

**MUNICIPAL STORMWATER
MANAGEMENT PLAN**

**BOROUGH OF BARNEGAT LIGHT,
OCEAN COUNTY, NEW JERSEY**

MARCH 2005

Prepared by:

**Owen, Little & Associates, Inc.
443 Atlantic City Blvd.
Beachwood, NJ 08722
BNLT-00-BORO-4-SWR**

**Frank J. Little, Jr., P.E.P.P., C.M.E.
NJPE License No. 27085**

INTRODUCTION

The Municipal Stormwater Management Plan (MSWMP) documents the strategy for the Borough of Barnegat Light ("the Borough") to address stormwater-related impacts. The creation of this plan is required by N.J.A.C. 7:14A-25 Municipal Stormwater Regulations. This plan contains all of the required elements described in N.J.A.C. 7:8 Stormwater Management Rules. The plan addresses groundwater recharge, stormwater quantity, and stormwater quality impacts by incorporating stormwater design and performance standards for new major development, defined as projects that disturb one or more acre of land. These standards are intended to minimize the adverse impact of stormwater runoff on water quality and water quantity and the loss of groundwater recharge that provides baseflow in receiving water bodies. The plan describes long-term operation and maintenance measures for existing and future stormwater facilities.

The plan addresses the review and update of existing ordinances, the Borough Master Plan, and other planning documents to allow for project designs that include low impact development techniques. The final component of this plan is a mitigation strategy for when a variance or exemption of the design and performance standards is sought. As part of the mitigation section of the stormwater plan, specific stormwater management measures are identified to lessen the impact of existing development.

GOALS

The goals of this MSWMP are to:

- Reduce flood damage to life and property,
- Minimize, to the extent practical, any increase in stormwater runoff from any new development;
- Reduce soil erosion from any development or construction project;
- Assure the adequacy of existing and proposed culverts and bridges, and other in-stream structures;
- Maintain groundwater recharge;
- Prevent, to the greatest extent feasible, an increase in nonpoint pollution;
- Maintain the integrity of stream channels for their biological functions, as well as for drainage;
- Minimize pollutants in stormwater runoff from new and existing development to restore, enhance, and maintain the chemical, physical and biological integrity of the waters of the state, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, and other uses of water.

To achieve these goals, this plan outlines specific stormwater design and performance standards for new development.

STORMWATER DISCUSSION

Land development can dramatically alter the hydrologic cycle (see Figure 1) of a site and, ultimately, an entire watershed. Prior to development, native vegetation can either directly intercept precipitation or draw that portion that has infiltrated into the ground and return it to the atmosphere through evapotranspiration. Development can remove this beneficial vegetation and replace it with lawn or impervious cover, reducing the site's evapotranspiration and infiltration rates. Clearing and grading a site can remove depressions that store rainfall. Construction activities may also compact the soil and diminish its infiltration ability, resulting in increased volumes and rates of stormwater runoff from the site. Impervious areas that are connected to each other through gutters, channels, and storm sewers can transport runoff more quickly than natural areas. This shortening of the transport or travel time quickens the rainfall-runoff response of the drainage area, causing flow in downstream waterways to peak faster and higher than natural conditions. These increases can create new and aggravate existing downstream flooding and erosion problems and increase the quantity of sediment in the channel. Filtration of runoff and removal of pollutants by surface and channel vegetation is eliminated by storm sewers that discharge runoff directly into a stream. Increases in impervious area can also decrease opportunities for infiltration which, in turn, reduces stream base flow and groundwater recharge. Reduced base flows and increased peak flows produce greater fluctuations between normal and storm flow rates, which can increase channel erosion. Reduced base flows can also negatively impact the hydrology of adjacent wetlands and the health of biological communities that depend on base flows. Finally, erosion and sedimentation can destroy habitat which some species cannot adapt.

In addition to increases in runoff peaks, volumes, and loss of groundwater recharge, land development often results in the accumulation of pollutants on the land surface that runoff can mobilize and transport to streams. New impervious surfaces and cleared areas created by development can accumulate a variety of pollutants from the atmosphere, fertilizers, animal wastes, and leakage and wear from vehicles. Pollutants can include metals, suspended soils, hydrocarbons, pathogens and nutrients.

In addition to increased pollutant loading, land development can adversely affect water quality and stream biota in more subtle ways. For example, stormwater falling on impervious surfaces or stored in detention or retention basins can become heated and raise the temperature of the downstream waterway, adversely affecting cold water fish species such as trout. Development can remove trees along stream banks that normally provide shading, stabilization, and leaf litter that falls into streams and becomes food for the aquatic community.

BACKGROUND

Barnegat Light Borough encompasses a total area of 0.86 square miles, with 0.72 square miles being land area, and 0.14 square miles comprised of water area, and is located within Ocean County, New Jersey. The most recent census data indicates that the population has risen from 675 in 1990 to 764 in 2000, an increase of 89, or 13.2%. The 2000 census also indicates that 1,207 housing units are located within the Borough, which is approximately 58% greater than the number of people living year round within the Borough. These figures indicate that this is a resort community, with population surges during the summer months.

Barnegat Light Borough is the northernmost municipality on the barrier island of Long Beach Island, and is surrounded by water on three sides; on the east is the Atlantic Ocean, on the west is the Barnegat Bay and on the north is the Barnegat Inlet. Figure 2 depicts the Borough boundary on the USGS quadrangle maps. Figure 3 provides an aerial view of the Borough from 2002 Orthography.

The New Jersey Department of Environmental Protection (NJDEP) has established an Ambient Biomonitoring Network (AMNET) to document the health of the state's waterways. There are over 800 AMNET sites throughout the state of New Jersey. These sites are sampled for benthic macroinvertebrates by NJDEP on a five-year cycle. Streams are classified as non-impaired, moderately impaired, or severely impaired based on the AMNET data. The data is used to generate a New Jersey Impairment Score (NJIS), which is based on a number of biometrics related to benthic macroinvertebrate community dynamics.

For the Borough of Barnegat Light, there are two water bodies along its coasts. The Atlantic Ocean to the east, has impairments including dissolved oxygen, total coliform and fecal coliform. However, the Borough does not have any outfalls to the Ocean, so there is no impact on the Borough. All outfalls are to the Barnegat Bay side of the Borough, and impairments are total coliform, fecal coliform, and dissolved oxygen.

Little Egg Harbor – Total coliform, fecal coliform and dissolved oxygen. This means the NJDEPO considers this a moderately impaired waterway, as is required to develop a Total Maximum Daily Load (TMDL) for these pollutants in the waterway.

A Total Maximum Daily Load (TMDL) is the amount of a pollutant that can be accepted by a waterbody without causing an exceedance of water quality standards or interfering with the ability to use a waterbody for one or more of its designated uses. The allowable load is allocated to the various sources of the pollutant, such as stormwater and wastewater discharges, which require an NJPDES permit to discharge, and nonpoint source, which includes stormwater runoff from agricultural areas and residential areas, along with a margin of safety. Provisions may also be made for future sources in the form of reserve capacity. An implementation plan is developed to identify how the various sources will be reduced to the designated allocations. Implementation strategies may include improved stormwater treatment plants, adoption of ordinances, reforestation of stream corridors, retrofitting stormwater systems, and other BMPs.

The New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d)) (Integrated List) is required by the Federal Clean Water Act to be prepared biennially and is a valuable source of water quality information. This combined report presents the extent to which New Jersey waters are attaining water quality standards, and identifies waters that are impaired. Sublist 5 of the Integrated List constitutes the list of waters impaired or threatened by pollutants, for which one or more TMDLs are needed.

Since the Borough of Barnegat Light is an island town, with water on both sides of its coasts, it is influenced by tidal patterns. The existing stormwater infrastructure is capable of handling design storm events during low tide. However, during a rain storm within high tide, the stormwater piping and inlet system becomes flooded.

No changes in development patterns or population have occurred within the Borough in many years. Occasional tidal flooding is expected within this type of community, and it is not necessary to make any changes to the existing system.

Figure 4 provides wellhead protection areas, which are required as part of the MSWMP.

DESIGN AND PERFORMANCE STANDARDS

The Borough will adopt the design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8-5 to minimize the adverse impact of stormwater runoff on water quality and water quantity and loss of groundwater recharge in receiving water bodies. The design and performance standards include the language for maintenance of stormwater management measures consistent with the stormwater management rules at N.J.A.C. 7:8-5.8 Maintenance Requirements, and language for safety standards consistent with N.J.A.C. 7:8-6 Safety Standards for Stormwater Management Basins. The ordinances will be submitted to the County for review and approval within 24 months of the effective date of the Stormwater Management Rules.

Specific attention is called to NJAC 7:8-5.4(a)3iv, regarding tidal flood hazard areas. It states that the stormwater runoff quantity analysis shall only be applied if the increased volume of stormwater runoff could increase flood damages below the point of discharge. For the Borough, which is within a Flood Zone, there is no danger of increased flood damages, as the outfalls are all to the Barnegat Bay. Therefore, no stormwater quantity analysis will be required of developers only a water quality analysis. The stormwater quality controls for total suspended solids and nutrient load shall meet the design and performance standards as specified in NJAC 7:8-5.

During construction, Borough Inspectors will observe the construction of the project to ensure that the stormwater management measures are constructed and function as designed.

PLAN CONSISTENCY

The Borough is not within a Regional Stormwater Management Planning Area and no TMDLs have been developed for waters within the Borough; therefore this plan does not need to be consistent with any Regional Stormwater Management Plans (RSWMPs) nor any TDMLs. If any RSWMPs or TMDLs are developed in the future, this Municipal Stormwater Management Plan will be updated to be consistent.

The Municipal Stormwater Management Plan is consistent with the Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21. The municipality will utilize the most current update of the RSIS in the stormwater management review of residential areas. This Municipal Stormwater Management Plan will be updated to be consistent with any future updates to the RSIS.

The Borough's Stormwater Management Ordinance requires all new development and redevelopment plans to comply with New Jersey's Soil Erosion and Sediment Control Standards. During construction, Borough Inspectors will observe on-site soil erosion and sediment control measures and report any inconsistencies to the Ocean County Soil Conservation District.

NONSTRUCTURAL STORMWATER MANAGEMENT STRATEGIES

The Borough has reviewed the master plan and ordinances, and has provided a list of the sections in the Borough land use and zoning ordinances that are to be modified to incorporate nonstructural stormwater management strategies. These are the ordinances identified for revision. Once the ordinance texts are completed, they will be submitted to the County review agency for review and approval within 24 months of the effective date of the Stormwater Management Rules. A copy will be sent to the Department of Environmental Protection at the time of submission.

The Borough of Barnegat Light has recently passed revised Ordinances, which amend and supplement Chapter 153 of the Borough Code, entitled "Sewers and Water" to provide for the control of stormwater facilities. Specifically, Section 153-40 provides "Prohibited Conduct", and states that no person shall discharge or cause to be discharged through an illicit connection to the municipal separate storm sewer system operated by the Borough of Barnegat Light any domestic sewage, non-contact cooling water, process wastewater, or other industrial waste (other than stormwater).

In addition, other revised ordinances include:

- Chapter 57, Animals, which provides regulations and restrictions on pet waste and prohibits wildlife feeding.
- Chapter 164, Solid Waste, which places restrictions on leaves and solid waste. The revised ordinance allows for the placement of containerized yard waste in the street, but prohibits the placement of yard waste that is not containerized from being placed in any location which would cause it to spill or blow into the street and/or come into contact with stormwater.
- Chapter 114, Littering, which provides language restricting illegal dumping on or along any street, road, right-of-way or from a boat into any waterway. It also prohibits the spilling, dumping or disposal of materials other than stormwater to or into the municipal separate storm sewer system operated by the Borough with certain exceptions, as listed in 114-3.C.

The remainder of the Ordinance has been reviewed and the following should be addressed:

- Chapter 168, Streets and Sidewalks – This section can be revised to indicate that developers should design sidewalks to discharge stormwater to neighboring lawns, where feasible, to disconnect impervious surfaces, or to use permeable paving materials where appropriate. Also, a section can be added to allow for flush curb stops or curb cuts, to allow vegetated swales to be used for stormwater conveyance and to allow the disconnection of impervious areas.

- Chapter 215, Zoning – This section currently provides requirements for lot development based upon zone restrictions. Lot coverage maximums are provided, representing building coverage. Language can be added which places maximum values on overall impervious coverage. Also, restrictions are placed on nonconforming buildings and uses, prohibiting any further development without Borough approval. This section can be revised so that any additional impervious surfaces on nonconforming lots is required to mitigate the impact of the additional impervious surfaces.

In addition to the above revisions, the following can be added to the Ordinance:

Landscaping – Requiring developers to preserve, whenever possible, natural features, such as trees, swamps, views, etc. and to take care to preserve selected trees to enhance soil stability and maintain natural vegetation to minimize the need for fertilizers and pesticides. Also, language can be added requiring minimum landscaping requirements for development, including a list of preferred species and shade tree recommendations.

Buffers: Requiring developers to provide buffers between residential and nonresidential lots by proposing landscaping meeting specific height, species and quantity/location requirements. Buffers can be used as stormwater management agents.

Offstreet Parking: Adding this section could allow developers to use permeable paving materials, such as clamshell, within parking areas, to minimize stormwater runoff and promote groundwater recharge.

LAND USE/BUILD-OUT ANALYSIS

Since the Borough of Barnegat Light contains 0.86 square miles, 0.72 square miles of which is land area, we are not required to prepare a Land Use/Build-Out Analysis. This analysis is only required of municipalities with more than one square mile of vacant or agricultural lands. Figure 5 is a Land Use Map and Figure 6 is a HUC14 (Hydrologic Unit Code) Watershed Area Map.

MITIGATION PROJECT CRITERIA

The mitigation plan is provided for a proposed development that is granted a variance or exemption from the stormwater management design and performance standards.

The mitigation project must be implemented in the same drainage area as the proposed development. The project must provide additional groundwater recharge benefits, or protection from stormwater runoff quality and quantity from previously developed property that does not currently meet the design and performance standards outlined in the Municipal Stormwater Management Plan. The developer must ensure the long-term maintenance of the project, including the maintenance requirements under Chapters 8 and 9 of the NJDEP Stormwater BMP Manual.

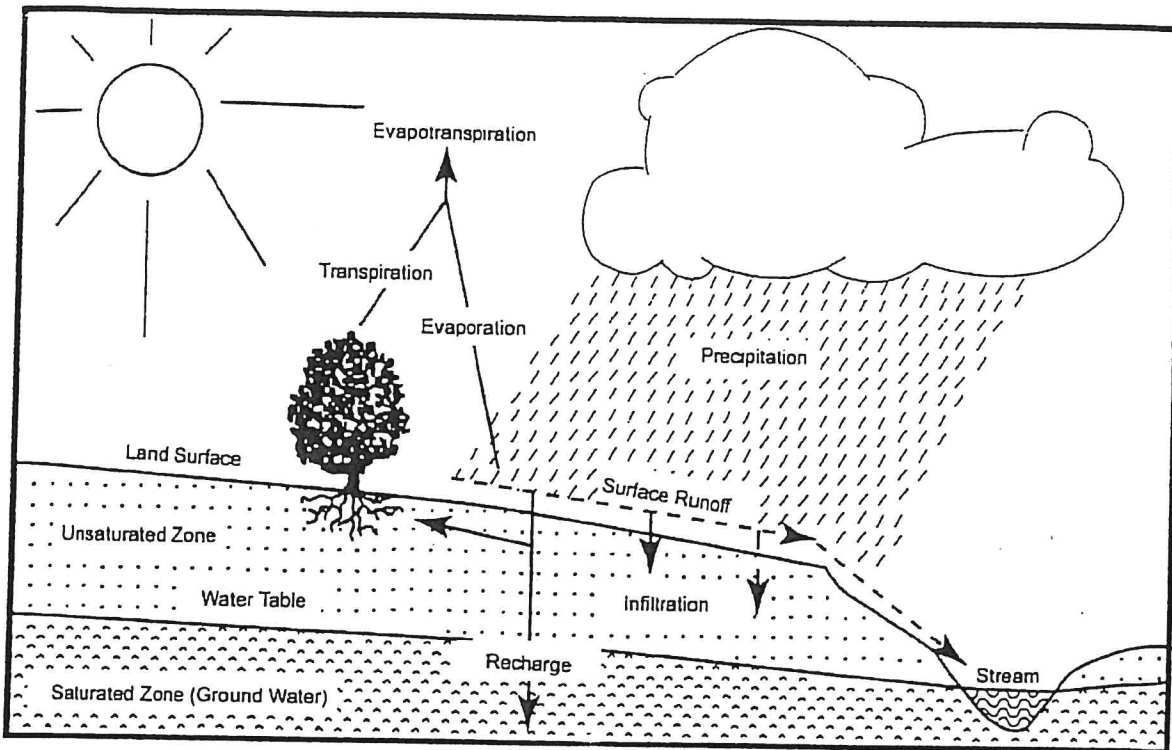
If a suitable site cannot be located in the same drainage area as the proposed development, as discussed above, the mitigation project may provide mitigation that is not equivalent to the impacts for which the variance or exemption is sought, but that addresses the same issue. For example, if a variance is given because the 80 percent TSS requirement is not met, the selected project may address water quality impacts due to a fecal impairment.

Two mitigation options are provided below, but this shall not be considered all-inclusive. If a developer can provide any different options for mitigation, they shall be presented to the Borough Engineer for this approval.

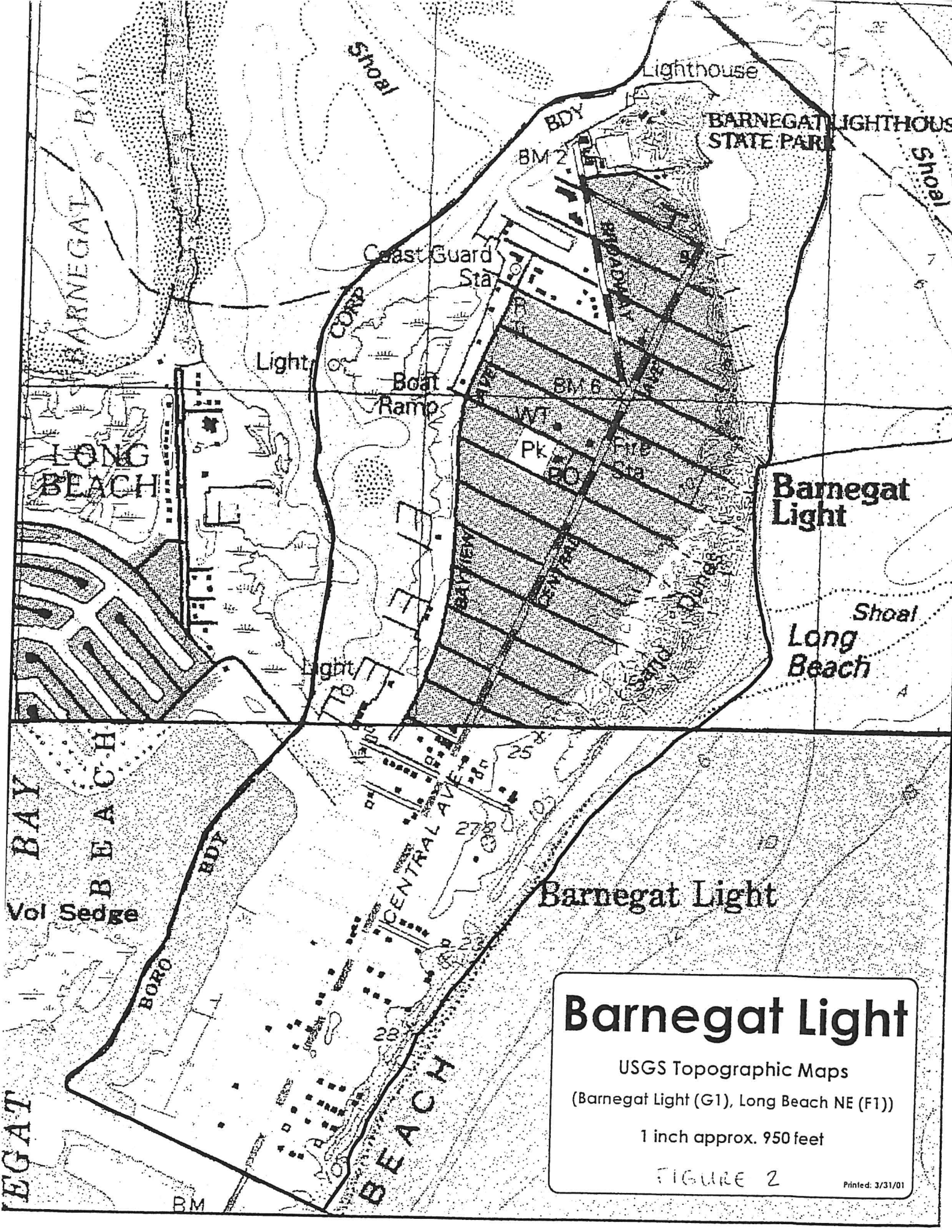
- Retrofit existing stormwater collection inlets, throughout the Borough, with grates and/or curb pieces as required in Appendix C of the NJBMP Manual.
- Install prefabricated stormwater filtration systems to provide water quality at the Borough's outfalls. Units installed shall be approved by the NJDEP and a maintenance schedule shall be provided.

FIGURES

Figure 1: Groundwater Recharge in the Hydrologic Cycle



Source: New Jersey Geological Survey Report GSR-32.



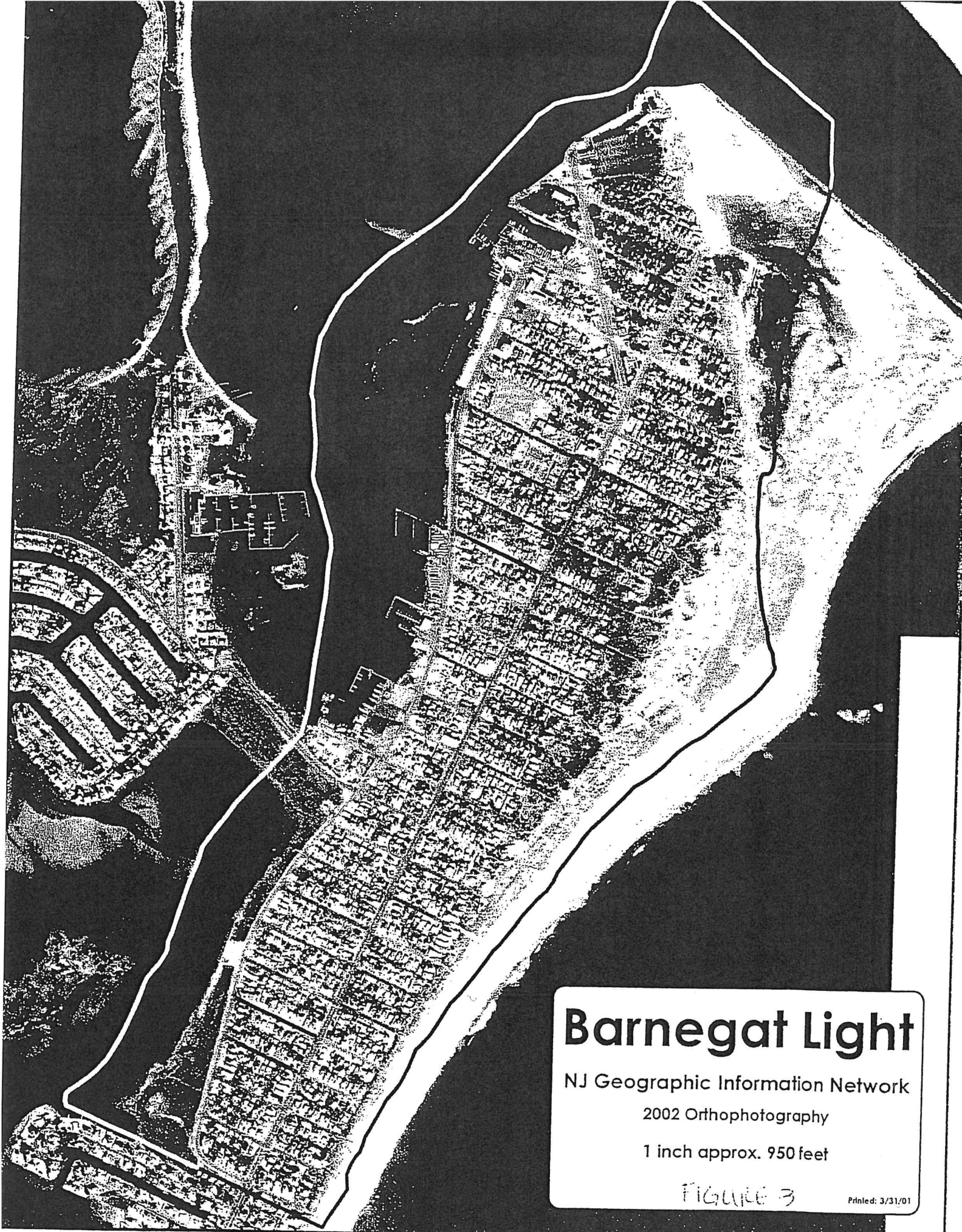
Barnegat Light

USGS Topographic Maps
 (Barnegat Light (G1), Long Beach NE (F1))

1 inch approx. 950 feet

FIGURE 2

Printed: 3/31/01



Barnegat Light

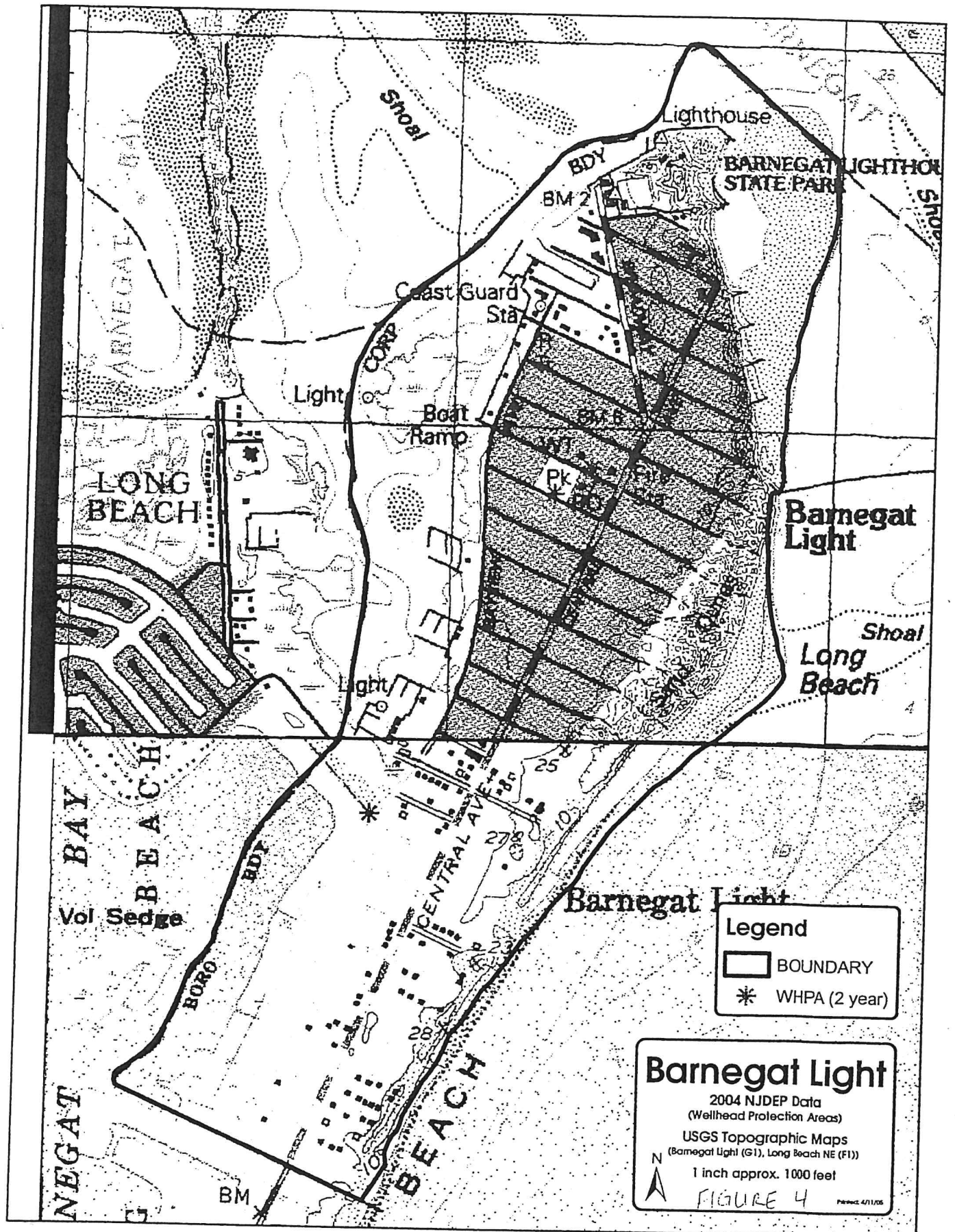
NJ Geographic Information Network

2002 Orthophotography

1 inch approx. 950 feet

FIGURE 3

Printed: 3/31/01



Legend

- BOUNDARY
- * WHPA (2 year)

Barnegat Light

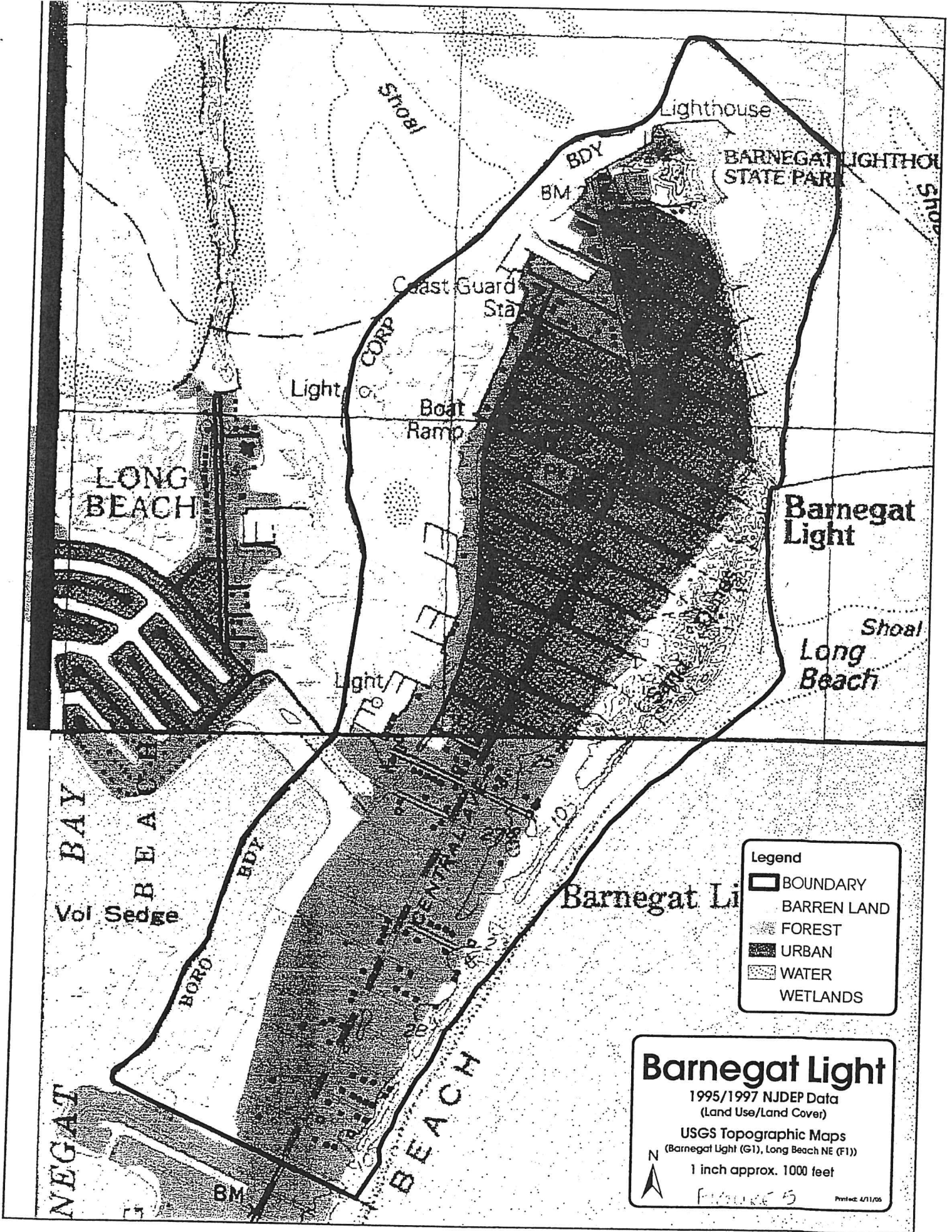
2004 NJDEP Data
(Wellhead Protection Areas)

USGS Topographic Maps
(Barnegat Light (G1), Long Beach NE (F1))

1 inch approx. 1000 feet

FIGURE 4

PARC 4/11/05



Legend

- BOUNDARY
- BARREN LAND
- FOREST
- URBAN
- WATER
- WETLANDS

Barnegat Light

1995/1997 NJDEP Data
(Land Use/Land Cover)

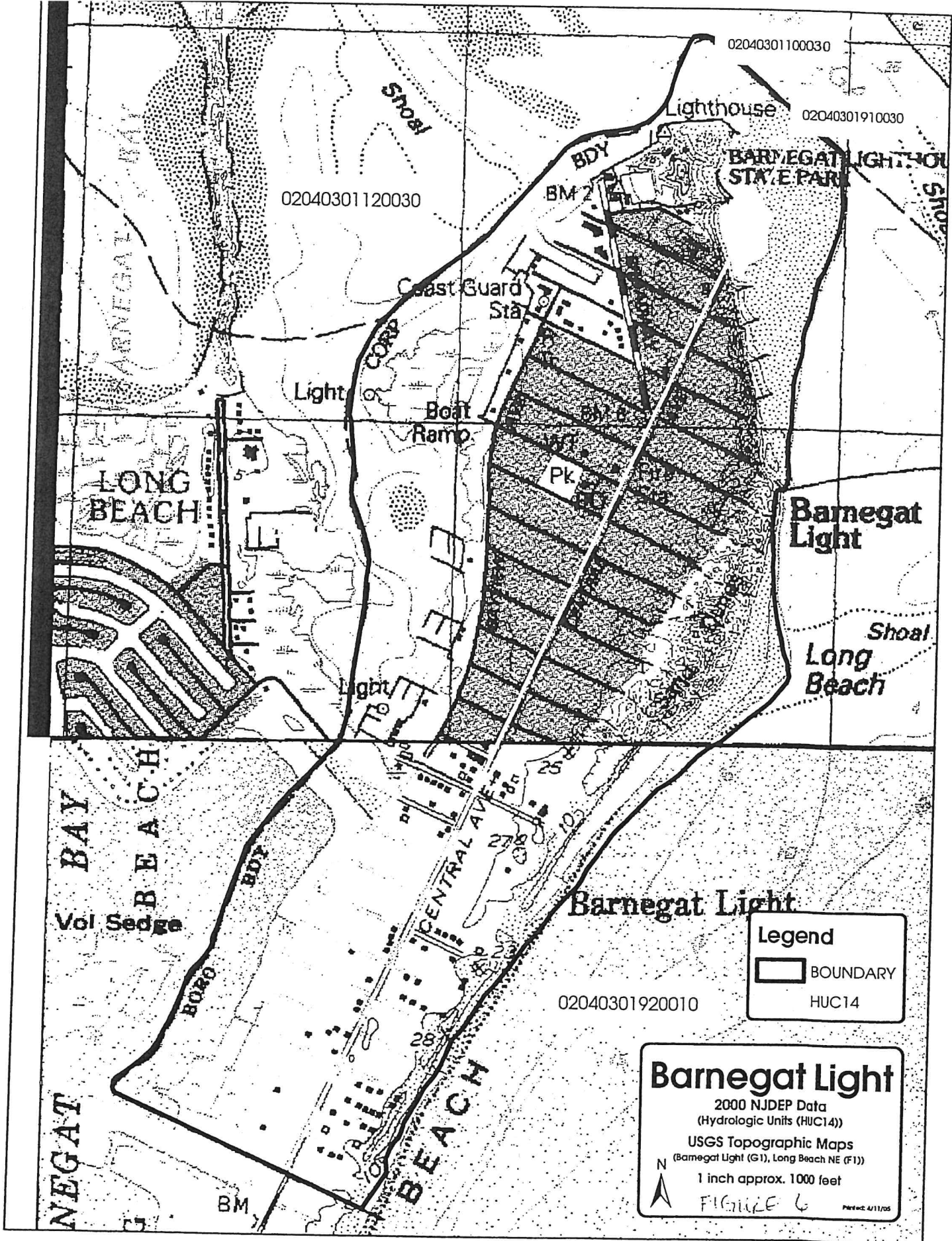
USGS Topographic Maps
(Barnegat Light (G1), Long Beach NE (F1))

1 inch approx. 1000 feet

N

FIGURE 15

Printed 4/1/05



Legend

- BOUNDARY
- HUC14

Barnegat Light

2000 NJDEP Data
(Hydrologic Units (HUC14))

USGS Topographic Maps
(Barnegat Light (G1), Long Beach NE (F1))

1 inch approx. 1000 feet

FIGURE 6

Printed: 4/11/05