TOWNSHIP OF ABERDEEN

MONMOUTH COUNTY
NEW JERSEY

NATURAL RESOURCES INVENTORY

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JUNCTION ~ NEW JERSEY

TOWNSHIP OF ABERDEEN
NATURAL RESOURCES INVENTORY

July 2002

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TOWNSHIP OF ABERDEEN
NATURAL RESOURCES INVENTORY

July 2002

INTRODUCTION

The Township of Aberdeen is situated in the northern portion of Monmouth County and contains approximately 5.54 square miles, or approximately 3,545 acres, of land area and 2.22 square miles of water area. Aberdeen Township is bounded to the north by the Raritan Bay to which flows Matawan Creek and other smaller tributaries.

To the south, the Township is bounded by the Township of Marlboro, and to the east, by the Borough of Keyport, the Township of Hazlet and the Township of Holmdel. To the west of Aberdeen Township and Matawan Borough lies the Township of Old Bridge located in Middlesex County. The Borough of Matawan separates the southwestern corner of the Township, known as the "Freneau" area, from most of Aberdeen Township which is located to the north and east of Matawan Borough.

The municipality is traversed from northwest to southeast by the Garden State Parkway, State Highway Route 34 and State Highway Route 35. A few County roads crisscross portions of the Township; County Route 3 (Lloyd Road), County Route 516 (New Brunswick Avenue and Lower Main Street), and County Route 6A and 6 (Cliffwood Avenue and Amboy Avenue). The North Jersey Coastline Railroad Line also traverses the Township, providing commuter service to New York City from the Aberdeen-Matawan Station.

The Township of Aberdeen is generally a predominantly residential community of medium density containing a wide variety of housing, from single-family homes to townhomes and condominiums. Concentrations of commercial development exist along State Highway Routes 34 and 35 and Lower Main Street (County Route 516), and a few manufacturing and industrial uses are located north of the Garden State Parkway along County Road and Cliffwood Avenue. Very little remaining vacant land areas which are developable remain in the Township.

Similar to many suburban areas throughout the State, the Township of Aberdeen has been experiencing development pressures, primarily for infill development on those few remaining vacant tracts of land. This is due to the Township's location within a regional suburban corridor extending from the New York City Metropolitan area along the eastern shore of New Jersey. Major transportation networks, such as the Aberdeen/Matawan railroad station, the Garden State Parkway and the numerous intersections of major arterial and collector roads all within Aberdeen Township, provide easy access to the Township from the Metropolitan area which tends to promote development.

Most of the larger tracts of vacant land exist in the portion of the Township referred to as the "Freneau" area, which is that southwest portion separated from the remainder of the Township by Matawan Borough. Due to environmental constraints as well as the physical separation from the remainder of the Township, the extension of public sewer to the Freneau area has not occurred and other infrastructural improvements have been very limited. What development exists in the Freneau area is predominantly older single-family residential uses with some scattered commercial, industrial and agricultural uses which all rely on individual onsite septic systems, many of which have failed or are near failing because of the high water table and unsuitable soils for the systems.

An integral part of Aberdeen Township is the variety of natural features situated amidst the developed portions of the Township. The natural features contained within the Township include steep topographic slopes, marshes, wetlands, flood plains, lakes, creeks, streams, coastal shore line, and woodlands, all of which are habitats for various flora and fauna. Additionally, the Township's geological formations and soil characteristics present important considerations for land development and land preservation.

It is the purpose of this "Natural Resources Inventory" report to identify and evaluate the natural features of Aberdeen Township in order to provide additional information to the Township in its continued efforts to both protect its environmental resources and to promote sound land development. The information provided by the Aberdeen Township Environmental & Shade Tree Advisory Board on geology, water supply and fauna and flora in the Township has been instrumental in the formulation of this report.

UPDATED TOWNSHIP BASE MAP

The 1997 "Base Map" of Aberdeen Township was updated utilizing Township Tax Map sheets revised to December 28, 1999, resulting in a February 2002 "Revised Base Map" prepared by Coppola & Coppola Associates. The "Revised Base Map" depicts roadways, lot lines and water courses. It is upon the "Revised Base Map" that most of the graphic information contained within this "Natural Resources Inventory" is presented.

The "Revised Base Map" initially was drafted at a scale of 1" = 400', which created a map approximately three feet by five and one-half feet (3' x 5.5') in size. The map was then photographically reduced to an eleven inch by seventeen inch (11" x 17") size for use within published reports.

On the 11" x 17" sheets, the scale of the map is approximately 1" = 1,666'. At this scale, one (1) square inch equals approximately 63.7 acres. The users of the maps in this report, therefore, should be aware of the inherent limitations of portraying graphic material at this scale; while the information is shown as accurately as possible, slight distortions in the drafting and reproduction process will necessarily be magnified several times due to the extreme reduction in the scale of the "Revised Base Map".

ABERDEEN TOWNSHIP'S EXISTING ZONE PLAN

The existing "Zoning Map" of the Township of Aberdeen, dated June 1993, is included within this report for informational purposes as an aide to the reader in order to more easily understand the textual discussions and the relationship of the natural features to the zone plan of the Township.

CRITICAL AREAS

The "Critical Areas Map" generally indicates those portions of the Township of Aberdeen that have limited development potential because of steep slopes of fifteen percent (15%) or greater, 100-year flood plains and/or freshwater wetlands. These three (3) categories of environmentally sensitive lands can be identified and mapped on a site plan and/or subdivision submission with a high degree of accuracy and certainty; however, the "Critical Areas Map" is not intended to take the place of specific on-site engineering investigation. The presence of one or more of these features clearly justifies the limitation of the density and/or intensity of development.

Slopes 15% & Greater

Slope is indicated as a percentage; i.e., the change in vertical elevation (in feet) per one hundred feet (100') of horizontal distance. Aside from the sheer physical impediment of improving a site for construction on steep slopes or rocky ledges, the degree of slope has a direct bearing on a number of other physical characteristics. For example, absorption or soil drainage is inversely related to the degree of slope. Steep slopes necessarily have poor drainage due to increased run-off. The natural evolution of soil types also is impeded on steep slopes due to the inherently limited amount of ground cover that can develop in areas of high erosion.

Slopes fifteen percent (15%) and greater are potentially critical environmental impact areas. On these slopes, the soils are often thin and have low natural fertility. Moreover, in areas where the slope of the land exceeds fifteen percent (15%), development costs rise sharply along with the potential for environmental problems and the associated costs that will invariably result if proper attention is not paid to the treatment for hillside or mountain development. For these reasons, it usually is recommended that relatively low densities prevail in areas where slopes are fifteen percent (15%) or greater in grade.

As shown on the "Critical Areas Map" from information on the U.S. Geological Survey Topographic Maps (Keyport Quadrangle, photo revised 1970 and photo inspected 1977, and South Amboy Quadrangle, photo revised1981), there are few steep slope areas within Aberdeen Township. Those steep slopes that are identified are situated in small, isolated areas scattered throughout the Township, most of which were formed by streams and creeks cutting through the characteristically soft soils.

TOWNSHIP OF ABERDEEN

Monmouth County • New Jersey

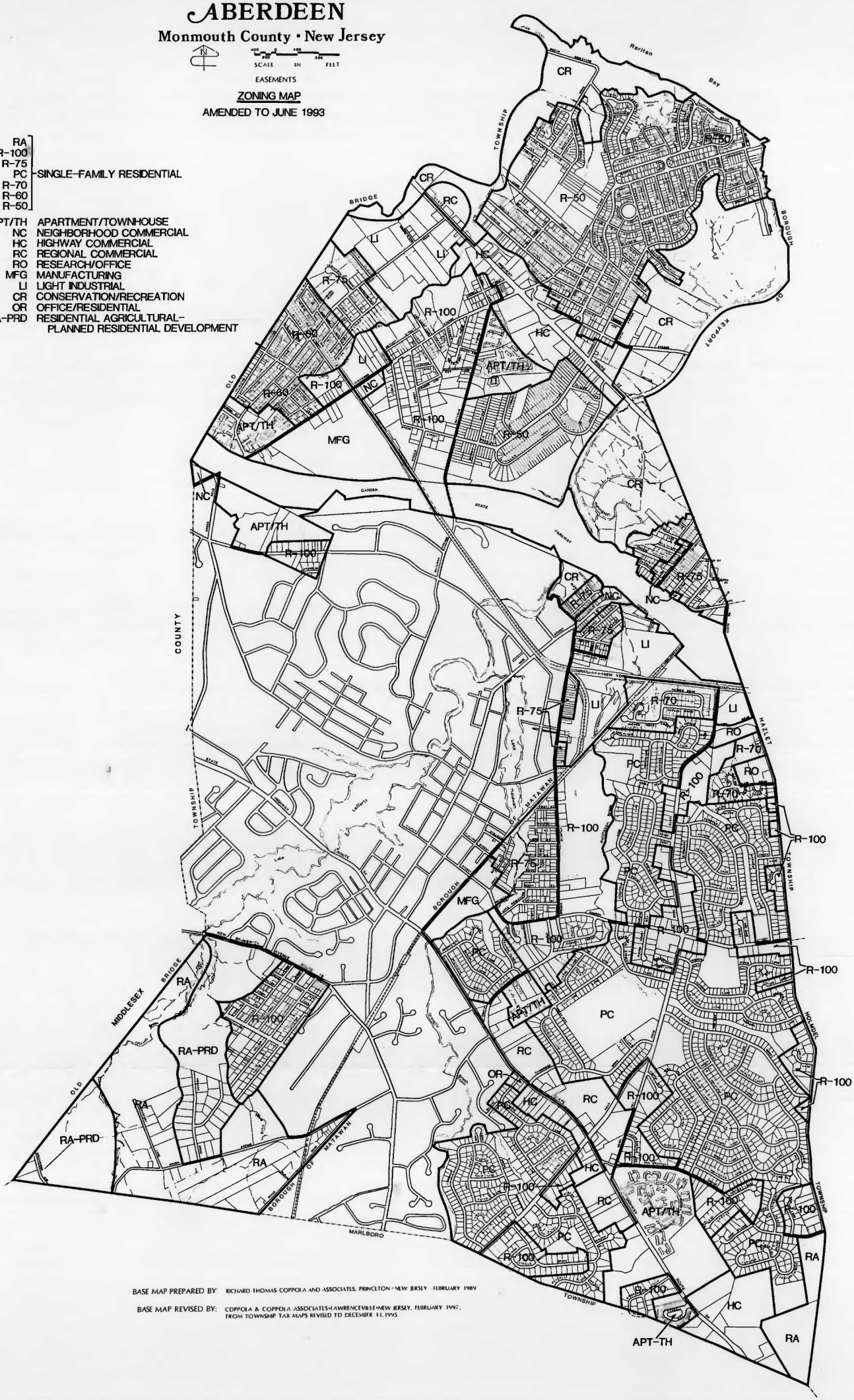
SCALE IN FEET

EASEMENTS

ZONING MAP

AMENDED TO JUNE 1993

RA, R-100, R-75, PC, R-70, R-60, R-50	SINGLE-FAMILY RESIDENTIAL
APT/TH	APARTMENT/TOWNHOUSE
NC	NEIGHBORHOOD COMMERCIAL
HC	HIGHWAY COMMERCIAL
RC	REGIONAL COMMERCIAL
RO	RESEARCH/OFFICE
MFG	MANUFACTURING
LI	LIGHT INDUSTRIAL
CR	CONSERVATION/RECREATION
OR	OFFICE/RESIDENTIAL
RA-PRD	RESIDENTIAL AGRICULTURAL-PLANNED RESIDENTIAL DEVELOPMENT



BASE MAP PREPARED BY: RICHARD THOMAS COPPOLA AND ASSOCIATES, PRINCETON • NEW JERSEY FEBRUARY 1989

BASE MAP REVISED BY: COPPOLA & COPPOLA ASSOCIATES • LAWRENCEVILLE • NEW JERSEY, FEBRUARY 1997, FROM TOWNSHIP TAX MAPS REVISED TO DECEMBER 11, 1995

TOWNSHIP OF ABERDEEN

Monmouth County • New Jersey

CRITICAL AREAS MAP

STEEP SLOPE
15% OR GREATER

100-YEAR FLOOD PLAIN

FRESHWATER WETLANDS

01	UPLAND	
05	PEM1C	PALUSTRINE: EMERGENT; Persistent, seasonal
09	PFO1C	PALUSTRINE: FORESTED: Broad Leaved Deciduous, seasonal
11	POWHh	PALUSTRINE: OPEN WATER: Unkown Bottom, permanent, diked/impounded
16	PFO1B	PALUSTRINE: FORESTED: Broad Leaved Deciduous, saturated
20	PSS1B	PALUSTRINE: SCRUB/SHRUB: Broad Leaved Deciduous, sautrated
27	PSS1C	PALUSTRINE: SCRUB/SHRUB: Broad Leaved Deciduous, seasonal
28	L1OW	LACUSTRINE: LIMNETIC: Open Water, unkown bottom
42	MODR	RIGHT-OF-WAYS (area maintained by utilities)
44	MODL	LAWNS, STORMWATER MANAGEMENT AREAS (areas are not normally inundated)
48	MODD	DISTURBED AREAS (surface vegetation disturbed)
59	PSS1B/PFO1B	PALUSTRINE: SCRUB/SHRUB,FORESTED: Broad Leaved Deciduous, saturated
80	PFO1C/PSS1C	PALUSTRINE: FORESTED, SCRUB/SHRUB: Broad Leaved Deciduous, seasonal
62	PEM1E/PSS1E	PALUSTRINE: EMERGENT, SCRUB/SHRUB: Broad Leaved Deciduous, seasonal saturated
64	PEM1C	PALUSTRINE: EMERGENT: Persistent, seasonal
185	UWB	NON-TIDAL: Unkonwn, Intermittently Flooded/ Temporary, Saturated
237	E2EM2	ESTUARINE-INTERTIDAL: Emergent, non-persistent, irregular

BASE MAP PREPARED BY RICHARD THOMAS COPPOLA AND ASSOCIATES PRINCETON - NEW JERSEY FEBRUARY 1989

BASE MAP REVISED BY COPPOLA & COPPOLA ASSOCIATES-LAWRENCEVILLE-NEW JERSEY FEBRUARY 1997
FROM TOWNSHIP TAX MAPS REVISED TO DECEMBER 31 1995

100-Year Flood Plains

Lands indicated to be within the 100-year flood boundary have a one percent (1%) chance of flooding in any given year. The source maps used for the delineation of the 100-year flood plains in Aberdeen Township were prepared by the Federal Emergency Management Agency, through the Federal Insurance Administration, which is charged with the responsibility of delineating the flood prone areas within the Township under the authority of the National Flood Insurance Act of 1968.

It should be understood that the source maps, the Flood Insurance Rate Maps (Community Panel Numbers 3403 12 0002B and 3403 12 0001B, revised to August 3, 1992 and Community Panel Number 3403 12 0010A, dated March 18, 1985), were prepared to facilitate flood plain management activities and do not show all the special flood hazard areas in Aberdeen Township or all the planimetric features outside the flood plain.

As shown on the "Critical Areas Map", significant 100-year flood plain areas exist within Aberdeen Township along the Raritan Bay and Matawan Creek and its tributaries. However, as noted above, not all of the flood plain areas in the Township have been mapped by FEMA, and it is certain that many additional 100-year flood plain areas exist within Aberdeen Township associated with the myriad number of stream tributaries in the municipality.

Freshwater Wetlands

"Wetlands" are physical characteristics that present severe constraints for land development. The delineation of the freshwater wetlands within Aberdeen Township was drafted from information mapped by the New Jersey Department of Environmental Protection (NJDEP) from March 1986 infrared photographs.

The extent of the freshwater wetlands mapped by the NJDEP was based upon the definition of "wetlands" adopted by the U.S. Fish and Wildlife Service, as follows:

> "Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three (3) attributes: 1) At least periodically, the lands support predominantly hydrophytes; 2) The substrate is predominantly undrained hydric soil; and/or 3) The substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year."

The U.S. Fish and Wildlife Service's "Cowardin Classification System" classifies wetlands systems according to type. The five (5) basic ecological systems are: Marine, Estuarine, Riverine, Palustrine and Lacustrine. Further differentiation is possible by class, subclass, water regime and special modifiers. The twenty-four (24) types of freshwater wetlands in addition to the "uplands" area delineated in Aberdeen Township are listed on the "Critical Areas Map".

Although site specific investigation is required to document the actual extent of freshwater wetlands on any particular property, it appears from the information mapped by the New Jersey Department of Environmental Protection (NJDEP) that freshwater wetlands are the most widespread constraint to development in Aberdeen Township. Most freshwater wetlands within Aberdeen Township coincide with the 100-year flood plains along the creeks, streams and bay.

SOILS

Soils have inherent characteristics that pose varying kinds of limitations for community development. The "Soil Survey of Monmouth County, New Jersey", published during April 1989 by the United States Department of Agriculture, Soil Conservation Service, provides a listing of the soil types within Monmouth County and a detailed description of their suitability for various types of land development and plant cultivation.

Regarding Aberdeen Township, the "Soil Survey" lists a total of thirty-seven (37) soil types throughout the Township. The location of soil types within the Township are shown on the "Soils" map. The accompanying chart, which is keyed to the map by the number assigned to a soil type, summarizes the "Degree And Kind Of Soil Limitations For Community Development" that each of the soils present for different types of community development.

As indicated in the "Soil Survey", the soil information and rankings are intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations due to the fact that the soil has been tested at a depth of only five to six feet (5'-6'). Moreover, because of the scale of the "Soil Survey" maps, small areas of different soil types may be included within the mapped area of a specific soil. In any case, the information is not intended to eliminate the need for on-site engineering investigation, testing and analysis of the soils for a particular type of community development as may be proposed.

TOWNSHIP OF ABERDEEN

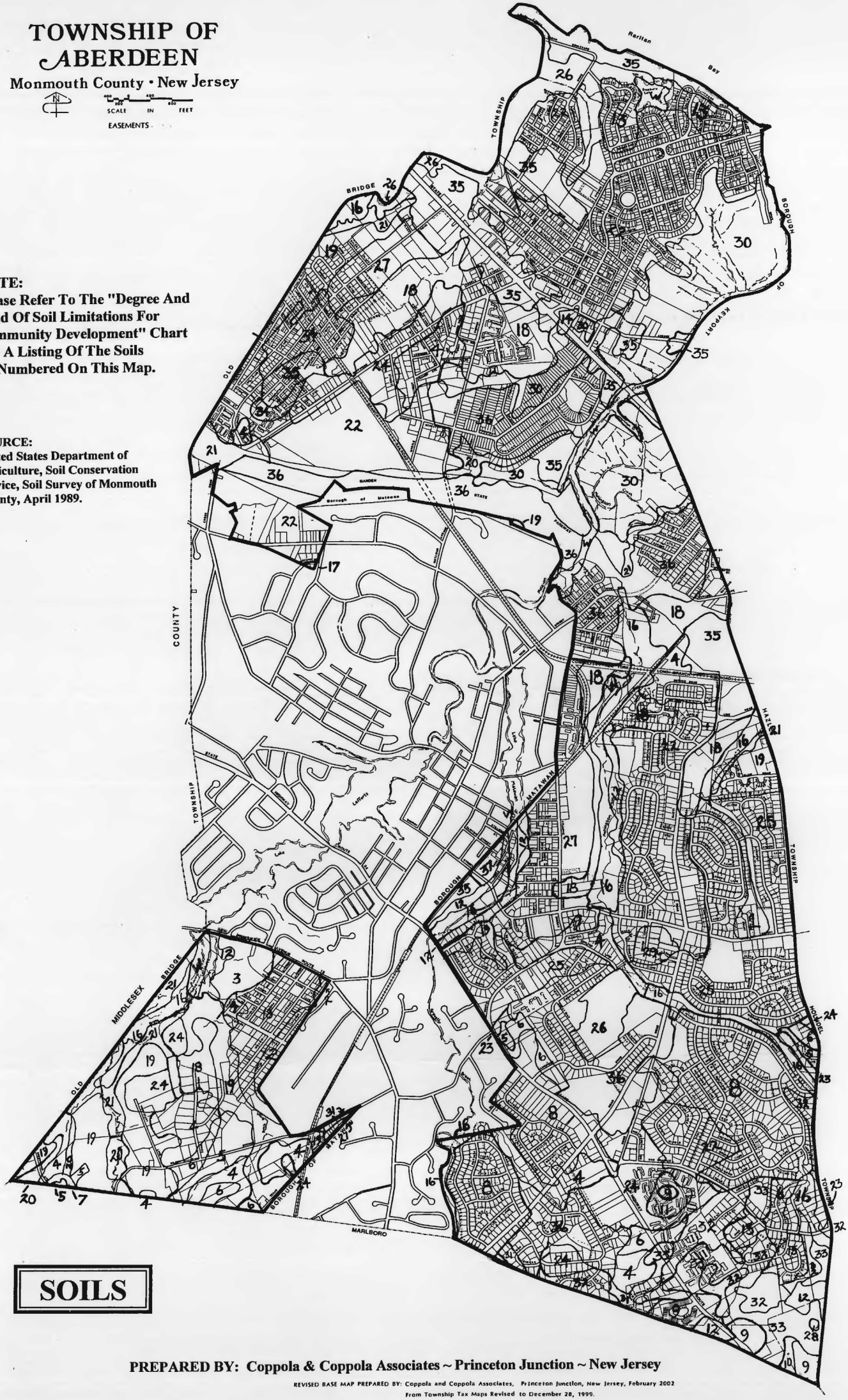
Monmouth County • New Jersey

SCALE IN FEET

EASEMENTS

NOTE:
Please Refer To The "Degree And Kind Of Soil Limitations For Community Development" Chart For A Listing Of The Soils As Numbered On This Map.

SOURCE:
United States Department of Agriculture, Soil Conservation Service, Soil Survey of Monmouth County, April 1989.



SOILS

PREPARED BY: Coppola & Coppola Associates ~ Princeton Junction ~ New Jersey

REVISED BASE MAP PREPARED BY: Coppola and Coppola Associates, Princeton Junction, New Jersey, February 2002
From Township Tax Maps Revised to December 28, 1999.

TOWNSHIP OF ABERDEEN

DEGREE AND KIND OF SOIL LIMITATIONS FOR COMMUNITY DEVELOPMENT

SOIL SERIES	MAP SYMBOL	FOUNDATIONS FOR DWELLINGS WITH BASEMENTS	PROBLEMS	FOUNDATIONS FOR DWELLINGS WITHOUT BASEMENTS	PROBLEMS	SEPTIC TANK ABSORPTION FIELDS	PROBLEMS	LOCAL STREETS AND PARKING LOTS	PROBLEMS	LAWNS AND LANDSCAPING	PROBLEMS	PLAYGROUNDS	PROBLEMS	PICNIC AREAS	PROBLEMS
1. Atsion	At	R	1	R	1	R	1, 12	R	1	R	1, 5	R	1, 5	R	1, 5
2. Downer	DoA	S		S		R	12	S		M	6	M	7	S	
3. Downer	DoB	S		S		R	12	S		M	6	M	3, 7	S	
4. Elkton	En	R	1, 9	R	1, 9	R	1, 2	R	1, 13, 15	R	1	R	1, 2	R	1, 2
5. Evesboro	EvB	S		S		R	12	S		R	6	R	5	R	5
6. Evesboro	EvC	S		S		R	12	S		R	6	R	3, 5	R	5
7. Evesboro	EvD	M	3	M	3	R	12	M	3	R	6	R	3, 5	R	5
8. Evesboro	EWB	S		S		R	12	S		R	6	R	5	R	5
9. Freehold	FrB	S		S		R	12	M	13	S		M	3	S	
10. Freehold	FrC	S		S		R	12	M	13	S		R	3	S	
11. Freehold	FrD2	M	3	M	3	R	12	M	3, 13	M	3	R	3	M	3
12. Freehold	FrE2	R	3	R	3	R	3, 12	R	3	R	3	R	3	R	3
13. Freehold	FUB	S		S		R	12	M	13	S		M	3	S	
14. Holmdel	HnA	R	1	R	1	R	1	R	1	R	1	R	1	R	1
15. Holmdel	HnB	R	1	R	1	R	1	R	1	R	1	R	1	R	1
16. Humaquepts	HV		NOT			RATED									
17. Hammonton	HLA	R	1	M	1	R	1, 12	R	13	M	1, 6	M	1, 7	M	1
18. Keyport	KeA	R	1	M	1, 14	R	1, 2	R	13, 15	M	1	R	2	R	2

SOIL SERIES	MAP SYMBOL	FOUNDATIONS FOR DWELLINGS WITH BASEMENTS	PROBLEMS	FOUNDATIONS FOR DWELLINGS WITHOUT BASEMENTS	PROBLEMS	SEPTIC TANK ABSORPTION FIELDS	PROBLEMS	LOCAL STREETS AND PARKING LOTS	PROBLEMS	LAWNS AND LANDSCAPING	PROBLEMS	PLAYGROUNDS	PROBLEMS	PICNIC AREAS	PROBLEMS
19. Keyport	KeB	R	1	M	1, 14	R	1, 2	R	13, 15	M	1	R	2	R	2
20. Keyport	KeC	R	1	M	1, 14	R	1, 2	R	13, 15	M	1	R	2, 3	R	2
21. Keyport	KeD	R	1	M	1, 3, 14	R	1, 2	R	13, 15	M	1, 3	R	2, 3	R	2
22. Keyport	KGB	R	1	M	1, 14	R	1, 2	R	13, 15	M	1	R	2	R	2
23. Klej	KlA	R	1	M	1	R	1, 2, 12	M	1, 13	M	1, 6	M	1	M	1
24. Klej	KmB	R	1	M	1, 13	R	1, 2	M	1, 13	R	5	R	1, 5	M	5
25. Klej	KUA	R	1	M	1	R	1, 2, 12	M	1, 13	M	1, 6	M	1	M	1
26. Manahawkin	Ma	R	8, 9	R	8, 9, 15	R	8, 9	R	8, 9, 13	R	8, 9, 10	R	8, 9, 10	R	8, 10
27. Pemberton	PeA	R	1	R	1	R	1	M	1, 13	M	1, 6	R	1	M	1
28. Pits	PT		NOT			RATED									
29. Shrewsbury	Sn	R	1	R	1	R	1, 2, 12	R	1, 13	R	1	R	1	R	1
30. Sulfaquents	SS		NOT			RATED									
31. Tinton	ToA	S		S		S		M	13	M	6	M	3	S	
32. Tinton	ToC	S		S		S		M	13	M	6	R	3	S	
33. Tinton	ToD	R	3	R	3	R	3	R	3, 13	R	3	R	3	M	3
34. Tinton	TUB	S		S		S		M	13	M	6	M	3	S	
35. Udorthents	UA		NOT			RATED									
36. Udorthents	UD		NOT			RATED									
37. Urban Land	UL		NOT			RATED									

Refer to next page for Key to Problems and Key to Ratings.

KEY TO PROBLEMS

1 High or Seasonally High Water Table
2 Slow Movement of Water Through Soil
3 Excessive Slope for Use
4 Easily Erodable Soil
5 Soil Too Sandy
6 Droughty
7 Unsuitable Surface with Small Stones
8 Potential for Standing or Ponding Water
9 Flooding Potential
10 Excessive, Unstable Organic Content
11 Compacted Soil Layer Difficult for Percolation
12 Inadequate Filtering of Effluent with Hazard of Groundwater Pollution
13 High Frost Action Potential
14 Expansion/Contraction of Soils When Wet or Dry
15 Soil Too Weak to Support Improvements
16 Too Much Clay Content
17 Soil Material Too Thin

KEY TO RATINGS

"S": Slight ratings mean little or no limitations for the particular type of community development, or limitations which can easily be corrected by the use of normal equipment.

"M": Moderate ratings mean the presence of some limitations which normally can be overcome by careful design and management at somewhat higher cost.

"R": Restrictive, or severe, limitations are those which normally cannot be overcome without exceptional, complex or costly measures.

SOURCE: United States Department of Agriculture Soil Conservation Service, Soil Survey of Monmouth County, New Jersey, April 1989
NOTE: "W" is water.
PREPARED BY: Coppola & Coppola Associates, Princeton Junction ~ New Jersey

As indicated on the chart, the soils are rated "S" Slight, "M" Moderate or "R" Restrictive for each type of community development. More specifically, the ratings by the Soil Conservation Service are based upon the following meanings of the terms:

"S": Slight ratings mean little or no limitations for the particular type of community development, or limitations which can easily be corrected by the use of normal equipment.

"M": Moderate ratings mean the presence of some limitations which normally can be overcome by careful design and management at somewhat higher cost.

"R": Restrictive, or severe, limitations are those which normally cannot be overcome without exceptional, complex or costly measures.

The chart of the "Degree And Kind Of Soil Limitations For Community Development" also lists the problems (e.g., high water table, steep slopes, slow permeability, etc.) associated with the ratings of the soils for the various types of community development.

More specifically, the criteria used by the Soil Conservation Service for the ratings of the various soil types for the different types of community development listed on the "Degree And Kind Of Soil Limitations For Community Development" chart are as follows:

Foundations For Dwellings With Or Without Basements

This rating is based on undisturbed soils to a depth of five feet (5'), assuming use for single-family dwellings or other structures with similar foundation requirements. Excluded are buildings more than three (3) stories high or buildings with foundation loads in excess of those equal to a three-story building.

Criteria used for the ratings were low bearing capacity, shallow depth to a seasonal or permanent water table, steepness of the slope, and stream flooding hazard.

Septic Tank Absorption Fields

While the majority of Aberdeen Township is served by sanitary sewer services, the land area in the southwestern portion of the Township, commonly known as the "Freneau" area of Aberdeen Township and designated within the "RA" Residential Agriculture, "RA-PRD" Residential Agriculture-Planned Residential Development or the "R-100" Single-Family Residential zoning districts, is not served by public sewerage facilities.

Therefore, identifying the suitability of the subject soils for on-site wastewater effluent disposal is an important consideration both for site selection and system design.

Suitable areas for septic disposal require a soil that has sufficient, but not excessive, drainage; in other words, soils that can adequately absorb the effluent, yet sufficiently filter the effluent to prevent groundwater contamination. Therefore, there must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Criteria used for the ratings were percolation rate, depth to seasonally high water table, slope, amount of stone, depth to and kind of bedrock, and flood hazard.

The chart of the "Degree And Kind Of Soil Limitations For Community Development" indicates almost all of the soils within Aberdeen Township exhibit "R" restricted soil limitations for septic disposal. However, most of the properties in the Township are provided public sewerage treatment service.

The previously noted residentially zoned properties located in the southwestern section of Aberdeen Township, which is not within the area currently provided public sewerage treatment services, all have "R" restrictive soil limitations for septic effluent disposal. These properties contain wetlands, have a high water table and/or do not allow adequate filtering of septic effluent, which result in the restrictive limitations for septic effluent disposal. These physical conditions of the land reinforce the prudent need to require large lot sizes to accommodate onsite septic effluent disposal and safeguard an adequate potable ground water supply.

Streets And Parking Lots

For these ratings, it is assumed that the streets and parking lots will be constructed of a hard, all-weather surface with a compact subgrade and a base course and designed to carry traffic year-round, similar to most of the streets and parking lots in Aberdeen Township.

The ratings are based on soil properties, site features, and observed performance of the soils. Depth to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength, shrink-swell potential, frost-action potential, and depth to a high water table affect the traffic-supporting capacity. Therefore, the criteria used for the ratings were the depth to the water table, natural drainage, slope, depth to bedrock and flood hazard.

Lawns And Landscaping

The soils are rated for their ability to support and maintain turf, ornamental trees and shrubs. The ratings are based on soil properties, site features, and observed performance of the soils.

Criteria used for the ratings were natural fertility, available water capacity, depth to bedrock, natural drainage, and slope. The texture of the subsurface soil and subsoil and the content of salts, sodium and sulfidic materials affect plant growth whereas flooding, wetness, slope, stoniness, and the amount of sand, clay or organic matter in the surface layer affect ability of established lawn areas to sustain traffic.

Playgrounds

Playgrounds require soils that are generally level and are not wet or subject to flooding during the season of use so that they can withstand intensive foot traffic. The surface of the soil should be free of stones and boulders, be firm after rains and not dusty when dry. The depth of the soil over bedrock or a hardpan should be considered when grading is required for the construction of playgrounds.

Therefore, the criteria used for the ratings were slope, natural drainage, texture and depth to bedrock.

Picnic Areas

Picnic areas, like playgrounds, also are subject to heavy foot traffic. Most vehicular traffic associated with picnic areas is confined to access roads and parking areas.

Like playgrounds, the best soils are firm when wet, are not dusty when dry, are not subject to flooding during the period of use and do not have excessive slopes or boulders which increase the cost of shaping sites or of building access roads and parking areas. Therefore, the criteria used for the ratings were depth to water table, slope, natural drainage and texture.

HYDRIC SOILS

The "Hydric Soils" map shows the location of the environmentally fragile soils classified as being "Hydric" by the United State Department of Agriculture, Natural Resources Conservation Service (1998). By definition, "Hydric Soils" are either:

> Saturated at or near the soil surface with water that is virtually lacking free oxygen for significant periods during the growing season; or
>
> Flooded frequently for long periods during the growing season.

The water saturated or flooded condition of the soil affects plant growth and supports hydrophytes and/or wetlands vegetation.

"Hydric Soils" in New Jersey are classified into three (3) groups based upon the degree to which they consistently display hydric conditions:

Group 1:	Soils nearly always display consistent hydric conditions;
Group 2:	Soils display consistent hydric conditions in most places, but additional verification is needed; and
Group 3:	Soils displaying hydric conditions in a few places, and additional verification is needed.

As shown on the "Hydric Soils" map, six (6) soil types in Aberdeen Township are classified as "Hydric Soils" which generally are also characterized by marshlands, wetlands and/or flood plain, with some exceptions. While it might be ideal for lands containing "Hydric Soils" not to be developed, this unilateral approach is not legally possible.

Nevertheless, reasonable care should be taken by applicants during the formative stages of site plan and subdivision preparation, and by the Township Planning Board and Township Zoning Board of Adjustment during the application review process, to incorporate the "Hydric Soils" land areas within that portion of a tract which need not be physically developed or, where applicable, within any land area to be set aside as open space.

TOWNSHIP OF ABERDEEN

Monmouth County • New Jersey

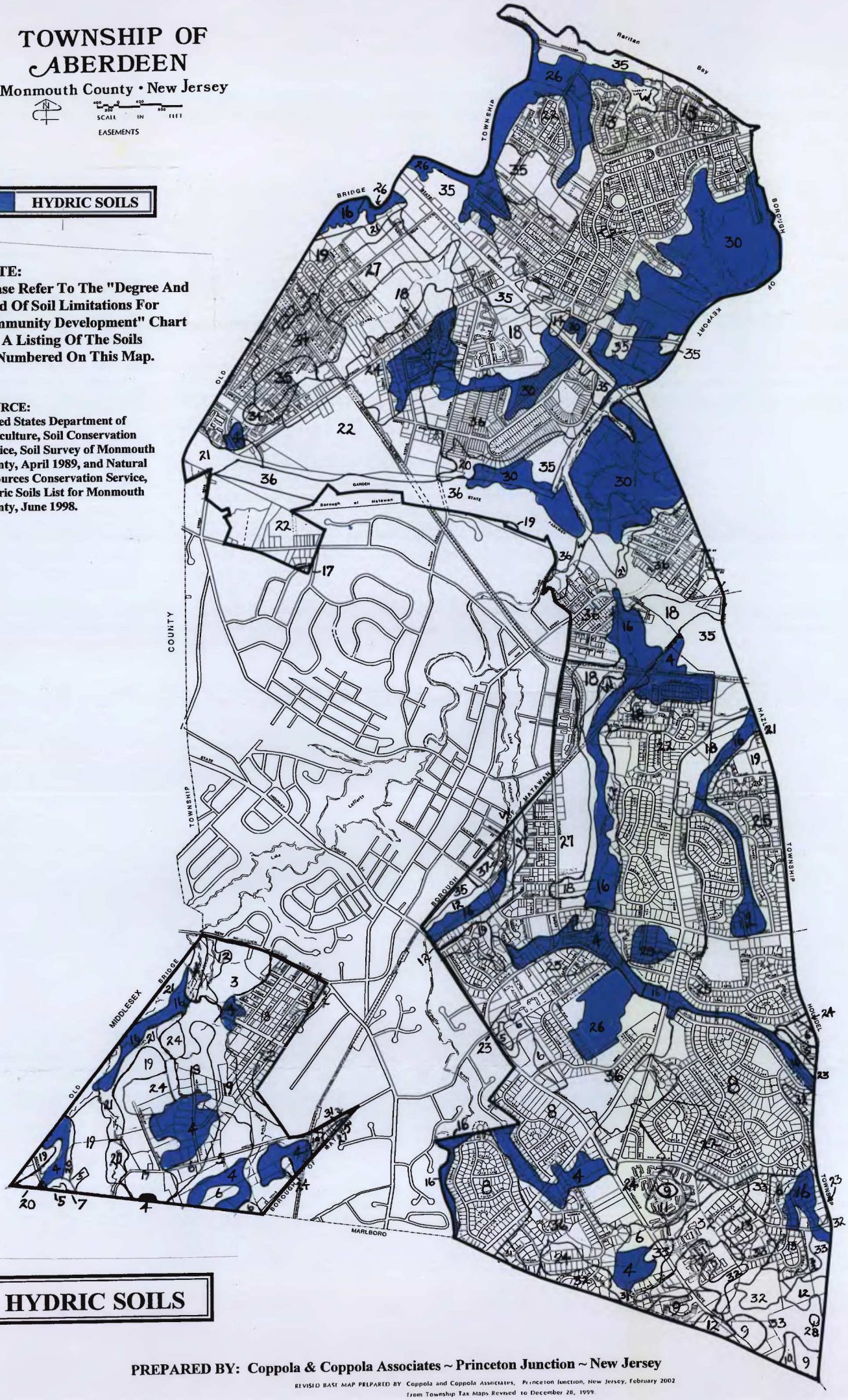
SCALE IN FEET

EASEMENTS

HYDRIC SOILS

NOTE:
Please Refer To The "Degree And Kind Of Soil Limitations For Community Development" Chart For A Listing Of The Soils As Numbered On This Map.

SOURCE:
United States Department of Agriculture, Soil Conservation Service, Soil Survey of Monmouth County, April 1989, and Natural Resources Conservation Service, Hydric Soils List for Monmouth County, June 1998.



HYDRIC SOILS

PREPARED BY: Coppola & Coppola Associates ~ Princeton Junction ~ New Jersey

REVISED BASE MAP PREPARED BY Coppola and Coppola Associates, Princeton Junction, New Jersey, February 2002
from Township Tax Maps Revised to December 28, 1999.

GEOLOGY

Aberdeen Township lies in the physiographic province of New Jersey known as the "Coastal Plain". The New Jersey Coastal Plain is a part of the larger Atlantic Coastal Plain which extends from Florida to Newfoundland and eastward to the edge of the Continental Shelf.

The Coastal Plain of New Jersey lies southeast of the "Fall Line", or south of Lower New York Bay and the Raritan River estuary and east of a line which runs from New Brunswick to Trenton and then down the west side of the Delaware River to Wilmington, Delaware. Located within the Coastal Plain is about one-fourth (1/4th) of New Jersey's population.

The Coastal Plain geology is comprised of unconsolidated sediments that overlap rocks of the Piedmont province at the "Fall Line". The term unconsolidated generally is applied to soils and other layers of loose materials that have not hardened into rock, such as sand, gravel, silt and clay. These sedimentary layers, which range in age from Cretaceous to Miocene (approximately 135 to 5.3 million years ago), dip gently to the southeast down toward the coast and extend beneath the Atlantic Ocean to the edge of the Continental Shelf.

The "Fall Line" is the shallowest part of the wedge-shaped Coastal Plain, which ranges in depth from zero (0) at the "Fall Line" to six thousand five hundred feet (6,500') at the southern tip of Cape May County. At Aberdeen Township, the depth to bedrock surface is about six hundred feet (600').

The bedrock of the New Jersey Coastal Plain was formed more than six hundred million years ago in the late Pre-Cambrian period when the weight of the overlying sediments created sufficient pressure and heat to form consolidated rocks: sandstones, shales and arkoses. These were altered into gneiss and schist by the intrusion of igneous rocks. During succeeding eons, these rocks eroded.

About one hundred twenty (120) million years ago, an uplift resulted in formation of the Appalachian Mountains to the west. Eastward-flowing streams deposited sand, clay and gravel in estuaries along the coast. After some erosion of these deposits, the sea began to ebb and flow over Monmouth County, depositing sand and clay. The sea retreated and another interval of erosion occurred, until the next advance of the sea about sixty million years ago. Alternating periods of erosion and deposition followed. About a million years ago, melt waters from the glaciers that covered the northern part of New Jersey deposited sand and gravel, covering the earlier sediments and forming the most recent strata.

The sediments consist of uneven layers of sand, silt and clay, varying in width and depth, which were deposited alternately in deltaic and marine environments as sea levels fluctuated during Cretaceous and Tertiary time. The sediment layers overlie the bedrock, which is made up of crystalline rocks and metamorphic schist and gneiss, and appear as outcrops above the surface in irregular bands. A thin veneer of Late Tertiary and Quaternary sand and gravel deposited by rivers covers wide areas of the Coastal Plain.

The topography of the Coastal Plain generally is flat to very gently undulating. Upland areas and isolated hills are underlain with erosion-resistant gravel or iron-cemented sediments. Coastal Plain sediments have been mined in the past for bog iron, glass sand, foundry sand, ceramic and brick clay, the mineral glauconite for use in fertilizer, and titanium from the mineral ilmenite in sand deposits. Today, the Coastal Plain sediments continue to supply glass sand and are extensively mined for sand and gravel construction material. The sand formations are productive aquifers and important ground water reservoirs.

Aberdeen Township is located in the "Inner Coastal Plain" section of the Coastal Plain province; this area contains a greater proportion of clays in the sediments, while the topmost formation, the Cohansey, which is not present in Aberdeen Township, is usually well-sorted porous sand.

The "Bedrock Geologic Map of Central and Southern New Jersey" published in 1998 by the United States Department of Interior, U. S. Geological Survey was the source of information for the geological formations underlying Aberdeen Township. As indicated on the "Geological Formations" map, the geology of Aberdeen Township north of the Garden State Parkway primarily is the Magothy Formation and the Merchantville Formation, while the area south of the Garden State Parkway consists of the Merchantville Formation, Woodbury Formation and the Englishtown Formation, with narrow bands of the Marshalltown, Wenonah, Mount Laurel, Navesink and Tinton Formations and the Sandy Hook and Shrewsbury Members of the Red Bank Formation.

Magothy Formation - Kmg

The Magothy Formation is primarily comprised of fine to coarse grained, white, quartz sand, interbedded with thin clay and clayey silt layers. The Magothy Formation is part of the Potomac-Raritan-Magothy aquifer system, which is the highest ranking aquifer system in the State (see "Water Resources" discussion).

The Magothy formation is characterized by charcoal fragments or carbonized fossil woods. Forty-three (43) species of marine invertebrate fossils and abundant flora have been removed from the Magothy formation, and all of these fossils indicate that the Magothy formation was deposited in the swamps and estuaries of an advancing sea.

Merchantville Formation - Kmv

The Merchantville Formation is primarily composed of very clayey and silty glauconite sand. This formation is part of the Merchantville-Woodbury confining layer that separates the aquifer in the Raritan and Magothy Formations from the overlying aquifers. Once extensively worked, the Merchantville Formation is still used occasionally for brick clay. Shark teeth, turtles and fish vertebrae and a wide variety of distinctive invertebrate fossils have been found in this formation.

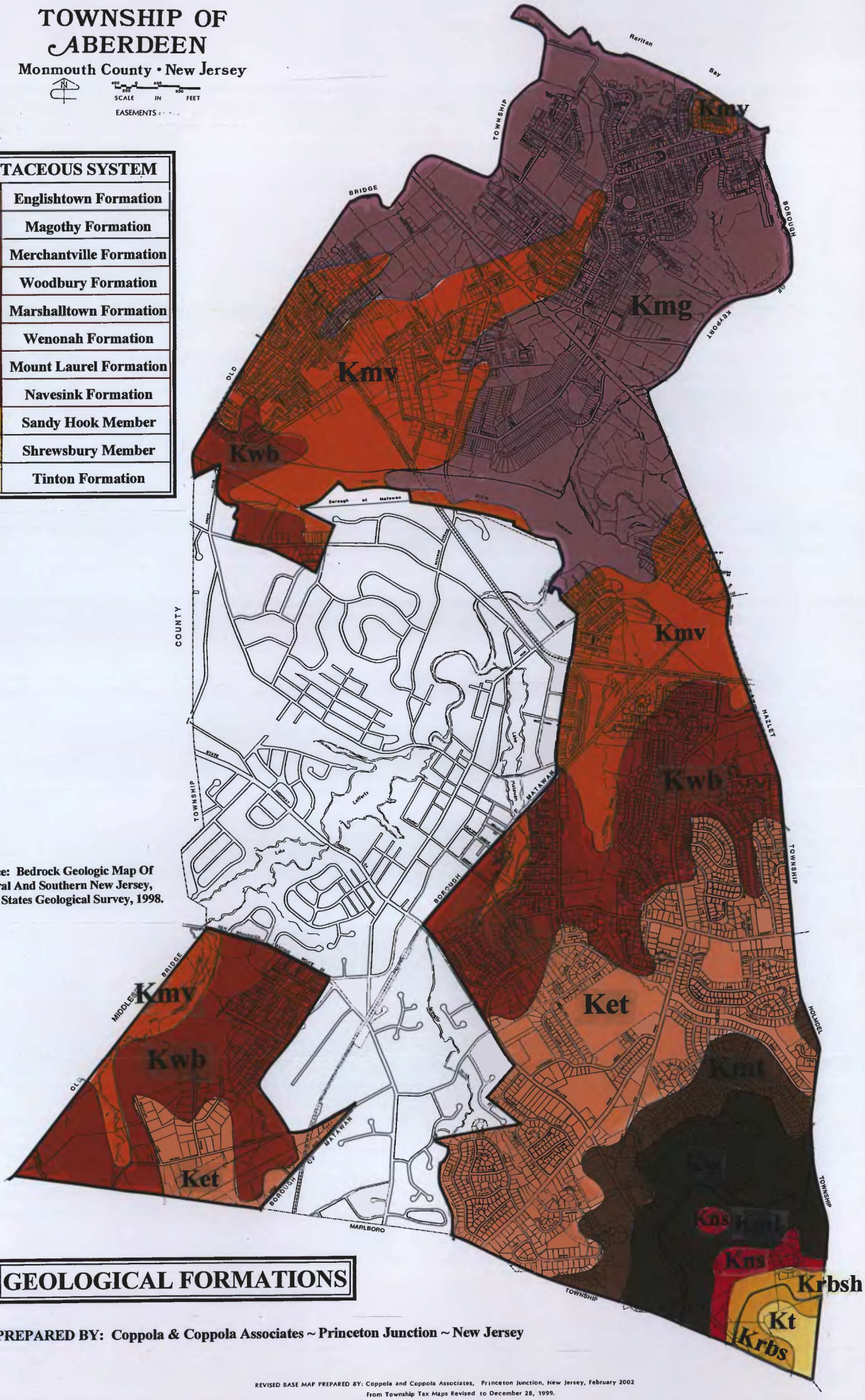
TOWNSHIP OF ABERDEEN

Monmouth County • New Jersey

SCALE IN FEET

EASEMENTS

CRETACEOUS SYSTEM	
Ket	Englishtown Formation
Kmg	Magothy Formation
Kmv	Merchantville Formation
	Woodbury Formation
	Marshalltown Formation
	Wenonah Formation
	Mount Laurel Formation
	Navesink Formation
Krbsh	Sandy Hook Member
Krbs	Shrewsbury Member
Kt	Tinton Formation



Source: Bedrock Geologic Map Of Central And Southern New Jersey, United States Geological Survey, 1998.

GEOLOGICAL FORMATIONS

PREPARED BY: Coppola & Coppola Associates ~ Princeton Junction ~ New Jersey

REVISED BASE MAP PREPARED BY: Coppola and Coppola Associates, Princeton Junction, New Jersey, February 2002
From Township Tax Maps Revised to December 28, 1999.

Woodbury Formation - Kwb

The Woodbury Formation is primarily comprised of micaceous clayey silt and also is part of the Merchantville-Woodbury confining layer that separates the aquifer in the Raritan and Magothy Formations from the overlying aquifers. The Woodbury formation contains about fifty feet (50') of non-glauconitic black marine clays that weather to a brown color. The lack of the glauconite, the chocolate-brown weathering characteristics, and a very different fossil fauna distinguish the Woodbury Formation from the underlying Merchantville Formation.

Englishtown Formation - Ket

The Englishtown Formation is primarily comprised of fine to coarse grained, bioturbated, quartz sand, locally interbedded with dark clay, and is part of the Englishtown aquifer system. The Englishtown aquifer transmits less water than the aquifer in the Magothy Formation, but still yields sufficient water to be considered an important aquifer. The Englishtown formation decreases in thickness from one hundred forty feet (140') in Monmouth County to a thickness of only twenty feet (20') in Gloucester County.

Marshalltown Formation - Kmt

The Marshalltown Formation consists of fine to medium grained, silty and clayey, bioturbated quartz and glauconite sand. Being primarily clayey, this formation acts as an aquilude or confining layer between the Englishtown Formation and overlying formations. The Marshalltown Formation does contain Class III ground water, but such waters are not suitable for potable water due to natural hydrogeologic characteristics or natural water quality such as saline ground water.

Wenonah Formation - Kw
Mount Laurel Formation - Kml

The Wenonah and Mount Laurel Formations, although distinct formations, are considered as one unit because they are hydraulically connected and function as a single aquifer. The aquifer in the two formations has a relatively low capacity for transmitting water, but the uniform thickness and lithology of the aquifer and the good quality of its water make it an important source of water in Monmouth County. These formations consist of quartz and mica sand, with the Wenonah Formation becoming slightly glauconitic as it approaches the underlying Marshalltown Formation. The Mount Laurel Formation is gradational into the underlying Wenonah Formation, with an increase in clay, silt and mica.

Navesink Formation - Kns

The Navesink Formation consists of a medium grained, clayey and silty, bioturbated glauconite sand, and forms a confining layer between the Mount Laurel Formation and overlying formations. The Navesink Formation is a very narrow formation, only ten to twenty-five feet (10'-25') thick. While not a major aquifer, the Navesink Formation yields water of excellent quality for individual residences.

Sandy Hook Member - Krbsh
Shrewsbury Member - Krbs

The Sandy Hook and Shrewsbury Members of the Red Bank Formation also are grouped together due to their similarity. Both consist of quartz sand and are fine to coarse grained, clayey and micaceous. The Shrewsbury Member is much thicker than the underlying Sandy Hook Member, with the transitional area characterized by an increase in clay, quartz, silt, mica and fine pieces of wood.

Tinton Formation - Kt

The Tinton Formation consists of quartz and glauconite sand in varying proportions and is very clayey. It contains scattered molds of calcitic fossils and argonitic shells.

WATER RESOURCES

Water quality is a concern throughout New Jersey, created primarily by the relatively high density of development. In fact, Executive Order 109, signed by the governor, requires comprehensive environmental assessments before the New Jersey Department of Environmental Protection (NJDEP) approves any new or amended Wastewater Management Plan. As a result, an applicant for a new or amended Wastewater Management Plan must examine wastewater alternatives before any major changes will be made to a sewer service area.

Surface Water Systems

Aberdeen Township lies within the Bayshore/Matawan Creek Watershed drainage basin, which is part of Watershed Management Area 12 as defined by the New Jersey Department of Environmental Protection. Watershed Management Area 12 includes five hundred three (503) square miles, or seven percent (7%) of the land surface in New Jersey, and fifty-seven (57) municipalities lie entirely or partially within its boundary. At its greatest dimensions, Watershed Management Area 12 is twenty-three (23) miles long and eighteen (18) miles wide.

The "Watersheds and Hydrology in WMA#12" map, prepared by the New Jersey Department of Environmental Protection, shows that there are six (6) watersheds plus a small area of the North Atlantic Coast watershed within Watershed Management Area 12. All streams and rivers within this management area drain either into the Raritan estuary by way of Sandy Hook Bay or into the Atlantic Ocean. Water courses in Aberdeen Township, which is part of the Bayshore/ Matawan Creek Watershed, drain directly into the Raritan Bay.

The Township of Aberdeen encompasses slightly more than two (2.22) square miles of water area, compared to its five and one-half (5.54) square miles of land area. As shown on the "Major Stream Corridors" map, there are eight (8) primary watercourses in Aberdeen Township, including Whale Creek, Long Neck Creek, Luppatcong Creek, Matawan Creek and its tributaries, Mohingson Brook (also known as Wilksons Creek), Gravelly Brook, Matawan Brook and Birch Swamp Brook. Additionally, there are three (3) lakes within the Township: Treasure Lake and portions of Lake Lefferts and Lake Matawan.

There are no water quality monitoring stations in Aberdeen Township; the closest water quality monitoring station to the Township is on the Manasquan River at Squankum. However, sampling of the water courses have shown that severe biological impairment to Gravelly Brook and Wilksons Brook around Church Street in Aberdeen Township and moderate biological impairment to Matawan Creek in Matawan Borough exist.

The predominant nonpoint sources of pollution in the Bayshore/Matawan Creek Watershed are those associated with suburban development, which has increased throughout the watershed. Runoff from construction sites, developed sites, storm sewers and roads are contributing to excessive sediment loading.

Other nonpoint pollution sources, resulting in sediment, nutrient and pesticide loading, are suspected of coming from horse farms and agricultural activities. Contaminated sites also can be a source of nonpoint pollution affecting ground water quality; there are a number of such sites in Aberdeen Township (for specific and current information, see "Site Remediation" on the NJDEP website).

Point source pollution comes from discharge treated wastewater from a pipe or ditch which is regulated by the New Jersey Department of Environmental Protection.

Water pollution problems can be minimized through storm water management practices, open space preservation, retention of natural vegetation and the acquisition of stream corridor buffers and easements.

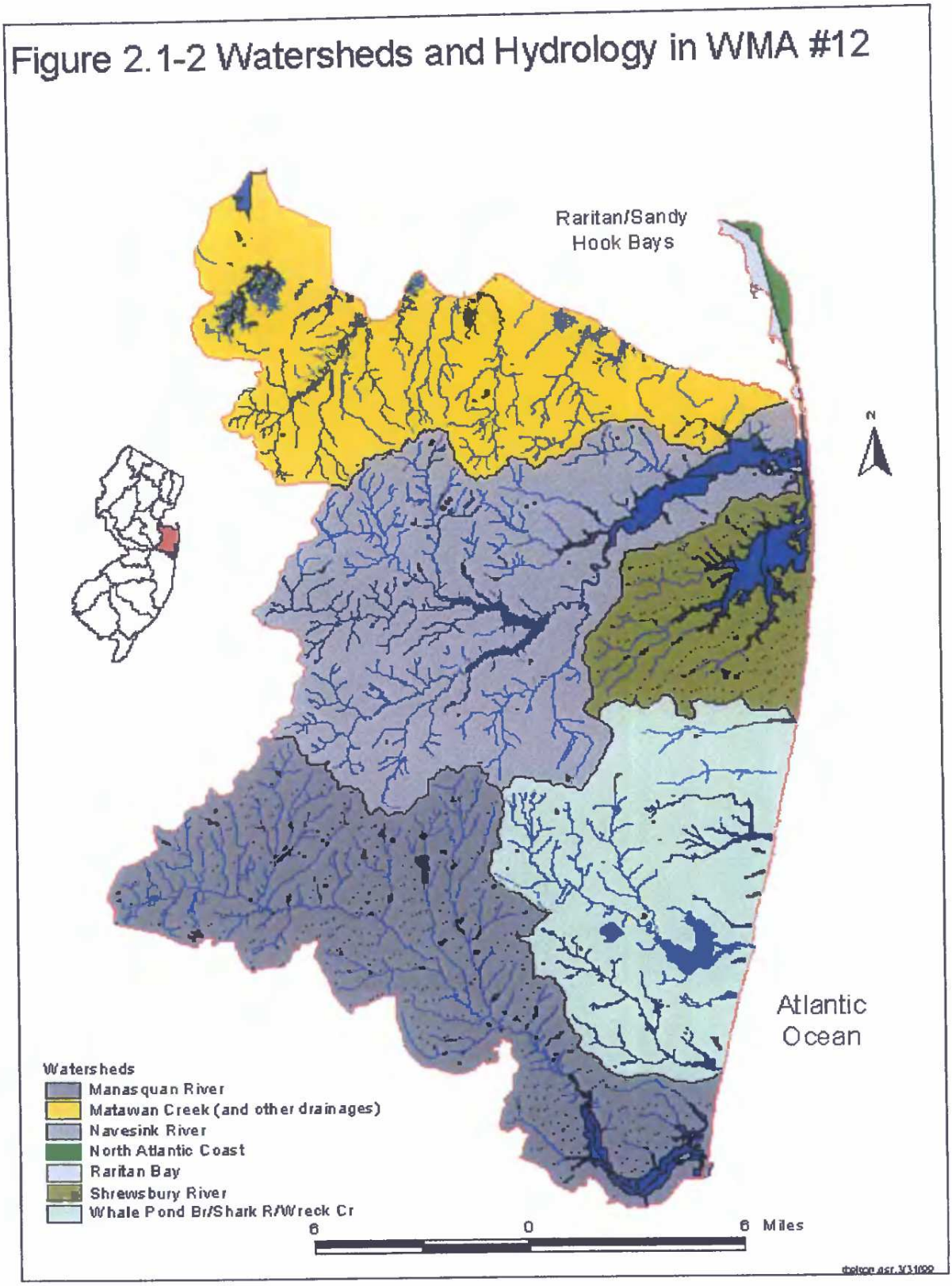


Figure 2.1-2 Watersheds and Hydrology in WMA #12
Raritan/Sandy Hook Bays
N
Atlantic Ocean
Watersheds
Manasquan River
Matawan Creek (and other drainages)
Navesink River
North Atlantic Coast
Raritan Bay
Shrewsbury River
Whale Pond Br/Shark R/Wreck Cr
6
0
6 Miles

TOWNSHIP OF ABERDEEN

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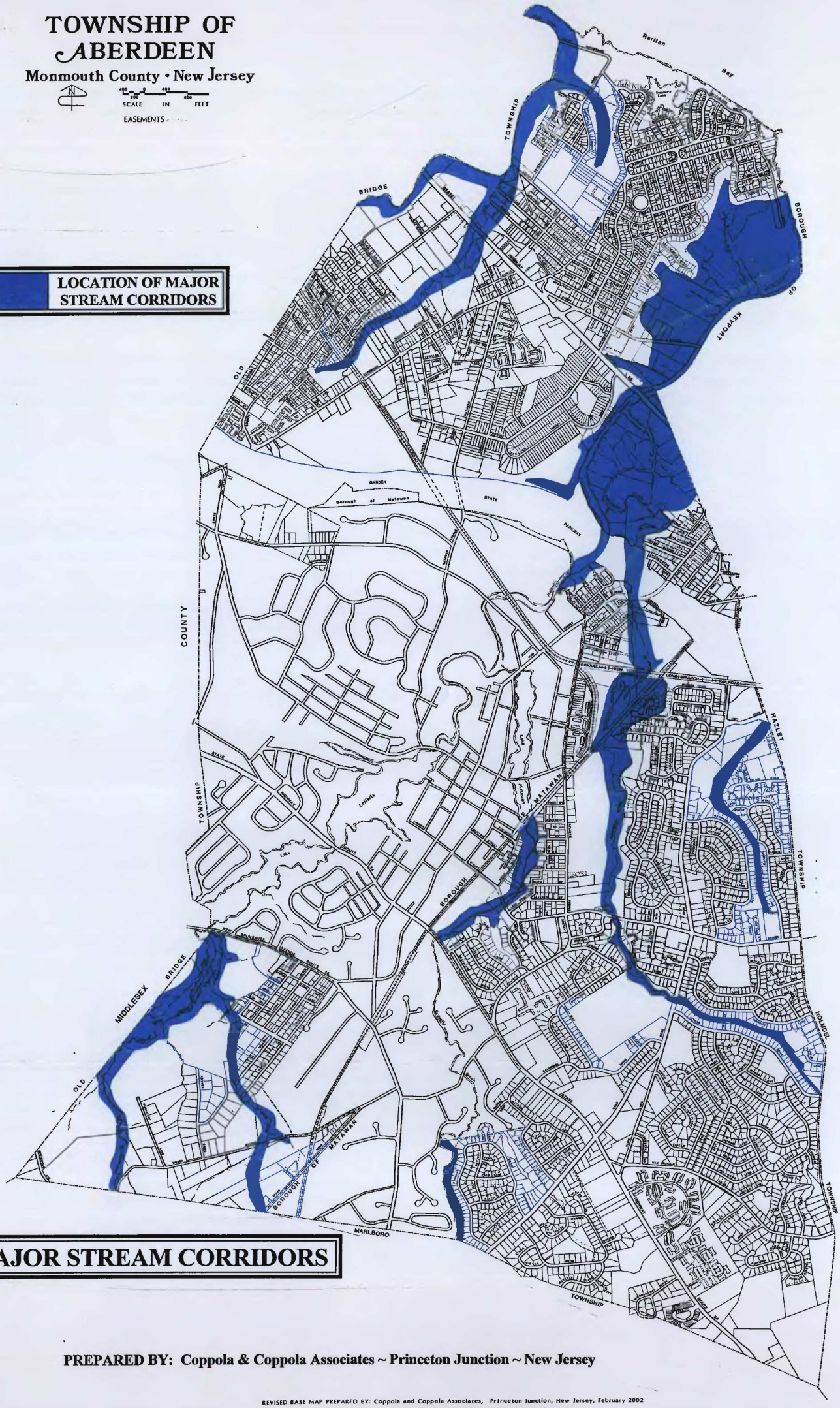
SCALE IN FEET

EASEMENTS

LOCATION OF MAJOR STREAM CORRIDORS



MAJOR STREAM CORRIDORS

PREPARED BY: Coppola & Coppola Associates ~ Princeton Junction ~ New Jersey

REVISED BASE MAP PREPARED BY: Coppola and Coppola Associates, Princeton Junction, New Jersey, February 2002
From Township Tax Maps Revised to December 28, 1999.

Ground Water Aquifers

Ground water aquifers are features of those geological formations that contain significant quantities of saturated, permeable materials, providing water to wells and springs. Aquifer recharge areas are porous soil or rock formations where water can percolate from the surface into the aquifer. Protection of aquifer recharge areas assures that the aquifer can continue to provide adequate quantities of potable water and remain free of contamination.

As discussed under the "Geology" section of this document, the Coastal Plain is made up of unconsolidated sediments that fall into irregular, alternating sequences of pervious and impervious layers, depending upon the major types of materials deposited during the geologic age in which they were formed. During periods when sand and relatively porous materials were deposited, aquifers or water-bearing layers, formed.

When materials with smaller particles were deposited, confining beds, or aquicludes, formed which separates the aquifers. A confining bed is an impermeable rock layer, commonly of shale or clay. These live up to their name, as they restrict the vertical flow of water and confine the ground water to the more porous layers, the aquifers. However, water can leak through the confining beds, thereby hydraulically interconnecting the aquifers to some degree.

Sole-source aquifers are those aquifers that contribute more than fifty percent (50%) of the drinking water to a specific area, and the potable water would be impossible to replace if the aquifer were contaminated. Sole-source aquifers are defined by guidelines set forth by the U.S. Environmental Protection Agency (USEPA), as authorized in Section 1424(e) of the Safe Drinking Water Act of 1974.

Seven (7) sole-source aquifers are defined in New Jersey, and their project review areas, which include the aquifer's recharge area and the upstream area that contributes recharge water to the aquifer, cover most of the State.

Mapping has defined the occurrence and configuration of nine (9) aquifers and six (6) confining beds in the New Jersey Coastal Plain, but the major aquifer underlying northern Monmouth County is the Potomac-Raritan-Magothy, which is a sole-source aquifer.

The Potomac-Raritan-Magothy aquifer system is made up of three (3) aquifers, which are described by the U.S. Geologic Survey as the lower, middle and upper aquifers, separated by two (2) confining beds. These multiple geological formations are generally classed as one system since the aquifers comprising them are lithologically indistinguishable and, in many areas, interconnected. They are the deepest and earliest-formed aquifers under Monmouth County and are overlain by all of the succeeding strata.

The Potomac-Raritan-Magothy aquifer system was and is an important water source for residents of central New Jersey. The Potomac-Raritan-Magothy aquifer system is the most heavily pumped of all aquifers in New Jersey and provides fresh water over an area of about two thousand five hundred (2,500) square miles.

More than seventy-five percent (75%) of the freshwater supply in the New Jersey Coastal Plain is from ground water. Aquifers in New Jersey have been ranked based upon their ability to provide ground water to high-capacity wells; these wells include water supply, irrigation, and industrial supply wells tested for maximum yield. The Potomac-Raritan-Magothy aquifer system is the highest ranking aquifer in New Jersey, with a median yield in excess of five hundred (500) gallons per minute.

Protection of the water quality of this aquifer is of prime importance to maintain adequate potable water supplies in the region. The maintenance of adequate water supply is accomplished through careful site development techniques in the aquifer recharge areas for the Potomac-Raritan-Magothy aquifer system, including open space preservation.

Drinking Water

Increasing population, resulting in increasing demand on water resources, and loss of recharge areas (forests, farms and wetlands) to development resulted in a serious drop in ground water levels in the mid and late twentieth century.

In January of 1981, users of 100,000 gallons per day or more of surface water, ground water or both were required by the State of New Jersey to obtain permits and report monthly withdrawal rates to the New Jersey Department of Environmental Protection, but more drastic steps were needed due to the decrease in water levels.

In 1985, Monmouth County was declared a "critical area", the first in the State. In 1986, the New Jersey Department of Environmental Protection designated two (2) "Critical Water-Supply Management Areas" in the New Jersey Coastal Plain as a result of concerns about long-term declines in ground water levels in the areas where ground water is the primary source of water supply.

To forestall salt water intrusion and other threats to the aquifers, the State required all permittees to reduce their diversion from aquifers by fifty percent (50%). The difference has been made up with surface water.

The U.S. Geological Survey (USGS) maintains a network of observation wells in New Jersey for the purpose of monitoring water-level changes throughout the State. The U.S. Geological Survey found in their "Summary Of Hydrologic Conditions, 2000" report that ground water withdrawals from specified aquifers were reduced, and as a result, in 1991, the water level declines have reversed in several observation wells screened in the Potomac-Raritan-Magothy aquifer system.

The water consumed by Aberdeen Township residents comes from both ground and surface water, but different purveyors supply different sections of the Township. Aberdeen Township buys water in bulk from the Old Bridge Municipal Utility Authority to supply residences and businesses in the Cliffwood and Cliffwood Beach sections of the Township.

This Old Bridge agency draws on surface water from the Delaware And Raritan Canal and ground water from the Potomac-Raritan-Magothy aquifer. The amount purchased varies with the season. In August of 2001, Aberdeen Township bought, in bulk, an average of 700,000 gallons per day; in January of 2002, an average of just over half a million gallons per day was bought.

Aberdeen has a similar arrangement with the Shorelands Water Company to purchase a million gallons per month to supply the Oak Shades section and with Matawan Borough to supply the Freneau area. Last year, Matawan Borough supplied an average of just over two (2) million gallons per quarter to Aberdeen Township.

Both the Shorelands and Matawan purveyors obtain surface water from the New Jersey American Water Company. In both cases, the supply comes from New Jersey American Water Company during the winter months and from their own wells which supply water from the Potomac-Raritan-Magothy aquifer during the peak periods of June, July and August.

In 1991, the Aberdeen Township Utilities Authority, which distributed ground water to the residents of other sections of Aberdeen Township, was disbanded, and the Township sold the assets of the utility to the New Jersey American Water Company, including the well that had been the source of water.

This company now services developments in the southern section of the Township: Strathmore, Wellington, Woodbrook and the various residential cul-de-sacs that have filled in the undeveloped areas. A new line has been completed, linking the New Jersey American Water Company's section to that now serviced by Shorelands to supplement the supply in peak periods and times of emergency.

New Jersey American Water Company operates an integrated distribution system, with surface water from a number of sources throughout the county. However, northern Monmouth communities receive their water from the Swimming River Reservoir. The company supplements the supply with groundwater when needed from its wells, which tap the Potomac-Raritan-Magothy aquifer. Diversions occur during the peak periods of June, July and August.

Aberdeen maintains interconnections with Hazlet, Matawan and Old Bridge for emergency use, such as fire, flood, damage to facilities or other catastrophic events. The State of New Jersey requires that each water line have an alternative source.

Whichever purveyor supplies it, the quality of the water supplied to Aberdeen residents meets all state and federal standards. The New Jersey American Water Company tests regularly for hundreds of compounds, the frequency of testing depending upon the nature of each compound, the amounts, fluctuations in quantity, and potential effects. Chlorine, for example, and pH are monitored continuously. Monitoring by on-line instrumentation is backed up with human and laboratory analysis. The other purveyors serving Aberdeen residents also operate testing programs to ensure that the potable water supply is clean and safe.

Monmouth County's population continues to increase. To supplement the supply from the Swimming River Reservoir, the New Jersey American Water Company is expanding an existing plant in Howell Township to increase the supply from 2.5 million gallons per day from the New Jersey Water Supply Authority to ten (10) million gallons per day and twenty (20) million gallons per day from the Manasquan Reservoir at some later date.

For the near future, the water supply seems assured. But with increasing development, the problem of too many demands on the available water may become an issue in Aberdeen Township as it has in other parts of the country.

FAUNA AND FLORA

Before the development that occurred primarily in the 1950s and 60s, most of Aberdeen Township's population was clustered in the Cliffwood, Cliffwood Beach, Freneau, and Oak Shades sections of the Township. Individual houses, small farms and orchards, and wooded and swamp areas occupied the lands between these developed areas.

With increasing development, the wildlife and vegetation gradually has changed over time. Landscaping of residential and commercial lands generally employs types of trees and shrubs different from those they replaced. A mix of native and alien species of plants, trees and shrubs also are found growing in the non-landscaped areas of Aberdeen Township. Some grew from seeds or cuttings of imported plants or escaped from cultivation, and they became naturalized and are widely assumed to be native because they have been established for many years.

Although indigenous species have lost habitat to development, some, such as gray squirrels and cottontail rabbits, adapted to the suburban environment, living and moving through residential properties. Others, such as red fox and muskrats, can be seen occasionally in stream corridors, wetlands, fields, wooded and undeveloped areas of the Township.

Aberdeen is home, albeit in some cases briefly, to a great variety of birds: year-round inhabitants, seasonal residents or visitors during migration. The Cliffwood Beach shoreline is a favored habitat for fish-eating species. Treasure Lake, the surrounding area and beachfront have been designated a "Wildlife Viewing Area" by the New Jersey Division of Fish, Game & Wildlife's Endangered and Nongame Species Program. Although small mammals, snakes and turtles can be found there, most visitors go to view the large variety of birds in this area.

Lake Lefferts, located partially within Aberdeen Township, is home to a number of freshwater fish. However, Lake Matawan, also located partially within Aberdeen Township, does not support fish. As reported in a study by the Monmouth County Health Department in 1990, Lake Matawan is "acidified due to iron sulfite (pyrite) deposits in the basal Englishtown outcrop and in the Keyport and Klej soils". Water tests done by the Aberdeen Township Environmental Advisory Board in 1995 showed pH readings between 3.1 and 4.8 in Gravelly Brook, the feeder stream, at a point just above the lake.

To the north, Aberdeen Township's boundary is the Raritan Bay, and species specific to a coastal or marine environment are found in this area. According to the New Jersey Audubon Society's Raritan Bay Wildlife Habitat Report, the Bay is a fish passage to five rivers (Navesink, Hackensack, Passaic, Raritan and Hudson) for some species of fish and a summer habitat and/or spawning ground for others.

However, a variety of trees and shrubs, such as red maple, serviceberry, and sweetgum that grow throughout the Township, also are found in this coastal area. Some birds, such as song sparrows and mockingbirds, frequent the dunes and forested areas behind them but also can be found in the interior areas of the Township. Regardless, Cliffwood Beach along the Raritan Bay is home to a sizable population of coastal related flora and fauna, such as seaside goldenrod and herring gulls.

A compilation of the wildlife, fish and vegetation in Aberdeen Township is found in Appendix I of this document. The species listed in Appendix I have been seen and reported by the Township Environmental & Shade Tree Advisory Board members, residents of Aberdeen Township and naturalists with State and County parks and the Audubon Society. Also included, and marked with asterisks, are those species that are reputed to inhabit the general area but have not been specifically reported.

The Natural Heritage Program, which is part of the Division of Parks and Forestry in the New Jersey Department of Environmental Protection, maintains an inventory of rare and endangered species and habitats for all areas in the State of New Jersey. The inventory is based upon the research and observations of numerous individuals and organizations, and new locations for animal and plant species are continually added to the database. Therefore, while the inventory summarizes the existing data known to date, it is not intended to substitute for onsite surveys required for environmental assessments.

Three (3) species have been seen in Aberdeen Township that are listed in the Database as endangered: the black skimmer, least tern and vesper sparrow. Three (3) more are listed as threatened: Cooper's hawk, osprey and Savannah sparrow. In 2001, the Township Department of Public Works constructed several nesting platforms and installed them at Cliffwood Beach. One was quickly adopted by an osprey pair, which nested and raised two chicks. Either the same or another pair returned to the nest in the spring of 2002.

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APPENDIX I

LISTING OF FAUNA AND FLORA

AS REPORTED BY
THE ABERDEEN TOWNSHIP
ENVIRONMENTAL & SHADE TREE ADVISORY BOARD

FAUNA AND FLORA

Mammals

Bat, Little brown	Myotis lucifugus
Cottontail rabbit	Sylvilagus floridanus
Eastern chipmunk	Tamias striatus
Fox, gray*	Urocyon cinereoargenteus
Fox, red	Vulpes fulva
Mole, Eastern	Scalopus aquaticus
Mouse, deer	Peromyscus manichulatus
Mouse, white-footed	Peromyscus leucopus
Mouse, house	Mus musculus
Muskrat	Ondatra zibethica
Opossum	Didelphis marsupialis
Raccoon	Procyon lotor
Rat, Norway	Rattus Norwegicus
Rat, eastern wood	Neotoma floridana
Shrew, masked*	Sorex cinereus
Shrew, smoky*	Sorex fumeus
Shrew, short-tailed*	Blarina brevicauda
Squirrel, eastern gray	Sciurus carolinensis
Squirrel, southern flying*	Glaucomys violans
Striped skunk	Mephitis mephitis
Weasel, short-tailed*	Mustela erminia
White-tailed deer	Odocoileus virginianus
Woodchuck	Marmota monax

Frogs, Toads & Salamanders

Bullfrog*	Rana catesbeinana
Fowler's toad*	Bufo woodhousie fowleri
Green frog*	Rana clamitans melanota
Leopard frog*	Rana utricularia
Eastern red-backed salamander*	Plethodon cinerus cinerus
Spring peeper	Hyler crucifer
Wood frog*	Rana sylvatica

Snakes & Turtles

Black racer snake	Coluber constrictor
Brown snake*	Storeria dekayi
Common garter snake	Thamnophis sirtalis
Green snake*	Opheodrys aestivus
Northern water snake*	Natrix sipedon
Ribbon snake*	Thamnophis sauritus
Box turtle	Terrapene carolina carolina
Eastern painted turtle*	Chrysemys picta picta
Northern diamond-back terrapin*	Malaclemys terrapin terrapin
Snapping turtle	Chelydra serpentina

Mollusks & Crustaceans

Clam, hard	Mercenaria mercenaria
Clam, razor	Ensis directus
Crab, blue claw	Callinectes sapidus
Crab, Fiddler	Uca spp.
Crab, Horseshoe	Limulus polyphemous
Crab, spider	Libinia spp.
Mussel	Modiolus spp.

Fish

Lake Lefferts is home to a number of freshwater species, as follows:

Carp	Cyprinus carpio
Catfish	Ictalurus punctatus
Crappie	Pomoxis annularis
Perch	Perca flavescens
Pickerel	Esox americanus
Smallmouth bass	Micropterus dolomieu
Sunfish	Enneacanthus spp.

At some time during the year, the following species frequent Raritan Bay:

Alewives	Pomolobus pseudoherengus
American eel	Anguilla rostrata
Atlantic silverside	Menidia Menidia
Bluefish	Pomotomus saltatrix
Flounder, summer	Paralichthys dentatus
Flounder, winter	Pseudopleuronectes americanus
Garfish	Tylosurus marinus

Herring	Clupea harengus harengus
Killifish, striped	Fundulus majalis
Lafayette	Leiostomus xanthurus
Menhaden	Brevoortia tyrannus
Mullet, white	Mugil curema
Northern stargazer	Astroscopus guttatus
Scup	Stenotomous chrysops
Searobin	Prionotus spp.
Shad	Alosa sapidissima
Striped bass	Morone saxatilis
Weakfish	Cynoscion regalis

Birds

American redstart	Setophaga ruticilla
Baltimore oriole	Icterus galbula
Blackbird, red-winged	Agelaius phoeniceus
Blue-gray gnatcatcher	Polioptila coerulea coerulea
Blue jay	Cyanocitta cristata
Cardinal	Richmondena cardinalis
Chickadee, black-capped	Parus atricapillus
Cedar waxwing	Bombycilla cedrorum
Cowbird, brownheaded	Molothrus ater
Crow, common	Corvus brachyrhynchos
Eastern kingbird	Tyrannus tyrannus
Eastern phoebe	Sayornis phoebe
Eastern towhee	Pipilo erythrophthalmus
Finch, house	Carpodacus meicanus
Goldfinch, American	Spinus tristis
Grackle	Quiscalus quiscula
Gray Catbird	Dumetella carolinensis
Great-crested flycatcher	Myiarchus crinitus
Harrier, northern	Circus cyaneus hudsonius
Hawk, Cooper's	Accipiter cooperii
Hawk, red-tailed	Buteo jamaicensis
Hawk, sharp-shinned	Accipiter striatus
Junco, slate-colored	Junco hyemalis
Kinglet, golden-crowned	Regulus satrapa
Kinglet, ruby-crowned	Regulus calendula
Merlin	Falco colubris
Mocking bird	Mimus polyglottis
Mourning dove	Zenaidura macroura
Nuthatch, red-breasted	Sitta carolinensis
Nuthatch, white-breasted	Sitta carolinensis cookei
Ovenbird	Seiurus aurocapillus

Owl, great horned	Bubo virginianis
Owl, saw-whet	Aegolius acadica acadica
Owl, screech	Otus asio
Owl, short-eared	Asio flammeus flammeus
Robin	Turdus migratorius
Ruby-throated hummingbird	Archilochus colubris
Sparrow, American tree	Spizella arborea
Sparrow, chipping	Spizella passerina passerina
Sparrow, field	Spizella pusilla pusilla
Sparrow, house	Passer domesticus
Sparrow, saltmarsh sharp-tailed	Ammospiza caudacuta
Sparrow, Savannah	Passerculus sandwichensis
Sparrow, song	Melospiza melodia
Sparrow, swamp	Melospiza georgiana
Sparrow, Vesper	Pooecetes gramineus gramineus
Starling	Sturnus vulgaris
Swallow, barn	Hirundo rustica
Swallow, northern rough-winged	Stelgidopteryx ruficollis serripennis
Swallow, tree	Iridoprocne bicolor
Thrush, hermit	Catharus guttatus
Thrush, wood	Hylocichla mustelina
Tufted titmouse	Parus bicolor
Turkey vulture	Cathartes aura
Veery	Hylocichla fuscescens
Vireo, warbling	Vireo gilvus gilvus
Vireo, white-eyed	Vireo griseus
Warbler, black and white	Dendroica magnolia
Warbler, northern parula	Parula americana
Warbler, palm	Dendroica palmarum
Warbler, yellow	Dendroica petechia
Water thrush, northern	Seiurus noveboracensis
Wood duck	Aix sponsa
Woodpecker, downy	Dendrocopus pubescens
Woodpecker, hairy	Dendrocopus villosus
Woodpecker, red-bellied	Centurus carolinus
Wren, Carolina	Thryothorus ludovicianus
Wren, house	Troglodytes aedon
Yellow-shafted flicker	Colaptes auratus

Shore and Coastal Birds

American kestrel or sparrow hawk	Falco sparverius
American oystercatcher	Haematopus palliatus palliatus
American widgeon or baldpate	Mareca americana
Belted kingfisher	Megaceryle alcyon alcyon

Black duck	Anas rubripes
Black skimmer	Rynchops nigra nigra
Baffle-head	Glaucionetta albeola
Canvasback	Aythya valisineria
Clapper rail	Rallus longirostris
Common goldeneye	Glaucionetta clangula americana
Double-crested cormorant	Phalacrocorax auratus
Dowitcher, short-billed	Limnodromus griseus
Duck hawk or peregrine falcon	Falco peregrinus
Egret, greater white	Casmerodius albus egretta
Fish crow	Corvus ossifragus
Gadwall	Anas strepera
Gull, Bonaparte's	Larus philadelphia
Gull, common black-headed	Larus ridibundus ridibundus
Gull, great black-backed	Larus marinus
Gull, herring	Larus argentatus
Gull, laughing	Larus atricilla
Gull, little	Larus minutus
Gull, ring-billed	Larus delawarensis
Heron, black-crowned night	Nycticorax nycticorax hoactli
Heron, great blue	Ardea herodias
Horned grebe	Colymbus auratus
Long-tailed duck	Clangula hyemalis
Loon, common	Gavia immer
Loon, red-throated	Gavia stellata
Mallard	Anas platyrhynchos platyrhinchos
Merganser, hooded	Lophodytes cucullatus
Merganser, redbreasted	Mergus serrator
Northern gannet	Morus bassanus
Osprey or fish hawk	Pandion halioetus carolinensis
Plover, black-bellied	Squatarola squatarola
Plover, semipalmated	Charadrius hiaticula semipalmatus
Sandpiper, greater yellowlegs	Totanus malenoleucus
Sandpiper, least	Erolia minutilla
Sandpiper, semipalmated	Ereunetes pusillus
Sandpiper, spotted	Actitis macularia
Scaup, greater	Aythya marila nearctica
Teal, blue-winged	Anas discors
Teal, green-winged	Anas carolinensis
Tern, common	Sterna hirundo hirundo
Tern, least	Sterna albifrons

Herbaceous Plants

NOTE: Those plants that grew from seeds or cuttings of imported plants or that escaped from cultivation and became naturalized are indicated with an "A" at the end of their Latin name.

American beach grass	Ammophila breviligulata	
Aster, late purple	Aster patens	
Aster, stiff-leaved	Aster linariifolius	
Aster, white wood	Aster divaricatus	
Burdock, seaside	Xanthium echinatum	
Celandine	Chelidonium majus	A
Clover	Trifolium spp.	A
Evening primrose	Oenthera biennis	
False Solomon's seal	Smilacina racemosa	
Fleabane	Erigeron annuus spp.	
Garlic mustard	Alliaria officinalis	A
Giant reed	Phragmites australis	
Goldenrod	Solidago spp.	
Heal-all	Prunella vulgaris	A
Horsetail, common	Equisetum arvense	
Jack-in-the-pulpit	Arisaema triphyllum	
Jewelweed	Impatiens capensis	
Loosestrife, fringed	Lysimachia ciliata	
Loosestrife, whorled	Lysimachia quadriflia	
Loosestrife, purple	Lythrum virgatum	A
Milkweed	Asclepias spp.	
Mullein	Verbascum spp.	A
Nettle	Urticaceae spp.	
Pickerelweed	Pontederia cordata	
Plantain	Plantago spp.	A
Pokeweed	Phytolacca americana	
Purslane, common	Portulaca oleracea	A
Queen Anne's lace, wild carrot	Daucus carota	A
Ragweed, common	Ambrosia artemisiifolia	
Sarsaparilla, wild	Aralia nudicaulis	
Sheep laurel	Kalmia angustifolia	
Sheep sorrel	Rumex acetosella	A
Skunk cabbage	Symplocarpus foetidus	
Solomon's seal	Polygonatum biflorum	
Thistle	Cirsium spp.	A
Three square	Scirpus americana	
Tickseed, sunflower	Bidens aristosa	A
Toadflax, blue	Linaria canadensis	
Toadflax, butter and eggs	Linaria vulgaris	A
Vervain	Verbena spp.	

Violet	Viola spp.	
Winter cress	Barbarea verna	A
Wood anemone	Anemone quinqefolia	
Yarrow	Achillea millefolium	A

Vines

Bittersweet, Asiatic	Celastrus orbiculatis	A
Bramble	Rubus ssp.	
Greenbriar	Smilax rotundifolia	
Honeysuckle, Japanese	Lonicera japonica	A
Morning glory, common	Ipomoea purpurea	A
Poison ivy	Rhus radicans	
Purple nightshade	Solanum dulcamara	A
Trumpet creeper	Campsis radicans	
Virginia creeper	Parthenocissus quinquefolia	
Wild grape, fox	Vitis labrusca	
Wild grape, frost	Vitis vulpina	
Wild grape, summer	Vitis aestivalis	

Groundcover and Ferns

Cinnamon fern	Osmunda cinnomomea	
Sensitive fern	Onoclea sensibilis	
Christmas fern	Polystichum acrostichoides	
Interrupted fern	Osmunda claytoniana	
Ivy, English	Hedera helix	A
Ivy, Boston	Parthenocissus triscuspidata	A
Lady fern	Athyrium filix-femina	
Ground Ivy	Glechoma hederacea	A
Ground pine	Lycopodium complanatum	
Periwinkle, myrtle	Vinca minor	A
Strawberry, common	Fragaria virginiana	
Strawberry, wood	Fragaria vesca	A
Wild lily-of-the-valley	Maianthemum canadensis	

Shrubs

Arrowwood	Viburnum dentatum
Bayberry	Myrica pennsylvanica
Blackhaw	Viburnum prunifolium
Blueberry, high-bush	Vaccinium corymbosum
Blueberry, low-bush	Vaccinium angusti folium

Bramble	Rubus spp.
Chokeberry, red	Aronia arbutifolia
Chokeberry, black	Aronia melanocarpa
Dogwood, silky	Cornus amomum
Groundsel	Baccharis halimifolia
Inkberry	Ilex glauca
Mountain laurel	Kalmia latifolia
Nannyberry	Viburnum lentago
Roses	Rosa spp.
Shadblow	Amelanchier spp.
Spicebush	Lindera benzoin
Sumac	Rhus spp.
Sweet pepperbush	Clethra alnifolia
Winterberry	Ilex verticilata
Witchhazel	Hamamelis virginiana

Trees

Alder	Alnus spp.
American arborvitae	Thuja occidentalis
American beech	Fagus grandifolia
American holly	Ilex opaca
Ash, green	Fraxinus pennsylvanica
Ash, white	Fraxinus americana
Atlantic white cedar	Chamaecyparis thyoides
Birch, gray	Betula populifolia
Birch, white	Betula papyrifera
Black gum	Nyssa sylvatica
Black walnut	Juglans nigra
Box elder	Acer negundo
Canadian hemlock	Tsuga canadensis
Catalpa, common	Catalpa bignonioides
Cherry, black	Prunus serotina
Cherry, sweet	Prunus avium
Crabapple	Malus spp.
Dogwood, flowering	Cornus florida
Dogwood, silky	Cornus amomum
Dogwood, gray	Cornus racemosa
Eastern redcedar	Juniperus virginiana
Ginkgo	Ginkgo biloba A
Hackberry	Celtis occidentalis
Locust, black	Robinia pseudoacacia
Maple, red	Acer rubrum
Maple, Norway	Acer platanoides
Maple, silver	Acer saccharinum

Maple, sugar	Acer saccharum	
Mulberry, red	Morus rubra	
Mulberry, white	Morus alba	A
Oak, black	Quercus velutina	
Oak, chestnut	Quercus prinus	
Oak, pin	Quercus palustris	
Oak, post	Quercus stellata	
Oak, white	Quercus alba	
Oak, northern red	Quercus rubra	
Oak, scarlet	Quercus cocchinea	
Pitch pine	Pinus rigida	
White pine	Pinus strobus	
Sassafras	Sassafras albidum	
Spruce, Colorado	Picea pungens	
Spruce, Norway	Picea abies	A
Sweet gum	Liquidambar styraciflua	
Sycamore	Platanus occidentalis	
Tree of heaven	Ailanthus altissima	A
Tulip poplar	Liriodendron tulipifera	
Willow, black	Salix nigra	
Willow, weeping	Salix babylonica	A
Willow, pussy	Salix discolor	
Yew	Taxus spp.	A

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