OUTER CONTINENTAL SHELF
and
ENERGY FACILITY PLANNING STUDY
in
OCEAN COUNTY, NEW JERSEY

n County Planning Board · January 1978

OCEAN COUNTY OUTER CONTINENTAL

SHELF AND ENERGY FACILITIES PLANNING STUDY

Prepared by:

Ocean County Planning Department

January, 1978

Revised April, 1978

U.S. DEPARTMENT OF COMMERCE NOAA
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CHARLESTON, SC 29405-2413

This report was prepared under terms of contract to the New Jersey Department of Environmental Protection, Office of Coastal Zone Management, with financial assistance under the provisions of Section 305 of P.L. 92-583 Coastal Zone Management Act of 1972.

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SUMMARY

The Ocean County Outer Continental Shelf and Energy Facility Planning Study was undertaken in conjunction with the New Jersey Department of Environmental Protection, Office of Coastal Zone Management, to supplement the regular Coastal Zone Management Program administered under Section 305 of the Federal Coastal Zone Management Act of 1972 (P.L. 92-583). The Ocean County Study is one of twelve county studies coordinated by the New Jersey Department of Environmental Protection, Office of Coastal Zone Management. These studies were developed in conjunction with an overall program of outer continental shelf and energy facility development analyses being undertaken by the State, the Federal government and other planning agencies. The purpose of the Ocean County Study was to provide local input and develop local expertise and a data base for the Ocean County area and also to provide inter-county and county-state coordination on the proposed outer continental shelf and energy facility development programs within the New Jersey Coastal area.

This study provides an overview of Ocean County, an inventory of natural resources, human resources and land uses within Ocean County, an evaluation of the suitability or unsuitability of outer continental shelf and related energy facility sites and activities, a description of criteria utilized in establishing the acceptability or unacceptability of energy facility siting related to the outer continental shelf program in terms of environmental impacts, economic impacts and energy related activities currently located within the County.

OCS related facilities identified as potentially compatible with Ocean County environmental resources, land use patterns and relationships, and economic base include temporary service base activities, permanent service space activities, and administration and ancillary activities, including inspection, emergency services, and related activities which are compatible with the existing fishing and resort/tourist facilities and environmental constraints within the County.

Ocean County has extensive natural resource areas which are not compatible with the transmission and/or processing of oil and natural gas in the event that it is discovered off the coast of Ocean County. The sensitive and critical natural resources within the County have been inventoried and are identified within the report. In addition, the development patterns and overall infrastructure development of the County in terms of water resource management, transportation, economic and industrial development, resort tourism, adult retirement communities, air quality, fishing, clamming, recreation uses, and other activities are described within the report.

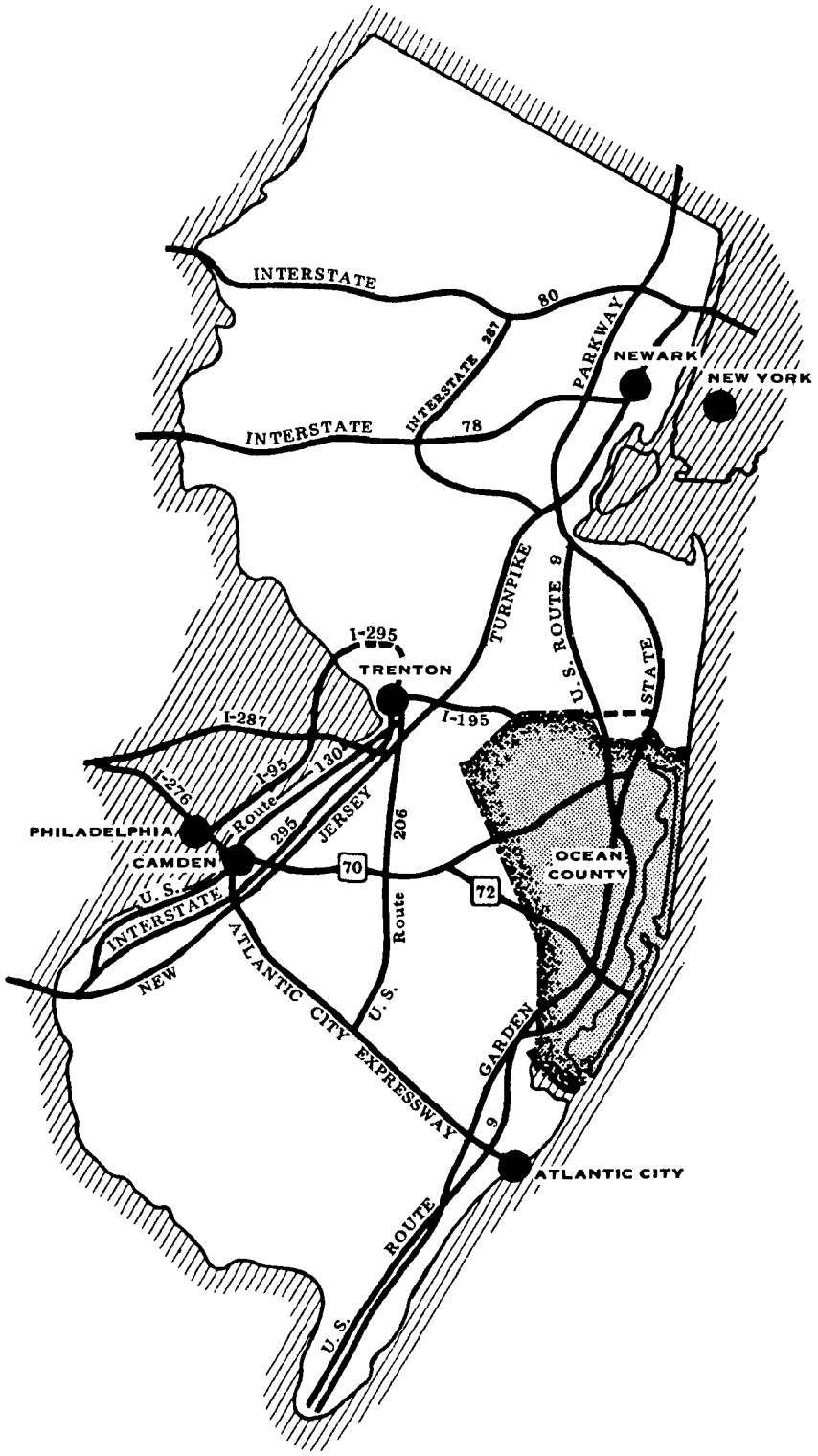
Ocean County has identified the extent to which energy facility siting in Ocean County and the New Jersey Coastal area will accommodate State and national interests. The report describes recommended methods for facilitating communication between State, regional, county and local interest groups. The report also provides an analysis of mitigating measures which the State of New Jersey can utilize if OCS activity is to be accommodated.

The importance of protecting and preserving environmentally sensitive areas in terms of the direct and indirect positive economic, social and energy conservation impacts on the State, region and nation have been identified and fully supported by the County of Ocean and its municipalities. The unique natural resource inherent in the coastal beaches of the State of New Jersey are a major national resource in terms of providing recreation to the major metropolitan areas of New York and Philadelphia and the central Atlantic coastal region which extends inland to areas within Pennsylvania, Ohio, West Virginia and New York and to the international tourist trade from Canada. The importance of preserving and maintaining the coastal area of Ocean County and New Jersey is deemed an essential and critical facet of off-shore energy siting and facility development.

Ocean County views its role in coastal energy facility siting as a sub-regional coordination function for the County area which constitutes one-third (1/3) of the New Jersey coastal region. The County serves as a focal point for coordinating local input and policy development for the County in terms of coordination and information distribution to municipal and area

interest groups concerned with the development of the coastal area. Ocean County strongly supports the development of coastal planning strategies at the County and municipal levels. The County has supported and continues to support recommendations for State and Federal legislation designed to include County/ municipal coordination in the development and implementation of outer continental shelf and energy facility planning programs and other energy related and economic development activities within the Ocean County coastal area and the New Jersey coastal zone.

REGIONAL LOCATION



PREPARED BY: OCEAN COUNTY PLANNING BOARD
January, 1978

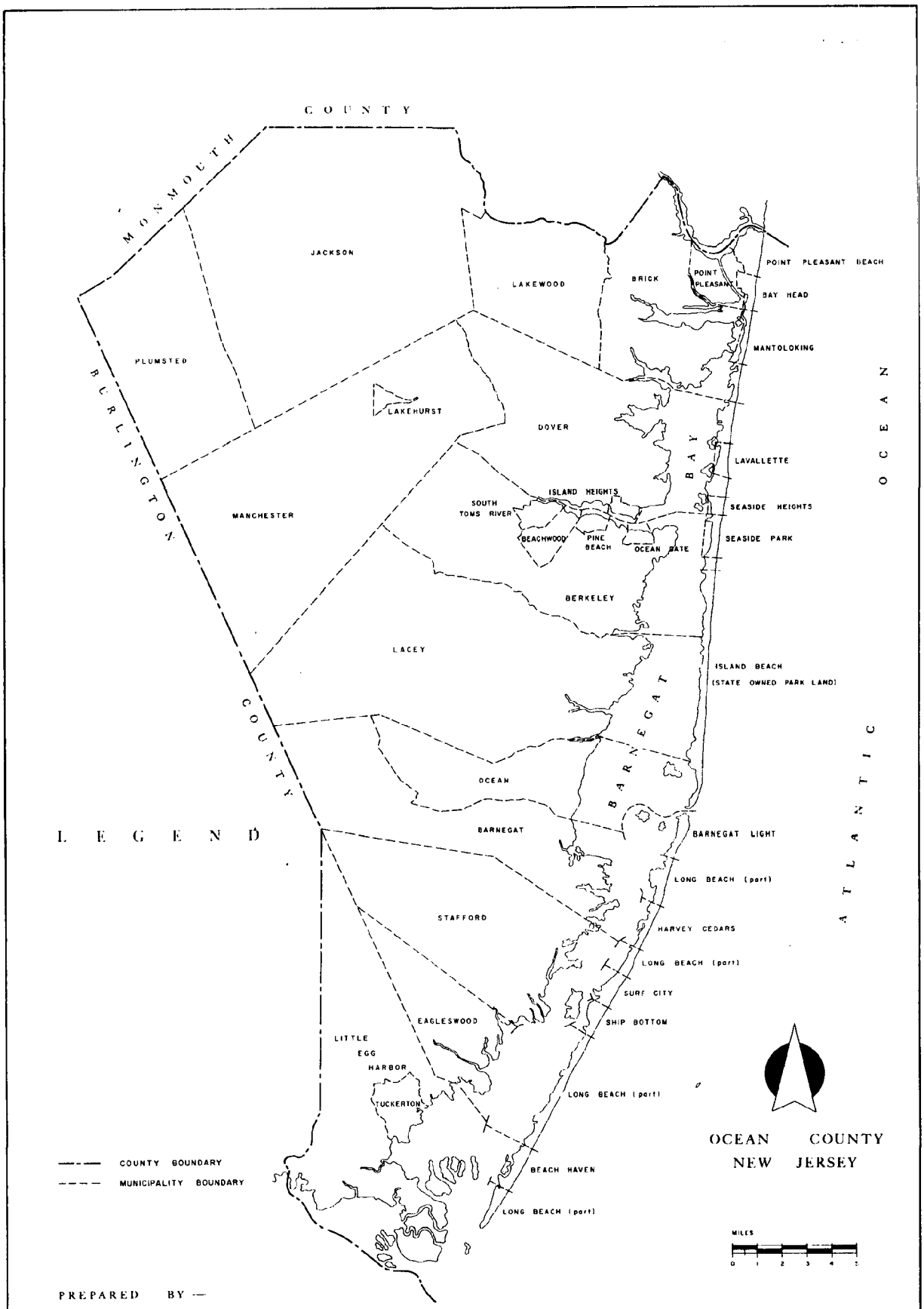

MONMOUTH COUNTY
BURLINGTON COUNTY
OCEAN
ATLANTIC
JACKSON
LAKEWOOD
BRICK
POINT PLEASANT
POINT PLEASANT BEACH
BAY HEAD
MANTOLOKING
PLUMSTED
LAKEHURST
DOVER
BARNEGAT BAY
LAVALLETTE
ISLAND HEIGHTS
SOUTH TOMS RIVER
SEASIDE HEIGHTS
MANCHESTER
BEACHWOOD
PINE BEACH
OCEAN GATE
SEASIDE PARK
BERKELEY
LACEY
ISLAND BEACH (STATE OWNED PARK LAND)
BARNEGAT
BARNEGAT LIGHT
LONG BEACH (part)
STAFFORD
HARVEY CEDARS
LONG BEACH (part)
SURF CITY
EAGLESWOOD
SHIP BOTTOM
LITTLE EGG HARBOR
TUCKERTON
LONG BEACH (part)
BEACH HAVEN
LONG BEACH (part)
LEGEND
COUNTY BOUNDARY
MUNICIPALITY BOUNDARY
OCEAN COUNTY
NEW JERSEY
MILES
0 1 2 3 4 5
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TABLE OF CONTENTS

TABLES, MAPS, FIGURES

TABLES

MAPS

FIGURES

Introduction

The U.S. Department of the Interior is leasing extensive offshore tracts on the Outer Continental Shelf (OCS) for purposes of oil and gas extraction. Certain onshore areas of New Jersey adjacent to these tracts are potential staging points for offshore operations, landside terminal points for transmission and storage of oil and gas, and locations for gas processing plants and related facilities.

The State of New Jersey arranged with the U.S. Department of Commerce through the National Oceanic and Atmospheric Administration (NOAA) to act as coordinator/contractor for funding coastal planning studies for OCS and energy facility siting. The State is also responsible for developing a management program under provisions of Section 305 of P.L. 92-583, which includes certain lands lying within Ocean County

A portion of the Federal grant to the State was passed-through to Ocean County to support local planning for these OCS and energy facility planning activities. The Ocean County Board of Chosen Freeholders signed an agreement with the New Jersey State Department of Environmental Protection to undertake a cooperative subregional OCS and Energy Facility Planning Study. Under this agreement, the Ocean County Planning Board's staff will fulfill the County's obligations as one of 12 participating Counties.

The work program included several tasks. The first task was a review of OCS studies, energy studies, State and local policies, and the solicitation of comments from interested persons and organizations. Next, the planning staff conducted surveys of existing coastal public and private facilities and services, coastal resources, and coastal land and water uses

existing within Ocean County. The inventory serves as a basis for evaluating the feasibility or non-feasibility of accommodating energy facilities.

The third task was the analysis and assessment of the impacts of OCS and energy facility development. Consideration was given to the national interest and the State's responsibilities in meeting regional and local needs, but also to compatibility with other coastal concerns, the benefits and/or costs of such activity to County and municipalities in terms of employment and tax revenues, and the constraints to OCS development in terms of the limitation of land to absorb development. Throughout the planning effort, the Board solicited and considered municipal and State input, as well as input from various groups active in the County, including those from both the environmental and the development perspective.

The final task involved recommendations to the State based on the tasks as described above as to the evaluation of geographic areas within Ocean County that could support O.C.S. and energy facility development. The plan also identifies areas within Ocean County that are unsuitable for O.C.S. related energy facility development, and documents the rationale for such recommendations.

OVERVIEW

of

OCEAN COUNTY

Ocean County, with approximately 639 square miles of land area, is the second largest county in New Jersey. The County is located in the southeast portion along the Atlantic Ocean coastline. A part of the Atlantic coastal plain, the topography of the County is essentially flat. There are four primary geographic features in the County; the two barrier beaches, Long Beach Island and Island Beach; Barnegat Bay consisting of 60 square miles of bay waters; the mainland with several hundred miles of coastline on Barnegat Bay; and the inland area that is mostly covered with upland forest. This inland area generally is comprised of the land west of the Garden State Parkway and is generically referred to as the "Pine Barrens".

The County lies on the periphery of two of the Nation's largest metropolitan centers, 50 miles south of New York City and 60 miles east of Philadelphia. With an improved transportation network, especially the construction of the Garden State Parkway in the mid-1950's, Ocean County was impacted by the national trend towards suburbanization that began at the end of the Second World War. Improved access to the metropolitan areas allowed people to live in the County and commute to jobs located in the traditional urban areas of northern New Jersey and New York. Approximately 48 percent of the working population commutes to jobs outside of the County.

The local factors that have encouraged growth include the availability of relatively inexpensive and developable land, accessibility to employment

centers, the development of a regional sewerage system, the continued development of senior citizen communities, the conversion of seasonal homes to year-round occupancy, the natural amenities and resort character of the County and the gradual filling up of the more urbanized areas to the north.

These incentives for growth have made Ocean County the fastest growing county in the State. Ocean County's population has nearly doubled in each of the last two decades, expanding from 56,609 persons in 1950 to 108,241 persons in 1960 and 208,470 persons in 1970. These figures represent population increases of 91.2 percent and 92.5 percent, respectively. The provisional July 1, 1976 estimates prepared by the U.S. Bureau of the Census indicates an increase in the County's population of 100,300 persons since 1970. This is an increase of 48 percent, for a current estimated population of 308,500 persons. Almost 98,000 persons are estimated to have migrated into the County since 1970.

The continued growth of Ocean County and other extra-urban counties may indicate a redistribution trend for New Jersey's population as a whole. Population growth at the State level has sharpley declined. The overall State growth margin is nominal, that is 3, 100 persons between 1975 and 1976.

Lacking major population increases at the State level, net migration into Ocean County in the future would be the result of geographical shifts in the population of the State. This redistribution effect is already observable. The provisional 1976 estimates show that the more densely populated and heavily urbanized northern counties have lost population. These northern counties include Bergen, Essex, Hudson, Middlesex, Morris and Union.

In contrast, the developing counties in the south and the northwest exhibited population increases, with Ocean County's being the most dramatic.

There are indications that the recent economic recession, that slowed somewhat the County's growth, is retreating. Residential building permit data collected by the New Jersey Department of Labor and Industry indicates that as of May 1977, approximately 600 dwelling units had been authorized in the County. This figure compares to 1,323 units authorized during the same period in 1976, and 880 units in 1975.

Ocean County's population is expected to continue to expand, but at a slower rate than experienced in the 1950's and 1960's. The 208 Water Quality Project has prepared a set of population projections to the year 2000 for the County. These projections estimate a total population figure of between 560,000 and 646,000 persons in the year 2000. If these projections are achieved, Ocean County's population would expand by 82 - 109 percent over a twenty-three year period.

The rapid population increases experienced by Ocean County has had a concomitant increase in the use of land. Through the 1950's, Ocean County was characterized by rural and resort-tourism activities. The tourist industry traditionally has been the most important element in the County's economy since improved rail transportation at the turn of the century made the beaches accessible to the millions of vacationers residing in New York, Philadelphia and northern New Jersey. Tourism remains the County's most lucrative industry, with about $500 million and 14,000 jobs attributed to tourism in 1975. Agriculture, fishing, shellfishing and mining, once mainstays of the County's economy have declined in importance as the economy has become more balanced

and diversified with the addition of jobs from the industrial and commercial sectors.

In February, 1977, the Ocean County 208 Water Quality Management Project completed a survey of existing land uses in the County. The survey is the first lot-specific field survey completed at the County level. Each of the 33 municipalities that comprise the County was surveyed, and detailed existing land use maps were prepared. Acreage tabulations at the municipal, planning area, and County levels were also calculated. The information regarding the amount of land associated with the various land use classifications for Ocean County is included in Table I and the EXISTING ZONING map.

The land use survey indicates that while the amount of land being developed for urban usage is increasing, the County maintains a vast potential for further development. Of the 408,382 acres in the County, approximately 230,156 acres are vacant, of which nearly 4,400 acres are in agricultural use. Certainly, not all of the vacant land in the County can be considered as developable. However, preliminary analysis by the 208 staff indicates that there are ample amounts of land to accommodate the residential, commercial, industrial such as light manufacturing, assembly plants, and research complexes and other requirements of the projected population without infringing or impacting environmentally sensitive areas. Environmental factors that were considered in this analysis include stream corridors and headwater areas; inland and tidal wetlands, prime open agricultural land, and areas of unique vegetation, such as lowland forest and the "dwarf forest". These areas were <u>not</u> considered as developable land and represent about 57 percent of the total land area of the county.

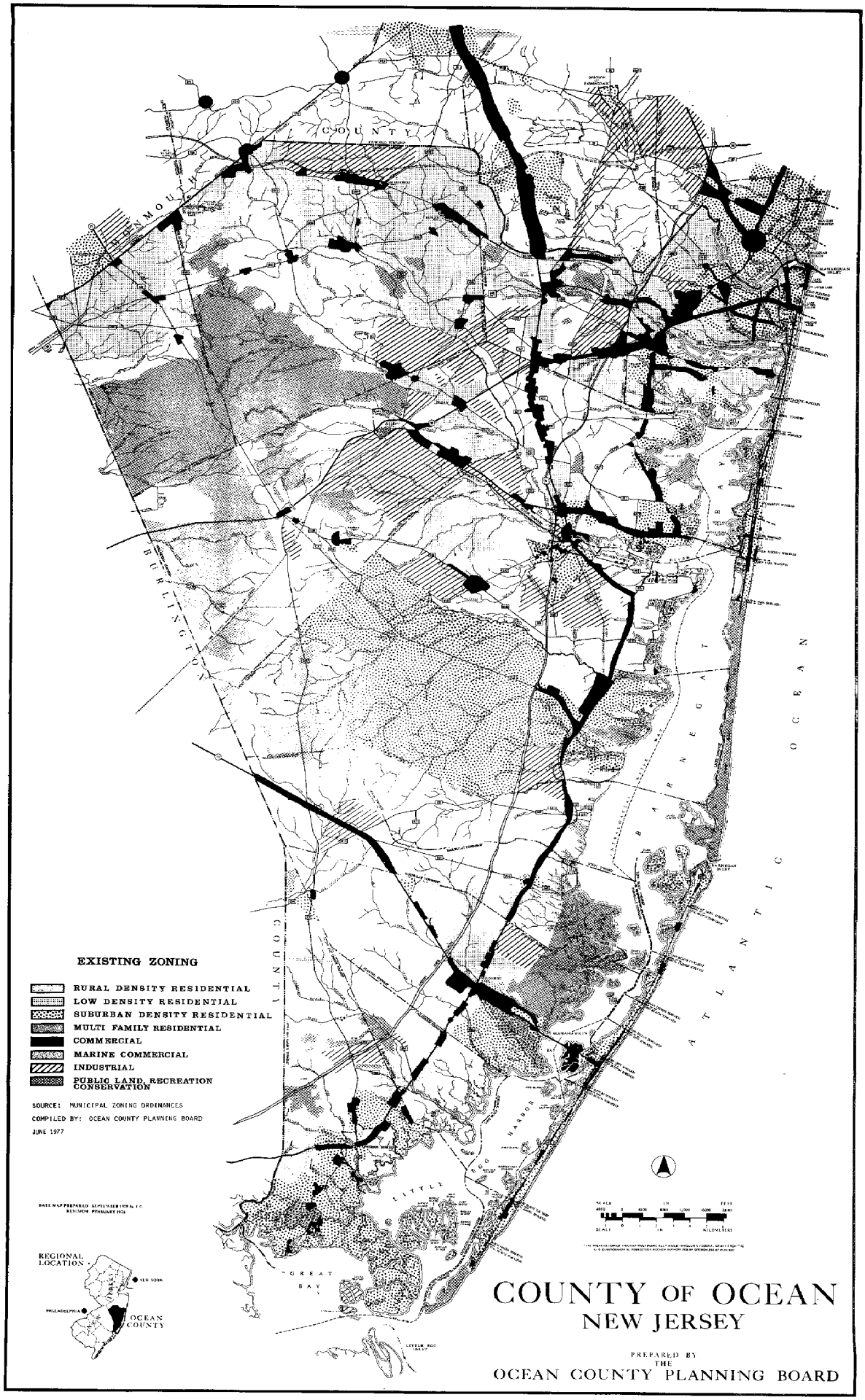
OCEAN COUNTY EXISTING LAND USE TABULATIONS

TABLE I

Developed Land	50108.98 acres	12.25%	Map Source 208
Roads, Public, Undeveloped Land	358273.00 acres	87.75%	Map Scale 1"=4000'
Total Land Area	408,381.98 acres	100.00%	

LAND USES	ACRES	% OF DEVELOPED LAND	% OF TOTAL LAND
RESIDENTIAL	**29,691.48**	**59.25**	**7.27**
Single Family	24301.66	48.50	5.95
Two Family	427.62	0.85	0.10
Three-Five Family	101.62	0.20	0.03
Multi-Family over Five	1071.46	2.14	0.26
Mobile Homes & Trailers	399.68	0.80	0.10
Retirement Communities	3389.49	6.76	0.83
BUSINESS & COMMERCIAL	**3,647.35**	**7.28**	**0.89**
Wholesale & Retail	1931.74	3.86	0.47
Professional Offices & Banks	317.76	0.63	0.08
Services (hotels, beauty shops, etc.)	295.31	0.59	0.07
Marine Commercial	327.84	0.65	0.08
Commercial Recreation	775.32	1.55	0.19
INDUSTRIAL	**11,115.06**	**22.00**	**2.72**
Light Industrial	976.96	1.95	0.22
Heavy Industrial	1323.30	2.64	0.34
Landfills (public & private)	1953.28	3.90	0.48
Extractive	4621.78	9.22	1.13
Construction	12.89	0.03	0.003
Utilities & Transportation	2225.85	4.44	0.54
PUBLIC & QUASI-PUBLIC	**84,530.84**	--	**20.69**
Parks	54884.15	--	13.44
Schools	1569.47	3.13	0.38
Military	23991.60	--	5.87
Municipal & Government	657.76	1.31	0.16
Quasi-Public (hospitals, clubs, organizations)	3427.86	6.84	0.84
OTHER	**279,397.25**	--	**68.42**
Public Beaches	279.68	--	0.07
Private Beaches	130.75	--	0.03
Lakes & Streams	5030.53	--	1.23
Vacant & Wooded	226778.05	--	55.53
Agriculture (cropland)	3377.46	--	0.83
Agriculture (livestock)	1094.44	--	0.27
Highways & Streets	42706.34	--	10.46
TOTAL	408381.98	100.00	100.00

Source: Ocean County 208 Project
August, 1977


EXISTING ZONING
RURAL DENSITY RESIDENTIAL
LOW DENSITY RESIDENTIAL
SUBURBAN DENSITY RESIDENTIAL
MULTI FAMILY RESIDENTIAL
COMMERCIAL
MARINE COMMERCIAL
INDUSTRIAL
PUBLIC LAND, RECREATION CONSERVATION
SOURCE: MUNICIPAL ZONING ORDINANCES
COMPILED BY: OCEAN COUNTY PLANNING BOARD
JUNE 1977
REGIONAL LOCATION
NEW YORK
PHILADELPHIA
OCEAN COUNTY
OCEAN COUNTY
BURLINGTON COUNTY
ATLANTIC OCEAN
BARNEGAT BAY
GREAT BAY
LITTLE EGG HARBOR
COUNTY OF OCEAN
NEW JERSEY
PREPARED BY
THE
OCEAN COUNTY PLANNING BOARD

In the past, the major constraint to increased development was the lack of sanitary sewerage facilities in the County. There are a number of municipal utility authorities and privately-owned sewerage systems operating or in various stages of development. These systems will for the most part tie into the Ocean County Sewerage Authority (OCSA) regional system. This system will provide secondary treatment with effluent discharge through outfalls into the Atlantic Ocean. When completed, this system will service most of Ocean County and will permit development to continue without creating a wastewater pollution problem. The system should also improve the County's major pollution problem, effluent discharge and seepage into Barnegat Bay.

The Ocean County Concept Plan, a H.U.D. funded and approved 701 plan, provides a succinct description of past and present development trends. Briefly, the mainland area east of the Garden State Parkway has been the center of development. The traditional urban settlements, such as Toms River, Manahawkin, Tuckerton and Barnegat are located here. This area has also accommodated the majority of recent development activity.

The barrier beaches have been intensively developed, first as seasonal dwellings and tourist activities, but recently is assuming a year-round complexion. The conversion of seasonal homes to year-round living will accommodate the bulk of the projected growth in the beach communities. The existing land use survey indicates that only 655 acres (9.82%) of Island Beach and 971 acres (19.19%) of Long Beach Island is vacant and/or wooded. Much of this vacant land is unsuitable for any kind of development.

Inland areas west of the Garden State Parkway are generally open space, vacant and/or agricultural. Exceptions are urban concentrations such as

Lakewood, Lakehurst and New Egypt. A recent phenomenon, and an important factor in Ocean County's continued growth, is the construction of large-scale adult retirement communities in the inland areas. There are now 26 retirement communities in the County with an estimate population of 35,100 occupying 19,910 dwelling units.

The policy of the County regarding future land development is to locate growth in areas that will not have a negative impact on the environment. There are several environmental areas of special concern, notably the Pine Barrens, stream corridors, tidal wetlands and water quality in general. The location and intensity of land development will essentially be tied into the availability of sewer facilities.

In the more heavily developed areas of the County such as along the Bay, growth will be encouraged to locate in areas contiguous to, or ligical extensions of, existing development. This will essentially be a in-fill process. It must be remembered that development in this area will also be subject to Coastal Area Facility Review, Riparian, Floodplain and Wetlands regulations.

Additionally, the County will seek to utilize major sewer interceptor lines as focal points for the direction of new land development. This will play an especially important role in guiding new growth into the northwestern portion of the County, especially Jackson and Lakewood Townships, but also Manchester and Plumsted Townships. By focusing growth in the northwestern area of the County, subject to environmental controls, the County is relieving much of the development pressure in the Pine Barrens. By allowing more intense development in the sewered northwest Townships, the very sensitive Pine Barrens can be protected by allowing only very low density development.

The County's policy is to use wastewater facilities as a dynamic planning tool in the loclation of new development. This policy differs from the traditional policy of locating sewage facilities in existing areas that exhibit water quality problems. The size and scope of the O.C.S.A. regional system will allow the County to service, and thus improve the water quality problems of existing development. Additionally, new development can be located on land adjacent to new interceptors such as the Davenport and Ridgeway interceptors allowing growth but precluding a water quality problem.

Another water quality problem, the quality and quantity of surface water run-off generated by more/intensive use of the land, is being addressed by the 208 staff. Essentially the management strategies formulated to deal with non-point pollution sources include prohibiting new development in environmentally sensitive areas, especially stream corridors and floodways, and on-site retention of stormwater run-off from new development. On-site retention will insure that the existing character of the receiving water body will not be substantially altered.

The use of sound planning practices will insure that Ocean County can continue to grow and develop, and at the same time, can realize minimal adverse impact on its sensitive natural resources. If land use control devices used to date have not been overly successful in enhancing the quality of development, it has been due to defects in the devices, wrong application of the devices, and perhaps most importantly, the lack of coordinated use of devices with supporting documentation, know-how and consensus. Those devices may rest in the hands of programs like Section 208 Water Quality Management and Coastal Zone Management, both initiated by the Federal government,

delegated to the State government, and coordinated with local (County) government. The New Jersey Municipal Land Use Law, and the New Jersey County and Regional Planning Enabling Act are insufficient to cope with today's land use problems, especially those unique to Ocean County.

INVENTORY

NATURAL RESOURCES

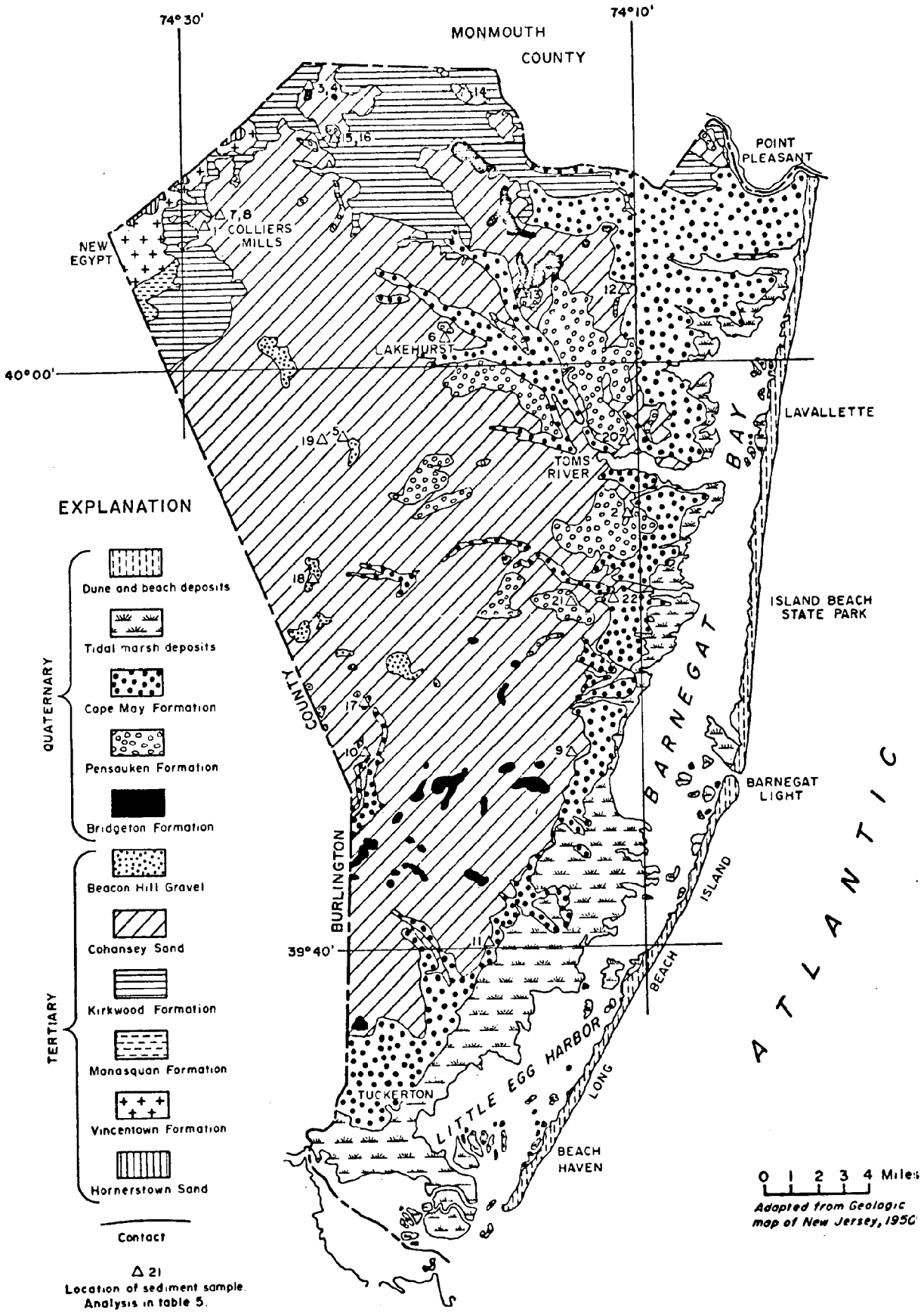
Geology

The Atlantic Coastal Plain in New Jersey is composed of a series of gently seaward dipping beds of clay, sand, and gravel of Cretaceous to Holocene age. Locally, the beds are composed of iron potassium silicate, and they do contain fossils. Coastal Plain sediments thicken from about 1,000 feet at New Egypt in the northwestern part of Ocean County to about 4,000 feet at Tuckerton in the southern part of the County. Underlying this sedimentary sequence are various layers of bedrock.

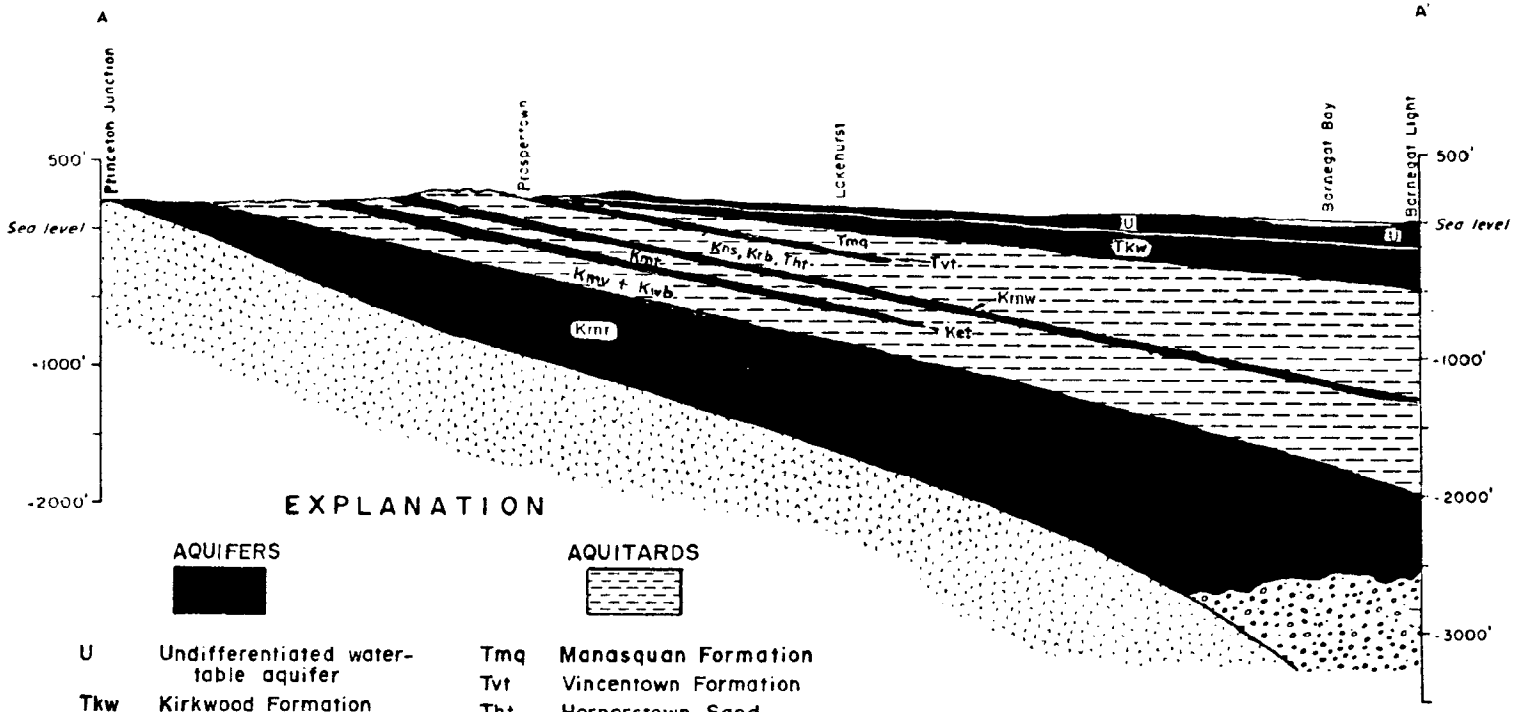
The surficial geology of Ocean County is shown in Figure 1. Outcroppings of the Vincentown, Manasquan and Kirkwood formations are found in the northwestern portion of the County, but is is the exposed Cohansey Sand which is found throughout most of the County. The Cohansey formation is capped in some rare places by Beacon Hill gravel, mostly on hilltops, while in valleys along the coast the Cohansey is overlain by the Bridgeton, Pennsauken, and Cape May formations. Halocene deposits include swamp and marsh muds as well as beach and dune sands. It is these deposits of which Long Beach Island is composed.

The sub-surface geology of Ocean County is shown in the geohydrologic sections. One secion (figure 2) shows a northwesterly-southeasterly cross-section from Princeton Junction to Barnegat Light, while the second (figure 3) shows a north-south coastal cross-section from Sandy Hook to Atlantic City. The Raritan and the Magothy formations are the deepest sediments occurring at levels of 1,500 feet or greater (figure 4).

FIGURE 1 GEOLOGY OF OCEAN COUNTY



Henry Anderson and Charles Appel, "Special Report 29: Ground-Water Resources of Ocean County," United States Geological Survey, 1969, page 24.



EXPLANATION

AQUIFERS

AQUITARDS

U	Undifferentiated water-table aquifer	Tmq	Manasquan Formation
Tkw	Kirkwood Formation aquifer	Tvt	Vincentown Formation
Tmg	Manasquan Formation aquifer	Tht	Hornerstown Sand
Kmw	Mount Laurel Sand and Wenonah Formation aquifer	Krb	Red Bank Sand
Ket	Englishtown Formation aquifer	Kns	Navesink Formation
Kmr	Raritan and Magothy Formations *(aquifer undefined)*	Kmt	Marshalltown Formation
		Kwb	Woodbury Clay
		Kmv	Merchantville Formation

Pre-Cretaceous crystalline bedrock

Aquifer containing salt water

Well screen

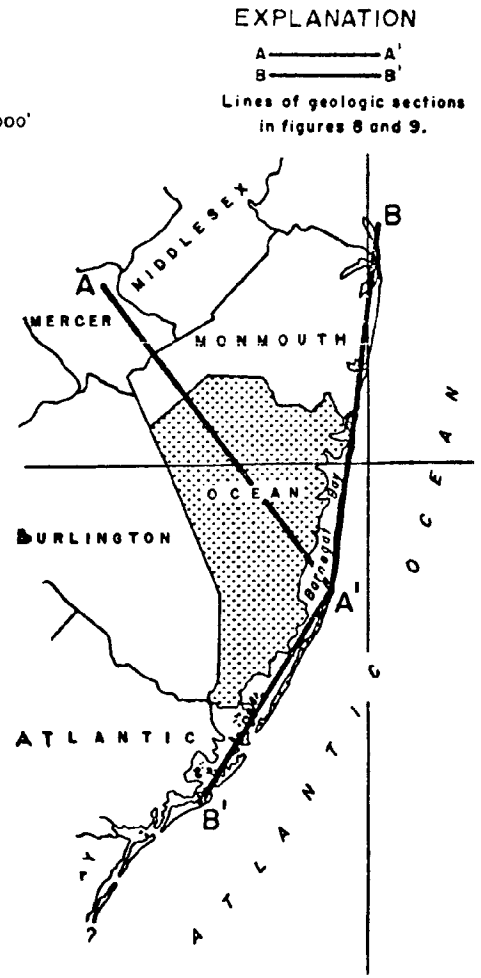
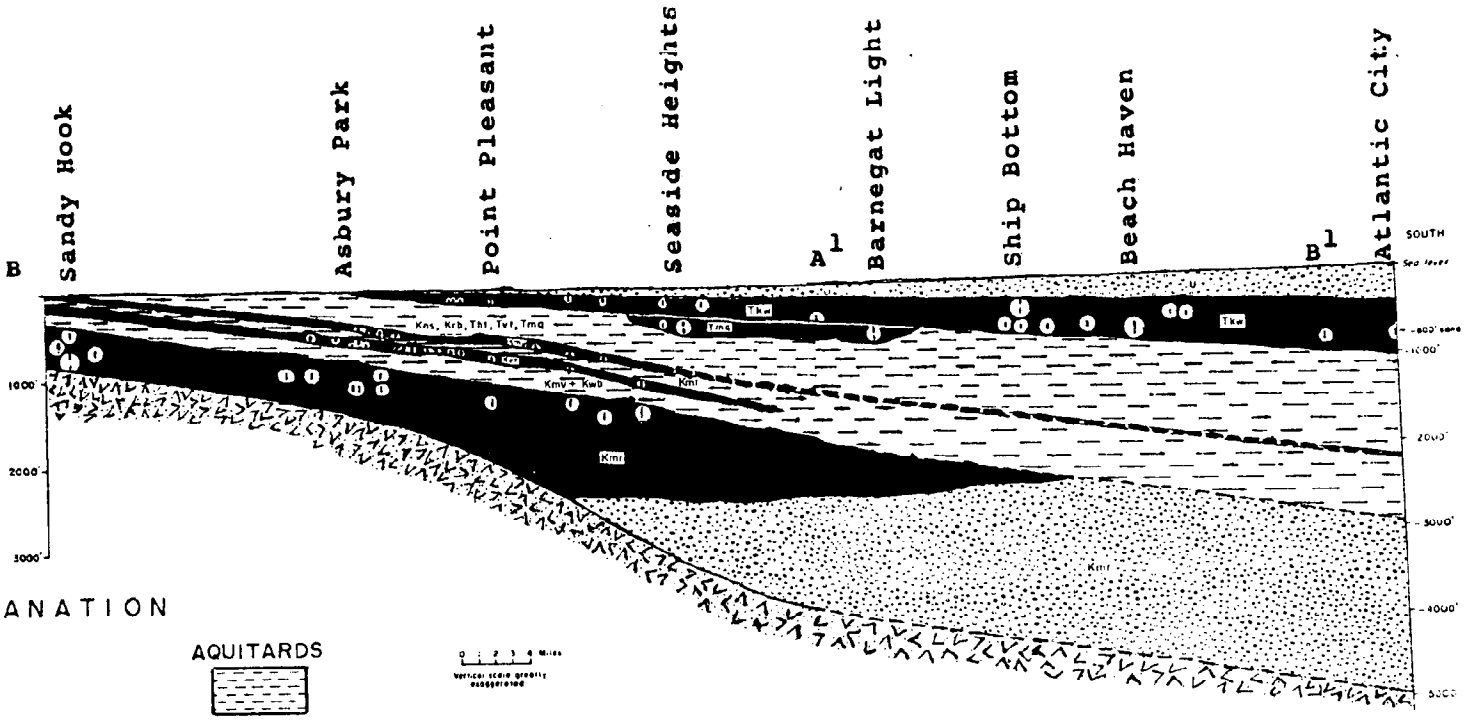


FIGURE 2 - Geohydrolic Section, Ocean County, N.J.

SOURCE: Ocean County Special Report 29
Geology & Ground-water Resources of
Ocean County, New Jersey 1969



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Tmq	Manasquan Formation
Tvt	Vincentown Formation
Tht	Hornerstown Sand
Krb	Red Bank Sand
Kns	Navesink Formation
Kmt	Marshalltown Formation
Kwb	Woodbury Clay
Kmv	Merchantville Formation

Aquifer containing salt water

Pre-Cretaceous crystalline bedrock

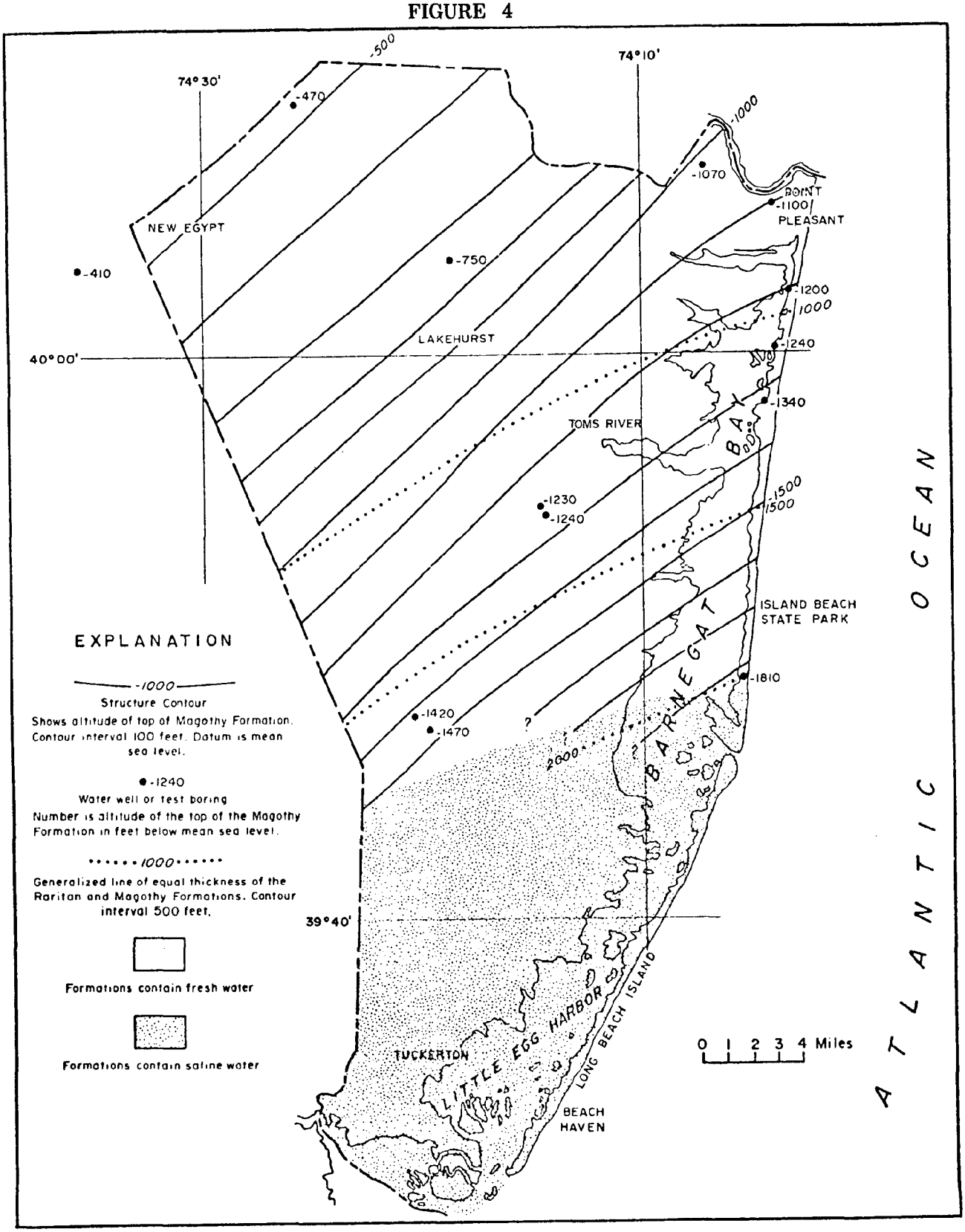
Well screen

FIGURE 3 - Geohydrologic Section from Sandy Hook to Atlantic City

SOURCE: Ocean County Special Report 29
Geology & Ground-water Resources of
Ocean County, New Jersey 1969

STRUCTURE CONTOURS AND THICKNESSES OF THE RARITAN AND MAGOTHY FORMATIONS

FIGURE 4



Henry Anderson and Charles Appel, "Special Report 29: Ground-Water Resources of Ocean County," United States Giological Survey, 1969, page 28.

Vegetation Habitats and Critical Areas

Approximately 56 percent of Ocean County's land area is covered in pine or pine-oak forests. Fresh water wetlands cover 28 percent, and marine tidal marshes account for another 8 percent. Barnegat Bay represents an area of between 8 to 10 percent of the surface area of the County.

The accompanying map, Summary of Environmentally Sensitive Areas, delineates critical natural resources that are instrumental in maintaining water quality and/or possess unique biological features. This assessment of critical areas is basically an examination of land surface features: natural characteristics evident from the landscape.

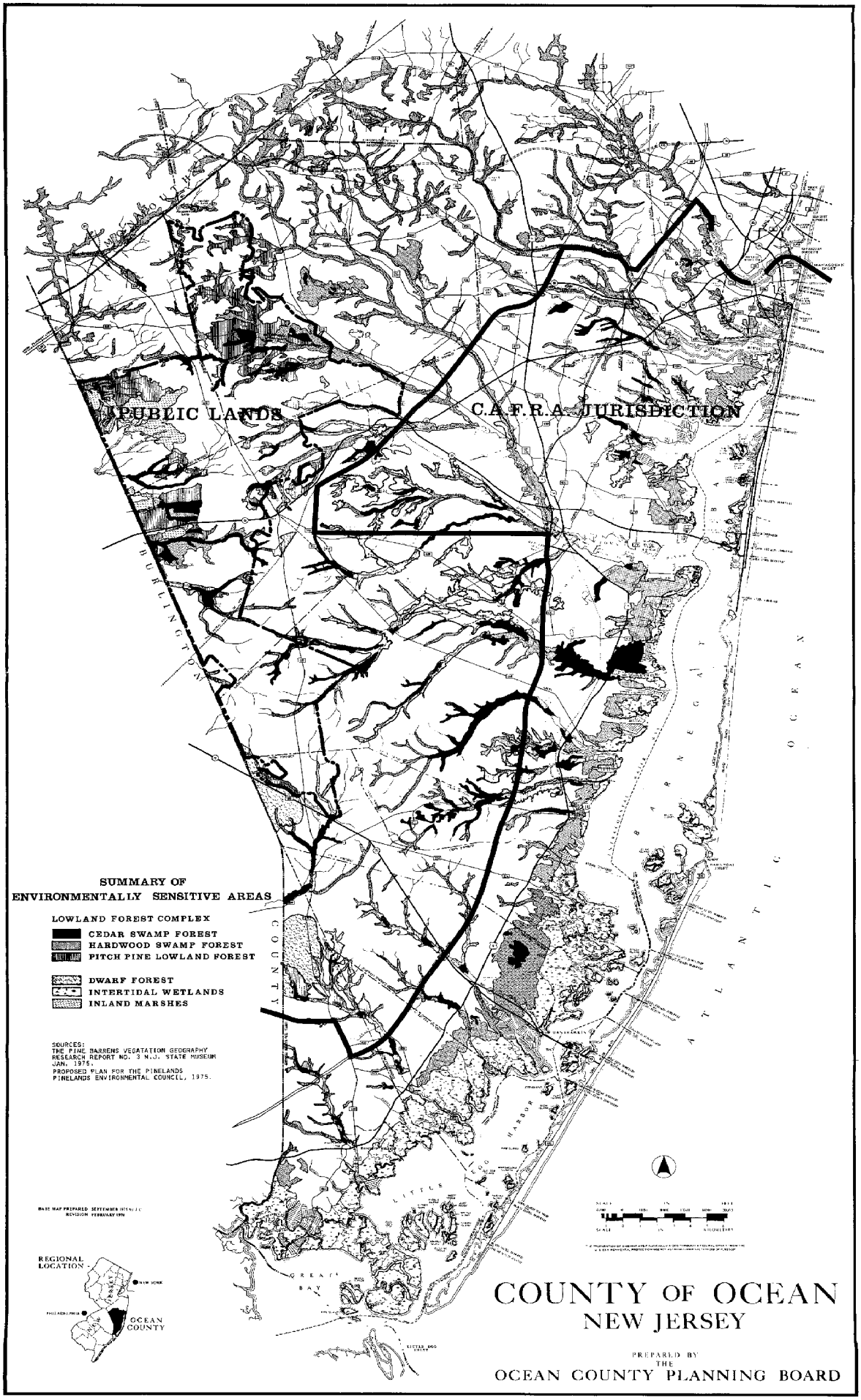
The salient characteristics of the environmentally sensitive resources are described below.

Lowland Forest Complex:

There are three basic lowland forest types in Ocean County. Pitch pine lowland, hardwood swamp, and Atlantic or Southern white cedar swamps. Soils in the lowlands are sands and gravels with a surface of shallow or deep muck. The seasonally high water table ranges in depth from 1½ feet to the ground surface.

The pitch pine lowland forest, in many cases, is representative of a transition zone between upland and lowland areas. The transition is also indicated by the types of understory and shrub vegetation.

Hardwood swamp forests are often present between areas of cedar swamp and pitch pine lowland forest. Red maple predominates, although sweet bay, black gum, gray birch and sassafras are also common.


PUBLIC LANDS
C.A.F.R.A. JURISDICTION
BURLINGTON COUNTY
ATLANTIC OCEAN
BARNEGAT BAY
LITTLE EGG HARBOR
GREAT BAY
SUMMARY OF
ENVIRONMENTALLY SENSITIVE AREAS
LOWLAND FOREST COMPLEX
CEDAR SWAMP FOREST
HARDWOOD SWAMP FOREST
PITCH PINE LOWLAND FOREST
DWARF FOREST
INTERTIDAL WETLANDS
INLAND MARSHES
SOURCES:
THE PINE BARRENS VEGATATION GEOGRAPHY
RESEARCH REPORT NO. 3 N.J. STATE MUSEUM
JAN. 1975.
PROPOSED PLAN FOR THE PINELANDS
PINELANDS ENVIRONMENTAL COUNCIL, 1975.
REGIONAL
LOCATION
NEW YORK
PHILADELPHIA
OCEAN
COUNTY
COUNTY OF OCEAN
NEW JERSEY
PREPARED BY
THE
OCEAN COUNTY PLANNING BOARD

The Atlantic white cedars are among the most noteworthy and characteristic species of the wet lowlands. The cedar swamps consist of pure, even-aged stands with an average height of 40 to 50 feet. Pure stands develop after severe forest fires, clear-cut timber harvesting, or in abandoned cranberry bogs, as seedlings are intolerant of shade and thrive in strong light. If cedar swamps are left without interference by man or fire, seedlings of shade-tolerant hardwoods will become established, crowding out the cedars and eventually changing the composition of the forest to a hardwood swamp.

Several rare and unusual plants are associated with the cedar swamps. These include the carnivorous pitcher plant, round-, spatulate-, and thread-leaf sundews, and horned bladderwort. Also found are the rare curly-grass fern and several species of orchids.

White cedar stands can be seriously impacted by development activity. The filling, draining and paving of soils that accompanies construction in the wet lowland areas have the effect of lowering the groundwater table. This destroys the cedars, which require a very shallow water table in order to survive.

The wet-soil woodlands support a considerable variety of wildlife, both common species and those unique to the Pinelands. White cedar seedlings feed rabbits, meadow mice, and other herbivorous animals. Cedar stands also provide excellent wintering grounds for white-tailed deer. Several threatened species, including the Pine Barrens treefrog, southern bog lemming, and bog turtle, also find a favorable habitat in the swamp forests.

The lowland forest complex contributes in many ways to the quality of

the physical environment. The luxuriant vegetation impedes the flow of surface runoff and filters out sediments and nutrients which would affect stream quality. It also stablizes the soil, inhibiting the erosion of stream banks and adjacent lands. The forests trap precipitation, encouraging recharge of the groundwater, which in turn feeds stream flow in dry weather. During heavy rainfall, the lowland forests serve as a floodwater storage area. Hardwood and cedar swamps can also act as firebreaks during forest fires, due to their saturated soils.

The natural characteristics of lowland forests (high water tables, flood hazards and the such) render them particularly unsuitable for building foundations, septic systems, and other development uses without substantial alteration of natural conditions. Possessing a unique aesthetic nature and a capacity for supporting rare plants and wildlife, the swamp forest presents an opportunity for scientific and passive recreational uses. Lowland forests are representative of a delicate ecological balance, easily upset by changes in soil drainage and stream flow that would accompany urbanization.

Dwarf Forest:

Among the most renowned features of the Pinelands is the dwarf forest, also called "pygmy forest" and the "Plains". This unusual vegetation consists primarily of dwarfed pitch pine and blackjack oak ranging from 2 to 5 feet in height.

The Pinelands Environmental Council estimates the total area of Plains vegetation in South Jersey as being 12,000 to 14,000 acres. The 208 staff places, approximately 3,450 acres within Ocean County. There are three principal areas of dwarf forest: the East Plains, West Plains, and Spring Hill

Plains. Spring Hill Plains, a very small area, lies outside the borders of the immediate area. Portions of the East and West Plains are in Ocean County, near its border with Burlington County. Lacey, Barnegat, Manchester, and Little Egg Harbor Townships all contain areas of dwarf forest.

A description of the Plains environment was developed by J. McCormick and M.F. Buell in their work, The Plains: Pigmy Forests of the New Jersey Pine Barrens (1968). According to McCormick and Buell, the Plains are characterized by a closed-cone variant of stunted pitch pine, the absence of shortleaf pine, and stunted blackjack and scrub oaks mixing with the pitch pine. Nearly all of the trees are multiple-stemmed, with large, older, woody root collars supporting younger stems.

Black huckleberry and lowbush blueberry are the most abundant shrubs. Sheep laurel, mountain laurel, sweetfern, and the uncommon sand myrtle are widely distributed, although abundant only locally. The broom crowberry, another rare plant, is also prominant in areas of the East and West Plains. Wintergreen, bearberry, and trailing arbutus are also fairly widespread. The association of ground-cover plants represented by sand myrtle, broom crowberry, bearberry, and pyxie moss occurs exclusively in the Pinelands.

The unique condition of the dwarf forest has attracted much scientific speculation as to its origin. Several theories have arisen, involving the chemical constituents of the soil and soil water, insect pests, fire, soil exposure, and soil infertility. Current theories revolve around the extreme permeability of the soils, which transmit water rapidly away from the ground surface, leaving soil and vegetation extremely dry and susceptible to fires, which are responsible for the stunted, multiple-stemmed trees.

Fires are estimated to occur about three times more frequently in the Plains than in other parts of the Pinelands. The practice of controlled burning, which eliminates accumulated forest litter to reduce the intensity of inevitable fires, is difficult in the Plains, where litter, shrubs, low tree crowns, and dry soils constitute a continuous concentration of fuel.

The permeable sands of the Plains render it a prime recharge area for the water table aquifer.

Physical factors discouraging development within this scientifically valuable area include the dry, infertile soils, which would hinder the establishment of grass lawns and trees for shade and privacy. A more important factor is the high frequency of forest fires, which would threaten lives and property. Since fire is most likely a causative factor in the evolution of the Plains, alteration of the natural forest fire patterns could change the character of the unique vegetation.

Inland Marshes:

Fresh water marshes are few in Ocean County, as most wet soils in flood plains or areas of high water table are covered with white cedar or hardwood swamps. The inland marshes existing today are often the remains of abandoned cranberry bogs which have begun to experience succession to a white cedar forest.

Fresh water marshes can also result from a process of pond succession, in which sediments and vegetative matter accumulate on the pond bottom and eventually support characteristic mosses, reeds, and shrubs. Typical vegetation includes sphagnum moss, sedges, reed grass, cattails, cranberry, blueberry, and swamp azalea.

Tidal Wetlands:

Tidal wetlands are found along the shores of Barnegat Bay and form scattered sedge islands within the bay. Wetland soils consist of sandy silt with a high content of organic matter.

Due to their dirunal tidal inundation, the coastal marshes support vegetation tolerant of saline water. Tidal marsh soils are very fertile, producing more vegetation per acre than any other type. Vegetation common to the tidal marshes include: smooth cordgrass, saltwort, sea lavender, widgeon grass, and eelgrass. On higher ground not usually flooded by tides, saltmeadow grass and spikegrass are common, as well as marsh elder, willow, groundsel tree, and bayberry. The normal high tide mark in the wetlands is indicated by black gum, red maple and pitch pine scrub growth. Areas disturbed by spoiling are generally covered with common reed grass.

Salt marshes are vital to the production of marine life, acting as habitat for diverse species. The plants contribute organic detritus to the soil which acts as food for aquatic biota. Marshes also provide a sheltered spawning and nursery area for fish and are necessary for the production of clams, crabs, and oysters. Nesting and migrating birds make heavy use of the wetlands in all seasons, including terns, skimmers, ducks, geese, and herons. Reptiles, turtles, such as the protected diamondback terrapin, amphibians and mammals also make use of the salt marsh.

Endangered species are supported by the tidal marsh, including the osprey. This bird is being encouraged through State and local programs to settle and propagate again in Ocean County.

Tidal marshes act as a buffer zone between coastal waters and inland areas.

During storms the shock of waves is absorbed by the marsh before the force can damage inland communities. Wetlands also benefit water quality by filtering pollutants from surface runoff.

Once coastal wetlands are filled to above the elevation of tidal inundation, most of their value to the tidal food web is lost. From 1968 to 1973, a survey was conducted by the New Jersey Division of Fish, Game and Shellfisheries to determine the amount of tidal marsh that had been lost to New Jersey through construction, agriculture and other activities. From a total of 37,007 acres of tidal marsh originally surveyed in Ocean County, 26,028 acres remained in 1973. Filling for housing developments was the principal cause of marsh destruction. In 1970, the New Jersey Wetlands Act became effective, severely restricting filling, dredging, and construction activities in the salt marsh.

Topography and Drainage

The elevation of Ocean County rises from sea level along the coastline to elevations above 200 feet in the northwest portion. (Figure 6). The gentle undulating topography separates Ocean County into 29 complete or partial drainage basins (Figure 7 and Table II).

The mainland of Ocean County is separated from the Atlantic Ocean by a barrier beach. The longest, Long Beach Island, is twenty three miles long with a varing width of between 1/4 to 1/2 miles. The shorter, Island Beach (which is actually a spit) is nine miles long, varies in a similar width and is joined to the mainland at Bay Head. The heights of the natural barrier dunes vary between ten to thirty four feet.

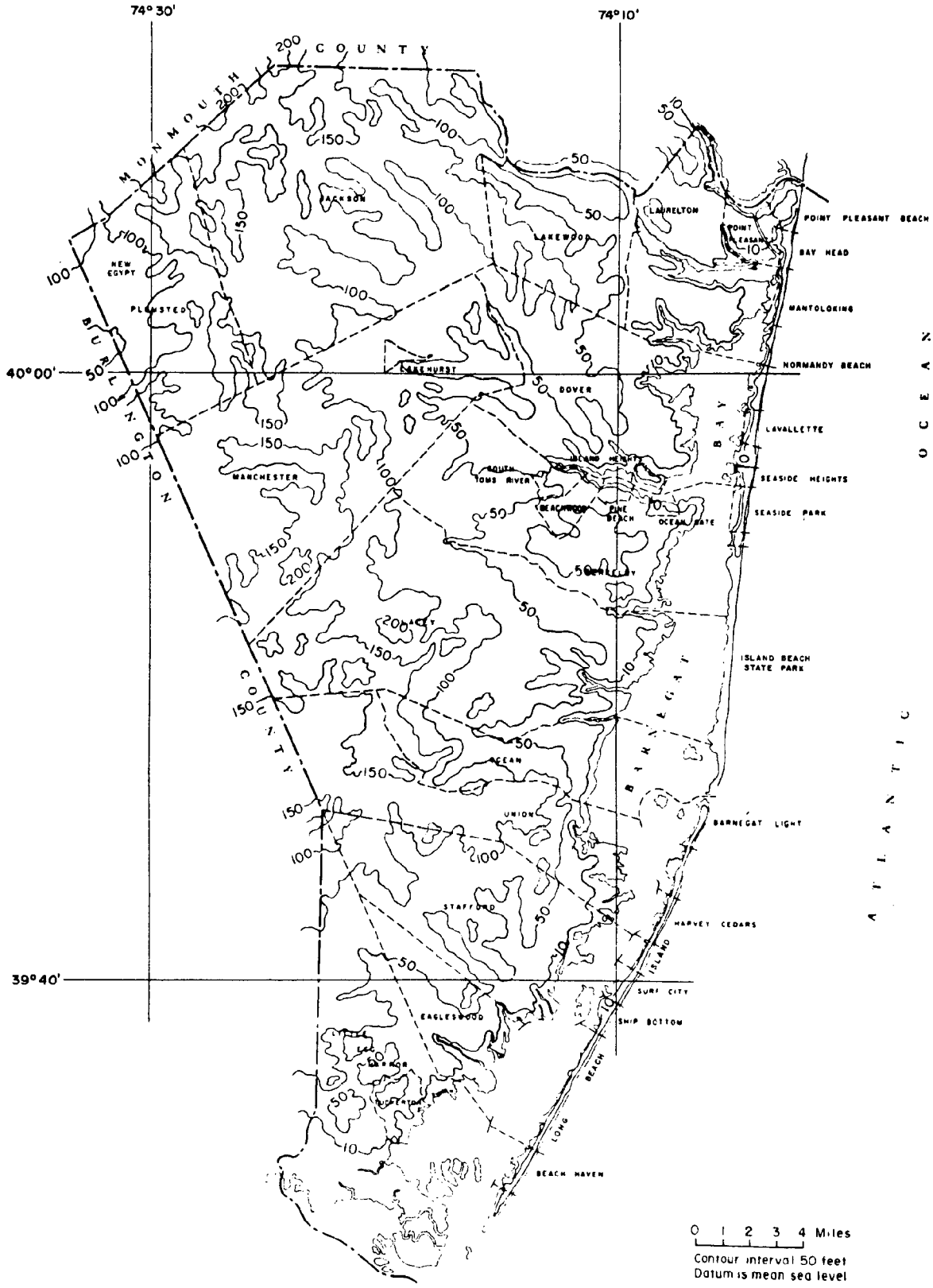
The estuary bay behind the barrier beaches (called Barnegat Bay) varies in width from 2,000 feet to four and one-half miles and occupies an area of approximately 60 square miles (41,300 acres).

The average depth of the bay is about 5 feet with a few deeper locations ranging to a maximum of 20 feet, all referenced to mean low tide. The volume is about 195,000 acre-feet. The normal tidal range in the bay is about 3.5 feet with a time cycle of about 12.7 hours. Barnegat Bay represents about 10 percent of the surface area of the County, Figure 8.

It has been calculated that there is a mean fresh water drainage flow of some 360 cfs (cubic feet per second) into Barnegat Bay from the mainland drainage basin area of 700 square miles.

TOPOGRAPHY OF OCEAN COUNTY

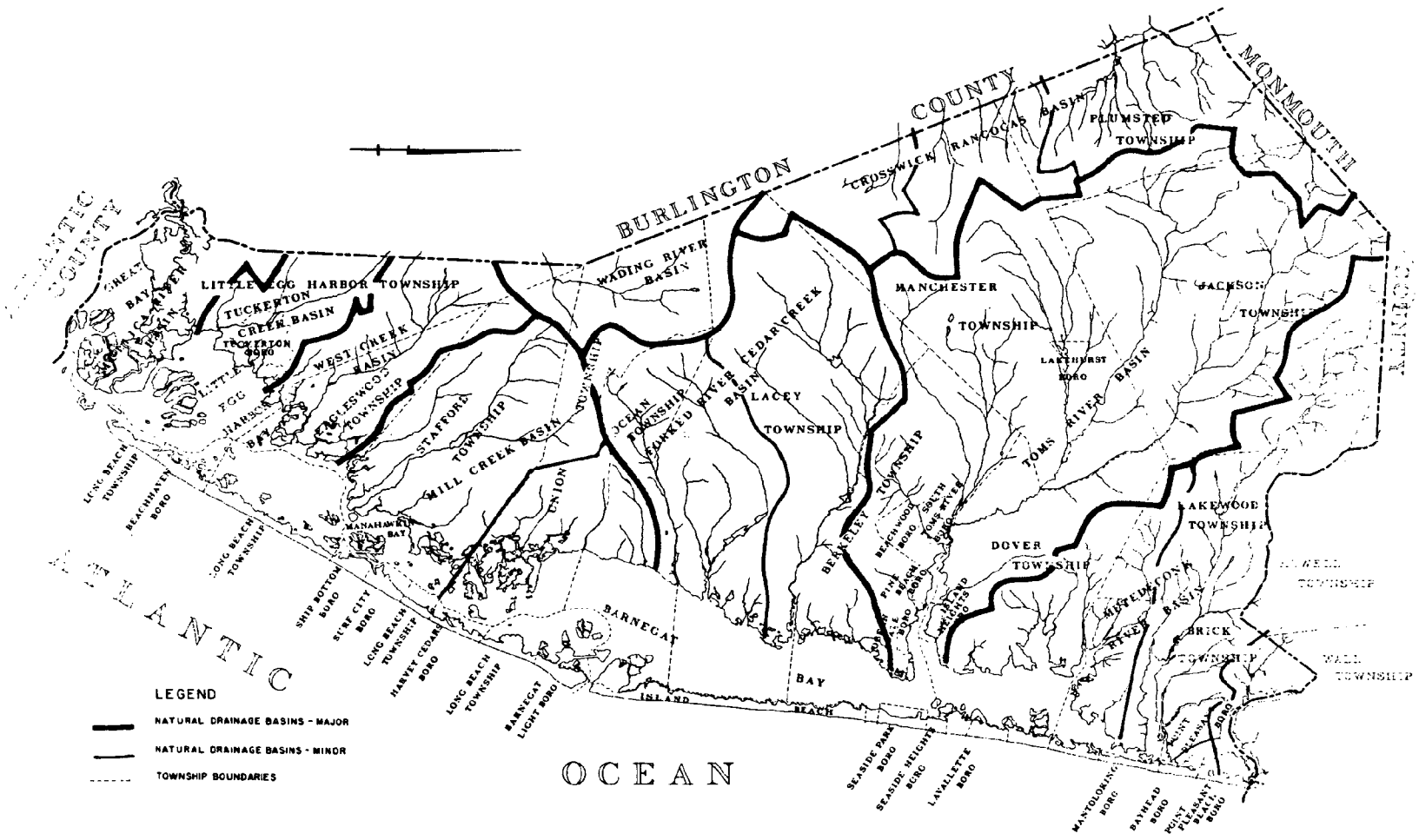
FIGURE 6



Henry Anderson and Charles Appel, "Special Report 29: Geology and Ground-Water Resources of Ocean County," United States Geological Survey, 1969, page 6.

FIGURE 7

DRAINAGE BASINS OF OCEAN COUNTY: LOCATION AND AREA



DRAINAGE BASINS

Fellows, Reed and Weber, Inc., Master Plan for Water Resource Management, Ocean County, New Jersey, December, 1969.

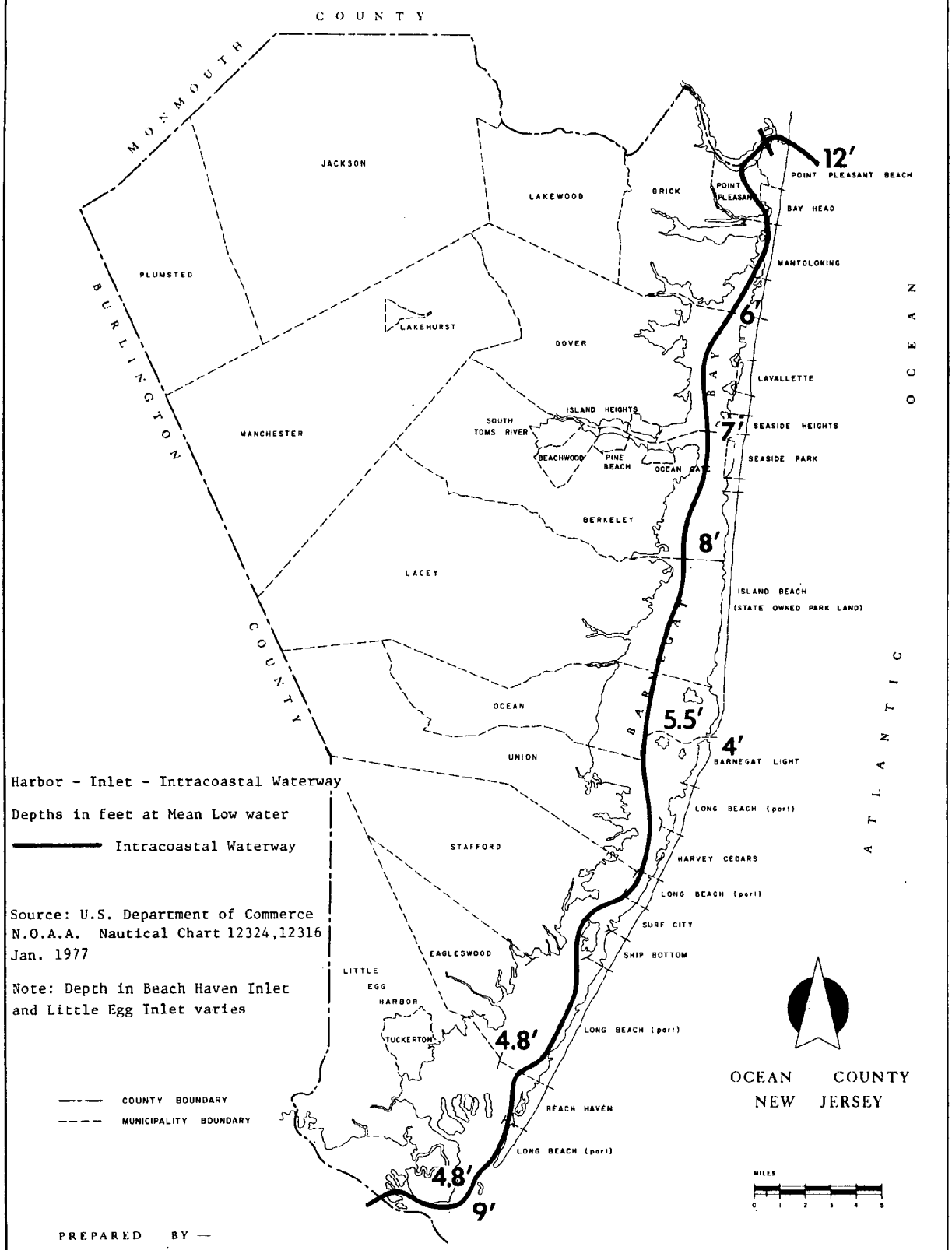
TABLE II

AREA MEASUREMENTS OF DRAINAGE BASINS

	Basin	Area (Sq. mi.)
1.	Manasquan River	6.70
2.	Metedeconk River	54.34
3.	Reedy Creek	3.14
4.	Kettle Creek	14.41
5.	Silver Bay	10.04
6.	Goose Creek	2.63
7.	Toms River	167.51
8.	Potters Creek	7.83
9.	Cedar Creek	56.00
10.	Stouts Creek	4.73
11.	Forked River	26.77
12.	Forked River Beach	
13.	Oyster Creek	12.82
14.	Waretown-Double Creek	16.54
15.	Gunning River	6.34
16.	Cedar-Manahawkin Creek	11.11
17.	Mill Creek	19.74
18.	Cedar Run	8.23
19.	Mud Cove	2.53
20.	Dinner Point Creek	4.59
21.	Westecunk Creek	29.13
22.	Parker Run	2.48
23.	Tuckerton Creek	13.98
24.	Big Thoroughfare	1.51
25.	Mullica River	31.192
26.	Oswego River	31.67
27.	Woodland	.38
28.	Mt. Misery Creek	43.00
29.	Crosswicks Creek	33.27

Source: Ocean County Engineering Dept.

FIGURE 8


MONMOUTH COUNTY
BURLINGTON COUNTY
OCEAN COUNTY
JACKSON
LAKEWOOD
BRICK
PLUMSTED
LAKEHURST
DOVER
MANCHESTER
SOUTH TOMS RIVER
ISLAND HEIGHTS
BEACHWOOD
PINE BEACH
OCEAN GATE
BERKELEY
LACEY
OCEAN
UNION
STAFFORD
EAGLESWOOD
LITTLE EGG HARBOR
TUCKERTON
POINT PLEASANT
POINT PLEASANT BEACH
BAY HEAD
MANTOLOKING
LAVALLETTE
BEASIDE HEIGHTS
SEASIDE PARK
ISLAND BEACH (STATE OWNED PARK LAND)
BARNEGAT LIGHT
LONG BEACH (port)
HARVEY CEDARS
SURF CITY
SHIP BOTTOM
BEACH HAVEN
12′
6′
7′
8′
5.5′
4′
4.8′
4.8′
9′
BARNEGAT BAY
ATLANTIC OCEAN
Harbor - Inlet - Intracoastal Waterway
Depths in feet at Mean Low water
Intracoastal Waterway
Source: U.S. Department of Commerce
N.O.A.A. Nautical Chart 12324,12316
Jan. 1977
Note: Depth in Beach Haven Inlet
and Little Egg Inlet varies
COUNTY BOUNDARY
MUNICIPALITY BOUNDARY
MILES
0 1 2 3 4 5
OCEAN COUNTY
NEW JERSEY
PREPARED BY —
• OCEAN COUNTY PLANNING BOARD •

Climate

The climate of Ocean County is characterized by moderate temperatures and precipitation. Mean temperatures are about 5 degrees higher in Ocean County during the winter than in the northwestern part of the State. This is due to the moderating effect of the ocean and is reflected in the average number of days without killing frost (figure 9) and by the closeness of the 180 and 200 day frost lines.

Similarly, the temperature differences between the mainland, the barrier beaches and the ocean create a on-shore off-shore summer breeze called a "Doctor". It is not known how far inland this breeze is felt but estimates place it at between one to five miles.

An annual precipitation difference mode of 2 to 4 inches from the rest of the County can be readily observed in the center of the County. Figure 10.

CLIMATE AND WEATHER CONDITIONS

ALTITUDE

Rises from sea level along the coastline to elevations above 200 feet in the northwestern portion.

AVERAGE NUMBER OF DEGREE DAYS

5,152 (10 year average).

AVERAGE MEAN TEMPERATURE

Summer - 72.3° (June, July, August) - (5 year average)

Winter - 35.2° (December, January, February) - (5 year average)

AVERAGE ANNUAL PRECIPITATION

Total - 45.7"

Snow - 23.5"

MONTH	AVERAGE MONTHLY TEMPERATURE			MONTHLY DEGREE DAYS		
	1974	1975	1976	1974	1975	1976
January	35.6°	36.2°	28.5°	905	888	1126
February	30.2°	35.4°	38.6°	968	821	762
March	41.8°	39.1°	45.0°	715	793	614
April	52.5°	45.9°	53.0°	388	565	384
May	59.5°	62.7°	60.3°	209	131	179
June	66.6°	69.6°	72.1°	46	22	41
July	74.8°	74.2°		--	--	
August	73.7°	73.5°		12	--	
September	65.7°	64.0°		76	77	
October	51.4°	58.9°		417	196	
November	46.3°	49.9°		566	454	
December	38.0°	37.3°		830	850	

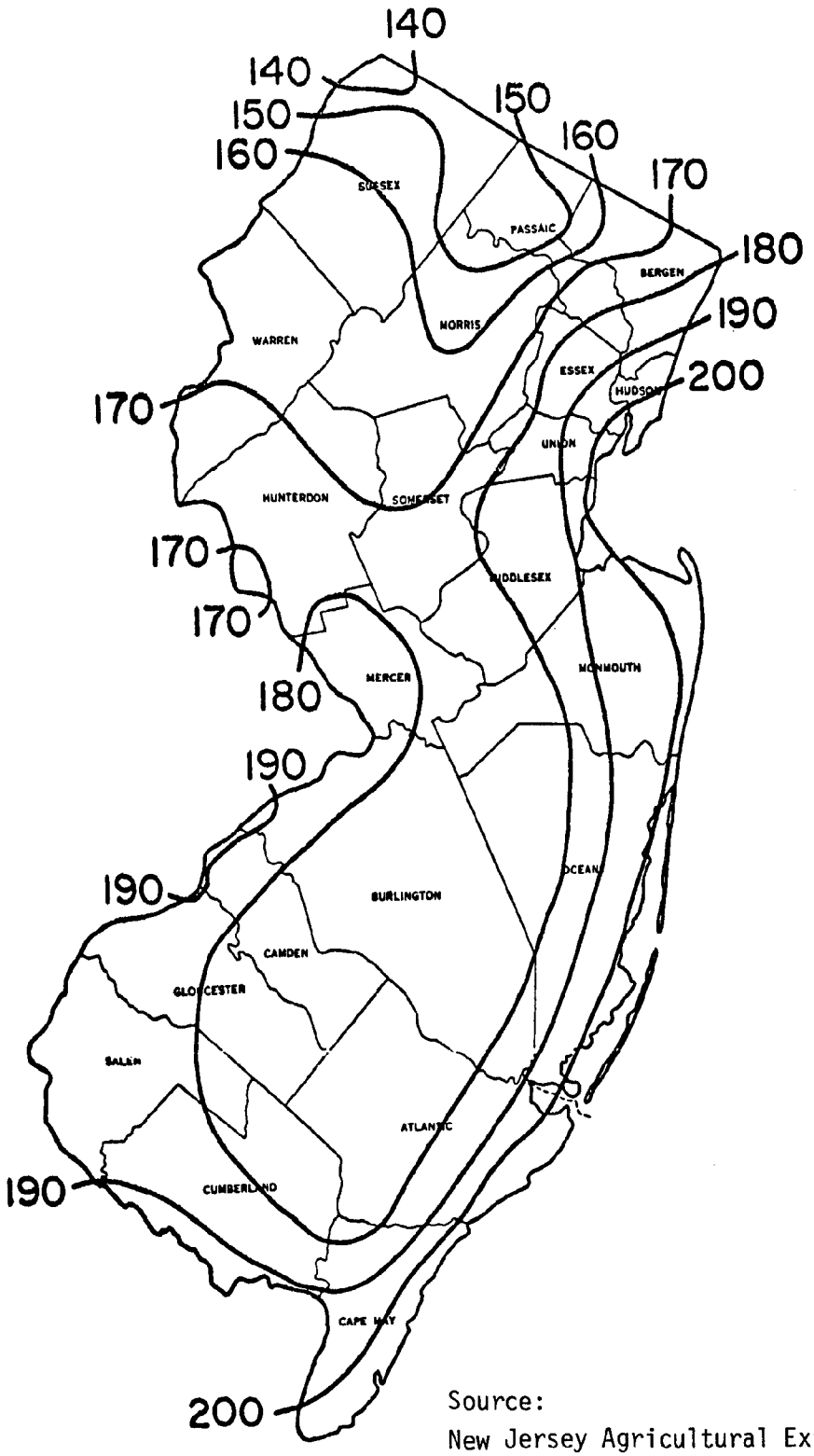
DEGREE DAYS/HEATING SEASON

1973/1974	1974/1975	1975/1976
4,921	5,109	4,683

Source: U.S. Weather Bureau Station, at Toms River, New Jersey

FIGURE 9

AVERAGE NUMBER OF DAYS WITHOUT KILLING FROST

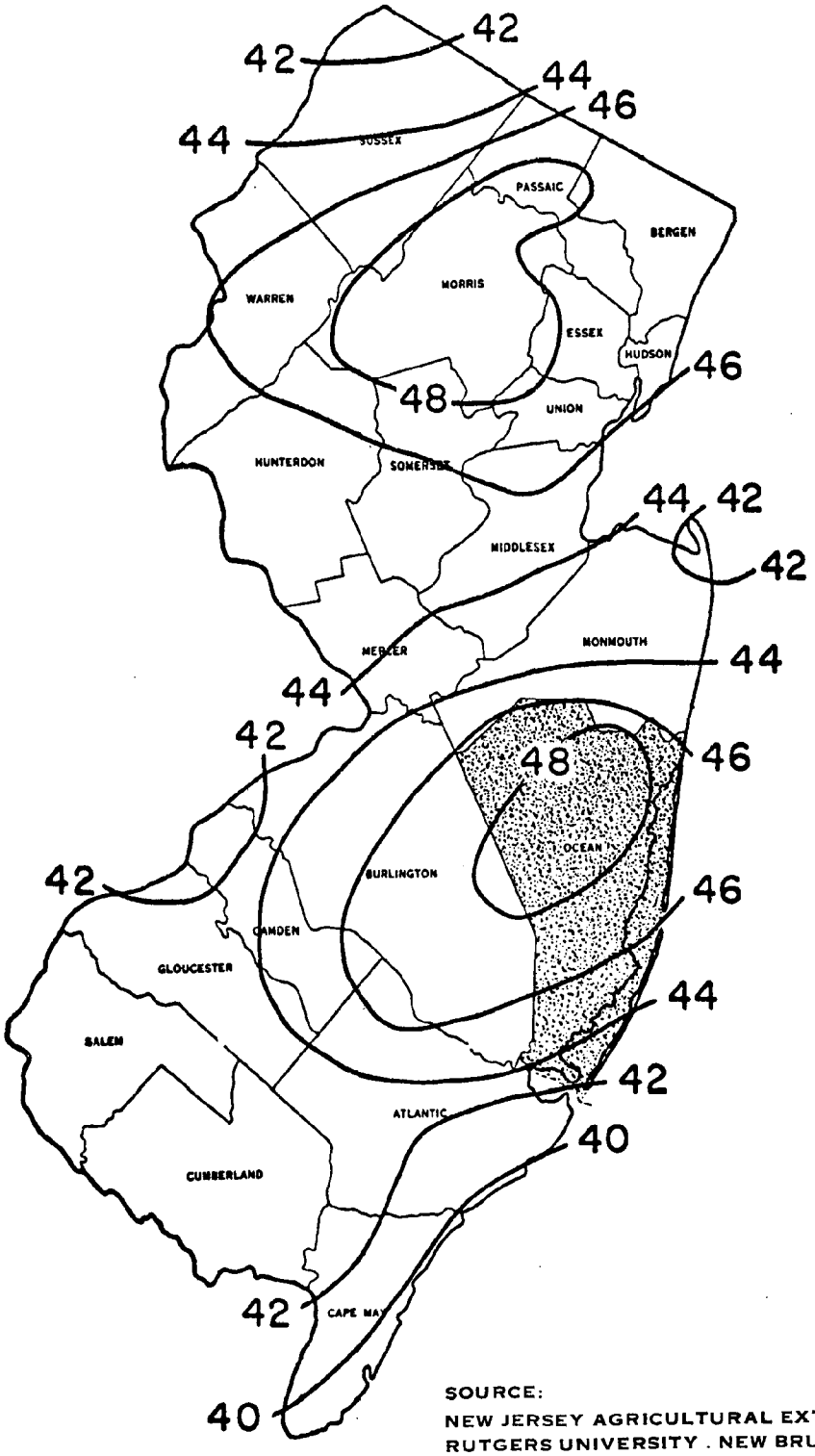


Source:

New Jersey Agricultural Extension Service
Rutgers University, New Brunswick, N.J.

FIGURE 10

AVERAGE ANNUAL PRECIPITATION



SOURCE:
NEW JERSEY AGRICULTURAL EXTENSION SERVICE
RUTGERS UNIVERSITY . NEW BRUNSWICK , N. J.

PRIME AGRICULTURAL SOILS

Several soil types found in Ocean County are within agricultural capability classes I, II, or III, according to the Interim Soil Survey Report for Ocean County. Soils composing these classes are considered prime agricultural soils, highly productive for most field crops. The largest contiguous area of non-urbanized, unforested prime agricultural soils is found in Plumsted Township. For the most part, these soils are under active cultivation.

At the present time, there are no programs encouraging the preservation of prime agricultural soils in Ocean County. An experimental program of development easement purchase, the Farmland Preservation Demonstration Project, is being administered by the State in the Townships of Lumberton, Medford, Pemberton, and Southampton in Burlington County. According to Robert Bruch, Agricultural Economist with the New Jersey Department of Agriculture, this program has met with a very favorable response from local farmers. An estimated 18,000 acres of prime farmland have been offered for development easement purchase.

This demonstration project is scheduled for completion in 1978. It is anticipated that a statewide program will then be established which will be designed to preserve prime farmland and special blueberrry and cranberry land.

The possiblility that a farmland preservation program may soon affect Ocean County lends support to the identification of prime open farmland as a resource worthy of special consideration. Its value in terms of food production is compounded by its relative scarcity and by the fact that it is non-renewable. Once urbanized, the agricultural benefits of the soils are lost.

AQUIFER RECHARGE AREAS

There are two major aquifer outcrops in Ocean County. The outcrop of the Kirkwood Aquifer forms an irregular area in the northern part of the County. As this is a heavily utilized aquifer, particularly in coastal communities, the issue of recharge is especially important (figure 11).

The groundwater table represents the surface of the unconfined aquifer of the Cohansey Formation (figure 12). The Cohansey outcrop covers the central part of the County. This aquifer supplies both large water companies and many private domestic wells. It is also the source of base flow to surface water, mainaining stream discharge during periods of dry weather.

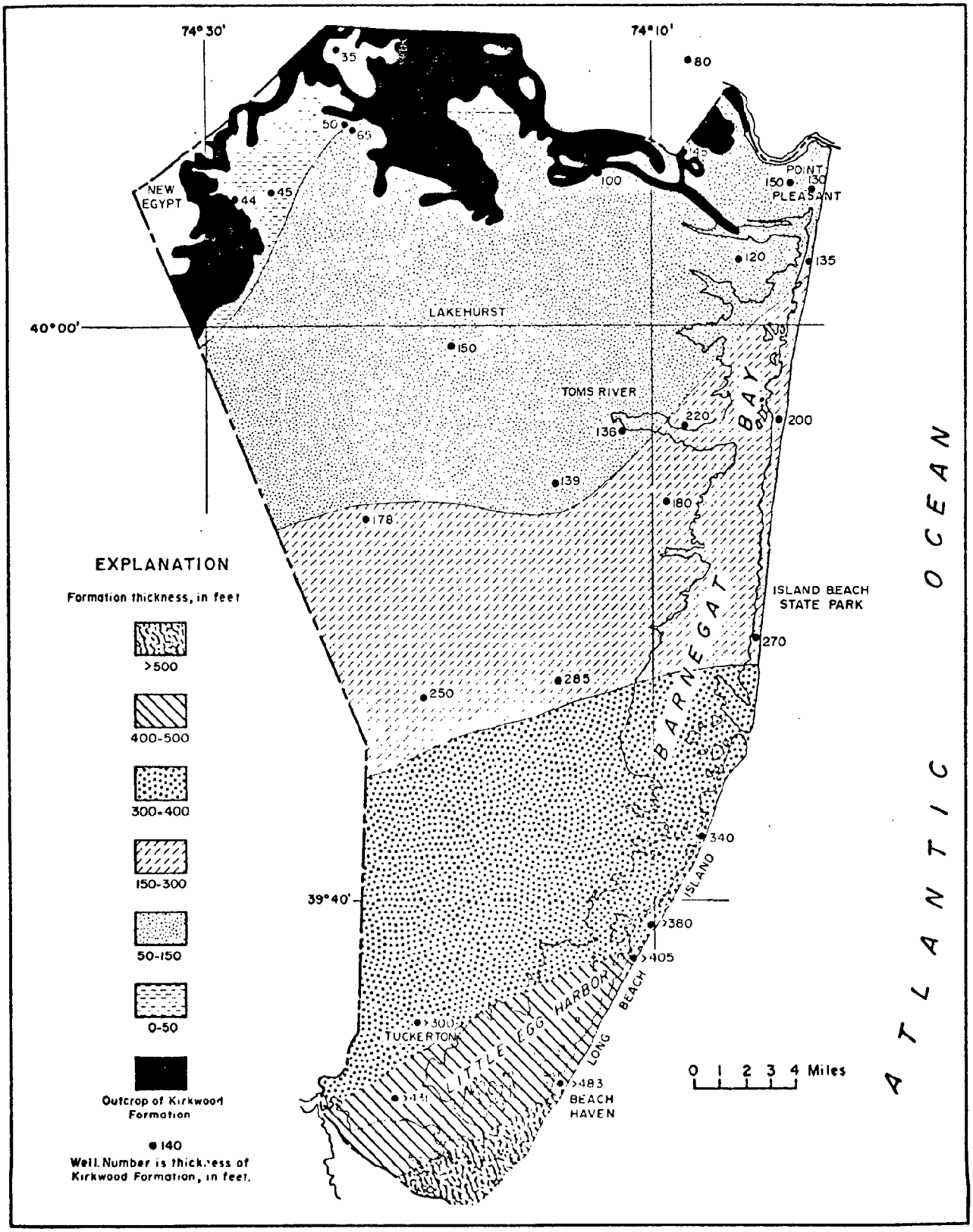
Prime areas for aquifer recharge occur where soils having the highest infiltration rates occur over aquifer outcrops. Soils consist of deep, well-drained sands or gravels. These soils have the highest rate of water transmission capability. Although they do not compose the majority of Ocean County soils, they are found scattered in the northern and central parts of the County.

Information on these prime recharge areas as to their significance in maintaining potable groundwater resources in unknown. Precise identification of these areas and recommendations as to their sound management would be in the best interest in future policy decisions affecting Ocean County.

According to the 1970 U.S. Census, 66 percent of the population of Ocean County is served by public suppliers, while 34 percent utilize their

THICKNESS OF KIRKWOOD FORMATION

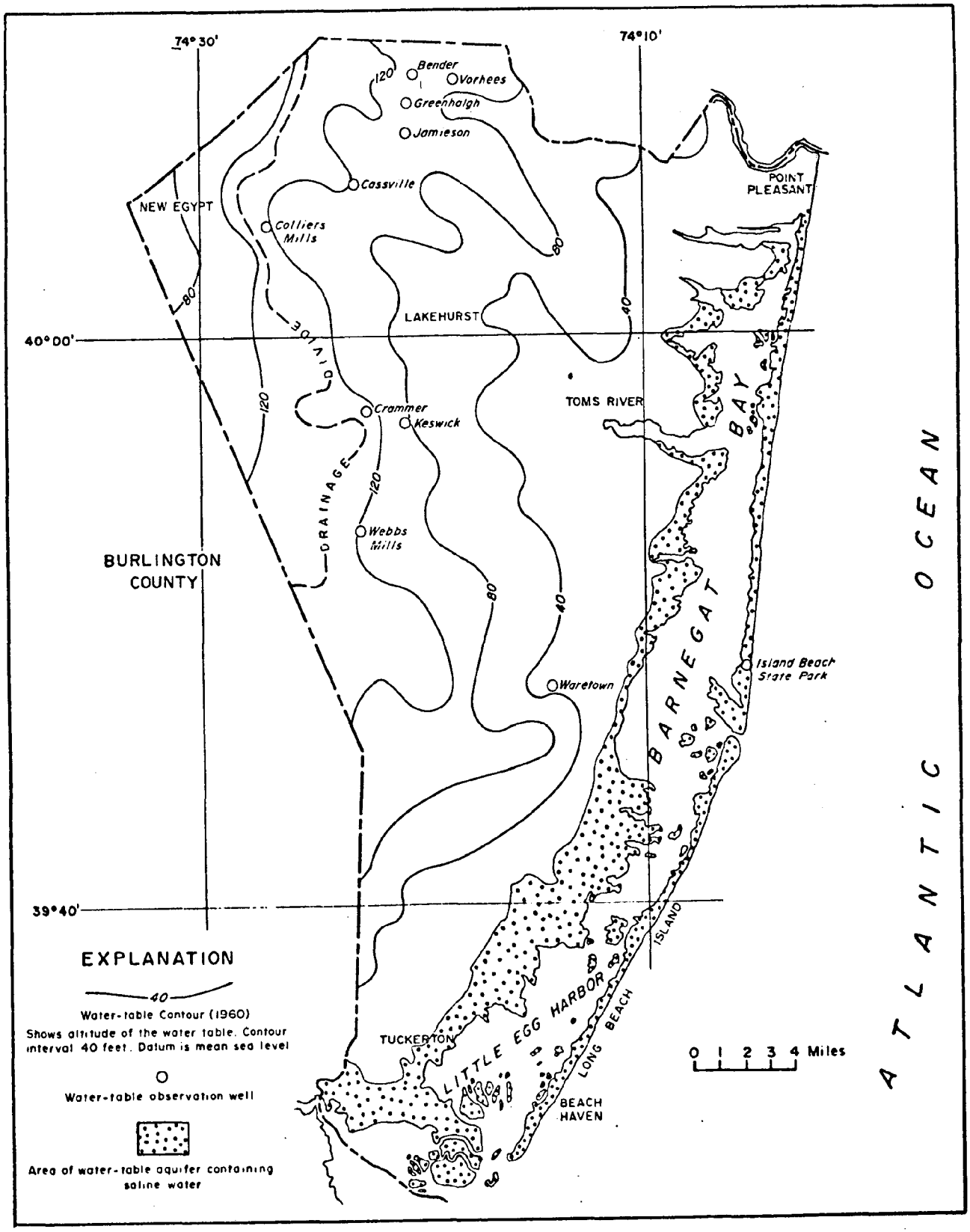
FIGURE 11



Henry Anderson and Charles Appel, "Special Report 29: Ground-Water Resources of Ocean County," United States Geological Survey, 1969, page 47.

WATER TABLE CONTOURS OF OCEAN COUNTY

FIGURE 12



Henry Anderson and Charles Appel, "Special Report 29: Ground-Water Resources of Ocean County," United States Geological Survey, 1969, page 53.

own wells. There are at present 22 municipal water systems within Ocean County.

A daily average of 24.62 million gallons per day (mgd) was pumped by public suppliers during 1975. Average pumpage during the peak month of 1975 was 45.33 mgd almost double that of the year-round average. Annual public supply withdrawals from 1965 to 1976 are shown in table

Industrial, military users and private organizations must also obtain permits to withdraw groundwater in excess of 100,000 gallons per day. The industries in Ocean County presently utilize groundwater at the rate of 383.8 million gallons per month.

The most heavily used aquifers in Ocean County are the Cohansey and the Kirkwood formation. Of the 146 wells operating in 1975 to provide public water supplies, 58 were in the Cohansey and 47 were in the Kirkwood. The Kirkwood weels, however, were permitted a greater total diversion. Other aquifers tapped were the Raritan-Mogothy Formation, tapped by eleven wells and the Englishtown and Vincentown Formations, tapped by 21 and seven wells, respectively. The Manasquan Formation is tapped by one well.

Prior to the intensive resort development and consequent groundwater development after 1900, most wells tapping the artesian aquifers in the coastal plain were flowing wells. Some had static levels of 50 feet or more above sea level. Few wells tapping these aquifers flow today. Pumping from the Kirkwood has depressed water levels more than 30 feet in the Long Beach Island region and as much as 80 feet below seal level in the Atlantic City area.

WASTE WATER MANAGEMENT

In 1965, the Ocean County Board of Chosen Freeholders and the New Jersey Department of Health retained the consulting engineering firm of Fellows, Read & Weber, Inc. (FRW), Toms River, New Jersey, to make a detailed study on a county-wide basis and develop recommendations regarding wastewater management.

The study revealed that although the county's primary economic base is its resort business, the secondary base had been slowly shifting from agriculture to industry. This had resulted in an increase in industrial wastes being discharged into county waters. Subdivisions, with individual package plants, and municipal plants had multiplied and discharged variable quality efflutents into receiving waters. Lagoon developments, built on filled in wetlands with individual septic tank systems, further compounded the pollution problem: High water tables allowed easy access for seepage pit effluent into bay waters.

Because of these growing population problems, the study's goals were the elimination of package and small municipal plants, and the development of a county regional system with fewer but larger capacity treatment plants.

The study has resulted in the design of three regional systems which will handle wastewater from virtually the entire area of Ocean County bordering the Atlantic Ocean. (Figures 13 and 7).

The county system has adopted the water quality standards promulgated by the New Jersey Department of Environmental Protection, which established minimum degrees of wastewater treatment for a particular body of receiving water. Inland estuarial and fresh waters require secondary treatment, even tertiary treatment in many cases.

After cost-effectiveness analyses of various alternatives, the county-

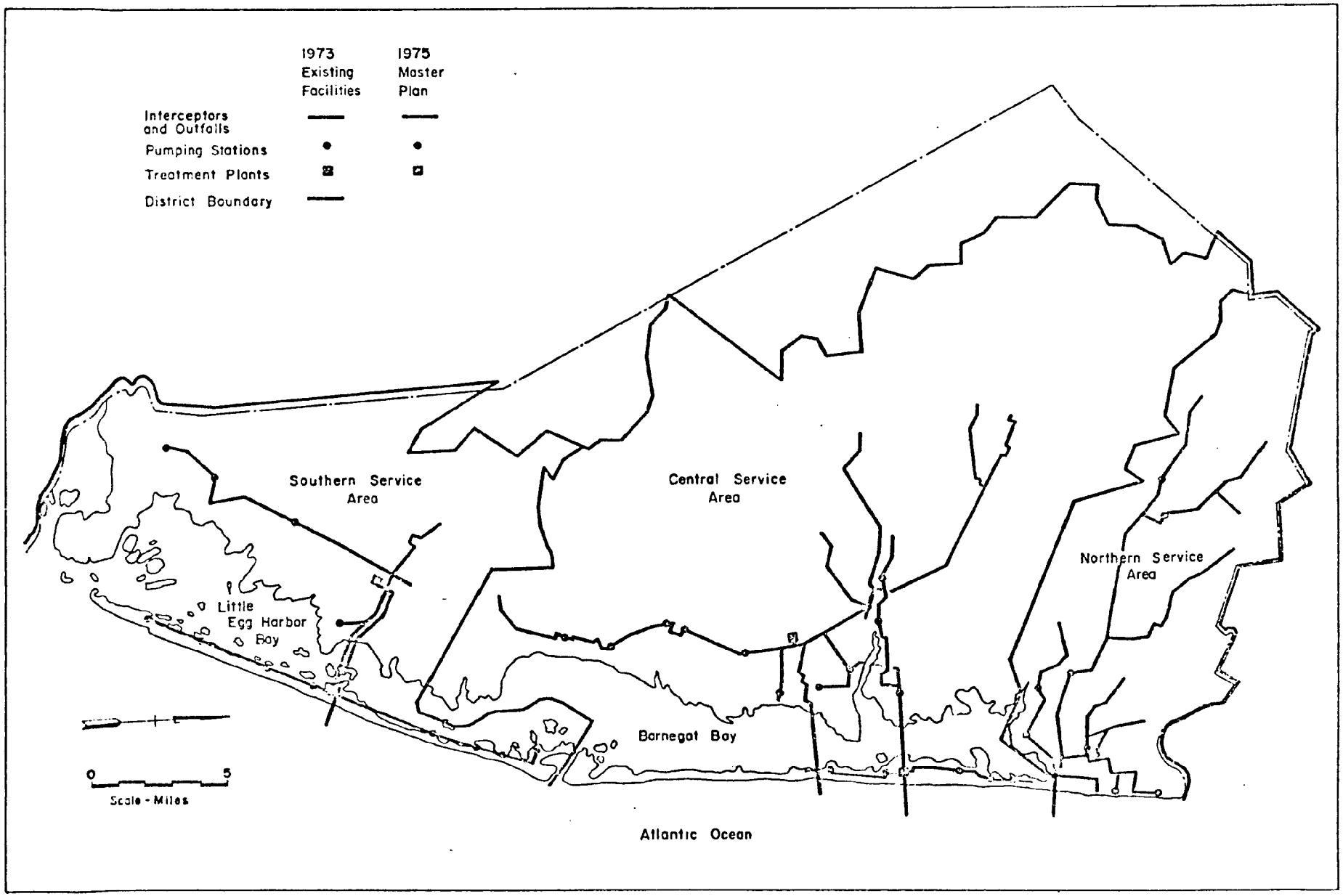


Figure 13

■ MASTER PLAN for wastewater managent in Ocean County, New Jersey, provides interceptor sewers, pumping stations, treatment plants and outfalls for three service areas.

wide system was modified from one having seven regions to one with three regions--the Northern. Central and Southern Service Areas. Each is a separate system consisting of a main secondary treatment plant, interceptors, pumping stations and an ocean outfall.

The treatment plant for the northern region has a 28 mgd capacity; the central, 24 mgd; and the southern 20 mgd. All have expansion capability to upgrade to tertiary treatment if and when required, either to meet more stringent environmental standards or to eliminate the ocean discharge by permitting the effluent to be integrated into an overall water management plan.

When completed in 1979, the regional systems will serve the county's growth until 1990. It will also help control population densities in the central portion of the county because of limitations placed on the size of the treatment plants serving that area. This environmentally sound system will not only abate water pollution problems existing today, but will control "people pollution" problems through proper land use planning based on the system's capacity to serve a growing population.

TRANSPORTATION

ROADS AND HIGHWAYS

Ocean County is serviced by the Garden State Parkway (toll road), six State and Federal highways, with one interstate route presently under construction.

The Garden State Parkway provides rapid passenger transportation between Ocean County and the New York City - northern New Jersey metropolitan area, and also serves as an effective 40 mile express connection between the northern and southern parts of the County.

NORTH-SOUTH HIGHWAYS

U.S. Route 9 is the major north-south highway and is planned for dualization from Toms River and Lakewood north to the Freehold area.

State Highway 35 connects northeastern New Jersey with the northern shore communities and is partially dualized with additional construction in progress.

EAST-WEST HIGHWAYS

Route 70 carries traffic between the Philadelphia-Camden area and Ocean County and feeds Routes 72, 37 and 88. It is the major connector at the present time with interstate routes to states to the south and west of New Jersey and is proposed for future dualization.

Routes 37 and 72 link Route 70 with the Toms River and Long Beach Island shore areas. Route 37 is presently dualized from the Garden State Parkway east to Barnegat Bay, Route 72 is also complete from the Parkway to the shore area.

Route 88 connects Lakewood and Route 70 with the Point Pleasant area.

I-195

This modern freeway has been constructed from western Monmouth County into the easterly portion of Jackson Township. Upon completion, it will provide an express connection between Trenton and the shore, with links to the New Jersey Turnpike and other major north-south arteries.

HIGHWAY USES

Route 9 currently is plagued by frequent intersections and an overabundance of driveway ingress/egress (due to commercial strip development) which reduces travel speeds, promotes congestion and generally frustrates users of this highway.

The ineffective use of Route 9 encourages county residents to use the Garden State Parkway whenever feasible, even for short distances. This use often creates peak-hour traffic problems at the Toms River/Lakewood areas of the Garden State Parkway (GSP). The G.S.P. was completed in 1965, and today has replaced Route 9 as the major north/south traffic highway. The Parkway currently is a limited access, dualized State highway. The Ocean County interchanges have become major focal points for connecting inter-regional traffic arteries with state and county highways. It has also become a principal route used by summer residents and tourists visiting Ocean County and neighboring resorts. The New Jersey Highway Authority is presently investigating the addition of a third lane from Asbury Park to Toms River, as well as new interchanges and interchange modifications, in anticipation of heavier vehicular volumes because of casino gambling and increased shipments of goods and supplies to developing areas in southern New Jerse. Pick-up and panel

trucks under 7,000 pounds will be able to use the G.S.P. for its entire length in 1978 but trucks over this weight are restricted north of Exit 105 in Eatontown.

RAILROADS

Conrail provides freight service from Lakewood on the north across the central portion of the County through Manchester Township at the westerly County line. A spur originating in Lakehurst parallels Route 37 into Toms River and then south to Barnegat. Conrail provides freight service over the facilities of Union Transportation Company in the New Egypt area. The New York and Long Branch Railroad provies a dual service rail facility within the County and Conrail provides passenger and freight connections with the northern metropolitan areas over this line. Passenger terminals are located in Bay Head and Point Pleasant Beach. Rail rates are as filed with the I.C.C. and the approximate in-transit time for rail service is 3 days to Baltimore and Washington, and 4 days to Pittsburgh, Cleveland and Chicago.

Economic Conditions

The economy of Ocean County is becoming increasingly diversified. The resort-tourism base has evolved into a broader economic base encompassing new industrial and commercial development. The estimated labor force in Ocean County is approximately 102,600.* A large number of area residents commute to jobs in northern New Jersey or New York and represent an untapped source of labor for local industrial development.

Major employers in the area include the Lakehurst Naval Air Station, which has a work force of 5,600. The Toms River Chemical Corporation, a subsidiary of Ciba-Geigy had approximately 1,348 employees at the end of 1976. Great Adventure Amusement Park in Jackson Township with 400 year-round and 2,500 seasonal employees provides a major source of employment for the youth of the area. The Toms River School District with 1,579 employees and the County of Ocean with 1,393 employees continue to be major public employers in the County. The Ocean County Mall located in Dover Township provided 1500 new jobs in 1976.

The economy of Ocean County should continue to expand and become more balanced with planned light industrial development, commercial service and resort trades. Diversifying the economic base will help to provide economic stability. A stable economy with expanding opportunities will attract new residents to Ocean County.

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*Ocean County Planning Board, Ocean County Economic Development Profile, 1976.

Industrial Development:

With the change of Ocean County from a rural, resort/tourism area to a rapidly growing suburban area, there has been a concomitant change in the economic base of the County. Traditional activities such as fisheries and mining, have shown steady decline as major employers.

Extractive industries may be seriously affected by rising land values. When land values continue to rise, the prospect of development can become more attractive than the continuation of extractive industry. There are, however, several large mining concerns still in operation within the County. Illmenite, which is used in paint manufacture; sand and gravel, which is used for construction purposes; and special sands such as silica which are used in glass munufacture, are major products from mining activities in this area.

Ocean County and area municipalities have become concerned with providing a more balanced economic base. The County and several municipalities have formed economic development agencies in the attempt to create a progressive climate for new light industrial, corporate and professional office and commercial development. In addition, the present residential and vacant land property taxes in Ocean County are the lowest in the metropolitan New York area. The Center for Local Tax Research in New York City reports also that Ocean County has the second lowest business tax rates in this same area.

A listing of existing and planned industrial parks in Ocean County is provided in Table III.

Compatible industries are now being actively sought by many area

municipalities. Full time industrial development directors have been hired by both Lakewood and Dover Townships. The success of area industrial development is exemplified by the Lakewood Industrial Park which currently includes 39 companies with almost 2 million square feet of office and industrial space. More than 3,000 workers are currently employed at the Lakewood Industrial Park. The planned expansion provides for a potential 9 million square feet of industrial space.

The industrial parks in Ocean County are well designed and located. Essential services and utilities are currently available or are being planned. The industrial parks are located near major highways. In addition, industrial parks in Dover and Lakewood have rail service available. Designed to attract light manufacturing and corporate headquarters, these parks have rigid quality controls and they have been carefully designed to protect adjacent properties from potential industrial blight. At costs from $3,500 to $5,500 per acre, the parks are very competitive as industrial sites within the metropolitan region.

TABLE III

INDUSTRIAL PARKS IN OCEAN COUNTY

LOCATION	SIZE IN ACRES	STATUS	PRESENT NO. OF COMPANIES	OWNERSHIP
Berkeley Township				
-Rte. 530 (near Co. Airport)	85	Under Construction	-	Public
Dover Township				
-Rte. 37 (West)	153	Accepting Clients (recently opened)	1	Public
Jackson Township				
-Interstate Ind. Park (near I-95	300	Accepting Clients	2	Private
-Ridgeway Park Site	200	Planned	-	Public & Private
-Whitesville Area Site	200	Planned	-	Public

TABLE III - Continued

INDUSTRIAL PARKS IN OCEAN COUNTY

LOCATION	SIZE IN ACRES	STATUS	PRESENT NO. OF COMPANIES	OWNER-SHIP
Lakewood Township				
- Rte. 70 (near Lakewood Airport)	500	Accepting Clients (near capacity)	34	Public & Private
-Rte. 70 (expansion)	786	Planned (final grant approval pending)		Public
-James Street	100	Accepting Clients	5	Public
Stafford Township				
-Rte. 9 (near GSP exit 63)	N/A	Planned	-	Public

Source: Ocean County Economic Development Profile, 1976; prepared by the Ocean County Planning Board.

In addition to increasing opportunities for industrial and manufacturing concerns, Ocean County has exhibited and is projected by the State Department of Labor and Industry to continue growth in retail, professional and service occupations. Growth is expected to be particularly large in the service fields. This is principally because service employment is heavily dependent on the population of an area. More people will create more service sector employment in Ocean County. Employment projections for Ocean County are shown in Table IV.

TABLE IV

1980 EMPLOYMENT PROJECTIONS
OCEAN COUNTY, NEW JERSEY

	1964	1970	N.J. DEPT. OF LABOR AND INDUSTRY	CENTER FOR URBAN POLICY RESEARCH
AGRICULTURE	200	300	100	
MINING	200	100		
CONTRACT CONSTRUCTION	2,600	3,500	6,400	5,100
MANUFACTURING	3,300	4,700	5,600	13,200
TRANSPORTATION AND OTHER PUBLIC UTILITIES	1,200	2,100	2,500	3,400
WHOLESALE TRADE	800	1,100	1,000	800
RETAIL TRADE	5,900	11,800	15,600	20,500
FINANCE, INSURANCE AND REAL ESTATE	1,300	3,200	3,100	4,900
SERVICES	4,200	7,900	12,700	11,300
TOTALS	19,700	34,700	47,000	59,200

Note: The 1964 and 1972 figures are from the U.S. Bureau of Census Data. The figures do not include government employment or seasonal employment.

Source: New Jersey Department of Labor and Industry, December 1976.

Population

There are three current estimates of existing population which are available. The most recent official estimates are for 1975. Estimates for 1975 were prepared by the Ocean County Planning Board, the New Jersey Department of Labor and Industry and the U.S. Bureau of the Census. The Bureau of the Census has estimated the 1975 population of each of the municipalities for revenue sharing purposes. Estimates of 1975 population are shown in Table V. Figure 14 illustrates the present distribution of population in Ocean County.

TABLE V

ESTIMATES OF EXISTING POPULATION - OCEAN COUNTY

	OCEAN COUNTY PLANNING BOARD	NEW JERSEY D.L.I.	U.S. BUREAU OF THE CENSUS
POPULATION 1975	299,318* 288,000**	258,940	296,800

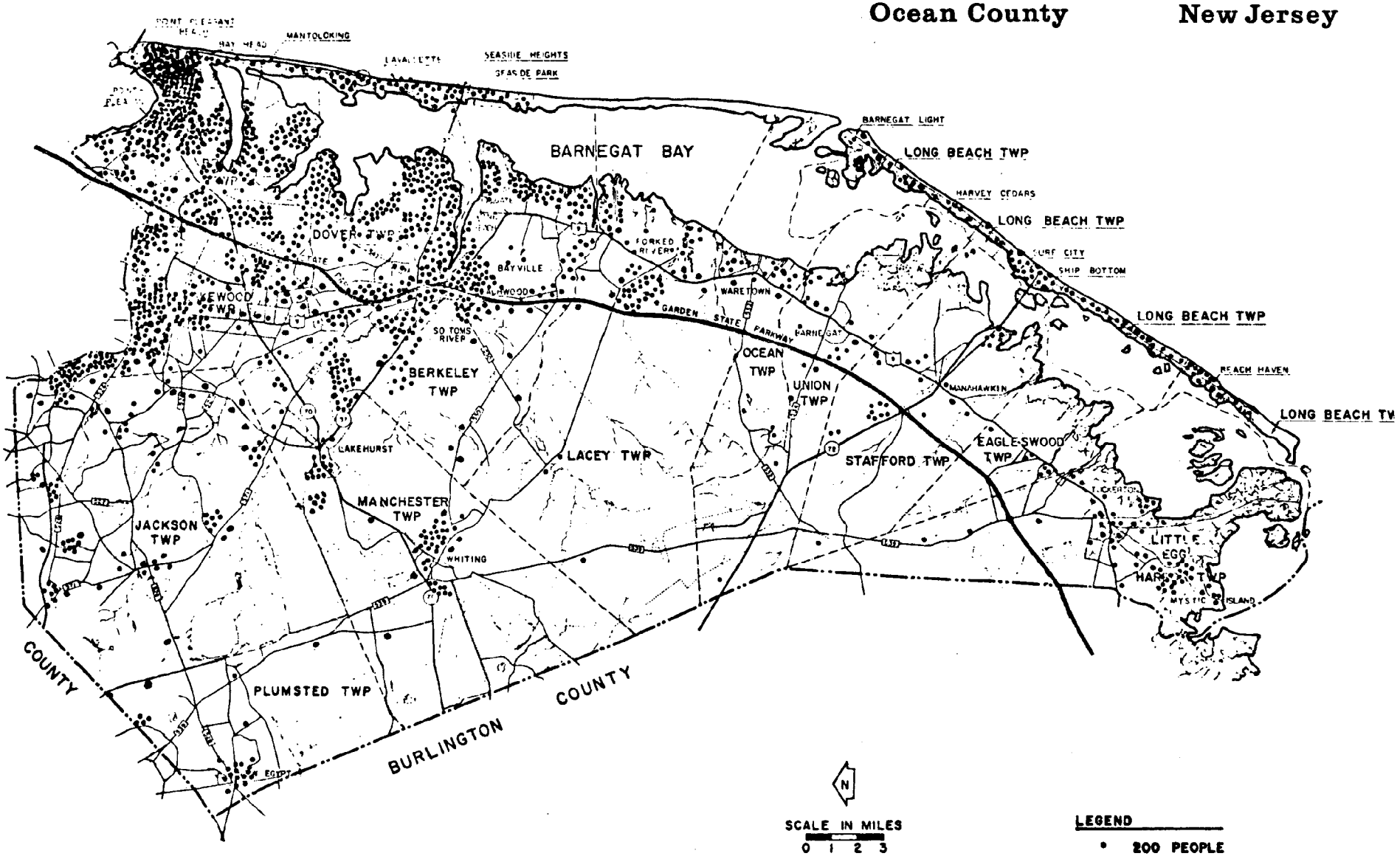
Note: *Based upon 2.84 persons per household; **based upon 2.5 persons/household.

Compiled by: 208 Water Quality Planning

It is anticipated that population increase will occur along the coastal beaches following the conversion of present seasonal dwelling to year-round dwellings. The bay corridor, the area between the Garden State Parkway and the bay waters, will continue to be the main focal point for new housing construction through 1980.

POPULATION DISTRIBUTION

Ocean County New Jersey



PREPARED BY: OCEAN COUNTY PLANNING BOARD

Figure 14

Recent development trends indicate a continuation of primarily single family housing units built on single lots in a dispersed pattern. This spread-type development is not indicative of the heavier population densities required to support mass transportation. Approximately 65 percent of the residential construction in the County over the last six years has consisted of single family homes.

Ocean County has two unique forms of housing which are found in only small numbers in the remainder of the state--lagoon developments and retirement communities. During the 1950's, 1960's and early 1970's, 13,612 or 93 percent of the States 14,591 lagoon homes were built in Ocean County. More than 8,300 of the 9,000 acres of lagoon development land in New Jersey is located in Ocean County. Both of these housing types again suggest lower population densities: lagoon development because of traffic circulation restrictions require spatial consideration and; retirement communities where it is estimated that there are 1.76 persons per unit. The 1970 Census shows this figure to be 2.83 persons per unit.

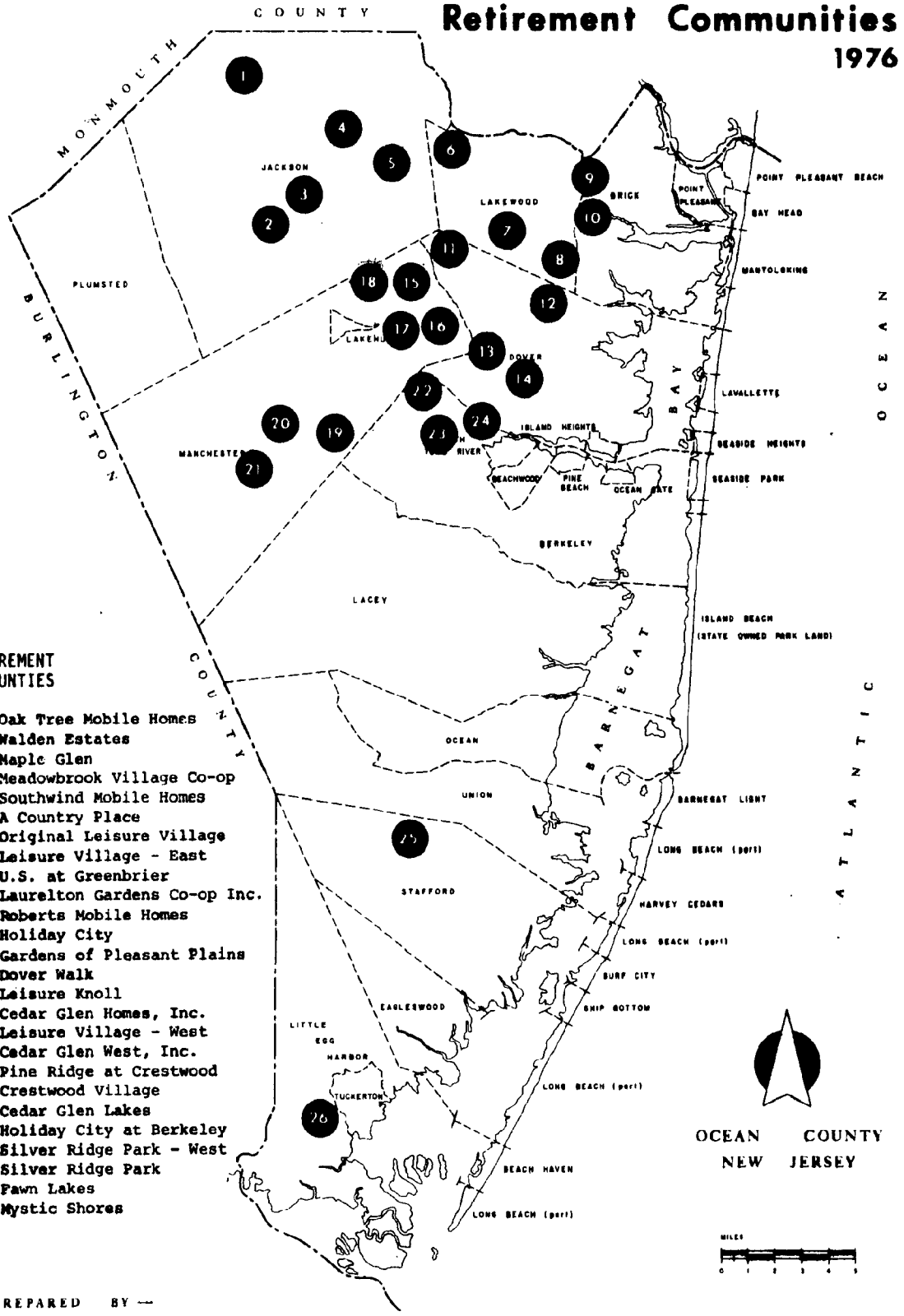
The population distribution map (figure 14) shows the importance that the County population places on the coastal marine environment as a place to reside.

Adult Retirement Communities: The increasing popularity of adult community living is making Ocean County one of the newest and fastest growing retirement areas on the east coast, rivaling the retirement development in Florida. A 1975 estimate placed the number of County residents 55 years and older at nearly 82,000 persons approximately 26% of the total County population. The 1970 U.S. Census showed this same age-group to be only 55,000 persons, an increase of nearly 27,000 persons or 49 percent. Recently as much as 40 per of the County's growth can be attributed to this age-exclusive living style.

In 1964, Ocean County experienced the construction of its first retirement community. By 1976, the number of retirement communities had increased to 26 with 19,981 dwelling units and a current estimated resident population of more than 38,000. (see location map). The retirement community is an attractive form of development for area municipalities. Retirement communities are seen as a way to maintain the single family residential character of the municipality. They also provide substantial property tax revenue without the associated high cost of educating school aged children. The positive impact of senior citizen purchasing on the area's economy is also widely recognized.

The existing retirement communities generally have low vacancy rates. There are incentives in many municipal zoning ordinances to encourage construction of adult retirement communities. The widespread popularity of retirement community living coupled with lengthy waiting lists and municipal acceptance seems to assure their continued construction.

Ocean County Retirement Communities 1976



RETIREMENT COMMUNITIES

1. Oak Tree Mobile Homes
2. Walden Estates
3. Maple Glen
4. Meadowbrook Village Co-op
5. Southwind Mobile Homes
6. A Country Place
7. Original Leisure Village
8. Leisure Village - East
9. U.S. at Greenbrier
10. Laurelton Gardens Co-op Inc.
11. Roberts Mobile Homes
12. Holiday City
13. Gardens of Pleasant Plains
14. Dover Walk
15. Leisure Knoll
16. Cedar Glen Homes, Inc.
17. Leisure Village - West
18. Cedar Glen West, Inc.
19. Pine Ridge at Crestwood
20. Crestwood Village
21. Cedar Glen Lakes
22. Holiday City at Berkeley
23. Silver Ridge Park - West
24. Silver Ridge Park
25. Pawn Lakes
26. Mystic Shores

PREPARED BY —

• OCEAN COUNTY PLANNING BOARD •

Retirement Communities
Ocean County, New Jersey
July 1, 1976

Municipality	Retirement Community	Dwelling Units
1. Manchester Township	Crestwood Village	4,186
2. Lakewood Township	Original Leisure Village	2,402
3. Berkeley Township	Holiday City at Berkeley	2,300
4. Dover Township	Holiday City	1,600
5. Brick Township	U.S. at Greenbriar	1,432
6. Lakewood Township	Leisure Village - East	1,412
7. Manchester Township	Cedar Glen Lakes	1,024
8. Berkeley Township	Silver Ridge Park - West	850
9. Berkeley Township	Silver Ridge Park	
10. Manchester Township	Cedar Glen West, Inc.	826
11. Manchester Township	Leisure Village - West	800
12. Manchester Township	Cedar Glen Homes, Inc.	564
13. Dover Township	Gardens of Pleasant Plains	437
14. Manchester Township	Pine Ridge at Crestwood	410
15. Lakewood Township	A Country Place	376
16. Jackson Township	Oak Tree Mobile Homes	250
17. Brick Township	Laurelton Gardens Co-op Inc.	220
18. Dover Township	Roberts Mobile Homes	215
19. Jackson Township	Southwind Mobile Home Development	210
20. Jackson Township	Meadowbrook Village Co-op	116
21. Manchester Township	Leisure Knoll	100
22. Little Egg Harbor Twp.	Mystic Shores	55
23. Dover Township	Dover Walk	45
24. Jackson Township	Walden Estates	40
25. Stafford Township	Fawn Lakes	28
26. Jackson Township	Maple Glen	12
	TOTAL	19,910

Source: Ocean County Planning Board

Resort Tourism:

The resort-tourism sector of the area's economy is significant not only because of the employment opportunities it provides, bu also because of the seasonal visitors which are attracted to the area. With over 75,000 acres of public open space, 45 miles of Atlantic Ocean shoreline, and hundreds of miles of clear streams and rivers, Ocean County has lont attracted hundreds of thousands of seasonal visitors each year. This seasonal influx varies by location (ocean beach/inland), community character and recreational generators, as well as by day and night, weekday and weekend and by weather conditions.

Even with Ocean County's tremendous growth and its changing character, the County still continues to act as a major tourist center on the Jersey Shore. Several studies have been conducted, both published and unpublished, which indicate the ratios of seasonal population per permanent population listed in Table V-a, and V-b.

TABLE V-a,

RATIO OF SEASONAL TO PERMANENT POPULATION

AREA	RATIO
COASTAL BEACH COMMUNITIES	10:1
BAY COMMUNITIES	2:1

Source: Ocean County Concept Plan, prepared by Ocean County Planning Board and consultants Dames and Moore, November, 1975.

TABLE V-b

OCEAN COUNTY POPULATION, 1974

MUNICIPALITY	ALL-YEAR POPULATION	ESTIMATED SUMMER POPULATION	WEIGHTED EQUIVALENT* POPULATION
BARNEGAT LIGHT	620	9,000	2,232
BAY HEAD	1,090	6,000	2,034
BEACH HAVEN	1,640	30,000	7,094
BEACHWOOD	5,170	6,400	5,407
BERKELEY	12,270	14,000	12,603
BRICK	44,795	80,000	51,565
DOVER	50,185	60,700	52,207
EAGLESWOOD	860	1,000	887
HARVEY CEDARS	500	7,000	1,750
ISLAND HEIGHTS	1,440	2,900	1,721
JACKSON	21,000	28,000	22,346
LACEY	7,560	30,000	11,875
LAKEHURST	2,930	2,930	2,930
LAKEWOOD	32,550	32,550	32,550
LAVALLETTE	1,545	22,000	5,479
LITTLE EGG HARBOR	4,675	18,500	7,334
LONG BEACH	3,645	45,000	11,598
MANCHESTER	12,835	19,000	14,021
MANTOLOKING	315	2,000	639
OCEAN	2,680	6,000	3,318
OCEAN GATE	1,115	2,500	1,381
PINE BEACH	1,480	2,500	1,676
PLUMSTED	4,525	4,525	4,525
POINT PLEASANT	16,760	25,000	18,345
PT. PLEASANT BEACH	4,945	35,000	10,725
SEASIDE HEIGHTS	1,400	35,900	8,035
SEASIDE PARK	1,505	30,000	6,985
SHIP BOTTOM	1,195	16,000	4,042
SOUTH TOMS RIVER	4,240	5,000	4,386
STAFFORD	4,595	11,000	5,827
SURF CITY	1,275	12,000	3,338
TUCKERTON	2,265	5,400	2,868
UNION	4,180	8,100	4,934
COUNTY	257,785	615,905	326,654

*Based on 10-week estimated summer population.

Source: M. Disko Associates, Ocean County Solid Waste Disposal & Resource Recover Management Study, Volume 1, February 1976.

Based upon these ratios and its 1975 estimate of permanent population, the Ocean County Planning Board estimated the peak day summer seasonal population of the County to be approximately 600,000 to 650,000 persons. This estimate includes permanent residents. Many of these seasonal visitors make use of the traditional ocean beach facilities. A rising phenomenon in Ocean County is the growth in the number of marinas located on the shoreline of Barnegat Bay. Estimates (1977) show there are now over 250 registered marinas in Ocean County. These marinas have become centers of seasonal activity.

While the shore continues to attract the bulk of the seasonal visitors, the inland sections of the County are attracting new recreational development. Older inland centers such as Lakewood have managed to maintain resort status despite burgeoning year round population through such methods as conversion of older resort hotels to spas and health and diet centers. Rova Farms in Jackson Township, with its unique attractiveness to members of the Russian Orthodox faith, is very popular in the summer months.

New recreational developments have been locating along the inland lakes and streams. Major among these is Great Adventure, representing an investment of almost $100 million. Proposed campgrounds, such as Jellystone Camp, also in Jackson Township, and several large K.O.A. campgrounds in the southern portion of the County, are examples of increased inland recreational development.

Air Quality

The National Ambient Air Quality Standards as developed by the U.S. Environmental Protection Agency (EPA) have been adopted by the N.J. Department of Environmental Protection (DEP) and are presented in Table . Primary ambient air quality standards are designed to protect the public health and are based on the air quality criteria to allow an adequate margin of safety. Secondary standards define the levels of air quality deemed necessary to protect the public welfare from any known or anticipated effects of an air pollutant.

The New Jersey DEP maintains a network of air quality monitoring stations throughout the State. Three selected stations for this report are located in Toms River, Asbury Park and Freehold. Data collected at these stations from 1973 to 1976 are presented in Tables 6, 7, 8 and 9. These stations are indicative of the air quality in surrounding areas.

Sulfur Oxides

Sulfur dioxide (SO_2) and sulfur trioxide (SO_3) essentially make up the class of corrosive, poisonous gases known as sulfur oxides. This gas results from the combination of certain fuels with an atmosphere oxygen during combustion. Power plants and industrial processes burning oil and coal are responsible for the majority of sulfur oxides emitted.

Sulfur dioxide levels at the three sampling stations have not exceeded the established standards over the four year period and do not appear to present local or regional problems in this area. However, significant determination of air quality is predicted as the result of on-shore activity from offshore oil development unless stringent sulfur removal

Table 6

National Ambient Air Quality Standards

	Standards	
	Primary	Secondary
Sulfur Dioxide		
Maximum 3 hour average		0.5 ppm*
Maximum 24 hour average	0.14 ppm	0.10 ppm
Annual Average	0.03 ppm	0.02 ppm
Suspended Particulate Matter		
Maximum 24 hour concentration	260 $\mu g/m^3$	150 $\mu g/m^3$
Annual Geometric Mean	75 $\mu g/m^3$	50 $\mu g/m^3$
Carbon Monoxide		
Maximum 1 hour average	35 ppm	35 ppm
Maximum 8 hour average	9 ppm	9 ppm*
Hydrocarbons (non-methane)		
Maximum 6-9 a.am. averages	0.24 ppm	0.24 ppm
Nitrogen Dioxide		
Annual Average	0.05 ppm	0.05 ppm
Ozone		
Maximum 1 hour average	0.08 ppm	0.08 ppm

* Not to be exceeded more than once a year

[2] New Jersey only

Source: U.S. Environmental Protection Agency, 1973

Air Quality Data for Toms River, New Jersey

Table 7

Pollutant	Data Expression for Standards	Air Quality Data 1976	1975	1974	1973	Times Per Year Standard Exceeded Or if Standard Was Exceeded 1976	1975	1974	1973
SO_2	Max. 3 hr. average	0.054	0.094	0.066	0.071	0	0	0	0
	Max. 24 hr. average	0.027	0.042	0.029	0.028	0	0	0	0
	Annual average	0.008	0.006	0.008	0.006	No	No	No	No
		(ppm)	(ppm)	(ppm)	(ppm)				
CO	Max. 1 hr. average	25.4	26.7	23.1	30.5	0	0	0	0
	Max. 8 hr. average[2]	15.5	18.3	15.8	24.3	262/56	363/68	129	489
		(ppm)	(ppm)	(ppm)	(ppm)				
Ozone	Max. 1 hr. average								
		($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)				
Suspended Particulates	24 hr. average	127	101	141	136	0	0	0	0
	Annual Geometric mean	42.4	43.3	48.6	46.9	No	No	No	No
		(COHS)	(COHS)	(COHS)	(COHS)				
Smoke Shade[3]									
	Max. 24 hr. average	2.11	2.91	2.04	1.42				
	Annual Average	0.53	0.64	0.69	0.64				

1 - P, Primary Standard exceeded; S, Secondary Standard exceeded; No, Standard not exceeded
2 - First number based on moving 8 hr. periods/second number based on non-overlapping 8 hr. periods
3 - No standard has been established

Source: New Jersey Department of Environmental Protection

Table 8

Pollutant	Data Expression for Standards	Air Quality Data 1976	1975	1974	1973	Times Per Year Standard Exceeded Or If Standard Was Exceeded 1976	1975	1974	1973
SO_2	Max. 3 hr. average	0.107	0.154	0.069	0.061	0	0	0	0
	Max. 24 hr. average	0.035	0.078	0.044	0.039	0	0	0	0
	Annual average	0.009	0.010	0.007	0.007	No	No	No	No
		(ppm)	(ppm)	(ppm)	(ppm)				
CO	Max. 1 hr. average	20.3	30.9	24.5	16.7	0	0	0	0
	Max. 8 hr. average	12.4	10.6	15.3	12.3	16/4	9/3	12/	24/
		(ppm)	(ppm)	(ppm)	(ppm)				
Ozone	Max. 1 hr. average	0.209	0.203	0.176	0.230	108	104	124	234
		($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)				
Suspended Particulates	24 hr. average	156	123	138	131	S-1	0	0	0
		51.6	50.3	50.6	51.6	No	No	No	No
		(COHS)	(COHS)	(COHS)	(COHS)				
Smoke Shade[3]									
	Max. 24 hr. average	2.03	2.21	2.30	2.56				
	Annual average	0.61	0.68	0.83	0.76				

1 - P, Primary Standard exceeded; S, Secondary Standard exceeded; No, Standard not exceeded
2 - First number based on moving 8 hr. periods/Second number based on non-overlapping 8 hour periods
3 - no standard has been established

Source: New Jersey Department of Environmental Protection

Air Quality Data for Freehold, New Jersey

Table 9

Pollutant	Data Expression for Standards	Air Quality Data 1976	1975	1974	1973	Times Per Year Standard Exceeded Or If Standard Was Exceeded 1976	1975	1974	1973
SO_2	Max. 3 hr. average	0.112	0.143	0.165	0.135	0	0	0	0
	Max. 24 hr. average	0.046	0.070	0.085	0.067	0	0	0	0
	Annual average	0.008	0.012	0.017	0.012	No	No	No	No
		(ppm)	(ppm)	(ppm)	(ppm)				
CO	Max. 1 hr. average	23.7	19.1	32.3	53.0	0	0	0	2
	Max. 8 hr. average[2]	13.4	12.6	14.8	23.6	170/39	156/36	326/	468/
		(COHS)	(COHS)	(COHS)	(COHS)				
Smoke Shade[3]									
	Max. 24 hr. average	1.78	1.84	2.05	3.52				
	Annual average	0.64	0.78	0.85	0.86				

1 - P, Primary Standard exceeded; S, Secondary Standard exceeded; No, Standard not exceeded
2 - First number based on moving 8 hr. periods/ Second number based on non-overlapping 8 hr. periods
3 - No standard has been extablished

Source: New Jersey Department of Environmental Protection

controls are not enforced for any gas processing plant located along the South Jersey coast.*

Carbon Monoxide

Carbon monoxide is a colorless, odorless and poisonous gas which forms during the incomplete combustion of fossil fuel. Internal combustion engines are responsible for the majority of carbon monoxide emissions. Levels of this pollutant tend to be localized and can vary significantly within short distances. The proximity of vehicular traffic and dispersive properties of the gas contribute to its localized nature.

The standard for the maximum 8 hour average of carbon monoxide was frequently exceeded at Freehold and Toms River over the four year period and it was exceeded several times at Asbury Park. The maximum standard for the one hour average was not exceeded at any of the stations over the period of record. These relatively high carbon monoxide levels were measured in commercial locations.

Suspended Particules

Particulate matter is composed of suspended particles of solids or liquid in a variety of sizes. They are produced from a number of sources

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*Source: Environmental Consequences of On-shore Activity in Four New Jersey Coastal Counties Resulting from Off-shore Oil Development.

Narkus-Kramer, Marc, Ratick, Sam, Watson, Andrea

Environmental Protection Agency, Washington, D.C., 1975, 41 pp.

and include carbon and soot, metallic oxides and salt, oily or tarry droplets and inorganic dust. Particulate emissions represent a major portion of the total quantity of air pollutants.

The secondary standard for the 24 hour average concentration of particulate matter was exceeded only once at Asbury Park (in 1976) and has not exceeded standards over the four year period at Toms River. Particulate matter is not routinely monitored at Freehold.

Ozone

Ozone is a photochemical oxidant which forms by combining with other pollutants in the presence of ultraviolet radiation. Hydrocarbons and nitrogen oxides participate in the chain of reactions responsible for the formation of ozone. The only station proximate to Ocean County which monitors ozone is Asbury Park. The standards were exceeded 570 times between 1973 and 1976.

Smoke Shade

Smoke shade or haze particles interfere with the passage of light through the atmosphere. It is measured as the coefficient of haze (COH) per 1000 lineal feet. An analysis of smoke shade levels is difficult because no standards have been established. High levels of from 1.4 to 3.5 COHS have been observed at the three stations however.

Summary: Air Quality

The overall air quality in the region defined by these three stations can be considred good locally although carbon monoxide and ozone levels may present a problem.

Airports

There are four public airport locations in Ocean County. Three locations could support small aircraft and helicopter services. The fourth has been inactive for several years but could be reactivated. Figure 15.

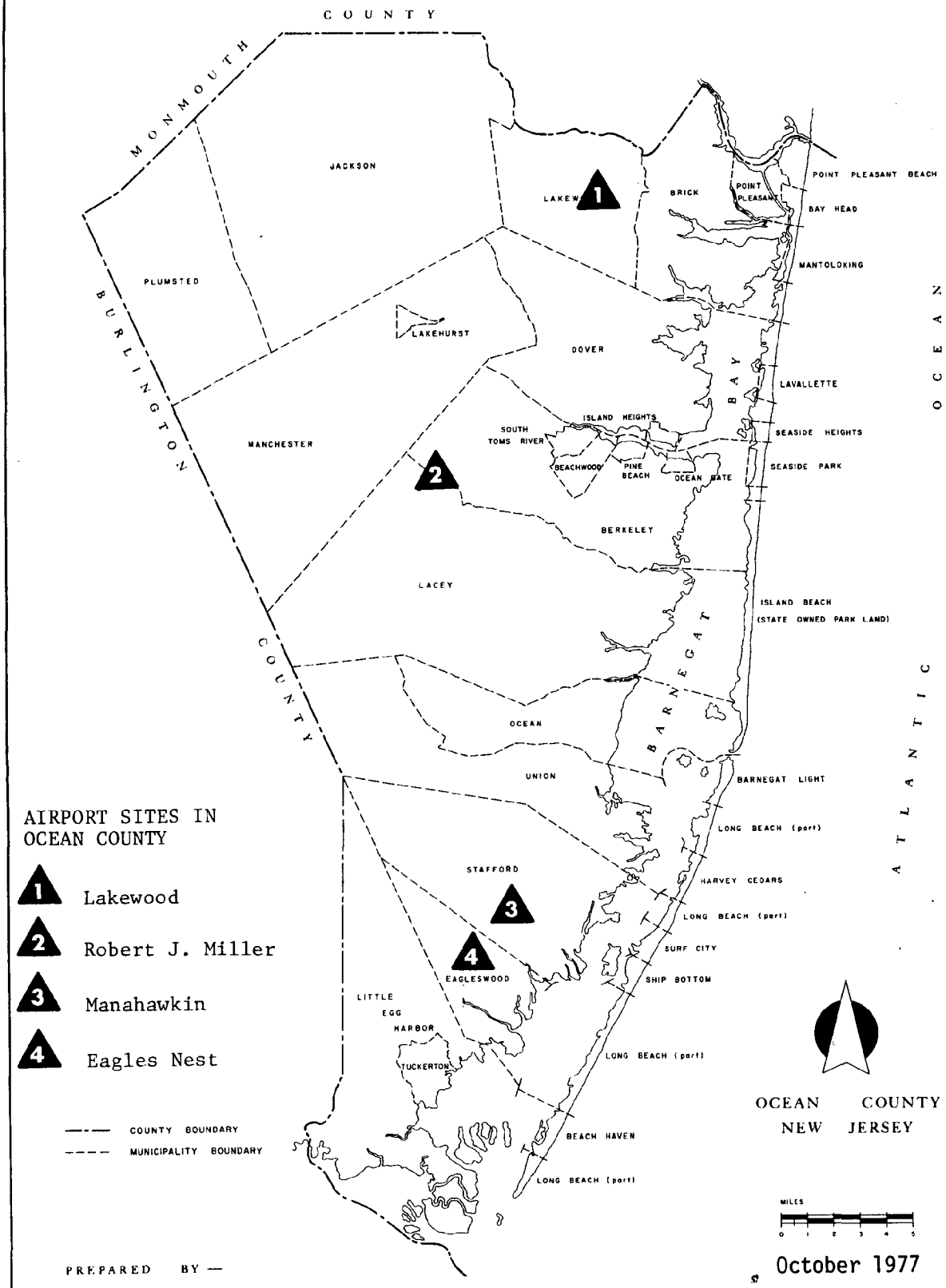
Lakewood Airport is a Class V airport located two and one-half miles east of downtown Lakewood (Route 9 and Cedar Bridge Avenue). It has one 2,700' X 50' macadam runway. Their radio system is UNICOM. Seven day operation, 9:00 a.m. to dark; minor repairs available.

Robert J. Miller Air Park is a Class V airport located in Berkeley Township five miles southwest of Toms River. Runway: 1 paved oil and stone-4,800' X 60'; seven day operation; 8:00 a.m. to 5:00 p.m.; all night runway illumination; major and minor repairs for small and medium aircraft; radio - UNICOM; flight instruction and air taxi; radio repairs.

Manahawkin Airport is a Class V airport located adjacent to the Garden State Parkway, Route 9 and Route 72 in Stafford Township. Runway: one 2,740' X 50' macadam runway, seven day operation; 8:00 a.m. to dark, minor repairs available; radio - UNICOM, lights by pre-arrangement.

The closest scheduled air passenger and freight service is available on major airlines operating out of Newark Airport and Philadelphia International, both approximately 60 miles from Toms River, and at other major airports in the New York area.

FIGURE 15


COUNTY
MONMOUTH
BURLINGTON
COUNTY
OCEAN
ATLANTIC
JACKSON
LAKEW
BRICK
POINT PLEASANT
POINT PLEASANT BEACH
BAY HEAD
MANTOLOKING
PLUMSTED
LAKEHURST
DOVER
BAY
LAVALLETTE
ISLAND HEIGHTS
SOUTH TOMS RIVER
SEASIDE HEIGHTS
MANCHESTER
BEACHWOOD
PINE BEACH
OCEAN GATE
SEASIDE PARK
BERKELEY
LACEY
ISLAND BEACH (STATE OWNED PARK LAND)
BARNEGAT
OCEAN
UNION
BARNEGAT LIGHT
LONG BEACH (part)
STAFFORD
HARVEY CEDARS
LONG BEACH (part)
SURF CITY
EAGLESWOOD
SHIP BOTTOM
LITTLE EGG HARBOR
TUCKERTON
LONG BEACH (part)
BEACH HAVEN
LONG BEACH (part)
1
2
3
4
AIRPORT SITES IN OCEAN COUNTY
1 Lakewood
2 Robert J. Miller
3 Manahawkin
4 Eagles Nest
COUNTY BOUNDARY
MUNICIPALITY BOUNDARY
OCEAN COUNTY
NEW JERSEY
MILES
0 1 2 3 4 5
PREPARED BY —
October 1977
• OCEAN COUNTY PLANNING BOARD •

ELECTRIC AND GAS UTILITIES

Jersey Central Power & Light Company

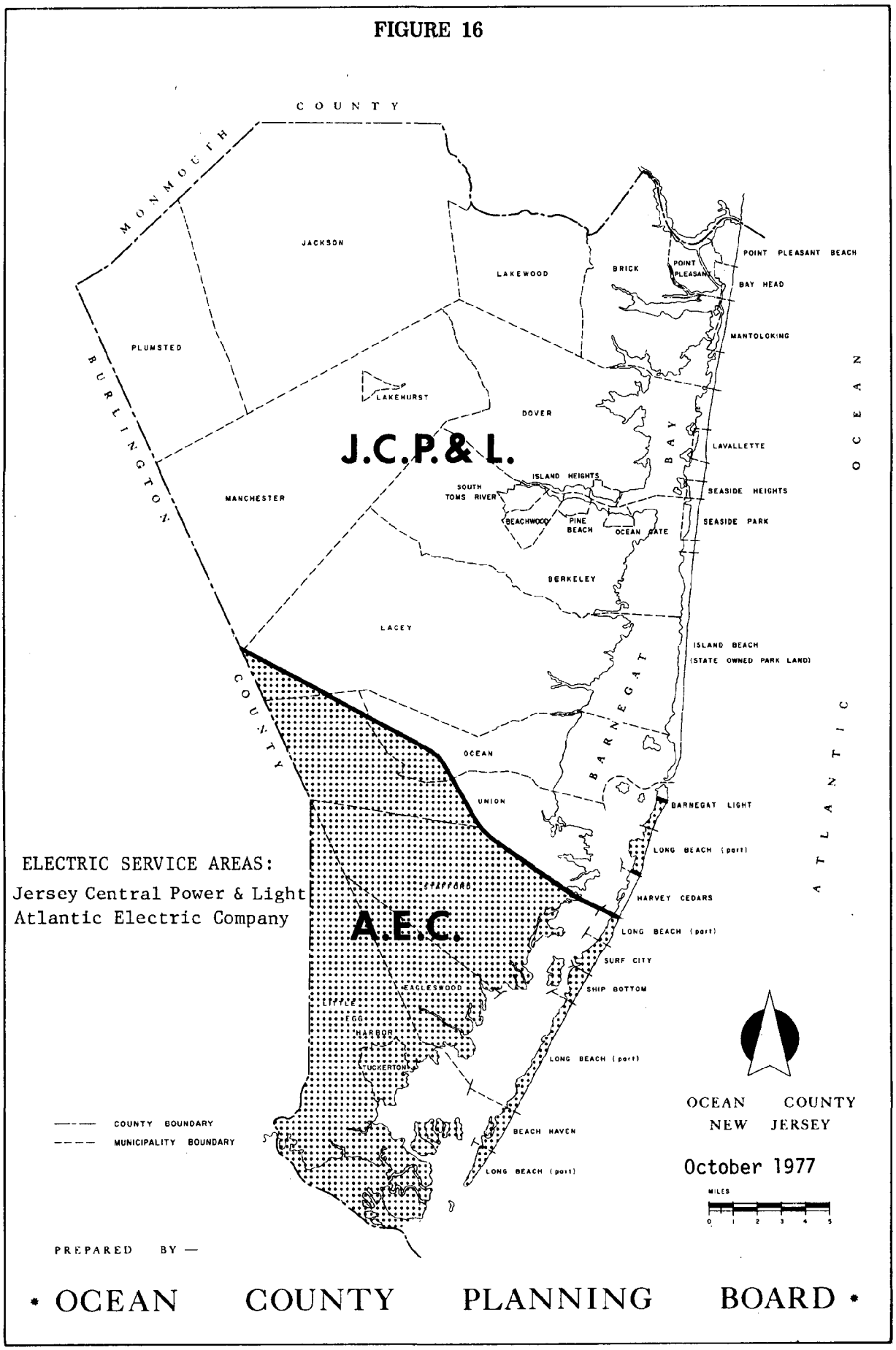
Most of Ocean County municipalities receive electric service from Jersey Central Power & Light Company through an extensive transmission and distribution system which is contantly being expanded and improved. Those areas in the southern part of the County which are not supplied by Jersey Central are shown on the Electrical Energy Service map. Figure 16.

Jersey Central Power & Light Company is part of the integrated General Public Utilities Corporation system which has a generating capacity of 6,452,000 KW (January 1, 1977) and is interconnected with the Pennsylvania, New Jersey and Maryland power pool with a generating capacity of 43,623,000 KW (January 1, 1977). The generating facilities of the General Public Utilities system include nuclear energy, hydro and pumped storage, as well as the fossil fuels -- coal, oil and gas.

One of the largest investor owned nuclear generating stations in the Country is located in Ocean County. This plant the Oyster Creek Nuclear Generation Station, is located near Barnegat Bay on an 800-acre site in Lacey Township it lies between Route 9 on the east, the Garden State Parkway on the west, the south branch of the Forked River on the north, and Oyster Creek on the south. The Oyster Creek Station has a rated capacity of 515,000 kilowatts with an expected capacity of 640,000 kilowatts. The cooling water flow is measured at 460,000 gallons a minute from the South Branch of Forked River with the resultant discharge into Oyster Creek.

A second station - the Forked River Nuclear Generating Station - is being

FIGURE 16


COUNTY
MONMOUTH
BURLINGTON
COUNTY
JACKSON
LAKEWOOD
BRICK
POINT PLEASANT
POINT PLEASANT BEACH
BAY HEAD
MANTOLOKING
PLUMSTED
LAKEHURST
DOVER
J.C.P.& L.
LAVALLETTE
ISLAND HEIGHTS
SEASIDE HEIGHTS
SOUTH TOMS RIVER
MANCHESTER
BEACHWOOD
PINE BEACH
OCEAN GATE
SEASIDE PARK
BERKELEY
LACEY
ISLAND BEACH (STATE OWNED PARK LAND)
OCEAN
UNION
BARNEGAT LIGHT
LONG BEACH (part)
STAFFORD
A.E.C.
HARVEY CEDARS
LONG BEACH (part)
SURF CITY
EAGLESWOOD
SHIP BOTTOM
LITTLE EGG HARBOR
TUCKERTON
LONG BEACH (part)
BEACH HAVEN
LONG BEACH (part)
OCEAN
BARNEGAT BAY
ATLANTIC
ELECTRIC SERVICE AREAS:
Jersey Central Power & Light
Atlantic Electric Company
COUNTY BOUNDARY
MUNICIPALITY BOUNDARY
OCEAN COUNTY
NEW JERSEY
October 1977
MILES
0 1 2 3 4 5
PREPARED BY —
• OCEAN COUNTY PLANNING BOARD •

constructed near the Oyster Creek facility on the same 800-acre tract. The Forked River Station will have a capacity of 1,140,000 KW. Present plans call for a single 500 foot high cooling tower with a re-circulation design.

Electric power is distributed throughout the County ba a 230,000 volt transmission system which provides the connection between generating sources and major substations located in the area. In addition, the transmission system is interconnected with all neighboring utility companies.

Single and three phase service is provided at voltages of 120, 120/240, 120/208, 240, 277/480, 4,160 4,800 12,500 and 34,500 depending on location, size of load and customer's requirements.

Atlantic Electric Company

Atlantic Electric Company serves the municipalities of Beach Haven, Eagleswood, Harvey Cedars, Little Egg Harbor, Long Beach Township, Ship Bottom, Stafford, Surf City and Tuckerton, in their entirety; and portions of Lacey, Ocean and Union Townships.

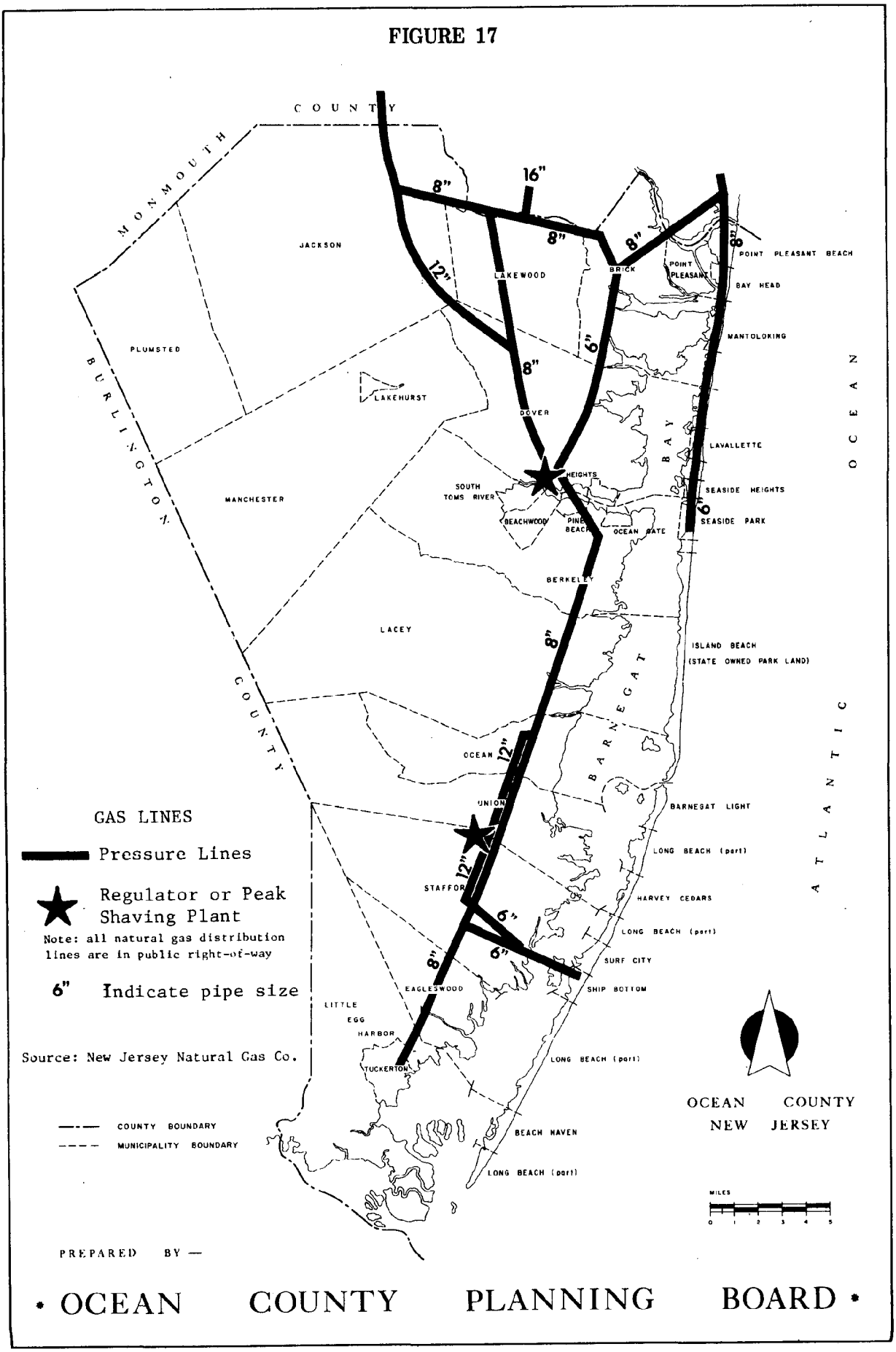
New Jersey Natural Gas Company & Public Service Electric & Gas Company

New Jersey Natural Gas Company provides service in all municipalities with the exception of Plumsted Township, which is served by Public Service Electric & Gas Company. (Figure 17).

Right-of-Ways

Right-of-ways of 50 feet or more are delineated on figure 18.

FIGURE 17


COUNTY
MONMOUTH
BURLINGTON
COUNTY
JACKSON
PLUMSTED
MANCHESTER
LACEY
LAKEWOOD
LAKEHURST
DOVER
SOUTH TOMS RIVER
BEACHWOOD
PINE BEACH
OCEAN GATE
BERKELEY
UNION
OCEAN
STAFFORD
EAGLESWOOD
LITTLE EGG HARBOR
TUCKERTON
BRICK
POINT PLEASANT
POINT PLEASANT BEACH
BAY HEAD
MANTOLOKING
LAVALLETTE
SEASIDE HEIGHTS
SEASIDE PARK
BARNEGAT BAY
ISLAND BEACH (STATE OWNED PARK LAND)
BARNEGAT LIGHT
LONG BEACH (part)
HARVEY CEDARS
SURF CITY
SHIP BOTTOM
BEACH HAVEN
OCEAN
ATLANTIC
8"
16"
12"
6"
GAS LINES
Pressure Lines
Regulator or Peak Shaving Plant
Note: all natural gas distribution lines are in public right-of-way
6" Indicate pipe size
Source: New Jersey Natural Gas Co.
COUNTY BOUNDARY
MUNICIPALITY BOUNDARY
OCEAN COUNTY
NEW JERSEY
MILES
0 1 2 3 4 5
PREPARED BY —
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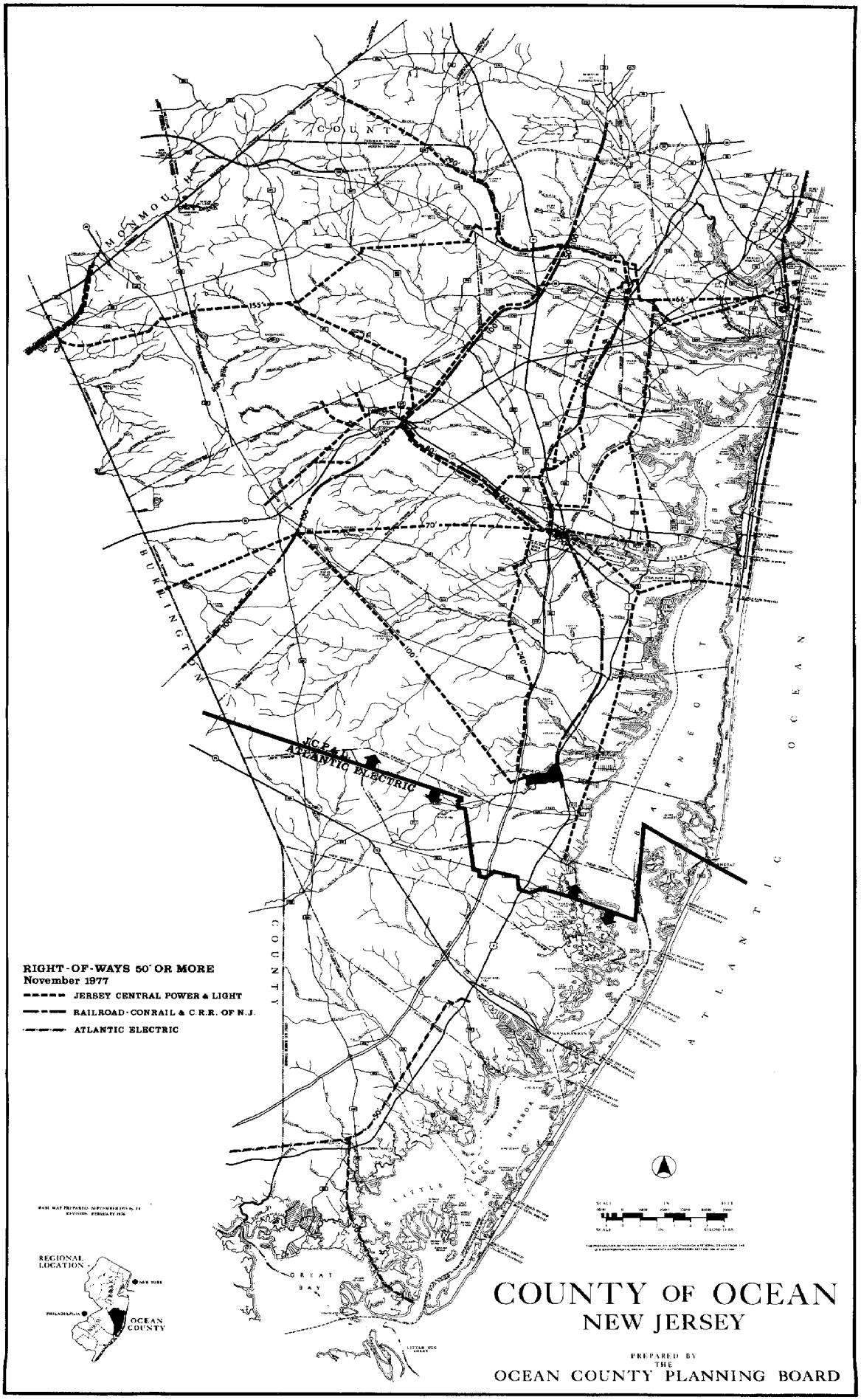

RIGHT-OF-WAYS 50' OR MORE
November 1977
JERSEY CENTRAL POWER & LIGHT
RAILROAD-CONRAIL & C.R.R. OF N.J.
ATLANTIC ELECTRIC
REGIONAL LOCATION
NEW YORK
PHILADELPHIA
OCEAN COUNTY
COUNTY OF OCEAN
NEW JERSEY
PREPARED BY
THE
OCEAN COUNTY PLANNING BOARD

OCEAN COUNTY GROWTH INCENTIVES

There are many area specific factors which in combination support the observation that Ocean County will continue to grow at a fairly rapid rate. These growth incentives are as follows:

Developable Land:

The availability of vast amounts of potentially developable land is a major growth incentive. As noted in the HUD 701 funded Ocean County Concept Plan, development has occurred in basically two patterns: (1) the coastal beach strip extending from Point Pleasant Beach south to Long Beach Township; and (2) urban concentrations on the mainland generally east of the Garden State Parkway and along major highways southward.

Inland areas west of the Garden State Parkway are generally open space, vacant and/or agricultural. Exceptions are smaller suburban concentrations such as Crestwood Village, a retirement community, and Lakehurst Borough and publically owned land. Of the 408,382 acres within the County, approximately 230,156 acres are vacant or are in agricultural use. These areas exhibit a potential for development. The present abundance of developable land, coupled with the relatively low cost of land will contribute to the continued growth of the area.

Accessibility to Metropolitan Centers:

A second incentive is the area's accessiblity to large metropolitan centers. This highway accessibility allows the resort-tourist economy to flourish. It also reduces commutation time to major metropolitan employment centers.

Other major factors discussed previously include the natural amenities and resort character of the County and the completion of the regional sewerage system.

Ocean County Growth Constraints

There are certain existing and potential constraints on growth which directly affect Ocean County. These constraints are principally the result of State and regional efforts to guide and regulate growth, however, the large amount of publicly owned lands also serves as a significant growth constraint.

State Coastal Zone Planning and CAFRA:

The N.J. D.E.P. is responsible for Coastal Zone Management and Planning pursuant to the federal Coastal Zone Management Act, Public Law 92-583. The State is currently finishing a management plan for the coastal area of New Jersey which includes much of Ocean County.

The Coastal Area Facilities Review Act (CAFRA) was enacted to protect the New Jersey coastal areas from further degradation from large scale development in environmentally sensitive coastal areas. A map on the following page shows the area presently within the CAFRA jurisdiction in Ocean County. (Figure 18).

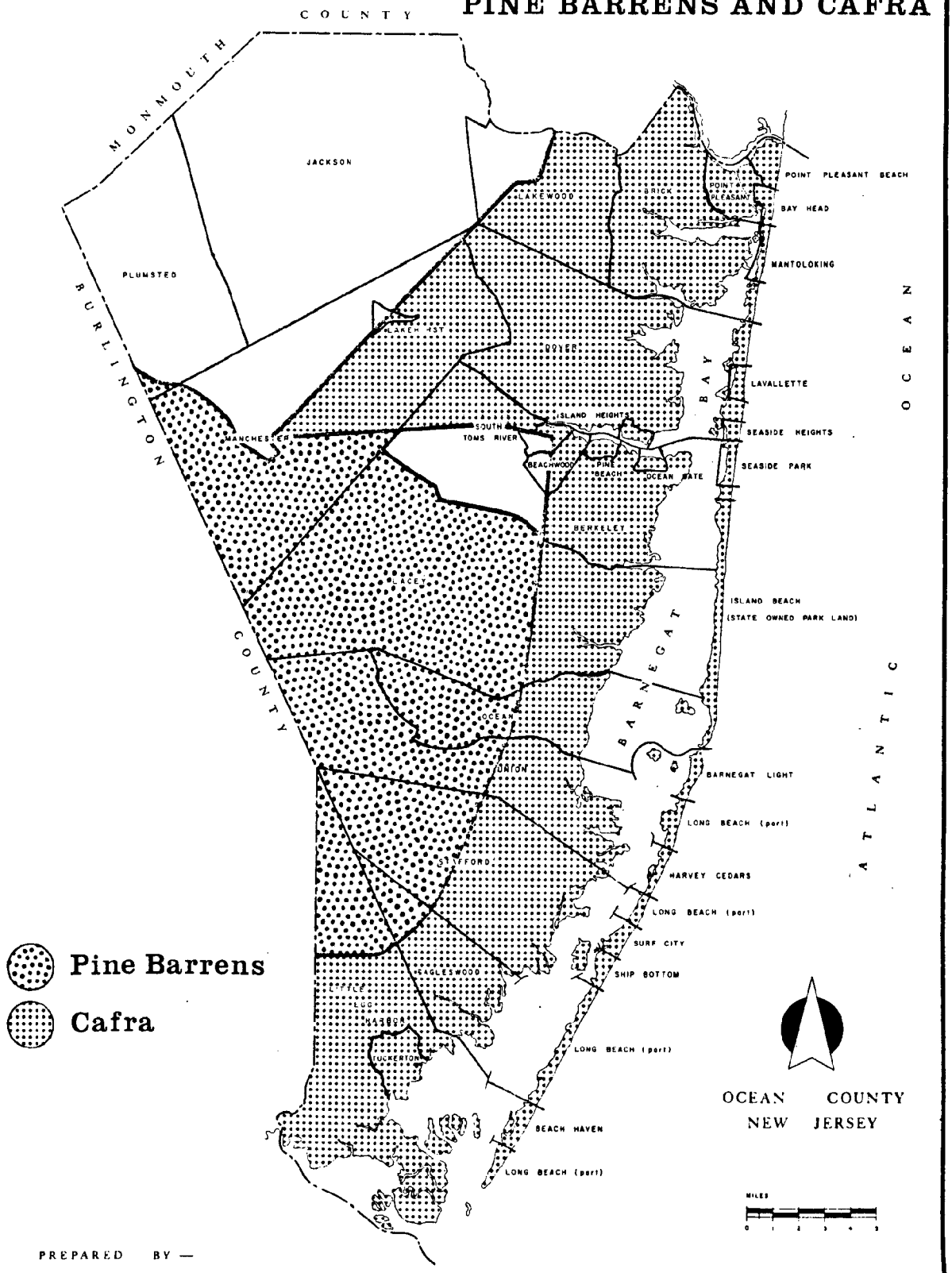
Basically, CAFRA provides a State permitting system under which proposed development is evaluated on the basis of:

1. The assessment of the environmetnal impact of potential development on an area.
2. Determination of the capacity of the affected area to absorb and react to man-made stresses.
3. Evaluation of the compatibility of the particular use with the environmental resources of the area.

Before construction and site preparation can begin, a developer must receive a permit from the commissioner of the Department of Environmental Protection. Facilities that must be reviewed by CAFRA include proposed residential

FIGURE 18

AREAS OF OCEAN COUNTY INCLUDED IN THE PINE BARRENS AND CAFRA



developments involving 25 units or more. Manufacturing and industrial uses, among others, also come under CAFRA review.

CAFRA, as a regulatory agency, has the potential to have a pronounced effect on future large scale development in Ocean County. While the CAFRA legislation does not prohibit development, it does provide a mechanism to restrict development in ecologically sensitive areas.

The future impact that CZM/CAFRA will have on the County is difficult to assess at this time. The State CZM/CAFRA planning agency has not yet completed the overall management plan for this area. In addition, several legislative initiatives have been started that could influence CAFRA's role in Ocean County. First, a bill has been introduced that would eliminate the "inland bulge" from the CAFRA zone in Ocean County. Secondly, a bill that would raise the number of building lots requiring permit action from 25 to 50 units has been introduced in the state legislature.

Wetlands Act of 1970:

Large areas of Ocean County are covered by the provisions of the New Jersey Wetlands Act. This Act regulates the dredging, removing, filling, altering or pollution of coastal wetlands. Under the Act a permit is required from the commissioner of the New Jersey Department of Environmental Protection. Very limited land uses, such as recreational facilities, may be allowed to locate in wetland areas under a Type B permit. On balance, however, the Wetlands Act serves as an effective prohibition of any future residential development in these critical resource areas.

Pine Barrens:

Approximately one-third of Ocean County is included in the largely

undeveloped area known as the Pine Barrens. Due to the importance of the water resources and the ecological significance of the flora and fauna of the Pine Barrens, a great deal of public attention has focused on the "Pines". In 1972, the New Jersey State legislature signed into law an Act which created the Pinelands Environmental Council (PEC). The purposes of the Council as defined in the law are:

1. the protection of the water resources and other natural assets of the Pinelands Region from mususe and pollution;

2. the conservation of the scientific, educational, scenic, water resources and recreational values of the region;

3. the encouragement of the continuation and development of compatible land uses in order to improve the overall environmental and economic position of the area; and,

4. the preservation and promotion of the agricultural complex of the Pinelands Region.*

The P.E.C. is charged with developing a coordinative, comprehensive plan that will help insure that development occurs in accordance with environmental objectives. The actual formal powers available to the P.E.C. to implement the plan are limited. The P.E.C., however, has the power to review each major project and development and, if the Council judges the public interest may not be served by any specific project, to delay its beginning for up to 60 days.

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* Laws of New Jersey Assembly Report No. 2096, Chapter 417

Additional land and water use controls covering the Pine Barrens area have recently been proposed by the Governor and by the N.J. D.E.P.. These include an executive order, which generally provides for State review of proposed projects and development in the area; a proposed extension of the critical areas boundary which would require State approval of sewerage and water supply facilities; and proposed revisions to the water quality standards in the area. Groundwater quality standards have also been proposed. The intent of the recent proposals is clear. The State is seeking a more active and direct role in regulating the development of the area. It is never-the-less difficult to determine the potential, cummulative effect of these proposals since they do not address the specific land use implications associated with their implementation. Areas which could be developed have not been identified. Acceptable densities have not been defined.

Clearly, in order to afford the degree of protection which is appropriate for the Pine Barrens, developmental controls need to be exercised in accord with a well defined, realistic land use plan for the area.

Publicly-Owned Lands:

A significant feature of Ocean County is the thousands of acres of Federal, State, and County-owned public lands. Most of the publicly-owned land totalling 118.999 acres is in parks or fish and wildlife management areas, and they can be removed from consideration of O.C.S. activity.

Fishing, Clamming, Recreation

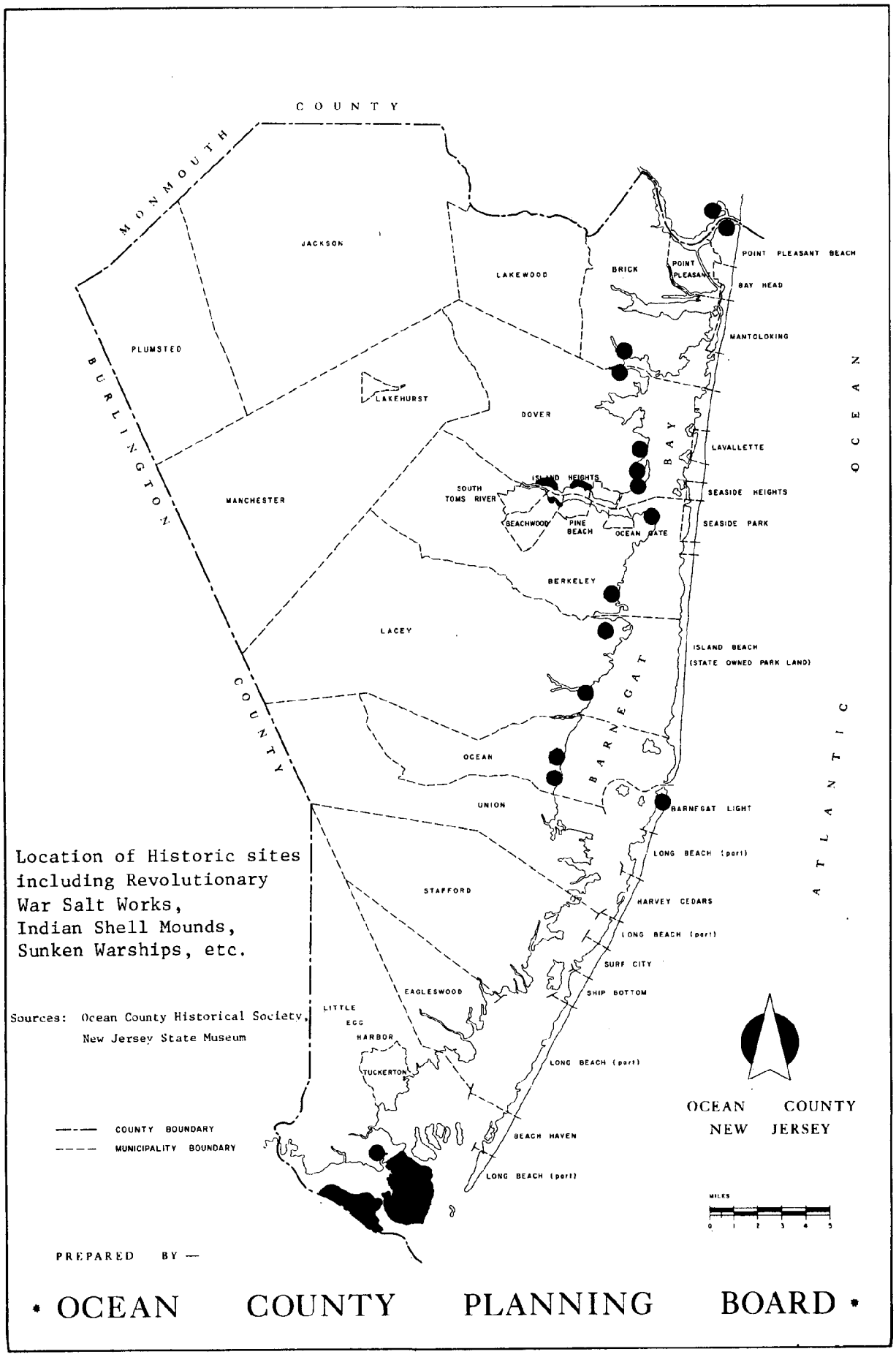
The 1976 New Jersey Landings Current Fisheries Statistics No. 7213 reports a commercial total of 4.7 million pounds of shellfish (value 3.95 million dollars) and 10.6 million pounds of fresh fish (value 2.52 million dollars) as being processed within Ocean County. These figures represent between 13.5 and 22 percent respectfully of the total poundage and dollar value of all shellfish and fish landed in New Jersey.

It is a significant amount since the major hard calm estuary areas is located in the lower Barnegat Bay and Great Bay Area. This also reflects the relative purity of the bay waters and river watersheds which empty into this area.

The area around the Mullica River including parts of Great Bay and Little Egg has been nominated as a marine sanctuary by the U.S. Department of the Interior and by the New Jersey Department of Environmental Protection. This is partially because the area is relatively free of major pollution and can be maintained in this manner. One other important reason is the confirmed hulls of 14 sunken revolutionary war ships partially located within the bay area. Revolutionary War salt works are also located along Barnegat Bay (figure 19).

Recreation within the Barnegat Bay area is available in many forms including boating, sailing, fishing, crabbing, and swimming. Ocean County presently accounts for more than 38 percent of the State's total motorboat use. Ocean County also leads the state in projected uses of sail boating and salt water fishing.

Clearly, Ocean County is a major tourist-recreation area that is utilized by residents and non-residents alike for all types of activities. Also for


MONMOUTH COUNTY
BURLINGTON COUNTY
OCEAN COUNTY
JACKSON
LAKEWOOD
BRICK
POINT PLEASANT
POINT PLEASANT BEACH
BAY HEAD
MANTOLOKING
PLUMSTED
LAKEHURST
DOVER
LAVALLETTE
ISLAND HEIGHTS
SOUTH TOMS RIVER
SEASIDE HEIGHTS
MANCHESTER
BEACHWOOD
PINE BEACH
OCEAN GATE
SEASIDE PARK
BERKELEY
LACEY
ISLAND BEACH (STATE OWNED PARK LAND)
OCEAN
UNION
BARNEGAT LIGHT
LONG BEACH (part)
STAFFORD
HARVEY CEDARS
LONG BEACH (part)
SURF CITY
EAGLESWOOD
SHIP BOTTOM
LITTLE EGG HARBOR
TUCKERTON
LONG BEACH (part)
BEACH HAVEN
LONG BEACH (part)
BARNEGAT BAY
ATLANTIC OCEAN
Location of Historic sites including Revolutionary War Salt Works, Indian Shell Mounds, Sunken Warships, etc.
Sources: Ocean County Historical Society, New Jersey State Museum
COUNTY BOUNDARY
MUNICIPALITY BOUNDARY
OCEAN COUNTY NEW JERSEY
MILES
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the foreseeable future. A significant amount of Ocean Counties economy will be dependent upon Barnegat Bay and the barrier islands for its economic viability.

SUITABILITY OF ON-SHORE FACILITIES FOR OUTER CONTINENTAL SHELF AND ENERGY DEVELOPMENT ACTIVITIES

The suitability of on-shore facilities for outer continental shelf and energy development activities in Ocean County is very limited due to the sensitive natural resources and economic base of the County. While Ocean County has been developing rapidly during the past thirty (30) years as a result of several factors, the County has remained essentially a suburban-rural area with an economic base comprised of resort/tourism, adult retirement communities and limited industrial development. Most on-shore facilities related to outer continental shelf and energy development are incompatible with the environmental, land use and economic development activities located within Ocean County. The incompatibility of most of the on-shore OCS facilities have been well recognized by all levels of government and have been incorporated into policies, regulations and development restrictions promulgated at the Federal, state, county and municipal levels. Future development within Ocean County is dependent upon a high quality environment including water quality, air quality and protection of open space.

The preservation of critical environmental factors has been recognized in land use and facilities planning in Ocean County and has been incorporated into County and municipal planning programs and into municipal zoning and other land development regulations. The County Master Plan, Concept Plan, 208 Water Quality Management Plan and the Wastewater Management Plan recognize the sensitivity of the natural resource base of Ocean County and the incompatibility of petro-chemical and other heavy industrial activities within the County.

There are, however, a wide range of on-shore facilities related to outer continental shelf and energy development and many of these activities and facilities are physically compatible with the present environmental quality, land use development patterns and economic base of the County. Such activities include human services and selected off-shore development platform support operations. These types of activities are permitted by the County and several of the municipalities in terms of existing Master Plans, Zoning Ordinances and economic development programs. Such facilities would include service base activities, air support facilities and numerous ancillary and light industrial activities. The facilities which are considered to be suitable for Ocean County would be those types of activities which are compatible with the resort/tourist industry and corporate and industrial parks such

as light manufacturing and technical professional service support, catering companies, administrative support activities, and specialized service activities. These types of facilities and services are currently prevalent in the County and are types of facilities which are promoted by the County and municipal economic development agencies and commissions.

Specific activities which may be suitable for Ocean County are described below. Each of the activities which are described would have to be carefully screened in order to insure that no adverse environmental impacts would occur in terms of disposal of waste materials or any potential petro-chemical contamination and that the activities would in no way have adverse impacts on the resort/tourist trade, the fishing and clamming industry or on the development of Ocean County for retirement communities.

Supplemental Service Base Facilities

OCS development requires temporary and permanent service bases for logistical support of the off-shore drilling rigs. The service bases serve as staging areas for equipment, supplies and personnel. Drilling companies look for available vacant land in port areas close to the off-shore activity (usually within 150 miles of the lease area) that can be leased according to the drilling company needs (short term lease for temporary bases during exploration and long term leases upon development

drilling). Temporary service bases require 5-10 acres, 200 feet of wharf per rig and 15-20 foot water depths at pier. Permanent service bases require 25-30 acres per rig, 200 feet of wharf per rig and 15-20 foot water depths at pier.

Due to the limited facilities for large scale service base facilities (25-30 acres) it is expected that only supplemental service base facilities would utilize Ocean County ports and wharves. Supplemental services would be those light duty or specialized services compatible with the Ocean County commercial, and recreational and private fishing fleets and resort/tourist industry. Detailed environmental reviews would be required for any shipment and disposal of solid wastes or oil contaminated drill cuttings. The Manasquan Inlet area (Point Pleasant) and Barnegat Inlet area could provide limited service facilities related to personnel and equipment support activities. Limitations of available wharves and land area would restrict marine services to specialized services which may be required to supplement a central service base at another location along the coast (such as Atlantic City). Environmental concerns and potential adverse impacts on fishing and resort/tourist activities would have to be carefully evaluated.

Repair and Maintenance Yards

These are utilized by many firms which provide repair service for boats and equipment used for OCS development. Repairs vary

widely, but are likely to include hull, electronic, mechanical, and inspection work for 60-200 foot tugs, crew, supply, and research vessels, as well as repairs to a wide variety of equipment.

Fast, efficient, and available service and highly skilled labor are primary requirements of oil companies for repair and maintenance work. Accessibility to road, rail, and air transport is necessary for fast delivery of supplies and parts. Skills required may include certified welders, ship-fitters, electricians, mechanics, machinists, riggers, carpenters, pipe-fitters, sand-blasters and painters.

Ocean County is capable of providing repair and maintenance for many of the marine vessels which would be utilized in the service operations for oil drilling. Existing repair and maintenance facilities are located in several areas in Ocean County.

Supply Drilling Base

These bases supply the equipment part needs of an oil rig such as drill bits, tool joints, drill collars, pump parts, etc. Supply companies look for vacant warehouses within 75 miles of dockside to set up a support base for off-shore oil. Supply bases employ 4-5 during exploratory phase and up to 30 at peak development. Ocean County is well suited for this activity.

Drilling Mud Supply Base

Drilling mud is a term used for a mixture of water with such substances as clay, bentonite, and barite that is used in the drilling process to remove cuttings, lubricate the bit, and control subsurface pressures. A warehouse of at least 5,000 square feet, usually located along rail facilities, is used to store the drilling mud material. The material is usually shipped and stored in sacks or bulk form, but it can also be stored in liquid form in mud tank farms. Drilling mud supply bases employ approximately 9-10 persons. It may be possible to provide a limited drilling mud supply base in Ocean County but a proposed facility would have to be reviewed very carefully.

Catering Services

Services are needed for off-shore production and drilling platforms to provide personnel food, sanitary supplies, linen and incidental equipment at the rigs. In the Gulf Coast area catering services employ an estimated 2,500 persons with an approximate annual payroll of $20 Million. Spinoff benefits to the local economy can be expected from the purchasing of food, linen, restaurant equipment, trucks, etc. Ocean County is well suited for catering services and has existing catering services which could adapt to the specialized services required in drilling operations.

Steel Platform Installation Service Bases

These bases support the installation process of drilling platforms. Similar to temporary service bases in siting requirements, these bases require wharfage and waterfront warehouse space, and repair and maintenance facilities for vessels and barges.

Requirements and Impacts

Land: Approximately 5 acres of waterfront land

Wharfspace: 200 Ft/4 platforms installed

Water Depth: 15-20 Ft. at pier

Offshore Labor: Approximately 100/installation spread (25% local)

Onshore Labor: 25 Workers/installation spread (50%)

Onshore Wages: Approximately $425,000; annual average wage $17,000

Environmental Impact: Approximately the same as temporary service base

Ocean County wharves and docks may be able to supply supplemental or specialized services as long as the services are compatible with existing fishing and resort/tourist facilities.

Pipeline Installation Service Bases

These bases support off-shore pipeline installation operations. As with other service bases, distance from installation site is the most important siting consideration.

Requirements and Impacts

Land: Approximately 5 acres

Waterfront: 200 Foot wharf/spread; 15-20 foot depth

Labor: Approximately 25 on-shore jobs

Wages: Approximately $425,000 annually; average wage $17,000

Environmental Impacts: Similar to temporary service bases

Ocean County may be able to provide supplemental or specialized services as long as the services are compatible with existing fishing and resort/tourist facilities.

Air Supply and Emergency Air Support Services

Helicopter support services are an important adjunct of marine support services in the exploration and development of outer continental shelf drilling programs. These include personnel shuttle programs, selected supply and service functions (mail for example), and emergency support services.

Ocean County can be expected to serve as a base for emergency services due to existing naval helicopter services at Lakehurst Naval Air Station and Coast Guard emergency capabilities. Commercial helicopter services would be well suited at existing airports in Ocean County particularly the Lakewood and Robert J. Miller Airports. Such services would supplement other service functions required for off-shore oil exploration and development.

Communications and Administrative Support Services

These services are required for off-shore development and would be suitable for and acceptable to Ocean County. Several corporate and light industrial parks are capable of supporting such services in Ocean County including the Toms River Industrial Park, Lakewood Corporate Park and industrial/corporate development areas in Brick, Berkeley, Manchester, Jackson, Lacey and other areas of the County.

Oil Spill Clean-Up Equipment Storage

In the event of an oil spill resulting from off-shore oil development, the need for immediate response and beach protection is essential. Ocean County would support the storage of oil spill and estuary and beach protection equipment within the County. A comprehensive plan for oil spill protection would, hopefully, incorporate a storage area(s) within the County to help ensure protection of beaches and estuarine areas which constitute the natural resources and the basis for the County fishing and resort/tourism economic base.

UNSUITABLE FACILITIES FOR OUTER CONTINENTAL SHELF ACTIVITIES

Several functions of off-shore drilling and development are not deemed suitable for Ocean County due to environmental and other physiographic constraints, incompatibility with existing land use and economic development activities and current governmental policies and regulatory constraints. The principal facilities which are not suitable for Ocean County and a synopsis of the reasons for their unsuitability are described below.

Steel Platform Fabrication Yards

Steel platform fabrication yards require large (200-1000 acre) land areas on deep draft (15-30 foot) navigable waterways with almost direct sea access. Ocean County does not have suitable physical site capabilities for a steel platform fabrication yard. There are no 200-plus acre sites with deep draft waterways capable of hosting such a facility. It is unlikely that such a facility would be located in New Jersey based upon stated site requirements.

Pipe Coating Yards

Pipe coating yards require large land areas (100-150 acres) with 20-30 feet deep piers and a wharf area of approximately

750 feet. The yards prepare pipes for underwater use through the application of concrete and asphalt sealers. Due to the lack of suitable marine terminal facilities and the heavy industrial nature of the operation (extensive air emissions such as particulate matter, nitrogen oxides, sulfer oxides, carbon monoxide, hydrocarbons and wastewater contaminents including hydrocarbons, alkaline substances, particulates, metal fragements and others), pipe coating yards are not likely to be considered in Ocean County and would be unsuitable due to incompatibility with resort/tourist activities, commercial and pleasure fishing and boating and the secondary air quality standards for the County. Coating yards are prohibited by current coastal municipal zoning ordinances in Ocean County and are discouraged by the Coastal Management Strategy of New Jersey (1).

Oil and Gas Processing and Refining Plants

The processing of crude oil and natural gas in Ocean County is incompatible with existing land development patterns along the coast and the newly developing adult residential communities in many interior areas of the County. The impacts of OCS processing and refinery activities on Ocean County in terms of air emissions and water usage and pollution would be unacceptable to the County. Environmental, governmental and social constraints would prohibit the installation of such facilities in Ocean County. Refineries are prohibited in the Bay and Ocean Shore Segments of New Jersey's Management Program (1).

(1) The Bay and Ocean Shore Segment is a revision of the Coastal Management Strategy (September, 1977) to be submitted by the New Jersey Offices of Coastal Zone Management to NOAA in May, 1978. It represents a segment of New Jersey's Coastal Management Program, approval of which would require Federal activities to be consistent with New Jersey's coastal policies.

Pipeline Corridors

Pipeline corridors may consist of four (4) types; crude oil, processed, un-processed and processed natural gas. (Processed oil product pipelines are not expected to be considered in the coastal area due to the prohibition of refineries in the ocean and bay region of the State.) Pipeline corridors require 50-100 foot rights-of-way, 40 acres for pumping stations, 60 acres for terminals and 2-3 acres for compressors.

Pipeline location in Ocean County is complicated due to the problems of crossing beaches, traversing the Barnegat Bay and extensive wetlands areas, the Pine Barrens region, sensitive inland stream corridors and the conflicts with existing land uses within the County.

The lack of data relative to potential regional corridor routes, direct and indirect environmental impacts and the feasibility of corrodor locations within Ocean County have made impact analysis impossible at this point in time. Based upon the limited data available, Ocean County officials have been opposed to crude oil and un-processed gas pipeline corridors within the County. (Processed natural gas corridors may be able to utilize existing rights-of-ways in conjunction with current natural gas lines.) Opposition to oil pipelines results from a) the potential adverse impacts of construction, b) the potential serious beach areas clean-up in event of a pipeline break, c) the potential devastating impact on the County bays and estuarine areas, d) the potential of ground water contamination

in inland areas and e) the associated potential of gassification or partial processing plants which are deemed unsuitable for the reasons cited above.

The County of Ocean has repeatedly opposed pipeline development in the County through public statements, resolutions and statements before State and Federal legislative hearings. Any proposal for pipeline corridor location would be viewed very critically by Ocean County and detailed environmental analyses and impact analyses would be required by the County.

COUNTY ROLE IN COASTAL ENERGY FACILITY SITING

Ocean County has played and expects to continue to play a very strong role in coastal energy facility siting in New Jersey. While county government in the State of New Jersey has limited land use controls under enabling legislation and few defined powers other than to regulate development as it affects county roads and drainage facilities, counties have developed extensive planning expertise as a result of numerous transportation, environmental, social and facility planning demands placed on counties.

Expertise developed at the county planning board level is not usually available at the municipal planning board level. With this expertise, county planning departments have been able to collate and synthesize pertinent planning information that can be used in making land use decisions at the municipal, state and federal level. The county serves a coordination function which focuses attention on specific issues and impacts which may affect the county and it's municipalities. The relationships developed at the county level of government and their importance in coastal energy facility siting are described below.

County-State Relationship

The State has recognized the county level of expertise by granting planning funds to Ocean County and eleven other New Jersey counties affected by OCS development to assist the State in analyzing and developing the energy element that is mandated by the New Jersey Coastal Area Facility Review Act of 1973 and the Federal Coastal Zone Management Act of 1976. Ocean County views its relationship with the State in coastal energy facility siting as basically being of one of coordinating appropriate land use, environmental, social and other data relating to Ocean County and providing the State with input that reflects county and municipal plans and policies relative to OCS development and on-shore energy facility siting and impacts.

County-County Relationships

There are many coastal energy facility siting characteristics that are of regional significance, such as pipeline corridors and oil or gas processing plant siting. It is for this reason that coordination among counties is viewed as being of particular importance. During the time frame of the OCS and energy facilities contract, Ocean County coordinated its efforts with other counties in a number of ways. The County met monthly with the State and the eleven (11) other counties to discuss the energy facility plans each county was developing. Monthly

reports of findings were also shared. In addition, Ocean County met with representatives from Atlantic, Burlington, Camden and Gloucester Counties to discuss potential pipeline corridors of mutual interest and concern. Further, the County has co-ordinated efforts with Atlantic, Cape May and Monmouth Counties through the creation of the Coastal Counties Off-Shore Development Committee which holds regular meetings and provides coordination in terms of data distribution, county policy formulation, joint legal action, public coordination activities and continuing communication among the counties. Because of the regional impact of many energy related facilities, communication and coordination among counties should continue in order to improve basic energy facilities and siting data, policy development and coordination of legal actions as required.

County-Public Relationship

Similar to the County's relationship with the municipalities, the County is seen as a clearinghouse for disseminating pertinent information dealing with energy facility siting issues to the public and a subregional coordinating agency for public input and data compilation of public concerns. The County serves as an important source of public information on energy issues through the Board of Chosen Freeholders, Planning Board, the County Energy

Office, the County Consumer Affairs Office and various other County boards and agencies. The County has sponsored and co-sponsored numerous public meetings, hearings and lectures on energy developments in the County. The Planning Board has presented numerous slide shows to senior citizen, business, civic, educational and social groups relative to energy studies and facilities which may affect Ocean County and its residents.

The Energy Council has developed numerous programs on energy designed to educate the public about energy needs and programs, to coordinate energy activities and to assist the County in developing a balanced energy policy. The Consumer Affairs Office works with consumer groups (and individuals) on protecting consumer rights and promoting energy conservation and awareness. Finally, the Board of Chosen Freeholders has evaluated the numerous energy development activities, programs and proposals within the County including on-shore nuclear, off-shore nuclear, nuclear cluster, off-shore oil development, deep water ports, solar energy, methane development from solid waste processing, county-wide energy conservation and others. In effect, the County has developed a public awareness of the energy.

COUNTY VIEW OF STATE AND NATIONAL INTERESTS IN COASTAL ENERGY SITING

Ocean County recognizes the importance of State and national interests in coastal energy siting, but also recognizes that there are competing state and national interests in terms of the coastal area of New Jersey. The protection and preservation of the coastal area environment is deemed by Ocean County to be as important in terms of state and national interests as the development of coastal energy activities.

Ocean County views a high quality coastal environment as a state and national resource in terms of long-term food production through fishing, clamming and other marine oriented activities which produce a form of state and national "aqua culture" which is one of the most productive in the world.

The County also views the extensive recreational facilities as a national resource which results in energy conservation through the close proximity of daily, weekly and seasonal recreational activities for the millions of metropolitan residents in the New York, Philadelphia and mid-Atlantic region.

Ocean County views the coastal region as a national resource in terms of attracting foreign visitors and tourists thus producing a positive impact on the national balance of payments situation.

Ocean County views the coastal region as a national and state resource in terms of providing housing and recreational activities in close proximity to the industrial, commercial and financial centers in the New York and Philadelphia metropolitan areas. These views have resulted in a County policy of asserting that any evaluation of coastal energy facility siting must be made within a context of the long-term importance of maintaining a high quality coastal environment which will protect and enhance the recreation, resort/tourist, fishing and related marine industries and future residential (including retirement community) development.

Ocean County has opposed all OCS development which would conflict with these views and has authorized legal action when these views may be violated. Thus, Ocean County has intervened in off-shore nuclear permit hearings and opposed oil lease sales in the Mid-Atlantic region. The County has also opposed proposed future on-shore nuclear facilities and hydrocarbon processing plants. The County has testified before State Senate and Assembly energy hearings; the New Jersey Public Utilities Commission; U. S. Congressional and Senate energy hearings; the Nuclear Regulatory Agency; numerous federal and state sponsored seminars, forums, conferences and public meetings. The County was also an

original co-sponsor of the Coastal Counties Off-Shore Development Control Committee which is now composed of the four (4) New Jersey coastal counties (Ocean, Monmouth, Atlantic and Cape May).

In concert with other coastal counties, Ocean County views the OCS development program as one which lacks any meaningful Federal-local communication; coordination and cooperation on a continuing basis. Ocean County urges that the National Environmental Policy Act and the Intergovernmental Cooperation Act mandating a national interest in environmental protection and intergovernmental cooperation be adhered to in off-shore and on-shore energy siting and development.

Ocean County urges that state and federal policies recognize and incorporate the state and national interests in the protection of a high quality coastal environment for state and national recreation/tourist, fishing and aquaculture for existing and future demands.

COUNTY VIEW OF STATE AND FEDERAL ASSISTANCE IN COASTAL ENERGY SITING

As presented in the preceding sections, Ocean County recognizes the need for siting of coastal dependent OCS and energy facilities in the coastal zone. However, when this occurs, state and federal level agencies should be required to aid municipalities and counties which are impacted by energy development and must protect the state and national interests in a quality coastal environment.

State and federal aid should be in the form of guidance, coordination, planning and financial assistance to mitigate the adverse impact. This must originate at the federal and state levels. Areas in which assistance could be rendered are additional housing, police, fire, emergency, sewer, water, recreation, roads, school and social service demands created by the siting of energy facilities. State and federal assistance should also be established to provide protection and compensation where required, for economic and environmental degradation.

By providing adequate planning assistance and guidance to the counties, the state and federal agencies can recognize the importance of not only the local interests, but also the state

and national interests related to energy development. Federal assistance concerning the overall national coastal zone policy most likely will originate with the Department of Commerce NOAA OCZM while state policy would be based and influenced by inputs from the New Jersey Department of Environmental Protection and the Department of Energy. Some assistance could be in the form of local grants to enable the counties to carry out necessary energy siting studies, to plan for the impacts of siting of energy facilities within the coastal zone and to provide for the required coordination of these activities on a subregional basis. The County views these activities as providing mutual long term benefits in terms of improved intergovernmental communication and coordination, detailed reviews and analyses and unique local contributions in developing balanced and responsible energy siting policies at the federal and state levels.

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