TOWNSHIP OF BARNEGAT
OCEAN COUNTY, NEW JERSEY

MUNICIPAL STORMWATER MANAGEMENT PLAN

NJPDES #: NJGNJ014G852

Original Prepared: March 2005

Reviewed/Revised:
March 2008 by Remington Vernick & Vena Engineers
Updated June 12, 2025 by CME Associates

Adopted by the Planning Board on June 22, 2025 by Resolution P-2025-18

Prepared by:

849 West Bay Avenue, Suite 16
Barnegat, NJ 08005

ZACHARY M. JORDAN, PE, CME, CFM
Professional Engineer
New Jersey License No. 56527

TABLE OF CONTENTS
MUNICIPAL STORMWATER MANAGEMENT PLAN
TOWNSHIP OF BARNEGAT

I. INTRODUCTION

The Municipal Separate Stormwater System (MS4) Stormwater Plan was prepared by Barnegat Township's previous municipal engineers, Remington, Vernick & Verna, and bearing the latest revision of March 2008.

According to NJDEP the Stormwater Management Rules, NJAC 7:8 was amended and adopted on July 17, 2023. NJDEP indicated that the Storm Water Management Plan and the Stormwater Control Ordinances were to be adopted by July 17, 2024. The Township has updated the MSWMP, the Stormwater Pollution Prevention, Plan (SP3) and Stormwater Control Ordinance to be in accordance with the requirements set forth in the NJDEP MS4 Permit Conditions, amendments to the Pinelands Comprehensive Management Plan (CMP) and the amendments to NJAC 7:8 Stormwater Management Rules. The SP3 was updated on December 23, 2023. The Township has updated their stormwater ordinances in 2005, 2007, 2010, and 2020 to be consistent with latest model ordinances from NJDEP and the Pinelands Commission.

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for the Township of Barnegat to address stormwater-related impacts. The creation of this plan is required by N.J.A.C. 7:14A-25 (Municipal Stormwater Regulations).

The plan contained herein addressed 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 quantity/quality and the loss of groundwater recharge that provides base flow in receiving water bodies.

In addition, this plan describes long-term operation and maintenance measures for existing and future stormwater facilities. The plan also addresses the review and update of existing ordinances, the Township Master Plan and other planning documents to allow for project designs that include low impact development techniques and utilizing green infrastructure. The final component of this plan is a mitigation strategy for when a variance or exemption of the design and performance standards are sought.

II. GOALS

The goals of this MSWMP are as follows:

- Reduce flood damage, including 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, 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;

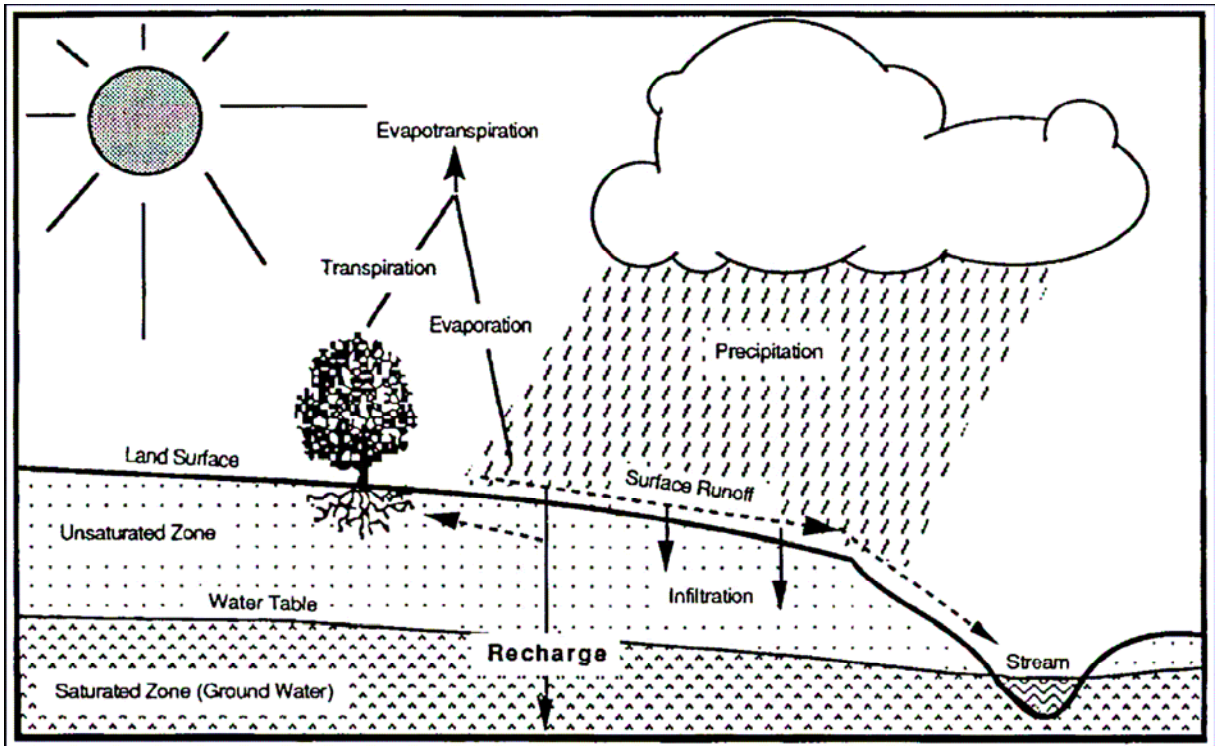
- Minimize pollutants in stormwater runoff from new and existing development to restore, enhance and maintain the chemical, physical and biological integrity of the waters of the state, protect public health, safeguard fish and aquatic life and scenic and ecological values, enhance the domestic, municipal, recreational, industrial and other uses of water;
- Protect public safety through the proper design and operation of stormwater basins.

To achieve these goals, this plan outlines specific stormwater design and performance standards for new development. Additionally, the plan proposes stormwater management controls to address impacts from existing development. Preventative and corrective maintenance strategies are included to ensure long-term effectiveness of stormwater management facilities. The plan also outlines safety standards for stormwater infrastructure to be implemented to protect public safety.

III. STORMWATER DISCUSSION

Land development can dramatically alter the hydrologic cycle (See Figure C-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 from which some species cannot adapt.

Groundwater Recharge in the Hydrologic Cycle



In addition, impervious areas that are connected to each other through gutters, channels and storm sewers can transport runoff more quickly that natural areas. This shortening of the transport or travel time quickens that 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 the stream. Increases in impervious area can also decrease opportunities for infiltration, which 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 from 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 solids, 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.

IV. BACKGROUND

The Township encompasses approximately 35 square miles in Ocean County, New Jersey. In recent years, the Township has been under significant development pressure. The population of the Township has increased from 12,235 in 1990, to 19,177 in 2004, to 20,936 in 2010, to an estimated amount of 23,655 in 2019 (per Ocean County Data Book 2020). This population increase has resulted in considerable demand for new development; changes in the landscape have most likely increased stormwater runoff volumes and pollutant loads to the waterways of the municipality.

Per consultation with Roger Budd, Barnegat Township Stormwater Coordinator, there are no significant stormwater or drainage issues to the Township. As referenced in this report, coliforms are the primary water quality concern for the Township and the remainder of the local Watershed Management Area (13).

As indicated on the "Township and its Waterways" Map and on the "HUC-14 Delineations Map", portions of the following waterways are present within Barnegat Township (west to east):

- Yellow Dam Branch
- Plains Branch (tributary to Oswego River)
- Oswego River
- Forked River
- Mill Creek
- Oyster Creek
- Four Mile Branch (Mill Creek)
- Waretown Creek
- Barnegat Bay and tributaries.

The 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 base 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. The AMNET site is found at:

https://dep.nj.gov/wms/bfbm/ambient-macroinvertebrate-network-amnet/

Only one (1) AMNET sampling location is located within Barnegat Township. The site ID is AN0603 and it is located on the Oswego River at Route 539. The site is classified as moderately impaired for benthic macroinvertebrates. No Additional impairment data has been located for Barnegat Township. This AMNET data can be found at:

https://gisdata-njdep.opendata.arcgis.com/datasets/njdep::ambient-biomonitoring-network-amnet-of-new-jersey/explore

In addition to the above AMNET site data, the following additional water bodies are listed as impaired per the NJDEP's 2004 Integrated List of Water bodies (all data reported from NJDEP Shellfish Monitoring):

Site ID	Water Body	Impairment Description
1672, 1672A 1673, 1673A	Double Creek Estuary	Total Coliform
Various	Barnegat Bay	Total Coliform
Various	Barnegat Bay Coastal Tributaries	Total Coliform

In addition to the above, a Total Daily Maximum Load (TMDL) was approved by NJDEP on September 27, 2006 for fourteen (14) waterbodies within Watershed Management Area (WMA) 13, which includes Barnegat Township.

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 a NJPDES permit to discharge, and nonpoint source, which includes stormwater runoff from agricultural areas and residential areas, along with a margin of safety.

Below is a list of all the applicable TMDL(s) within the Township of Barnegat:

Applicable Stream TMDL(s)

- None

Applicable Lake TMDL(s)

- Total Maximum Daily Loads for Pathogens to Address 18 Lakes in the Atlantic Coastal Water Region
  Fecal Coliform - 2007 : Deer Head Lake :
  https://www.nj.gov/dep/wms/bears/docs/adopted_atlantic_fecal_lake.pdf

- Total Maximum Daily Loads for Pathogens to Address 18 Lakes in the Atlantic Coastal Water Region
  Fecal Coliform - 2007 : Holiday Lake :
  https://www.nj.gov/dep/wms/bears/docs/adopted_atlantic_fecal_lake.pdf

- Total Maximum Daily Loads for Pathogens to Address 18 Lakes in the Atlantic Coastal Water Region
  Fecal Coliform - 2007 : Lake Barnegat :
  https://www.nj.gov/dep/wms/bears/docs/adopted_atlantic_fecal_lake.pdf

- Total Maximum Daily Loads for Pathogens to Address 18 Lakes in the Atlantic Coastal Water Region
  Fecal Coliform - 2007 : Manahawkin Lake :
  https://www.nj.gov/dep/wms/bears/docs/adopted_atlantic_fecal_lake.pdf

- Total Maximum Daily Loads for Pathogens to Address 18 Lakes in the Atlantic Coastal Water Region
  Fecal Coliform - 2007 : Ocean Twp Bathing Beach:
  https://www.nj.gov/dep/wms/bears/docs/adopted_atlantic_fecal_lake.pdf

Applicable Shellfish TMDL(s)

- Fourteen Total Maximum Daily Loads for Total Coliform to Address Shellfish-Impaired Waters in Watershed Management Area 13
  Total coliform - 2006 : Barnegat Bay-C :
  https://www.nj.gov/dep/wms/bears/docs/Coastal_Pathogen_TMDLs_WMA13.pdf

- Fourteen Total Maximum Daily Loads for Total Coliform to Address Shellfish-Impaired Waters in Watershed Management Area 13
  Total coliform - 2006 : Manahawkin Bay-C, Mill Creek-A :
  https://www.nj.gov/dep/wms/bears/docs/Coastal_Pathogen_TMDLs_WMA13.pdf

- Five Total Maximum Daily Loads for Total Coliform to Address Shellfish-Impaired Waters in Watershed Management Area 14
  Total coliform - 2006 : Mullica Middle-A, Mullica Upper-A, Wading River-A :
  https://www.nj.gov/dep/wms/bears/docs/Coastal_Pathogen_TMDLs_WMA14.pdf

In accordance with Section 305(b) and 303(d) of the Federal Clean Water Act, the State of New Jersey is required to assess the overall water quality of the State's waters and identify those waterbodies with a water quality impairment for which Total Maximum Daily Loads (TMDL) may be necessary. NJDEP fulfills its assessment obligation under the Clean Water Act through the Integrated Water Quality Monitoring and Assessment Report (Integrated Report), which includes the Integrated List of Waterbodies, issued biennially. The Integrated Report can be found at:

https://dep.nj.gov/wms/bears/integrated-wq-assessment-report-2022/

It is important to note that Barnegat Township does not have development conditions or uses within the above estuaries that traditionally contribute to total coliform exceedances

(e.g. agricultural farms, malfunctioning septic systems etc.). Only one horse farm exists within the Township, located on Ridgeway Street in the eastern part of the Township.

Is should be noted that there are two relatively large mobile home parks in the portion of the Township that is within the Pinelands Area, Brighton @ Barnegat and Pinewood Estates, which have been served by septic systems since their inception. The Township has contacted the Pinelands Commission regarding the feasibility of serving these developments with Public Sewer. Public sewerage of these areas would likely result in significant decreases in coliform counts within these areas.

Barnegat Township will address stormwater point sources through existing Best Management Practices (BPMS) of the MS4 program, as practicable, and in accordance with its MS4 permit obligations.

The Township passed wildlife feeding and pet waste (pickup) ordinances which are enforced by the Township. If needed, geese control measures could also be implemented.

If should also be noted that Barnegat Township will also attempt to manage waterward sources of coliforms as practicable, including the following:

- Enforcement of local No Discharge Zones (including Barnegat Bay)
- Endorsement of Clean Marina Programs
- Marina Best Management Practices (e.g. providing and managing Marina pumpout facilities, etc.)

It should be noted that as part of the Township's Municipal Separate Storm Sewer Permit, as outlined in its Stormwater Pollution Prevention Plan, existing inlets and stormwater management facilities are inspected annually and repair/maintenance are made. At that time, existing water quantity and erosion problems (if any) are assessed and abated to the maximum extent practicable.

In addition, future major development will comply with the new NJDEP Stormwater Design Standards (NJAC 7:8), including average annual recharge.

V. DESIGN AND PERFORMANCE STANDARDS

The Township has adopted 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 quantity/quality 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 were submitted to the Ocean County reviews and approval (within 24 months of the effective date of the Stormwater Management Rules). Current versions of the Township's existing stormwater ordinances as are follows:

§ 55-329.1	Non-Pinelands Ordinance #2024-13, updated May 7, 2024, adopted June 6, 2024

§ 55-330	Pineland Ordinance #2023-08, updated February 7, 2023 and adopted March 7, 2023
§ 55-191 & 55-191.1	Tree Reforestation Ordinance #2023-08, updated February 7, 2023 and adopted March 7, 2023

In addition, the "Trees and Shrubs" Ordinance 2014-14 and "Division II East of Parkway" Ordinance 2014-15 updated §55-191 and §55-191.1 to be consistent with NJDPE and Pinelands tree protection and reforestation.

As stated in this report, Township properties under Pinelands jurisdiction (i.e. the majority of the Township's land area) are subject to the Pinelands design standards as outlined in the Township's stormwater ordinance #2023-08 for Pinelands properties (i.e. within the Pinelands Commission's jurisdiction).

In addition, all regulated stormwater BMP facilities will be subject to operation and maintenance requirements stipulated in the NJ Stormwater Rule, including but not limited to the following:

- The design engineer shall prepare a maintenance plan for the stormwater management measures incorporated into the design of a major development.

- The maintenance plan shall contain specific preventative maintenance tasks and schedules; cost estimates, including estimated cost of sediment, debris, or trash removal; and the name, address and telephone number of the person(s) responsible for preventative and corrective maintenance (including replacement).

- Preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measure(s), including repairs or replacement to the structure; removal of sediment, debris or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; and repair or replacement of non-vegetated linings.

- The person responsible for maintenance shall maintain a detailed log of all preventative and corrective maintenance for the structural stormwater management measures incorporated into the design of the development, including a record of all inspections and copies of all maintenance-related workorders.

- The person responsible for maintenance shall evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed.

- The person responsible for maintenance shall retain and make available, upon request by any public entity with administrative, health, environmental, or safety authority over the site, the maintenance plan and the documentation required by the Township's stormwater ordinances.

- In the event that the stormwater management facility becomes a danger to public safety or public health, or if it is in need of maintenance or repair, the municipality shall so notify the responsible person in writing. If the responsible person fails or refuses to perform such maintenance and repair, the municipality or County may immediately proceed to do so and shall bill the cost thereof to the responsible person.

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

VI. PLAN CONSISTENCY

The Township is not within a Regional Stormwater Management Planning Area. As stated previously, a Total Maximum Daily Load (TMDL) was approved by NJDEP on September 27, 2006 for fourteen (14) water bodies within Watershed Management area (WMA) 13, which includes Barnegat Township. This MSWMP is also in compliance with the Pinelands Commission's Comprehensive Management Plan (CMP).

As referenced previously, the Township adopted both Pinelands and non-Pinelands stormwater ordinances for respective properties within Barnegat that are regulated by their respective locations and agency jurisdiction.

Approximately 56% of the Township (i.e. westerly portion) is within the Pinelands National Reserve and under the jurisdiction of the Pinelands commission.

Easterly portions of the Township are within the NJDEP Coastal Zone and possibly subject to CAFRA regulations. For such areas, CAFRA rules incorporate the new Stormwater Rule(s) by reference. It should be noted that in such areas, where CAFRA development permits are submitted, the NJDEP could require a mitigation plan even if Barnegat Township does not.

If any Regional Stormwater Management Plans (RSWMPs) or additional 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 Township's Stormwater Management Ordinances require all new development and redevelopment plans to comply with New Jersey's Soil Erosion and Sediment Control Standards. During construction, Township inspectors will observe on-site soil erosion and sediment control measures and report any inconsistencies to the Ocean County Soil Conservation District.

VII. 2021 MASTER PLAN RE-EXAMINATION REPORT

The Ocean County Comprehensive Master Plan serves as a county policy statement about the future development of Ocean County. While it makes no statement that are explicitly relevant to future land use planning within Barnegat Township, it does make a number of recommendations that would promote sustainability and resiliency in Barnegat Township. These include (commentary in ***bold italics***):

- Encourage low-impact design techniques to minimize the disturbance of natural areas and maximize the recharge of stormwater on-site.

  Maximizing the recharge of stormwater on-site may help to decrease the incidence of flooding.

- Continue to assist the State of New Jersey in the implementation of the Governor's Ten-Point Plan for Barnegat Bay.

  Key parts of the Ten-Point Plan that will promote resiliency in Barnegat Township include funding storm water mitigation projects and acquiring land in the Barnegat Bay watershed.

- Encourage land use planning strategies, such as low-impact design to preserve open space and maximize the natural infiltration of storm water.

  Preservation of open space and maximization of storm water infiltration helps to minimize flooding and promotes resiliency to extreme weather events.

- Explore and assess best management practices used by other areas in the country to address stormwater management.

  Effectively addressing stormwater management helps to minimize flooding and promotes resiliency to extreme weather events

- Continue to assess structural and nonstructural options for stormwater management to increase infiltration, remove debris and reduce nutrient and pollution loads.

  Increasing infiltration will help to reduce flooding. Additionally, removing debris will help to increase the efficiency of existing stormwater management facilities.

- Encourage compliance with new legislation that requires New Jersey Department of Transportation to address stormwater management issues on state highways, including US Route 9 and NJ Route 72.

  Addressing stormwater management issues along highways will help to minimize their impacts and increase their safety. This is particularly important as highways generate stormwater runoff and may serve as evacuation routes during emergencies.

Ocean County Multi-Jurisdictional Hazard Mitigation Plan
The Ocean County Multi-Jurisdictional Hazard Mitigation Plan (Ocean County HMP) was last adopted in 2018 and approved by FEMA in 2020. The next update of the Ocean County HMP is scheduled to commence in 2023 and be completed by 2025 (n.b., the current Ocean County Multi-Jurisdictional Hazard Mitigation Plan is set to expire in 2025).

The Ocean County HMP documents Ocean County's continuing attempts to identify potential natural hazards and associated risks across jurisdictions and to develop an integrated mitigation strategy. The Plan addresses the mitigation of potential damage to public, quasi-public, and private entities, facilities, and infrastructure. Ocean County's intention for the Ocean County HMP is to substantially reduce and/or eliminate long-term risk to life and properties associated with natural hazards.

Also, as part of its participation in the preparation of Ocean County HMP, the Township of Barnegat identified a number of municipal mitigation measures to mitigate the impacts of natural hazards. The Township's identified municipal mitigation measures include the following:

1. Elevate 20 homes; Focus on Bayshore Drive & Pebble Beach Section;
2. Install riprap along the shoreline along Bayshore Drive and south Plank Road;
3. Continue annual beach replenishment program each spring;
4. Maintain and improve Forest Fire website, continue the post updates and share information through same;
5. Continue participation in CRS program.

VIII. NONSTRUCTURAL STORMWATER MANAGEMENT STRATEGIES

Non-structural stormwater strategies for design of new developments or redevelopments, as defined per the NJDEP Stormwater Design Regulations (N.J.A.C. 7:8), include the following objectives:.

- Protection of areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss.
- Minimizing impervious surfaces and breakup or disconnecting the flow of runoff over impervious surfaces.
- Maximum protection of natural drainage features and vegetation.
- Minimizing the decrease in the “time of concentration” from pre-construction conditions to post-construction conditions.
- Minimizing land disturbance during clearing and grading.
- Minimizing soil compaction.
- Providing low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides.
- Providing vegetated open channel conveyance systems discharging into and through stable vegetative areas.
- Provide other source controls to prevent or minimize the use or exposure of pollutants from development sites in order to prevent or minimize the release of those pollutants into stormwater runoff. These source controls include, but are not limited to:
    - Development design features that help to prevent accumulation of trash and debris in drainage systems;

- o Development design features that help to prevent discharge of trash and debris from drainage systems;
- o Development design features that help to prevent and/or contain spills or other harmful accumulations of pollutants at industrial or commercial developments; and
- o When establishing vegetation after land disturbance, applying fertilizer in accordance with the requirements established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq., and implementing rules.

Additional nonstructural stormwater management strategies such as Green Infrastructure 9GI) BMP's and Low Impact Development (LID) should be developed based upon physical site conditions and the origin, nature, and the anticipated quantity, or amount, of potential pollutants. Enclosed within Appendix C of this plan is a review of Barnegat's existing Master Plan and Ordinances for compliance with non-structural strategies, using the checklist provided in the New Jersey Best Management Practices (NJBMP) manual. Ordinance changes for additional compliance will be made at the discretion of Barnegat Township.

In addition, as indicated previously, Barnegat Township has adopted the NJDEP and Pinelands model stormwater control ordinance, as amended and updated for use and enforcement within the Township of Barnegat. This ordinance includes methodologies for incorporating non-structural stormwater strategies identified above, in design, "to the maximum extent practicable".

If an applicant (or his/her engineer) contends that it is not feasible for engineering, environmental or safety reasons to incorporate any non-structural stormwater management strategies identified in (b) below into the design of a particular project, the applicant will identify the strategy and provide a basis for the contention. It is understood that any project requiring NJDEP Land Use Regulation Program permitting or approvals will also be subject to a similar stormwater review by the appropriate agency.

IX. LAND USE/BUILD-OUT ANALYSIS

A detailed land use analysis for the Township was conducted and all applicable mapping is included in Appendix A. The Existing Land Use Map illustrates the existing land use in the Township based on 1995/97 GIS Information from NJDEP. The Hydrologic Units Map illustrates the HUC14s within the Township. The Township Zoning Map is also included. The Wetlands Map illustrates the constrained lands within the Township. The build-out calculations for impervious cover are shown in Table 1. Table 2 presents the pollutant loading coefficients by land cover. The pollutant loads at full build-out are presented in Table 3.

X. MITIGATION PLANS

This mitigation plan is provided for a proposed development that is granted a variance or exemption from the stormwater management design and performance standards. Presented is a hierarchy of options.

Mitigation Project Criteria

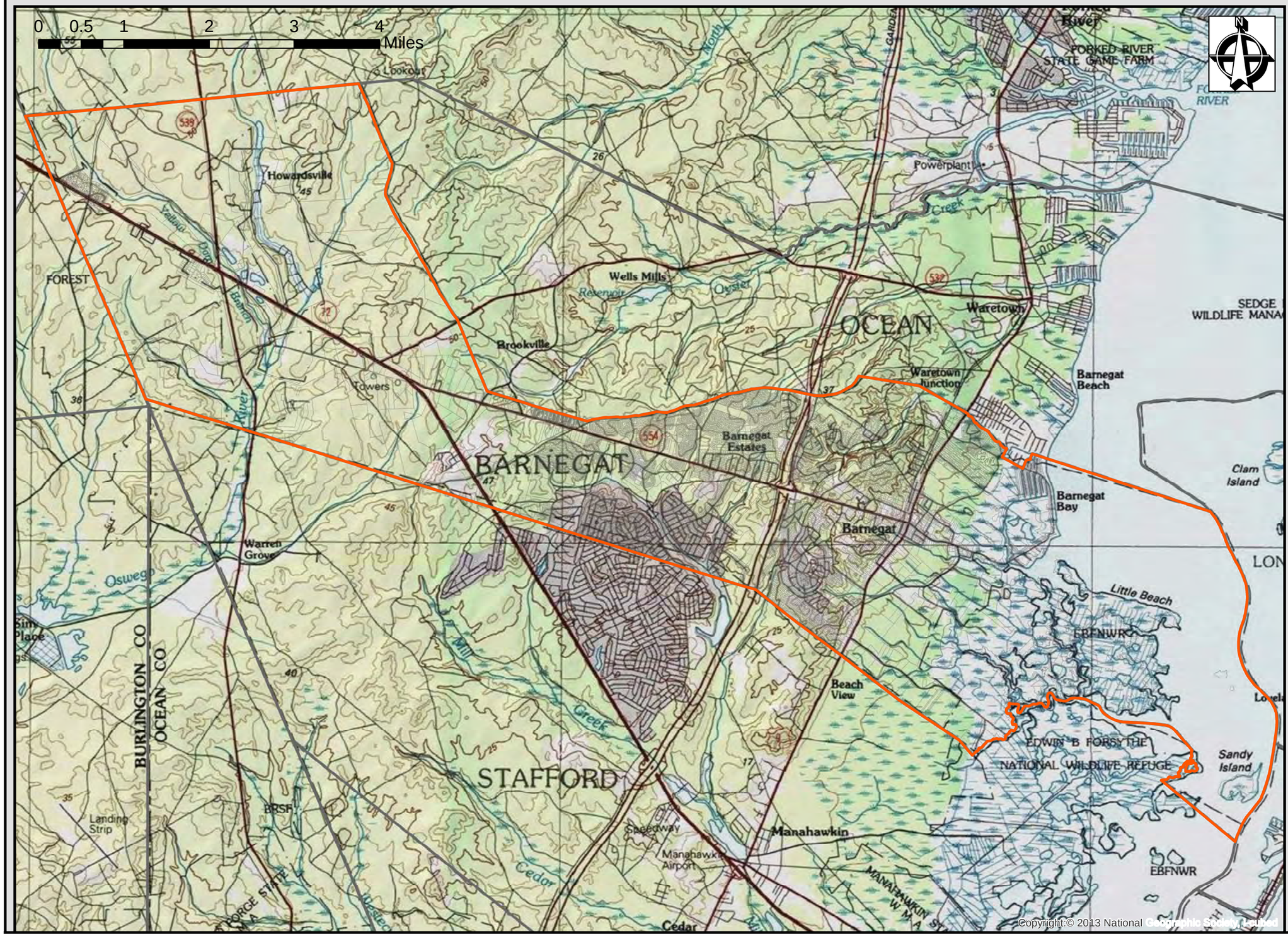
1. The mitigation project must be implemented in the same drainage area as the proposed development. The project must provide additional groundwater recharge benefits, or protection from stormwater runoff quality and quantity from previously developed property that does not currently meet the design 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.

All Mitigation Projects will be reviewed on a case by case basis. Review and recommendation will be done by the Township Planner and Township Engineer. The Recommendation will be brought to the Planning Board for review on its consistency with the Master· plan.

APPENDIX A
MAPPING

USGS Map

BARNEGAT, N.J.



Municipal Stormwater Management Plan

Barnegat Township
Ocean County
New Jersey

Legend

- Barnegat Border
- Parcels

Source: NJDEP Bureau of GIS, NJGIN

CME ASSOCIATES

CONSULTING & MUNICIPAL ENGINEERS

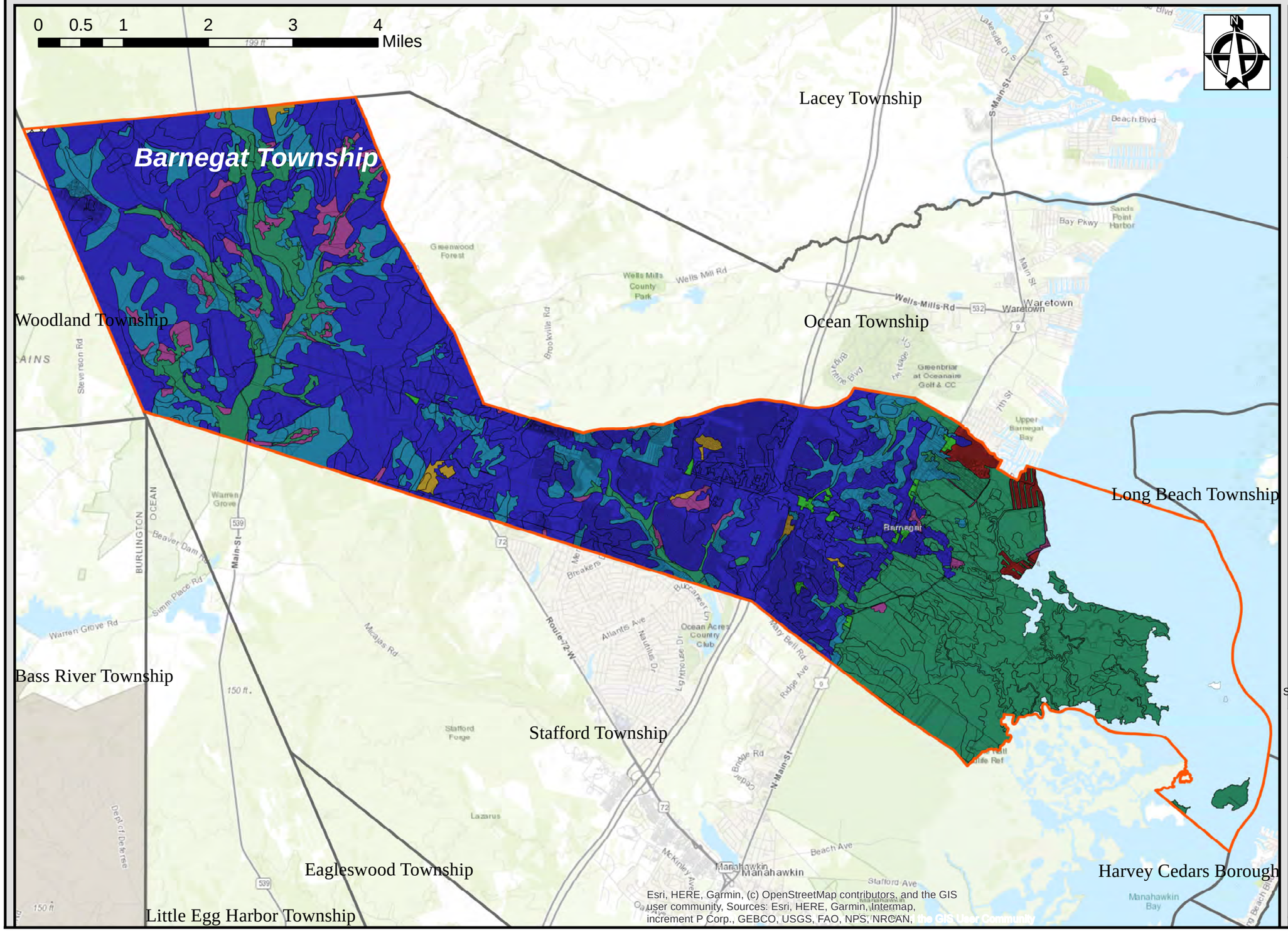
3141 BORDENTOWN AVENUE, PARLIN, N.J. 08859
1460 ROUTE 9 SOUTH HOWELL, N.J. 07731
3759 ROUTE 1 SOUTH SUITE 100, MONMOUTH JUNCTION, NJ 08852
ONE MARKET STREET SUITE 1F, CAMDEN, NJ 08102

WWW.CMEUSAI.COM

DATE	SCALE	LAST REVISED	CREATED BY
05/16/25	1 in = 5,917 feet	N/A	RA

Groundwater Recharge

BARNEGAT, N.J.



Municipal Stormwater Management Plan

Barnegat Township
Ocean County
New Jersey

Parcels

Groundwater Recharge

- 0 in/yr
- 1 to 7 in/yr
- 8 to 10 in/yr
- 11 to 15 in/yr
- 16 to 23 in/yr
- Hydric Soil
- Wetlands, Open Water
- No Recharge Calculated

Source: NJDEP Bureau of GIS(2023) , NJGIN(2024)

CME ASSOCIATES

CONSULTING & MUNICIPAL ENGINEERS

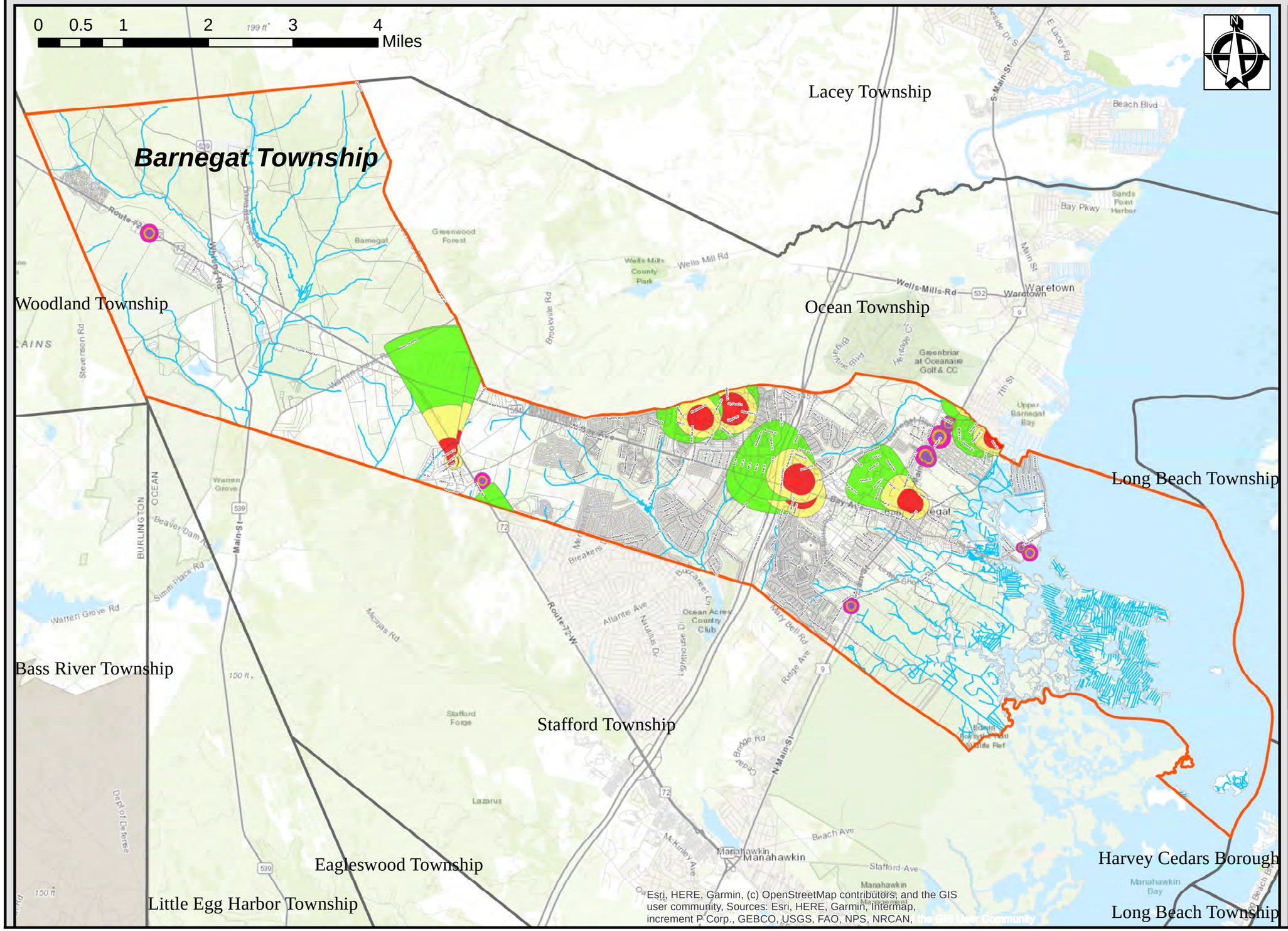
3141 BORDENTOWN AVENUE, PARLIN, N.J. 08859
1460 ROUTE 9 SOUTH HOWELL, N.J. 07731
3759 ROUTE 1 SOUTH SUITE 100, MONMOUTH JUNCTION, NJ 08852
ONE MARKET STREET SUITE 1F, CAMDEN, NJ 08102

WWW.CMEUSA1.COM

DATE	SCALE	LAST REVISED	CREATED BY
05/16/25	1 in = 5,917 feet	N/A	RA

Wellhead Protection Areas

BARNEGAT, N.J.



Municipal Stormwater Management Plan

Barnegat Township
Ocean County
New Jersey

Public Community Wells

- Tier 1: 2-Year
- Tier 2: 5-Year
- Tier 3: 12-Year

Public Non-Community Wells

- Tier 1: 2-Year
- Tier 2: 5-Year
- Tier 3: 12-Year

- Streams
- Parcels

Source: NJDEP Bureau of GIS (2023), NJGIN (2024)

CME ASSOCIATES

CONSULTING & MUNICIPAL ENGINEERS

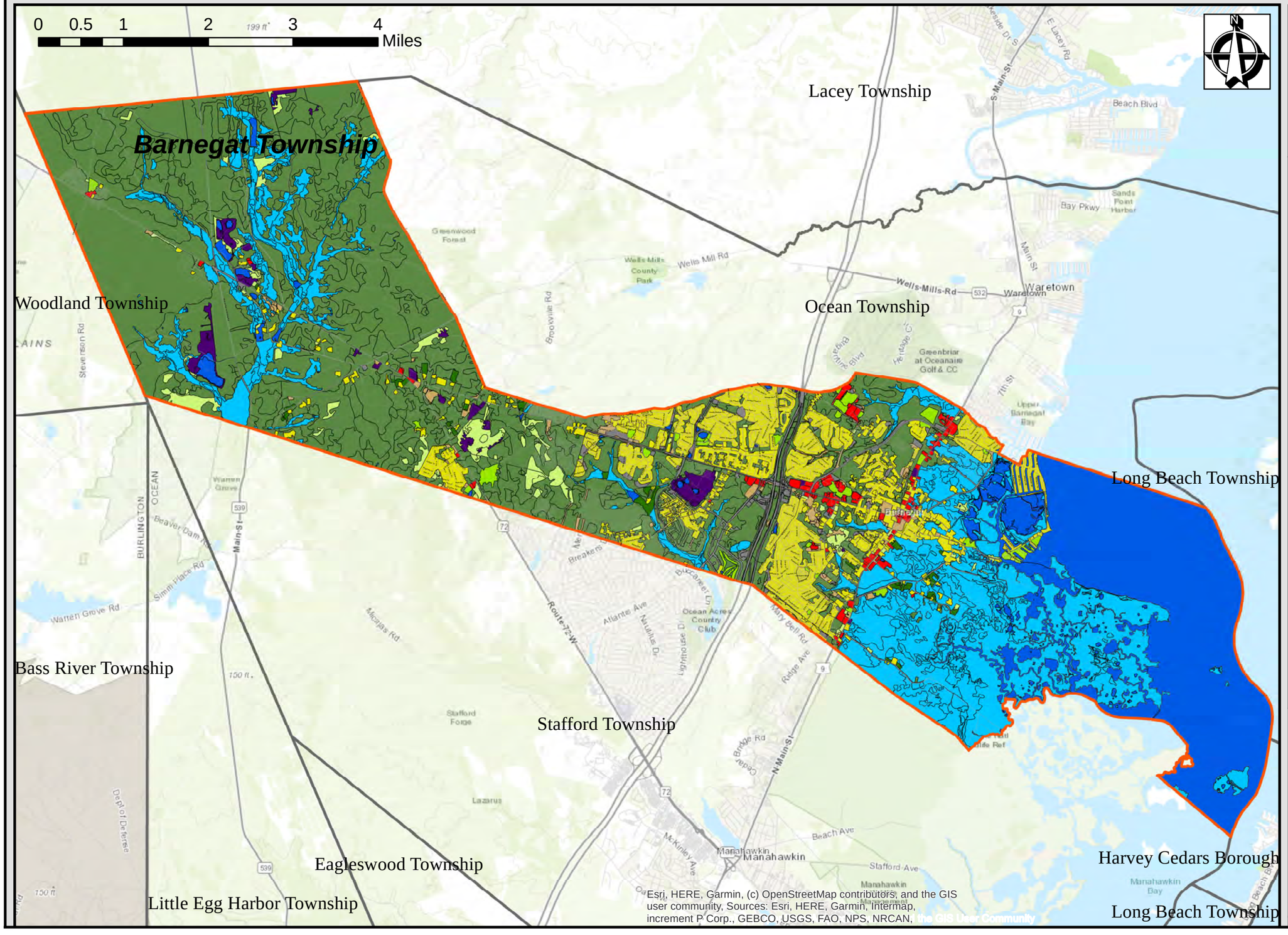
3141 BORDENTOWN AVENUE, PARLIN, N.J. 08859
1460 ROUTE 9 SOUTH HOWELL, N.J. 07731
3759 ROUTE 1 SOUTH SUITE 100, MONMOUTH JUNCTION, NJ 08852
ONE MARKET STREET SUITE 1F, CAMDEN, NJ 08102

WWW.CMEUSA1.COM

DATE	SCALE	LAST REVISED	CREATED BY
05/16/25	1 in = 5,917 feet	N/A	RA

Existing Land Use

BARNEGAT, N.J.



Municipal Stormwater Management Plan

Barnegat Township
Ocean County
New Jersey

Land Use

- Parcels
- Agricultural
- Brush/Shrubland
- Commercial/Services
- Forest
- Industrial
- Mixed, Other Urban, and Transitional
- Recreational
- Residential
- Transportation/Communication/Utilities
- Water
- Wetlands

Source: NJDEP Bureau of GIS(2020), NJGIN(2024)

CME ASSOCIATES

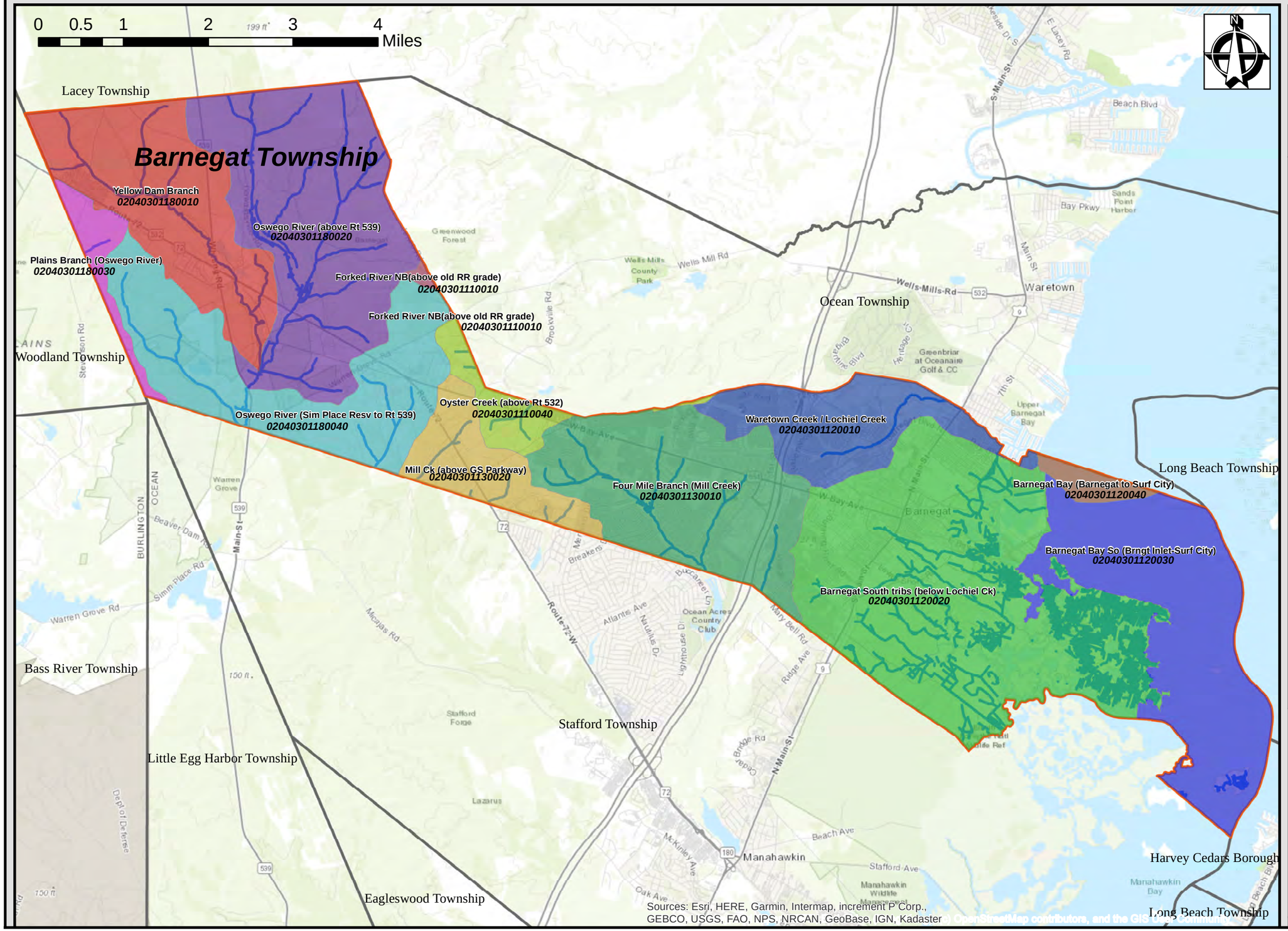
CONSULTING & MUNICIPAL ENGINEERS

3141 BORDENTOWN AVENUE, PARLIN, N.J. 08859
1460 ROUTE 9 SOUTH HOWELL, N.J. 07731
3759 ROUTE 1 SOUTH SUITE 100, MONMOUTH JUNCTION, NJ 08852
ONE MARKET STREET SUITE 1F, CAMDEN, NJ 08102

WWW.CMEUSA1.COM

DATE	SCALE	LAST REVISED	CREATED BY
05/16/25	1 in = 5,917 feet	N/A	RA

Hydrologic Units: HUC14 BARNEGAT, N.J.



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster

Municipal Stormwater Management Plan

Barnegat Township
Ocean County
New Jersey

Sub-Watershed

- Barnegat Bay (Barnegat to Surf City)
- Barnegat Bay So (Brngt Inlet-Surf City)
- Barnegat South tribs (below Lochiel Ck)
- Forked River NB(above old RR grade)
- Four Mile Branch (Mill Creek)
- Mill Ck (above GS Parkway)
- Oswego River (Sim Place Resv to Rt 539)
- Oswego River (above Rt 539)
- Oyster Creek (above Rt 532)
- Plains Branch (Oswego River)
- Waretown Creek / Lochiel Creek
- Yellow Dam Branch
- Streams
- Parcels

Source: NJDEP Bureau of GIS(2023), NJGIN(2024)

CME ASSOCIATES

CONSULTING & MUNICIPAL ENGINEERS

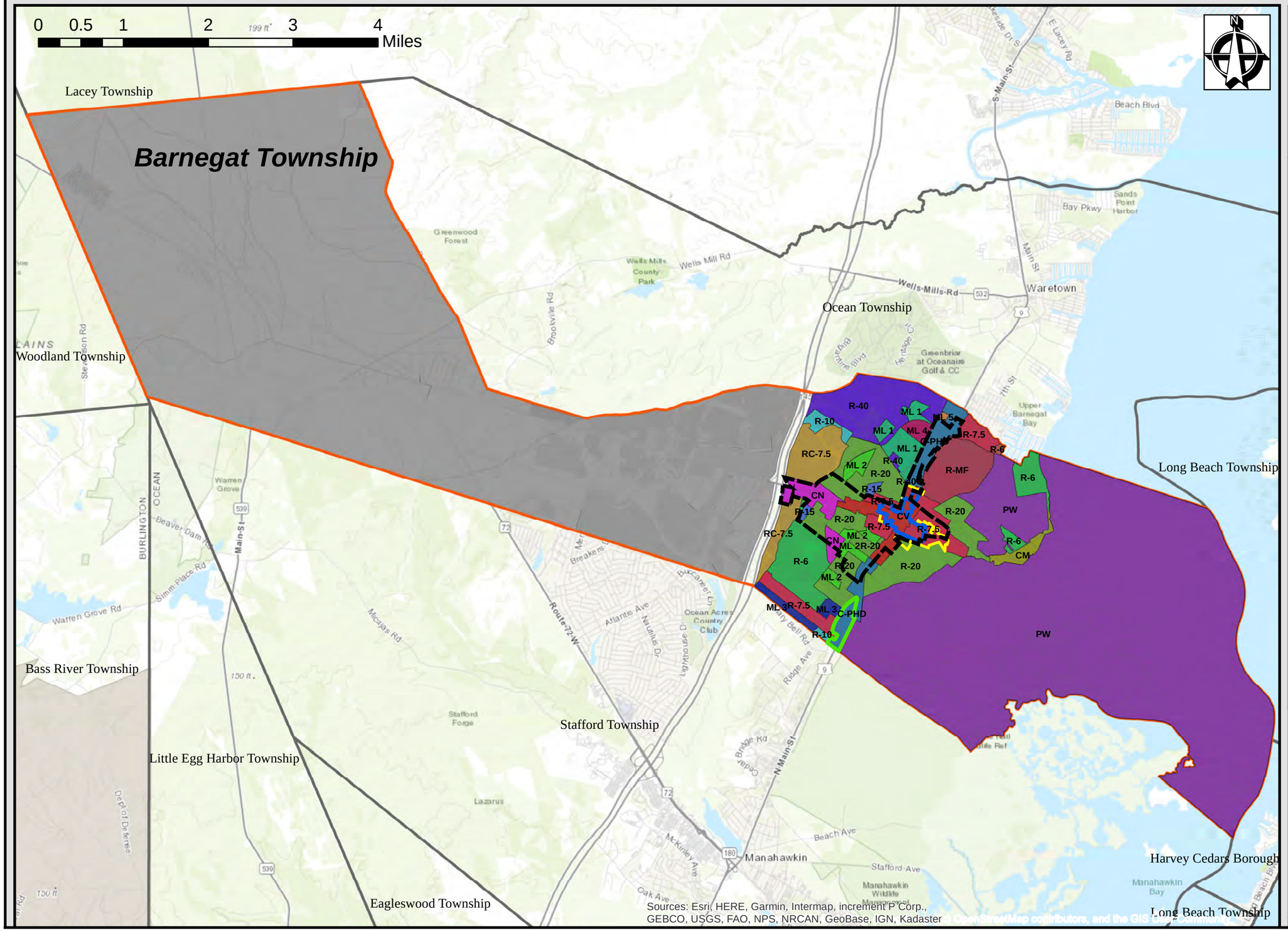
3141 BORDENTOWN AVENUE, PARLIN, N.J. 08859
1460 ROUTE 9 SOUTH HOWELL, N.J. 07731
3759 ROUTE 1 SOUTH SUITE 100, MONMOUTH JUNCTION, NJ 08852
ONE MARKET STREET SUITE 1F, CAMDEN, NJ 08102

WWW.CMEUSA1.COM

DATE	SCALE	LAST REVISED	CREATED BY
05/16/25	1 in = 5,917 feet	N/A	RA

Non-Pinelands Zoning

BARNEGAT, N.J.



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster

Municipal Stormwater Management Plan

Barnegat Township
Ocean County
New Jersey

- Parcels
- Town Center Overlay District
- Pinelands Zones
- Historic District
- Historic District Transition Area
- Commercial Core Overlay Zone
- C-M: Marine Commercial
- C-N: Neighborhood Commercial
- C-PHD: Commercial Planned Highway Development
- C-V: Village Commercial
- ML-1: Residential Single Family
- ML-2: Residential Single Family
- ML-3: Residential Single Family
- ML-4: Residential Rental Units
- ML-5: Multi-Family Residential
- PW: Preserved Waterfront 1 D.U./3.2 Ac.
- R-10: Residential 10,000 S.F.
- R-15: Residential 15,000 S.F.
- R-20: Residential 20,000 S.F.
- R-40: Residential 40,000 S.F.
- R-6: Residential 6,000 S.F.
- R-6: esidential 6,000 S.F.
- R-7.5: Residential 7,500 S.F.
- R-7.5: Residential 7,500 S.F.(Cluster Dev. Permitted)
- R-MF: Residential Multi-Family

Source: NJGIN, Birdsall Services Group

CME ASSOCIATES

CONSULTING & MUNICIPAL ENGINEERS

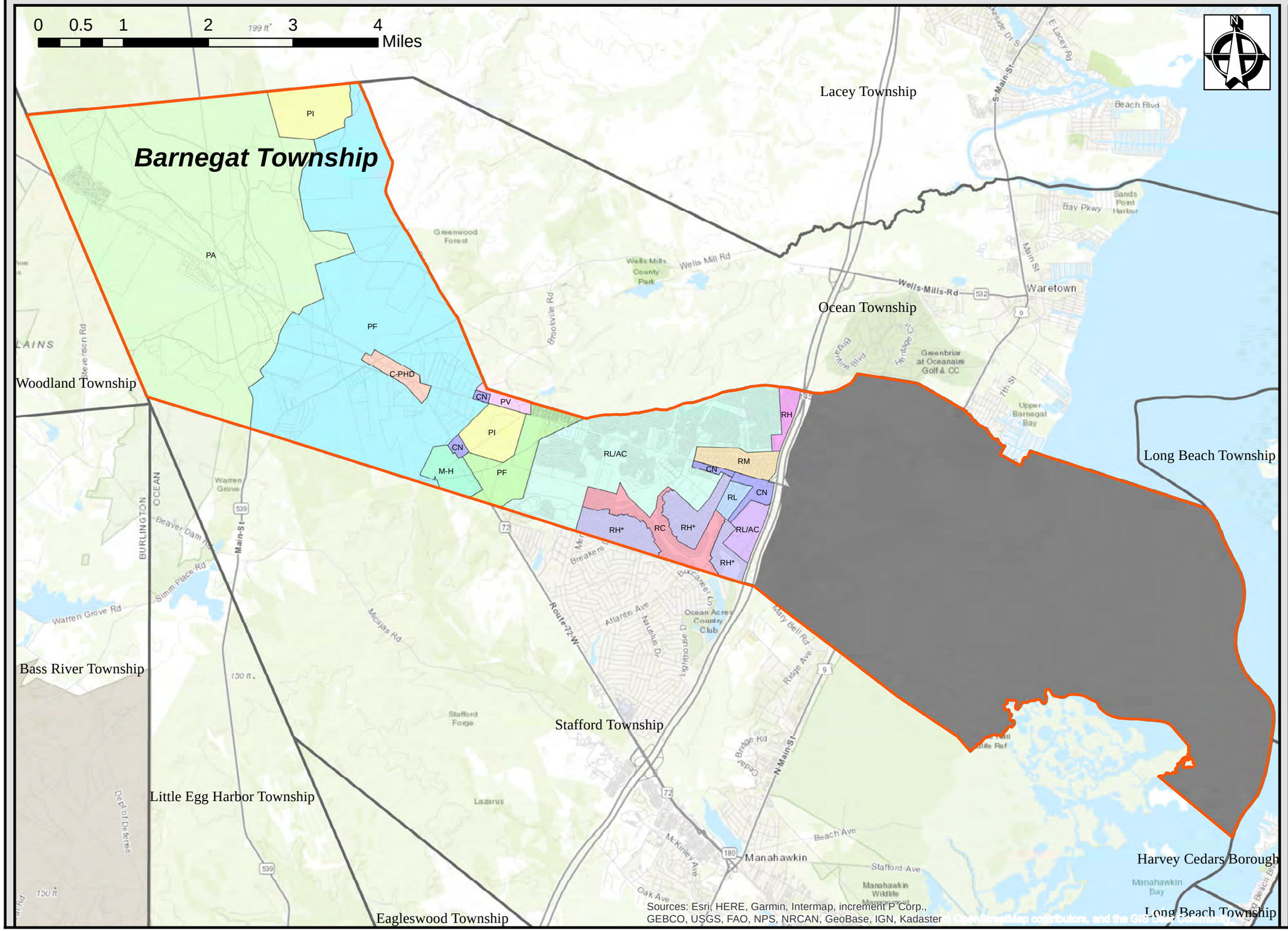
3141 BORDENTOWN AVENUE, PARLIN, N.J. 08859
1460 ROUTE 9 SOUTH HOWELL, N.J. 07731
3759 ROUTE 1 SOUTH SUITE 100, MONMOUTH JUNCTION, NJ 08852
ONE MARKET STREET SUITE 1F, CAMDEN, NJ 08102

WWW.CMEUSAI.COM

DATE	SCALE	LAST REVISED	CREATED BY
05/16/25	1 in = 5,917 feet	N/A	RA

Pinelands Zoning

BARNEGAT, N.J.



Municipal Stormwater Management Plan

Barnegat Township
Ocean County
New Jersey

- Parcels
- Non-Pinelands Zones

Pinelands Zones

- C-N: Neighborhood Commercial
- C-PHD: Commercial Planned Highway Development
- M-H: Multi Family Residential
- PA: Preservation Area
- PF: Preserved Forest Pinelands
- PF: Preserved Pinelands Forest
- PI: Planned Industrial
- PV: Pinelands Village
- RC: Residential Conservation
- RH*: Residential High 4 D.U./Ac.
- RH: Residential High 4 D.U./Ac.
- RL/AC: Residential Low/Adult Community
- RL/AC:: Residential Low/Adult Community
- RL: Residential Low 1 D.U./Ac.
- RM: Residential Moderate 2 D.U./Ac.

*: One Acre Minimum Lot Area in the Pinelands Without Municipal Sewer System

Source: NJGIN, Birdsall Services Group

CME ASSOCIATES

CONSULTING & MUNICIPAL ENGINEERS

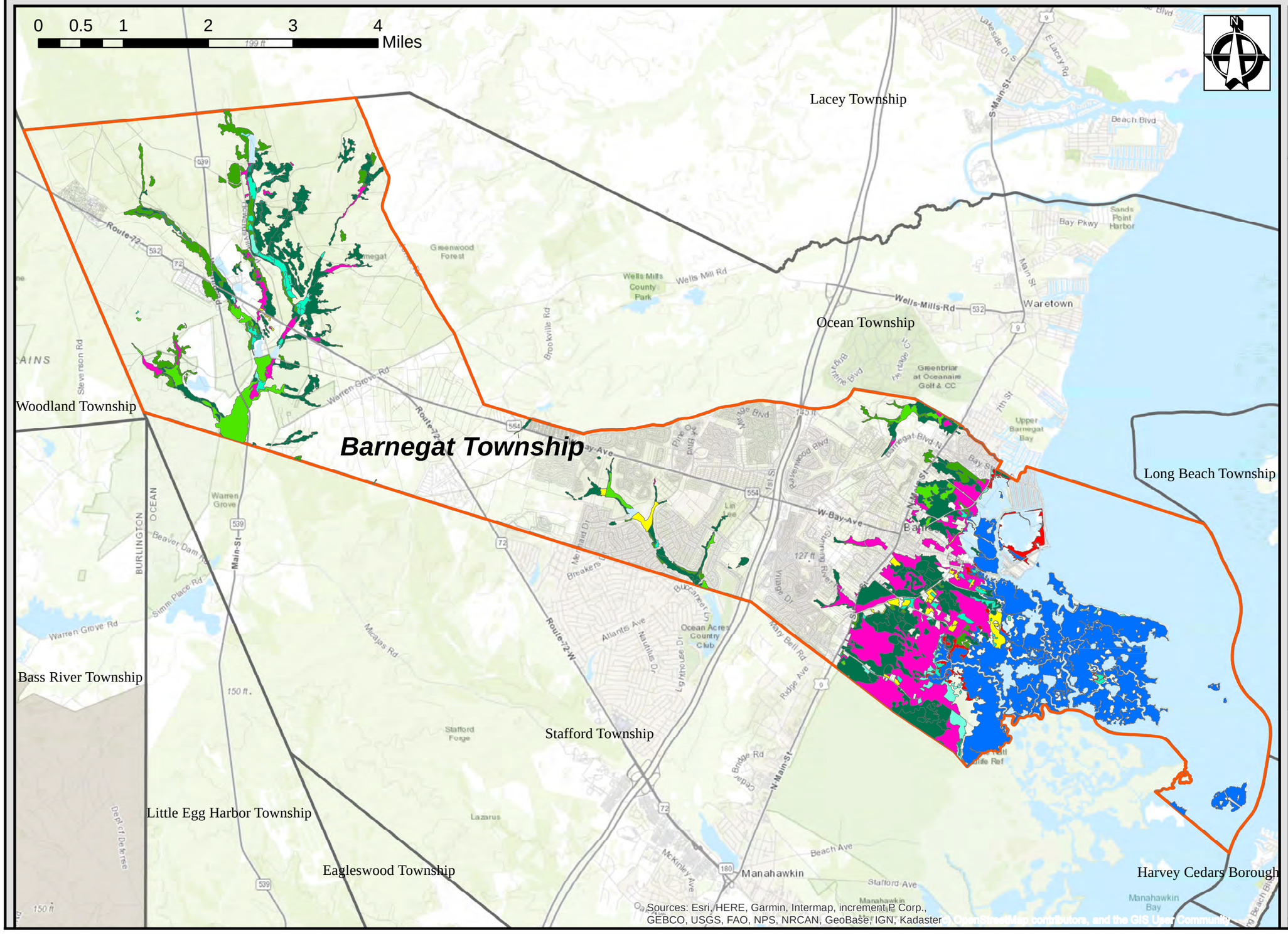
3141 BORDENTOWN AVENUE, PARLIN, N.J. 08859
1460 ROUTE 9 SOUTH HOWELL, N.J. 07731
3759 ROUTE 1 SOUTH SUITE 100, MONMOUTH JUNCTION, NJ 08852
ONE MARKET STREET SUITE 1F, CAMDEN, NJ 08102

WWW.CMEUSAI.COM

DATE	SCALE	LAST REVISED	CREATED BY
05/16/25	1 in = 5,917 feet	N/A	RA

Wetlands

BARNEGAT, N.J.



Municipal Stormwater Management Plan

Barnegat Township
Ocean County
New Jersey

Wetland Types

- Parcels
- Agricultural, Disturbed or Managed Wetlands
- Saline Marsh
- Phragmites Dominate Wetlands
- Mixed Wooded Wetlands
- Mixed Shrub Wetlands
- Herbaceous Wetlands
- Deciduous Wooded Wetlands
- Deciduous Shrub Wetlands
- Coniferous Wooded Wetlands
- Atlantic White Cedar Wetlands

Source: NJDEP Bureau of GIS(2023), NJGIN(2024)

CME ASSOCIATES

CONSULTING & MUNICIPAL ENGINEERS

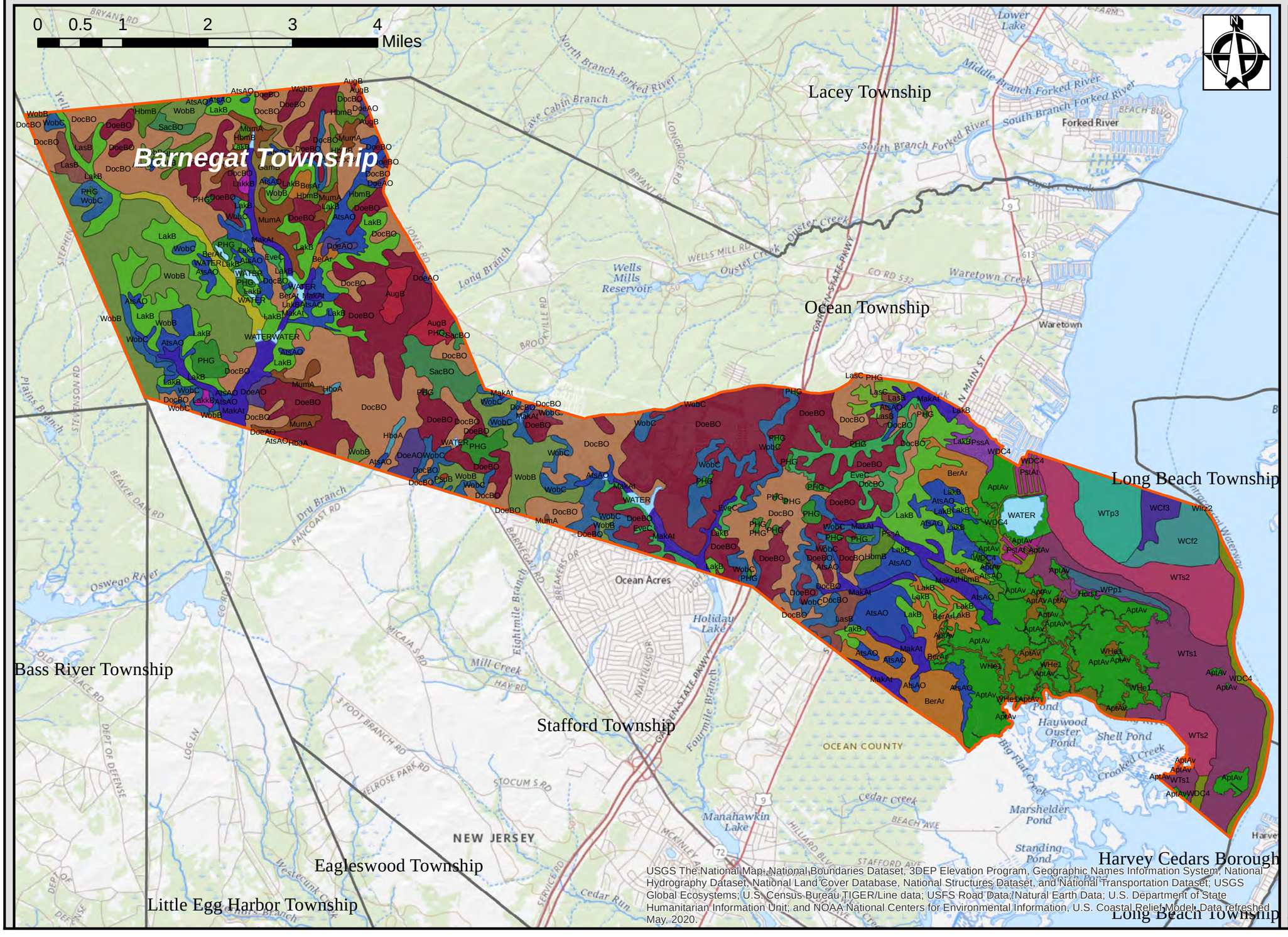
3141 BORDENTOWN AVENUE, PARLIN, N.J. 08859
1460 ROUTE 9 SOUTH HOWELL, N.J. 07731
3759 ROUTE 1 SOUTH SUITE 100, MONMOUTH JUNCTION, NJ 08852
ONE MARKET STREET SUITE 1F, CAMDEN, NJ 08102

WWW.CMEUSA1.COM

DATE	SCALE	LAST REVISED	CREATED BY
05/16/25	1 in = 5,917 feet	N/A	RA

Soils

BARNEGAT, N.J.



USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information, U.S. Coastal Relief Model. Data refreshed May, 2020.

Municipal Stormwater Management Plan

Barnegat Township
Ocean County
New Jersey

Legend

Parcels

Soil Type

- AptAv
- AtsAO
- AugB
- BerAr
- DocBO
- DoeAO
- DoeBO
- EveC
- GamB
- HbmB
- HboA
- HorsC
- LakB
- LakkB
- LasB
- LasC
- MakAt
- MumA
- PHG
- PssA
- PstAt
- PsuB
- SacBO
- WATER
- WCf2
- WCf3
- WDC4
- WHe1
- WIrz2
- WPp1
- WTp3
- WTs1
- WTs2
- WobB
- WobC

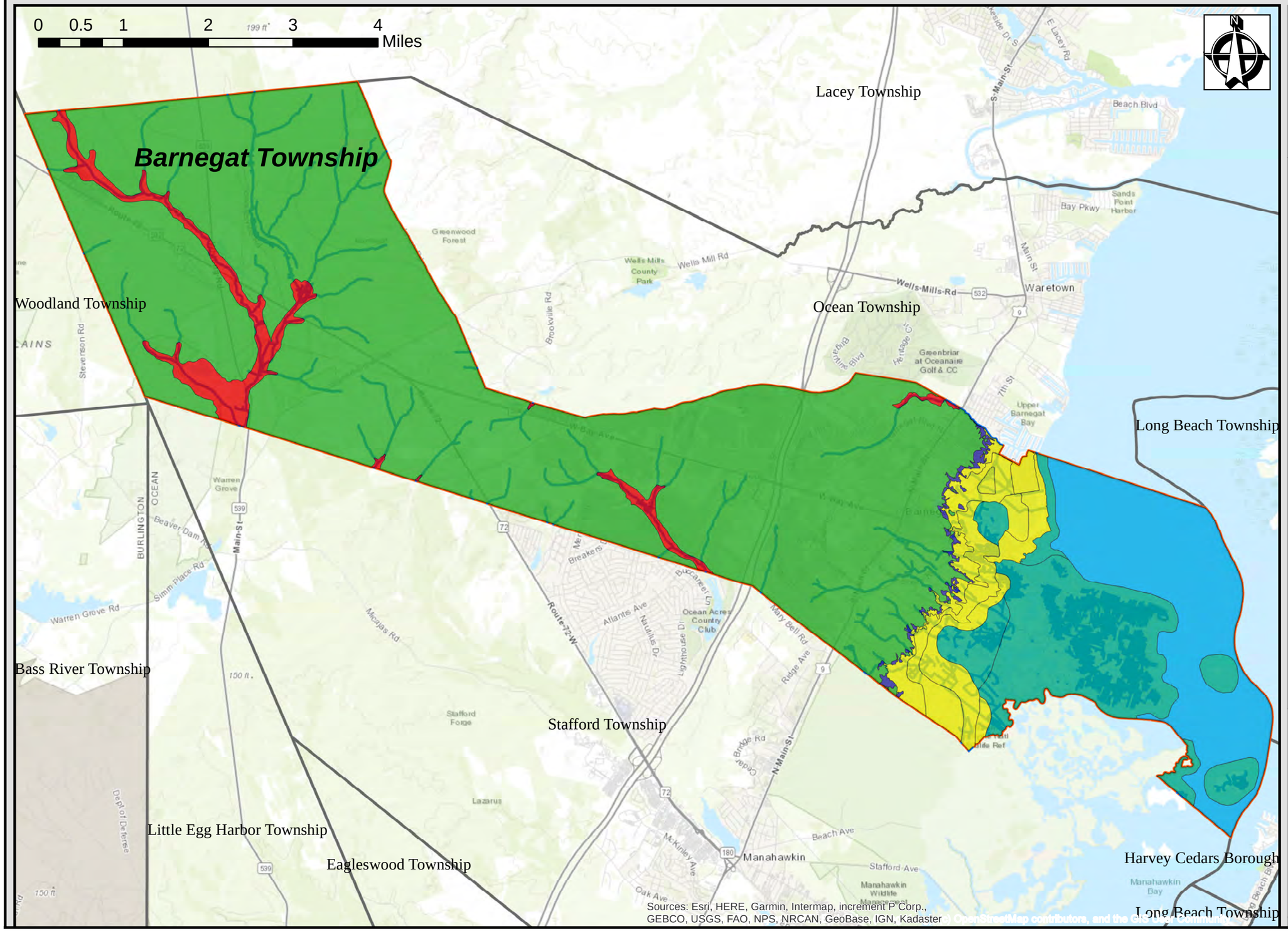
Source: USDA-NRCS
202007 Gridded SSURGO Database

CME ASSOCIATES
CONSULTING & MUNICIPAL ENGINEERS
3141 BORDENTOWN AVENUE, PARLIN, N.J. 08859
1460 ROUTE 9 SOUTH HOWELL, N.J. 07731
3759 ROUTE 1 SOUTH SUITE 100, MONMOUTH JUNCTION, NJ 08852
ONE MARKET STREET SUITE 1F, CAMDEN, NJ 08102
WWW.CMEUSA1.COM

DATE	SCALE	LAST REVISED	CREATED BY
12/23/20	1 in = 5,917 feet	N/A	NF

Flood Zones

BARNEGAT, N.J.



Municipal Stormwater Management Plan

Barnegat Township
Ocean County
New Jersey

FEMA Flood Zones

- 0.2% ANNUAL CHANCE FLOOD HAZARD
- A
- AE
- VE
- X
- OPEN WATER
- Streams
- Parcels

Source:US FEMA/FIRM(2020), NJGIN(2023)

CME ASSOCIATES

CONSULTING & MUNICIPAL ENGINEERS

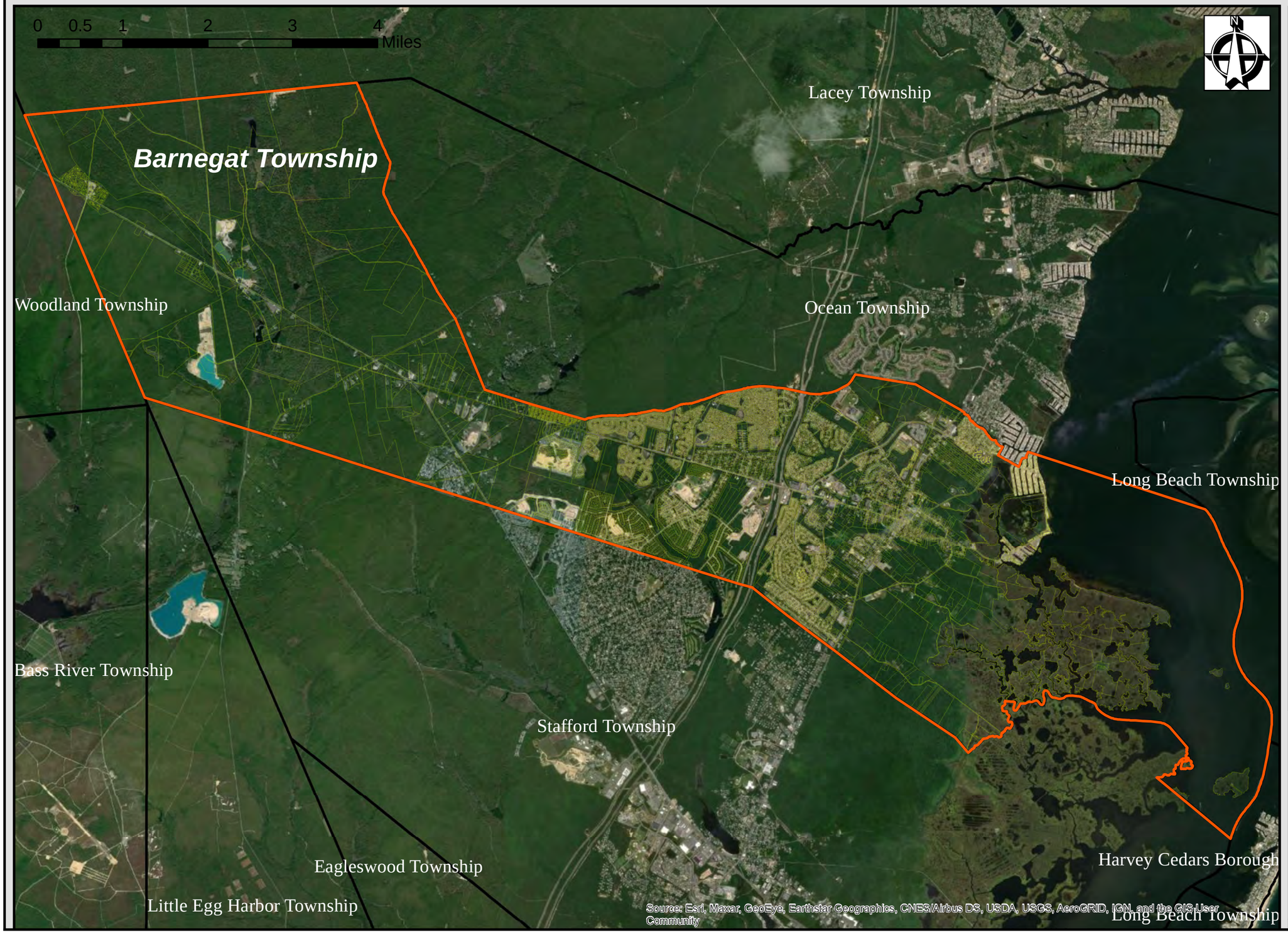
3141 BORDENTOWN AVENUE, PARLIN, N.J. 08859
1460 ROUTE 9 SOUTH HOWELL, N.J. 07731
3759 ROUTE 1 SOUTH SUITE 100, MONMOUTH JUNCTION, NJ 08852
ONE MARKET STREET SUITE 1F, CAMDEN, NJ 08102

WWW.CMEUSA1.COM

DATE	SCALE	LAST REVISED	CREATED BY
05/19/25	1 in = 5,917 feet	N/A	RA

Existing Conditions

BARNEGAT, N.J.



Municipal Stormwater Management Plan

Barnegat Township
Ocean County
New Jersey

Legend

Parcels

Source: NJGIN

CME ASSOCIATES

CONSULTING & MUNICIPAL ENGINEERS

3141 BORDENTOWN AVENUE, PARLIN, N.J. 08859
1460 ROUTE 9 SOUTH HOWELL, N.J. 07731
3759 ROUTE 1 SOUTH SUITE 100, MONMOUTH JUNCTION, NJ 08852
ONE MARKET STREET SUITE 1F, CAMDEN, NJ 08102

WWW.CMEUSA1.COM

DATE	SCALE	LAST REVISED	CREATED BY
12/21/20	1 in = 5,917 feet	N/A	NF

APPENDIX B
TABLES

Build-Out Calculations

HUC 14 and Developable Soils	Build Out Zoning	Total Area (acres)	Existing Impervious (%)	Existing Impervious (acres)	Wetlands/Water Area (acres)	Developable Area (acres)	Allowable Impervious (%)	Build-out Impervious (acres)
0204301180010								
DoA, LwB, BF, AxB, LhA, DoA, HaA, AdA, Pm	PA	2500.73	1.77%	44.31	292.45	2163.97	10%	216.397
Total		**2500.73**	**1.77%**	**44.31**	**292.45**	**2163.97**		**216.397**
0204301180030								
AxB, BF, LhA	PA	381.57	0.00%	0	0	381.57	10%	38.157
Total		**381.57**	**0.00%**	**0**	**0**	**381.57**		**38.157**
0204301180020								
AxB, AdA, DoA, DpB, LmA, LhA	PA	1493.74	1.37%	20.5	510.3	962.94	10%	96.294
DoA, DpB	PI	327.9	0.00%	0	2.71	325.19	20%	65.038
At	PF	2141.31	1.77%	37.8	356.79	1746.72	20%	349.344
Total		**3962.95**	**1.47%**	**58.3**	**869.8**	**3034.85**		**510.676**
0204301180040								
DpB, DpA, AdA	PF	1467.68	2.42%	35.58	62.49	1369.61	20%	273.922
DoA	C-PHD	101.89	17.20%	17.52	0	84.37	50%	42.185
AxB, LhA, At, BF,Pm	PA	1245.91	0.00%	0	233.96	1011.95	10%	101.195
Total		**2815.48**	**1.89%**	**53.1**	**296.45**	**2465.93**		**417.302**
0204301130020								
DoA, DoB, AxB, Pm	PF	504.24	10.82%	54.54	0	449.7	20%	89.94
BF	CN	25.82	58.09%	15	0	10.82	50%	5.41
DoA	MH	161.43	75.02%	121.11	1	39.32	20%	7.864
Pm	PI	89.04	0.00%	0	1	88.04	20%	17.608
AxB, DoA	RL/AC	182.53	0.00%	0	0	182.53	20%	36.506
BF	RH*	50.01	0.00%	0	0	50.01	30%	15.003
Total		**1013.07**	**18.82%**	**190.65**	**2**	**820.42**		**172.331**
0204301130010								
AxB	PF	23.49	3.53%	0.83	0	22.66	20%	4.532
AxB,BF,DoA,DoB	RL/AC	1448.96	30.69%	444.73	95.5	908.73	20%	181.746
AxB,DoA,BF	RH*	444.81	32.74%	145.64	1	298.17	30%	89.451
DpB	RM	161.58	72.66%	117.41	0	44.17	20%	8.834
DpB	CN	151.24	37.45%	56.64	0	94.6	50%	47.3
DoA	RL	62.07	0.00%	0	4.5	57.57	10%	5.757
DoA	RC-7.5	99.96	72.68%	72.65	1.95	25.36	30%	7.608
DoA	R-15	5.94	47.14%	2.8	0	3.14	20%	0.628
DpB, DoA, AxB	R-6	123.34	99.39%	122.59	0	0.75	30%	0.225
DoA	R-7.5	46.35	82.31%	38.15	0	8.2	30%	2.46
DoA	ML#3	35.89	33.46%	12.01	0	23.88	30%	7.164
DoA, DoB, WoC, Pm	R.O.W.	129.15	100.00%	129.15	0	0	100%	0
Total		**2732.78**	**41.81%**	**1142.6**	**102.95**	**1487.23**		**355.705**

0204301120020								
SS	PW	3840.38	1.15%	44.32	3767.6	28.46	20%	5.692
BF, DaA, LwB	ML#3	36.55	37.81%	13.82	0	22.73	30%	6.819
BF DoA, LhA	R-7.5	286.91	75.47%	216.54	54.51	15.86	30%	4.758
LhA	C-PHD	206.52	49.30%	101.82	41.44	63.26	50%	31.63
BF	R-6	255.02	85.10%	217.02	40.6	-2.6	30%	-0.78
Pm, BF, DpB	CN	90.08	49.31%	44.42	1	44.66	50%	22.33
At, Ma, Be, SS	R-20	760.82	25.49%	193.92	341.97	224.93	20%	44.986
HaA, SS	CV	173.26	86.55%	149.95	9.49	13.82	50%	6.91
PN	R-MF	283.94	18.78%	53.33	203.34	27.27	50%	13.635
DoA, DpB, Pm	ML#2	54.91	16.57%	9.1	1.9	43.91	30%	13.173
DoA, DpB, EvC	R-15	15.58	85.37%	13.3	0	2.28	20%	0.456
BF, EvC	ML#1	75.18	18.99%	14.28	0	60.9	30%	18.27
LhA	ML#4	34.75	54.79%	19.04	0	15.71	20%	3.142
Po	CN	64.23	79.73%	51.21	16.71	-3.69	30%	-1.107
Total		**6178.13**	**18.49%**	**1142.07**	**4478.56**	**557.5**		**169.914**
0204301120030								
W, SS	PW	533.67	0.00%	0	533.67	0	20%	0
Total		**533.67**	**0.00%**	**0**	**533.67**	**0**		**0**
0204301120010								
DpB	RL/AC	272.36	63.68%	173.43	0	98.93	20%	19.786
DpB, BF	RH*	72.73	68.60%	49.89	0	22.84	30%	6.852
Pm, BF, DpB	RM	1.75	97.71%	1.71	0	0.04	20%	0.008
EvC, DpB	R-10	47.2	83.50%	39.41	0	7.79	30%	2.337
EvC, DpB	R-7.5	65.01	97.83%	63.6	1.33	0.08	30%	0.024
DpB, Pm	R-40	452.18	14.63%	66.17	74.58	311.43	20%	62.286
DoA	ML#1	76.77	20.74%	15.92	2.19	58.66	30%	17.598
EvC	R-20	115.34	52.53%	60.59	0	54.75	20%	10.95
DpB	ML#4	6.47	42.19%	2.73	0	3.74	20%	0.748
Pm	CN	4.28	74.53%	3.19	0	1.09	50%	0.545
LmA	C-PHD	50.5	42.40%	21.41	19.91	9.18	50%	4.59
WDC4, WTs2, APtAv, PstAt, PssA	R-6	30.44	75.85%	23.09	7.42	-0.07	30%	-0.021
EvC, DoeBO	ML#2	41.2	28.33%	11.67	0	29.53	30%	8.859
EvC, PHG, DoeBO, DocBO	RC-7.5	219.76	80.47%	176.84	0	42.92	30%	12.876
	R.O.W.	77.16	100.00%	77.16	0	0	100%	0
Total		**1533.15**	**51.32%**	**786.81**	**105.43**	**640.91**		**147.438**
0204301110040								
AxB, AdA, DoA, DpB, Pm	PF	274.35	3.26%	8.95	1.31	264.09	20%	52.818
AxB, BF	PV	56.07	22.74%	12.75	1.44	41.88	20%	8.376
Pm, BF	PI	140.84	1.29%	1.81	2.06	136.97	20%	27.394
WoC	CN	10.32	23.84%	2.46	0	7.86	50%	3.93
AxB	RL/AC	19.54	0.00%	0	0	19.54	20%	3.908
Total		**501.12**	**5.18%**	**25.97**	**4.81**	**470.34**		**96.426**
0204301110010								

DpB, DpA, AxB	PF	6.66	0.00%	0	0	6.66	20%	1.332
0204301120040								
WCf3,WTs2,WTp3	PW	234.36	0.00%	0	234.35	0.01	20%	0.002
Total		**234.36**	**0.00%**	**0**	**0**	**0.01**		**0.002**

Pollutant Loads by Land Cover
(NJDEP BMP Manual)

Land Cover	Total Phosphorus Load (lbs/acre/year)	Total Nitrogen Load (lbs/acre/year)	Total Suspended Solids (TSS) Load (lbs/acre/year)
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
Commercial	2.1	22	200
Industrial	1.5	16	200
Urban, Mixed Urban, Other Urban	1	10	120
Agriculture	1.3	10	300
Forest, Water, Wetlands	0.1	3	40
Barrenland/Transitional Area	0.5	5	60

Nonpoint Source Loads at Build-Out

HUC 14 and Developable Soils	Build Out Zoning	Developable Area (acres)	TP (lbs/acre/year)	TP (lbs/year)	TN (lbs/acre/year)	TN (lbs/year)	TSS (lbs/acre/year)	TSS (lbs/year)
0204301180010								
DoA, LwB, BF, AxB, LhA, DoA, HaA, AdA, Pm	PA	2163.97	0.1	216.397	3	6491.91	40	86558.8
Total		**2163.97**		**216.397**		**6491.91**		**86558.8**
0204301180030								
AxB, BF, LhA	PA	381.57	0.1	38.157	3	1144.71	40	15262.8
Total		**381.57**		**38.157**		**1144.71**		**15262.8**
0204301180020								
AxB, AdA, DoA, DpB, LmA, LhA	PA	962.94	0.1	96.294	3	2888.82	40	38517.6
DoA, DpB	PI	325.19	1.5	487.785	16	5203.04	200	65038
At	PF	1746.72	0.1	174.672	3	5240.16	40	69868.8
Total		**3034.85**		**758.751**		**13332.02**		**173424.4**
0204301180040								
DpB, DpA, AdA	PF	1369.61	0.1	136.961	3	4108.83	40	54784.4
DoA	C-PHD	84.37	2.1	177.177	22	1856.14	200	16874
AxB, LhA, At, BF,Pm	PA	1011.95	0.1	101.195	3	3035.85	40	40478
Total		**2465.93**		**415.333**		**9000.82**		**112136.4**
0204301130020								
DoA, DoB, AxB, Pm	PF	449.7	0.1	44.97	3	1349.1	40	17988
BF	CN	10.82	2.1	22.722	22	238.04	200	2164
DoA	MH	39.32	0.1	3.932	3	117.96	4	157.28
Pm	PI	88.04	1.5	132.06	16	1408.64	200	17608
AxB, DoA	RL/AC	182.53	0.6	109.518	5	912.65	100	18253
BF	RH*	50.01	1.4	70.014	15	750.15	140	7001.4
Total		**820.42**		**383.216**		**4776.54**		**63171.68**
0204301130010								
AxB	PF	22.66	0.1	2.266	3	67.98	40	906.4
AxB,BF,DoA,DoB	RL/AC	908.73	0.6	545.238	5	4543.65	100	90873
AxB,DoA,BF	RH*	298.17	1.4	417.438	15	4472.55	140	41743.8
DpB	RM	44.17	1.4	61.838	15	662.55	140	6183.8
DpB	CN	94.6	2.1	198.66	22	2081.2	200	18920
DoA	RL	57.57	0.6	34.542	5	287.85	100	5757
DoA	RC-7.5	25.36	1.4	35.504	15	380.4	140	3550.4
DoA	R-15	3.14	1.4	4.396	15	47.1	140	439.6
DpB, DoA, AxB	R-6	0.75	1.4	1.05	15	11.25	140	105
DoA	R-7.5	8.2	1.4	11.48	15	123	140	1148
DoA	ML#3	23.88	1.4	33.432	15	358.2	140	3343.2
Total		**1487.23**		**1345.844**		**13035.73**		**172970.2**

0204301120020								
SS	PW	28.46	0.1	2.846	3	85.38	40	1138.4
BF, DaA, LwB	ML#3	22.73	1.4	31.822	15	340.95	140	3182.2
BF DoA, LhA	R-7.5	15.86	1.4	22.204	15	237.9	140	2220.4
LhA	C-PHD	63.26	2.1	132.846	22	1391.72	200	12652
BF	R-6	-2.6	1.4	-3.64	15	-39	140	-364
Pm, BF, DpB	CN	44.66	2.1	93.786	22	982.52	200	8932
At, Ma, Be, SS	R-20	224.93	1.4	314.902	15	3373.95	140	31490.2
HaA, SS	CV	13.82	2.1	29.022	22	304.04	200	2764
PN	R-MF	27.27	1.4	38.178	15	409.05	140	3817.8
DoA, DpB, Pm	ML#2	43.91	1.4	61.474	15	658.65	140	6147.4
DoA, DpB, EvC	R-15	2.28	1.4	3.192	15	34.2	140	319.2
BF, EvC	ML#1	60.9	1.4	85.26	15	913.5	140	8526
LhA	ML#4	15.71	1.4	21.994	15	235.65	140	2199.4
	CN	-3.69	1.4	-5.166	22	-81.18	200	-738
Total		**529.04**		**825.874**		**8761.95**		**81148.6**
0204301120030								
W, SS	PW	0	0.1	0	3	0	40	0
Total		**0**		**0**		**0**		**0**
0204301120010								
DpB	RL/AC	272.36	0.6	163.416	5	1361.8	100	27236
DpB, BF	RH*	72.73	1.4	101.822	15	1090.95	140	10182.2
Pm	RM	1.75	1.4	2.45	15	26.25	140	245
EvC, DpB	R-10	47.2	1.4	66.08	15	708	140	6608
EvC, DpB	R-7.5	65.01	1.4	91.014	15	975.15	140	9101.4
DpB, Pm	R-40	452.58	0.6	271.548	5	2262.9	100	45258
DoA	ML#1	76.77	1.4	107.478	15	1151.55	140	10747.8
EvC	R-20	115.34	1.4	161.476	15	1730.1	140	16147.6
DpB	ML#4	6.47	1.4	9.058	15	97.05	140	905.8
Pm	CN	4.28	2.1	8.988	22	94.16	200	856
LmA	C-PHD	50.5	2.1	106.05	22	1111	200	10100
WDC4, WTs2, APtAv, PstAt, PssA	R-6	30.44	2.1	63.924	15	456.6	140	4261.6
EvC, DoeBO	ML#2	41.2	2.1	86.52	15	618	140	5768
EvC, PHG, DoeBO, DocBO	RC-7.5	219.76	2.1	461.496	15	3296.4	140	30766.4
Total		**1456.39**		**1089.38**		**10608.91**		**137387.8**
0204301110040								
AxB, AdA, DoA, DpB, Pm	PF	264.09	0.1	26.409	3	792.27	40	10563.6
AxB, BF	PV	41.88	1.4	58.632	15	628.2	140	5863.2
Pm, BF	PI	136.97	1.5	205.455	16	2191.52	200	27394
WoC	CN	7.86	2.1	16.506	22	172.92	200	1572
AxB	RL/AC	19.54	0.6	11.724	5	97.7	100	1954
Total		**470.34**		**318.726**		**3882.61**		**47346.8**
0204301110010								

DpB, DpA, AxB	PF	6.6	0.1	0.66	3	19.8	40	264
0204301120040								
	PW	0.01	0.1	0.001	3	0.03	40	0.4
Total		**0.01**		**0.001**		**0.03**		**0.4**

APPENDIX C
MUNICPAL REGULATION CHECKLIST

New Jersey Stormwater Best Management Practices Manual

February 2004

Municipal Regulations Checklist

A checklist for incorporating nonstructural stormwater management strategies into local regulations

As part of the requirements for municipal stormwater management plans in the Stormwater Management Rules at N.J.A.C. 7:8-4, municipalities are required to evaluate the municipal master plan, and land use and zoning ordinances to determine what adjustments need to be made to allow the implementation of nonstructural stormwater management techniques, also called low impact development techniques, which are presented in *Chapter 2: Low Impact Development Techniques*. *Chapter 3: Regional and Municipal Stormwater Management Plans* provides information on the development of municipal stormwater management plans, including the evaluation of the master plan, and land use and zoning ordinances. This checklist was prepared to assist municipalities in identifying the specific ordinances that should be evaluated, and the types of changes to be incorporated to address the requirements of the Stormwater Management Rules.

Part 1: Vegetation and Landscaping

Effective management of both existing and proposed site vegetation can reduce a development's adverse impacts on groundwater recharge and stormwater runoff quality and quantity.

A. Preservation of Natural Areas

Municipal regulations should include requirements to preserve existing vegetated areas, minimize turf grass lawn areas, and use native vegetation.

☒ Yes ☐ No Are applicants required to provide a layout of the existing vegetated areas, and a description of the conditions in those areas?

☐ Yes ☒ No Does the municipality have maximum as well as minimum yard sizing ordinances?

☐ Yes ☒ No Are residents restricted from enlarging existing turf lawn areas?

☒ Yes ☐ No Do the ordinances provide incentives for the use of vegetation as filters for stormwater runoff?

☒ Yes ☐ No Do the ordinances require a specific percentage of permanently preserved open space as part of the evaluation of cluster development?

B. Tree Protection Ordinances

Municipalities often have a tree ordinance to minimize the removal of trees and to replace trees that are removed. However, while tree ordinances protect the number of trees, they do not typically address the associated leaf litter or smaller vegetation that provides additional water quality and quantity benefits. Municipalities should consider enhancing tree ordinances to a forest ordinance that would also maintain the benefits of a forested area.

☒ Yes ❑ No Does the municipality have a tree protection ordinance?

☒ Yes ❑ No Can the municipality include a forest protection ordinance?

☒ Yes ❑ No If forested areas are present at development sites, is there a required percentage of the stand to be preserved?

C. Landscaping Island and Screening Ordinances

Municipalities often have ordinances that require landscaping islands for parking areas. The landscaping islands can provide ideal opportunities for the filtration and disconnection of runoff, or the placement of small LID-BMPs. Screening ordinances limit the view of adjoining properties, parking areas, or loading areas. Low maintenance vegetation can be required in islands and areas used for screening to provide stormwater quality, groundwater recharge, or stormwater quantity benefits.

☒ Yes ❑ No Do the ordinances require landscaping islands in parking lots, or between the roadway and the sidewalk? Can the ordinance be adjusted to require vegetation that is more beneficial for stormwater quality, groundwater recharge, or stormwater quantity, but that does not interfere with driver vision at the intersections?

☒ Yes ❑ No Is the use of bioretention islands and other stormwater practices within landscaped areas or setbacks allowed?

☒ Yes ❑ No Do the ordinances require screening from adjoining properties? Can the screening criteria require the use of vegetation to the maximum extent practicable before the use of walls or berms?

D. Riparian Buffers

Municipalities may have existing buffer and/or floodplain ordinances that require the protection of vegetation adjacent to streams. Municipalities should consult existing regulations adopted by the Department to ensure that riparian buffer or floodplain ordinances reflect the requirements of the Department within these areas. The municipality should consider conservation restrictions and allowable maintenance to ensure the preservation of these areas.

☒ Yes ❑ No Is there a stream buffer or floodplain ordinance in the community?

☒ Yes ❑ No Is the ordinance consistent with existing state regulatory requirements?

☒ Yes ❑ No Does the ordinance require a conservation easement, or other permanent restrictions on buffer areas?

❑ Yes ☒ No Does the ordinance identify or limit when stormwater outfall structures can cross the buffer?

❑ Yes ☒ No Does the ordinance give detailed information on the type of maintenance and/or activities that is allowed in the buffer?

Part 2: Minimizing Land Disturbance

The minimization of disturbance can be used at different phases of a development project. The goal is to limit clearing, grading, and other disturbance associated with development to protect existing features that provide stormwater benefits. Zoning ordinances typically limit the amount of impervious surfaces on building lots, but do not limit the amount of area that can be disturbed during construction. This strategy helps preserve the site's existing hydrologic character, as well as limiting the occurrence of soil compaction.

A. Limits of Disturbance

Designing with the terrain, or site fingerprinting, requires an assessment of the characteristics of the site and the selection of areas for development that would minimize the impact. This can be incorporated into the requirements for existing site conditions and the environmental impact statement. Limits of disturbance should be incorporated into construction plans reviewed and approved by the municipality. Setbacks should be evaluated to determine whether they can be reduced. The following maximum setbacks are recommended for low impact development designs:

- front yard – 20 feet;
- rear yard – 25 feet; and
- side yard – 8 feet.

☒ Yes ☐ No As part of the depiction of existing conditions, are environmentally critical and environmentally constrained areas identified? (Environmentally critical areas are areas or features with significant environmental value, such as steep slopes, stream corridors, natural heritage priority sites, and habitats of threatened and endangered species. Environmentally constrained areas are those with development restrictions, such as wetlands, floodplains, and sites of endangered species.)

☐ Yes ☒ No Can any of the existing setbacks be reduced?

☐ Yes ☒ No Are there maximum turf grass or impervious cover limits in any of the setbacks?

☒ Yes ☐ No Do the ordinances inhibit or prohibit the clearcutting of the project site as part of the construction?

☐ Yes ☒ No Is the traffic of heavy construction vehicles limited to specific areas, such as areas of proposed roadway? Are these areas required to be identified on the plans and marked in the field?

☒ Yes ☐ No Do the ordinances require the identification of specific areas that provide significant hydrologic functions, such as existing surface storage areas, forested areas, riparian corridors, and areas with high groundwater recharge capabilities?

☒ Yes ☐ No Does the municipality require an as-built inspection before issuing a certificate of occupancy? If so, does the inspection include identification of compacted areas, if they exist within the site?

☒ Yes ☐ No Does the municipality require the restoration to compacted areas in accordance with the Soil Erosion and Sediment Control Standards?

B. Open Space and Cluster Development

Open space areas are restricted land that may be set aside for conservation, recreation, or agricultural use, and are often associated with cluster development requirements. Since open space can have a variety of uses, the municipality should evaluate its open space ordinances to determine whether amendments are necessary to provide improved stormwater benefits.

☒ Yes ❑ No Are open space or cluster development designs allowed in the municipality?

☒ Yes ❑ No Are flexible site design incentives available for developers that utilize open space or cluster design options?

☒ Yes ❑ No Are there limitations on the allowable disturbance of existing vegetated areas in open space?

☒ Yes ❑ No Are the requirements to re-establish vegetation in disturbed areas dedicated for open space?

❑ Yes ☒ No Is there a maximum allowable impervious cover in open space areas?

Part 3: Impervious Area Management

The amount of impervious area, and its relationship to adjacent vegetated areas, can significantly change the amount of runoff that needs to be addressed by BMPs. Most of a site's impervious surfaces are typically located in the streets, sidewalks, driveway, and parking areas. These areas are further hampered by requirements for continuous curbing that prevent discharge from impervious surfaces into adjacent vegetated areas.

A. Streets and Driveways

Street widths of 18 to 22 feet are recommended for low impact development designs in low density residential developments. Minimum driveway widths of 9 and 18 feet for one lane and two lanes, respectively, are also recommended. The minimum widths of all streets and driveways should be evaluated to demonstrate that the proposed width is the narrowest possible consistent with safety and traffic concerns and requirements. Municipalities should evaluate which traffic calming features, such as circles, rotaries, medians, and islands, can be vegetated or landscaped. Cul-de-sacs can also be evaluated to reduce the radius area, or to provide a landscape island in the center.

☒ Yes ❑ No Are the street widths the minimum necessary for traffic density, emergency vehicle movement, and roadside parking?

☒ Yes ❑ No Are street features, such as circles, rotaries, or landscaped islands allowed to or required to receive runoff?

☒ Yes ❑ No Are curb cuts or flush curbs with curb stops an allowable alternative to raised curbs?

☒ Yes ❑ No Can the minimum cul-de-sac radius be reduced or is a landscaped island required in the center of the cul-de-sac?

☒ Yes ❑ No Are alternative turn-arounds such as "hammerheads" allowed on short streets in low density residential developments?

❑ Yes ☒ No Can the minimum driveway width be reduced?

❑ Yes ☒ No Are shared driveways permitted in residential developments?

B. Parking Areas and Sidewalks

A mix of uses at a development site can allow for shared parking areas, reducing the total parking area. Municipalities require minimum parking areas, but seldom limit the total number of parking spaces. Table 1 shows recommendations for minimum parking space ratios for low impact design:

Table 1: Low Impact Development Parking Space Ratios

Use	Parking Ratio per 1000 sq. ft. of Gross Floor Area
Professional office building	Less than 3.0
Shopping centers	Less than 4.5

❑ Yes ☒ No Can the parking ratios be reduced?

❑ Yes ☒ No Are the parking requirements set as maximum or median rather than minimum requirements?

❑ Yes ☒ No Is the use of shared parking arrangements allowed to reduce the parking area?

❑ Yes ☒ No Are model shared parking agreements provided?

❑ Yes ☒ No Does the presence of mass transit allow for reduced parking ratios?

❑ Yes ☒ No Is a minimum stall width of 9 feet allowed?

☒ Yes ❑ No Is a minimum stall length of 18 feet allowed?

❑ Yes ☒ No Can the stall lengths be reduced to allow vehicle overhang into a vegetated area?

❑ Yes ☒ No Do ordinances allow for permeable material to be used in overflow parking areas?

❑ Yes ☒ No Do ordinances allow for multi-level parking?

❑ Yes ☒ No Are there incentives to provide parking that reduces impervious cover, rather than providing only surface parking lots?

Sidewalks can be made of pervious material or disconnected from the drainage system to allow runoff to re-infiltrate into the adjacent pervious areas.

❑ Yes ☒ No Do ordinances allow for sidewalks constructed with pervious material?

☒ Yes ❑ No Can alternate pedestrian networks be substituted for sidewalks (e.g., trails through common areas)?

C. Unconnected Impervious Areas

Disconnection of impervious areas can occur in both low density development and high density commercial development, provided sufficient vegetated area is available to accept dispersed stormwater flows. Areas for disconnection include parking lot or cul-de-sac islands, lawn areas, and other vegetated areas.

☒ Yes ❑ No Are developers required to disconnect impervious surfaces to promote pollutant removal and groundwater recharge?

☒ Yes ❑ No Do ordinances allow the reduction of the runoff volume when runoff from impervious areas are re-infiltrated into vegetated areas?

☒ Yes ❑ No Do ordinances allow flush curb and/or curb cuts to allow for runoff to discharge into adjacent vegetated areas as sheet flow?

Part 4: Vegetated Open Channels

The use of vegetated channels, rather than the standard concrete curb and gutter configuration, can decrease flow velocity, and allow for stormwater filtration and re-infiltration. One design option is for vegetated channels that convey smaller storm events, such as the water quality design storm, and provide an overflow into a storm sewer system for larger storm events.

☒ Yes ❑ No Do ordinances allow or require vegetated open channel conveyance instead of the standard curb and gutter designs?

☒ Yes ❑ No Are there established design criteria for vegetated channels?