

# **Stormwater Management Plan**

**for**

**Stanhope Borough  
Sussex County, New Jersey**

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## Table of Contents

|   |   |
|---|---|
| Introduction  | 1 |
| Goals   | 1 |
| Stormwater Discussion                                     | 2 |
| Background  | 3 |
| Design and Performance Standards                          | 5 |
| Plan Consistency  | 5 |
| Nonstructural Stormwater Management Strategies            | 6 |
| Land Use/Build-Out Analysis                               | 6 |
| Mitigation Plans  | 6 |
| Recommended Implementing Stormwater<br>Control Ordinances | 7 |

## List of Figures

- Figure 1 – Hydrologic Cycle
- Figure 2 – Streams and Rivers
- Figure 3 – USGS Map
- Figure 4 – HUC14 Drainage Areas
- Figure 5 – 100-Year Frequency Floodplain
- Figure 6 – Land use/Land Cover
- Figure 7 – Zoning
- Figure 8 – Aerial Photo
- Figure 9 – Average Annual Groundwater Recharge Rates
- Figure 10 – Well Head Protection Areas
- Figure 11 – Wetlands
- Figure 12 – Water Quality Monitoring Stations
- Figure 12.1 – Water Quality Monitoring Stations
- Figure 13 – Center Designation
- Attachment C – Design Standards, Stormwater Drain Inlets

## Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for Stanhope Borough ("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 base flow in receiving water bodies. The plan describes long-term operation and maintenance measures for existing and future stormwater facilities.

This plan also 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. In addition, the plan includes 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.

## MSWMP Goals

The goals of this MSWMP are to:

- 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 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 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; and
- 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. Preventive and corrective maintenance strategies are included in the plan 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.

### **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 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.

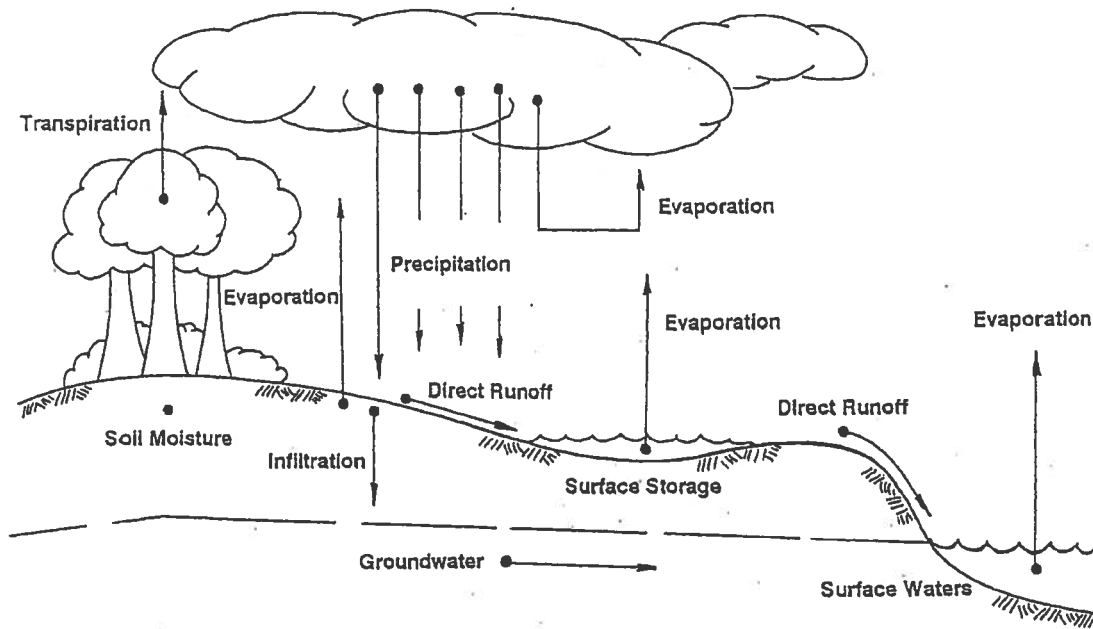


Figure 1 – Hydrologic Cycle

## Background

The Borough encompasses 1.90 square miles at the southerly end of Sussex County, New Jersey. The Borough “enjoys a mix of commercial, professional and residential development while also enjoying the ambiance of a small town with a main street setting unique in the region.” The Borough is an older community and few large areas of undeveloped area remain. The undeveloped areas that do exist are stream corridors along the Musconetcong River and Lake Musconetcong. Stream and rivers within the Borough are shown in Figure 2, and the topography and rocky steep slopes of the Borough are shown in Figure 3.

According to the 2000 census, the Borough has 3,584 residents. The population rose approximately 5.6 percent since the 1990 census. This population increase is less than the overall state and county increases of approximately 9 and 24 percent respectively over the same period.

The Borough is situated along the side of the main stem of the Musconetcong River in the Upper Delaware Basin. It is located in Watershed Management Area (WMA) 1 – upper Delaware River. The Borough contains portions of three Hydrologic Unit Code (HUC) areas. These HUC14 areas are shown in Figure 4.

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 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.

Based on the AMNET data, the water bodies bordering the Borough are not impaired to moderately impaired. The closest AMNET sites are located at the Musconetcong River below Lake Musconetcong in Mount Olive (AN0064), at the Musconetcong River off Rt. 604 (above Lubbers Run) in Byram (AN0064), and at the Musconetcong River below Lake Hopatcong in Roxbury (AN0062).

In addition to the AMNET data, the NJDEP and other regulatory agencies collect water quality chemical data on the streams in the state. These data show that the instream total phosphorus concentrations and fecal coliform concentrations of the Musconetcong River meets the state's criteria. This means that the river is not an impaired waterway and the NJDEP is not required to develop a Total Maximum Daily Load (TMDL) for these pollutants at this time.

A TMDL is the amount of a pollutant that can be accepted by a water body without causing an exceedance of water quality standards or interfering with the ability to use a water body 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 BMP's.

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 1 of the Integrated List constitutes the list of waters attaining the water quality standard and no use is threatened. Sublist 2 of the Integrated List constitutes the list of waters attaining some of the designated uses; no use is threatened; and insufficient or no data and information is available to determine if the remaining uses are attained or threatened. Sublists 1 and 2 have been combined in New Jersey's Integrated List because the limitations of the current data gathering efforts prevent NJDEP from being able to fulfill information requirements of Sublist 1. The Musconetcong River below Lake Musconetcong in Mount Olive (AN0063) and off Route 604 (above Lubbers Run) in Byram (AN0064) is on Sublist 1 and 2. Sublist 3 of the Integrated List constitutes the list of waters where there is insufficient or no data and information to determine if any designated use is attained. The Musconetcong River below Lake Hopatcong in Roxbury (AN0062) is on Sublist 3. All three cite Benthic Macroinvertebrates. Sublist 5 of the Integrated List constitutes the list of waters impaired or threatened by pollutants, for which one or more TMDL's are needed. None of the waters within the Borough appear on Sublist 5.

The Borough is mostly developed. The existing land use, based on 1995/1997 aerial photography, is shown in Figure 6. The existing zoning is shown in Figure 7. A majority of land

is urban land and has steep rock formation with little chance for groundwater recharge. The Borough is located within the State Plan area Designations for Planning Areas 2 and 5 and Town Center. Infiltration requirements are not applicable for Town Centers. However, groundwater recharge rates for native soils in this area are generally between 0 and 21 inches annually. The average annual ground- water recharge rates are shown graphically in Figure 9.

According to the NJDEP, "A Well Head Protection Area (WHPA) in New Jersey is a map area calculated around a Public Community Water Supply (PCWS) well in New Jersey that delineates the horizontal extent of ground water captured by a well pumping at a specific rate over a two-, five-, and twelve-year period of time for unconfined wells. ... The confined wells have a fifty foot radius delineated around each well serving as the well head protection area to be controlled by the water purveyor in accordance with Safe Drinking Water Regulations (see NJAC 7:10-11.7(b)1)."

According to the NJDEP, "WHPA delineations are conducted in response to the Safe Drinking Water Act Amendments of 1986 and 1996 as part of the Source Water Area Protection Program (SWAP). The delineations are the first step in defining the sources of water to a public supply well. Within these areas, potential contamination will be assessed and appropriate monitoring will be undertaken as subsequent phases of the NJDEP SWAP."

Wellhead protection areas are shown in Figure 10.

In addition to the rivers and streams that run through and along the Borough, there are a number of wetland areas. These wetland areas, shown in Figure 11, provide flood storage, nonpoint pollutant removal and habitat for flora and fauna.

### **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 month of the effective date of the Stormwater Management Rules.

### **Plan Consistency**

The Borough is not within a Regional Stormwater Management Planning Area and no TMDL's have been developed for waters within the Borough; therefore this plan does not need to be consistent with any regional stormwater management plans (RSWMPs) or any TMDL's. If any RSWMPs or TMDLs are developed in the future, this Municipal Stormwater Management Plan will be updated to be consistent.



The Borough is within the Upper Delaware Basin and much information on the basin and about its characteristics has been developed as part of the Upper Delaware Basin Plan. The Borough supports the Upper Delaware Basin Plan.

The Municipal Stormwater Management Plan is consistent with the Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21. The Borough will utilize the most current update of the RSIS in the stormwater review of residential areas. This Municipal Stormwater Management Plan will be updated to be consistent with any future updates of 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 local 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. All nonstructural stormwater management strategies shall be considered and implemented as given in the NJ Stormwater Best Management Practices Manual, February 24, 2004, as amended except for retention or detention basin, as provided for in the Flood Plain Management Plan. 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.

### **Land Use/Build-Out Analysis**

Since the Borough has a combined total of less than one square mile of vacant lands (there are no agricultural lands), the Borough is not required to do a build-out analysis.

### **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. A mitigation project must be implemented in the same drainage area as the proposed development. The project must provide additional protection from stormwater runoff quality and quantity from the 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.

The applicant can select one or more projects listed to compensate for the deficit from the performance standards resulting from the proposed project. The mitigation projects and detailed information, including size, permit requirements, land ownership and estimated costs can be obtained from the Borough Engineer. Non-structural as well as structural mitigation methods shall be analyzed as part of the proposed mitigation plan. The mitigation plan shall be incorporated into the site plan approval by the Land Use Board.

2. If a suitable site cannot be located in the same drainage area as the proposed development, as discussed in Option 1, 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 that impact aquatic life along the Musconetcong River and Lake Musconetcong.

A complete list of mitigation projects can be obtained from the Borough Engineer. The list of mitigation projects, engineering and maintenance will be developed on an on-going basis.

When an on-site mitigation plan is impractical, a plan to compensate for the on-site mitigation plan shall be established to determine the type of structural and non-structural mitigation devices that will be required to improve water quality.

The cost of the mitigation devices, engineering and maintenance will be developed on an on-going basis as each plan is developed.

The Borough may allow a developer to provide funding or partial funding to the Borough for an environmental enhancement project that has been identified in a Municipal Stormwater Management Plan, or towards the development of a Regional Stormwater Management Plan. The funding must be equal to or greater than the cost to implement the mitigation outlined above, including costs associated with purchasing the property or easement for mitigation, and the cost associated with the long-term maintenance requirements of the mitigation measure.

### **Recommended Implementing Stormwater Control Ordinances**

The Borough currently has a Dog Ordinance in place but will need to revise said current ordinance and implement the Litter, Improper Waste Disposal, Wildlife Feeding, Yard Waste and Illicit Connection ordinances.

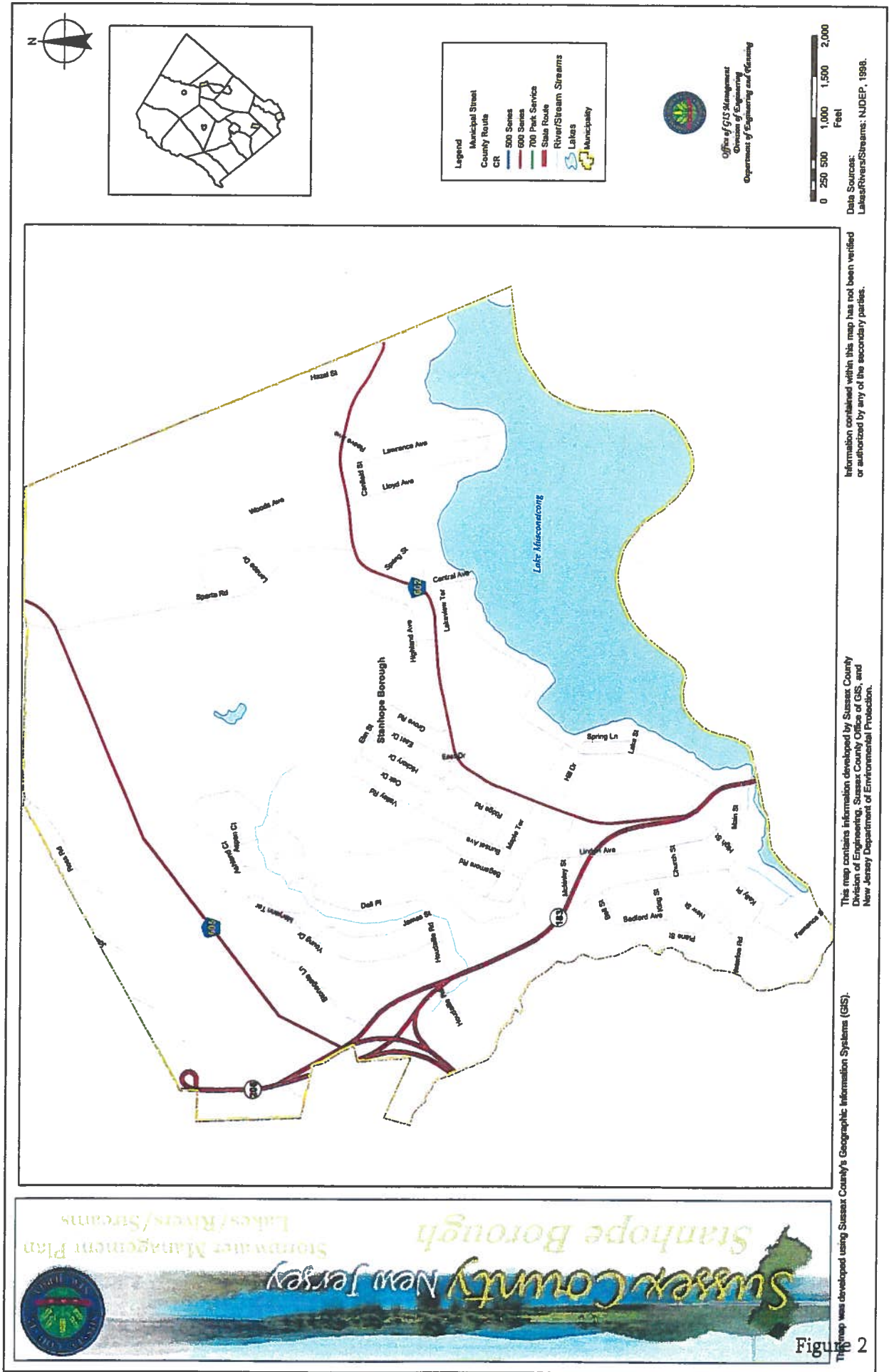


Figure 2

Figure 2



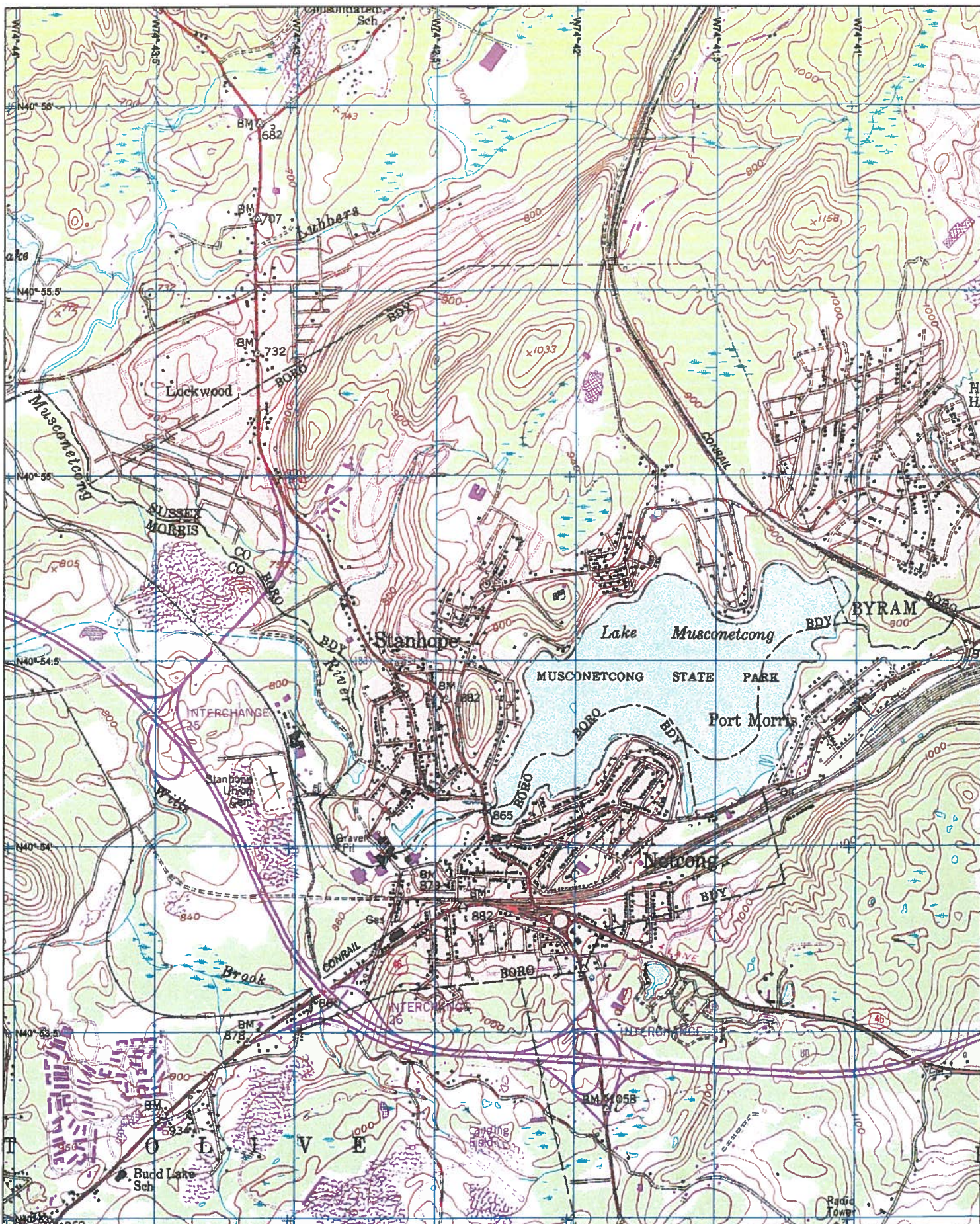
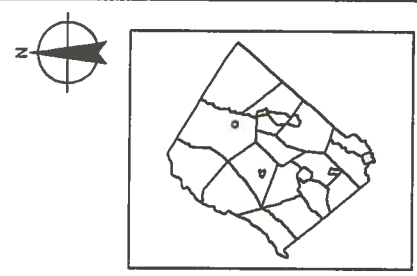


Figure 3





- Legend**
- Municipal Street
  - County Route
  - CR
  - 500 Series
  - 600 Series
  - 700 Part Service
  - State Route
  - River/Stream
  - Streams
  - Lakes
  - Municipality
  - HUC14 Watershed Area



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 Division of Engineering  
 State of New Jersey  
 Department of Engineering and Construction



Data Sources:  
 HUC 14: NJDEP, 1999.

This map contains information developed by Sussex County Division of Engineering, Sussex County Office of GIS, and New Jersey Department of Environmental Protection.

This map was developed using Sussex County's Geographic Information Systems (GIS).

Figure 4

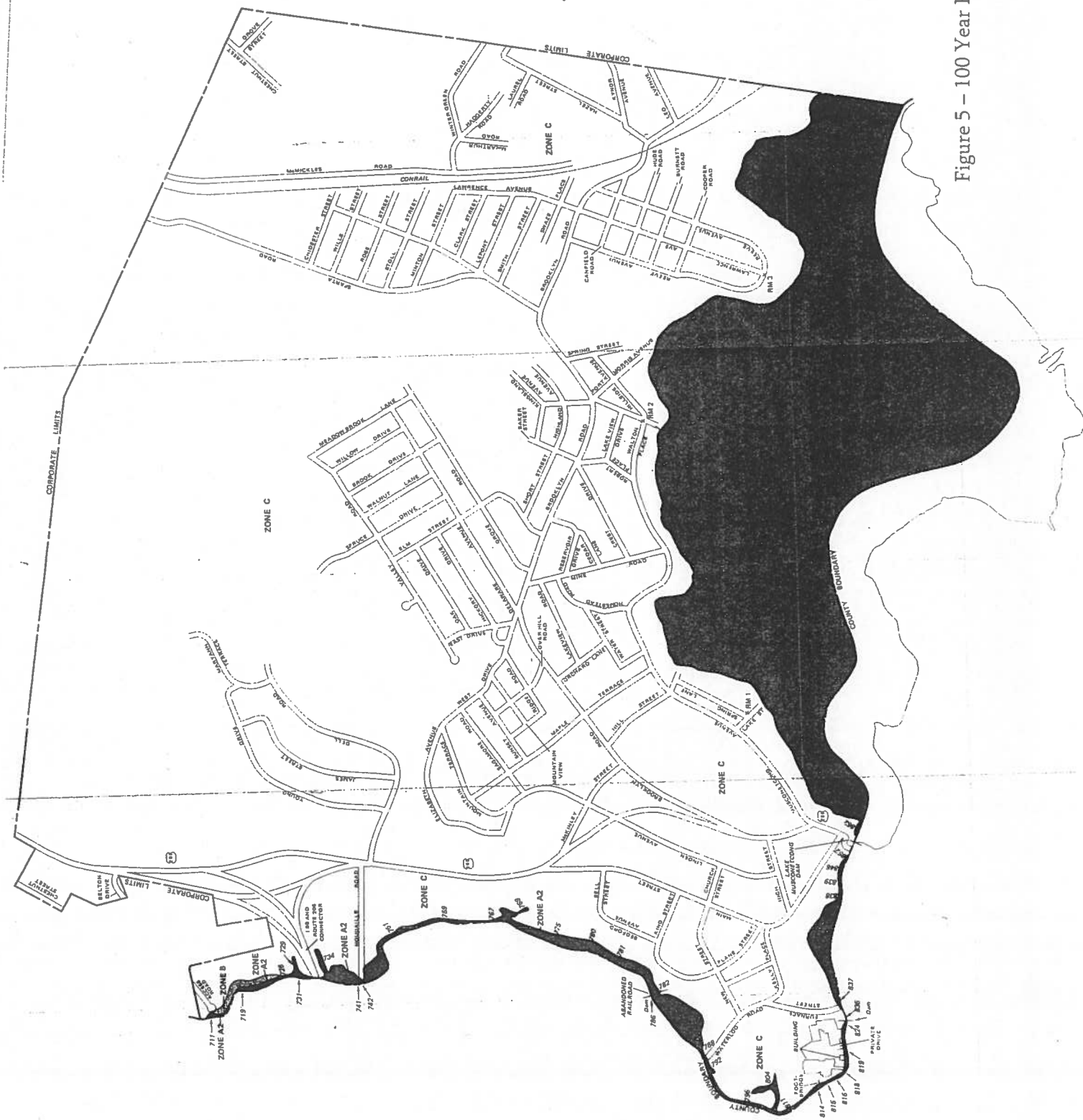
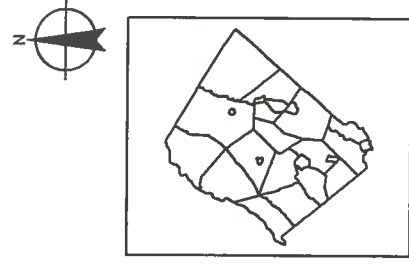


Figure 5 - 100 Year Frequency Floodplain





**Legend**

|                  |              |
|------------------|--------------|
| Municipal Street | AGRICULTURE  |
| County Route     | BARREN LAND  |
| CR               | FOREST       |
| 500 Series       | URBAN        |
| 600 Series       | WATER        |
| 700 Park Service | WETLANDS     |
| State Route      | Municipality |
| River/Stream     |              |
| Streams          |              |
| Lakes            |              |
| Landbase         |              |
| Landbase Type    |              |



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Data Sources:  
 Landbase: Sussex County, 2002.

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Figure 6



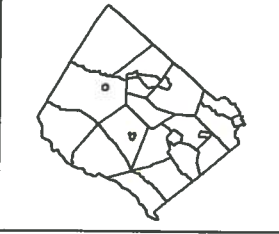
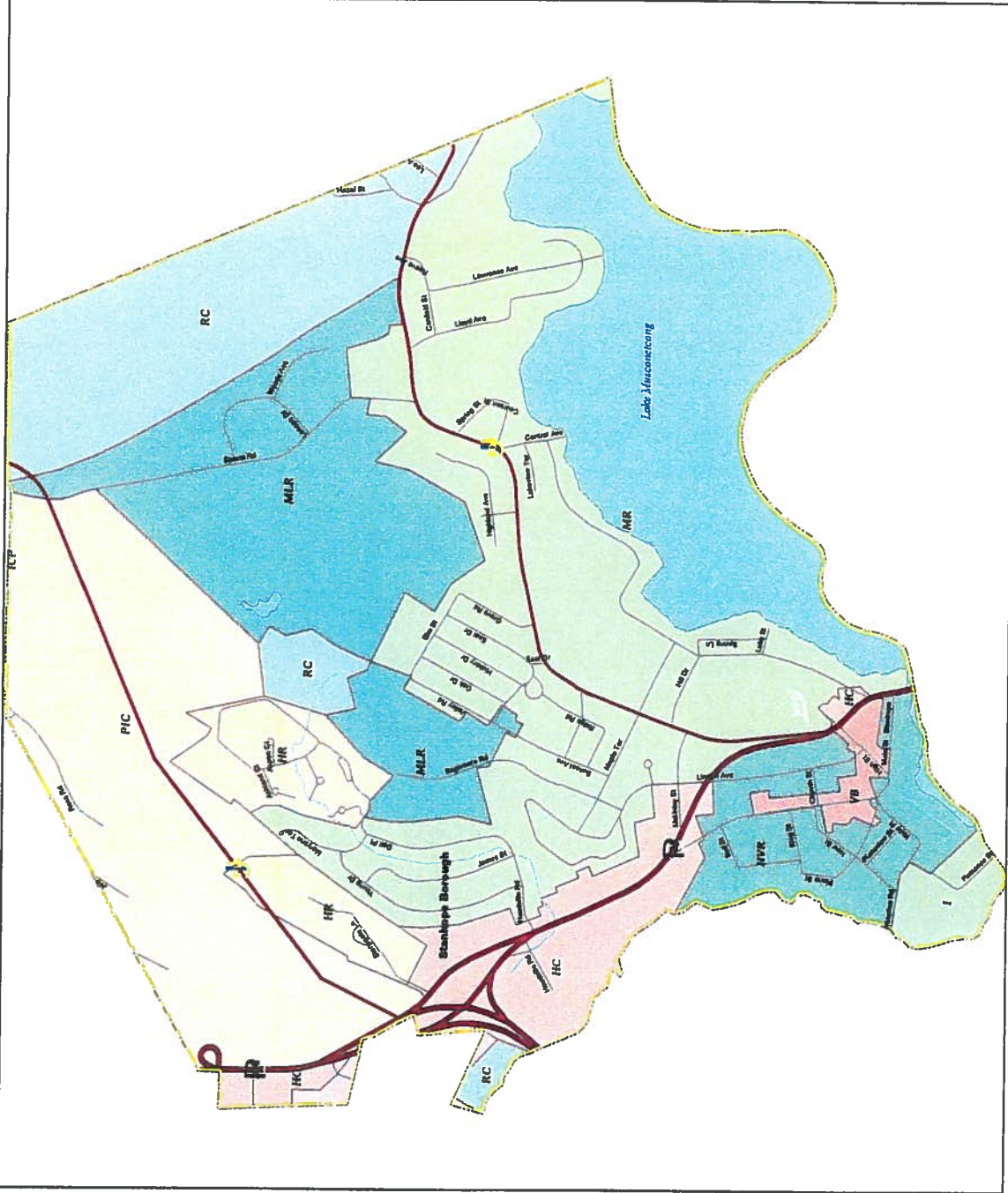


# Sussex County New Jersey

## Stanhope Borough

### Summer Management Plan

### Zoning



- Legend**
- Municipal Street
  - County Route
  - CR
  - 500 Series
  - 600 Series
  - 700 Park Service
  - State Route
  - River/Stream
  - Streams
  - Lakes
  - Municipality



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Figure 7



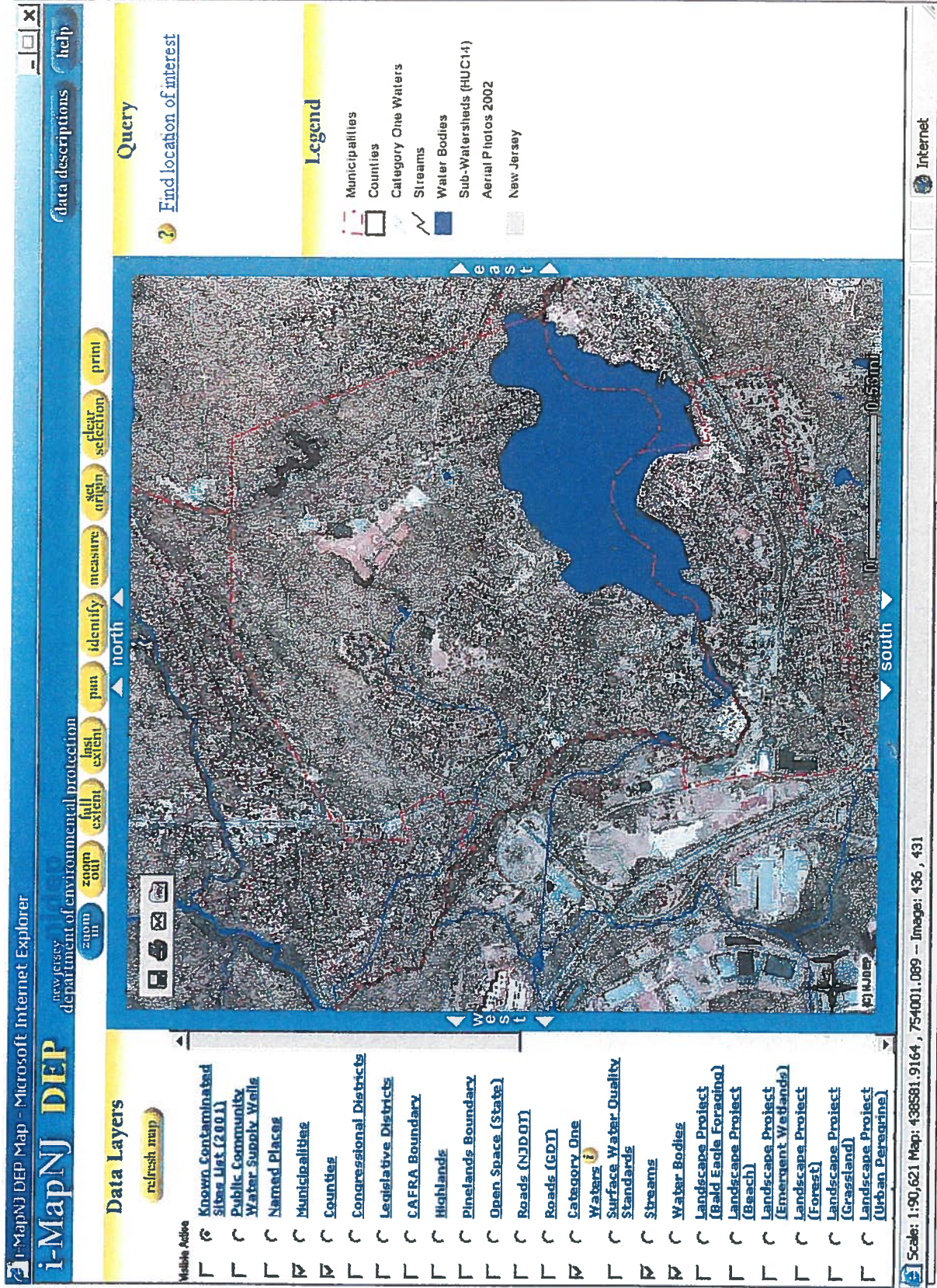


Figure 8



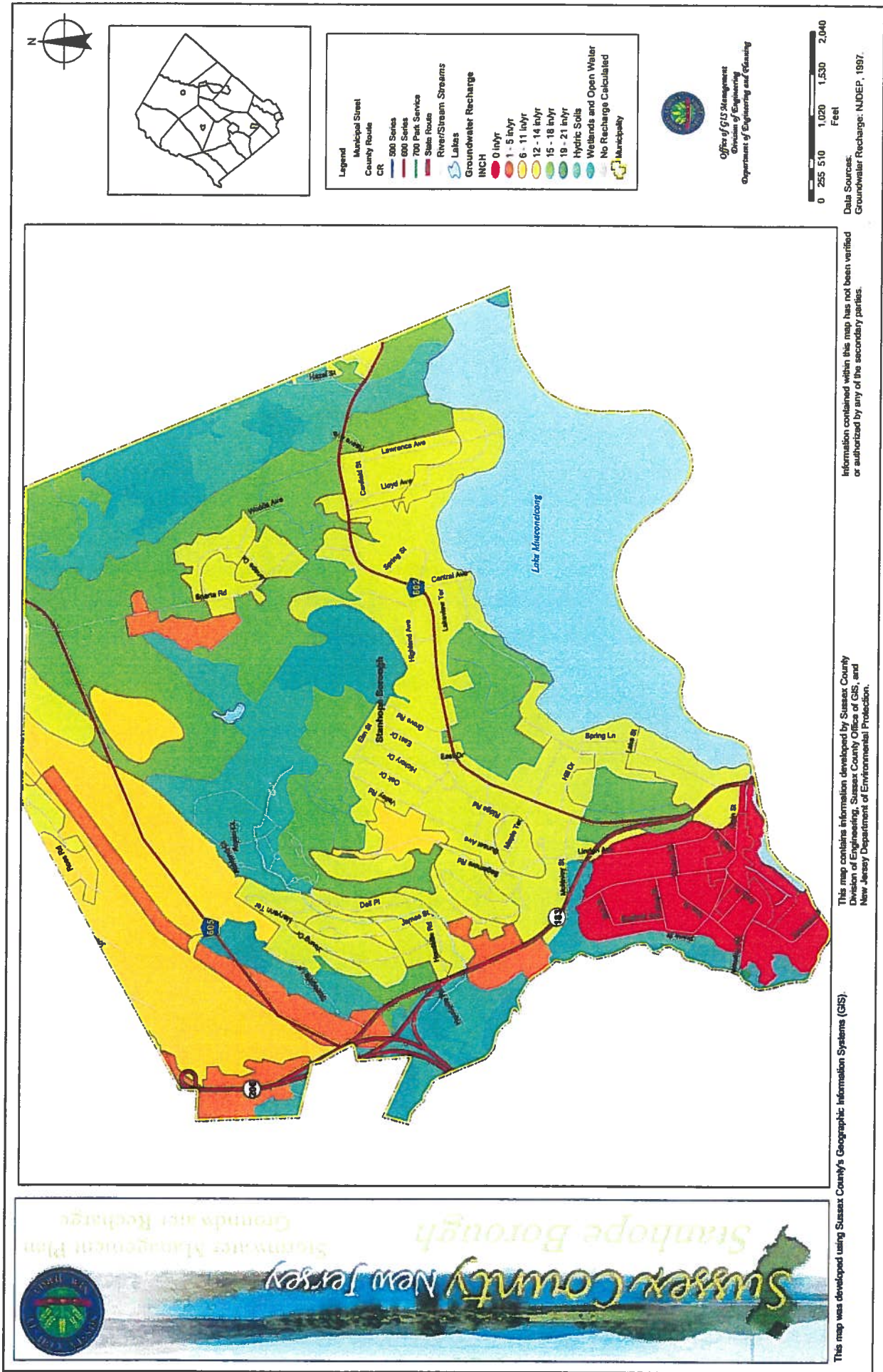
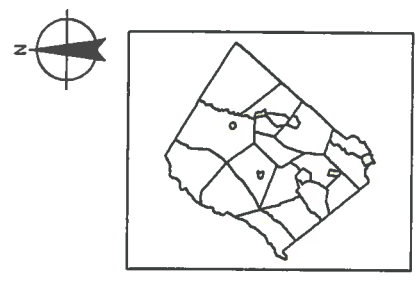
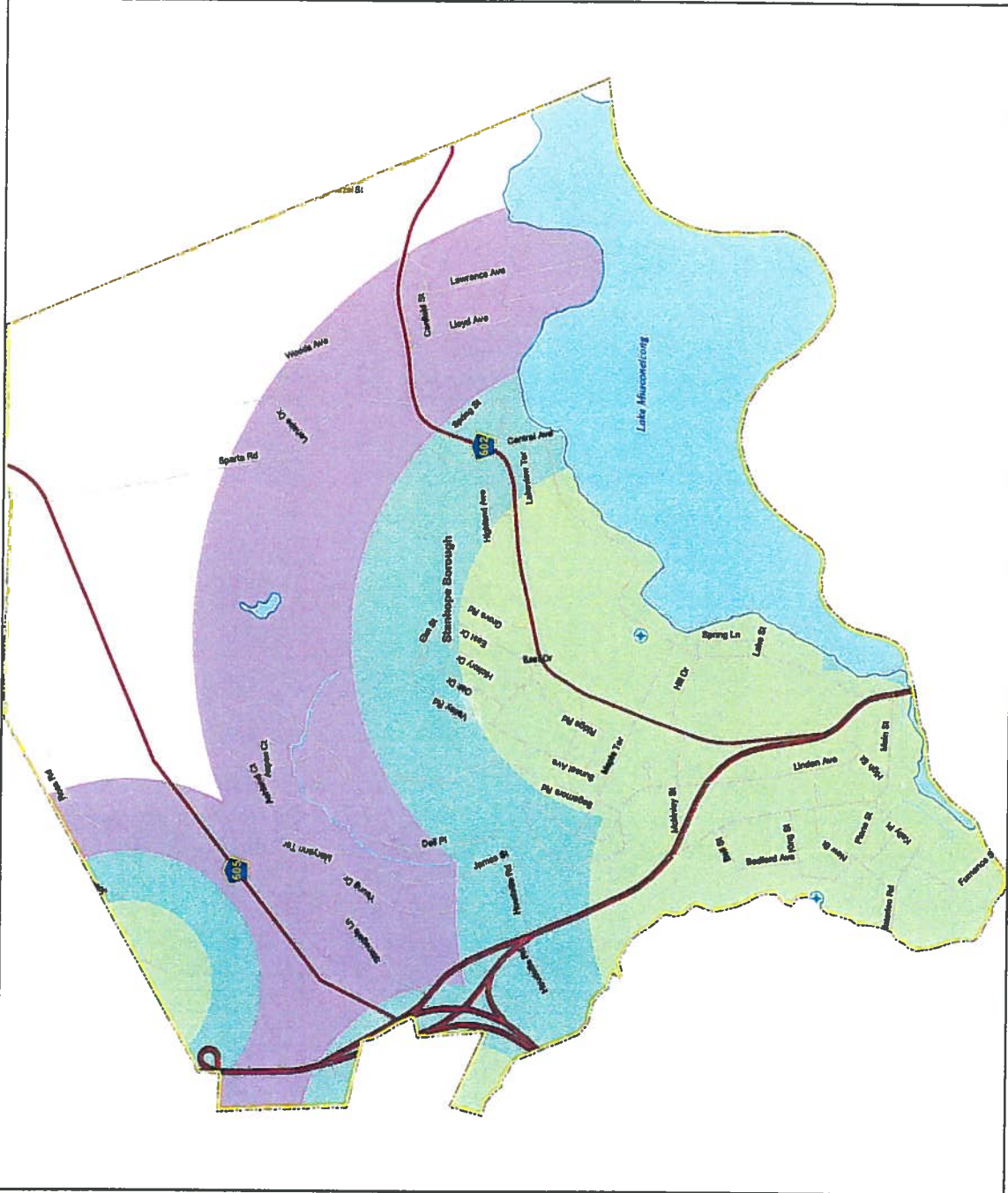


Figure 9



- Legend**
- Public Community Water System
  - Municipal Street
  - County Route
  - CR
  - 500 Soils
  - 600 Soils
  - 700 Park Services
  - State Route
  - Public Community Watershed Protection Area
  - TIER
  - 2 year
  - 5 year
  - 12 year
  - River/Stream Streams
  - Municipality
  - Lakes



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Data Sources:  
 Watershed Protection Areas: NJDEP, 02/2004.  
 Public Community Water System: NJDEP, 3/2004.

Figure 10





Figure 11

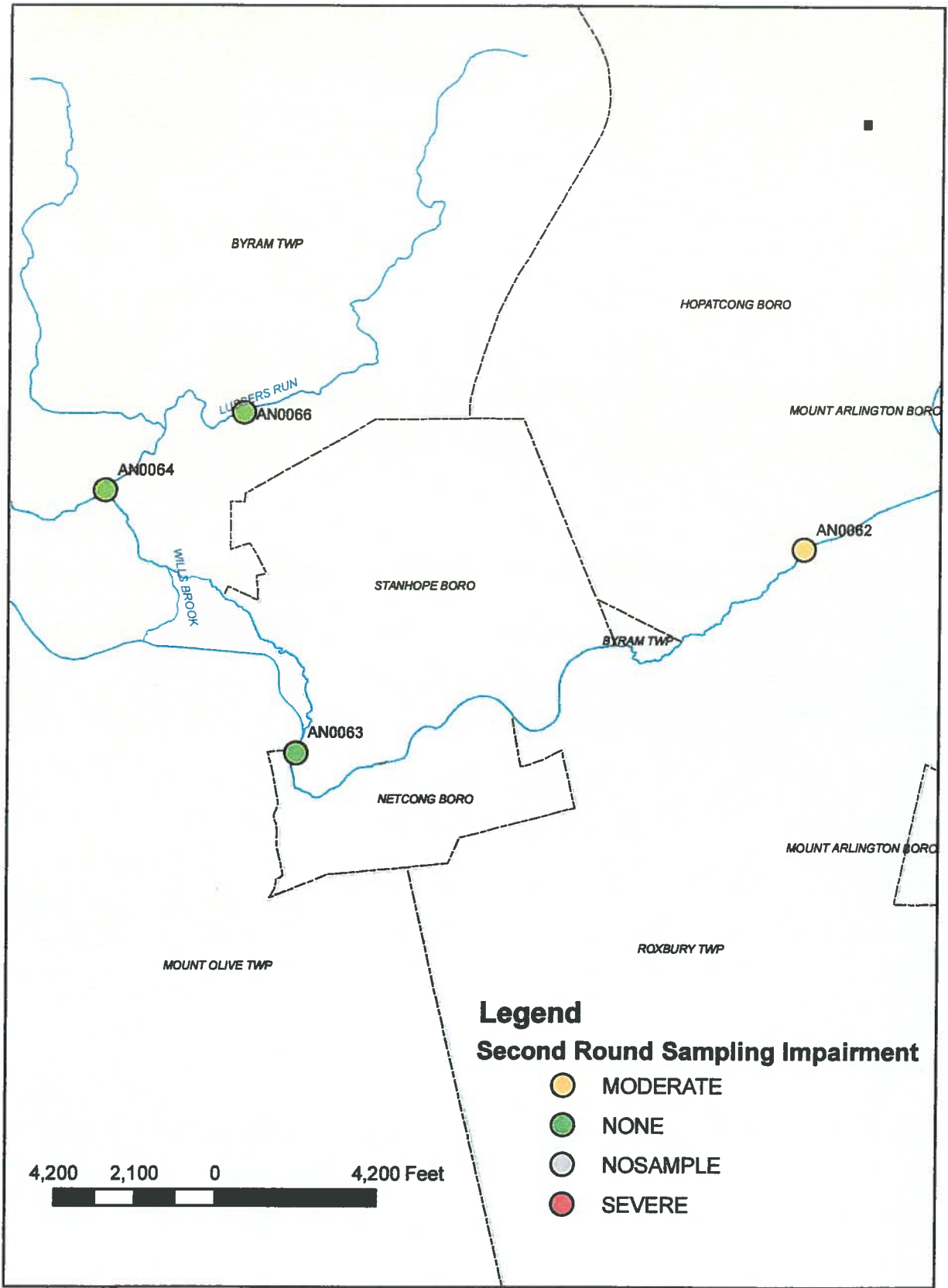


Figure 12 – Water Quality Monitoring Stations

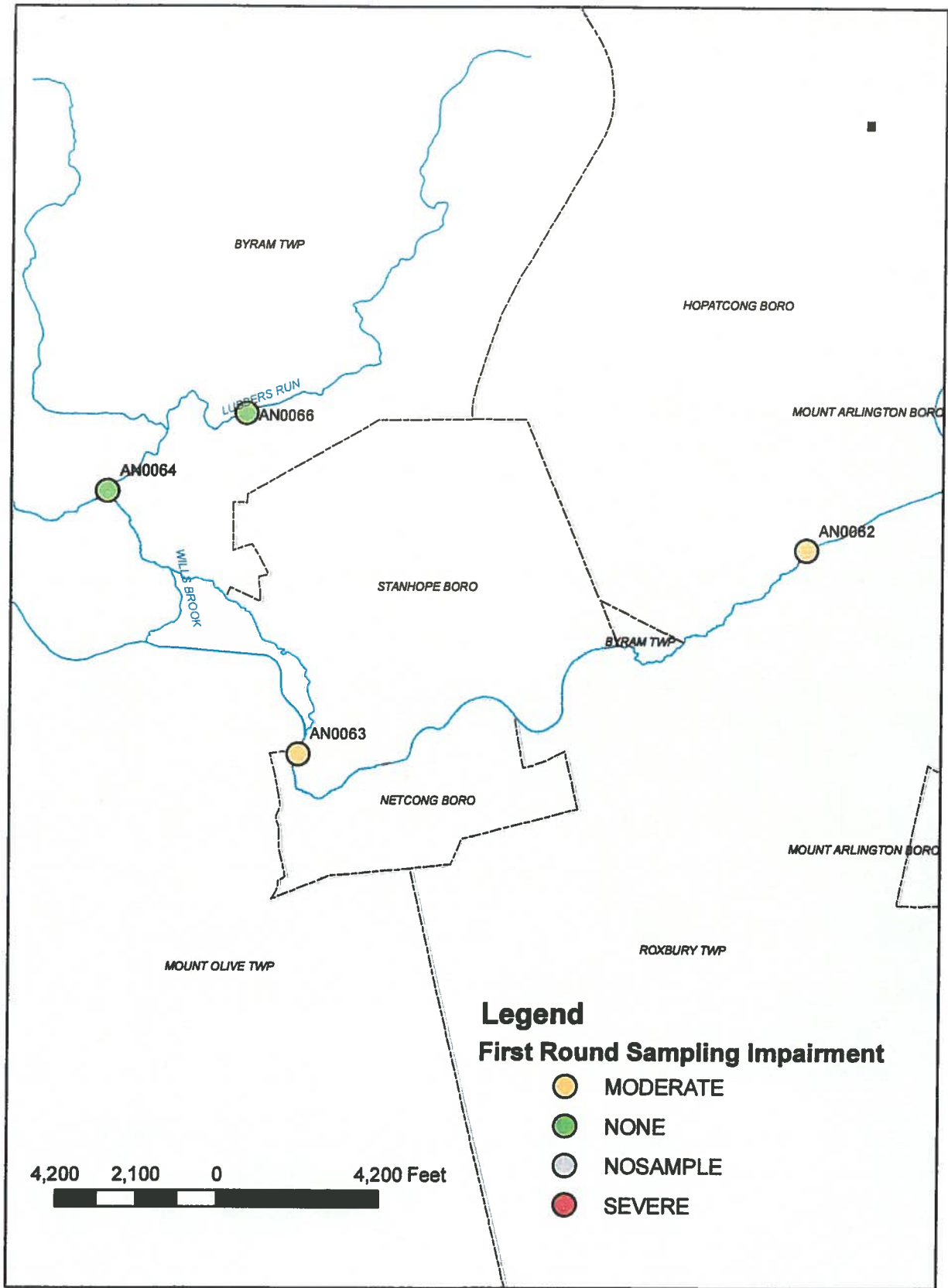


Figure 12.1 – Water Quality Monitoring Stations

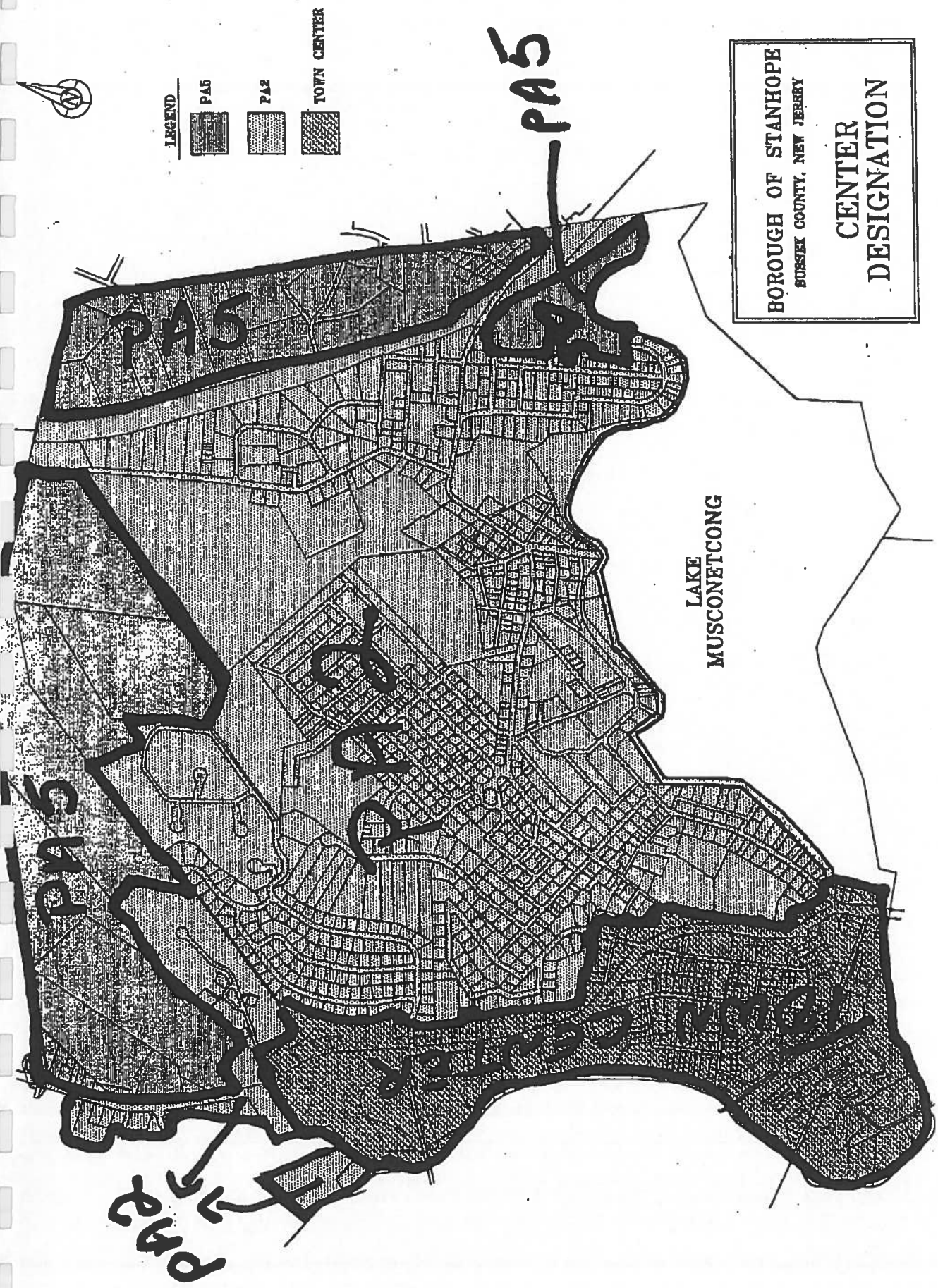


Figure 13 - Center Designation



## **Attachment C**

### **DESIGN STANDARD - STORM DRAIN INLETS**

This standard applies to storm drain inlets installed as part of new development and redevelopment projects (public or private) that disturb one acre or more. In addition, retrofitting of existing storm drain inlets to this standard is required where such inlets are in direct contact with repaving, repairing (excluding repair of individual potholes), reconstruction or alterations of facilities owned or operated by the Tier A Municipality. For exemptions to this standard see "Exemptions" below.

#### Grates in Pavement or Other Ground Surfaces

Design engineers shall use either of the following grates whenever they use a grate in pavement or another ground surface to collect stormwater from that surface into a storm drain or surface water body under that grate:

1. The New Jersey Department of Transportation (NJDOT) bicycle safe grate, which is described in Chapter 2.4 of the NJDOT Bicycle Compatible Roadways and Bikeways Planning and Design Guidelines (April 1996).
2. A different grate, if each individual clear space in that grate has an area of no more than seven (7.0) square inches, or is no greater than 0.5 inches across the smallest dimension.

(In regard to whether the different grate must also be bicycle safe, the Residential Site Improvement Standards include requirements for bicycle-safe grates.)

Examples of grates subject to this standard include grates in grate inlets, the grate portion (non-curb-opening portion) of combination inlets, grates on storm sewer manholes, ditch grates, trench grates, and grates of spacer bars in slotted drains. Examples of ground surfaces include surfaces of roads (including bridges), driveways, parking areas, bikeways, plazas, sidewalks, lawns, fields, open channels, and stormwater basin floors.

#### Curb-Opening Inlets (Including Curb-Opening Inlets in Combination Inlets)

Whenever design engineers use a curb-opening inlet, the clear space in that curb opening (or each individual clear space, if the curb opening has two or more clear spaces) shall have an area of no more than seven (7.0) square inches, or be no greater than two (2.0) inches across the smallest dimension.

#### Exemptions

##### *Retrofitting Exemptions*

1. Repaving, repairing, reconstruction or alterations projects that began construction prior to March 3, 2004, and projects that were awarded bid prior to March 3, 2004, are exempted from the storm drain inlet design standard.
2. Existing curb-opening inlets do not need to be retrofitted to meet the design standard if each individual clear space in the curb opening has an area of no more than nine (9.0) square inches.



*Hydraulic Performance Exemptions*

1. New Development and Redevelopment Projects - Where the review agency determines that this standard would cause inadequate hydraulic performance that could not practicably be overcome by using additional or larger storm drain inlets that meet these standards.
2. Retrofitting of existing storm drain inlets - Where the review agency determines that this standard would cause inadequate hydraulic performance.

*Alternative Device Exemptions*

1. Where flows from the water quality design storm as specified in N.J.A.C. 7:8 are conveyed through any device (e.g., end of pipe netting facility, manufactured treatment device, or a catch basin hood) that is designed, at a minimum, to prevent delivery of all solid and floatable materials that could not pass through one of the following:
  - a. A rectangular space four and five-eighths inches long and one and one-half inches wide (this option does not apply for outfall netting facilities); or
  - b. A bar screen having a bar spacing of 0.5 inches.
2. Where flows are conveyed through a trash rack that has parallel bars with one-inch (1") spacing between the bars, to the elevation of the water quality design storm as specified in N.J.A.C. 7:8.

Note - The preceding exemptions do not authorize any infringement of requirements in the Residential Site Improvement Standards for bicycle-safe grates in new residential development (N.J.A.C. 5:21-4.18(b)2 and 7.4(a)).

*Historic Places Exemption*

Where the Department determines, pursuant to the New Jersey Register of Historic Places Rules at N.J.A.C. 7:4-7.2(c), that action to meet this standard is an undertaking that constitutes an encroachment or will damage or destroy the New Jersey Register listed historic property.