NATURAL RESOURCE INVENTORY

Borough of Keyport

Monmouth County, New Jersey

The Pearl of the Bayshore
Keyport
NEW JERSEY

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INTRODUCTION

This Natural Resource Inventory (NRI) for the Borough of Keyport has been compiled pursuant to the authorization of the Mayor and Borough Council. In accordance with Municipal Land Use Law (N.J.S.A. 40:55D-1 et seq.), a municipal Master Plan is required to contain a land use plan element. An NRI is a compilation of basic environmental information that is an essential supplement to a land use plan. This document is therefore intended to be utilized by the Keyport Borough Environmental Commission, the Unified Land Development Review Board, and Borough Committee to aid in the identification of significant natural resources and the evaluation of environmental issues in land use planning.

Maps for this NRI were generated using Geographic Information Systems (GIS) software. A GIS facilitates the linking of digital spatial data that define the location and boundaries of natural and cultural resources to databases that contain information identifying the characteristics of each resource. Data used in this project was obtained from secondary sources including the New Jersey Department of Environmental Protection (NJDEP), the New Jersey Geological Survey (NJGS), the New Jersey Office of State Planning, and the Monmouth County GIS Management Office (MCGISMO). Compilation of the NJDEP data was completed in 1996/1997, the NJGS data was completed in 1998/1999, and the MCGISMO data was completed in 2000. The data is continually updated by NJDEP, with the last photo base map completed between 2002 and 2003. Most data sets were used as received from the source agencies, but some were partially modified to include changes that have occurred since the original data was acquired or to include local information. The base map depicting Keyport tax lots and roadways was created by CME Associates using Computer Aided Drafting and Design (CADD) software. The Association of New Jersey Environmental Commissions (ANJEC) document entitled “The Environmental Resource Inventory: NRI” also provided guidance in the preparation of this inventory.

Maps for this NRI are provided at two different scales. Maps at a 1”=5000’ scale are bound into this document, and a set of similar maps at a 1”=2,500’ scale are attached separately. The larger scale maps are intended to assist in the assessment of individual land parcels.

POPULATION

The Borough of Keyport comprises an area of approximately 1.4 square miles. The Township population recorded in the year 2000 census is 7,568 (United States Census Bureau). There was steady growth in Borough population over the four decades from 1960 to 2000. During these forty years, population increased from 6,440 to 7,568 (See Table 1 Population Trends). However, there was a population decrease of 0.2% in the ten-year span between 1990 and 2000.

TABLE 1

POPULATION TRENDS

Year	Population
1930	4,940
1940	5,147
1950	5,888
1960	6,440
1970	7,205
1980	7,413
1990	7,586
2000	7,568

CLIMATE

The Borough of Keyport has a continental climate, with the prevailing winds from the south during summer months. The buffering effects from the Atlantic Ocean on temperature are substantial. In an average year, the growing season extends from early April until mid to late October and lasts approximately 240 days. Rainfall averages approximately 46 inches per year, and is more or less evenly distributed month to month. Total annual snowfall accumulations average 25".

LAND USE

The New Jersey Department of Environmental Protection GIS database includes eighteen different types of land uses within the Borough of Keyport. These land use types are interpreted from aerial color infrared photography, and do not reflect changes in land use that have occurred since the data was acquired. The Land Use Map is based on a land use and land cover classification system developed by the US Geological Survey and edited by NJDEP (U.S. Geological Survey, 1976). Brief definitions of each land use category mapped in Keyport are provided in this section. Map units representing wetland areas are described in the Freshwater Wetlands section.

Altered Lands

This map unit includes lands outside of an urban location that have been altered by human activities other than mining.

Athletic Fields (Schools)

This category includes athletic fields that are only associated with schools.

Beaches and Dunes

Areas in this category are predominantly composed of sand and may occur at the land-water interface of oceans, bays and estuaries. Beaches are generally elongated non-vegetated buffering systems subject to the action of waves and tides.

Cemetery

Areas set apart for containing graves, tombs or funeral urns. Cemeteries are separate from churchyards.

Commercial and Services

The commercial and services land use coverage includes properties that contain buildings predominantly used for services and the sale of products. Also included in this map unit are support areas such as parking lots, driveways, and associated landscaped areas. Due to the limitations in the mapping process, some residential and industrial land uses may be contained within this map unit.

Deciduous Forest

This map unit includes woodlands with an average tree height greater than 20 feet and at least 75% deciduous trees.

Deciduous Wooded Wetlands

These forest areas contain deciduous trees with an average tree height in excess of 20 feet. Species found here are well suited for wet, hydric soils found within wetland areas.

Industrial

Light and heavy industrial land uses are included in this map unit.

Managed Wetlands

Former natural wetland areas that now are part of an altered managed recreational area, but which still exhibit signs of soil saturation. These areas do not support typical wetland vegetation, but are vegetated primarily by grasses and other planted vegetation that may be routinely mowed.

Open Tidal Bays

Included in this category are large tidal water bodies that have large unrestricted openings directly to the Atlantic Ocean.

Other Urban or Built-Up Land

This map unit includes urban areas that are not associated with active commercial, industrial, service, transportation, communications, or utility facilities. These areas are usually open lands, possibly with abandoned buildings in a state of ruin. Cemeteries are also included in this category.

Prime Farmland

Prime farmland is based on data provided by the Natural Resource Conservation Service (NRCS). Prime farmland is generally defined by the US Department of Agriculture as land with the soil quality, growing season, and moisture supply needed to produce a sustained high yield of crops while employing conventional farming methods. The mapping therefore identifies the location and extent of the most suitable land for producing crops (Jablonski & Baumley, 1989). There is only one small area within the Borough of Keyport designated as prime farmland, however, it has been converted into a graveyard since the date of photographic interpretation.

Recreation Land

Areas depicted as recreation land have been specifically developed for recreational activities that are open to the general public.

Residential

Single unit medium density residential and multiple unit high-density residences are included in this land use category.

Saline Marshes

Areas that are open graminoid dominated regions associates with waters with salinities greater than 1 part per thousand. Saline marshes are dominated by cordgrasses, phragmites, cattails and bulrush.

Tidal Rivers, Inland Bays & Other Tidal Waters

Included in this category are the tidal portions of watercourses, enclosed tidal bays and other tidal water bodies such as tidal pools, ponds and natural lagoons.

Transitional Areas

Lands on which site work or construction has begun for a range of development types are mapped as transitional areas.

Transportation, Communication, and Utilities

Areas included in this category are limited access highways, railroad facilities, bus and truck terminals, airports, wetland rights-of-way, water treatment facilities, sewage treatment facilities, and communication towers.

STATE DEVELOPMENT AND REDEVELOPMENT PLAN

The New Jersey State Development and Redevelopment Plan ("the Plan") was initially adopted in June of 1992. A new State Development and Redevelopment Draft Final Plan was adopted on March 1, 2001.

In 1985, the New Jersey State Legislature adopted the State Planning Act (under N.J.S.A. 52:18A-196 et. seq.). According to the New Jersey Office of State Planning, the Plan was developed because the State of New Jersey needed sound and integrated statewide planning to "…conserve its natural resources, revitalize its urban centers, protect the quality of its environment, and provide needed housing and adequate public services at a reasonable cost while promoting beneficial growth, development, and renewal…" (New Jersey Office of State Planning, 2000). The Plan is designed to establish statewide planning objectives "regarding land use, housing, economic development, transportation, natural resource conservation, agriculture and farmland retention, recreation, urban and suburban redevelopment, historic preservation, public facilities and services, and intergovernmental coordination".

The Resource Planning and Management Structure of the Plan has two basic concepts: Planning Areas and Centers/Environs. Planning Areas are determined by type and intensity of development, proximity to existing developed areas, public and private infrastructure, and environmental resources. Five Planning Areas are defined:

- PA1: Metropolitan Planning Area - Designed to "promote growth, stabilize and revitalize communities, modernize infrastructure, and redesign areas of sprawl".
- PA2: Suburban Planning Area - Designed to "promote much of the statewide growth in centers and redesign areas of sprawl"
- PA3: Fringe Planning Area - Designed to "accommodate growth in centers and keep environs largely open"
- PA4: Rural Planning Area, which includes PA4B, the Rural/Environmentally Sensitive Planning Area - Designed to "promote a viable agricultural industry, protect large contiguous areas of farmland – including those on environmentally sensitive land – and accommodate growth in centers".
- PA5: Environmentally Sensitive Planning Area, which includes PA5B, the Environmentally Sensitive/Barrier Island Planning Area - Designed to "protect environmental resources – including large areas of open lands and sensitive barrier islands – and accommodate growth in centers".

Centers are defined as central places within planning areas where growth should be either attracted or contained, depending on the unique characteristics and growth opportunities of each center and the characteristics of the surrounding planning area in which it is located.

Environs are “areas outside centers and should be protected from the growth that occurs in centers”.

Two State planning areas are designated within the Borough of Keyport: the Metropolitan Planning Area (PA1) and the Environmental Sensitive Planning Area (PA5). It should be noted that State Planning Areas generally do not coincide with the Township boundaries, but extend into adjacent municipalities. The New Jersey State Development and Redevelopment Plan should be referenced for specific details on how the designated State planning areas may affect various aspects of development within the Borough of Keyport. A copy of the Plan can be obtained from the New Jersey Office of State Planning, Department of Community Affairs (33 West State Street, P.O. Box 204, Trenton, NJ 08625-0204, Phone: 609-292-7156).

HISTORIC SITES

An inventory of historic sites in Monmouth County has been compiled by the Monmouth County Historical Association (1990), and this list was used to create the Borough of Keyport Historic Sites Map. The County inventory was performed in accordance with criteria established by the National Historic Preservation Act of 1966. Extant aboveground structures which are considered significant to or representative of the County’s history, culture, or architecture, were identified and documented in the inventory. Selection criteria included age, structural type, architectural style, and historical or cultural association. In general, sites at least 50 years old were considered for selection. The physical condition of a structure was also a factor in site selection.

Fishing Village – Keyport has a history as a fishing village, specifically oystering, as well as a port for steamboats. Records of sailboats and steamships built and used in Keyport through the end of the nineteenth century are kept at Keyport’s Steamboat Dock Musuem, which is located on Broad Street.

The New Jersey Department of Environmental Protection, Historic Preservation Office provides a current listing of the New Jersey and National Registers of Historic Places (last updated 7/20/06). After reviewing the list, there appears to be two places listed within the Borough of Keyport and they are the following:

Front Street Historic District – Front Street Historic District can be found on Front Street between Beers Street and Church Street. This district is associated with Keyport's history of fishing and use as a port. (ID #3351)

Garden State Parkway Historic District – The Garden State Parkway right-of-way is listed on both the National Historic Places List and the State Historic Places List, however, the Garden State Parkway and its right-of-way are not located within the Borough of Keyport's boundaries.

GEOLOGY

Physiography

The Borough of Keyport is located entirely within the Atlantic Coastal Plain physiographic province. The Coastal Plain is characterized by low lying terrain with open stream valleys and broad, gently sloping divides. Topography in the Coastal Plain is a result of the differential erosion of unconsolidated, gently dipping strata of gravel, sand, silt, and clay. Relatively resistant geologic formations erode less rapidly and typically form the higher elevations. The majority of Keyport is at an elevation less than 50 feet, with the lowest areas along the northern boundary of the Borough at sea level. The highest point in the Borough of Keyport is on Route 35 near its intersection with Clark Street at an elevation of 47 feet above mean sea level (NGVD 1929). Steep slopes exist along the Luppatatong Creek near the southern border of the Borough and near the confluence of the Matawan Creek and Raritan Bay near the north end of Broadway. Coastal bluffs, also considered to be steep slopes, are located in various locations along the Raritan Bay at the northern border of the Borough.

Stratigraphy

The Atlantic Coastal Plain is mainly composed of strata of clay, silt, sand, and gravel deposited during the Cretaceous and Tertiary geologic time periods. These layers of unconsolidated sediment lie over a basement of much older Precambrian and early Paleozoic crystalline rock (schist and gneiss). The sedimentary formations dip gently toward the southeast (10 to 60 feet per mile), and generally thicken toward the southeast (Kümmel, 1940).

Each sedimentary formation of the Coastal Plain consists of a succession of strata of similar or variable characteristics that were deposited over a particular interval of geologic time. The surface outcrop patterns of the formations generally trend from southwest to northeast. On a local scale, formation boundaries typically appear irregular due to their gentle dip and the effects of topography. Sedimentary strata of the Coastal Plain dip to the southeast, and the formations become successively younger toward the southeast. Brief descriptions of each formation that outcrops within the Township are obtained from Wilber & Johnson (1940).

Woodbury Formation (Kwb)

The *Woodbury* formation consists of a dark gray clay-silt that weathers brown or orange pink. Iron oxides fill fractures to form layers in the most weathered beds. This unit is massive except for the base where thin quartz sand layers are present. Locally and near the top, thin strings of pale-greenish-brown, smooth surface glauconite occur. The formation also contains finely dispersed pyrite, carbonaceous matter, and small pieces of carbonized wood as much as 12 inches in length. The *Woodbury* maintains a thickness of about 49 feet throughout most of the outcrop belt.

Merchantville Formation (Kmv)

The *Merchantville* formation consists of black, glauconitic, micaceous clay deposited in a marine environment. Maximum thickness is approximately 60 feet and it dips towards the southeast. The Merchantville is conformable (transitions gradually) to the underlying Magothy sand/clay. In Keyport, the Merchantville is found beneath a majority of the Township.

Magothy Formation (Kmr)

The *Magothy* formation is typically comprised of sand, quartz, fine to coarse grained, locally gravelly (especially at the base) and weathers to yellow brown or orange brown. This formation is interbedded with thin-bedded clay or dark-gray clay-silt, mainly at the top of the formation. Maximum thickness of the Magothy sand is 260 feet.

TABLE 2

GEOLOGIC FORMATIONS OF THE BOROUGH OF KEYPORT

AGE	FORMATION	HYDROGEOLOGIC UNIT		THICKNESS (Feet)
Upper Cretaceous (70-100 mya)	Woodbury Clay	Merchantville-Woodbury Confining Unit		50
	Merchantville Formation			60
	Magothy and Raritan Formations	Raritan-Magothy Aquifer System	Upper Aquifer	50-200
			Confining Unit	50-150
			Middle Aquifer	50-150
Pre-Cretaceous	Pre-Cambrian/Lower Paleozoic Schist and Gneiss	Bedrock Confining Unit		----

Adapted from Pucci, Gronberg, & Pope (1989)

According to the NJDEP Technical Manual for Stream Encroachment, all three (3) of these formations (Magothy, Merchantville, and Woodbury) may contain iron sulfide minerals (pyrite or marcasite), that if exposed to air for a period of time can produce sulfuric acid. This material can drastically impact new and proposed vegetative cover and cause water pollution. The handling of this material should be done in accordance with the aforementioned NJDEP Stream Encroachment Manual.

AQUIFERS

Aquifers are saturated geologic formations capable of yielding significant quantities of water under conventional pumping pressures. An unconfined aquifer is a near surface aquifer that has the water table as its upper boundary (also called a water table aquifer). A confined aquifer is a fully saturated unit bounded above and below by relatively impermeable formations called confining units. Aquifers underlying the Borough of Keyport include the Merchantville-Woodbury aquifer system and a portion of the Potomac-Raritan Magothy aquifer system.

Although the Potomac-Raritan Magothy aquifer system is not exposed at the surface within Keyport, the formation is present at depth within the Borough. The Raritan and Magothy formations are a complex sequence of interbedded sand, gravel, silt, and clay strata. In the northern Coastal Plain, this sequence can be divided for simplicity into upper and middle aquifers separated by a confining unit (Pucci, Gronberg, & Pope, 1989). Locally, the upper and middle aquifers may be respectively correlated to the Old Bridge sand and Farrington sand members of the Raritan-Magothy formations. A lower aquifer corresponding to the Potomic formation is absent in the northern Coastal Plain, and the middle aquifer is underlain directly by Pre-Cretaceous bedrock or by a clay layer that rests on bedrock. The Raritan-Magothy aquifer system is assigned rank “A” by the New Jersey Geological Survey, with an average yield of high capacity wells in excess of 500 gallons per minute. Water is typically fresh and moderately hard, with a near neutral pH. Elevated iron and manganese levels are common (NJDEP, 1996).

The Merchantville-Woodbury overlies the Raritan-Magothy aquifer system. The confining unit is comprised of silt and clay with thin layers of sand. An aquifer rank of “E” is assigned to the Merchantville-Woodbury formation, with an average yield of high capacity wells less than 25 gallons per minute.

Groundwater recharge is the transmission of water from the surface to the saturated zone beneath the water table. Areas of high aquifer recharge areas typically correspond to the outcrop occurrence of permeable strata that are hydraulically connected to an aquifer. Potential recharge areas therefore roughly correspond to areas where geologic formations comprising aquifers are exposed at the surface. Actual groundwater recharge is dependent on climate, soil characteristics, slope, vegetative cover, and land use. The method for quantitatively evaluating recharge areas and creating detailed groundwater recharge maps is outlined in the New Jersey Geological Survey

methodology from NJ Geological Survey Report GSR-32 “A Method for Evaluation for Groundwater Recharge Areas in NJ”.

WELLHEAD PROTECTION AREAS

Under the 1986 Federal Safe Drinking Water Act Amendments Program, New Jersey developed a Well Head Protection Program (WHPP) to prevent contamination of groundwater resources. The delineation of well head protection areas (WHPA) is one of the components of the WHPP. The WHPA is the area from which a well draws its water within a specific time frame. Once delineated, these areas become a priority for efforts to prevent and clean up ground water contamination and potential pollution sources may be managed in relation to their location within the WHPA.

The Borough of Keyport has one WHPA located within the southwestern portion of the site. The WHPA extends into neighboring Aberdeen Township.

STREAMS AND LAKES

Major surface hydrologic features within the Borough of Keyport are presented on the Streams and Lakes Map. Drainage within the Borough is generally toward the north-northeast. Main streams in the northwestern border and the northeastern border of the Borough include Matawan Creek and Chingarora Creek. The Luppatatong Creek is bisects the western portion of the Borough. These streams generally flow toward the north and directly drain into the Raritan Bay. The entire Borough is thus part of the Raritan/Sandy Hook Bay watershed and the Atlantic drainage basin.

All streams within the Borough of Keyport are classified as FW2-NT/SE1 by the New Jersey Department of Environmental Protection (NJAC 7:9B; NJDEP, 2005). FW2 is a general surface water classification applied to fresh waters that are not considered to be of exceptional quality, significance, or resource value (i.e., not FW1 waters). NT is the designation for non-trout waters. SE1 represents the general surface water classification applied to saline waters of estuaries.

The New Jersey Department of Environmental Protection has divided the State into 20 Watershed Management Areas for the purposes of environmental planning and management. The major drainage systems of Keyport are within Monmouth Watershed Management Area 12 (NJDEP, 1996).

Water quality in the State is monitored by the NJDEP. The Matawan Creek and Chingarora Creek have been included on the 2006 Integrated List of Waters. The monitoring results publicly available were published in 2006 and reflect water quality conditions from 2004 through 2006. Both the Matawan Creek and the Chingarora Creek were assessed as non-attainment for supporting primary contact recreation (swimmable use), indicating relatively high chlordane, DDX, SO, mercury, pathogens and PCB concentrations in these waters. Priority rankings of pathogens in both creeks are high while the ranking of chlordane, DDX, dissolved oxygen, mercury and PCBs are medium. Matawan Creek also has pH of medium ranking.

Both the Matawan Creek and Chingarora Creek located within the Borough were assessed with regard to aquatic life support (macroinvertebrates). Both creeks were assessed as non-attainment. An assessment of a stream as non-attainment indicates no support of aquatic life use.

Principal land uses in the Raritan/Sandy Hook Bay watershed include suburban & urban residential, commercial and light industrial. Nonpoint source (NPS) pollution is caused by precipitation moving over and through land and carrying natural and anthropogenic pollutants into the surface and groundwater. Non-point source water quality problems associated with the land uses described above are related to suburban and urban runoff from flooding, fertilizers/pesticides/herbicides used on residential lawns, and stream bank destabilization.

No ponds or lakes exist within the Borough of Keyport. All bodies of water present are associated with the Matawan Creek, Luppatatong Creek, Chingarora Creek and Raritan Bay.

FLOOD-PRONE AREAS

The areas designated as flood-prone are based on readily available information on past floods, which may include detailed site-specific surveys and inspections. Information on potential flood zones is available on Flood Insurance Rate Maps (FIRMs) published by the Federal Emergency Management Association (FEMA). The FEMA FIRMs show areas subject to flooding

as determined by historic, meteorological, and hydrological data, as well as open space conditions, flood control structures, and land use in the watershed at the time the FEMA study is conducted. These maps delineate Special Flood Hazard Areas, commonly referred to as 100-year or base flood areas. These maps may also include the elevation of the base flood (100-year flood event), flood insurance risk zones, and areas subject to inundation by the a 500-year flood event, all of which may be used to establish the National Flood Insurance Program's (NFIP) flood insurance premiums. In general, there is an average of 1 chance in 100 that these flood-prone areas will be inundated in any year. A Flood-Prone (FEMA/FIRM) Areas Map for the Borough of Keyport is included in this document and zones designations within the borough are described in the table below.

TABLE 3

BOROUGHT OF KEYPORT FLOOD INSURANCE RATE MAP ZONE DESIGNATIONS

ZONES	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
AO	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but not flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths area between one (1) and three (3) feet; base flood elevations are shown, but no flood hazards factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected be levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazards factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazards factors determined.

FRESHWATER WETLANDS

Wetlands are generally defined as areas that are inundated or saturated by surface or ground waters at a frequency and duration sufficient to support vegetation adapted for life in saturated soil conditions. The Freshwater Wetlands Map for Keyport depicts wetlands within the Borough as interpreted by the New Jersey Department of Environmental Protection from 1986 color aerial infrared photography. These wetland areas are classified according to the U.S. Geological Survey Land Use and Land Cover classification system used for Land Use mapping. The wetlands map is intended for use as a planning guide to indicate areas that may potentially contain regulated wetlands. Actual determination of regulated areas is dependent on a field delineation of the wetland boundary.

Freshwater wetlands in Keyport are commonly associated with stream corridors. General wetland types found within the Township include:

Deciduous Wooded Wetlands – This map unit includes closed canopy swamps associated with watercourses and marsh edges, as well as isolated wetlands. The wetlands are dominated by deciduous tree species (>75%) with an average height greater than 20 feet.

Deciduous Shrub/Scrub Wetlands – This map unit includes brush/shrubland swamps with deciduous species less than 20 feet in height predominant (>75%).

Herbaceous Wetlands – This map unit includes non-tidal swamps dominated by non-woody plant species. Typical herbaceous wetlands may be located on open lake edges and floodplains, and in abandoned wet agricultural fields.

Managed Wetlands – This map unit includes modified former natural wetland areas that are managed for miscellaneous types of agriculture other than cropland and pasture land. Included in this category may be orchards, nurseries, sod and seed farms, cranberry and blueberry farms, live stock feed lots, poultry farms, horse farms, and other specialty farms that have hydric soils.

Saline Marshes – This map unit includes open graminoid regions associated with waters with salinities greater than 1 part per thousand. Typical saline marshes may be located adjacent to estuarine tributaries that empty into the Atlantic Ocean and Open Bays.

SOILS

Soil Series

Abbreviated descriptions of the soils series that have been mapped in the Borough of Keyport are obtained from the Soil Conservation Service of the United States Department of Agriculture soil survey for Monmouth County (Jablonski & Baumley, 1989).

Humaquepts –frequently flooded (HV)

The *Humaquepts – frequently flooded* map unit consist if somewhat poorly drained to very poorly drained soils on flood plains. These soils are subject to frequent flooding with water covering some areas several feet deep during flood stage. These soils formed in stratified, sandy or loamy sediments of fluvial origins. Slopes ranges from 0 to 2 percent. *Humaquepts* differ in stratification from place to place. Consequently, a typical pedon is not given. The solum ranges from 24" to 48" thick. These soils are extremely acid to slightly acid. Characteristics vary greatly from site to site, but *Humaquepts* generally consist of stratified loamy sand, sandy loam, loam, and silt loam that may include gravelly or mucky layers. The soils apparent seasonal high water table is between the surface and a depth of 1.5'. Humaquepts are Group 1 in the New Jersey Hydric Soil List, and nearly always display consistent hydric conditions.

Keyport Series (KeA and KeD)

The *Keyport* series consist of nearly level to moderate sloping well-drained soils in depressional areas and on low divides and side slopes. A typical profile may include 0" to 10" brown sandy loam, 10" to 18" yellowish brown silty clay loam, 18" to 44" mottled dark yellowish brown silty clay loam, and 44" to 60" gray silty clay loam. These soils have a seasonal high water table at 1.5' to 4.0' deep. The Keyport series is not listed on the New Jersey Hydric Soils List.

Pemberton Series (PeA)

The *Pemberton series* consist of moderately well drained and somewhat poorly drained soils on low divides and depressional areas. A typical profile has a brown loamy sand surface layer about 10" thick, a yellowish brown loamy sand subsurface layer 15" thick, a mottled dark yellowish brown and yellowish brown sandy clay loam subsoil 20" thick, and a mottled pale olive fine sandy loam substratum to a depth of 60" or more. The seasonal high water table is 1.0' to 4.0' below the surface. Pemberton soils are not on the New Jersey Hydric Soils List.

Psamment - waste susbtratum (PW)

The *Psamments - waste substratum* map unit consist of reclaimed areas or areas used as sites for sanitary landfills. The mapped areas are generally rectangular in shape and typically range from 10 to 25 acres in size. Typically, a 24" to 48" cover of sandy fill material has been placed over the refuse. Included in these soils are areas of *Udorthents* and soils that have not been covered with fill. Also, some small areas of sand and gravel pits may be included. The properties and characteristic of this map unit differ greatly from place to place. For most uses onsite investigation and evaluation are needed.

Sulfaquents and Sulfihemists (SS)

The *Sulfaquents and Sulfihemists* consist of poorly drained and very poorly drained soils in tidal marshes and estuaries that are subject to tidal flooding. This map unit is about 40 percent Sulfaquents (mineral), 30 percent *Sulfihemists* (organic), and 30 percent other soils. Permeability of these soils is moderate or moderately rapid. The water table fluctuates with the tides in these soils. The properties and characteristics of these soils differ so greatly that onsite investigation and evaluation are needed for most uses.

Tinton Series (TUB)

The *Tinton series* consist of well drained soils on uplands and terraces. These soils formed in acid, loam, Coastal Plain sediments that area 10 to 40 percent glauconite, by volume. A typical profile of the Tinton series may include dark brown loamy sand from 0" to 7" deep, yellowish brown loamy sand from 7" to 32" deep, dark yellowish brown sandy clay loam from 32" to 46" deep, and dark yellowish brown loamy sand from 46" to 60" deep.

Depth to the seasonal high water table is greater than 6'. The Tinton series is not on the New Jersey Hydric Soils List.

Udorthents (UA, UD)

Areas mapped as *Udorthents* consist of soils that have been altered by excavating or filling. In filled areas these soils typically consist of loamy material that is more than 20" thick. The filled areas are on flood plains, in tidal marches, and on areas of moderately well drained to very poorly drained soils. Included with these soils in mapping are soils that may contain such materials as concrete, asphalt, metal, and glass, as well as areas of undisturbed soils. The properties and characteristics of these soils vary greatly from place to place, and onsite investigation is needed to determine suitability for most uses.

Urban Land (UL)

The *Urban land* map unit consists of areas that are more than 85% covered by impermeable surfaces. Urban land is typically covered by dwellings, roads, shopping centers, parking lots, and industrial areas. Relatively small areas of undisturbed soils and Udorthents may be included in this map unit. Properties and characteristics vary from site to site, and field investigation is needed to determine suitability for most intended uses. Urban land is mapped in complexes with various undisturbed soil series where the areas of each are in an intricate pattern and it was not practical to map them separately.

TABLE 4

SELECTED SOIL PROPERITES

MAP UNIT	SOIL SERIES	SLOPE %	DEPTH TO SHWT (feet)	DRAINAGE CLASS	FLOODING FREQUENCY	SURFICIAL PERMEABILITY (in/hr)	HYDRO-LOGIC GROUP	SURFACE EROSION POTENTIAL K-FACTOR
HV	Humaquepts	0-2	0.0-1.5	Somewhat poorly drained to very poorly drained	Frequent	Properties Variable	--	Properties Variable
KeA	Keyport sandy loam	0-2	1.5-4.0	Moderately well drained	None	0.6-6.0	C	0.37
KeD		5-10						
PeA	Pemberton	0-5	1.0-4.0	Moderately well to somewhat poorly drained	None	2.0-6.0	B	0.20
PW	Psamments	0-2	---	Excessively drained to somewhat poorly drained	Properties Variable	Properties Variable	---	Properties Variable
SS	Sulfaquents and Sulfihemists	0-1	---	Poorly drained to very poorly drained	Frequent	Properties Variable	---	Properties Variable
TUB	Tinton loamy sand	0-5	>6.0	Well drained	None	0.6-6.0	A	0.20
UA	Udorthents	0-3	1.5-2.0	Well drained to somewhat poorly drained	None	Properties Variable	---	Properties Variable
UD								
UL	Urban Land	---	>2.0	Excessively drained to very poorly drained	None	Properties Variable	---	Properties Variable

NOTES:

1. SHWT is apparent seasonal high water table; a '+' sign indicates a water table above the surface of the soil.

2. Urban land complexes are undifferentiated areas of soil and urban land (impermeable surfaces). Properties for urban land vary greatly from site to site.

Soil Properties

The Soil Survey of Monmouth County, New Jersey (Jablonski & Baumley, 1989) contains information on soil properties, characteristics, and limitations pertaining to agriculture, woodland management, recreation, wildlife habitat, site development, sanitary facilities, construction materials, water management, engineering, and hydrology. A table of selected properties for the soil types occurring in the Borough of Keyport is included in this document.

Texture

Textural classes are defined by the relative proportion of sand, silt, and clay particles in a soil mass. Sand includes soil particles ranging in size from 2mm to 0.05mm; silt particles range from 0.05mm to 0.002mm; clay particles are smaller than 0.002mm (U.S.D.A. System of Soil Textural Classification). The sand size fraction may be subdivided into very coarse, coarse, medium, fine, and very fine sand. Gravel includes particles greater than 2mm.

Slope

Slope is the inclination of the land surface from the horizontal. The slope between two points on the land surface is thus the difference in elevation divided by the horizontal distance between the points, which may be expressed as a percentage. Moderate to severe limitations on site development are generally associated with slopes in excess of 10% (slope classes D and E).

Seasonal High Water Table

The water table is the surface below which a soil is saturated. The elevation of this surface varies spatially and with time, and is usually highest in the winter and early spring. A perched water table occurs where a saturated zone overlies an unsaturated zone, usually due to the presence of a low permeability layer impeding the vertical movement of ground

water. Moderate limitations on site development are generally associated with a depth to the seasonal high water table less than 4 feet; severe limitations exist for groundwater shallower than 1 foot below the land surface.

Drainage Class

Drainage is the removal of excess surface and subsurface water. The Soil Conservation Service defines seven classes of natural soil drainage (Jablonski & Baumley, 1989).

- Excessively Drained: Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep.

- Somewhat Excessively Drained: Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff.

- Well Drained: Water is removed from the soil readily, but not rapidly. Well drained soils are commonly medium textured.

- Moderately Well Drained: Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

- Somewhat Poorly Drained: Water is removed slowly enough that the soil is wet for significant periods during the growing season. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

- Poorly Drained: Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

- Very Poorly Drained: Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Very poorly drained soils are commonly level or depressed and are frequently ponded.

Flooding

Flooding is the temporary covering of the soil surface by flowing water due to overflowing streams or runoff from adjacent slopes. The Soil Conservation Service has estimates of the frequency, duration, and probable period of occurrence of flooding for each soil series. There are five categories for flooding frequency:

None	Flooding is not probable;
Rare	Flooding is unlikely but possible under unusual weather conditions (near 0 to 5 percent chance of flooding in any year);
Occasional	Flooding occurs infrequently under normal weather conditions (5 to 50 percent chance of flooding in any year);
Common	This term is used when classification as occasional or frequent does not affect interpretations;
Frequent	Flooding occurs often under normal weather conditions (more than a 50 percent chance of flooding in any year).

Soil survey information on flooding is based on the physical characteristics and typical landscape position of a soil series. The Federal Emergency Management Association (FEMA) has more detailed information available as part of the National Flood Insurance Program. FEMA delineated flood zones are based on detailed topographic surveys and hydraulic engineering calculations. A Flood-Prone Areas Map (FEMA FIRM) for the Borough of Keyport is included in this document.

Permeability

Permeability is the property that characterizes a soils ability to transmit water or air. The permeability of a particular soil is dependent on the size, shape, and structural arrangement of the soil particles. Soil Survey estimates of permeability are reported as the number of inches per hour that water moves vertically downward through saturated soil. The following terms are used to describe permeability in soil descriptions:

Very Slow	< 0.06 in/hr
Slow	0.06-0.2 in/hr
Moderately Slow	0.2-0.6 in/hr
Moderate	0.6-2.0 in/hr
Moderately Rapid	2.0-6.0 in/hr
Rapid	6.0-20 in/hr
Very Rapid	> 20 in/hr

Surficial permeability refers to water movement through the surface of an undisturbed soil profile. The Soil Survey of Monmouth County contains permeability estimates for additional horizons in the profile of each soil type. Soil permeability can be a critical parameter in the design of septic system disposal fields and certain types of drainage systems. Soil survey estimates of permeability are typically used as a planning guide to identify areas of potentially permeable soils. Actual permeability is generally assessed by onsite investigation and evaluation or laboratory testing.

Hydrologic Group

Soil series are assigned to one of four hydrologic groups according to the estimated stormwater runoff that would occur during long-duration storms. The groupings assume a soil to be unvegetated, and are determined by the rate at which a soil intakes water when thoroughly wet.

- Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

- Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

- Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

- Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two groups, the first grouping refers to runoff when the soil is drained (relatively low water table) and the second grouping refers to runoff when the soil is undrained (relatively high water table). Hydrologic soil groupings are used to estimate runoff in stormwater management design.

Erosion Potential

Soil erosion is the removal of soil material from the land surface by the action of rainfall and surface runoff. The K-factor is used to indicate the susceptibility of a soil to sheet and rill erosion (sheet erosion is the removal of a layer of soil material; rill erosion is the removal of soil in a network of shallow, steep-sided channels). Estimates of the K-factor are primarily based on the percentage of silt, sand, and organic matter in a soil. Values of K range from 0.05 to 0.69, with higher values indicating a greater susceptibility to sheet and rill erosion by water.

FORESTS

There is only one type of forest coverage mapped in the Borough and it is deciduous forest.

Deciduous forest exists mostly along stream corridors along the western and eastern portions of the Borough and through the center section of the Borough.

Deciduous forests within the upland portions of Keyport commonly include the following species:

- Dominant Trees

White Oak	(Quercus alba)
Black Oak	(Quercus velutina)
Chestnut Oak	(Quercus muehlenbergii)
Tree-of-Heaven	(Ailanthus altissima)
White Mulberry	(Morus alba)
Black Cherry	(Prunus serotina)
Red Cedar	(Juniperus virginiana)
Black Birch	(Betula lenta)
Norway Maple	(Acer platanoides)

- Non-Dominant Trees

Shagbark Hickory	(Carya ovata)
Pignut Hickory	(Carya glabra)
American Holly	(Ilex opaca)
Sugar Maple	(Acer saccharum)
Flowering Dogwood	(Cornus florida)
American Beech	(Fagus grandifolia)
Quaking Aspen	(Populus tremuloides)

The following tree species commonly occur in deciduous forests within the lowland portions of the Township:

- Dominant Trees

Red Maple	(Acer rubrum)
Silver Maple	(Acer saccharinum)
Pin Oak	(Quercus palustris)
Gray Birch	(Betula populifolia)
Sweetgum	(Liquidambar styraciflua)
Blackgum	(Nyssa sylvatica)
Black Willow	(Salix nigra)

- Non-Dominant Trees

Green Ash	(Fraxinus pennsylvatica)
River Birch	(Betula nigra)
American Hornbeam	(Carpinus caroliniana)
Sweetbay Magnolia	(Magnolia virginiana)
American Sycamore	(Platanus occidentalis)

This G.I.S. mapping is a general assessment of the Township's woodlands, and is intended for overall planning purposes. A site-specific assessment of forest types typically requires an onsite inspection and evaluation.

RARE SPECIES AND NATURAL COMMUNITIES

The map coverage has been provided by the N.J. Department of Environmental Protection, Division of Parks and Forestry, Office of Natural Lands Management, does not indicate that rare species or natural communities exist within the Borough.

The term rare has been utilized by the Natural Lands Management Office to include both endangered and threatened plant and animal species, and species that could potentially become endangered or threatened if the population continues a downward trend. Also included within this coverage are natural communities.

The United States Department of the Interior, Fish and Wildlife Service was contacted in an effort to determine whether or not federally listed endangered and threatened species exist in the Borough of Keyport. They have indicated that no federally listed endangered or threatened species are likely to exist within the Borough as a result of limited wooded areas, and generally narrow beaches. The Fish and Wildlife Service did indicate, however, that an occasional transient bald eagle (Haliaeetus leucocephalus) or roseate tern (Sterna dougallii) may exist within the Borough. Additionally, based upon correspondence received from the Land Use Regulation Program of the New Jersey Department of Environmental Protection, the State listed black crowned night heron (Nycticorax nycticorax) exists along portions of the bay shore where sufficient tree cover exists.

SHELLFISH CLASSIFICATION

The New Jersey Department of Environmental Protection (NJDEP) prohibits the harvesting of shellfish for human consumption in the coastal waters of the Borough of Keyport.

APPENDIX - A

WILDLIFE

WILDLIFE

Lists of the mammals, birds, reptiles, amphibians, and fish common to Northern Coastal Monmouth County were adapted from State checklists generated by the New Jersey Division of Fish and Wildlife. Wildlife habitats found within Keyport include woodland habitat (deciduous forests) and wetland habitat (marshes, swamps, and other shallow water areas). These generalized habitat types are typically intermingled with each other and with the increasing urban/suburban environments in the Borough. Relatively larger parcels of wildlife habitat in Keyport generally coincide with forested and wetland areas shown on the land use map.

The Natural Heritage Program of the New Jersey Department of Environmental Protection Division of Parks and Forestry maintains a database on rare plants, animals, and natural communities in the State. A list of rare species for which there are records of sightings within Monmouth County is included here. This list includes vertebrate, invertebrate, and vascular plant species that are listed as endangered or threatened in the State of New Jersey (N.J.A.C. 7:25). Endangered species are defined as those whose prospects for survival within the State are in immediate danger due to one or many factors including habitat loss, over exploitation, predation, competition, or disease. An endangered species requires immediate assistance or extinction will probably follow. Species listed as threatened may become endangered if conditions surrounding the species begin to or continue to deteriorate. The potential for a particular rare species to be present in the Township is dependent on the presence of suitable habitat. Identification of suitable habitat generally requires a field evaluation by an experienced wildlife biologist.

MAMMALS OF NORTHERN COASTAL MONMOUTH COUNTY

COMMON NAME	SCIENTIFIC NAME	COMMON NAME	SCIENTIFIC NAME
Oppossum	Didelphis marsupialis	Red Squirrel	Tamiasciurus hudsonicus
Short-tailed Shrew	Blarina brevicauda	Southern Flying Squirrel	Glaucomys volans
Least Shrew	Crytotis parva	White-footed Mouse	Peromyscus leucopus
Eastern Mole	Scalopus aquaticus	Muskrat	Ondatra zibethicus
Star-nosed Mole	Condylura cristata	Brown Rat	Rattus norvegicus
Eastern Cottontail	Sylvilagus floridanus	House mouse	Mus musculus
New England Cottontail	Sylvilagus transitionalis	Meadow jumping mouse	Zapus hudsonius
European Hare	Lepus capensis	Raccoon	Procyon lotor
Gray Squirrel	Sciurus carolinensis		

REPTILES & AMPHIBIANS OF NORTHERN COASTAL MONMOUTH COUNTY

COMMON NAME	SCIENTIFIC NAME	COMMON NAME	SCIENTIFIC NAME
Common Snapping Turtle	Chelydra s. serpentina	NJ Chorus Frog	Pseudacris feriarum kalmi
Stinkpot	Sternotherus odoratus	Eastern Garter Snake	Thamnophis s. sirtalis
Tremblay's salamander	Ambystoma x tremblayi	Northern Brown Snake	Storeria dekayi
Blue-spotted salamander	Ambystoma laterale		

BIRDS OF NORTHERN COASTAL MONMOUTH COUNTY

COMMON NAME	SCIENTIFIC NAME
Catbird	Dumetella carolinensis
American Crow	Corvus brachyrhynchos
Mourning Dove	Zenaida macroura
American Black Duck	Anas rubripes
Mallard	Anas platyrhynchos
Great Black-backed Gull	Larus marinus
Herring Gull	Larus argentatus
Osprey	Pandion haliaetus
Laughing Gull	Larus artricilla
American Robin	Turdus migratorius
Spotted Sandpiper	Actitis macularia
Snowy Egret	Egretta thula
Cattle Egret	Bubulcus ibis
Song Sparrow	Melospiza melodia
Barn Swallow	Hirundo rustica
Downy Woodpecker	Picoides pubescens
Hairy Woodpecker	Picoides villosus
Red-bellied Woodpecker	Melanerpes carolinus
Canada Goose	Branta Canadensis
White-Throated Sparrow	Zonotrichia albicollis
European Starling	Sturnus vulgaris
Northern Raven	Corvus corax
Snow Goose	Chen caerulescens
Mute Swan	Zenaida macroura
Great Blue Heron	Ardea herodias
Little Blue Heron	Egretta caerulea
Green Heron	Butorides virescens

FISH OF NORTHERN COASTAL MONMOUTH COUNTY

COMMON NAME	SCIENTIFIC NAME
American eel	Anguila rostrata
Moon Jellies	Aurelia aurita
Red Jelly	Cyanea capillata
Weakfish	Cynoscion regalis
Flounder	Pseuopleuronectes americanus
Fluke	Paralichthys dentatus
Bluefish	Pomatomus saltatrix
Black Seabass	Centropristis striata
Clearnose Skate	Raja aglanteria
Blueback Herring	Alosa aestivalis
Hickory Shad	Alosa mediocris
Alewife	Alosa pseudoharengus
American Shad	Alosa sapidissima
Altantic Manhaden	Brevoortia tyrannus
Bay Anchovy	Anchoa mitchilli
Sheepshead Minnow	Cyprinodon variegates
Banded Killifish	Fundulus diaphanous
Mummichog	Fundulus heteroclitus
Striped Killifish	Fundulus majalis
Atlantic Silverside	Menidia menidia
Northern Searobin	Prionotus carolinus
White Perch	Morone americana
Striped Bass	Morone saxatilis
Oyster Toadfish	Opsanus tau
Blue Crab	Callinectes sapidus
Horseshoe Crab	Limulus polyphemus
Surf Clams	Spisula solidissima
Oysters	Crassostrea gigas

Source: Marine Fish of New Jersey, NJDEP, Division of Fish & Wildlife

RARE SPECIES OF MONMOUTH COUNTY (VERTEBRATES)

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
Cooper's Hawk	Accipiter Cooperii		E
Grasshopper Sparrow	Ammodramus savannarum	(PS)	T/T
Upland Sandpiper	Bartramia longicauda		E
Piping Plover	Charadrius melodus	(LE-LT)	E
Wood Turtle	Clemmys insculpta		T
Bog Turtle	Clemmys muhlenbergii	(LT-T(S/A))	E
Timber Rattlesnake	Crotalus horridus horridus		E
Bobolink	Dolichonyx oryzivorus		T/T
Bald Eagle	Haliaeetus leucocephalus	(PS)	E
Pine Barrens Treefrog	Hyla andersonii		E
Red-headed Woodpecker	Melanerpes erythrocephalus		T/T
Yellow-crowned Night-heron	Nyctanassa violacea		T/T
Osprey	Pandion haliaetus		T/T
Savannah Sparrow	Passerculus sandwichensis		T/T
Northern Pine Snake	Pituophis melanoleucus		T
Pied-billed Grebe	Podilymbus podiceps		E/S
Vesper Sparrow	Pooecetes gramineus		E
Black Skimmer	Rynchops niger		E
Least Tern	Sterna antillarum	(PS)	E
Barred Owl	Strix varia		T/T

Source: NJDEP Natural Heritage Program Database 1999

Key: E – Endangered State Status
T – Threatened Stat Status
LE – Endangered Federal Status
LT – Endangered Federal Status
PS – Potential Similarity of Appearance Species

RARE SPECIES OF MONMOUTH COUNTY (INVERTEBRATES)

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
A Noctuid Moth	Apamea apamiformis		
A Noctuid Moth	Chytonix sensilis		
Northeastern Beach Tiger Beetle	Cicindela dorsalis dorsalis	LT	E
Pine Barrens Bluet	Enallagma recurvatum		
Henry's Elfin	Incisalia henrici		
Frosted Elfin	Incisalia irus		
Golden-winged Skimmer	Libellula auripennis		
Coastal Swamp Metarranthis	Metarranthis pilosaria		
A Satyr	Neonympha areolata septentrionalis		
Sunflower Borer Moth	Papaipema necopina		
Yellow edged pygarctia	Pygarctia abdominalis		
Regal Fritillary	Speyeria idalia		
A Noctuid Moth	Zale curema		

Source: NJDEP Natural Heritage Program Database 1999

Key: E – Endangered State Status
T – Threatened Stat Status
LE – Endangered Federal Status
LT – Endangered Federal Status
PS – Potential Similarity of Appearance Species

RARE SPECIES OF MONMOUTH COUNTY (VASCULAR PLANTS)

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
Yellow Giant Hyssop	Agastache nepetoides		
Sea-Beach Pigweed	Amaranthus pumilus	LT	E
Wild Wormwood	Artemisia campestris ssp caudate		
Red Milkweed	Asclepias rubra		
White Milkweed	Asclepias variegata		
Cornel-Leaved Aster	Aster infirmus		
Low Rough Aster	Aster radula		E
Pale Indian Plantain	Cacalia atriplicifolia		E
Pickering's Reedgrass	Calamagrostis pickeringii		E
Pine Barren Reedgrass	Calamovilfa brevipilis		
Barratt's Sedge	Carex barrattii		
Clustered Sedge	Carex cumulata		E
Variable Sedge	Carex polymorpha		E
Spiny Coontail	Ceratophyllum echinatum		E
Pear Hawthorn	Crataegus calpodendron		E
Fleshy Hawthorn	Crataegus succulenta		E
Lancaster Flatsedge	Cyperus lancastriensis		
Coast Flatsedge	Cyperus polystachyos		E
Trailing Tick-Trefoil	Desmodium humifusum		E
Larger Buttonweed	Diodia virginiana		E
Leatherwood	Dirca palustris		
Parker's Pipewort	Eriocaulon parkeri		

Source: NJDEP Natural Heritage Program Database 1999

Key: E – Endangered State Status
T – Threatened Stat Status
LE – Endangered Federal Status
LT – Endangered Federal Status
PS – Potential Similarity of Appearance Species

RARE SPECIES OF MONMOUTH COUNTY (VASCULAR PLANTS CONTINUED)

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
Pumpkin Ash	Fraxinus profunda		E
Pine Barren Gentian	Gentiana autumnalis		
Sea-Beach Milkwort	Glaux maritime		E
Swamp-Pink	Helonias bullata	LT	E
Whorled Pennywort	Hydrocotyle verticillata		
New Jersey Rush	Juncus caesariensis		E
Northern Blazing Star	Liatris scariosa var novae-angliae		E
Mudweed	Limosella subulata		E
Sandplain Flax	Linum intercursum		E
Southern Twayblade	Listera australis		
Hairy Woodrush	Luzula acuminata		E
Climbing Fern	Lygodium palmatum		
Slender Water-Milfoil	Myriophyllum tenellum		E
Virginia False-Gromwell	Onosmodium virginianum		E
Mistletoe	Phoradendron serotinum		
Sea-Side Plantain	Plantago maritime		
Slender Plantain	Plantago pusilla		E
Purple Fringeless Orchid	Platanthera peramoena		E
Sea-Beach Knotweed	Polygonum glaucum		E
Torrey's Mountain Mint	Pycnanthemum torrei		E
Greenish-Flowered Wintergreen	Pyrola chlorantha		E
Sea-Side Crowfoot	Ranunculus cymbalaria		E

Source: NJDEP Natural Heritage Program Database 1999

Key: E – Endangered State Status
T – Threatened Stat Status
LE – Endangered Federal Status
LT – Endangered Federal Status
PS – Potential Similarity of Appearance Species

RARE SPECIES OF MONMOUTH COUNTY (VASCULAR PLANTS CONTINUED)

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
Grass-like Beaked Rush	Rhynchospora globularis		E
Knieskern's Beaked Rush	Rhynchospora knieskernii	LT	E
Pale Beak Rush	Rhynchospora pallida		
Heart-Winged Sorrell	Rumex hastatulus		
Southern Arrow Head	Sagittaria australis		E
Shining Willow	Salix lucida		
Salt Marsh Bulrush	Scirpus maritimus		E
Slender Nut Rush	Scleria minor		
Sea-Side Arrow-Grass	Triglochin maritimum		E
Pine Barren Bellwort	Uvularia puberula var nitida		E
Narrow-Leaved Vervain	Verbena simplex		E

Source: NJDEP Natural Heritage Program Database 1999

Key: E – Endangered State Status
T – Threatened Stat Status
LE – Endangered Federal Status
LT – Endangered Federal Status
PS – Potential Similarity of Appearance Species

APPENDIX - B

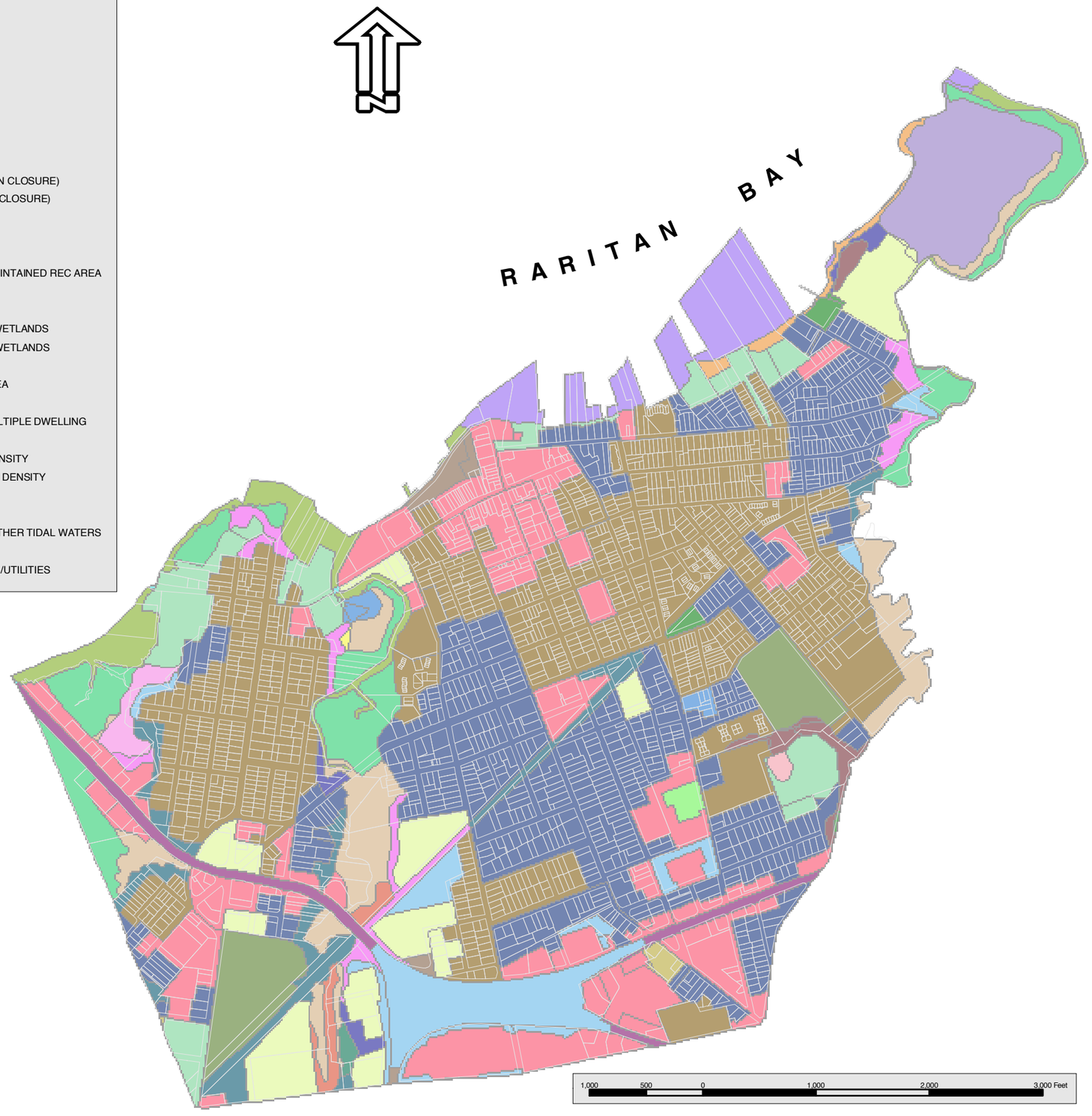
GIS IMAGERY

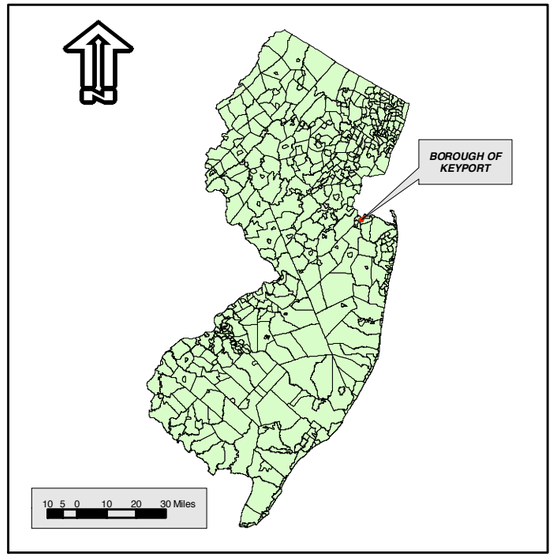
LEGEND

LAND USE 2002

LABEL02

- ALTERED LANDS
- ATHLETIC FIELDS (SCHOOLS)
- BEACHES
- BRIDGE OVER WATER
- CEMETERY
- COMMERCIAL/SERVICES
- DECIDUOUS BRUSH/SHRUBLAND
- DECIDUOUS FOREST (10-50% CROWN CLOSURE)
- DECIDUOUS FOREST (>50% CROWN CLOSURE)
- DECIDUOUS WOODED WETLANDS
- INDUSTRIAL
- MAJOR ROADWAY
- MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA
- OPEN TIDAL BAYS
- OTHER URBAN OR BUILT-UP LAND
- PHRAGMITES DOMINATE COASTAL WETLANDS
- PHRAGMITES DOMINATE INTERIOR WETLANDS
- PHRAGMITES DOMINATE OLD FIELD
- PHRAGMITES DOMINATE URBAN AREA
- RECREATIONAL LAND
- RESIDENTIAL, HIGH DENSITY OR MULTIPLE DWELLING
- RESIDENTIAL, RURAL, SINGLE UNIT
- RESIDENTIAL, SINGLE UNIT, LOW DENSITY
- RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY
- SALINE MARSH (HIGH MARSH)
- SALINE MARSH (LOW MARSH)
- TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS
- TRANSITIONAL AREAS
- TRANSPORTATION/COMMUNICATION/UTILITIES



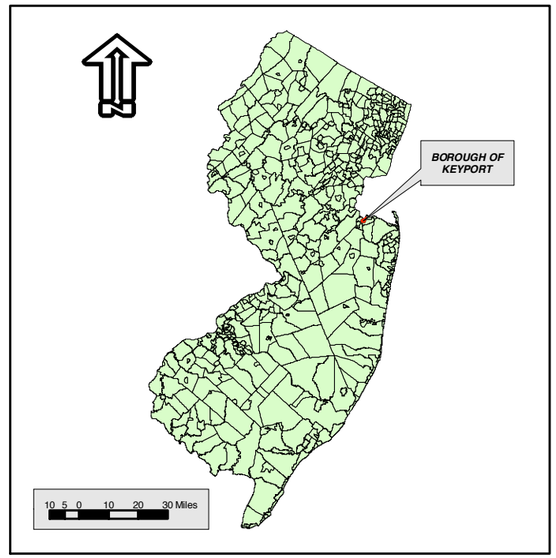


2002 Land Use/Land Cover
Natural Resource Inventory
Borough of Keyport
Monmouth County, New Jersey

prepared by:

ASSOCIATES

Gregory R. Valesi, P.E., P.P.
New Jersey Professional Planner N.J. Lic. No. 4361
New Jersey Professional Engineer N.J. Lic. No. 34458



Smart Growth Planning Areas: Natural Resource Inventory

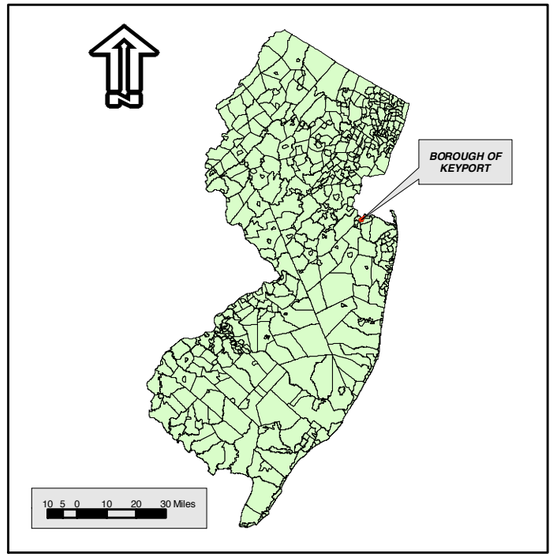
Borough of Keyport

Monmouth County, New Jersey

prepared by:

CME ASSOCIATES

Gregory R. Valesi, P.E., P.P.
New Jersey Professional Planner N.J. Lic. No. 4361
New Jersey Professional Engineer N.J. Lic. No. 34458



Historic Properties: Natural Resource Inventory

Borough of Keyport

Monmouth County, New Jersey

prepared by:

CME ASSOCIATES

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New Jersey Professional Planner N.J. Lic. No. 4361
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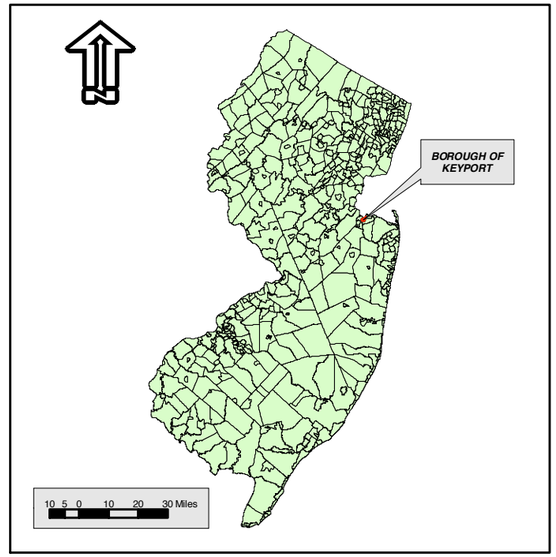

NJGS Bedrock Geology
Natural Resource Inventory
Borough of Keyport
Monmouth County, New Jersey

prepared by:

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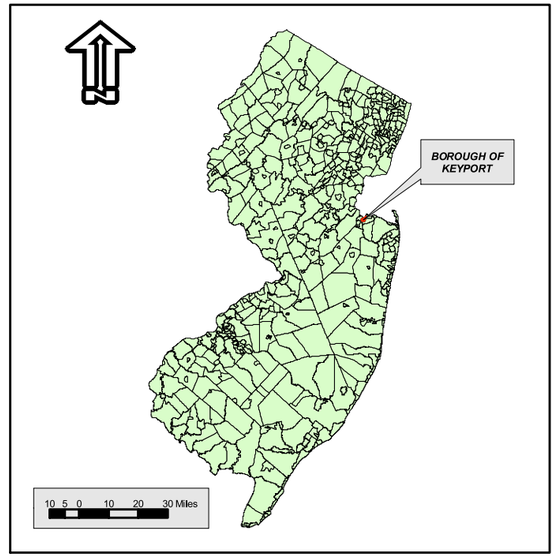

Topography
Natural Resource Inventory
Borough of Keyport
Monmouth County, New Jersey

Topographic contours shown are intended to aid in determining general surface configuration and topographic trends only. Contours have been interpolated from digital elevation models utilizing ESRI's ArcGIS Spatial Analyst software and are not field verified by CME Associates.

prepared by:

CME ASSOCIATES

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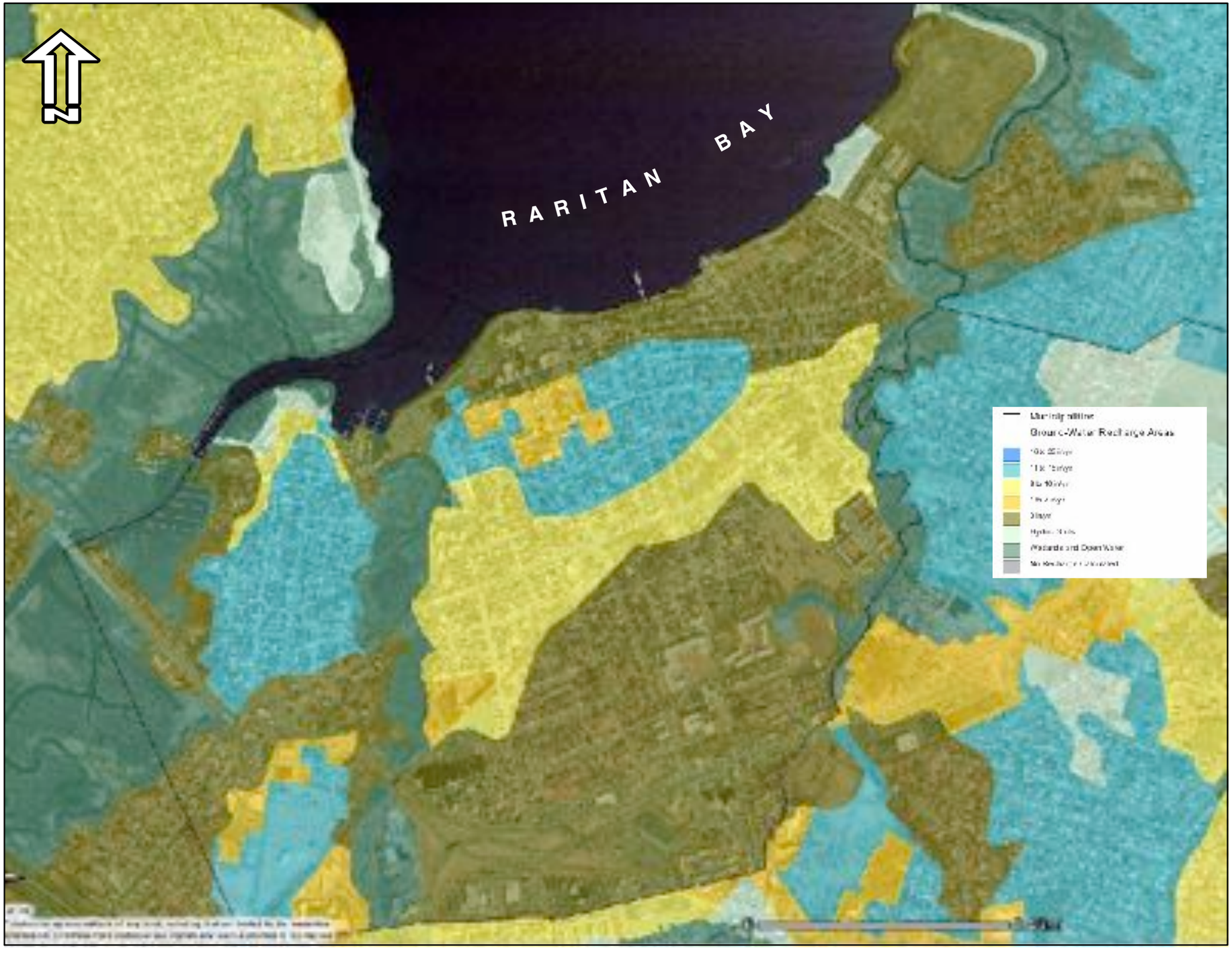
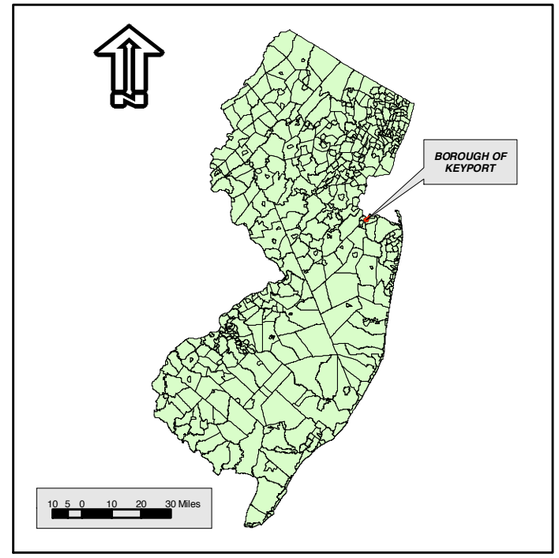
New Jersey Professional Planner N.J. Lic. No. 4361
New Jersey Professional Engineer N.J. Lic. No. 34458





Ground-Water Recharge Areas
Natural Resource Inventory
Borough of Keyport
Monmouth County, New Jersey

prepared by:

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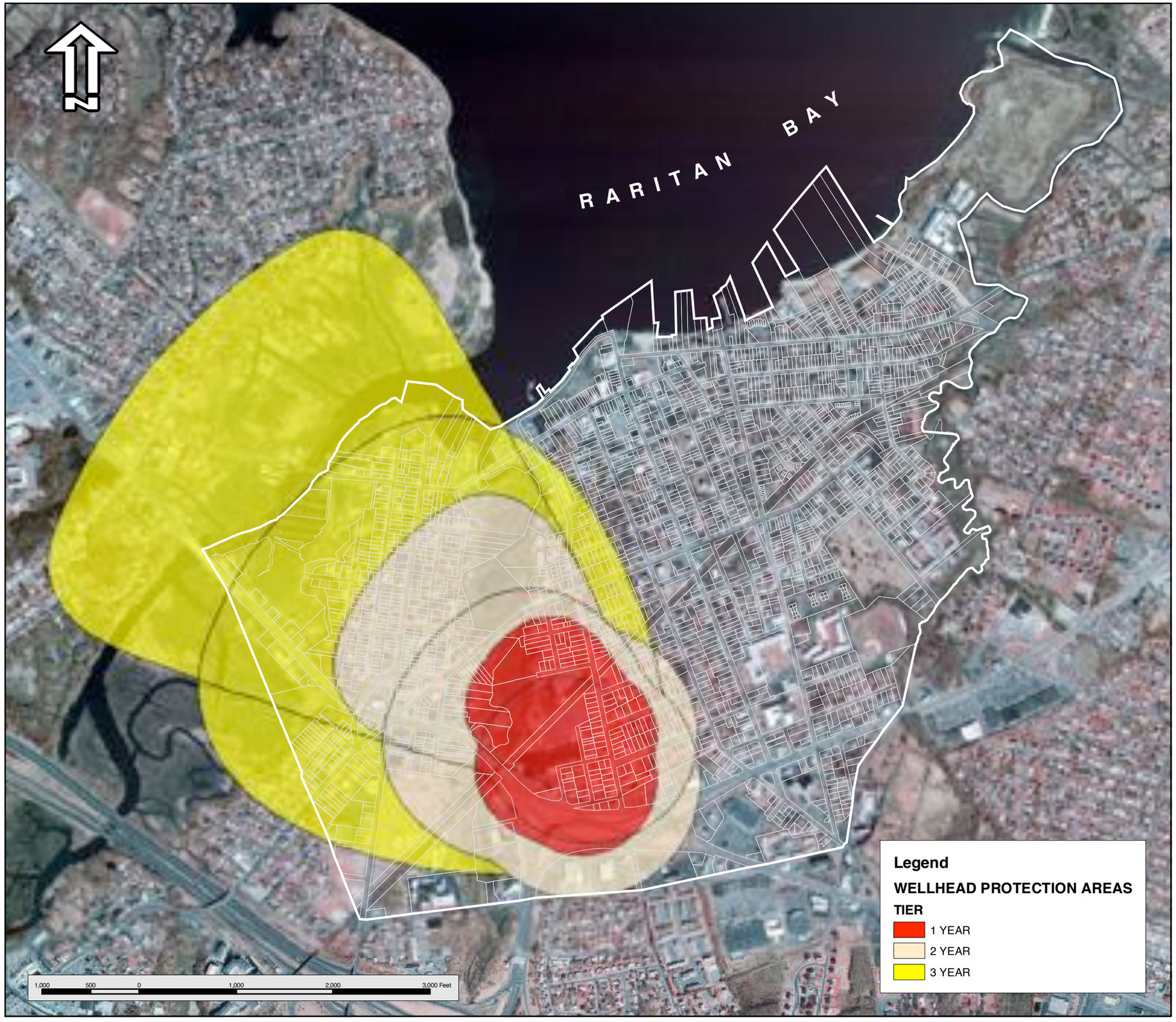

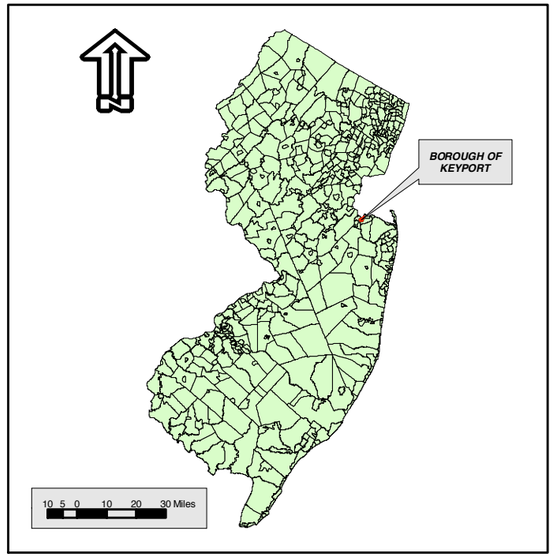

Community Wellhead Protection Areas: Natural Resource Inventory

Borough of Keyport

Monmouth County, New Jersey

prepared by:

CME ASSOCIATES

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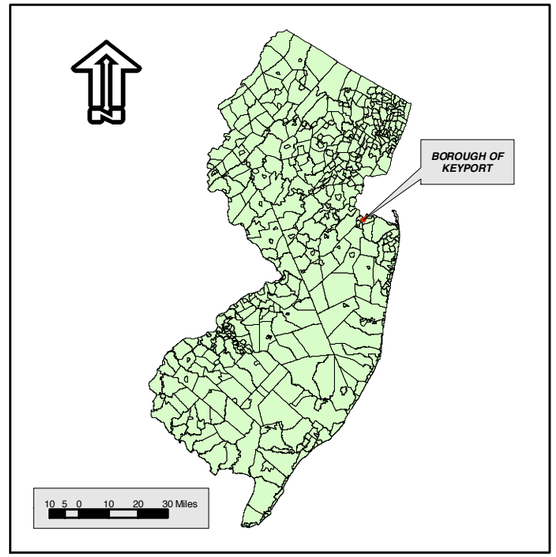
New Jersey Professional Engineer N.J. Lic. No. 34458



Streams, Lakes & HUC 14 Watersheds Natural Resource Inventory

Borough of Keyport

Monmouth County, New Jersey

prepared by:

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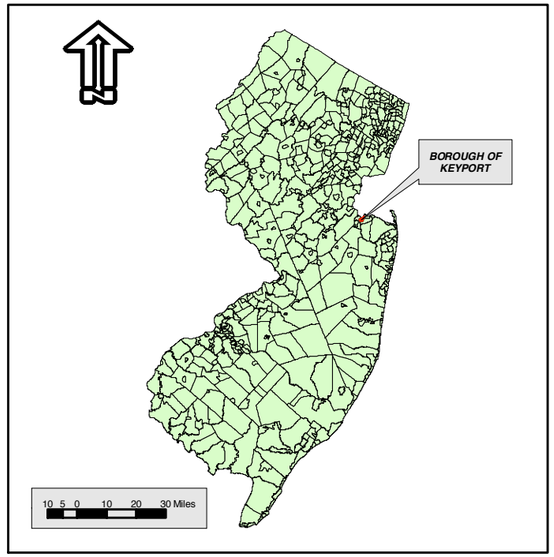
New Jersey Professional Engineer N.J. Lic. No. 34458



FEMA/FIRM Q3 Flood Data
Natural Resource Inventory
Borough of Keyport
Monmouth County, New Jersey

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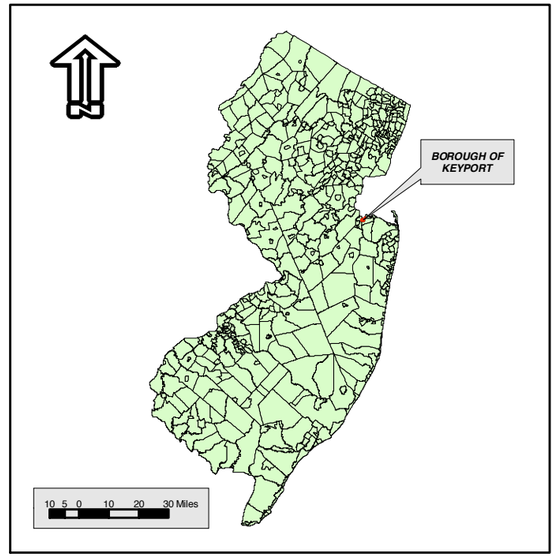

Borough of Keyport

Natural Resource Inventory

(NJDEP) Wetlands

Monmouth County, New Jersey

prepared by:

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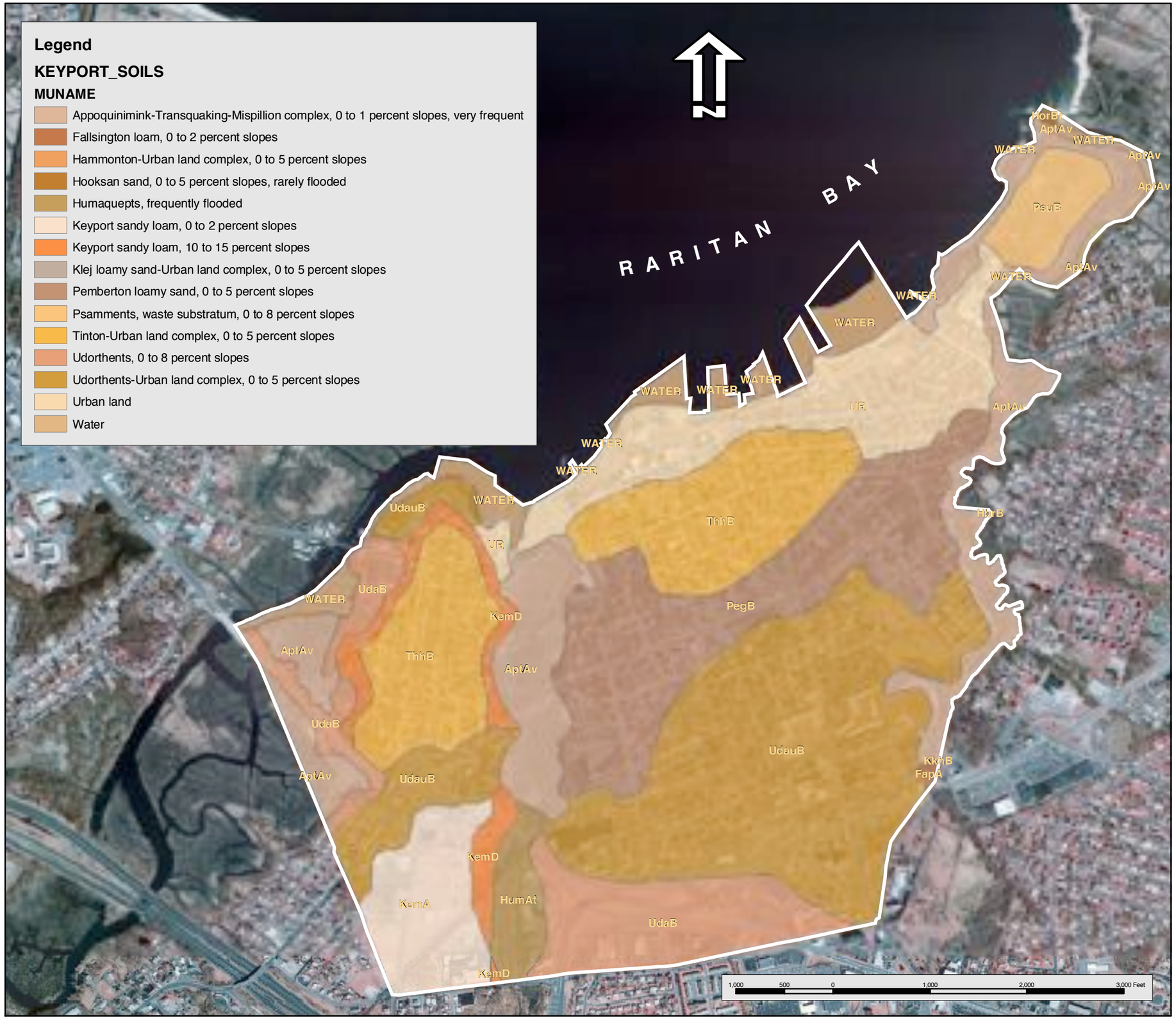

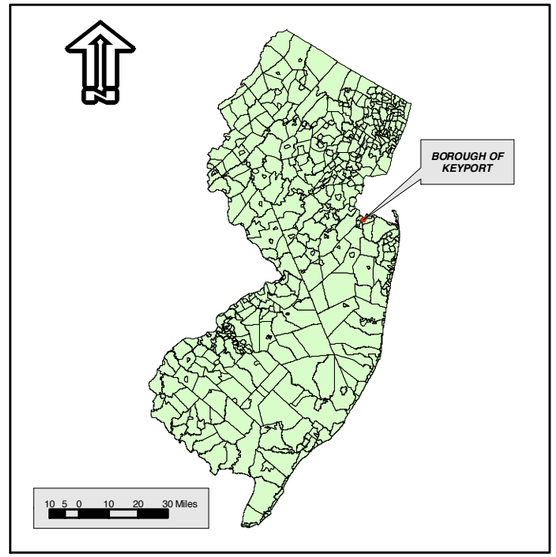

Soils (SSURGO) Natural Resource Inventory

Borough of Keyport

Monmouth County, New Jersey

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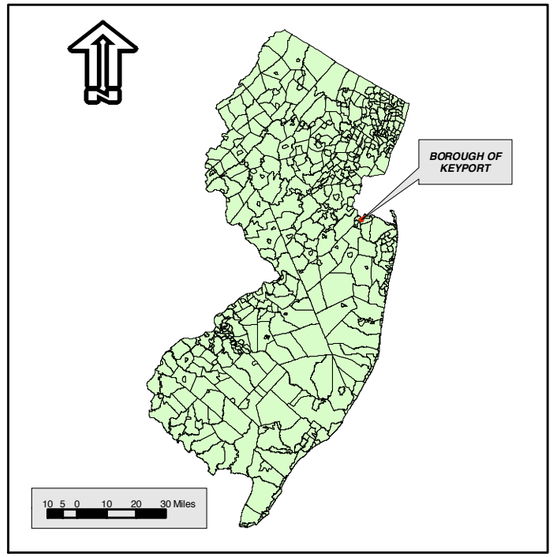

Shellfish Classifications
Natural Resource Inventory
Borough of Keyport
Monmouth County, New Jersey

prepared by:

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http://www.shore.co.monmouth.nj.us/