

Natural Resource Inventory for the former Fort Monmouth Properties Monmouth County, New Jersey

Prepared for:

The Fort Monmouth Economic Redevelopment Agency

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Chapter 1 Introduction

Statutory Basis

The Fort Monmouth Economic Revitalization Authority (“FMERA” or “the Authority”), pursuant to N.J.S.A. 52:27I-18 et seq. (“the Fort Monmouth Economic Revitalization Authority Act” or “the Act”), is responsible for the efficient redevelopment and reuse of Fort Monmouth which closed in 2011. Pursuant to the Act, the Authority shall appoint an environmental advisory committee which shall for all intents and purposes be the exclusive “environmental commission,” as established pursuant to P.L. 1968, c.245 (C:40:56A-1 et seq.), for all land use matters and approvals within the project area.

Pursuant to N.J.A.C. 19:31C-3.20(e) (“the Fort Monmouth Land Use Rules”), the Authority shall provide to the environmental advisory committee an informational copy of each application for mandatory conceptual review. If the application involves open space to be preserved or other environmental features to be preserved or protected as identified in the natural resources inventory (NRI), the Authority shall request the environmental advisory committee’s review of the application. The NRI shall give due consideration to the *Fort Monmouth Reuse and Redevelopment Plan* and the natural resource inventories, if any, of the host municipalities, and approved by the Authority. A current copy of the NRI shall be kept in the offices of the Authority.

Purpose of a Natural Resource Inventory

The NRI, also known as an environmental resource inventory (ERI), is a compilation of text and visual information about the natural resource characteristics and environmental features of an area.

The NRI is an unbiased report of integrated data. It provides baseline documentation for measuring and evaluating resource protection issues. The NRI is an objective index and description of features and their functions, rather than an interpretation or recommendation. Identifying significant environmental resources is the first step in their protection and preservation. Open space parcels and environmental features to be protected or preserved shall consist of floodplains, wetlands, and habitats of endangered or threatened species. The NRI identifies the general locations of environmental features, however many of these features have not yet been field verified. Thus, at present, the NRI does not identify any specific open space parcels or other environmental features to be protected or preserved. The Authority shall refine the open space parcels and environmental features to be protected or preserved as information becomes available for each proposed redevelopment project and should add to, revise and refine the document as it gains knowledge and more data becomes available.

Data Sources

The NRI provides both visual depictions of natural resources in the form of mapping information and text that describes these resources, their sensitivities and limitations for development. The text has been gathered from existing resources listed at the end of this document.

Existing map sources derived from the New Jersey Department of Environmental Protection GIS (geographic information systems) data provided the basis for establishing the location of natural

resources presented in the NRI. Since the maps were not field verified, the resource mapping presented herein is intended for general planning purposes and should not substitute for site-specific surveys.

Location of Fort Monmouth

The Fort Monmouth property is located near the eastern shore of New Jersey within the Coastal Region of Monmouth County. With its location between New York City to the north and Philadelphia to the southwest, the former Fort property affords easy access to two major metropolitan areas as well as the State's capital, Trenton to the west.

The former Fort Monmouth occupies approximately 1,127 acres within three host municipalities: the Boroughs of Eatontown, Oceanport and Tinton Falls (see **Figure 1, Aerial Photograph of Fort Monmouth**). The former Fort property is separated into two distinct areas on either side of Route 35: the Main Post to the east (~638 acres) and the Charles Wood Area to the west (~489 acres). The Main Post is contained within the Boroughs of Oceanport (~419 acres) and Eatontown (~219 acres), and the Charles Wood Area is contained within the Boroughs of Tinton Falls (~254 acres) and Eatontown (~235 acres). The Charles Wood area is generally bounded by Pearl Harbor Road to the west, Tinton Avenue to the north, Maxwell Road to the east and the Conrail railroad tracks to the south. The area is split nearly in half by Hope Road. The Main Post area is generally bounded by State Highway 35 to the west, Parkers Creek to the north, the New Jersey Transit railroad line to the east, and residential neighborhoods to the south. Approximately 87 acres of the easternmost portion of the Main Post are separated from the rest of the Main Post via Oceanport Avenue.

History of Fort Monmouth and Fort Closure

A fort was established at this location in 1917. Prior to this time, the site was home to Monmouth Park Race Track from 1870 to 1917. After being abandoned due to New Jersey's ban on horse betting, the Army began leasing the land from a private owner in 1917 and purchased the land in 1919. The original name of Fort Monmouth was Camp Little Silver in 1917, then renamed Camp Alfred Vail. The Fort was originally established as a temporary facility for training the 1st and 2nd Reserve Signal Battalions, in anticipation of the United States' involvement in World War I. The Chief Signal Officer authorized the purchase of Camp Alfred Vail in 1919 when the Signal Corps School relocated to Camp Vail from Fort Leavenworth that year. In 1925, the installation was granted permanent status and renamed Fort Monmouth, in honor of the soldiers of the American Revolution who died in the Battle of Monmouth.

The primary mission of Fort Monmouth was to provide command, administrative, and logistical support for Headquarters, United States Army, Communications-Electronics Command (CECOM), CECOM is a major subordinate command of the United States Army Materiel Command (AMC) and was the host activity. At the time of its closure in 2011, Fort Monmouth served as the center for the development of the Army's Command and Control, Communications, Computers, Intelligence, Sensors and Reconnaissance (C4ISR) systems, the primary tenants of the Fort. Much of the Army's research and development of high-tech systems was done at Fort Monmouth, thus various specialized technical facilities were located throughout the Fort. Additional tenant activities that occur on the Fort include the performance of research, development, procurement, and production of electronic material for use by the United States Armed Forces. Other missions included the provision of administrative training and

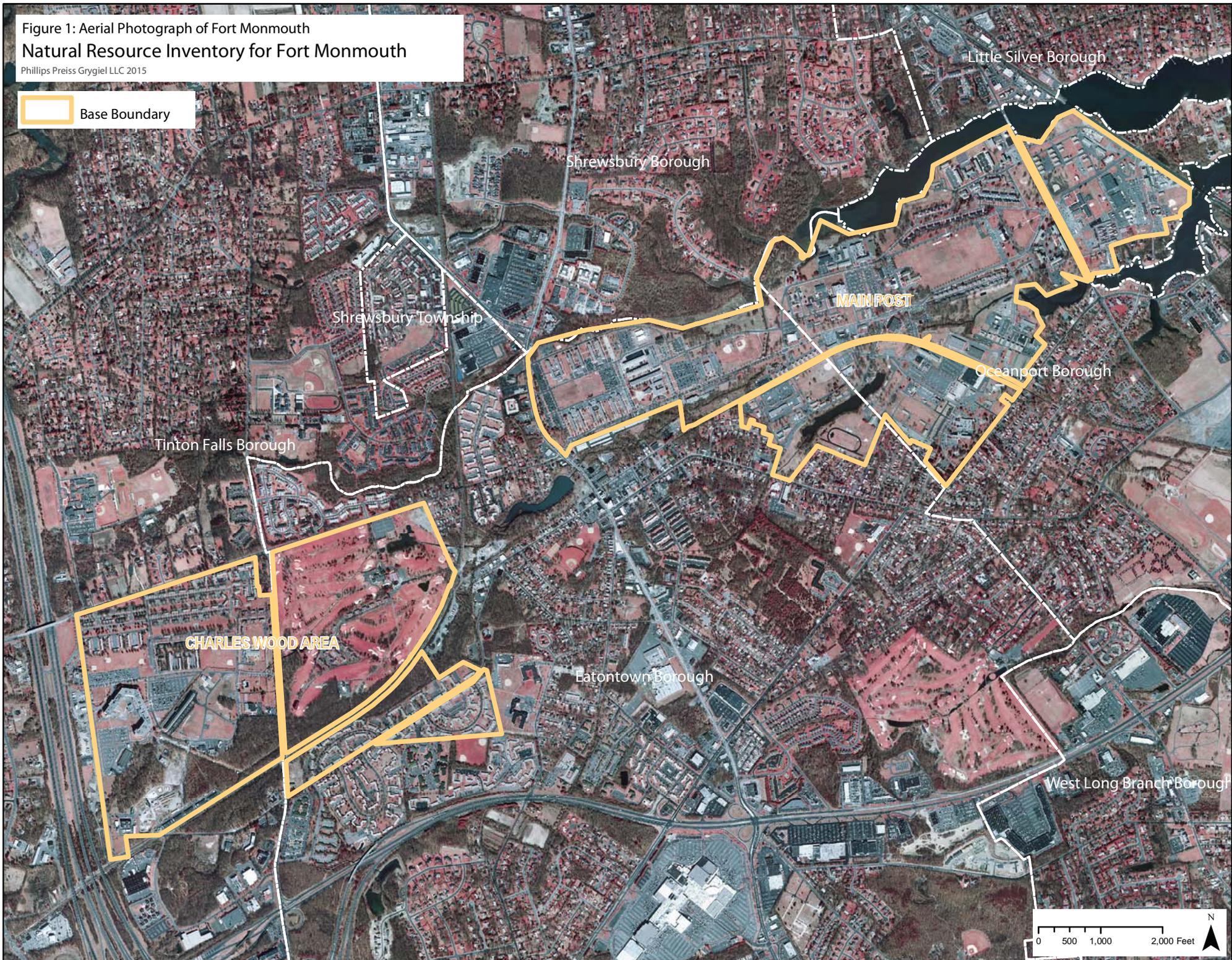
logistical and related support necessary to transition selected reserve component units into the active force structure in the event of a national emergency.

In 2005, the federal government selected Fort Monmouth for closure as part of the federal Base Realignment and Closure Act (BRAC) Act. On September 15, 2011, the Fort closed. The *Department of Defense Base Structure Report for the Fiscal Year 2010 Baseline* stated that Fort Monmouth included approximately 425 buildings covering over 5 million square feet. Upon the Fort's closure, these buildings were all vacated.

Figure 1: Aerial Photograph of Fort Monmouth
Natural Resource Inventory for Fort Monmouth

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 Base Boundary



Chapter 2 Climate

The state of New Jersey is located on the eastern coast of the United States, approximately halfway between the Equator and the North Pole. Due to its geographic location, the state is influenced by wet, dry, hot, and cold airstreams, the result of which is variable daily weather.

Despite the state's relatively small size (7,836 square miles), there are distinct differences in climate between the northern and southernmost portions of the state. The Office of the New Jersey State Climatologist identifies five climate zones in the state: The Northern; Central; Pine Barrens; Southwest; and Coastal. The geology, distance from the Atlantic Ocean, and prevailing atmospheric flow patterns produce distinct variations in the daily weather between each of these regions. Fort Monmouth is located within the Coastal Climate Zone and is included in the North Coast Planning Region of Monmouth County (see **Figure 2, New Jersey Climate Zones**).

The Coastal Zone can be characterized by both continental and oceanic influences. When the ocean is warmer than the land surface in the fall and early winter, the Coastal Zone experiences warmer temperatures than that of the state's interior regions; similarly, ocean breezes keep these coastal locales cooler in the spring. The Atlantic Ocean creates a stabilizing influence on temperatures, making the Coastal Zone less prone to seasonal temperature fluctuations and temperature extremes. However, coastal storms, such as nor'easters and tropical storms and hurricanes are of particular concern in this zone; damage can be especially great when strong winds and heavy rains from these types of storms are coupled with times of high tide.

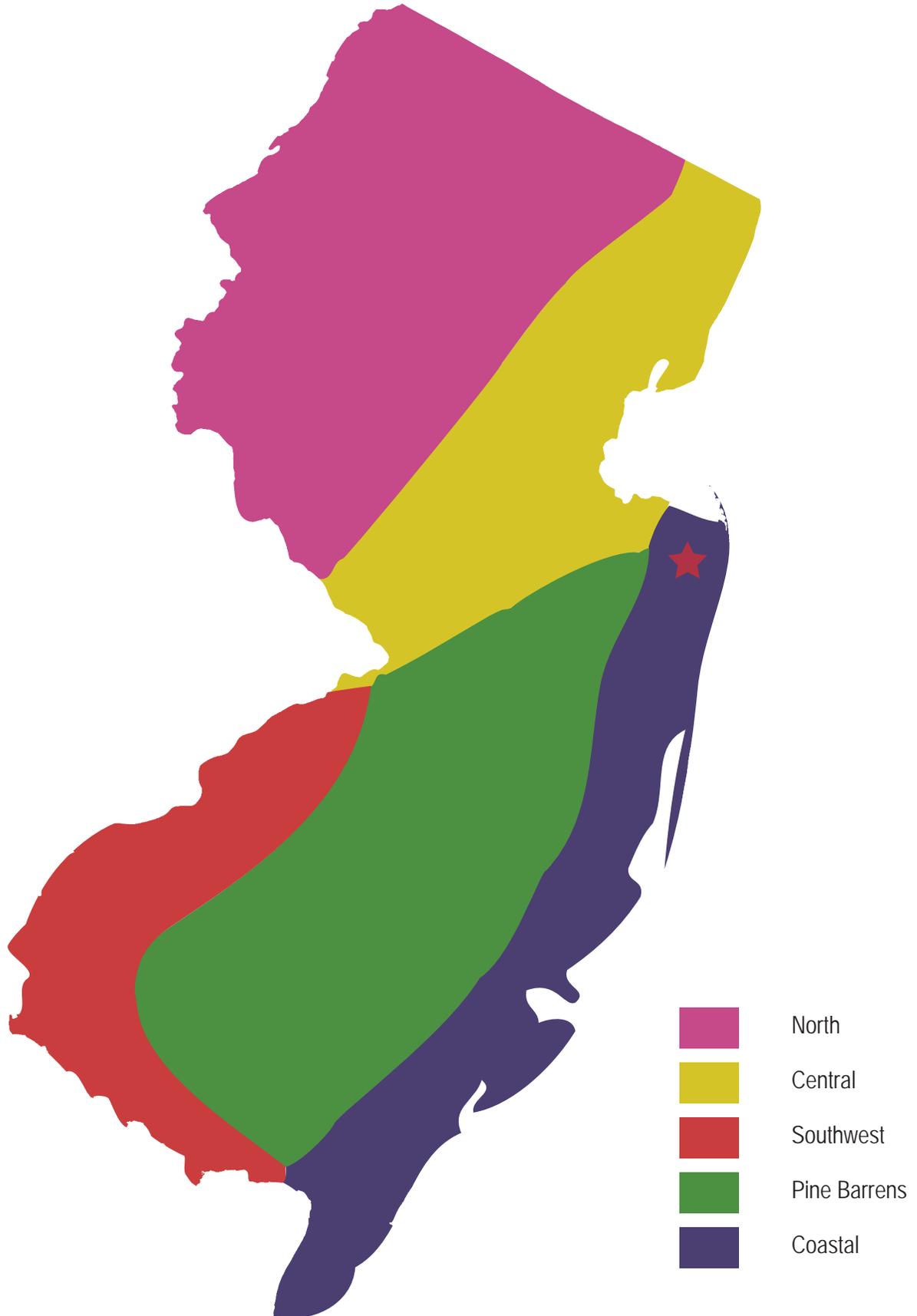
In Monmouth County, the mean annual temperature is approximately 52 degrees Fahrenheit (°F). Winters are moderate, with an average temperature of around 30°F and summers are warm with an average temperature around 70°F, where average minimum and maximum temperatures exceed 60 and 80°F, respectively. The county receives an average of between 40 and 50 inches of precipitation each year; a little over half of the total annual precipitation falls between April and September. The National Oceanic and Atmospheric Administration (NOAA) has a monitoring station in West Long Branch that gathers weather data for the Monmouth coastal area. The Office of the State Climatologist at Rutgers University is responsible for maintaining the weather data collected at this station, and, more generally, provides information on climate trends in New Jersey.

Figure 2 : New Jersey Climate Zones

Natural Resource Inventory for Fort Monmouth

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★ Base Location



Chapter 3 Geology and Topography

New Jersey Coastal Plain

New Jersey is comprised of four major physiographic provinces: the Ridge and Valley, Highlands, Piedmont, and the Atlantic Coastal Plain. The Coastal Plain province can be found in the southern and easternmost portions of New Jersey, extending from Sandy Hook to Cape May and inland to the Delaware River, making up about 60% of the total land area of the state.

The Coastal Plain province is separated into the Inner and Outer Coastal Plain and is part of a larger geologic province in the eastern United States that extends north to Long Island and Cape Cod and south along the coast into Mexico. Fort Monmouth lies within the Outer Coastal Plain. The Outer Coastal Plain consists of unconsolidated Tertiary deposits of sands, silt and gravel. Soils in this province are sandy and have less clay than that of the Inner Coastal Plain, making them more dry and acidic. As a result, these soils retain fewer nutrients than that of the Inner Coastal Plain, making much of the region unsuitable for agriculture. The Pine Barrens, which occupies the center of the Outer Coastal Plain, is characterized as “agriculturally poor,” yet rich in species diversity, and remains largely undeveloped even today. Soil differences in the Inner and Outer Coastal Plain may be reflected in the differences between the vegetative communities found in each, including the increased dominance of coniferous (pitch pine) forests in the Outer Coastal Plain.

Fort Monmouth lies primarily within the Hornerstown Formation, and is partially within the Tinton Formation to the north and the Vincentown Formation to the south (see **Figure 3, Geology**). The Hornerstown Formation is comprised of clay and silty clay and is Early Paleocene in age. Coloration ranges from olive, dark brown, black where unweathered, to olive-brown with brown and reddish-brown mottles where weathered. Total thickness of the Hornerstown Formation is 25 to 30 feet. The Tinton Formation is comprised of silty medium-to-coarse and fine-to-medium quartz sand and is Late Cretaceous in age. Coloration ranges from reddish-brown, reddish-yellow, yellowish-brown where weathered, grayish-brown, brown, to olive-brown where weathered. Total thickness of the Tinton Formation is 30 to 40 feet. The Vincentown Formation is comprised of silty medium-to-coarse quartz sand, some fine-to-medium sand and some very coarse sand to very fine pebbles; the lowermost 10 to 20 feet of the formation is silty fine-to-medium sand. It is Late Paleocene in age. Coloration ranges from yellow, reddish-yellow, olive-yellow, to olive-brown. Total thickness of the Vincentown Formation is 180 feet.

Topography

The topography of the Main Post and Charles Wood areas is generally flat, with the exception of short, steep slopes that occur along streams and waterways (see **Figure 4, USGS Topographical Quadrangle**). The land surface at the Main Post ranges in elevation from four feet above mean sea level (ft amsl) in the east at Oceanport Creek to 32 ft amsl at the western end of the Post near Highway 35. The eastern portion of the Main Post is generally 10 ft amsl in elevation. The highest elevations can be found at the M-8 Landfill, located along Parkers Creek, as well as along Lafetra Creek, Mill Creek and Husky Brook.

Elevations within the Charles Wood area range from approximately 27 to 60 ft amsl, the lowest elevations being observed along Wampum Brook near the eastern boundary of the property. Generally, the southwestern corner of the Charles Wood Area is gently rolling and has the greatest relief.

Figure 3: Geology
Natural Resource Inventory for Fort Monmouth

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Base Boundary

Geology

Hornerstown Formation

Shrewsbury Member

Tinton Formation

Vincetown Formation

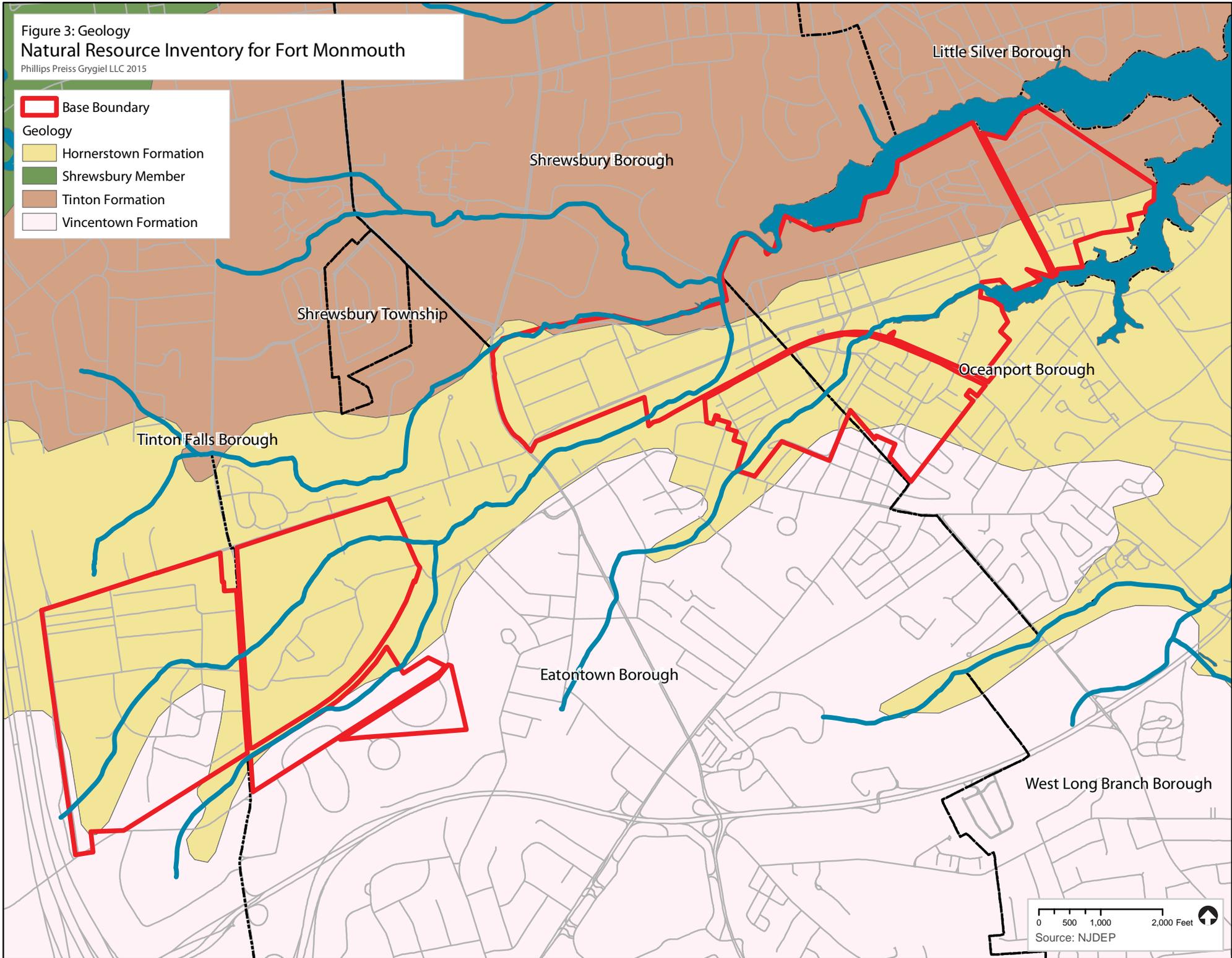
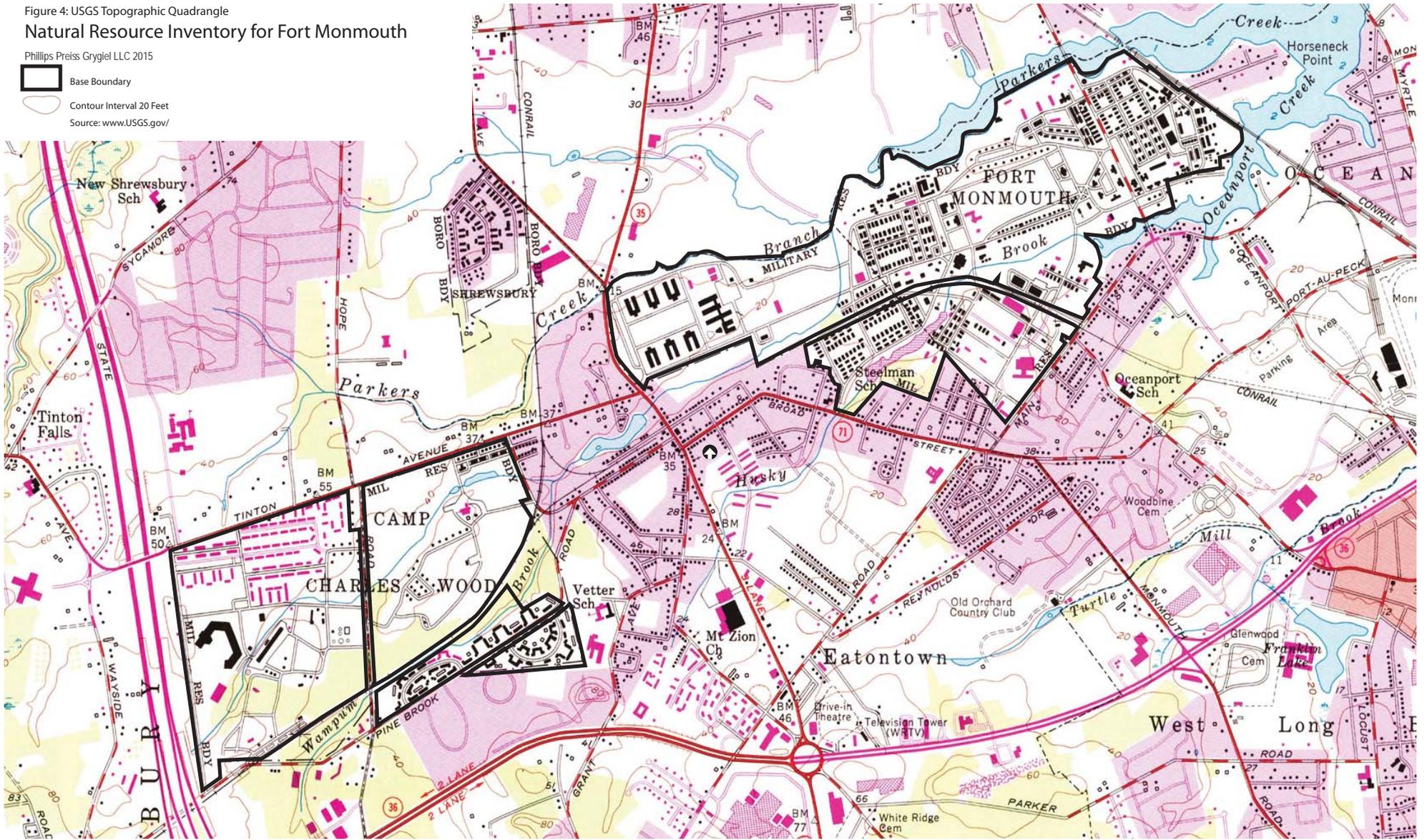


Figure 4: USGS Topographic Quadrangle
 Natural Resource Inventory for Fort Monmouth

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-  Base Boundary
-  Contour Interval 20 Feet
- Source: www.USGS.gov/



Chapter 4 Soils

According to the Monmouth County Soil Survey, much of the Main Post is comprised of “urban land” or developed land with disturbed soils (see **Figure 5, Land Use/Land Cover (2007)**). As such, most of the soils found within the Main Post have previously been altered by excavation or filling. The most commonly observed soil type within the Main Post is Udorthents-Urban land complex with 0 to 8 percent slopes. The Charles Wood Area has less urban land complexes than that of the Main Post. Shrewsbury sandy loam, Freehold sandy loam and Freehold-Urban Land Complex are the dominant soil types. Freehold soil types are considered to have slight building limitations with regard to dwellings and small commercial buildings and severe limitations with regard to shallow excavations due to wetness. Neither the Main Post nor the Charles Wood Area are classified as “lands suitable for cultivation” by the Monmouth County Soil Conservation District.

Fort Monmouth’s major soil series are provided here with a brief description (see **Figure 6, Soil Series** and **Figure 7, Slopes**). Information is provided by the Natural Resource Conservation Service’s (NRCS) Official Soil Series Descriptions and the SSURGO Database. Official Soil Series Descriptions are not given for Udorthents, pits and urban land complexes.

AptAV – Appoquinimink-Transquaking-Mispillion complex

This soil series’ parent material is comprised of loamy fluvial sediment (high in silt) with overlying organic materials. Its permeability is moderately slow in the mineral layers and moderately rapid to rapid in the organic layers. It ranges in slope from 0 to 1% and, as a result, is characterized as very poorly drained with very slow or ponded surface runoff. Depth to the seasonal water table is 0 inches year-round. This soil type is mainly used for wetland wildlife, shellfish and small crustacean habitat. Natural vegetation is salt-tolerant wetland herbaceous species (e.g., spike grass, salt marsh cordgrass, etc.). This series can be found in the coastal and estuarine areas of New Jersey, Delaware and Maryland.

AtsA – Atsion sand

This soil series’ parent material is comprised of sandy marine sediments. Its permeability is moderately rapid to rapid above 40 inches and moderately slow to rapid below 40 inches. It ranges in slope from 0 to 2% and is characterized as poorly drained with slow to very slow runoff. Depth to the seasonal water table is six to 12 inches year-round. This soil type is found mostly in wooded areas, though some areas are used for growing blueberries and cranberries. Natural vegetation is pitch pine, black gum and maple in wooded areas. This series can be found in the Northern Atlantic Coastal Plain in New Jersey, Delaware, Maryland and New York.

DoeB – Downer sandy loam

This soil series’ parent material is comprised of loamy fluviomarine deposits. Its permeability is moderate to moderately rapid. It ranges in slope from 0 to 5%, and is characterized as well-drained with negligible to high runoff. Depth to the seasonal water table is greater than 72 inches. This soil type is typically used for growing field crops, vegetables, flowers, and some fruit trees. Natural vegetation includes white, red,

scarlet and black oak, pitch pine, dogwood, American Holly, etc. This series can be found in the Northern Coastal Plain in New Jersey, Delaware and Maryland.

EveB – Evesboro sand

This soil series' parent material is comprised of sandy marine and eolian deposits. Its permeability is rapid in the subsoil and moderately rapid to very rapid in the substratum. It ranges in slope from 0 to 5% and is characterized as excessively drained with negligible runoff. Depth to the seasonal water table is greater than 72 inches. Most areas of this soil type are in woodland, used for fruit and vegetable crops or are urban land. Natural vegetation includes black, white, chestnut, and red oak, yellow poplar, pitch pine, etc. This series can be found in the Coastal Plain in New Jersey, Delaware and Maryland.

Freehold Urban land complex

Official soil series descriptions are not provided for urban land complexes.

FrkB – Freehold sandy loam

The Freehold series are very deep, well-drained, moderately permeable soils formed in marine sediments containing glauconite. It typically ranges in slope from 0 to 5%. With the exception of steeply sloping areas, these soils are generally cleared and used for growing fruits and specialty crops. Natural vegetation includes black, white, scarlet, and northern red oak, yellow poplar, hickory, and beech. This series can be found in the Inner Coastal Plain in New Jersey and Maryland.

KrhB – Kresson loam

This soil series' parent material is comprised of clayey glauconite marine and/or fluviomarine deposits. Its permeability is slow. It ranges in slope from 0 to 5% and is characterized as somewhat poorly drained with medium to high runoff. Depth to the seasonal water table is 12 to 18 inches from November to May. This soil series was historically cleared and used for corn, tomatoes, hay, and pasture. In New Jersey, many areas have become urbanized. Natural vegetation includes sweetgum, red maple, white oak and yellow poplar.

PHG – Pits, sand and gravel

Official soil series descriptions are not provided for pits.

ShrA – Shrewsbury sandy loam

This soil series' parent material is comprised of marine sediments containing moderate amounts of glauconite. Its permeability is moderately slow to moderate in solum and moderately rapid to rapid in the substratum. It ranges in slope from 0 to 2% and is characterized as poorly drained. Depth to the seasonal water table is 0 to 12 inches below the surface, primarily from October to June. Drained areas can be used to grow corn, soybeans, small grains, and turf grasses. Natural vegetation includes oaks, willow, yellow poplar, sweet gum, red maple, beech, and holly. This series can be found in Southern New Jersey and Maryland.

ThgB – Tinton loamy sand

This soil series' parent material is comprised of sandy eolian deposits over glauconite with fluviomarine deposits. Its permeability is moderate to moderately rapid. It ranges in slope from 0 to 5% and is characterized as well drained. Depth to the seasonal water table is greater than 72 inches. This soil series can be used for fruit and vegetable production, generally with irrigation. Natural vegetation includes white, black, red and chestnut oak with scattered Virginia pine. This series can be found in the Northern Atlantic Coastal Plain.

ThhB – Tinton-Urban land complex

Official soil series descriptions are not provided for urban land complexes.

UdaB – Udorthents

Official soil series descriptions are not provided for Udorthents.

Figure 5: Land Use/Land Cover (2007)
Natural Resource Inventory for Fort Monmouth

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- Base Boundary
- Land Use
 - Urban
 - Barren Land
 - Forest
 - Wetlands
 - Water

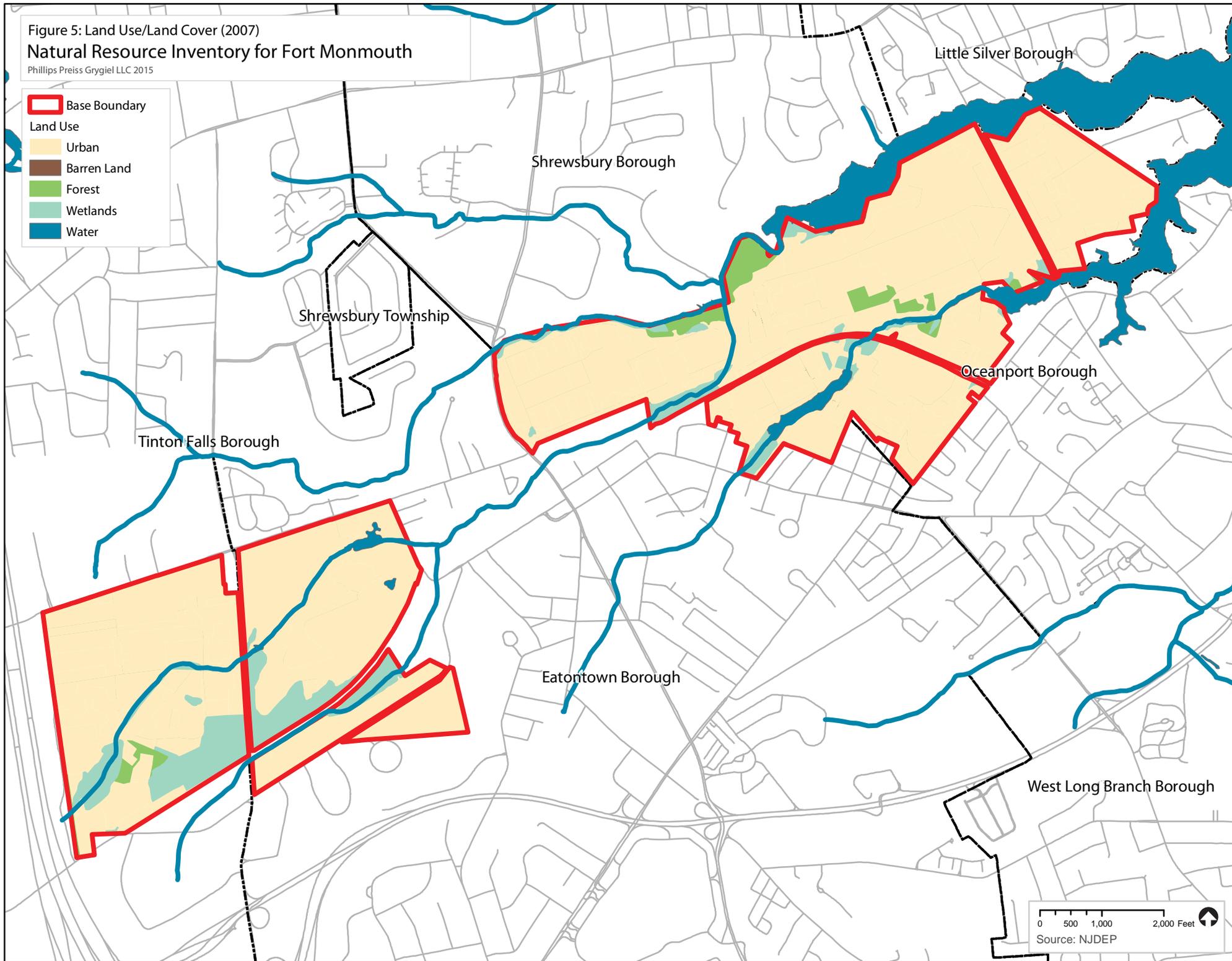


Figure 6: Soil Series
 Natural Resource Inventory for Fort Monmouth

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- Base Boundary
- Soils
- Appoquinimink-Transquaking-Mispiration
- Atsion
- Downer
- Evesboro
- Freehold
- Freehold - Urban Land Complex
- Holmdel
- Holmdel - Urban Land Complex
- Humaquepts
- Kresson
- Pits
- Shrewsbury
- Tinton
- Udorthents
- Udorthents - Urban Land Complex
- Water

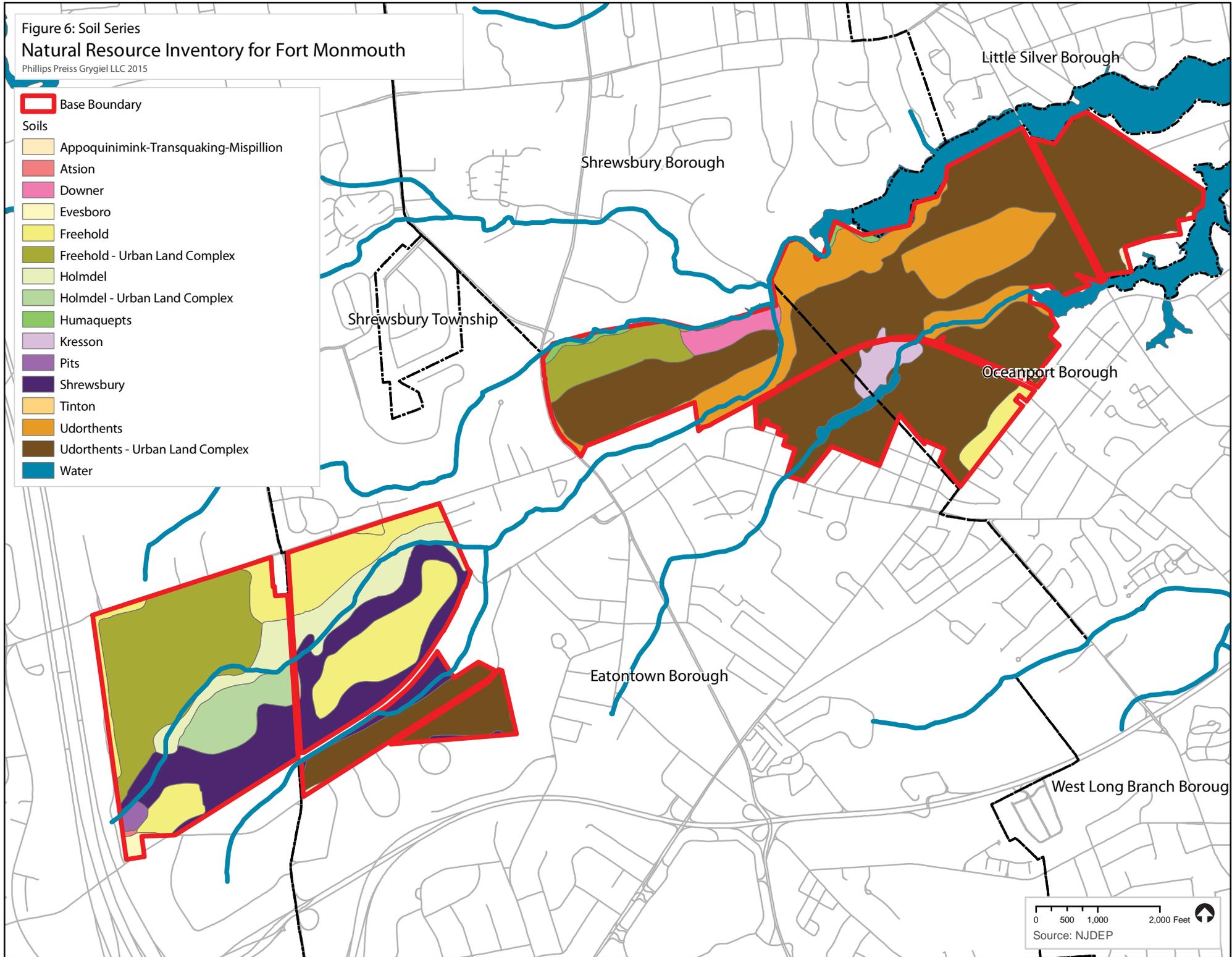


Figure 7: Slopes
Natural Resource Inventory for Fort Monmouth

Phillips Preiss Grygiel LLC 2015

Base Boundary

Slope

0-2%

0-5%

0-8%

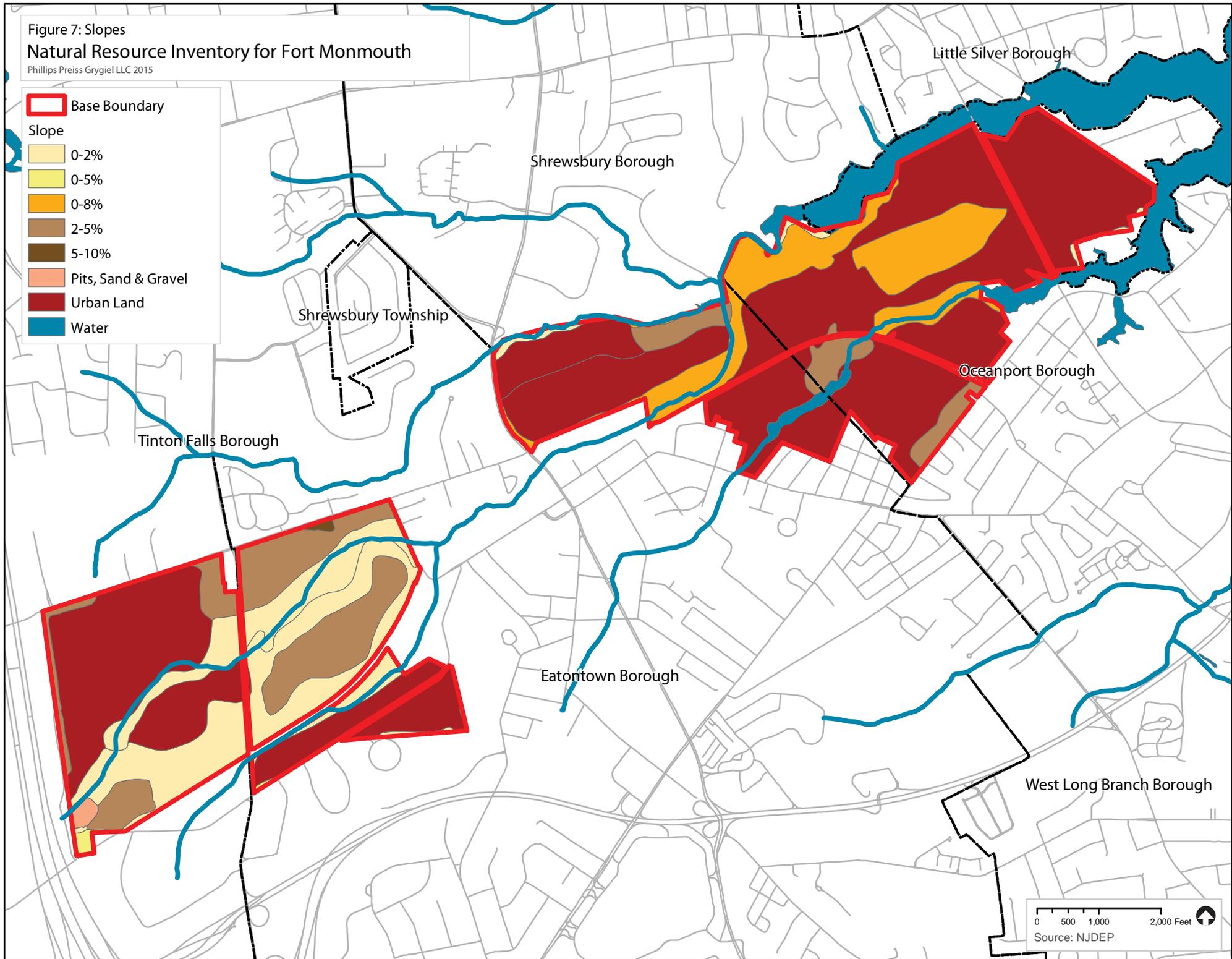
2-5%

5-10%

Pits, Sand & Gravel

Urban Land

Water



Chapter 5 Water Resources

Drainage Basins and Major Surface Water Features

A watershed is an area of land that drains into a body of water such as a stream, lake, river or bay. This includes surface water features and surrounding land itself. Topographic features such as hills and slopes define the boundaries of watershed management areas. These watershed management areas are comprised of Drainage Basins; large watersheds that encompass multiple small watersheds. NJDEP manages watersheds by dividing the state into 20 large watershed management areas (WMAS).

The former Fort Monmouth property is in the Atlantic Coast Drainage Basin, the Shrewsbury River Watershed and the Parkers Creek/Oceanport Creed Subwatershed (see **Figure 8, HUC 14 Subwatersheds**), which contains tributary streams with a low gradient.

The Main Post is drained by a number of waterways that flow generally from west to east. Within the western part of the Main Post, surface water runoff flows either north into Lafetra Creek or south into Mill Cree, both of which originate off-site to the west of the Main Post. Mill Cree enters the former Fort Monmouth property along its southwestern boundary and flows partially through the property before turning north and meeting Lafetra Creek. Lafetra Creek originates off the Fort property and, along with Parkers Creek, forms the northern boundary to the Main Post. Parkers Creek originates at the confluence of Lafetra Creek and Mill Cree and flows along the northern boundary of the former Fort until it discharges into the Shrewsbury River, directly to the east of the Main Post. Parkers Creek is a shallow tidal estuary having an average depth of three feet at mean tide. The northern half of the Main Post is located within the Parkers Creek sub-watershed.

Surface water runoff from the southern half of the Main Post flows into Husky Brook and Husky Brook Lake through a series of drainage ditches and outfalls. Husky Brook, a fresh water stream originates off-site to the west of the Main Post and flows into Husky Brook Lake on-site. Husky Brook Lake is a portion of the Husky Brook that has been dredged, widened and dammed to form that is used for recreational purposes. Downstream from the lake, Husky Brook is piped underground for several hundred feet before it again surfaces and eventually runs into Oceanport Creek. Oceanport Creek is a tidal stream that flows along the southern boundary of the Main Post before emptying into the Shrewsbury River. The Shrewsbury River is a tidal estuary that empties into Sandy Hook Bay and is separated from the Atlantic Ocean by a narrow barrier beach ending at Sandy Hook. The Atlantic Ocean is within three miles of the Main Post.

Surface water runoff at the Charles Wood Area is drained by Wampum Brook and Shrewsbury Creek. Wampum Brook flows along the southern boundary of the Charles Wood Area. Shrewsbury Creek originates near the Charles Wood Area's western boundary and flows eastward through the Charles Wood Area through the area into the golf course. Wampum Brook and Shrewsbury Creek join east of the Charles Wood Area before becoming Wampum Lake east of the Charles Wood Area boundary. Wampum Lake discharges into Mill Cree, which flows through the Main Post.

Surface Water Quality Classification

Parkers and Oceanport Creeks, as well as the tributaries to these creeks, on the Main Post are classified by the NJDEP, for the purposes of determining surface water quality criteria, as fresh non-trout water/saline water (FW2-NT/SE1). This classification indicates that the waterbody may exhibit a saltwater/freshwater interface; the point of demarcation between freshwater and saltwater is determined through salinity measurements. These waterbodies are characterized as freshwater FW2-NT where the mean salinity at high tide is 3.5 parts per thousand (ppt) or less and as saline SE1 where the mean salinity at high tide is greater than 3.5 ppt (N.J.A.C. 7:9B et seq.).

All surface water streams at the CWA are classified as FW2-NT by the NJDEP for the purposes of determining surface water quality criteria, indicating they are non-trout freshwaters.

Floodplains

The Main Post and Charles Wood Area are not mapped on the current Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs). However, the land adjacent to each area has been documented (see **Figure 9, USGS Floodprone Areas & FEMA Floodplains**). A 100-year floodplain surrounds Parkers and Lafetra Creeks to the north and south as it flows along the Main Post's northern property line. A 100-year floodplain surrounds Mill Brook as it enters the Main Post. A 100-year floodplain and 500-year floodplain surrounds Oceanport Creek in the southeastern portion of the Main Post and along the boundary with Horseneck Point. And a 500-year floodplain surrounds Husky Brook as it enters the Main Post near Broad Street. A 100-year floodplain surrounds the intersection of Wampum Brook and Shrewsbury Creek to the east of the Charles Wood Area border.

Further, an extensive stormwater drainage system discharges at various points into Wampum Brook, Shrewsbury Creek, Husky Brook, Husky Brook Lake, Lafetra Creek, Mill Creek, Parkers Creek, and Oceanport Creek. Some of the stormwater drainage system outfalls on the Main Post are below the elevation of the mean high tide, particularly along Oceanport Creek and Parkers Creek. Thus, during high tides water backs up into the stormwater drainage system.

Advisory Base Flood Elevations

In the wake of Hurricane Sandy, FEMA devised Advisory Base Flood Elevations (ABFEs) in an effort to inform and support local reconstruction efforts. Current FEMA FIRMs for New Jersey and New York were developed over 25 years ago, while the recently-issued ABFEs are based on more recent data and improved study methodologies. In most cases, ABFEs reflect a higher flood elevation than the current regulatory FIRMs. FEMA is encouraging communities to use ABFEs when rebuilding to reduce vulnerability to future flooding events. ABFEs will be used in the larger effort to update FIRMs in New Jersey and New York, but will not result in changes to insurance premium rates and mandatory purchase requirements until the revised base flood elevations have been subject to review, comment and adoption by local governments.

The ABFEs depict two "advisory zones." Advisory Zone A includes those areas that are subject to storm surge flooding from the 1% annual chance coastal flood (i.e., 100-year flood); these areas are not subject to high velocity wave action but are still considered high risk flooding areas. Advisory Zone V includes

those areas that are subject to high velocity flood action (a 3-foot breaking wave) from the 1% annual chance coastal flood (i.e., 100-year flood). Zone V is subject to more stringent building requirements than other zones because these areas are exposed to a higher level of risk.

As with the FIRMs, the Main Post and Charles Wood Area are not mapped on the ABFEs. However, the land adjacent to each area has been documented (see **Figure 10, Advisory Base Flood Elevations**). FEMA has issued an Advisory Map Panel for the area including the Main Post; advisory information is not yet available for the area including the Charles Wood Area. There are no areas of Advisory Zone V on the Main Post. Advisory Zone A is present in several locations on the Main Post, including: south of Gosselin Avenue along Husky Brook; extending south along Wampum Brook just west of Wilson Avenue; and east of Oceanport Avenue to the north of Oceanport Creek and to the south of Parkers Creek.

Figure 8: HUC 14 Subwatersheds
Natural Resource Inventory for Fort Monmouth

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 Base Boundary

Subwatersheds

-  Branchport Creek
-  Parkers Creek / Oceanport Creek
-  Pine Brook / Hockhockson Brook

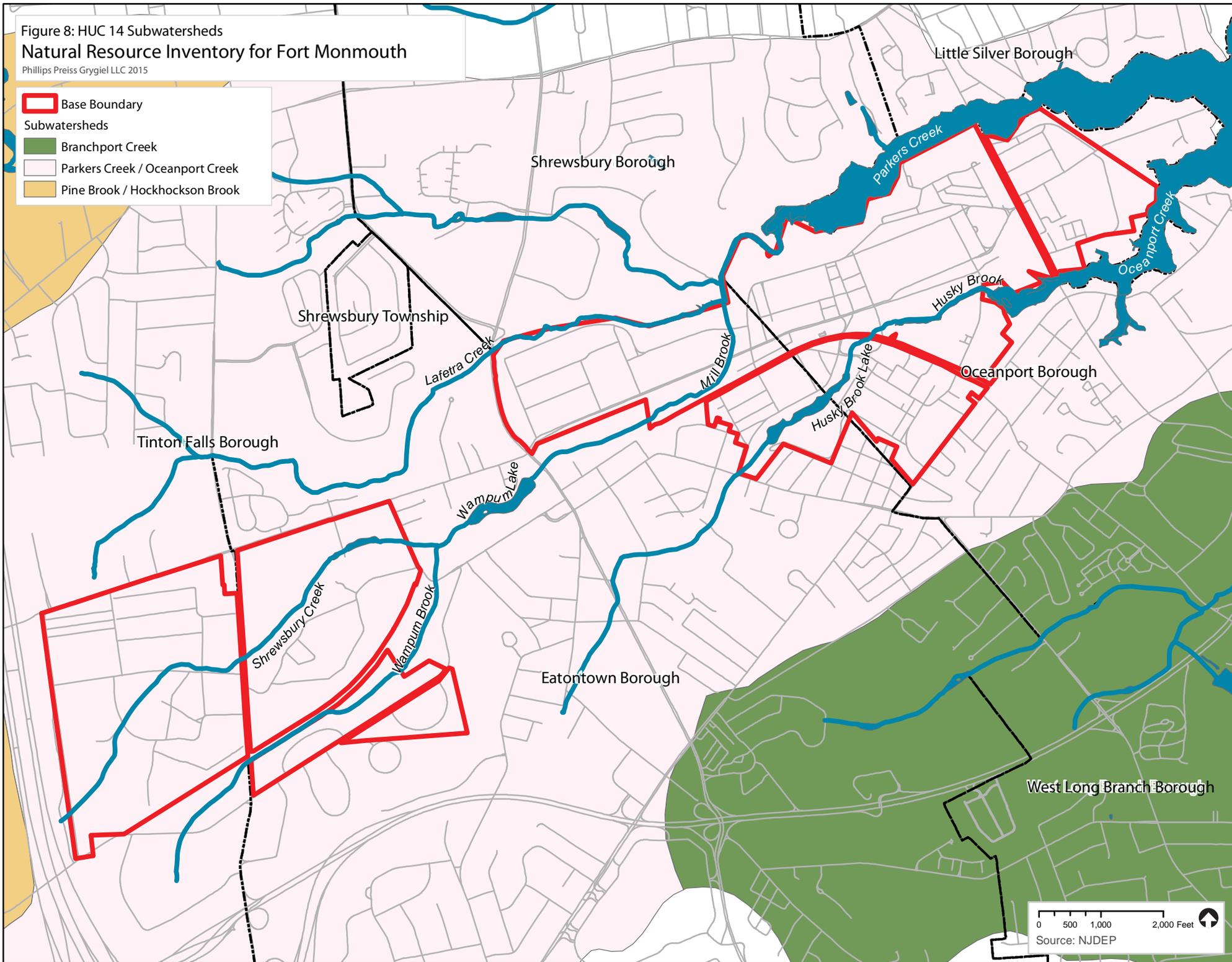


Figure 9: USGS Floodprone Areas & FEMA Floodplains
Natural Resource Inventory for Fort Monmouth

Phillips Preiss Grygiel LLC 2015

- Base Boundary
- FEMA Floodplains
 - 100-year floodplain
 - 500-year floodplain
- Zone D - Undetermined Risk Area
- USGS Floodprone Areas
 - Undocumented Floodprone Area
 - USGS Documented Floodprone Area
- Water

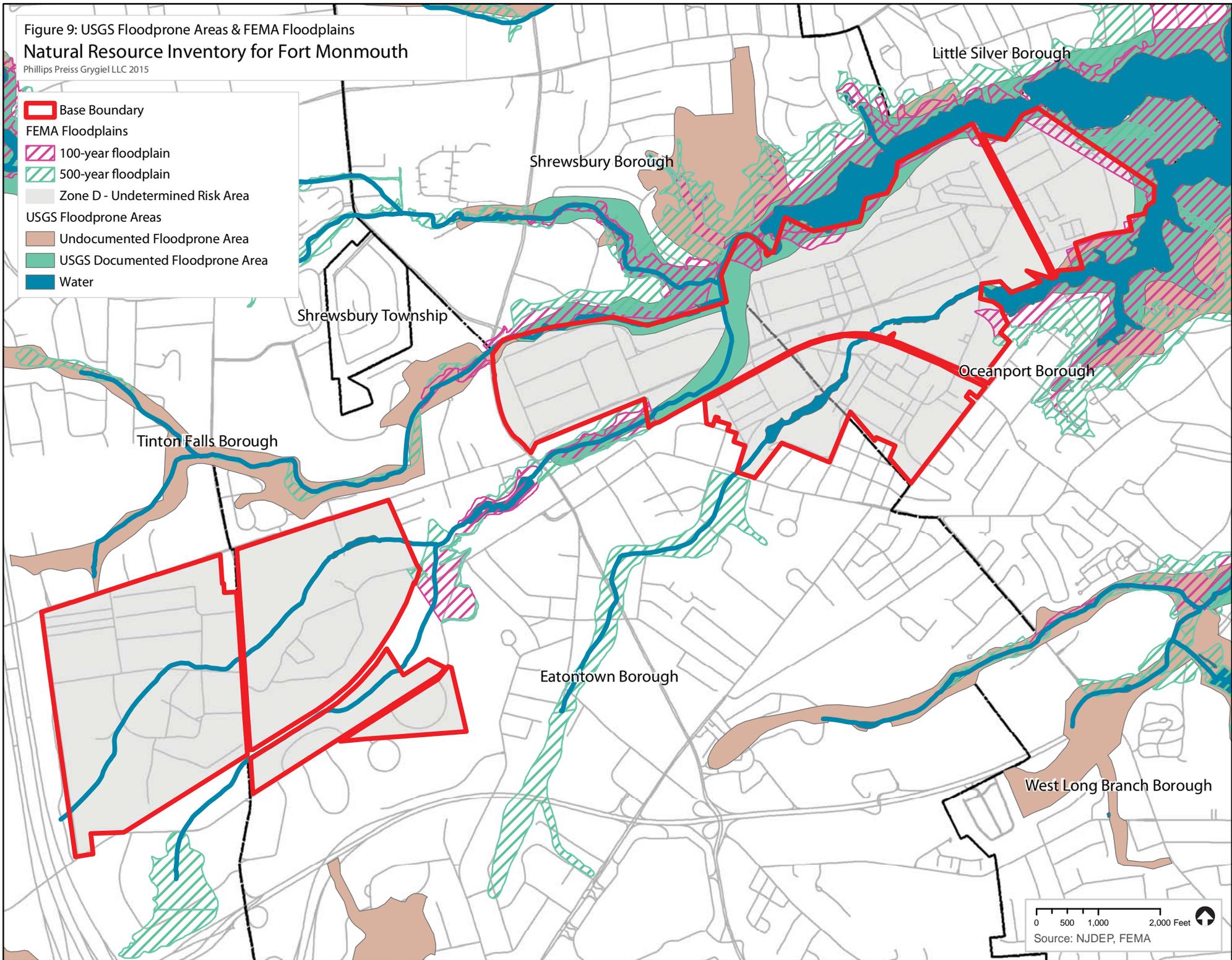
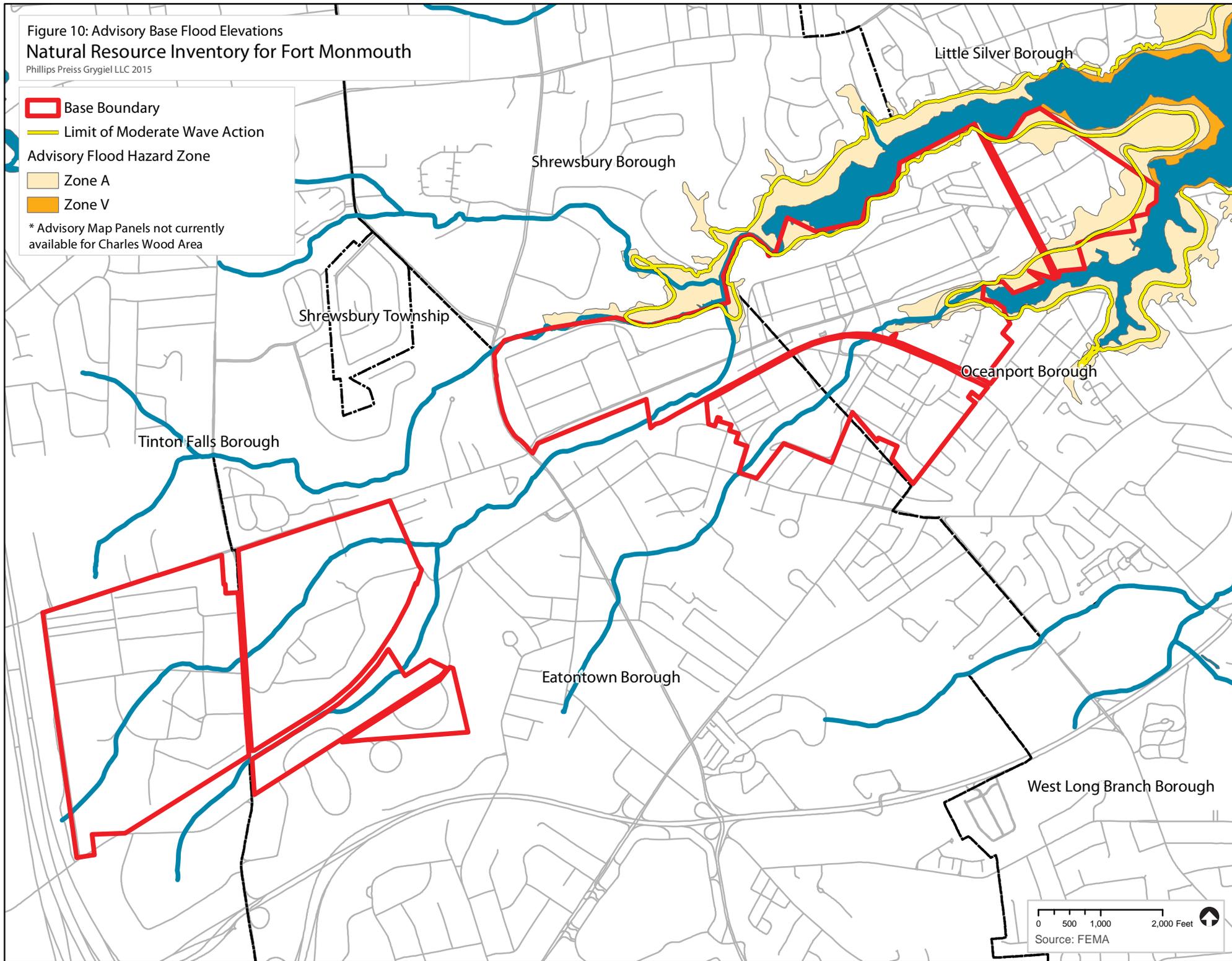


Figure 10: Advisory Base Flood Elevations
Natural Resource Inventory for Fort Monmouth

Phillips Preiss Grygiel LLC 2015

- Base Boundary
- Limit of Moderate Wave Action
- Advisory Flood Hazard Zone
 - Zone A
 - Zone V

* Advisory Map Panels not currently available for Charles Wood Area



Chapter 6 Wetlands

Definition and Identifying Factors

The New Jersey Department of Environmental Protection (NJDEP) regulates activities in wetlands and their adjacent transition areas under the *New Jersey Freshwater Wetlands Protection Act* (N.J.S.A. 13:9A-1 et seq.), which defines wetland as “an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation.” In other words, a wetland is an area with a specific hydrologic regime that supports the growth of plants adapted to living in saturated soil conditions.

In order to accurately define and delineate wetlands, a methodology was developed by the Federal Interagency Committee for Wetland Delineation (FICWD) and is presented in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (FICWD 1989). NJDEP has adopted this manual as the technical basis for identifying and delineating wetlands in New Jersey. The location and extent of wetlands is established using a three-parameter approach: 1) dominance of hydrophytic vegetation, 2) presence of hydric soils, and 3) evidence of long-term wetland hydrology.

Wetland Locations and Characteristics

G.I.S. (Geographic Information Systems) data provided by NJDEP indicates the general location of two types of wetlands on the former Fort Monmouth property, estuarine and freshwater. The extent of wetlands as depicted in **Figure 10, Wetlands** are intended to be used as a general planning tool. The wetlands on the former Fort property have not been field verified or mapped. The specific location, extent and resource value classification of wetlands is subject to a case-by-case detailed field delineations, surveys and analysis. The presence, absence, extent and resource value classification of wetlands are subject to verification by NJDEP Land Use Regulation Program through the Letter of Interpretation (LOI) application process in accordance with the requirements found at N.J.A.C. 7:7A-3. A LOI is obtained by submitting an application to the NJDEP Land Use Regulation Program. FMERA, and each host municipality, must be notified that an applicant has submitted an application to the NJDEP to delineate wetlands on the parcel that is to be developed. There is a 15 day period during which FMERA and a host municipality has an opportunity to comment to the NJDEP. After the NJDEP has evaluated the applicant’s wetlands delineation and has conducted an on-site inspection, it issues a LOI either agreeing or disagreeing with the applicant’s delineation and establishing the limit of the wetlands on site.

Estuarine and Marine Wetlands

According to the NJDEP wetlands mapping, areas along the tidal brackish waters of Oceanport Creek and Parkers Creek are designated estuarine and marine wetlands or open waters. They include both mesohaline areas of moderate salinity (5-18 ppt) and oligohaline areas of low salinity (0.5-5 ppt).

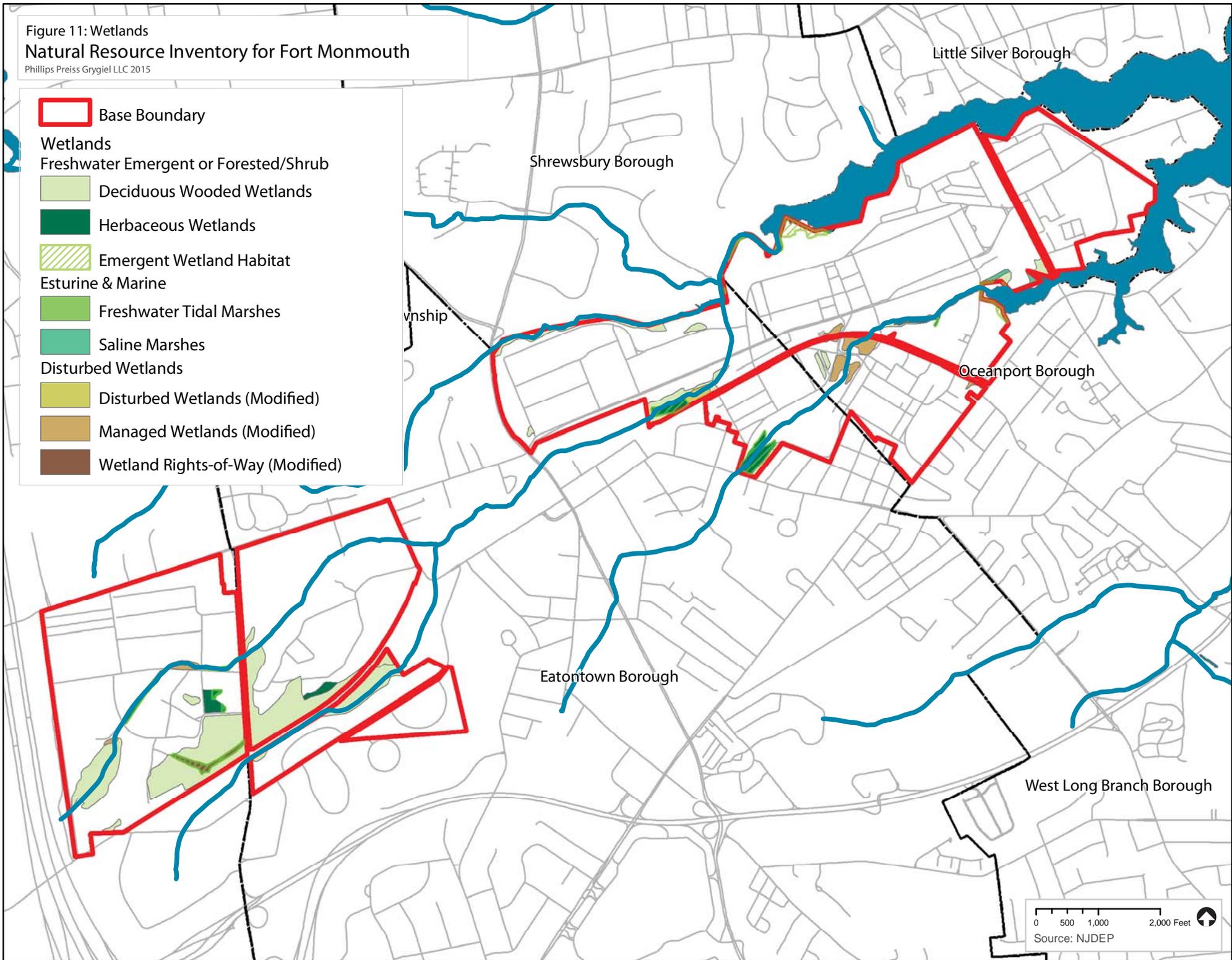
Freshwater Emergent or Forested/Shrub Wetlands

According to the NJDEP wetlands mapping, areas along Mill Creek, Husky Brook, Husky Brook Lake, Wampum Brook, Lafetra and Shrewsbury Creeks are freshwater emergent or forested/shrub wetlands. The most extensive of these are forested wetlands.

Figure 11: Wetlands
 Natural Resource Inventory for Fort Monmouth

Phillips Preiss Grygiel LLC 2015

- Base Boundary
- Wetlands**
- Freshwater Emergent or Forested/Shrub**
- Deciduous Wooded Wetlands
- Herbaceous Wetlands
- Emergent Wetland Habitat
- Esturine & Marine**
- Freshwater Tidal Marshes
- Saline Marshes
- Disturbed Wetlands**
- Disturbed Wetlands (Modified)
- Managed Wetlands (Modified)
- Wetland Rights-of-Way (Modified)



Chapter 7 Vegetation and Wildlife

Rare, Threatened or Endangered Flora and Fauna

Rare, Threatened or Endangered Flora

No federally listed or proposed threatened or endangered flora are known to exist on the former Fort Monmouth property. There was one observance in 1992 of a New Jersey listed endangered species, the clustered sedge.

Rare, Threatened or Endangered Fauna

No federally or state listed rare, threatened, and endangered species are known to exist on the former Fort Monmouth property. Peregrine falcons (*Falco peregrinus*) and Bald Eagles (*Haliaeetus leucocephalus*) can potentially be found in the region given the forested areas along the waterways. Although no longer protected by the Endangered Species Act of 1973, Bald Eagles are still protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Potential eagle foraging areas have been identified around the southeastern and northern portions of the Main Post along the waterways (see **Figure 12, New Jersey's Landscape Project – Bald Eagle Foraging**).

Vegetation and Wildlife by Habitat

Ranking of Wetlands and Forest Habitats

Although there is no evidence of there being threatened or endangered species on the former Fort Monmouth property aside from the one observance in 1992 of the clustered sedge, the combination of open space, forested areas, wetlands and proximity to water on the property has the potential to attract numerous species of mammals, birds, amphibians, and reptiles.

The New Jersey Landscape Project has ranked some of the areas of wetlands and forest habitat on the former Fort Monmouth property based on the status of the species present. The ranking is from one to five with five being assigned to those areas containing one or more occurrences of wildlife listed as endangered and threatened and one being assigned to species-specific habitat patches that meet habitat-specific suitability requirements such as minimum size or core area criteria for endangered, threatened or special concern wildlife species, but that do not intersect with any confirmed occurrences of such species. Some of the forested wetlands on the Main Post and the Charles Wood Area have been valued as "Rank 1". Some of the forested wetlands north of the railroad tracks in the Charles Wood Area have been valued as "Rank 2," as has some of the forest habitat. "Rank 2" is assigned to species-specific habitat patches containing one or more occurrences of species considered to be species of special concern. (see **Figure 13, New Jersey's Landscape Project – Wetland Habitat** and **Figure 14, New Jersey's Landscape Project – Forest Habitat**).

Wetlands

Estuarine and Marine Wetlands

VEGETATION

Wetlands in mesohaline tidal areas of New Jersey are often characterized by smooth cordgrass (*Spartina alterniflora*) and common reed (*Phragmites australis*). Other species present often include marsh elder (*Iva frutescens*), eastern baccharis (*Baccharis halimifolia*), spike grass (*Distichlis spicata*), salt hay (*Spartina patens*), seaside goldenrod (*Solidago sempervirens*), and salt marsh asters (*Aster subulatus* and *A. tenuifolius*).

Where present on the Main Post, estuarine wetlands are dominated by common reed. Common reed tends to create a monoculture and, although they can provide valuable habitat, are generally not considered to be high quality wetlands.

WILDLIFE

Common reed wetlands typically provide nesting habitat for many avian species, including Pied-billed Grebe (*Podilymbus podiceps*), Black-crowned and Yellow-crowned Night Heron (*Nycticorax nycticorax* and *Nyctanassa violacea*), American and Least Bittern (*Botaurus lentiginosus* and *Ixobrychus exilis*), Green Heron (*Butorides virescens*), Coot (*Fulica americana*), Common Moorhen (*Gallinula chloropus*), King and Virginia Rail (*Rallus elegans* and *Rallus limicola*), grackles (*Quiscalus* sp.), Red-winged Blackbird (*Agelaius phoeniceus*), Swamp Sparrow (*Melospiza georgiana*), Marsh Wren (*Cistothorus palustris*), and several waterfowl species. White-tailed deer (*Odocoileus virginianus*), northern raccoon (*Procyon lotor*), and other mammalian species use common reed wetlands for refuge cover. Double-crested Cormorant (*Phalacrocorax auritus*), Common Egret (*Ardea alba*), Great Blue Heron (*Ardea herodias*), Little Blue Heron (*Egretta caerulea*), Wilson's Plover (*Charadrius wilsonia*), and numerous small sandpipers (*Calidris* sp.) have all been reported on the former Fort property.

Freshwater Emergent or Forested/Shrub Wetlands

VEGETATION

Forested wetlands in the area are typically dominated by red maple (*Acer rubrum*) and other hardwoods, including sweetgum (*Liquidambar styraciflua*), and black gum (*Nyssa sylvatica*). Shrubs/vines include arrowwood (*Viburnum dentatum*), coastal sweet pepperbush (*Clethra alnifolia*), and greenbrier (*Smilax rotundifolia*). Herbaceous species found in these forested wetlands typically include smartweed (*Polygonum* sp.), jewelweed (*Impatiens capensis*), violets (*Viola* sp.), asters, sedges and ferns. Fresh water emergent vegetation typically include cattail (*Typha latifolia*), water smartweed (*Polygonum amphibium*), arrowhead (*Sagittaria* sp.), pondweed (*Potamogeton* sp.), sedges, and rushes.

WILDLIFE

Although limited in extent, emergent wetlands at the former Fort Monmouth property may provide habitat for muskrat (*Ondatra zibethicus*), Mallard (*Anas platyrhynchos*) and other species of water fowl, and for reptiles including northern water snake (*Nerodia sipedon*), salamanders and several frog species. Mallard and Belted Kingfisher (*Megaceryle alcyon*) have been reported on the former Fort property.

Avian species likely to utilize forested wetlands habitat at the former Fort property for nesting and foraging include: Barred Owl (*Strix varia*), Veery (*Catharus fuscescens*), Wild Turkey (*Meleagris gallopavo*), American Woodcock (*Scolopax minor*), and several species of woodpeckers and warblers.

Mammals utilizing forested uplands are likely to include white-tailed deer, eastern gray squirrel, northern raccoon, Virginia opossum, striped skunk, eastern chipmunk (*Tamias striatus*), red fox (*Vulpes vulpes*), and white-footed mouse (*Peromyscus leucopus*). Avian species utilizing these areas for foraging and nesting habitat are likely to include Red-tailed Hawk (*Buteo jamaicensis*), Cooper's Hawk (*Accipiter cooperii*), Blue Jay (*Cyanocitta cristata*), Tufted Titmouse (*Baeolophus bicolor*), Carolina Chickadee (*Parus carolinensis*), Red-eyed Vireo (*Vireo olivaceus*), Wood Thrush (*Hylocichla mustelina*), and several species of wood warblers. Catbird (*Dumetella carolinensis*), Carolina Chickadee, and American Robin (*Turdus migratorius*) have been reported on the former Fort property.

Upland Forest/Old Field Habitat

Upland Forest Area

VEGETATION

Although most upland forest areas of the Main Post and Charles Wood Area are developed, patches of upland forest are present in several areas. Significant forested areas are most prominent on the southern portion of the Charles Wood area, consisting of secondary hardwood growth with a closed canopy and moderate to dense undergrowth. Dominant tree species include red oak (*Quercus rubra*), chestnut oak (*Quercus prinus*), birch (*Betula* sp.), tuliptree (*Liriodendron tulipifera*), and sweetgum (*Liquidambar styraciflua*). Understory species include sassafras (*Sassafras albidum*), flowering dogwood (*Cornus florida*), and black cherry (*Prunus serotina*).

WILDLIFE

Mammals utilizing forested uplands are likely to include white-tailed deer, eastern gray squirrel, northern raccoon, Virginia opossum, striped skunk, eastern chipmunk (*Tamias striatus*), red fox (*Vulpes vulpes*), and white-footed mouse (*Peromyscus leucopus*). Avian species inhabiting forested uplands at the MP and CWA and utilizing these areas for foraging and nesting habitat are likely to include Red-tailed Hawk (*Buteo jamaicensis*), Cooper's Hawk (*Accipiter cooperii*), Blue Jay (*Cyanocitta cristata*), Tufted Titmouse (*Baeolophus bicolor*), Carolina Chickadee (*Parus carolinensis*), Red-eyed Vireo (*Vireo olivaceus*), Wood Thrush (*Hylocichla mustelina*), and several species of wood warblers. Avian species observed or heard in forested upland habitat during the BEE site visit included Catbird (*Dumetella carolinensis*), Carolina Chickadee, and American Robin (*Turdus migratorius*).

Old Field Habitat

VEGETATION

Old field habitats include formerly mowed areas where the vegetation includes grasses and forbes and often immature trees. Old field habitat at the Main Post includes grasses, many forbes including Queen Ann's lace (*Daucus carota*), pokeweed (*Phytolacca americana*), goldenrod (*Solidago* sp.), milkweed (*Asclepias syriaca*), and sparse saplings of tree species including eastern red cedar (*Juniperus virginiana*) and winged sumac (*Rhus copallinum*).

WILDLIFE

Mammals utilizing old field habitats are likely to include white-tailed deer, groundhog (*Marmota monax*), eastern cottontail (*Sylvilagus floridanus*), and meadow vole (*Microtus pennsylvanicus*). Groundhog burrows have been observed on the former Fort property. Avian species that prefer open old field habitat and are likely to be present at the former Fort include Northern Mockingbird (*Mimus polyglottos*), Eastern Bluebird (*Sialia sialis*), American Goldfinch (*Spinus tristis*), Rufus-sided Towhee (*Pipilo erythrophthalmus*), Common Yellowthroat (*Geothlypis trichas*), and other warblers, and several sparrow species. Birds observed in the vicinity of old-field habitat on the former Fort property include Mourning Dove (*Zenaida macroura*), House Finch (*Carpodacus mexicanus*), Carolina Wren (*Thryothorus ludovicianus*), Fish Crow (*Corvus ossifragus*), and Northern Mockingbird.

Figure 12: New Jersey's Landscape Project - Bald Eagle Foraging
Natural Resource Inventory for Fort Monmouth

Phillips Preiss Grygiel LLC 2015

- Base Boundary
- Bald Eagle Foraging

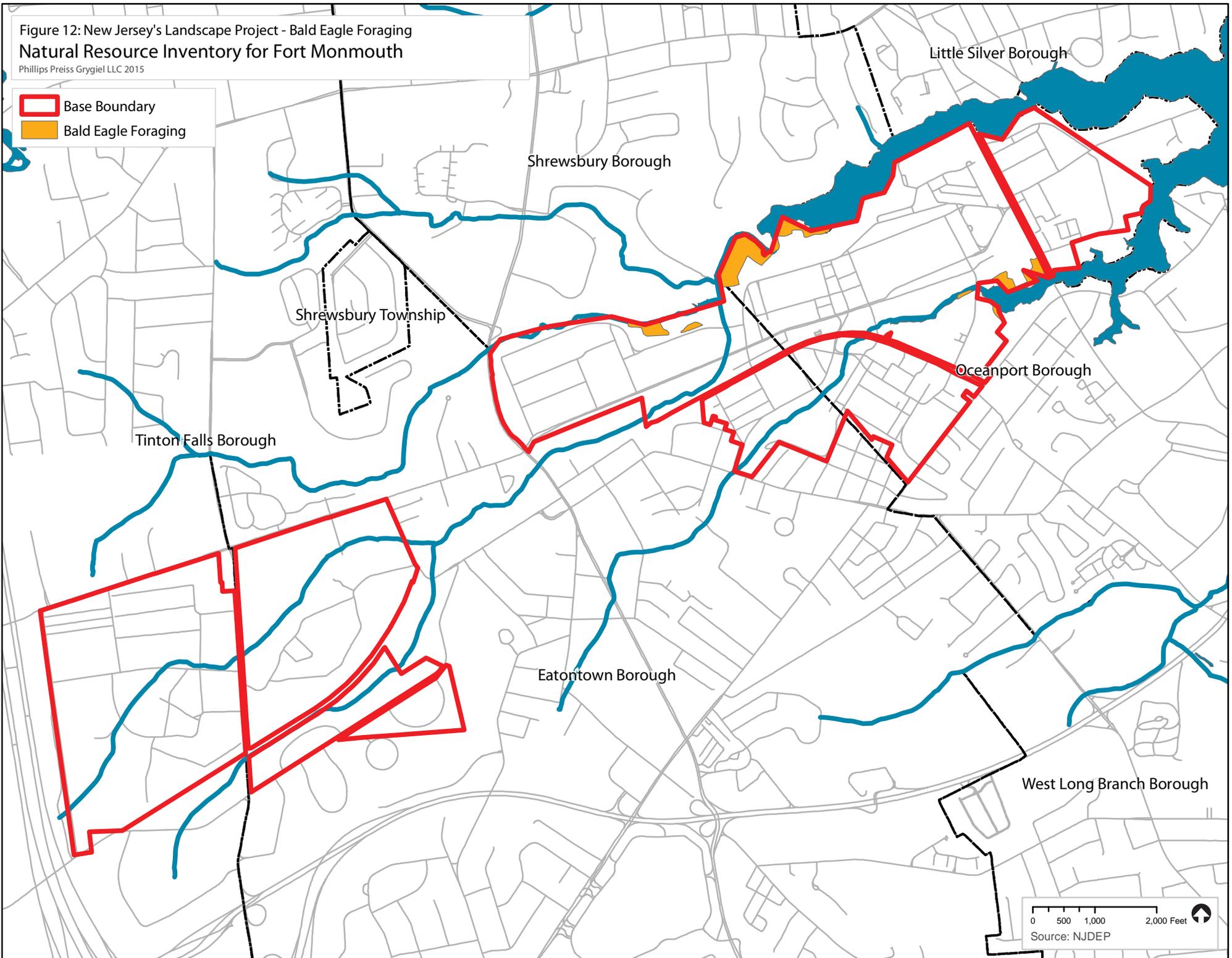


Figure 13: New Jersey's Landscape Project - Wetland Habitat
Natural Resource Inventory for Fort Monmouth

Phillips Preiss Grygiel LLC 2015

- Base Boundary
- Forested Wetland Habitat
 - Suitable (Rank 1)
 - Priority Concern (Rank 2)
- Emergent Wetland Habitat
 - Suitable (Rank 1)

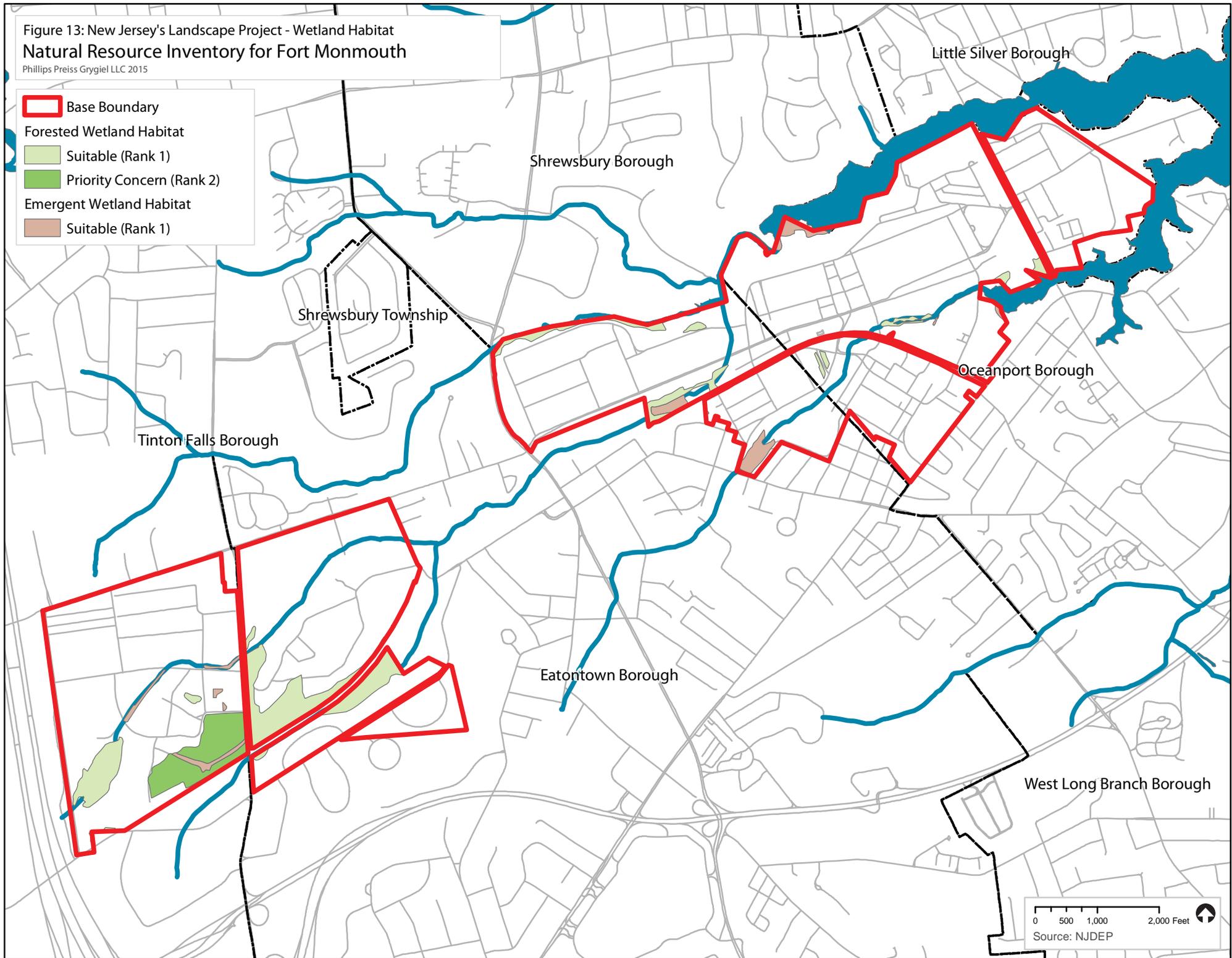
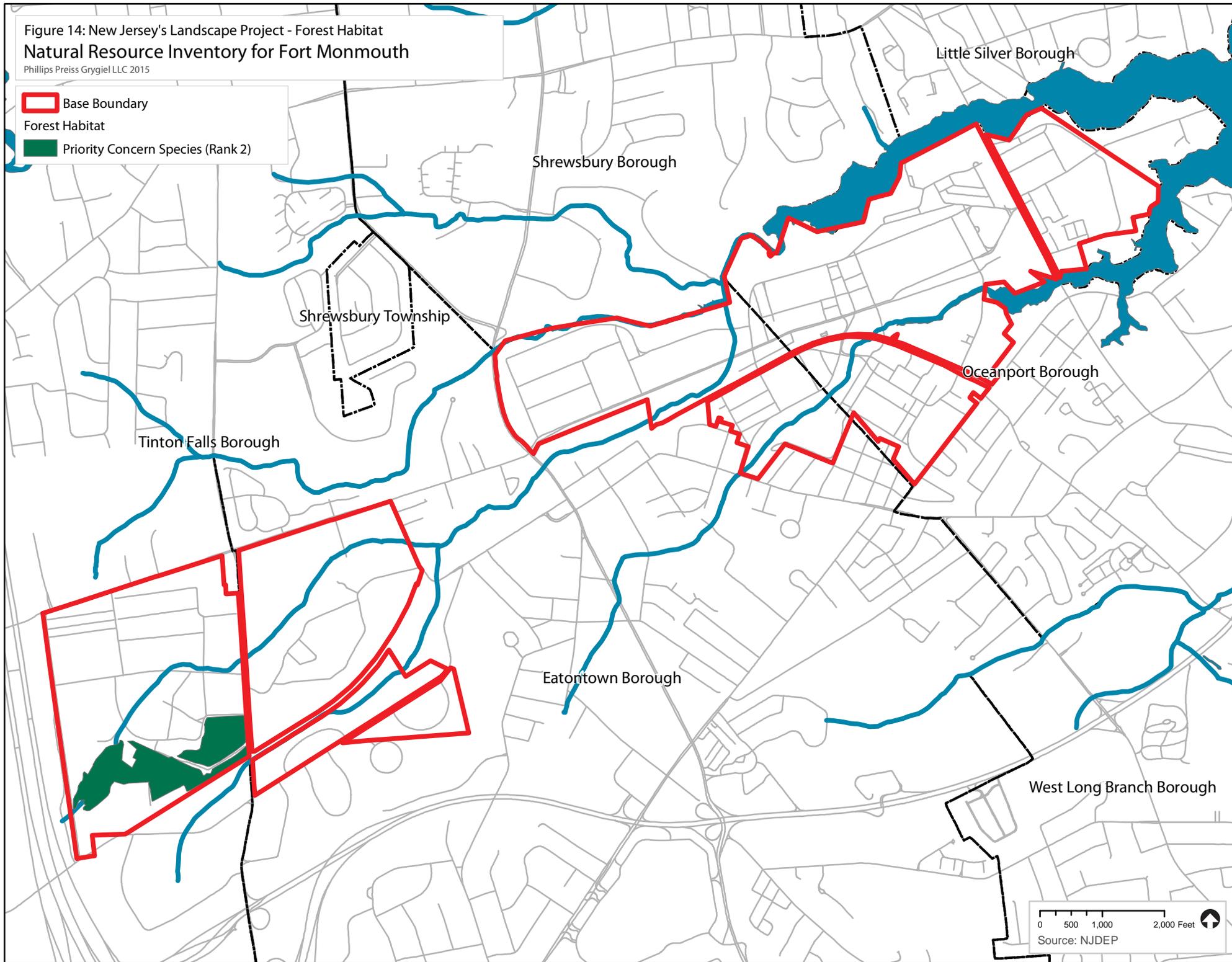


Figure 14: New Jersey's Landscape Project - Forest Habitat
Natural Resource Inventory for Fort Monmouth

Phillips Preiss Grygiel LLC 2015

- Base Boundary
- Forest Habitat
- Priority Concern Species (Rank 2)



Sources

Federal Emergency Management Agency. 2012. *Hurricane Sandy Advisory Base Flood Elevations*. November 2012.

FMERPA. 2007. *Fort Monmouth Reuse and Redevelopment Plan: Technical Memorandum: Environmental Conditions*. September 2007. Prepared by Matrix Environmental Services, LLC.

FMERPA. 2008. *Fort Monmouth Reuse and Redevelopment Plan*. August 2008. Prepared by EDAW, Inc.

New Jersey Department of Environmental Protection. *Geographic Information Systems*. Retrieved January 25, 2013 from <http://www.state.nj.us/dep/gis/>.

Office of the New Jersey State Climatologist at Rutgers University. *The Climate of New Jersey*. Retrieved January 25, 2013 from <http://climate.rutgers.edu/stateclim/?section=njcp&target=NJCoverview>.

Shaw. 2007. *Environmental Condition of Property Report – Fort Monmouth, Monmouth County, New Jersey*. January 2007.

Shaw. 2011. *Fort Monmouth Main Post and Charles Wood Area Baseline Ecological Evaluation Report*. May 2011.

Stanford, Scott D. and Peter J. Sugarman. 2010. New Jersey Department of Environmental Protection and New Jersey Geological Survey. *Bedrock Geology of the Long Branch Quadrangle, Monmouth County, New Jersey, Open-File Map OFM 78*.