. N 476,296 ft.	Located along the east side of a shoreline point (see Katona on following row of table).
Katona	Bl. 301 Lot 26.01	200	E 458,322 ft. N 476,354 ft.	Located along the west side of a shoreline point (see Gendron on previous row of table).
Palmer	Bl. 301 Lot 6	13.25	E 451,336 ft. N 481,705 ft.	Located on a shoreline point near the west side of the property.

With the exception of the Wm. Flemer's Sons, Inc. property, the above potential locations were all examined on foot as part of the pedestrian survey. The development of public access points on the above properties will all require varying degrees of earthwork in order to provide a safe approach down to the stream valley from the front portion of the properties which are situated at relatively higher elevations. However, providing a means of access to the stream valley from the property frontage brings up potentially conflicting circumstances that will need to be resolved on a site-specific basis.

For example, instead of a meandering pedestrian path to the stream, an access easement can be used to provide a straight-line path from the property frontage. A straight-line path is minimally intrusive to the landowner, is relatively easy to maintain, and will have low construction costs because of the relatively smaller linear footage of the project. However, depending upon the property selected and the location of the path on that property, a straight-

line path may have dangerously steep slopes and require substantial erosion controls during and after construction.

In contrast, a meandering path that follows along existing topographic contours will have less potential erosion problems and can provide a gentler slope for its users. However, meandering paths increase the encroachment into the landowner's property and if situated near the property boundary, may require abrupt changes in its path to avoid encroachment into neighboring properties. The construction and maintenance costs of a meandering path are also relatively higher than that of a straight-line path.

6.3 Regulatory Considerations

The decision of whether to establish a straight-line path versus a meandering path is not independent of the environmental constraints that will likely be encountered on each of the above properties (Township- and privately-owned). Much of the Crosswicks Creek riparian corridor and valley serve as the floodplain for this stream. Additionally, this riparian corridor is a complex mosaic of uplands and wetlands of varying sizes and types. The development of a canoe/kayak launch would require encroachments into surrounding freshwater wetlands, their associated transition areas (i.e. wetland buffers), and State open waters (i.e. Crosswicks Creek). All of these categories of natural resources are regulated under the New Jersey Freshwater Wetlands Protection Act (N.J.S.A. 13:9B-1 et seq.) and the New Jersey Water Pollution Control Act (N.J.S.A. 58-10A-1 et seq.), with governing rules at N.J.A.C. 7:7A (the New Jersey Freshwater Wetlands Protection Act Rules). In addition, these encroachments are anticipated to be regulated under the New Jersey Flood Hazard Area Control Act (N.J.S.A. 58-16A-50 et seq.), with governing rules at N.J.A.C. 7:13 (the "Stream Encroachment Rules").

Furthermore, although New Jersey has assumed the regulation of wetlands from the federal government, the proximity of the lower Crosswicks Creek in Chesterfield Township to the tidal portions within Bordentown Township suggest that the U.S. Army Corps of Engineers may, at a minimum, play a strong advisory role in the review of any proposed regulated activity near this stream. The regulatory requirements of these agencies must be considered when designing a development concept for public access.

~ Section 7 ~

~ Conclusions and Recommendations ~

7.0 FINDINGS AND RECOMMENDATIONS

The following list presents the findings of the NRI of the Crosswicks Creek watershed in Chesterfield Township:

- The study area for this NRI was the Crosswicks Creek watershed within the municipal boundaries of Chesterfield Township, with emphasis on the Crosswicks Creek riparian corridor.

- Twenty Chesterfield Township landowners (17 private and 3 public) possess property abutting the Crosswicks Creek. Five of these landowners own a collective total of 538.50 acres of land that is farmland preserved. These farmland preserved areas are roughly contiguous with each other, spanning from Extonville Road to a point approximately midway between Bridge Road and Church Road.

- 280 plant species across 76 plant families were identified within the Crosswicks Creek riparian corridor. When combined with existing vegetation data for Chesterfield Township, a total of 400 plant species across 96 plant families are reported.

- A portion of a NJDEP Natural Heritage Priority Site with a Biodiversity Rank of "high significance" is located around the Extonville Road bridge; the majority of this Priority Site is located in neighboring Monmouth County.

- The large tracts of open space, composed largely of preserved farmland, provide an important link between undeveloped areas in surrounding municipalities, creating a roughly contiguous greenway for the Crosswicks Creek watershed.

- In 1992, the NJDEP Natural Heritage Program reported the following listed plant and animal species as documented to occur within the Township:
    - Pumpkin ash (*Fraxinus profunda*) – state endangered
    - Wand-like three-awned grass (*Aristida virgata*)

- Pale Indian plantain (*Cacalia atriplicifolia*) – state endangered
- Cranefly orchid (*Tipularia discolor*)

- Tiger salamander (*Ambystoma tigrinum*) – state endangered
- Bog turtle (*Glyptemys muhlenbergii*) –state endangered
- Bobolink (*Dolichonyx oryzivorous*) – state threatened

- In 2006, the NJDEP Natural Heritage Program reports no listed plant species and only the eastern box turtle to occur within the study area.

- The NJDEP i-Map GIS data indicate the following priority concern wildlife species to be present within the study area:
  - Hermit thrush (*Catharus guttata*)
  - Eastern box turtle (*Terrapene carolina*)

- The USFWS NJ Field Office reports no federally listed plant or animal species to occur within the study area, except for an occasional transient bald eagle (*Haliaeetus leucocephalus*).

- A Township-owned parcel (Block 106, Lot 17) should be considered for the development of a public access point with a canoe/kayak launch, with the specific location of the canoe/kayak launch downstream of the existing ice house dam. Modifications to the current site entrance may be required, which may entail the establishment of a public access easement through neighboring properties. However, the possibility of a public access point located farther upstream should not be unilaterally ruled out (see nest bullet item below).

- A small number of privately-owned properties should also be further evaluated for the potential development of a public access point. These properties are as follows: Wm. Flemer's Sons, Inc. (Block 401, Lot 1.01), Greenberg (Block 400, Lot 2), Russo (Block 400, Lot 3.01), Gendron (Block 301, Lot 35.01), Katona (Block 301, Lot 26.01), and Palmer (Block 301, Lot 6).

- The large and contiguous tracts of undeveloped land along the Crosswicks Creek riparian corridor currently serve as an ecologically-important greenway link between undeveloped areas to the east and west of the Township. The integrity of this greenway should be maintained through land preservation, conservation, and public education and involvement.

8.0 REFERENCES

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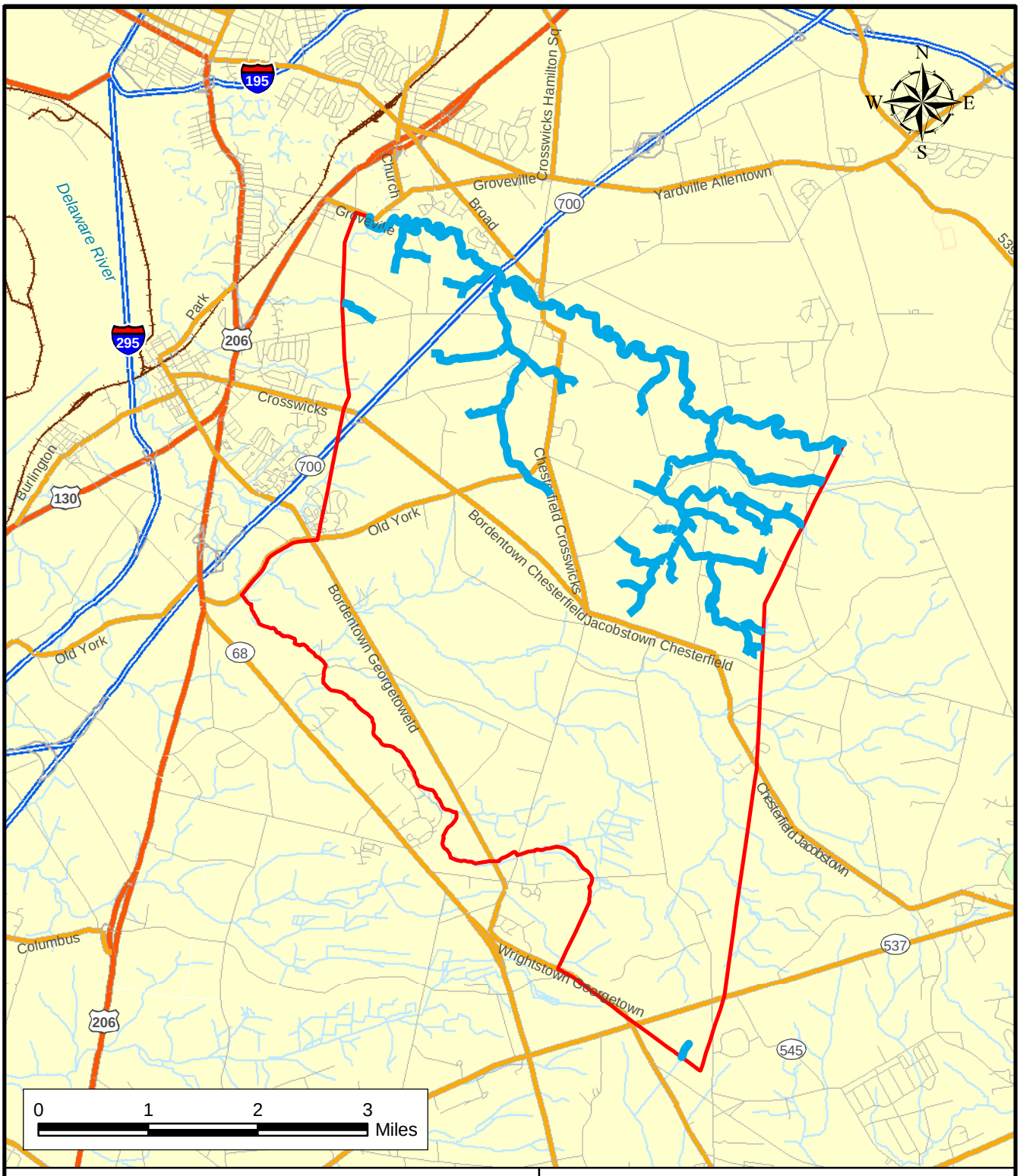
FIGURES



Legend

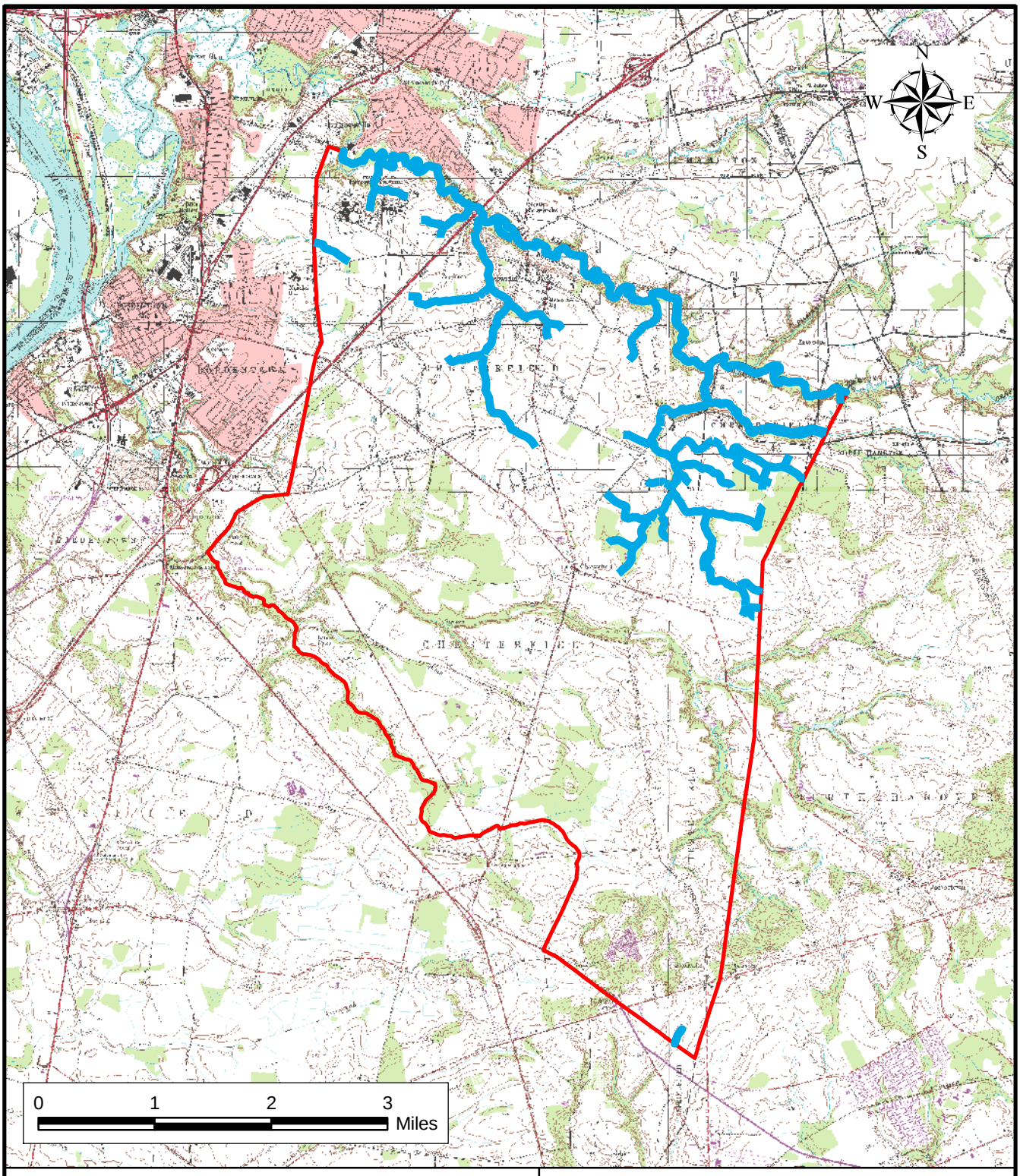
- Chesterfield Township
- Crosswick Creek Drainage System

SOURCE:
ESRI StreetMap USA, 2000

amec Earth & Environmental

Figure 1
Site Location Map
Crosswicks Creek Watershed NRI
Chesterfield Twp., Burlington Co., NJ

Rev. By: PP	Contract No.: 676200000.0001	07/02/2006



Legend

Chesterfield Township

Crosswick Creek Drainage System

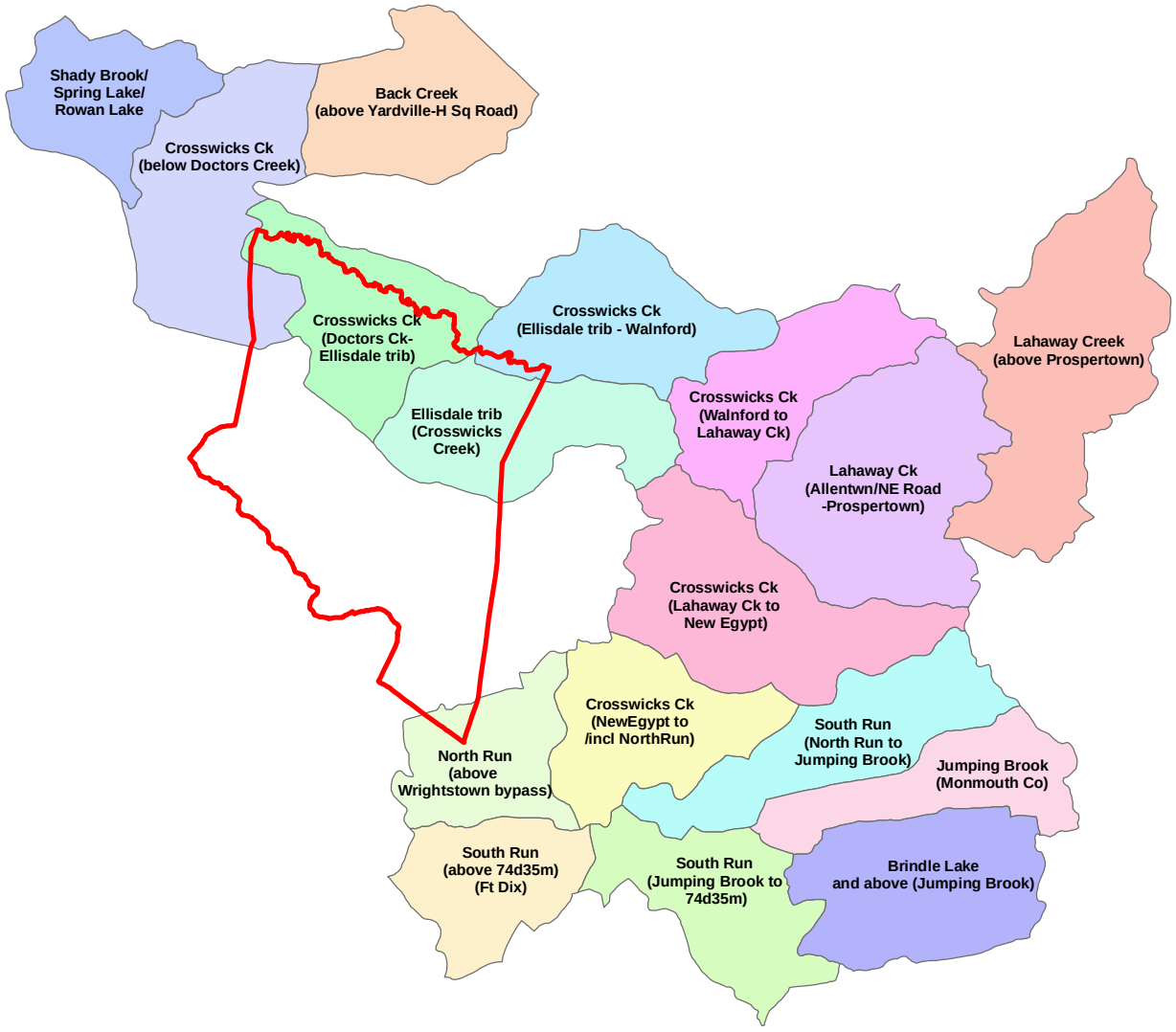
Image Source:

USGS Topographic Quad Map
Allentown, NJ, 1957, photorevised 1981
Columbus, NJ, 1957, photorevised 1981
New Egypt, NJ, 1957, photoinspected 1977
Trenton East, NJ-PA, phororevised 1981

amec Earth & Environmental

Figure 2
USGS Topographic Quad Map
Crosswicks Creek Watershed NRI
Chesterfield Twp., Burlington Co., NJ

Rev. By: PP	Contract No.: 676200000.0001	07/02/2006



Legend

Chesterfield Township

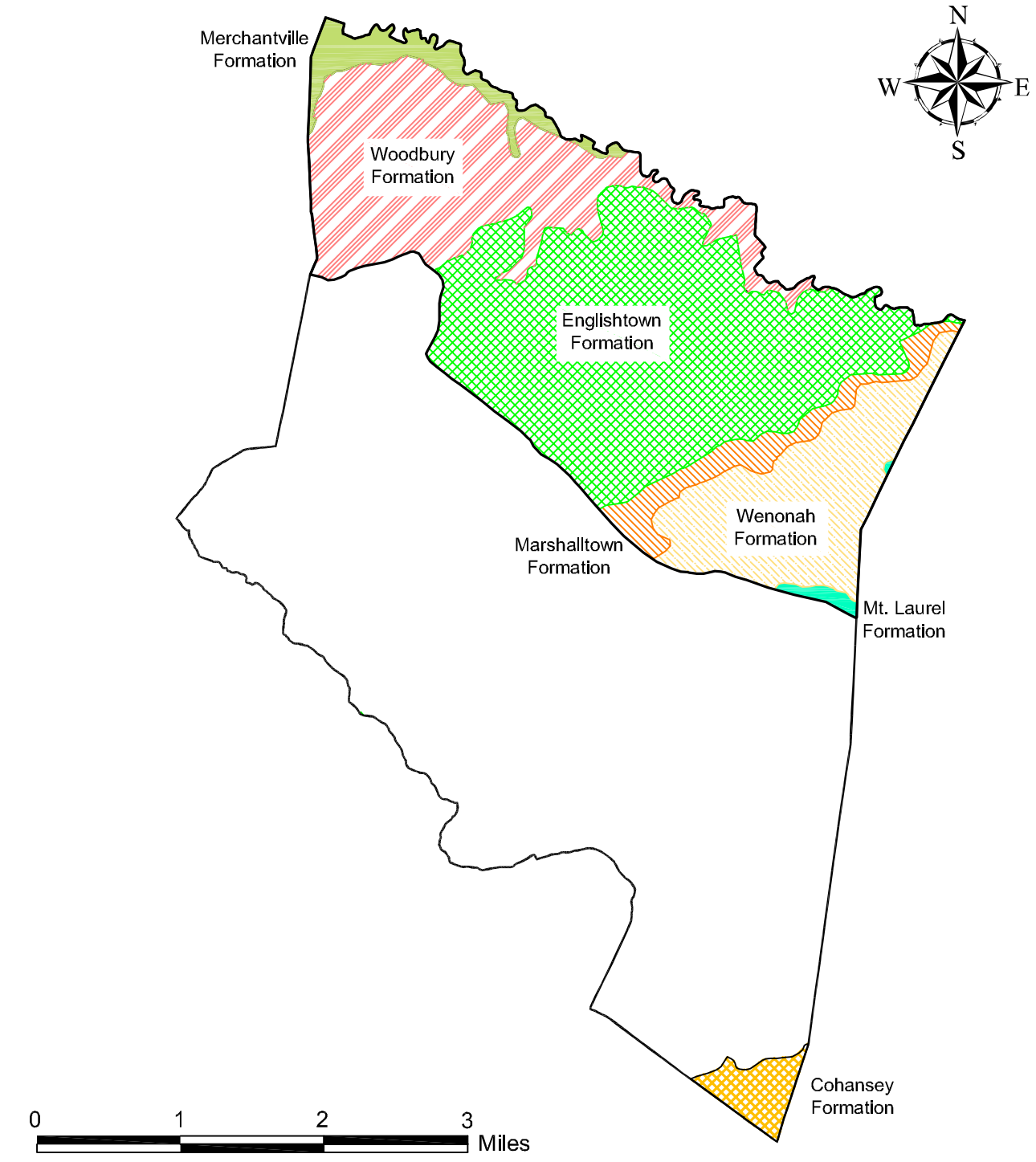
Crosswick Creek Drainage System

SOURCE:
NJ Department of Environmental Protection (NJDEP)
New Jersey Geological Survey (NJGS)
NJDEP Hydrologic Unit Code
Delineations for New Jersey (DEPHUC14), 1999

amec Earth & Environmental

Figure 3
Crosswick Creek Watershed
Crosswicks Creek Watershed NRI
Chesterfield Twp., Burlington Co., NJ

Rev. By: PP	Contract No.: 676200000.0001	07/02/2006



LEGEND

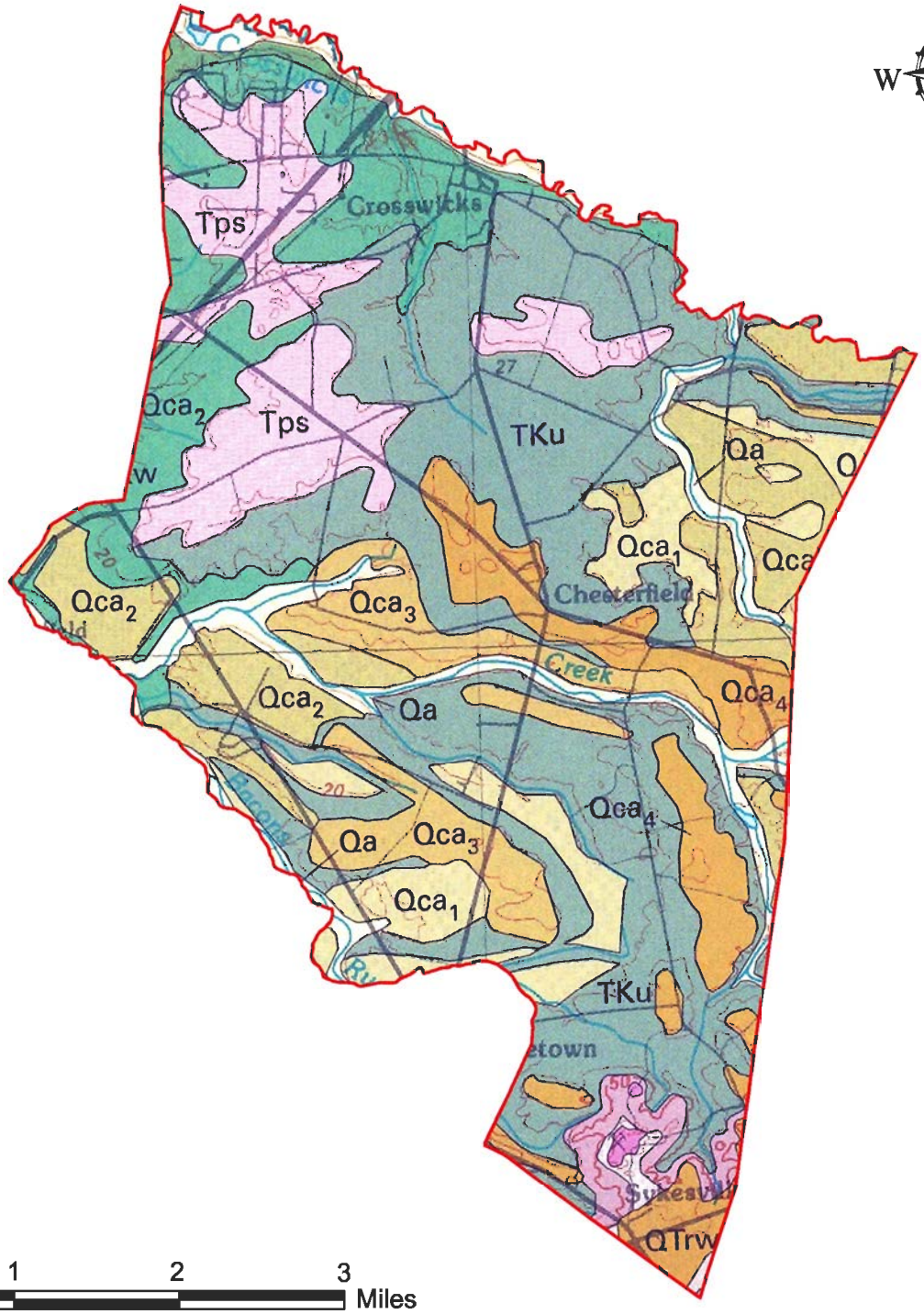
- Chesterfield Twp.

IMAGE SOURCE:
Bedrock geology for New Jersey, CD-01, 1999
New Jersey Department of Environmental Protection (NJDEP)
New Jersey Geological Survey (NJGS)

amec Earth & Environmental

Figure 4
USGS Bedrock Geology Map
Crosswicks Creek Watershed NRI
Chesterfield Twp., Burlington Co., NJ

Rev. By: PP	Contract No.: 676200000.0001	rev. 07-02-06



LEGEND

- Chesterfield Twp.
- Qa - Alluvium (Holocene)
- Qca1 - Colluvium & alluvium unit 1 (Pleistocene)
- Qca2 - Colluvium & alluvium unit 2 (Pleistocene)
- Qca3 - Colluvium & alluvium unit 3 (Pleistocene)
- Qca4 - Colluvium & alluvium unit 4 (Pleistocene)
- TKu - Marshalltown formation to Shark River formation, undivided (Upper Cretaceous to Eocene)
- Tps - Pensauken Formation (late Miocene ? to Pliocene)

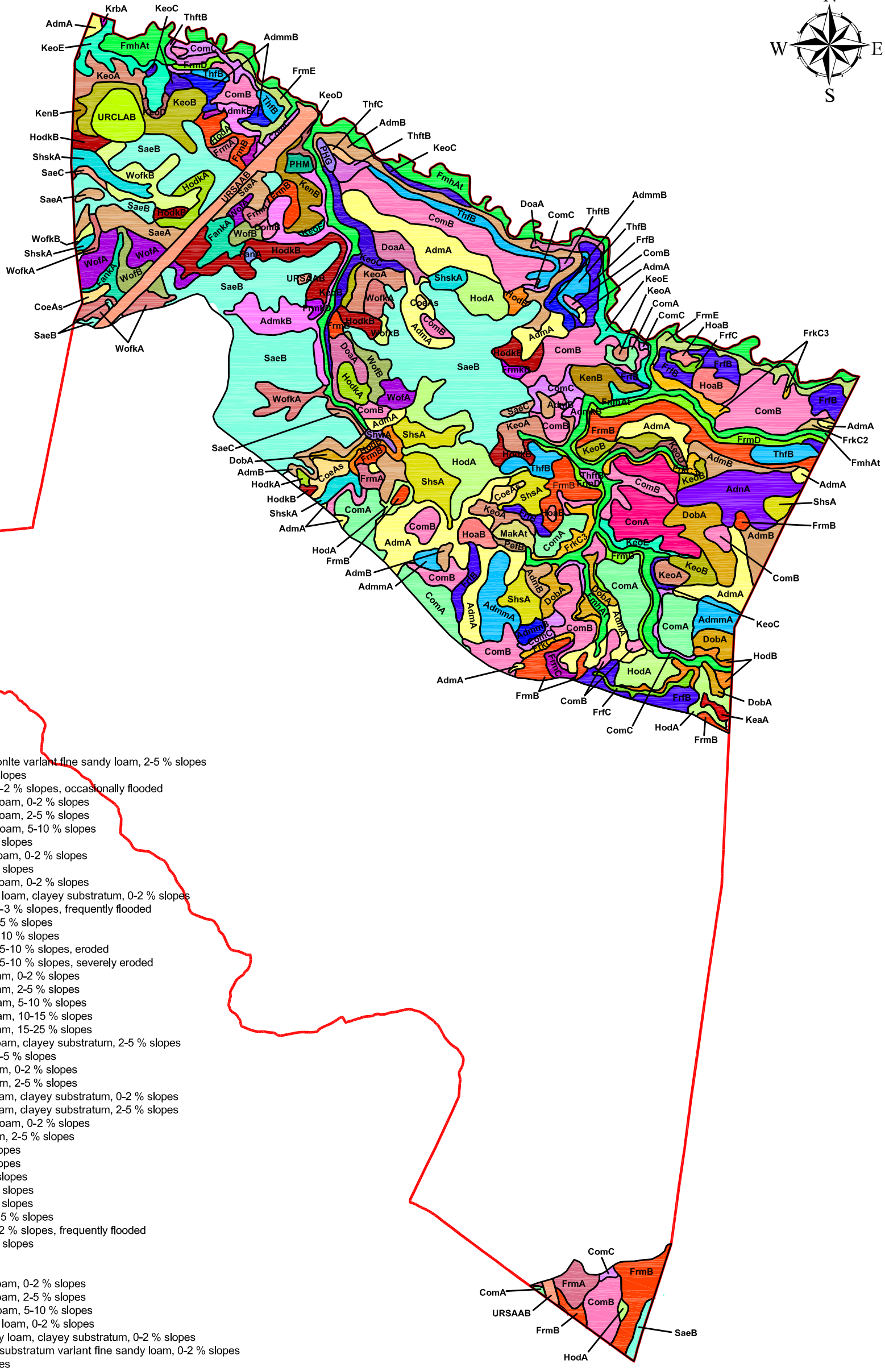
IMAGE SOURCE:

USGS Surficial geologic map of central and southern NJ
Prepared in cooperation with the NJGS, 2000
Miscellaneous Investigation Series Map I-2540-D

amec Earth & Environmental

Figure 5
USGS Surficial Geology Map
Crosswicks Creek Watershed NRI
Chesterfield Twp., Burlington Co., NJ

Rev. By: PP	Contract No.: 676200000.0001	rev. 07-02-06



LEGEND

- Chesterfield Twp.

AdmmB - Adelphia high glauconite variant fine sandy loam, 2-5 % slopes
AdnA - Adelphia loam, 0-2 % slopes
CoeAs - Colemantown loam, 0-2 % slopes, occasionally flooded
ComA - Collington fine sandy loam, 0-2 % slopes
ComB - Collington fine sandy loam, 2-5 % slopes
ComC - Collington fine sandy loam, 5-10 % slopes
ConA - Collington loam, 0-2 % slopes
DoaA - Donlonton fine sandy loam, 0-2 % slopes
DobA - Donlonton loam, 0-2 % slopes
FanA - Fallsington fine sandy loam, 0-2 % slopes
FankA - Fallsington fine sandy loam, clayey substratum, 0-2 % slopes
FmhAt - Fluvaquents, loamy, 0-3 % slopes, frequently flooded
FrfB - Freehold loamy sand, 0-5 % slopes
FrfC - Freehold loamy sand, 5-10 % slopes
FrkC2 - Freehold sandy loam, 5-10 % slopes, eroded
FrkC3 - Freehold sandy loam, 5-10 % slopes, severely eroded
FrmA - Freehold fine sandy loam, 0-2 % slopes
FrmB - Freehold fine sandy loam, 2-5 % slopes
FrmC - Freehold fine sandy loam, 5-10 % slopes
FrmD - Freehold fine sandy loam, 10-15 % slopes
FrmE - Freehold fine sandy loam, 15-25 % slopes
FrmkB - Freehold fine sandy loam, clayey substratum, 2-5 % slopes
HoaB - Holmdel loamy sand, 0-5 % slopes
HodA - Holmdel fine sandy loam, 0-2 % slopes
HodB - Holmdel fine sandy loam, 2-5 % slopes
HodkA - Holmdel fine sandy loam, clayey substratum, 0-2 % slopes
HodkB - Holmdel flne sandy loam, clayey substratum, 2-5 % slopes
KeaA - Keansburg fine sandy loam, 0-2 % slopes
KenB - Keyport flne sandy loam, 2-5 % slopes
KeoA - Keyport loam, 0-2 % slopes
KeoB - Keyport loam, 2-5 % slopes
KeoC - Keyport loam, 5-10 % slopes
KeoD - Keyport loam, 10-15 % slopes
KeoE - Keyport loam, 15-25 % slopes
KrbA - Kresson loamy sand, 0-5 % slopes
MakAt - Manahawkin muck, 0-2 % slopes, frequently flooded
PefB - Pemberton sand, 0-5 % slopes
PHG - Pits, sand and gravel
PHM - Pits, clay
SaeA - Sassafras fine sandy loam, 0-2 % slopes
SaeB - Sassafras fine sandy loam, 2-5 % slopes
SaeC - Sassafras fine sandy loam, 5-10 % slopes
ShsA - Shrewsbury fine sandy loam, 0-2 % slopes
ShskA - Shrewsbury fine sandy loam, clayey substratum, 0-2 % slopes
ShwA - Shrewsbury ironstone substratum variant fine sandy loam, 0-2 % slopes
ThfB - Tinton sand, 0-5 % slopes
ThfC - Tinton sand, 5-10 % slopes
ThftB - Tinton sand, thick surface, 0-5 % slopes
URCLAB - Urban land, clayey substratum, 0-8 % slopes
URSAAB - Urban land, sandy, 0-8 % slopes
WofA - Woodstown flne sandy loam, 0-2 % slopes
WofB - Woodstown fine sandy loam, 2-5 % slopes
WofkA - Woodstown fine sandy loam, clayey substratum, 0-2 % slopes
WofkB - Woodstown fine sandy loam, clayey substratum, 2-5 % slopes

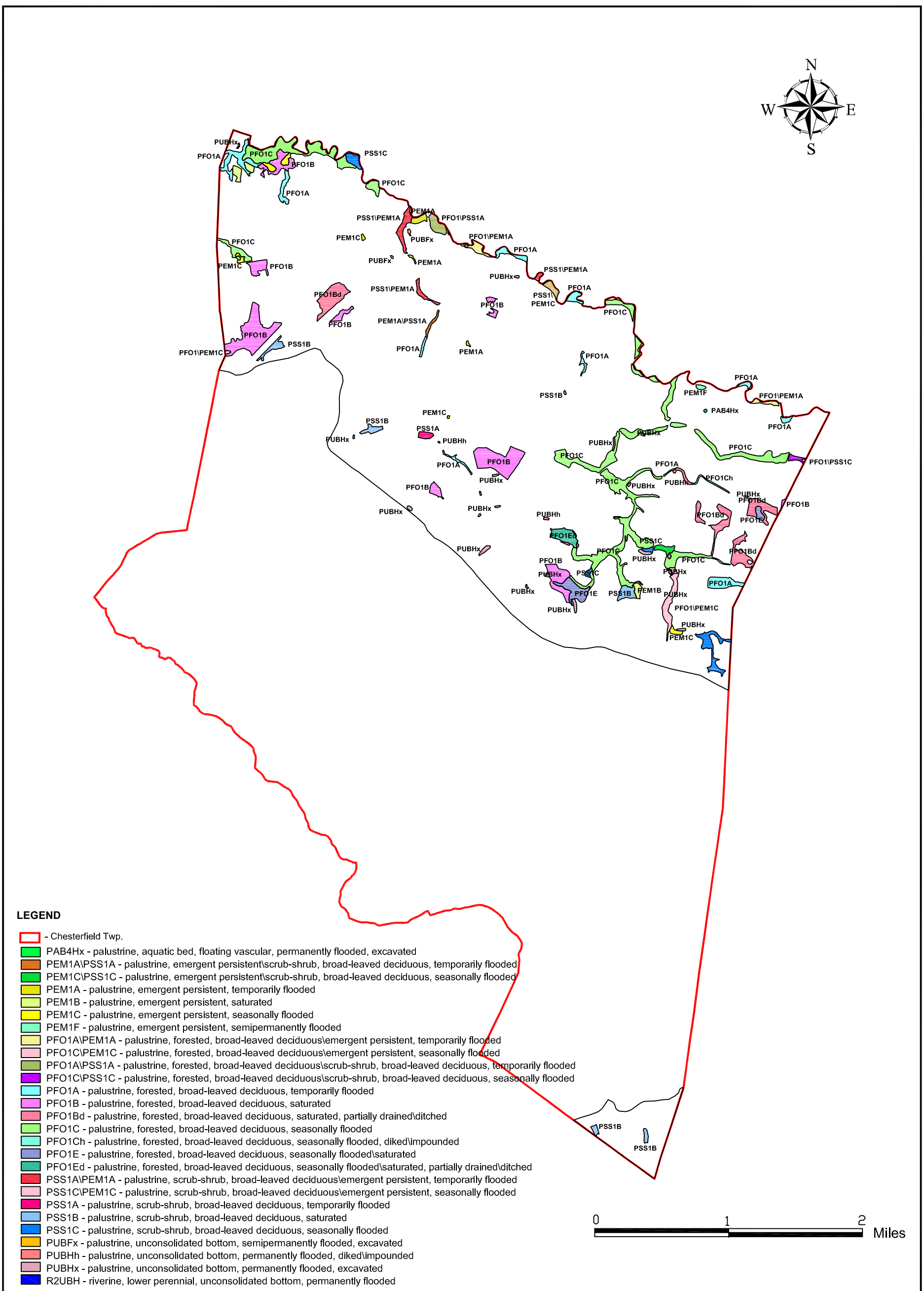
SOURCE:

U.S. Department of Agrlculture, Natural Resources Conservatlon Servlce (NRCS)
New Jersey Department of Environmental Protection (NJDEP)
Soil Survey Geographic 2005 (SSURGO) Database for Burlington County, New Jersey

amec Earth & Environmental

Figure 6
USDA SSURGO Soil Map
Crosswicks Creek Watershed NRI
Chesterfield Twp., Burlington Co., NJ

Rev. By: PP	Contract No.: 676200000.0001	rev. 07-27-06



LEGEND

- - Chesterfield Twp.
- PAB4Hx - palustrine, aquatic bed, floating vascular, permanently flooded, excavated
- PEM1A\PSS1A - palustrine, emergent persistent\scrub-shrub, broad-leaved deciduous, temporarily flooded
- PEM1C\PSS1C - palustrine, emergent persistent\scrub-shrub, broad-leaved deciduous, seasonally flooded
- PEM1A - palustrine, emergent persistent, temporarily flooded
- PEM1B - palustrine, emergent persistent, saturated
- PEM1C - palustrine, emergent persistent, seasonally flooded
- PEM1F - palustrine, emergent persistent, semipermanently flooded
- PFO1A\PEM1A - palustrine, forested, broad-leaved deciduous\emergent persistent, temporarily flooded
- PFO1C\PEM1C - palustrine, forested, broad-leaved deciduous\emergent persistent, seasonally flooded
- PFO1A\PSS1A - palustrine, forested, broad-leaved deciduous\scrub-shrub, broad-leaved deciduous, temporarily flooded
- PFO1C\PSS1C - palustrine, forested, broad-leaved deciduous\scrub-shrub, broad-leaved deciduous, seasonally flooded
- PFO1A - palustrine, forested, broad-leaved deciduous, temporarily flooded
- PFO1B - palustrine, forested, broad-leaved deciduous, saturated
- PFO1Bd - palustrine, forested, broad-leaved deciduous, saturated, partially drained\ditched
- PFO1C - palustrine, forested, broad-leaved deciduous, seasonally flooded
- PFO1Ch - palustrine, forested, broad-leaved deciduous, seasonally flooded, diked\impounded
- PFO1E - palustrine, forested, broad-leaved deciduous, seasonally flooded\saturated
- PFO1Ed - palustrine, forested, broad-leaved deciduous, seasonally flooded\saturated, partially drained\ditched
- PSS1A\PEM1A - palustrine, scrub-shrub, broad-leaved deciduous\emergent persistent, temporarily flooded
- PSS1C\PEM1C - palustrine, scrub-shrub, broad-leaved deciduous\emergent persistent, seasonally flooded
- PSS1A - palustrine, scrub-shrub, broad-leaved deciduous, temporarily flooded
- PSS1B - palustrine, scrub-shrub, broad-leaved deciduous, saturated
- PSS1C - palustrine, scrub-shrub, broad-leaved deciduous, seasonally flooded
- PUBFx - palustrine, unconsolidated bottom, semipermanently flooded, excavated
- PUBHh - palustrine, unconsolidated bottom, permanently flooded, diked\impounded
- PUBHx - palustrine, unconsolidated bottom, permanently flooded, excavated
- R2UBH - riverine, lower perennial, unconsolidated bottom, permanently flooded

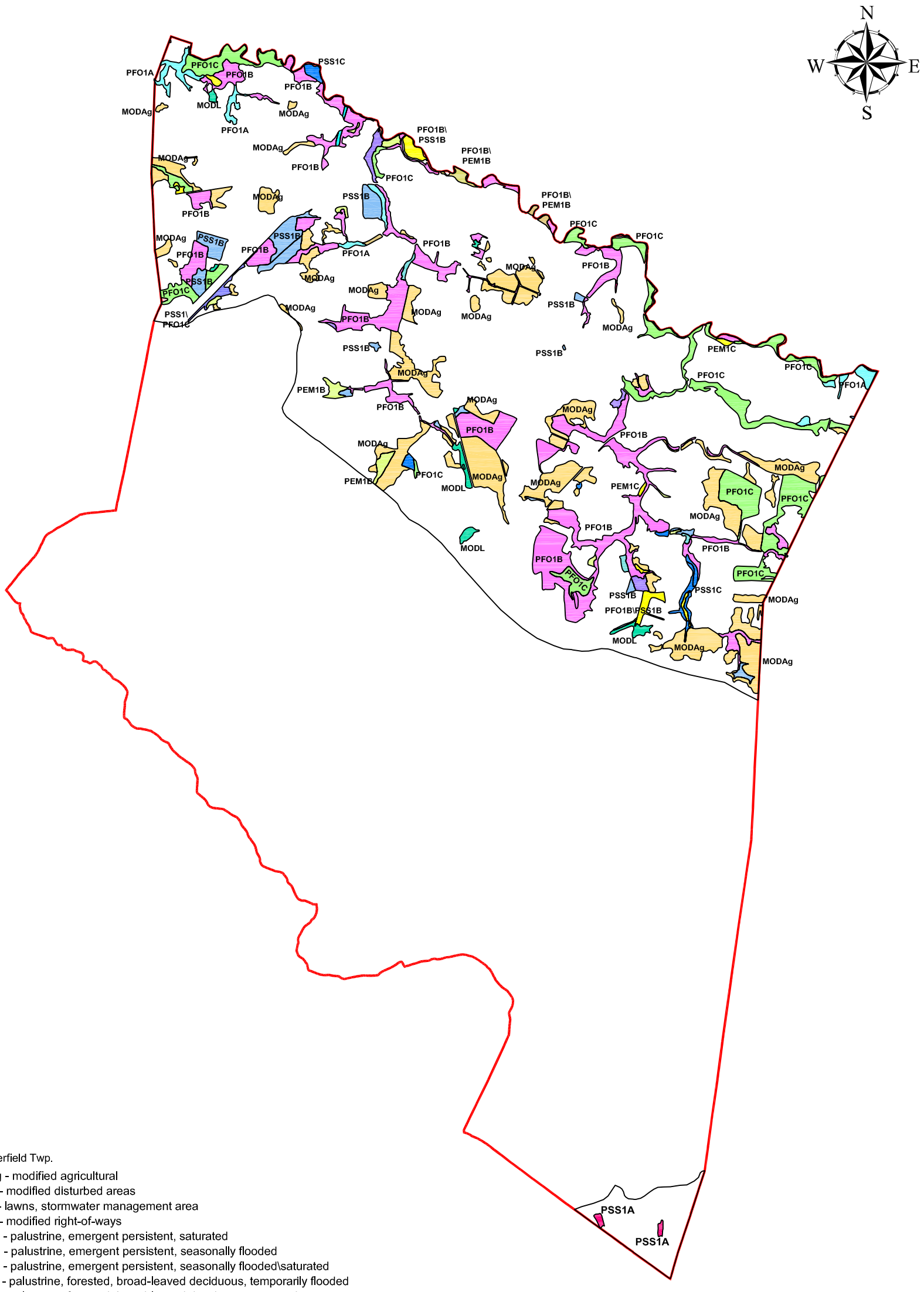
SOURCE:

U.S. Fish and Wildlife Service
Branch of Habitat Assessment
National Wetlands Inventory Polygon Data
Wetlands Online Mapper, publication 2004

amec Earth & Environmental

Figure 7
National Wetlands Inventory (NWI) Map
Crosswicks Creek Watershed NRI
Chesterfield Twp., Burlington Co., NJ

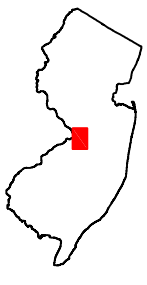
Rev. By: PP	Contract No.: 676200000.0001	rev. 07-27-06



LEGEND

- Chesterfield Twp.
- MODAg - modified agricultural
- MODD - modified disturbed areas
- MODL - lawns, stormwater management area
- MODR - modified right-of-ways
- PEM1B - palustrine, emergent persistent, saturated
- PEM1C - palustrine, emergent persistent, seasonally flooded
- PEM1E - palustrine, emergent persistent, seasonally flooded\saturated
- PFO1A - palustrine, forested, broad-leaved deciduous, temporarily flooded
- PFO1B - palustrine, forested, broad-leaved deciduous, saturated
- PFO1B\PEM1B - palustrine, forested, broad-leaved deciduous, saturated\emergent persistent
- PFO1B\PSS1B - palustrine, forested, broad-leaved deciduous, saturated\scrub-shrub, broad-leaved deciduous
- PFO1C - palustrine, forested, broad-leaved deciduous, seasonally flooded
- PFO1C\PEM1C - palustrine, forested, broad-leaved deciduous, seasonally flooded\emergent persistent
- PSS1A - palustrine, scrub-shrub, broad-leaved deciduous, temporarily flooded
- PSS1B - palustrine, scrub-shrub, broad-leaved deciduous, saturated
- PSS1B\PEM1B - palustrine, scrub-shrub, broad-leaved deciduous, saturated\emergent persistent
- PSS1B\PFO1B - palustrine, scrub-shrub, broad-leaved deciduous, saturated\forested, broad-leaved deciduous
- PSS1C - palustrine, scrub-shrub, broad-leaved deciduous, seasonally flooded
- PSS1C\PEM1C - palustrine, scrub-shrub, broad-leaved deciduous, seasonally flooded\emergent persistent
- PSS1C\PFO1C - palustrine, scrub-shrub, broad-leaved deciduous, seasonally flooded\forested, broad-leaved deciduous

0 1 2 Miles



SOURCE:

Bureau of Geographic Information and Analysis (BGIA)
New Jersey Department of Environmental Protection (NJDEP)
Wetlands of Burlington County, New Jersey, 1986

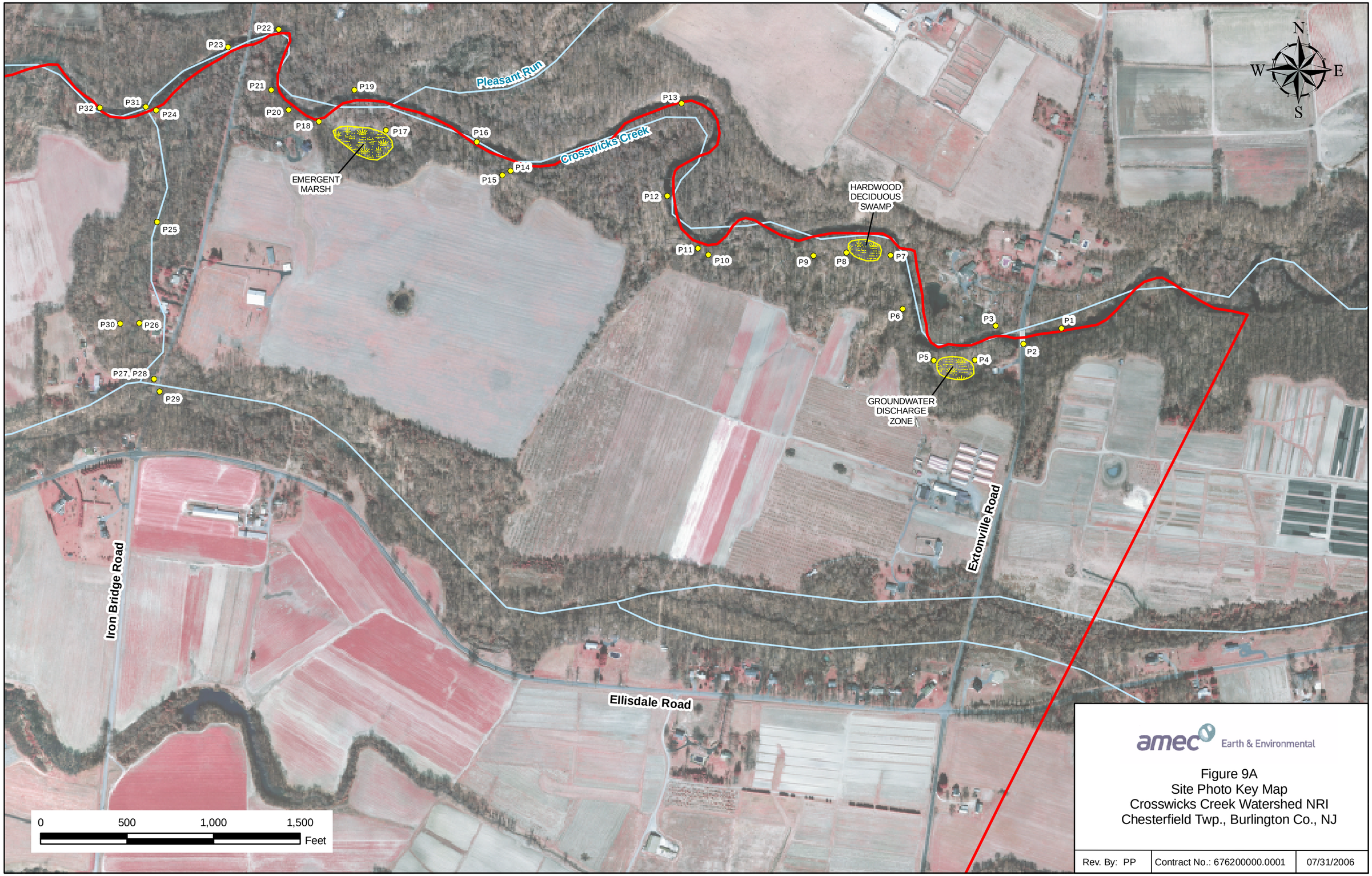
amec Earth & Environmental

Figure 8
New Jersey Freshwater Wetlands Map
Crosswicks Creek Watershed NRI
Chesterfield Twp., Burlington Co., NJ

Rev. By: PP	Contract No.: 676200000.0001	rev. 07-27-06

APPENDIX A

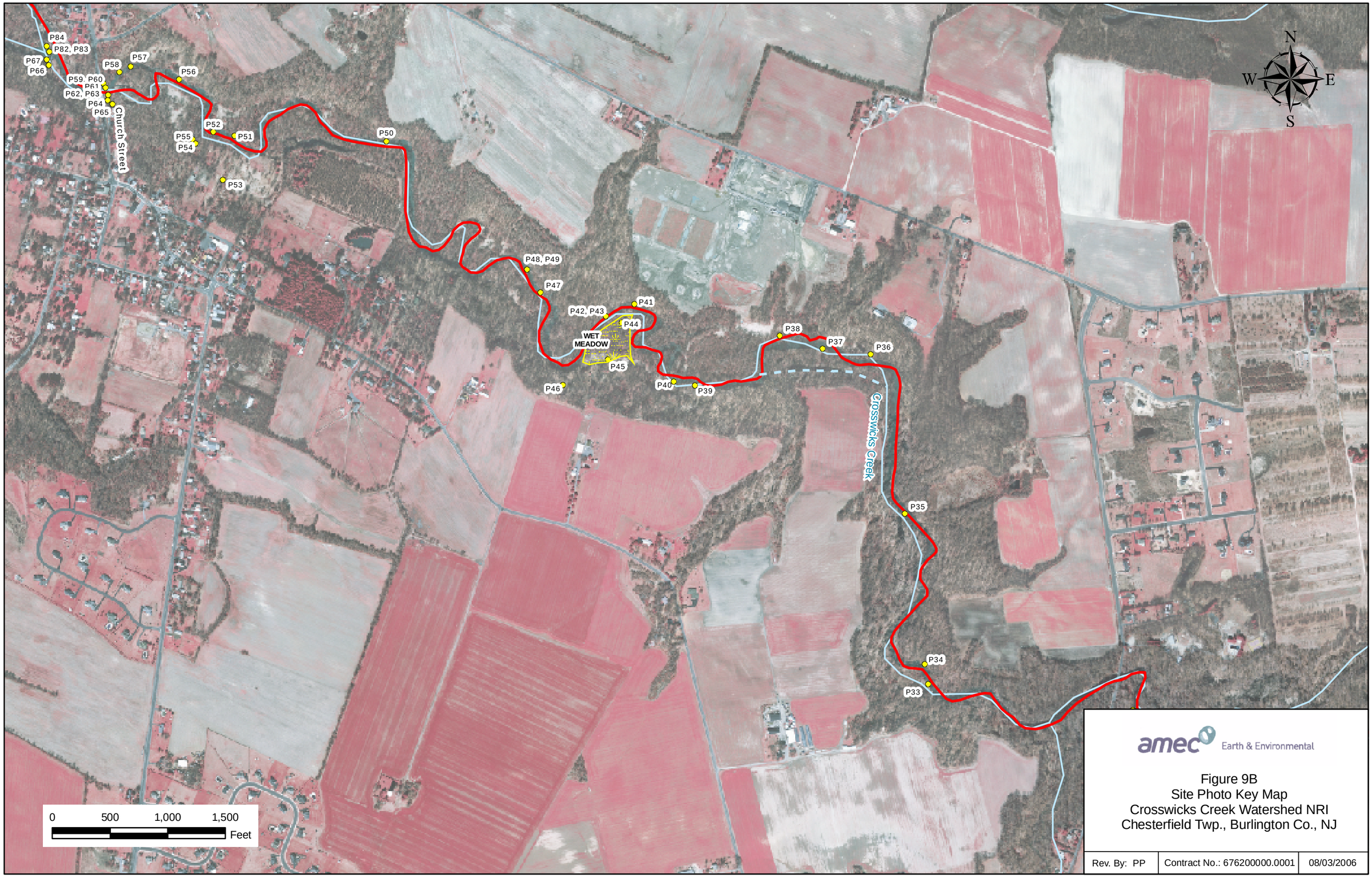
Site Photographs and Key Map



amec Earth & Environmental

Figure 9A
Site Photo Key Map
Crosswicks Creek Watershed NRI
Chesterfield Twp., Burlington Co., NJ

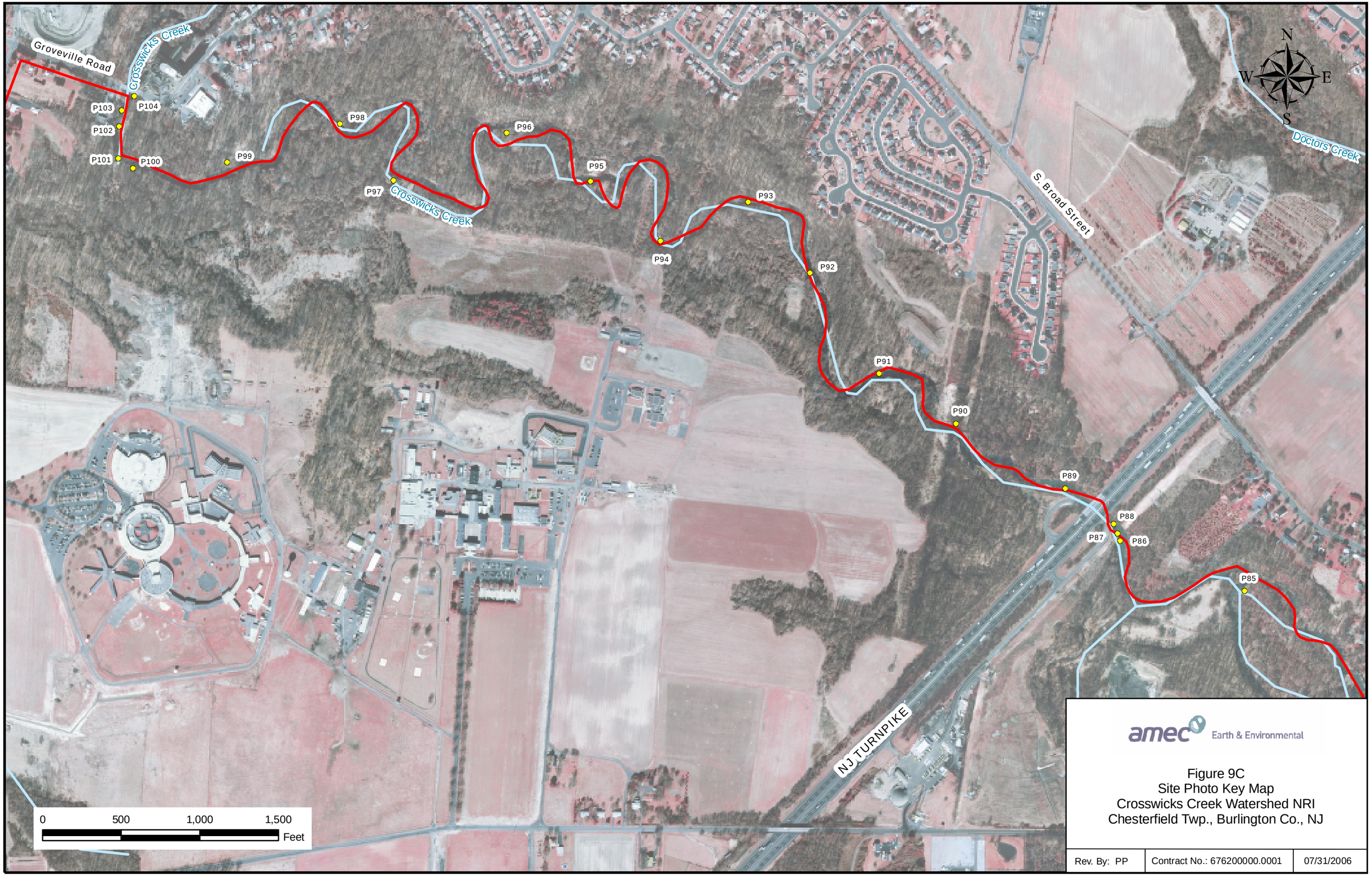
Rev. By: PP	Contract No.: 676200000.0001	07/31/2006



amec Earth & Environmental

Figure 9B
Site Photo Key Map
Crosswicks Creek Watershed NRI
Chesterfield Twp., Burlington Co., NJ

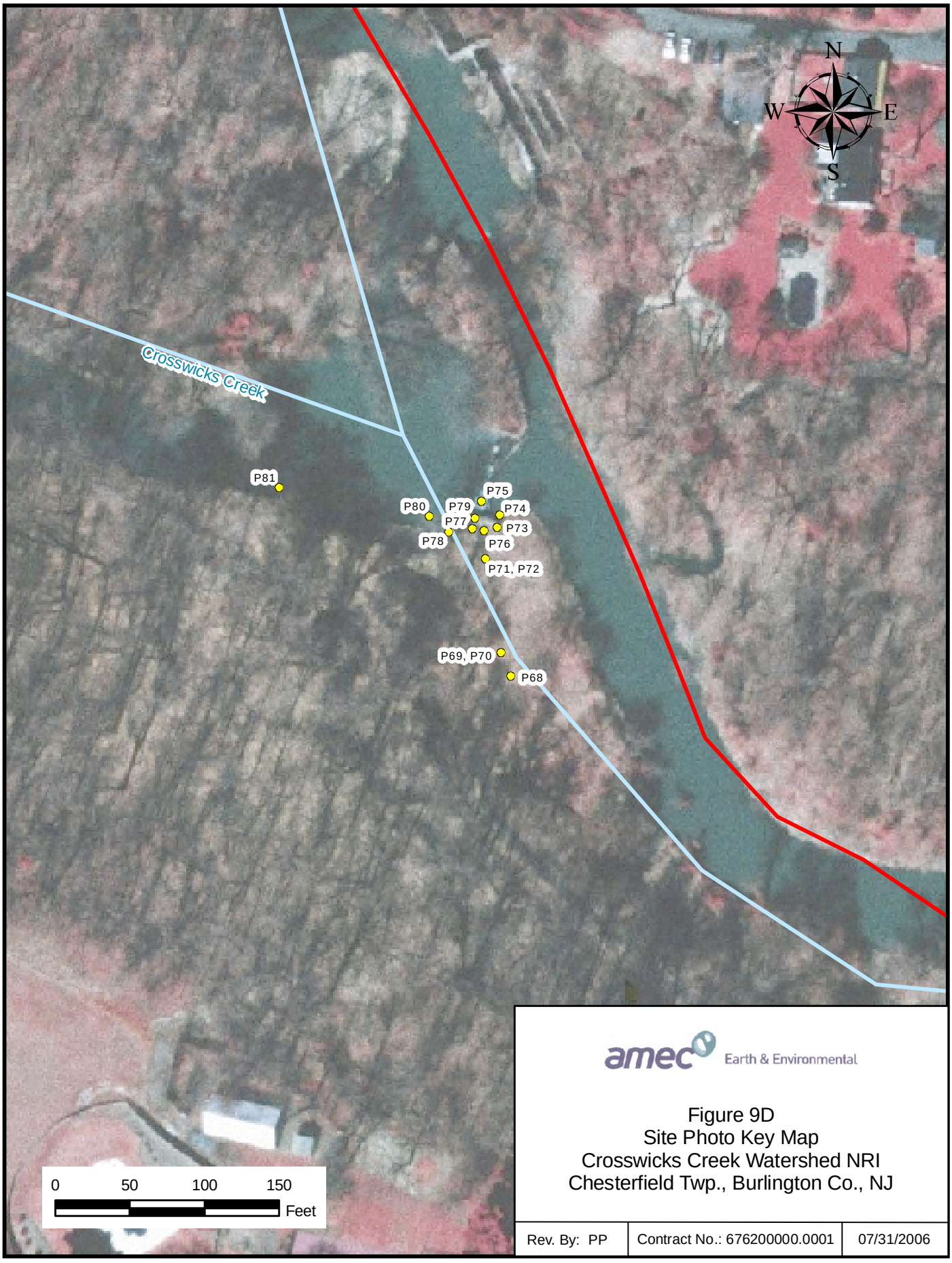
Rev. By: PP	Contract No.: 676200000.0001	08/03/2006



amec Earth & Environmental

Figure 9C
Site Photo Key Map
Crosswicks Creek Watershed NRI
Chesterfield Twp., Burlington Co., NJ

Rev. By: PP	Contract No.: 676200000.0001	07/31/2006



amec Earth & Environmental

Figure 9D
Site Photo Key Map
Crosswicks Creek Watershed NRI
Chesterfield Twp., Burlington Co., NJ

Rev. By: PP	Contract No.: 676200000.0001	07/31/2006

Photo 1: Extonville Road bridge, viewed from upstream (outside of study area), facing downstream (west).

Photo 2: USGS Gaging Station No. 01464500 located at the Extonville Road bridge.

Photo 3: Crosswicks Creek immediately downstream of the Extonville Road bridge, viewed from upstream, facing downstream (west).

Photo 4: Tributary located in forested deciduous wetland, downstream of the Extonville Road bridge.

Photo 5: Large groundwater discharge area located at bottom of slope.
N 40.13655^{o}; W 074.60211^{o} (WGS 84).

Photo 6: Tributary located downgradient of groundwater seep depicted in Photo 5.

Photo 7: Transcontinental pipeline crossing right-of-way.
N 40.13822°; W 074.60301° (WGS 84).

Photo 8: Hardwood deciduous swamp.

Photo 9: Tributary located downstream of the swamp depicted in Photo 8.

Photo 10: Emergent marsh.

Photo 11: Tributary located downstream of the emergent marsh depicted in Photo 10.

Photo 12: Typical log jam on Crosswicks Creek.

Photo 13: General view of Crosswicks Creek, facing downstream (west/southwest).

Photo 14: General view of small tributary.

Photo 15: Evidence of recent beaver activity.
N 40.13948^{o}; W 074.61103^{o} (WGS 84).

Photo 16: General view of Crosswicks Creek, facing downstream (west).

Photo 17: Upstream end (eastern end) of large emergent marsh.
N 40.14019°; W 074.61344° (WGS 84).

Photo 18: Downstream end (western end) of large emergent marsh.

Photo 19: General view of Crosswicks Creek, facing downstream (west).

Photo 20: Additional emergent marsh located downstream of areas depicted on Photos 17 and 18.

Photo 21: General view of Crosswicks Creek, viewed from the Chesterfield Township shoreline, facing downstream (north).

Photo 22: Iron Bridge Road, viewed from upstream, facing downstream (west/southwest).

Photo 23: General view of Crosswicks Creek downstream of Iron Bridge Road, facing downstream (southwest).

Photo 24: Confluence of large tributary and Crosswicks Creek, viewed from Chesterfield Township, facing north. N 40.14050^{o}; W 074.61819^{o} (WGS 84).

Photo 25: Farther upstream on the large tributary depicted in Photo 24.

Photo 26: Farther upstream on the large tributary depicted in Photo 25.
N 40.13702^{o}; W 074.61865^{o} (WGS 84).

Photo 27: View of the large tributary from the Gendron property driveway bridge, facing downstream (north). N 40.13624^{o}; W 074.61823^{o} (WGS 84).

Photo 28: View of large tributary from the Gendron property driveway bridge, facing upstream (south). N 40.13624^{o}; W 074.61823^{o} (WGS 84).

Photo 29: Tributary viewed from Iron Bridge Road.

Photo 30: Skunk cabbage groundcover within forested deciduous wetland community. N 40.137127^{o}; W 074.61893^{o} (WGS 84).

Photo 31: Alternate view of confluence of large tributary (right side of photo) with Crosswicks Creek, viewed facing upstream (east).

Photo 32: Another confluence of a large tributary to Crosswicks Creek, facing downstream and towards Chesterfield Township (southwest).

Photo 33: Potential vernal habitat along Crosswicks Creek riparian corridor.

Photo 34: Typical log jam across Crosswicks Creek.

Photo 35: General view of Crosswicks Creek, facing downstream (north/northwest).

Photo 36: General view of Crosswicks Creek, facing downstream (west).

Photo 37: General view of Crosswicks Creek, facing downstream (west).

Photo 38: Entrenched stream channel, facing downstream (west).

Photo 39: Large log jam across Crosswicks Creek, facing downstream (west).

Photo 40: Continuation of large log jam depicted in Photo 39, farther downstream.

Photo 41: General view of Crosswicks Creek, facing downstream (west).

Photo 42: General view of Crosswicks Creek, viewed from the Chesterfield Township shoreline, facing downstream (southwest).

Photo 43: Alternate view of Crosswicks Creek depicted in Photo 42, but facing upstream (northeast).

Photo 44: Downgradient end (northern end) of a wet meadow community.
N 40.14915^{o}; W 074.63210^{o} (WGS 84).

Photo 45: Upgradient end (southern end) of a wet meadow community.

Photo 46: Small, dry tributary.

Photo 47: View of a mid-channel island, facing downstream (northwest).

Photo 48: General view of Crosswicks Creek to the south side (Chesterfield Township side) of the mid-channel island.

Photo 49: General view of Crosswicks Creek on the north side (Hamilton Township side) of the mid-channel island.

Photo 50: General view of Crosswicks Creek, facing downstream (west).

Photo 51: General view of Crosswicks Creek, facing upstream (east).

Photo 52: General view of Crosswicks Creek, facing downstream (northwest).

Photo 53: Northern black racer (*Coluber constrictor constrictor*).
N 40.15341°; W 074.64404° (WGS 84).

Photo 54: Floodplain forest.

Photo 55: Alternate view of floodplain forest depicted in Photo 54.

Photo 56: General view of Crosswicks Creek, facing downstream (northwest).

Photo 57: General view of Crosswicks Creek, facing downstream (west).

Photo 58: Church Street bridge, facing downstream (southwest).

Photo 59: View of Crosswicks Creek from atop the Church Street bridge, facing downstream (west).

Photo 60: Church Street bridge, facing north (towards Hamilton Township).

Photo 61: View of Crosswicks Creek from atop the Church Street bridge, facing upstream (east).

Photo 62: Entrance trail on Township-owned property identified as Block 106, Lot 17.

Photo 63: Alternate view of entrance trail depicted in Photo 62.

Photo 64: View of the frontage for the Township-owned parcel identified as Block 106, Lot 17. The entrance is located on the right side of the photo, immediately past the 35 mph speed limit sign. The view is from the bridge, facing into Chesterfield Township (south).

Photo 65: Alternate view of the entrance for the Township-owned parcel identified as Block 106, Lot 17. The driveway is situated between the “No Motor Vehicles” sign and the end of the guard rail. The view is from across the street, facing towards the property (west).

Photo 66: The ice house dam, viewed from the center of Crosswicks Creek, facing downstream (northwest).

Photo 67: Chesterfield Township side of the ice house dam (southwestern side), facing downstream (northwest).

Photo 68: Drainage path alongside trail on the Township-owned parcel.

Photo 69: Drainage path leading through scrub-shrub wetlands on the Township-owned parcel.

Photo 70: Another drainage path that bisects the Township-owned parcel.

Photo 71: Corrugated plastic pipe inlet on the Township-owned parcel.

Photo 72: Downgradient end of the pipe depicted in Photo 71.

Photo 73: General view of the flat upland area on the Township-owned parcel.

Photo 74: Alternate view of the flat upland area depicted in Photo 73. This particular view is close to the shoreline.

Photo 75: General view of the flat upland area, viewed from the ice house dam, facing landward (south). N 40.15637°; W 074.64934° (WGS 84).

Photo 76: The ice house dam, viewed from the Township-owned parcel, facing north. N 40.15637°; W 074.64934° (WGS 84).

Photo 77: The downstream side of the ice house dam, viewed from the Township-owned parcel, facing slightly upstream (east).

Photo 78: One example of several semi-permanent or permanent pools located on the Township-owned parcel.

Photo 79: General view of the shoreline proposed to be a likely candidate for a canoe/kayak launch. The view is from atop the ice house dam, facing downstream (west).

Photo 80: General view of the proposed canoe/kayak launch location, facing upstream (east). The ice house dam is in the background of the photo. N 40.15580^{o}; W 074.64909^{o} (WGS 84).

Photo 81: The side channel of Crosswicks Creek situated downstream of the ice house dam.

Photo 82: The Hamilton Township side of the ice house dam area.

Photo 83: Pool area Immediately upstream of the ice house dam on the Hamilton Township side, facing downstream (northwest).

Photo 84: Ice house located on the Hamilton Township shoreline.

Photo 85: General view of the confluence of Crosswicks Creek and the side channel, facing downstream (northwest).

Photo 86: General view of Crosswicks Creek as it nears the NJ Turnpike bridge, facing downstream (northwest).

Photo 87: General view of the Chesterfield Township shoreline immediately upstream of the NJ Turnpike bridge.

Photo 88: The NJ Turnpike bridge, viewed from upstream, facing downstream (northwest).

Photo 89: Side channel bar on the Chesterfield Township side, immediately downstream of the NJ Turnpike bridge.

Photo 90: General view of Crosswicks Creek, facing downstream (west) within the vicinity of the multi-utility right-of-way, located west of the NJ Turnpike bridge.

Photo 91: General view of Crosswicks Creek, facing downstream (west).

Photo 92: General view of Crosswicks Creek, facing downstream (north/northwest).

Photo 93: General view of Crosswicks Creek, facing downstream (west).

Photo 94: General view of Crosswicks Creek, facing downstream (north).

Photo 95: General view of Crosswicks Creek, facing downstream (west).

Photo 96: General view of Crosswicks Creek, facing downstream (west).

Photo 97: General view of Crosswicks Creek, facing downstream (northwest).

Photo 98: General view of Crosswicks Creek, facing downstream (west).

Photo 99: General view of Crosswicks Creek, facing downstream (west).

Photo 100: General view of Crosswicks Creek, facing downstream (west).

Photo 101: General view of Crosswicks Creek, facing downstream (north).

Photo 102: General view of Crosswicks Creek, facing downstream (north).

Photo 103: Groveville Road bridge, viewed from Crosswicks Creek, facing downstream (north/northeast).

Photo 104: Canoe/kayak launch at Anchor Thread Park in historic Groveville.

APPENDIX B

Landowners Adjacent to Crosswicks Creek and Respective Tax Maps

Chesterfield Township Landowners with Properties Abutting Crosswicks Creek

Mr. and Mrs. Michael Free
105 Groveville Road
Chesterfield, New Jersey 08515
609-291-0581
Block 105, Lot 8, 110' x 95' (0.239 Acres)

Mr. Dennis M. DeSantis
103 Groveville Road
Chesterfield, New Jersey 08515
609-581-0016
Block 105, Lot 7, (0.75 Acres)

New Jersey State Corrections
Block 105, Lot 2.01, (581.97 Acres)

New Jersey Turnpike
Block 105, Lot 11, (5.73 Acres)
Block 106, Lot 3, (5.89 Acres)
Block 106, Lot 4.02, (1.48 Acres)

Mr. Herman W. Liedtka
Post Office Box 313
Crosswicks, New Jersey 08515
Phone # not available.
Block 106, Lot 4.01, (38.34 Acres)

Township of Chesterfield
Block 106, Lot 17, (16.17 Acres)

Ms. Nancy Bossio-Mutnick
275 west 96th Street, Apt. 21E
New York City, New York 10025
Phone # not available. Property is vacant
Block 301, Lot 1, (1.5 Acres)

Mr. and Mrs. Kenneth J. Palmer
Post Office Box 455
Crosswicks, New Jersey 08515
609-298-0988
Block 301, Lot 6, (13.25 Acres)

Mr. and Mrs. Christopher Krupa
7 New Street
Crosswicks, New Jersey 08515
609-291-0900
Block 301, Lot 9, (12.4 Acres)

Judith A. Morgenstern
Post Office Box 507
Crosswicks, New Jersey 08515
609-298-2666
Block 301, Lot 19.01, (35 Acres)

Mr. Harry H. Williams
423 Ellisdale Road
Crosswicks, New Jersey 08515
609-298-0880
Block 301, Lot 20.01, (20 Acres)

Mr. and Mrs. Charles M. Bunting
Post Office Box 83
Crosswicks, New Jersey 08515
609-298-6618
Block 301, Lot 23.01, (23 Acres)

Mr. John Catalfamo
391 Ellisdale Road
Chesterfield, New Jersey 08515
609-298-7066
Block 301, Lot 24.01, (70 Acres)

Mr. Walter M. Katona
344 Ellisdale Road
Chesterfield, New Jersey 08515
609-298-6249
Block 301, Lot 26.01, (200 Acres)

Mr. and Mrs. Joseph D. Gendron
6 Iron Bridge Road
Chesterfield, New Jersey 08515
609-298-5265
Block 301, Lot 35.01, (38.5 Acres)

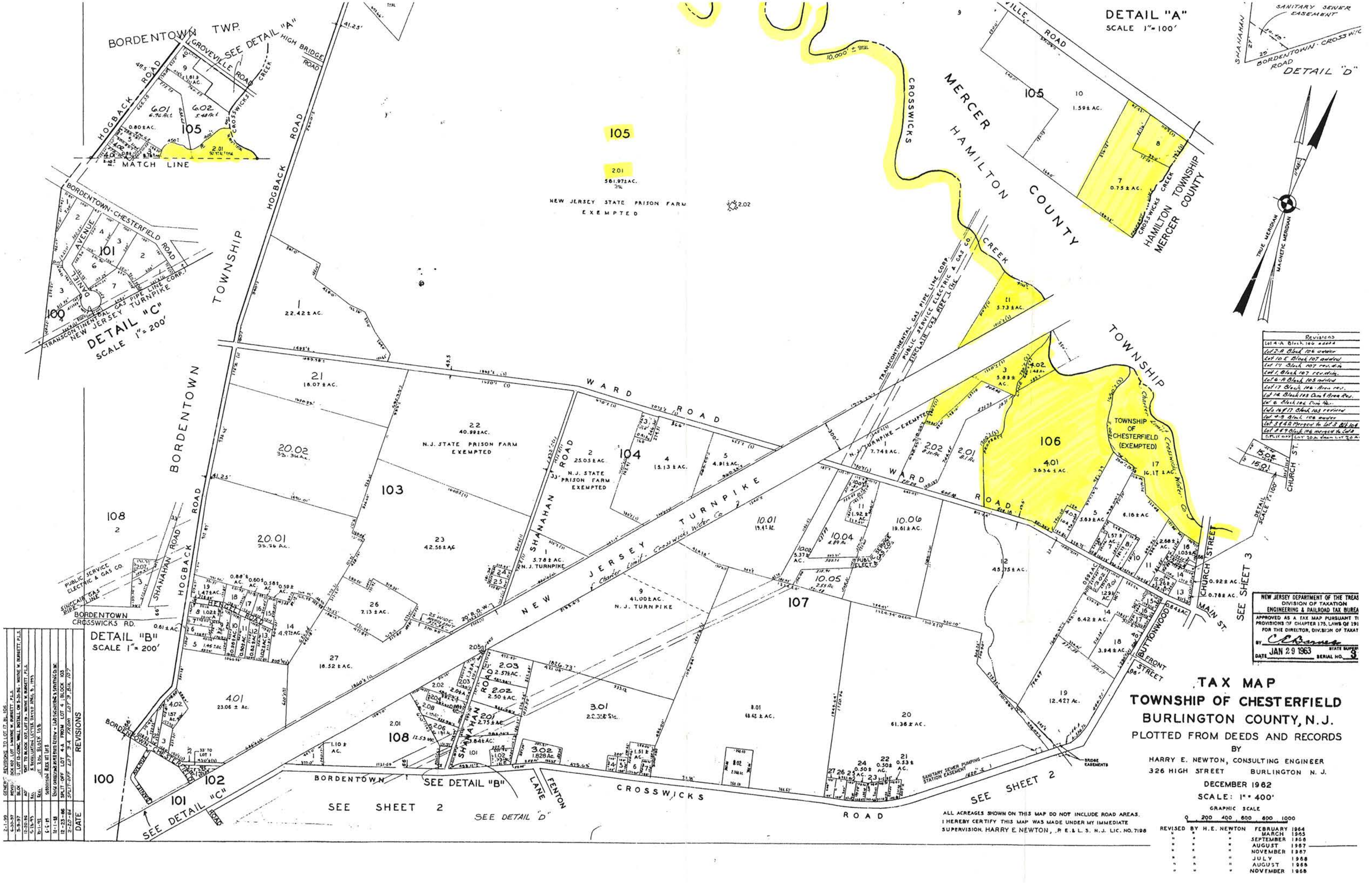
Mr. and Mrs. Daniel Manukas
19 Iron Bridge Road
Chesterfield, New Jersey 08515
609-298-1204
Block 400, Lot 2.01, (10 Acres)

Mr. Al Greenberg and Family
Post Office Box 13
Allentown, New Jersey 08501
609-298-6959
Block 400, Lot 2, (100 Acres)

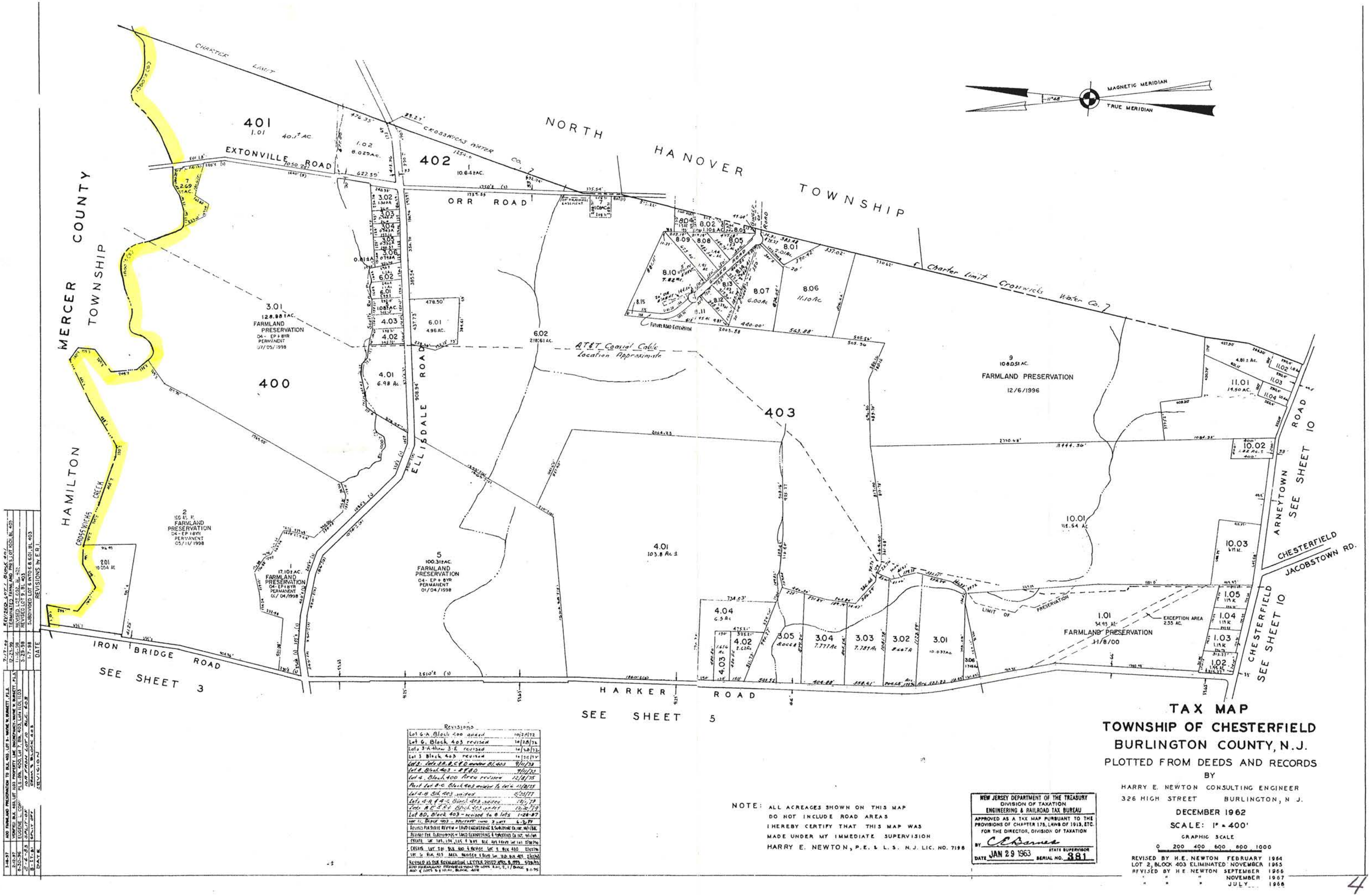
Mr. and Mrs. Nicholas A. Russo
310 Extonville Road
Chesterfield, New Jersey 08515
609-259-3685
Block 400, Lot 3.01, (129 Acres)

Mr. and Mrs. William C. Bower, III
328 Extonville Road, PO Box 1646
Chesterfield, New Jersey 08515
609-259-1169
Block 400, Lot 7, (2.69 Acres)

William Flemer's Sons, Incorporated
Post Office Box 185
Allentown, New Jersey 08501
609-259-7671
Block 401, Lot 1.01, (40 Acres)



TAX MAP
TOWNSHIP OF CHESTERFIELD
BURLINGTON COUNTY, N.J.
PLOTTED FROM DEEDS AND RECORDS
BY
HARRY E. NEWTON, CONSULTING ENGINEER
326 HIGH STREET BURLINGTON N.J.
DECEMBER 1962
SCALE: 1" = 400'
GRAPHIC SCALE
0 200 400 600 800 1000
REVISED BY H.E. NEWTON FEBRUARY 1964
MARCH 1965
SEPTEMBER 1966
AUGUST 1967
NOVEMBER 1967
JULY 1968
AUGUST 1968
NOVEMBER 1968
ALL ACREAGES SHOWN ON THIS MAP DO NOT INCLUDE ROAD AREAS.
I HEREBY CERTIFY THIS MAP WAS MADE UNDER MY IMMEDIATE SUPERVISION. HARRY E. NEWTON, P.E. & L.S. N.J. LIC. NO. 7198
NEW JERSEY DEPARTMENT OF THE TREAS
DIVISION OF TAXATION
ENGINEERING & RAILROAD TAX BUREA
APPROVED AS A TAX MAP PURSUANT T
PROVISIONS OF CHAPTER 175, LAWS OF 19
FOR THE DIRECTOR, DIVISION OF TAXAT
JAN 29 1963
DETAIL "A"
SCALE 1" = 100'
DETAIL "B"
SCALE 1" = 200'
DETAIL "C"
SCALE 1" = 200'
DETAIL "D"
SHANAHAN
BORDENTOWN-CROSSWICKS ROAD
SANITARY SEWER EASEMENT
MERCER COUNTY
HAMILTON TOWNSHIP
CROSSWICKS CREEK
BORDENTOWN TOWNSHIP
BORDENTOWN TWP.
HOGBACK ROAD
GROVEVILLE ROAD
HIGH BRIDGE ROAD
SEE DETAIL "A"
MATCH LINE
BORDENTOWN-CHESTERFIELD ROAD
DANIEL AVENUE
TRANSCONTINENTAL GAS PIPE LINE CORP.
NEW JERSEY TURNPIKE
PUBLIC SERVICE ELECTRIC & GAS CO.
SINCLAIR GAS PIPE LINE
SHANAHAN ROAD
BORDENTOWN CROSSWICKS RD.
105
2.01
581.97± AC.
NEW JERSEY STATE PRISON FARM
EXEMPTED
WARD ROAD
103
104
106
107
108
22
40.99± AC.
N.J. STATE PRISON FARM
EXEMPTED
2
25.05± AC.
N.J. STATE PRISON FARM
EXEMPTED
9
41.00± AC.
N.J. TURNPIKE
TOWNSHIP OF CHESTERFIELD (EXEMPTED)
401
36.34± AC.
CHURCH STREET
MAIN ST.
BUTTONWOOD
FRONT STREET
SEE SHEET 3
SEE SHEET 2
SEE DETAIL "B"
SEE DETAIL "C"
SEE DETAIL 'D'
BORDENTOWN CROSSWICKS ROAD
FENTON LANE
SANITARY SEWER PUMPING STATION EASEMENT
BRIDGE EASEMENTS
TRUE MERIDIAN
MAGNETIC MERIDIAN
Revisions
REVISIONS
DATE



TAX MAP
TOWNSHIP OF CHESTERFIELD
BURLINGTON COUNTY, N.J.
PLOTTED FROM DEEDS AND RECORDS
BY
HARRY E. NEWTON CONSULTING ENGINEER
326 HIGH STREET BURLINGTON, N.J.
DECEMBER 1962
SCALE: 1" = 400'
GRAPHIC SCALE
0 200 400 600 800 1000
REVISED BY H.E. NEWTON FEBRUARY 1964
LOT 2, BLOCK 403 ELIMINATED NOVEMBER 1965
REVISED BY H.E. NEWTON SEPTEMBER 1966
NOVEMBER 1967
JULY 1968
NEW JERSEY DEPARTMENT OF THE TREASURY
DIVISION OF TAXATION
ENGINEERING & RAILROAD TAX BUREAU
APPROVED AS A TAX MAP PURSUANT TO THE PROVISIONS OF CHAPTER 175, LAWS OF 1913, ETC.
FOR THE DIRECTOR, DIVISION OF TAXATION
DATE JAN 29 1963
STATE SUPERVISOR
SERIAL NO. 381
NOTE: ALL ACREAGES SHOWN ON THIS MAP DO NOT INCLUDE ROAD AREAS
I HEREBY CERTIFY THAT THIS MAP WAS MADE UNDER MY IMMEDIATE SUPERVISION
HARRY E. NEWTON, P.E. & L.S. N.J. LIC. NO. 7198
Revisions
Lot 6-A Block 400 added 10/28/72
Lot 6, Block 403 revised 10/28/72
Lots 3-A thru 3-E revised 10/28/72
Lot 3 Block 403 revised
Lot 8D, Block 403 - revised to 8 lots 1-28-87
NORTH HANOVER TOWNSHIP
MERCER COUNTY
HAMILTON TOWNSHIP
CROSSWICKS CREEK
MAGNETIC MERIDIAN
TRUE MERIDIAN
EXTONVILLE ROAD
ORR ROAD
ELLISDALE ROAD
IRON BRIDGE ROAD
HARKER ROAD
ARNEYTOWN ROAD
CHESTERFIELD JACOBSTOWN RD.
SEE SHEET 3
SEE SHEET 5
SEE SHEET 10
Charter Limit Crosswicks Water Co.
A.T.&T. Coaxial Cable Location Approximate
LIMIT OF PRESERVATION
EXCEPTION AREA 2.55 AC.
400
401
402
403
FARMLAND PRESERVATION
4

MERCER

COUNTY

HAMILTON TOWNSHIP

CROSSWICKS CREEK

CROSSWICKS CREEK

Charter Limit

Crosswicks Water Company

CHURCH ST.
SEE SHEET 1

MAIN STREET

NEW ST.

FRONT ST.

SEE SHEET 2.01

SEE DETAIL "A"

ELLISDALE ROAD

IRON BRIDGE ROAD
SEE SHEET 4

HARKER ROAD

ELLISDALE ROAD

WALN ROAD
SEE SHEET 5

CROSSWICKS - CHESTERFIELD ROAD
SEE SHEET 2

CHESTERFIELD - CROSSWICKS ROAD

ROSEWOOD DRIVE

MIDDLETON PLACE

DAVENPORT DRIVE

OLD YORK ROAD

MARGERUM ROAD
SEE SHEET 5

SEE SHEET 3.01

TRUE MERIDIAN

MAGNETIC MERIDIAN

6
13.25 ± AC.

5
12.14 AC ±

1.58 AC ±

2 AC.

10
1.82 AC.

19.01
35.8 AC ±

19.02
4.2 Ac. ±

20.01
14.2 AC

23.01
32.60 ± AC.

24.01
69.45 ± Ac
FARMLAND PRESERVATION
04-EP + BYR
PERMANENT
01/04/1998
W/EXCEPTION 1 HOMESITE
2.17 ac.

300

301

302

18
0.98 ± AC.

21
1.64 ± AC.

22
1.19 ± AC.

2.00 ± AC.

0.60 ± AC.

4.01
1.04 AC.

4.03
1.04 AC.

4.04
1.07 AC.

5
0.80 ± AC.

6.02
2.17 AC.

4.02
17.266 Ac.

4.05
14.566 Ac.

3
3.29 ± AC.

38
3.98 ± AC.

35
0.54 ± AC.

6.01
14.395 AC.
FARMLAND PRESERVATION
3/22/01

24.02
2.00 AC.

25
2.00 ± AC.

26.02
1.792 Ac.

7.01
28.24 ± AC.
FARMLAND PRESERVATION
04-EP + BYR
PERMANENT
01/04/1998

0.54 ± A

0.54 ± A

0.77 ± A

7.02
7.805 ± AC.

26.01
200.67 ± Acres
FARMLAND PRESERVATION
04-EP + BYR
PERMANENT
01/04/1998

35.01
38.30 ± AC.
FARMLAND PRESERVATION
04-EP + BR
PERMANENT
06/03/1998

36
1.57 AC ±

35.02
1.25 ± AC.

30.01
FARMLAND PRESERVATION
04-EP + BYR
PERMANENT
01/08/1998

31
1.98 ± AC.

30.02
6.77 ± AC.

0.64 ± AC.

27
0.92 ± AC.

28
0.81 ± AC.

29

9

10
9.72 ± AC.
FARMLAND PRESERVATION
04-EP + BYR
01/06/1998

8.01
105.04 Ac
FARMLAND PRESERVATION
04-EP + BYR
PERMANENT
10/18/1997

12.01
77.24 ± Ac

12.02
2.38 ± AC.

12.03
2.24 ± AC.

12.04
2.24 ± AC.

11.01

11.02

11.03

11.04

11.05

31
65.334 AC.
FARMLAND PRESERVATION
3/22/01

20' WIDE ACCESS & UTILITY EASEMENT GRANTED TO GARDEN STATE WATER CO.

20' WIDE ACCESS & UTILITY EASEMENT GRANTED TO GARDEN STATE WATER CO.

20
5.0 Ac.

19
1.43 ± AC.

RESCUE MISSION

18
26.19 ± AC.

13.25
10 Ac.

13.01
140.811 Ac.

16
0.72 ± AC.

14.02
4.68 ± AC.

41

38

A.M.E. CHURCH
EXEMPTED

37

396.00'

33.02
1.002 Ac.

33.03
1.251 AC.

619.77'

240'

33.01

34

35

32.01

32.02

32.03

DETAIL "A"
SCALE : 1"=100'

NOTE: ALL ACREAGES SHOWN ON THIS MAP DO NOT INCLUDE ROAD AREAS

I HEREBY CERTIFY THAT THIS MAP WAS MADE UNDER MY IMMEDIATE SUPERVISION

HARRY E. NEWTON, P.E. & L.S. N.J. LIC. NO 7198

NEW JERSEY DEPARTMENT OF THE TREASURY
DIVISION OF TAXATION
ENGINEERING & RAILROAD TAX BUREAU
APPROVED AS A TAX MAP PURSUANT TO THE PROVISIONS OF CHAPTER 175, LAWS OF 1911
FOR THE DIRECTOR, DIVISION OF TAXATION
BY C.L. Barnes
DATE JAN 29 1963 SERIAL NO. 32

TAX MAP
TOWNSHIP OF CHESTERFIELD
BURLINGTON COUNTY, N.J.

PLOTTED FROM DEEDS AND RECORDS

BY

HARRY E. NEWTON CONSULTING ENGINEER

326 HIGH STREET BURLINGTON N.J.

DECEMBER 1962

SCALE: 1" = 400'

GRAPHIC SCALE

0 200 400 600 800 1000

REVISED BY H.E. NEWTON FEBRUARY 1964
" " MARCH 1965
" " SEPTEMBER 1966
" " FEBRUARY 1967

3

DATE	REVISIONS
3-3-01	SOLD FARM AND PRESERVATION LOTS 6,01,31, BL 302
12-29-97	Revised lot 3, Bl. 301
	E.R.I. REVISIONS

Revisions			
Lot 35-B-Block 301 added	12/17/71	Lot 10, Block 302 Revised	12/2/77
Lot 11 Block 302 Sub. Lots 11, 11A, B, C, D, E add	12/17/71	Lot 20-A Block 301 Added	12/3/77
Lot 12-A Block 302 added (Separate Title)	A/27/72	Lot 6-A Block 302 Added	12/9/77
Lot 39-A Block 301 added	12/26/72	Lot 1R. Block 302 Revised	12/20/77
Lot 1 Block 302 dimensions added	10/3/73		
Lot 35 B Lot 39 revised Block 301	10/30/73		
Lot 13 Block 302 revised	11/13/73		
Lot 12A Block 302 Lot 12A-1, 12A-2 added	9/18/74		
Lot 39 Block 301 designation from Lot 1	11/18/75		
Lot 40 Block 302 separated from Lot 20	5/19/76		
Lot 39-39A & B revision Bl. 301	10/29/77		
Lot 19 & 19A Block 301 Revised	12/1/77		
Lot 24-A Block 301 Revised	12/1/77		
Lot 4 Block 302 Sub-divided into 4-A, 4-B, 4-C, 4-D	12/1/77		

10-1-86	ROSS PROPERTIES	LOTS 39 & 40	SPLIT OFF	LOT 40 FROM LOT 39	BLOCK 301
12-24-86	SPLIT-OFF	LOTS 26.01 & 26.02	FROM LOT 26	BLOCK 301	
8-1-86	SPLIT-OFF	LOT 40	FROM LOT 39	BLOCK 302	
7-09-85	SPLIT-OFF	LOT 32A	FROM LOT 32	BLOCK 302	
7-11-84	SOLD	PART OF LOT 11	FROM LOT 11	BLOCK 302	
6-26-81	SUBDIVIDED	LOT 6	BLOCK 301		

APPENDIX C

Riparian Setbacks Document

APPENDIX D

List of Plant Species Observed in the Study Area

APPENDIX E

Maps of Natural Heritage Priority Site

APPENDIX F

NJDEP i-Map Printouts

APPENDIX G

NJDEP Natural Heritage Program Inquiry Results (1992)

APPENDIX H

NJDEP Natural Heritage Program Inquiry Results (2006)

APPENDIX I

List of Wildlife Species Observed in the Study Area

APPENDIX J

US Fish and Wildlife Service Inquiry Response Letter