

Municipal Stormwater Management Plan
Master Plan Element
for the
Township of South Brunswick
Middlesex County, New Jersey



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April 2005 - Revised November 2021

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Introduction

This Municipal Stormwater Management Plan (MSWMP or the “Plan”) documents the strategy for South Brunswick Township (“the Township”) 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, generally 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, water quantity and the loss of groundwater recharge that provides base-flow in receiving waterbodies.

The plan addresses long-term operation and maintenance measures for existing and future stormwater facilities. The final component of this plan is a mitigation strategy for when a variance or exemption of the design and performance standards is sought. As part of the mitigation section of the stormwater plan, specific stormwater management measures are identified to lessen the impact of existing development.

Goals

The goals of this MSWMP are to:

- reduce flood damage, 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 runoff from new and existing development to restore, enhance, and maintain the chemical, physical, and biological integrity of the waters of the state, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, and other uses of water;
- protect public safety through the proper design and operation of stormwater basins; and
- promote public education and involvement, via the Stormwater Pollution Prevention Plan as implemented by the Township as of May 2021.

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 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.

Consideration should be given to a reasonable, efficient funding mechanism for the implementation of stormwater management by all levels of government. Developers will be required to absorb some of the associated costs. State law should be established to permit use of mechanisms such as a stormwater utility.

Stormwater Discussion

Land development can dramatically alter the hydrologic cycle (See *Figure 1: Groundwater Recharge in the Hydrologic Cycle*) 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.

Background

Township Demographics

The Township encompasses a 40.65 square mile area in Middlesex County, New Jersey (see *Figure 2: South Brunswick Vicinity Map*). In recent years, the Township population has increased from 43,417 persons in 2010, to 47,043 persons in 2020. Thus, the population has increased by 8.3% from 2010 to 2020. The population density has consequently increased from 1068 persons per square mile of land area in 2010, to 1158 persons per square mile of land area in 2020. This population density has resulted in considerable development and affects waterway systems and their function. *Figure 3: Existing Land Use* depicts the Township's current land use and the existing land area that has been developed.

Figure 4: Zoning Districts displays the existing zoning districts and dictates the extent at which the existing undeveloped land can be developed. In general, Township water features abut land zoned residential and public. The zoning districts adjacent to water features range from, but are

not limited to, rural residential, single family residential, village residential, light industrial, office/research/conference and public land.

Township Water Features

There are fourteen (14) named streams within the Township, as well as several un-named tributaries. The named streams are as follows:

- Millstone River
- Heathcote Brook
- Carter Brook
- Devils Brook
- Shallow Brook
- Ten Mile Run
- Nine Mile Run
- Lawrence Brook
- Great Ditch
- Terhune Run
- Ireland Brook
- Oakeys Brook
- Cow Yard Brook
- Delaware and Raritan Canal

There are four (4) named waterbodies;

- Carnegie Lake
- Farrington Lake
- Deans Pond
- Davidson Mill Pond

The Township's northeast border is formed by Ireland Brook, Oakeys Brook and Farrington Lake. The western most border is formed by Carnegie Lake, Delaware and Raritan Canal and Millstone River.

See *Figure 5: Township Waterways* for relative location of waterways within the Township. Category One waterways are situated along Great Ditch and its unnamed tributaries. *Figure 6: Category One Waterways* provides a general location of Category One waterways within the Township. *Figure 7: Boundary on USGS Quadrangle* depicts the Township boundary on the USGS quadrangle maps and provides a spatial representation of the Township in relation to the surrounding areas.

Future Developable Land

As presented in *Figure 8: Developable and Un-developable Land*, there are 7.37 square miles of future developable land within the Township. Future developable land is calculated from

information provided by the New Jersey Department of Environmental Protection (NJDEP) 1995/1997 Land Use Geographic Information Systems (GIS) data and South Brunswick Township. Since the area of future developable land is greater than one square mile, the Township is required to reevaluate the Master Plan and provide future non-point source pollution loads assuming full build-out analysis, in accordance with N.J.A.C.7:8-4.3(a). The Township will provide these requirements and adopt an amended MSWMP to reflect the inclusion of the same.

Existing Water Quality Issues

Ambient Biomonitoring Network (AMNET) Study

Changes in the landscape caused by development have most likely increased stormwater runoff volumes and pollutant loads to the waterways of the municipality. It is necessary to monitor the health of waterways and determine methods to mitigate pollution where encountered. Studies, programs and networks have been developed to document the health of waterways, such as the Ambient Biomonitoring Network (AMNET) established by the NJDEP. 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; the ratio of pollution tolerant to pollution sensitive benthic macroinvertebrates coupled with a visual inspection is examined to assess water quality. Based on AMNET analysis criteria, streams are classified as non-impaired, moderately impaired, or severely impaired. 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.

There are nine (9) AMNET sites located within the analysis area. Of these sites, one (1) location is classified non-impaired, six (6) sites are assessed moderately impaired and the remaining two (2) sites are designated severely impaired. See *Table 1: South Brunswick Township AMNET Site Classifications* for a categorized list of AMNET assessment locations and their respective classification. See *Figure 10a: AMNET Water Quality Assessment Locations* for AMNET assessment locations.

Table 1: South Brunswick Township AMNET Site Classification

| Non-Impaired | Moderately Impaired | Severely Impaired |
|--|--|--|
| <ul style="list-style-type: none"> • AN0396 * | <ul style="list-style-type: none"> • AN0387 • AN0395 • AN0430 | <ul style="list-style-type: none"> • AN0431 • AN0432 • AN0433 • AN0388 • AN0397 |

* Significant Macroinvertebrate Abnormalities (observed in greater than 5% of taxa)

There are two assessment sites located on Lawrence Brook within the Township. The most upstream AMNET station, AN0430, is assessed moderately impaired; the downstream site, AN0431, is moderately impaired. Lawrence Brook is designated moderately impaired from site AN0430 to AN0434, an AMNET assessment location downstream in Milltown Borough. Immediately upstream of Ireland Brook’s junction with the Lawrence Brook, Ireland Brook’s assessment location, AN0433, is moderately impaired. Oakeys Brook assessment station, AN0432, is also moderately impaired.

Devils Brook assessment site, AN0387, is classified moderately impaired. In general, Devils Brook is moderately impaired from site AN0387 to AN0389, an AMNET assessment location downstream Devils Brook in Plainsboro Township. Shallow Brook, a tributary to Devils Brook, is assessed severely impaired at AMNET site AN0388. Heathcote Brook’s most upstream assessment station, located before the stream’s junction with the Millstone River, is non-impaired at AMNET site AN0396. Heathcote Brook’s upstream AMNET station, AN0395, is moderately impaired. Heathcote Brook is assessed non-impaired from AMNET sites AN0394 to AN0396. Along the Township’s western border in Princeton Township, the Millstone River is assessed severely impaired at AMNET site AN0397.

Several AMNET site locations were tested for benthic macroinvertebrates abnormalities. Samples taken from specified AMNET assessment stations were examined for physical abnormalities via visual inspection. Morphological abnormalities are noted in the AMNET study because they may signify the possibility of stressful conditions or contaminants in the existing ecological environment, which, in turn, has affected their development. A site is identified as

exhibiting significant or chronic macroinvertebrate abnormalities when greater than five percent (5%) of the taxa observed are deformed.

Sites identified with chronic macroinvertebrate abnormalities indicate that deformities were encountered during the most recent and previous site assessments. Significant macroinvertebrate abnormalities indicate that taxa deformities were only encountered during the most recent site inspection. Significant macroinvertebrate abnormalities were detected on Heathcote Brook, assessment station AN0395.

See *Appendix B* for the above referenced AMNET site data obtained from the *Ambient Biomonitoring Network (AMNET)* report for *Watershed Management Areas 7, 8, 9 and 10: Raritan Region, 2012 Benthic Macroinvertebrates Data* issued by the NJDEP December 2012. See *Figure 10a: AMNET Water Quality Assessment Locations* for AMNET assessment locations.

New Jersey Integrated Water Quality Monitoring and Assessment Report

In addition to the AMNET data, the NJDEP and other regulatory agencies collect water quality chemical data on streams within the state. 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.

Waterways are categorized into Sublists, ranging from Sublist 1, which indicates a healthy functioning waterway, to Sublist 5, which indicates an unhealthy waterway not meeting its intended use. Sublist 1 waterways attain water quality standards and none of the designated uses are threatened. Sublist 5 of the Integrated List constitutes the list of waters impaired or threatened by pollutants for which one or more Total Maximum Daily Loads (TMDLs) are needed. Waterways are placed on Sublist 3 because there is insufficient data or the guidelines/criteria to conduct a use attainment assessment is unavailable; therefore, it can not be determined if a designated use is

threatened. Sublist 4 waterways are those impaired or threatened for one or more uses, but do not require the development of a TMDL, or a TMDL has been developed and water quality is being attained.

Sublist 2 of the Integrated List was utilized in past studies to designate if waterbody uses are attained, no uses were threatened and there was insufficient or no data to determine if the remaining uses were threatened. Waterbody assessment has been revised and is now done according to individual use status and not total waterbody use status. The elimination of Sublist 2 occurred when the Integrated List was categorized according to waterbody and pollutant (parameter).

A TMDL is the amount of a pollutant that can be accepted by a waterbody without exceeding 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 sources, which includes stormwater runoff from agricultural 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 will be developed to identify how the various sources will be reduced to the designated allocations. Implementation strategies can include improved stormwater treatment plants, adoption of ordinances, reforestation of stream corridors, retrofitting stormwater systems, and other BMPs, structural and non-structural.

The New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d)), issued June 2004, examined:

- Heathcote Brook
- Shallow Brook
- Millstone River
- Oakeys Brook
- Devils Brook
- Lawrence Brook
- Ireland Brook
- Carnegie Lake

See *Table 2: South Brunswick Township Integrated List Site Classification* below for a categorized list of assessed sites examined within this plan.

Table 2: South Brunswick Township Integrated Site Classification

| Sublist | Waterbody |
|----------------|---|
| Sublist 1 | <ul style="list-style-type: none"> • Heathcote Brook |
| Sublist 3 | <ul style="list-style-type: none"> • Shallow Brook • Millstone River • Oakeys Brook |
| Sublist 5 | <ul style="list-style-type: none"> • Heathcote Brook • Carnegie Lake • Ireland Brook • Lawrence Brook • Devils Brook |

The Integrated List shows the most downstream analysis point on Heathcote Brook at Academy Street on Sublist 1 for attaining water quality standards for benthic macroinvertebrates, results as demonstrated in the AMNET study. There is insufficient data pertaining to benthic macroinvertebrates for the following sites:

- (1) Shallow Brook at Scotts Corner Road
- (2) Millstone River at Route 27
- (3) Oakeys Brook at Davidsons Mill Road
- (4) Heathcote Brook at Stouts Lane

Consequently, these sites are listed on Sublist 3.

Carnegie Lake is on Sublist 3 for phosphorus and Sublist 5 for not meeting fish-mercury criteria. Lawrence Brook at both site locations, Ireland Brook and Devils Brook are on Sublist 5 for benthic macroinvertebrates, as demonstrated in AMNET data. Thus, these waterways are impaired for one or more parameters or there is insufficient data to support a water quality assessment.

See *Figure 10b: Integrated List Water Quality Assessment Locations* for the location of monitoring sites examined in the Integrated Water Quality Monitoring and Assessment Report. Also, see *Appendix C* for the Integrated Water Quality Monitoring and Assessment Report data analyzed.

Existing Water Quantity Issues

In addition to water quality problems, the Township has exhibited severe water quantity problems including flooding, stream bank erosion, and diminished base-flow in its streams. Many of the culverts associated with road crossings in the Township are undersized. During storm events,

these undersized culverts and other stormwater drainage features do not have adequate capacity, thereby causing a backwater effect and flooding upstream.

See *Figure 15: FEMA Flood Prone Map Q3 Flood Data* per the National Flood Insurance Program (NFIP) issued September 1996. Areas of concern for water quantity are:

- | | |
|--|---------------------------------|
| 1) Intersection of Route 27 & Stillwell Road | 5) New Road at Ridge Door |
| 2) New Road & Pyne Road | 6) Highway Route 1 & Ridge Road |
| 3) Shelley Road | 7) Ridge Road & Chris Court |
| 4) Heathcote Brook Park | |

At the intersection of State Route 27 and Stillwell Road, there has been frequent flooding due to an undersized culvert and associated stormwater drainage system. This system lacks capacity and causes backwater effects.

Twin box culverts cross Ten Mile Run near the intersection of New Road and Pyne Road; this area exhibits chronic flooding, as there is a significant amount of debris collecting along the center wall of the box culvert. This collection of debris has hindered the flow of the stormwater runoff and created backwater effects and flooding upstream, despite maintenance efforts this problem persists.

In the northwestern area of Town, Shelley Road has experienced chronic flooding due to a deficient stormwater drainage system. The existing stormwater drainage network lacks the capacity to adequately transfer stormwater runoff to the associated drainage outfall.

The stormwater drainage system in Heathcote Brook Park does not have adequate capacity to transfer stormwater runoff generated by the increased amount of impervious coverage within the surrounding area. New Road at Ridge Door has also experienced flooding due to a deficient stormwater drainage system.

The stormwater drainage systems along the southbound jug-handle at the intersection of State Highway Route 1 and Ridge Road and at the intersection of Ridge Road and Chris Court do not have adequate capacity.

These stormwater drainage features may have been designed for much different hydrologic conditions (i.e., less impervious area) than presently exist in the Township and upstream of the Township. As the impervious coverage increased, the peak flows and runoff volumes of the stream also increased. The increased amount of water resulted in stream bank erosion, which resulted in unstable areas at roadway/bridge crossings, degraded stream habitats and cause chronic flooding. The high impervious coverage of the Township has significantly decreased groundwater recharge; hence, decreasing base flows in the streams during dry weather periods. Lower base flows can have a negative impact on stream habitat during the summer months. A map of the groundwater recharge areas is provided; see *Figure 11: Groundwater Recharge Areas*.

Hydrologic Unit Code 14 (HUC14)

Watersheds are defined by the United States Geological Survey (USGS). The most basic defined watershed area or hydrologic unit is a unique defined feature having a minimum size of 3,000 acres. The base hydrologic unit is given a unique hydrologic unit code (HUC) fourteen (14) digits long; hence, the terminology Hydrologic Unit Code 14 (HUC14). The hydrologic unit network is hierarchical. HUCs are combined to identify larger watershed areas such as HUC11, HUC8, HUC6, HUC4, watershed management areas (WMAs), watershed regions and so on.

There are fourteen (14) HUC14 areas within the Township. The Township's HUC14s fall within two (2) watershed management areas (WMAs). Both WMAs are within the Raritan watershed region. The western portion of the Township falls within the Millstone watershed management area, WMA 10. The eastern portion of the Township is within the Lower Raritan, South River & Lawrence watershed management area, WMA 9. See *Figure 9: Hydrologic Unit Codes 14 (HUC14)* for the Township's HUC14 areas and WMA boundaries.

Township Features

Wellhead protection areas are located throughout the Township. There are three (3) tiers associated with each wellhead protection area. Tiers 1 through 3, delineate the extent of ground water captured by a pump at a specified rate calculated over a 2, 5 and 12-year periods, respectively. Wellhead protection areas are delineated by the NJDEP Source Water Protection Program (SWAP) and acted upon in response to the Safe Drinking Water Act Amendments of 1986 and 1996. Please see *Figure 12: Wellhead Protection Areas* for wellhead protection areas located throughout the Township.

A map of the wetlands and other constrained land is displayed in *Figure 13: Wetlands and Water Land Uses Constrained Land*. A soil map of the Township is provided and references the latest Soil Survey Geographical (SSURGO) Database; see *Figure 14: Soil Survey Geographical (SSURGO) Database*.

Design and Performance Standards

The Township will adopt the design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8-5, via the Stormwater Control Ordinance, to minimize the adverse impact of stormwater runoff on water quality, water quantity and loss of groundwater recharge in receiving waterbodies for residential and commercial site development. Generally, projects meeting the definition of a major development are required to meet the regulations stated under N.J.A.C. 7:8-5. Said regulations address erosion control, groundwater recharge, runoff quantity standards, stormwater runoff quality standards, standards for calculating stormwater runoff and groundwater recharge, structural stormwater management standards, and maintenance requirements, as stated above. The major development must meet the established design and performance standards set forth in the Soil Erosion and Sediment Control Act.

Low Impact Development (LID) Techniques

The N.J.A.C. 7:8: Stormwater Management regulations promote stormwater management measures for major developments that minimize the adverse impact of stormwater runoff on water quantity, water quality and the loss of groundwater recharge to receiving waterbodies. In N.J.A.C. 7:8-5.3 and Chapter 2 of the *New Jersey Stormwater Best Management Practices (BMP) Manual 2004* stormwater management design techniques are focused on non-structural stormwater management strategies. Non-structural Stormwater Management Strategies, Low Impact Development (LIDs) techniques are enumerated as follows:

1. "Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;" (N.J.A.C. 7:8-5.3(b)1.)

i.e., preserve forested areas, riparian corridors and high groundwater or aquifer recharge capabilities and any other natural area with significant hydrologic function, specific legal and/or procedural measures to ensure areas remain preserved in the future and, reestablish wooded and forested areas that were disturbed

2. "Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces;" (N.J.A.C. 7:8-5.3(b)2.)

i.e., use vegetative filters and buffers, promote sheet flow over vegetated areas, use level and/or curb cuts at appropriate locations, utilize the minimum pavement widths, vegetate/landscape islands, utilize pervious materials at appropriate locations and locate parking underground or beneath buildings

3. "Maximize the protection of natural drainage features and vegetation;" (N.J.A.C. 7:8-5.3(b)3.)

i.e., preserve forested areas, riparian corridors and high groundwater or aquifer recharge capabilities and any other natural area with significant hydrologic function and take specific legal and/or procedural measures to ensure areas remain preserved in the future

4. "Minimize the decrease in the pre-construction "time of concentration;" (N.J.A.C. 7:8-5.3(b)4.)

i.e., increase sheet flow, disconnect impervious areas, use vegetative stormwater conveyance systems and dense vegetation at appropriate locations, utilize natural features and reduce slopes

5. "Minimize land disturbance including clearing and grading;" (N.J.A.C. 7:8-5.3(b)5.)
i.e., preserve forested areas, riparian corridors and high groundwater or aquifer recharge capabilities and any other natural area with significant hydrologic function and reduce lawn areas
6. "Minimize soil compaction;" (N.J.A.C. 7:8-5.3(b)6.)
i.e., use light weight equipment during construction and minimize disturbed land areas
7. "Provide low maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides;" (N.J.A.C. 7:8-5.3(b)7.)
i.e., use of native plants will result in lower fertilizer and water needs, will promote infiltration characteristics similar to those of natural area and can attract native wildlife and provide better habitat
8. "Provide vegetated open-channel conveyance systems discharge into and through stable vegetated areas;" (N.J.A.C. 7:8-5.3(b)8.)
i.e., use vegetated channels and swales at appropriate locations to increase surface roughness and decrease flow velocities and ensure vegetative conveyance systems are tolerant to higher frequency storms
9. "Provide other source controls to prevent or minimize the use or exposure of pollutants at the site in order to prevent or minimize the release of those pollutants into stormwater runoff."
(N.J.A.C. 7:8-5.3(b)9.)
i.e., provide trash receptacles, litter fences, require regular sweepings, provide "pet waste stations," provide storm drain inlets and trash racks, utilize berms and secondary containment systems (This section is more specifically geared towards commercial and industrial areas or areas with high residential population densities.)

The applicant submitting for review must address the nonstructural stormwater management strategies utilized in the proposed design. If these strategies are not incorporated into the design, the applicant must state reasons for contention. All nonstructural stormwater management strategies must be incorporated to the "maximum extent practical." An applicant should demonstrate the design

has exhausted all measures to implement the nonstructural strategies prior to the use of the structural methods.

“...nonstructural LID-BMPs are to be given preference over structural BMPs. Where it is not possible to fully comply with the Stormwater Management Rules solely with nonstructural LID-BMPs, they should then be used in conjunction with LID and standard structural BMPs to meet the Rules’ requirements.” (NJ Stormwater BMP Manual 2004, page 2-3)

NJAC 7:8-5.3(a) states:

“To the maximum extent practical, the standards in NJAC 7:8-5.4 and 5.5 shall be met by incorporating nonstructural stormwater management strategies at NJAC 7:8-5.3 into the design. The persons submitting an application for review shall identify the nonstructural strategies incorporated into the design of the project. If the applicant contends that it is not feasible for engineering, environmental, or safety reasons to incorporate any nonstructural stormwater management strategies identified in (b) below [NJAC 7:8-5.3(b)] into the design of a particular project, the applicant shall identify the strategy and provide basis for the contention.”

See Appendix A of the *NJ Stormwater BMP Manual 2004* for Low Impact Development Checklists provided by the NJDEP.

Stormwater Management Regulations Overview

Groundwater Recharge Requirements

Major developments must meet one of two standards for groundwater recharge, per N.J.A.C.

7:8-5.4(a)2.:

- (1) maintain 100 percent of the average annual pre-construction groundwater recharge volume for the site, or
- (2) infiltrate the increase in the stormwater runoff volume from pre-construction to post-construction for the two-year storm.

Stormwater Quality Requirements

For water quality (N.J.A.C. 7:8-5.5), stormwater management measures shall be designed to reduce the post-construction load of *total suspended solids (TSS)* in the stormwater runoff generated

by the water quality design storm by *eighty-percent (80%)* of the anticipated load from the major development.

Stormwater Quantity Requirements

To control stormwater runoff quantity impacts (N.J.A.C. 7:8-5.4 3.), a major development must meet one of three design standards:

- (1) demonstrate at no point in time that the post-construction runoff hydrograph exceeds the pre-construction runoff hydrograph,
- (2) demonstrate there is no increase, as compared to the pre-construction condition, in the peak runoff rates of stormwater leaving the site for the 2, 10 and 100-year storm event and that the increased volume or change in timing of stormwater runoff will not increase flood damage at or downstream of the site, or
- (3) demonstrate the post-construction peak runoff rates for the 2, 10 and 100-year storm events are 50, 75 and 80 percent, respectively, of the pre-construction runoff rates.

However, for stormwater water runoff quantity requirement enumerated in (3) above, stream encroachment standards (N.J.A.C. 7:13-2.8) will require for the 100-year storm event seventy-five percent (75%) of the pre-construction peak runoff rates.

Maintenance, Safety and Ordinances

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. These sections address long-term operation and maintenance measures for existing and future stormwater facilities.

The Stormwater Control Ordinance must be submitted to the county for review and approval within 24 months of the effective date of the Stormwater Management Rules, April 2006.

The following ordinances must be adopted by the Township and meet the minimum requirements set forth in the Tier A Municipal Stormwater General Permit (NJ0141852). If these ordinances already exist then they must be reviewed and updated where necessary.

Those ordinances are as follows, but are not limited to:

1. *Pet Waste Ordinance* – will require owners and keepers to immediately and properly dispose of their pet’s solid waste and will require information provided by NJDEP to be distributed with pet licenses regarding said ordinance;
2. *Litter Ordinance* – will meet the minimum standards set forth in the State Litter Statue (N.J.S.A. 13:1E-99.3);
3. *Improper Disposal of Waste Ordinance* – will prohibit spilling, dumping or disposing of any materials other than stormwater into the municipal separate storm sewer system;
4. *Wildlife Feeding Ordinance* – will prohibit feeding of non-confined wildlife in any public park or property owned/operated by the municipality;
5. *Illicit Connection Ordinance* – will prohibit illicit connections to the municipal separate storm sewer system.

During construction, Township inspectors will observe the construction of the project to ensure that the stormwater management measures are constructed and function as designed. Operation and Maintenance Manuals will be required for BMPs to ensure long-term maintenance strategies.

Plan Consistency

Regional Stormwater Management Plan (RSWMP)

The Township is within the Devils, Shallow, Cedar and Cranbury Brooks Regional Stormwater Management Area. Currently, Middlesex County is awaiting NJDEP approval for proposed project

scope. If at any time a Regional Stormwater Management Plan (RSWMP) is adopted, the Township will revise this MSWMP to be consistent with the RSWMP.

Total Maximum Daily Loads (TMDL)

At this time, the Township has one TMDL proposed, established and approved for phosphorus in Davidsons Mill Pond. See *Appendix D* for an excerpt of the TMDL Report filed by the NJDEP titled "Total Maximum Daily Loads for Phosphorus to Address 6 Eutrophic Lakes in the Raritan Water Region," prepared by the NJDEP Division of Watershed Management proposed January 21, 2003, established March 28, 2003 and approved September 29, 2003. Also enclosed in *Appendix D* is a copy of the NJDEP Division of Watershed Management website citing the study and TMDL documentation. The United States Environmental Protection Agency (EPA) has recommended TMDLs be established for Devils Brook, Lawrence Brook, Carnegie Lake and Ireland Brook. Accordingly, this MSWMP will be updated to be consistent if TMDLs are approved. See the *Appendix C, Total Maximum Daily Loads*, for TMDL reports.

Residential Site Improvement Standards (RSIS)

The MSWMP 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 MSWMP will be updated to be consistent with any future updates to the RSIS.

Freehold Soil Conservation District

The Township's Stormwater Control Ordinance will 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 Freehold Soil Conservation District (FSCD). FSCD is the enforcement agency for soil erosion and sediment control.

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. However, approval of variances or exemptions from N.J.A.C. 7:8 are a last resort and all non-structural and structural BMPs should be explored prior to a variance or exemption being granted. Non-structural BMPs are highly recommended and shall be the initial design technique utilized. It is up to the discretion of the Township Engineer, Board and professionals to ensure all BMP options are explored prior to granting a variance or exemption. The Township Engineer shall be consulted to determine availability of mitigation projects. All mitigation projects are subject to approval of the Township Engineer, Governing Body and Township Planning and/or Zoning Board.

Mitigation Project Criteria

The mitigation project must be implemented within the same drainage area as the proposed development. If a suitable site cannot be located in the same drainage area as the proposed development, the mitigation project may provide mitigation that is equivalent to the impacts for which the variance or exemption is sought and addresses the same issue in adjacent drainage areas. The project must provide additional groundwater recharge benefits, or protection from stormwater runoff quality and quantity from previously developed property, which does not currently meet the design and performance standards as 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 NJ Stormwater BMP Manual.

The Township Engineer must be contacted to obtain a list of potential mitigation projects to compensate for the deficit from the performance standards resulting from the proposed project. More detailed information on the mitigation projects shall be obtained from the Township Engineer.

The Township maintains the right to update the mitigation project list and is not held accountable for time frames or to construct any of the mitigation projects or potential mitigation projects addressing groundwater recharge, water quality and water quantity.

Mitigation projects are environmental enhancement projects that provide groundwater recharge, control flooding or control nonpoint source pollution. The Township Engineer shall be contacted for availability, description and any other necessary information pertaining to mitigation projects.

Mitigation projects are subject to the approval of the Township Engineer, Governing Body and Township Planning and/or Zoning Board. Each project is approved upon an individual basis considering the extent of the variance, waiver or exception granted. Mitigation projects may require cooperation with outside agencies such as the Freehold Soil Conservation District, Middlesex County Mosquito Commission, Army Corp of Engineers, NJDEP, etc.

The municipality may require a developer to provide funding or partial funding to the municipality for an environmental enhancement project that has been identified in a MSWMP, or towards the development of a RSWMP. Funding quantities are subject to the approval of the Township Engineer, Governing Body and Township Planning and/or Zoning Board. Funding quantities will include costs or partial costs, including those associated with purchasing a property or easement for mitigation, and those associated with the long-term maintenance requirements of the mitigation measure.

The Township invites all public for input regarding possible mitigation projects. As a result of public education and involvement promoted through the Stormwater Pollution Prevention Plan, it is anticipated that the public will be knowledgeable of stormwater issues and will work towards preventing stormwater quality, quantity and groundwater recharge problems within the Township.

References

Bureau of Freshwater and Biological Monitoring. Ambient Biomonitoring Network Watershed Management Areas 7, 8, 9, and 10. State of New Jersey: NJDEP, June 2000.

Water Assessment Team. New Jersey 2004 Integrated Water Quality Monitoring and Assessment Report (305(b) and Monitoring and Assessment Report (305(b) and 303(d)) State of New Jersey: NJDEP, June 2004.

New Jersey Dept. of Environmental Protection. TMDLs for Fecal Coliform to Address 48 Streams in the Raritan Water Region. 2003. Division of Watershed Management: 25 Jan. 2005 <<http://www.nj.gov/dep/watershedmgt/tmdl>

U.S. Environmental Protection Agency. TMDLs- 2002 Section 303(d) List Fact Sheet for NEW JERSEY. 2003. USEPA: 25 Jan. 2005. http://oaspub.epa.gov/waters/state_rept.control

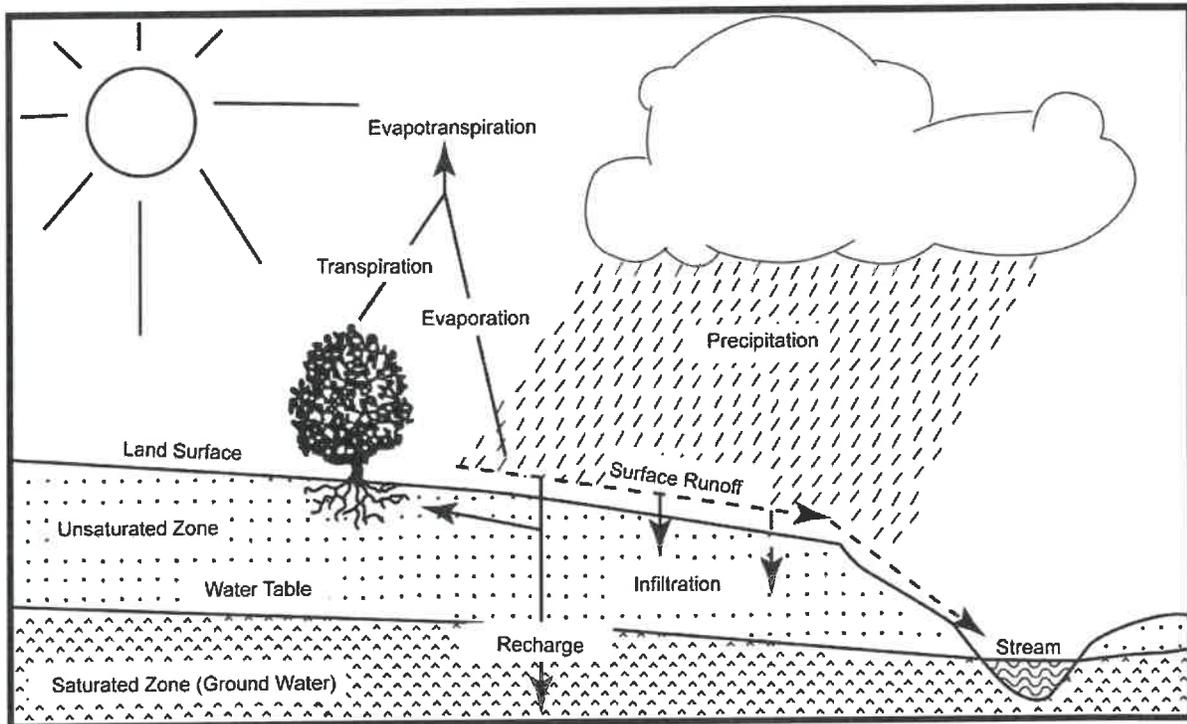
APPENDICES

APPENDIX A

Appendix of Figures

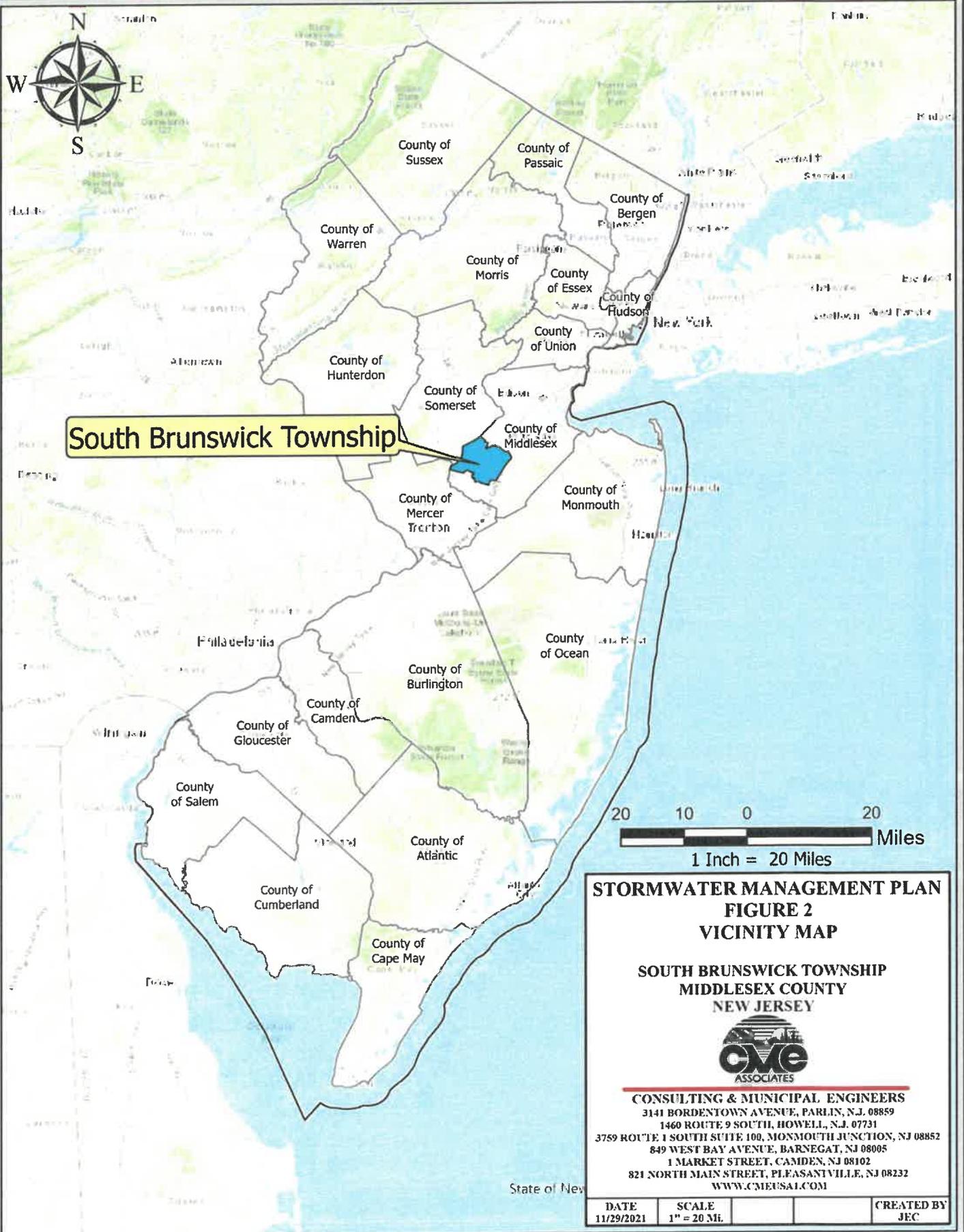
Figures 1 thru 16

Figure 1: Groundwater Recharge in the Hydrologic Cycle

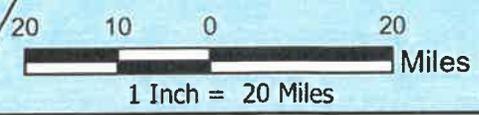


Source: New Jersey Geological Survey Report GSR-32.

South Brunswick Township Middlesex County, NJ



South Brunswick Township



**STORMWATER MANAGEMENT PLAN
FIGURE 2
VICINITY MAP**

**SOUTH BRUNSWICK TOWNSHIP
MIDDLESEX COUNTY
NEW JERSEY**

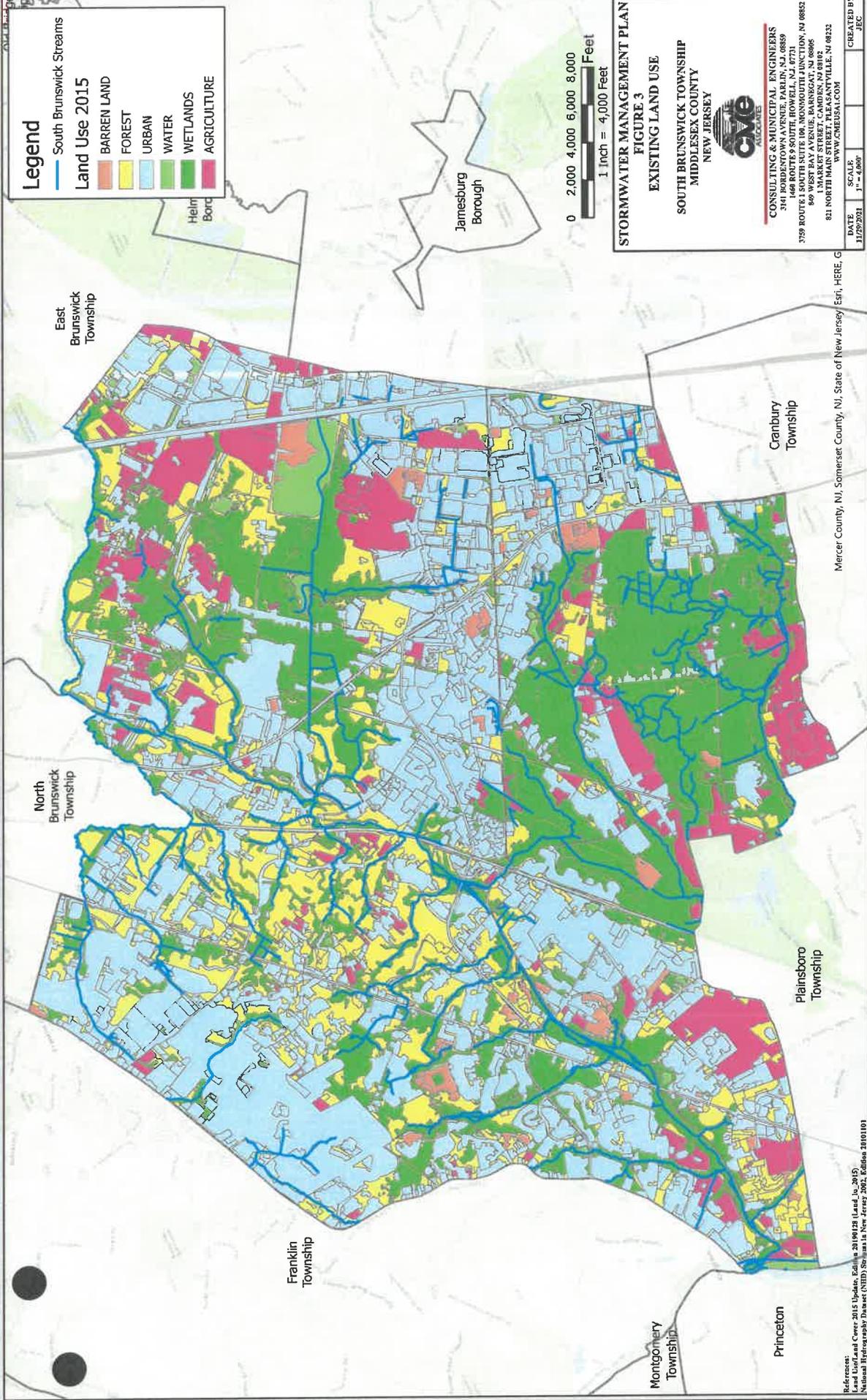


CONSULTING & MUNICIPAL ENGINEERS
 3141 BORDENTOWN AVENUE, PARLIN, N.J. 08859
 1460 ROUTE 9 SOUTH, HOWELL, N.J. 07731
 3759 ROUTE 1 SOUTH SUITE 100, MONMOUTH JUNCTION, NJ 08852
 849 WEST BAY AVENUE, BARNEGAT, NJ 08005
 1 MARKET STREET, CAMDEN, NJ 08102
 821 NORTH MAIN STREET, PLEASANTVILLE, NJ 08232
 WWW.CMEUSA1.COM

| | | |
|--------------------|----------------------|-------------------|
| DATE 11/29/2021 | SCALE 1" = 20 MI. | CREATED BY JEC |
|--------------------|----------------------|-------------------|

South Brunswick Township

Middlesex County, NJ



Legend

- South Brunswick Streams
- Land Use 2015
- BARREN LAND
- FOREST
- URBAN
- WATER
- WETLANDS
- AGRICULTURE

0 2,000 4,000 6,000 8,000 Feet
1 Inch = 4,000 Feet

STORMWATER MANAGEMENT PLAN
FIGURE 3
EXISTING LAND USE

C&E
CONSULTANTS

CONSULTING & MUNICIPAL ENGINEERS
3101 ROUTE 1 SOUTH, SUITE 100, MONMOUTH JUNCTION, NJ 08852
732-666-8859
840 WEST BAY AVENUE, BARRINGTON, NJ 08805
1 MARKET STREET, CAMDEN, NJ 08132
631 NORTH WALTON AVENUE, PHILADELPHIA, NJ 08133
WWW.CMEUSA.COM

SOUTH BRUNSWICK TOWNSHIP
MIDDLESEX COUNTY
NEW JERSEY

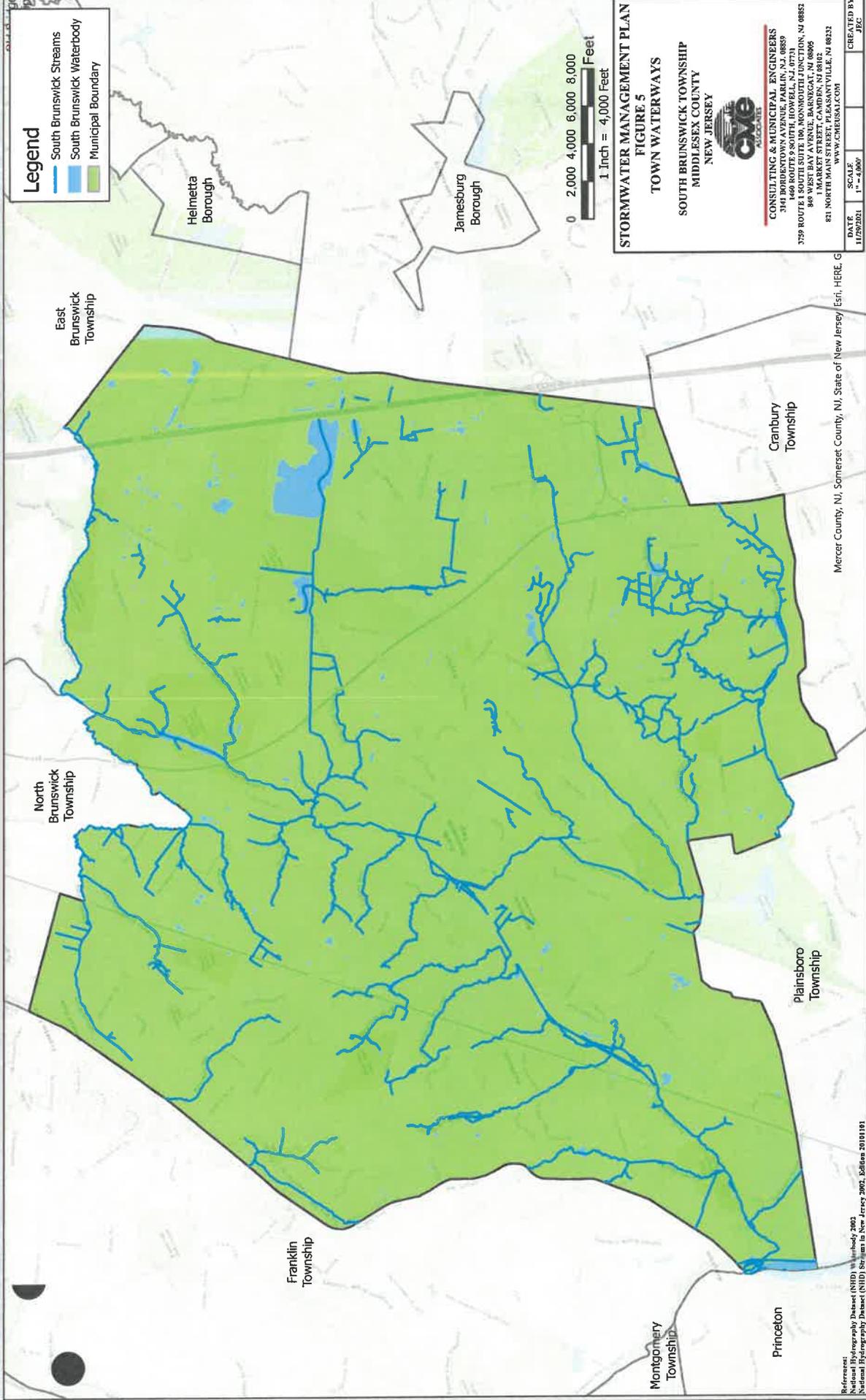
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SCALE: 1" = 4,000'
CREATED BY: JEC

Mercer County, NJ, Somerset County, NJ, State of New Jersey, Esri, HERE, G

Reference:
Land Use/land Cover, 2015 Update, Esri, Inc. 2016/12/28 (Land_Use_2015)
National Hydrography Dataset (NHD) Stream in New Jersey, 2002, Edition: 20101101

South Brunswick Township

Middlesex County, NJ



Legend

- South Brunswick Streams
- South Brunswick Waterbody
- Municipal Boundary



STORMWATER MANAGEMENT PLAN
FIGURE 5
TOWN WATERWAYS
SOUTH BRUNSWICK TOWNSHIP
MIDDLESEX COUNTY
NEW JERSEY

CONSULTING & MUNICIPAL ENGINEERS
310 ROUTE 1 SOUTH BRUNSWICK, NJ 08859
3759 ROUTE 1 SOUTH SUITE 100, MONMOUTH JUNCTION, NJ 08852
1 MARKET STREET, CAMDEN, NJ 08102
821 NORTH AVENUE, VINELAND, NJ 08353
WWW.CWEUSA1.COM

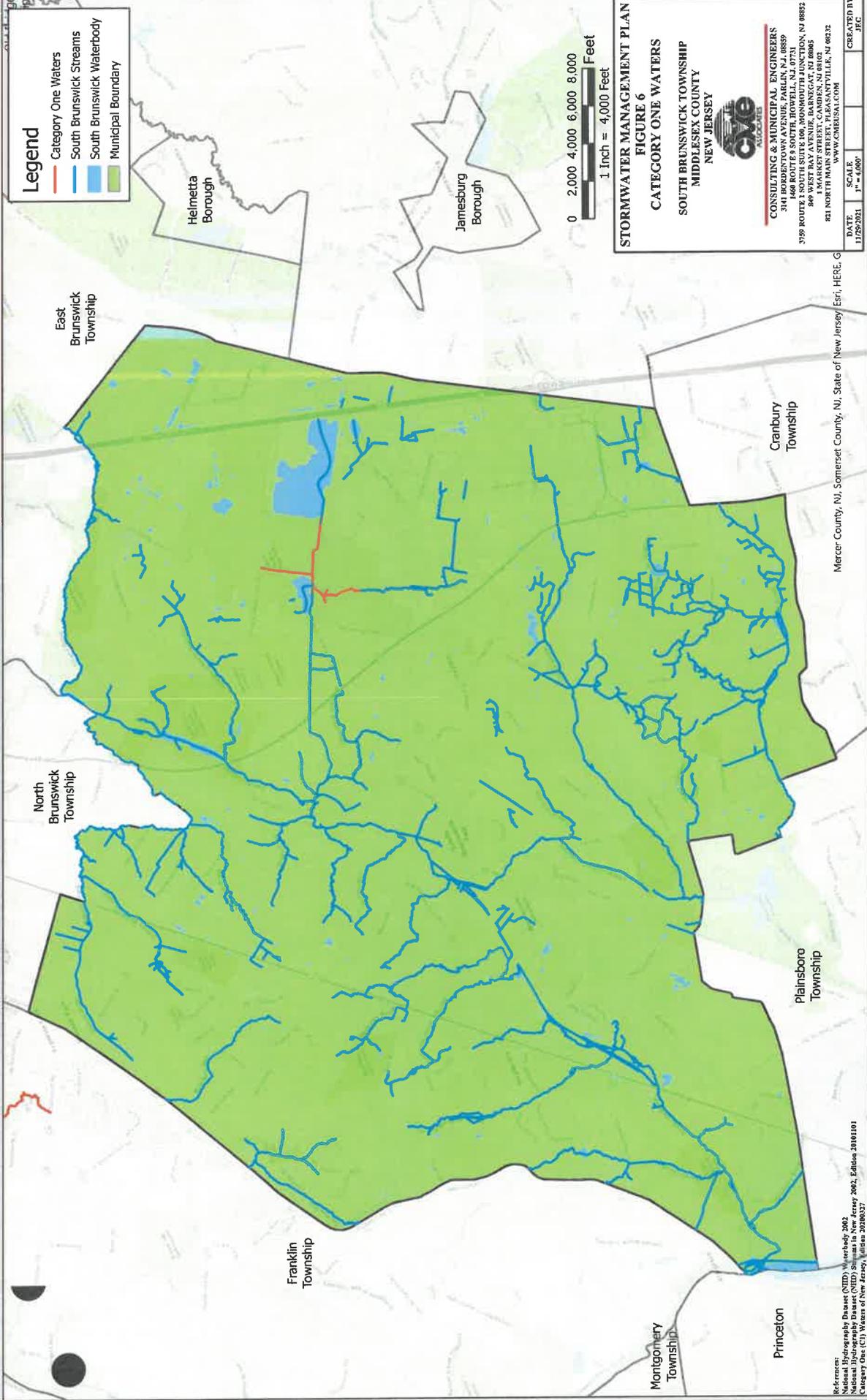
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SCALE: 1" = 4,000'
CREATED BY: JBC

Mercer County, NJ, Somerset County, NJ, State of New Jersey/ Esri, HERE, G

References:
National Hydrography Dataset (NHD) - July 2002
National Geographic Dataset (NGD) - July 2002 Edition 2011101

South Brunswick Township

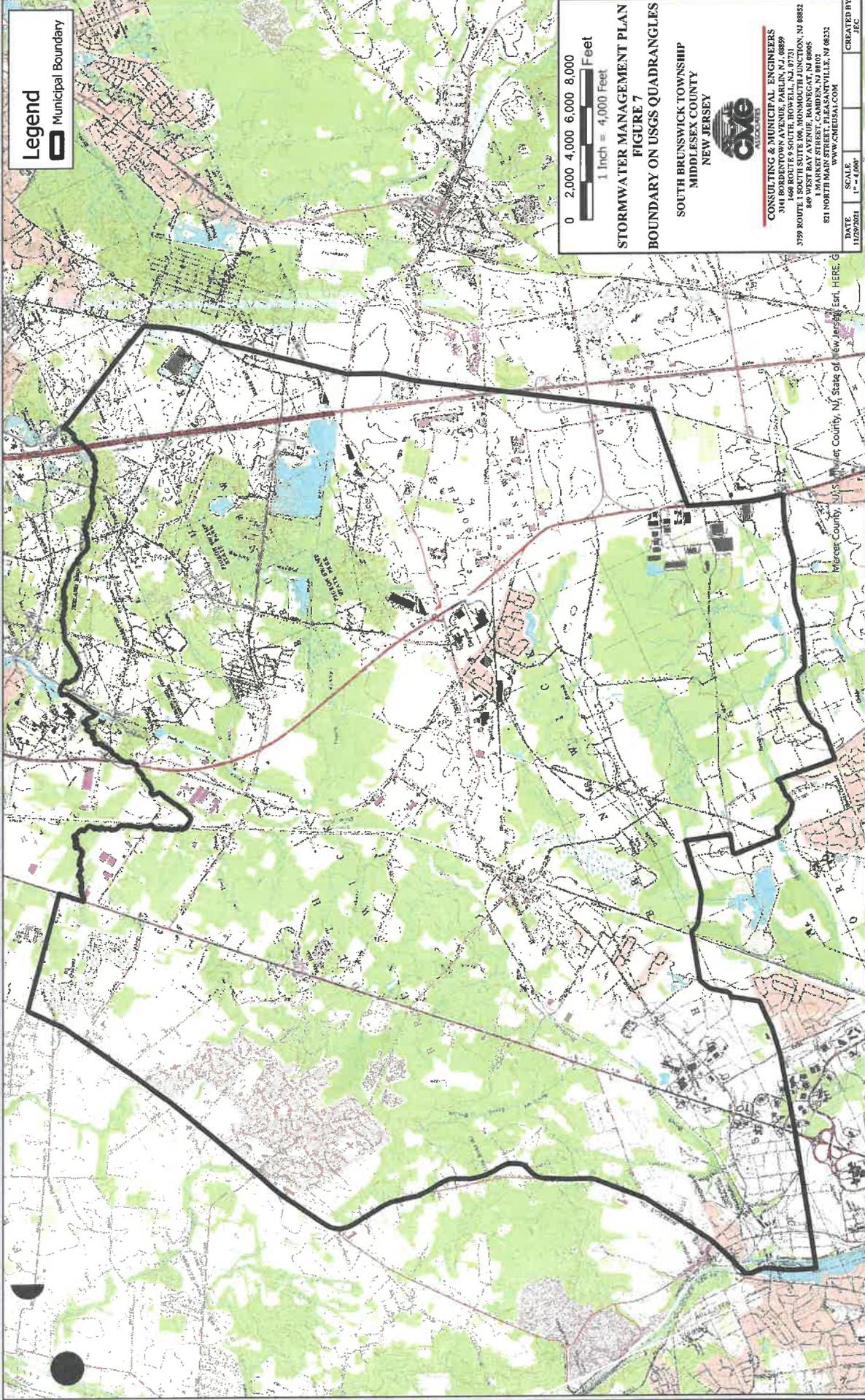
Middlesex County, NJ



References:
National Hydrography Dataset (NHD) Waterbody 2002
National Hydrography Dataset (NHD) Stream 2002
County Data (CT), Waters of New Jersey, Version 20080327

Mercer County, NJ, Somerset County, NJ, State of New Jersey, Esri, HERE, G

DATE: 11/29/2021
SCALE: 1" = 4,000'
CREATED BY: JFC



Legend
Municipal Boundary

0 2,000 4,000 6,000 8,000 Feet
1 Inch = 4,000 Feet

**STORMWATER MANAGEMENT PLAN
FIGURE 7
BOUNDARY ON USGS QUADRANGLES**

**SOUTH BRUNSWICK TOWNSHIP
MIDDLESEX COUNTY
NEW JERSEY**

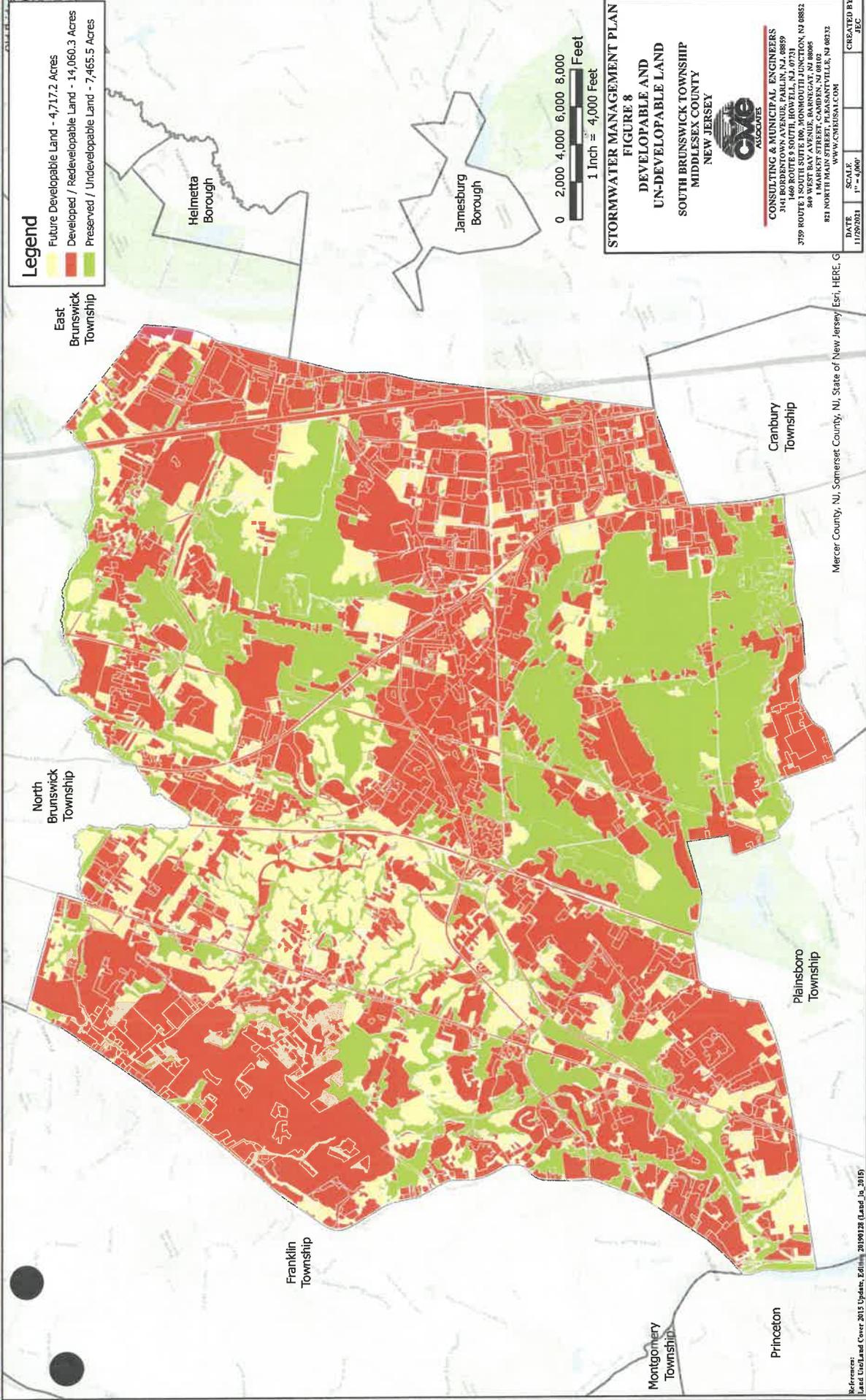
CVE

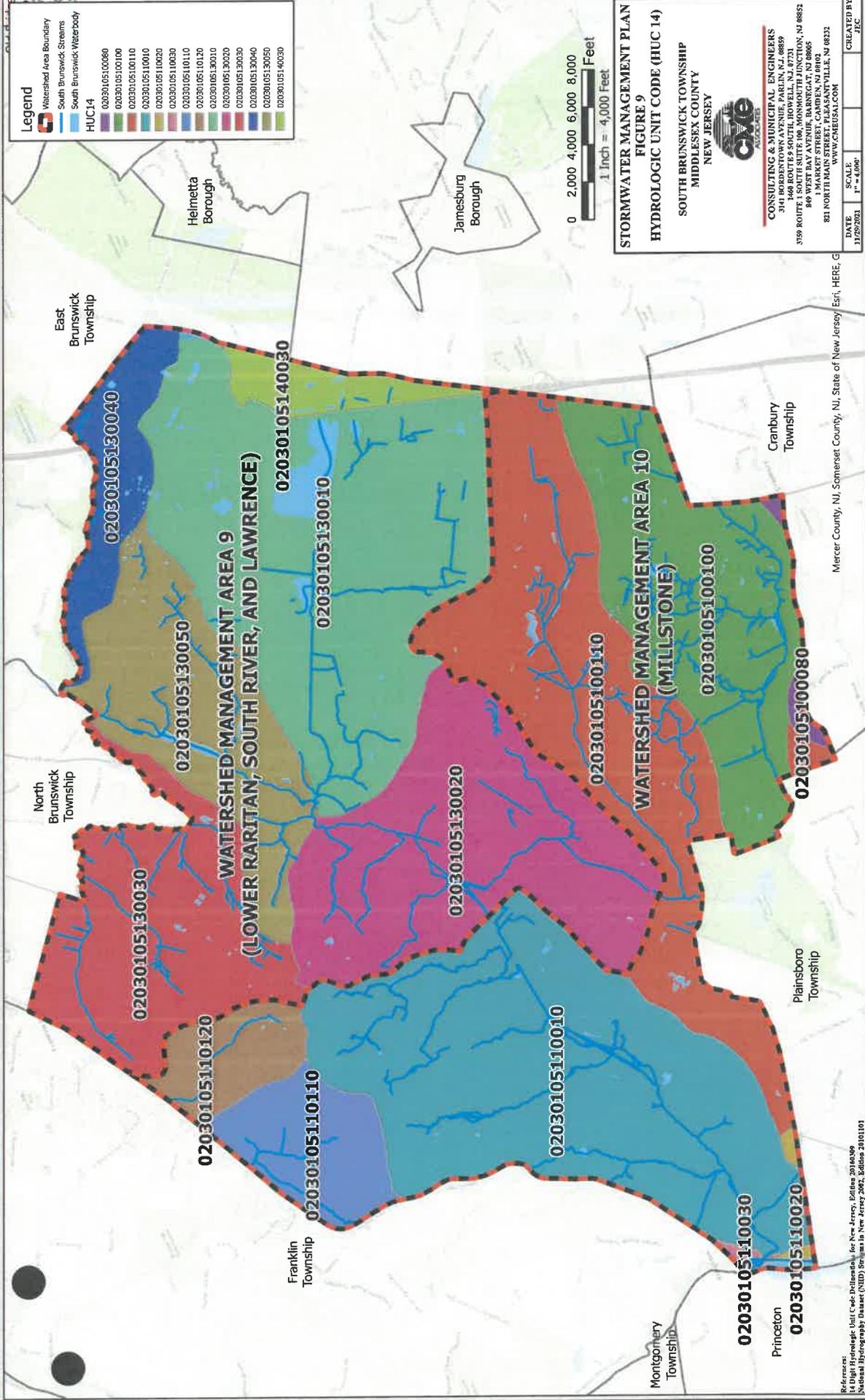
CONSULTING & MUNICIPAL ENGINEERS
300 SOUTH BRUNSWICK AVENUE
4TH FLOOR SOUTH BRUNSWICK, NJ 08852
3759 ROUTE 1 SOUTH SUITE 100, MONMOUTH JUNCTION, NJ 08852
840 WEST BAY AVENUE, BARNEGAT, NJ 08005
1 MARKET STREET, CAMDEN, NJ 08102
821 NORTH ROAD, WINDY HILL, NJ 08533
WWW.CVEUSA1.COM

DATE: 11/29/2021
SCALE: 1" = 4,000'
CREATED BY: JEC

South Brunswick Township

Middlesex County, NJ





Legend

| | |
|---------------------------|----------------|
| Watershed Area Boundary | 02030105100080 |
| South Brunswick Streams | 02030105100100 |
| South Brunswick Watershed | 02030105100110 |
| HUC14 | 02030105100020 |
| | 02030105100030 |
| | 02030105100100 |
| | 02030105100110 |
| | 02030105100120 |
| | 02030105100130 |
| | 02030105100140 |
| | 02030105100150 |
| | 02030105100160 |
| | 02030105100170 |
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| | 02030105100190 |
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| | 02030105100220 |
| | 02030105100230 |
| | 02030105100240 |
| | 02030105100250 |
| | 02030105100260 |
| | 02030105100270 |
| | 02030105100280 |
| | 02030105100290 |
| | 02030105100300 |



STORMWATER MANAGEMENT PLAN
FIGURE 9
HYDROLOGIC UNIT CODE (HUC 14)

SOUTH BRUNSWICK TOWNSHIP
 MIDDLESEX COUNTY
 NEW JERSEY

CONSULTING & MUNICIPAL ENGINEERS
 311 HIGHLAND AVENUE, SUITE 200
 1400 ROUTE 4 SOUTH, HOWELL, NJ 07731
 890 ROUTE 1 SOUTH SUITE 100, MONMOUTH JUNCTION, NJ 08852
 840 WEST BAY AVENUE, BARNEGAT, NJ 08005
 1 MARKET STREET, CAMDEN, NJ 08102
 821 NORTH HAVEN AVENUE, VILLAS, NJ 08233
 WWW.CMEUSA1.COM

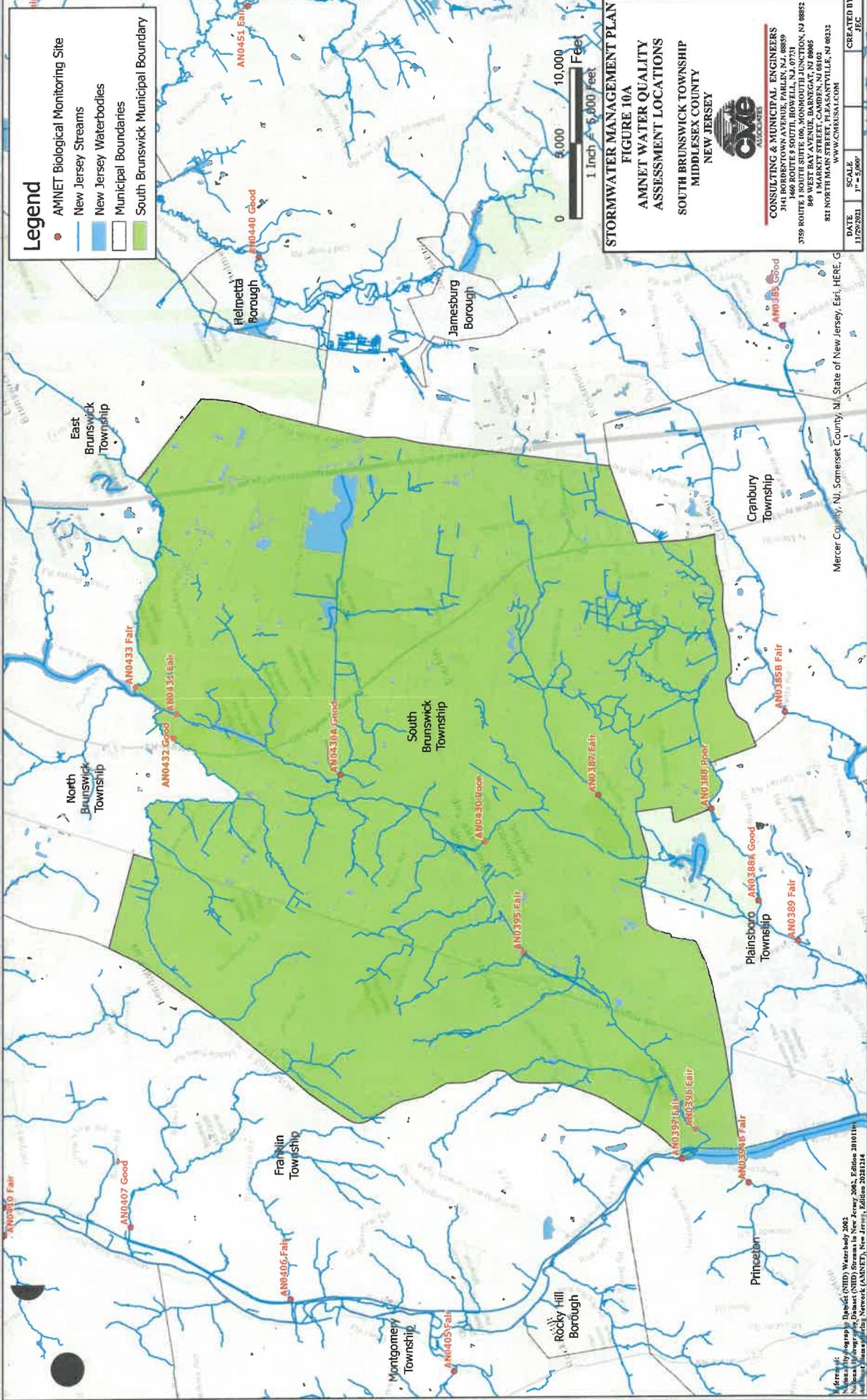
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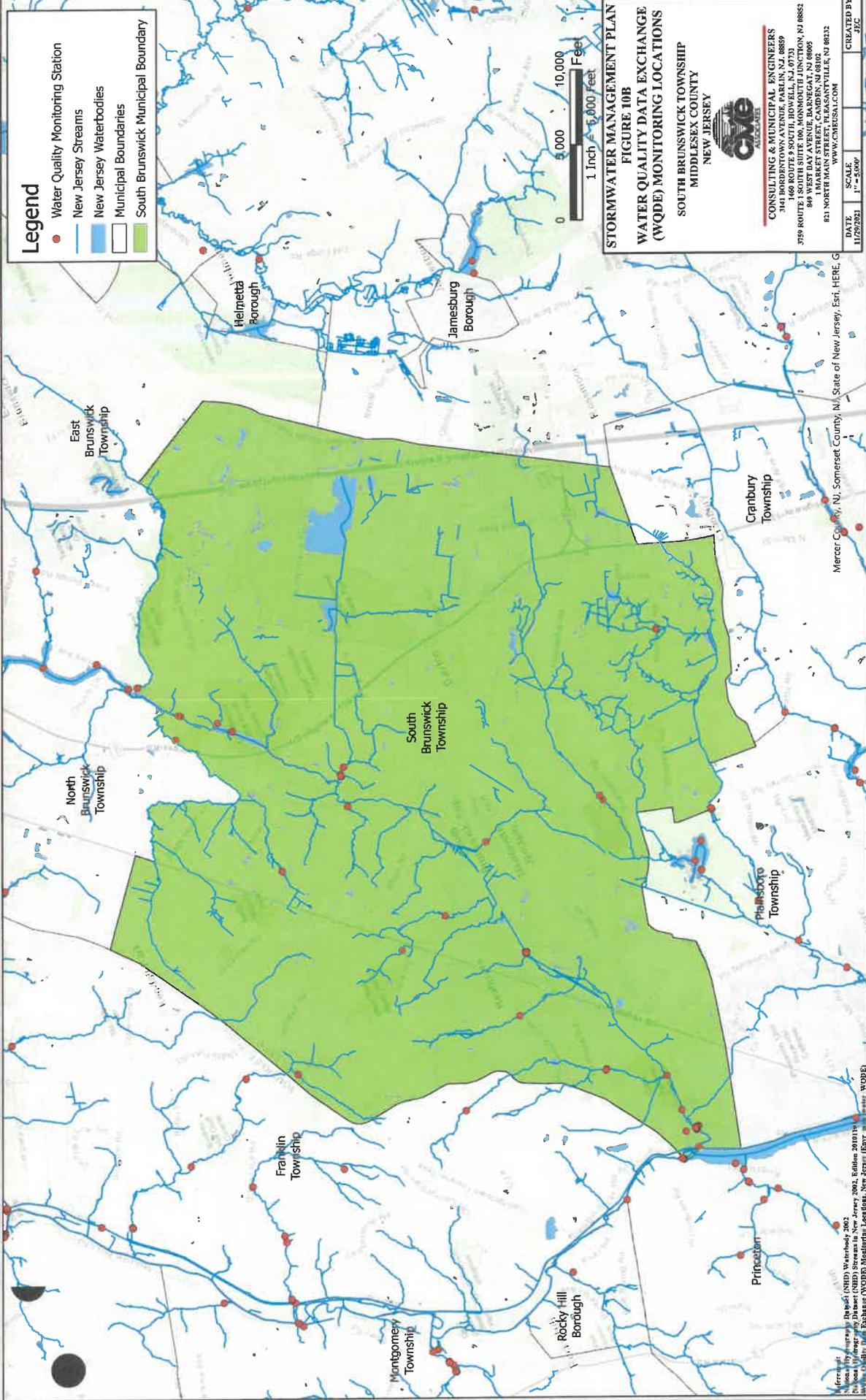
Mercer County, NJ, Somerset County, NJ, State of New Jersey, Esri, HERE, G

References:
 14 Digit Hydrologic Unit Code Delineation for New Jersey, Edition 2010/09
 National Hydrologic Information System (NHIS) Data for New Jersey, 2002, Edition 2010/01

South Brunswick Township

Middlesex County, NJ





Legend

- Water Quality Monitoring Station
- New Jersey Streams
- New Jersey Waterbodies
- Municipal Boundaries
- South Brunswick Municipal Boundary



STORMWATER MANAGEMENT PLAN
FIGURE 10B
WATER QUALITY DATA EXCHANGE
(WQDE) MONITORING LOCATIONS

SOUTH BRUNSWICK TOWNSHIP
MIDDLESEX COUNTY
NEW JERSEY

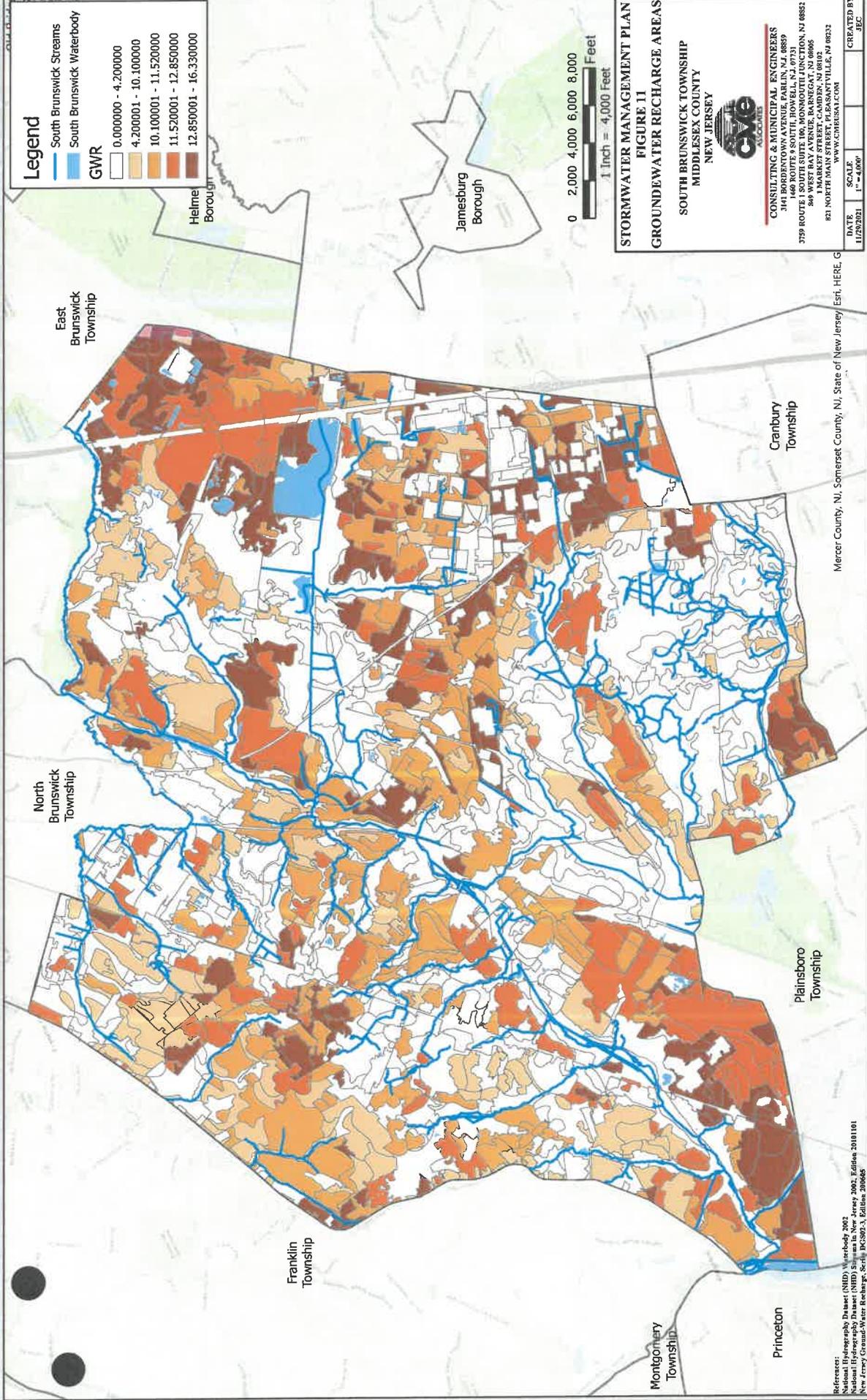
CONSULTING & MUNICIPAL ENGINEERS
 315 140 ROUTE 1 SOUTH, HOWELL, NJ 07731
 732-983-8899
 3759 ROUTE 1 SOUTH SUITE 100, MONMOUTH JUNCTION, NJ 08852
 846 WEST DAY AVENUE, BARNEGAT, NJ 08005
 603-885-1111
 831 NORTH MAIN STREET, PLAINFIELD, NJ 08632
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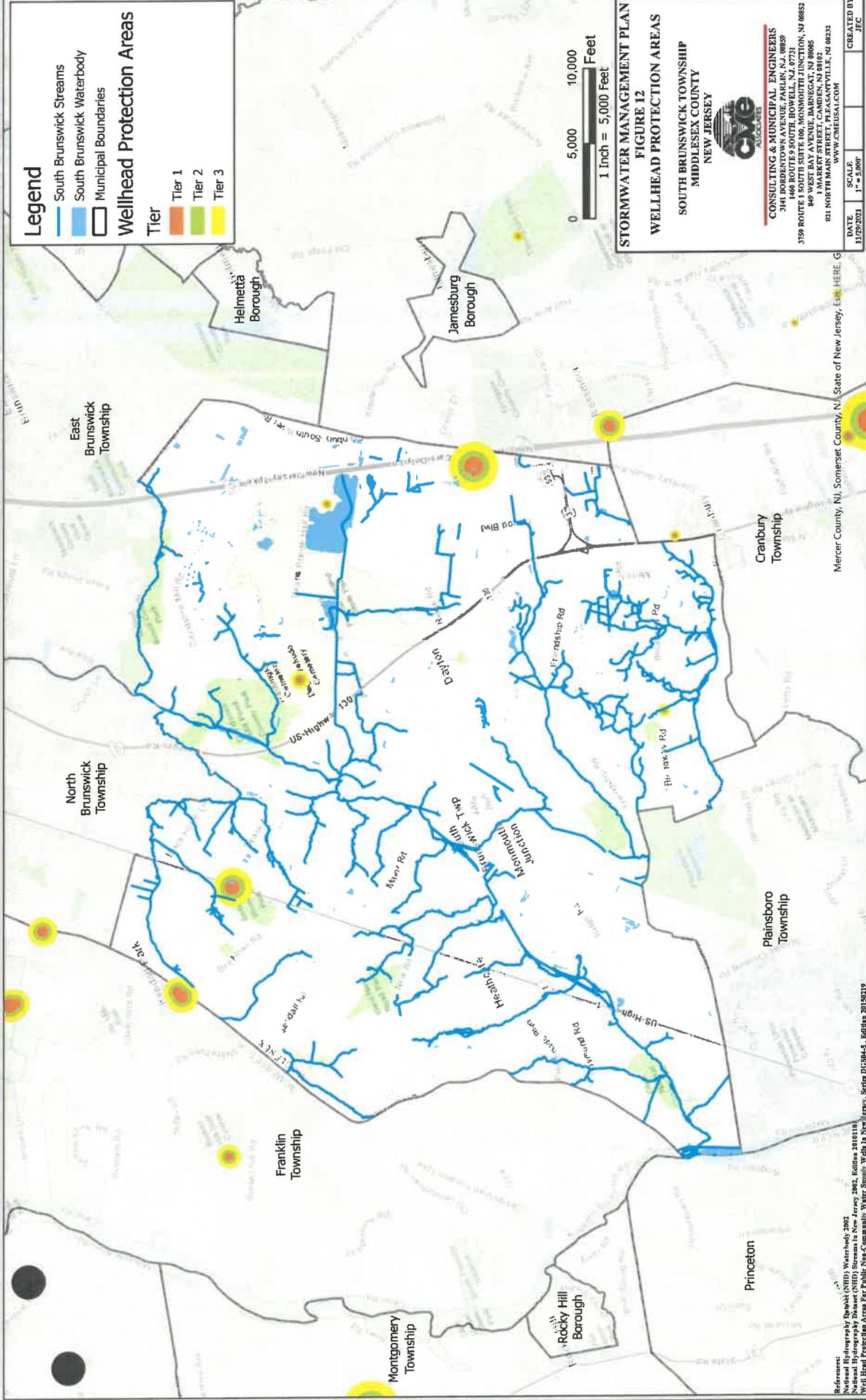
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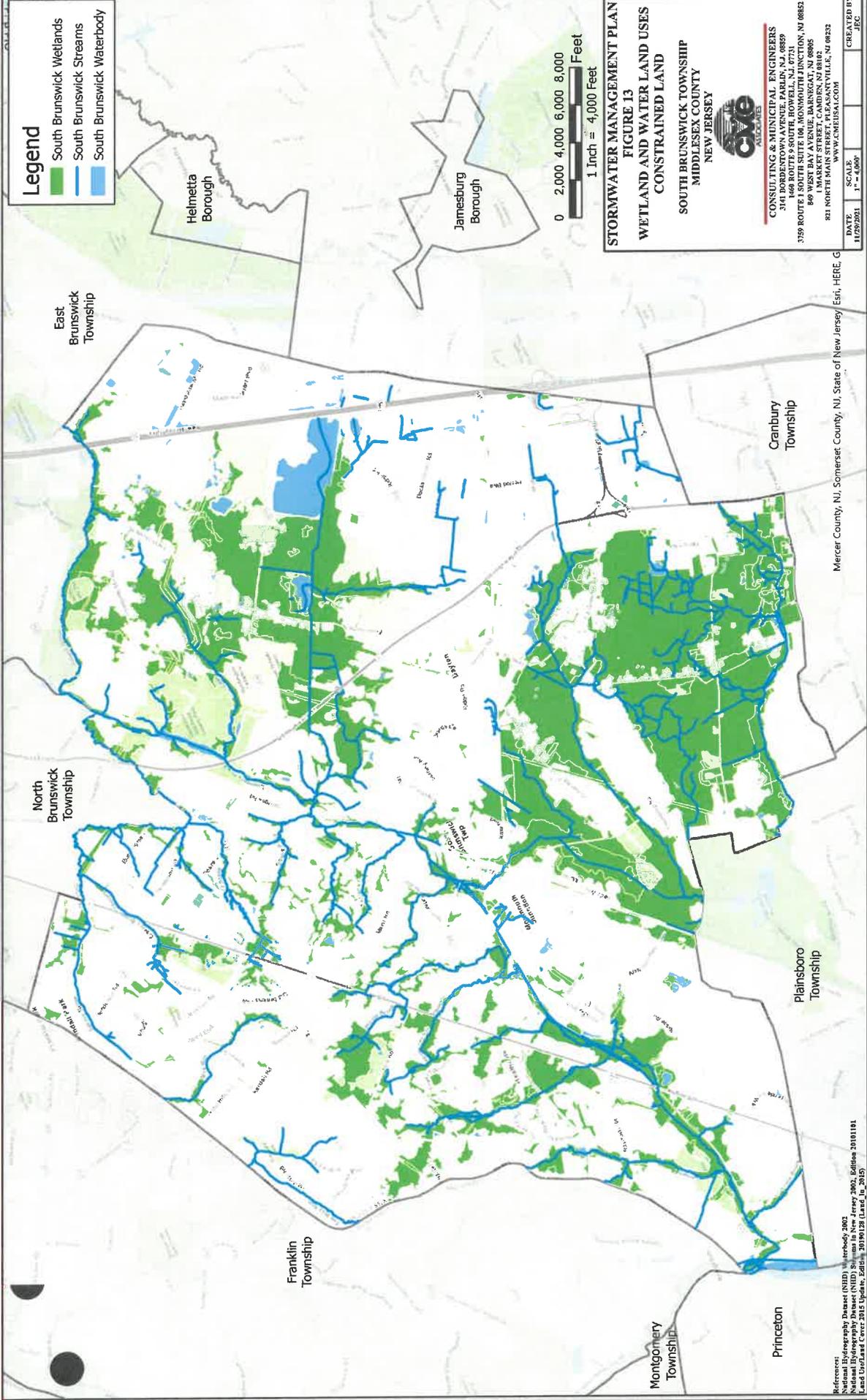
Source: Municipal Debris (NHD) Waterbody 2002
 National Hydrography Dataset (NHD) Streams in New Jersey 2002, Edition 20101114
 National Hydrography Dataset (NHD) Streams in New Jersey (East of the River) 2002
 National Hydrography Dataset (NHD) Streams in New Jersey (West of the River) 2002

South Brunswick Township

Middlesex County, NJ







STORMWATER MANAGEMENT PLAN
FIGURE 13
WETLAND AND WATER LAND USES
CONSTRAINED LAND

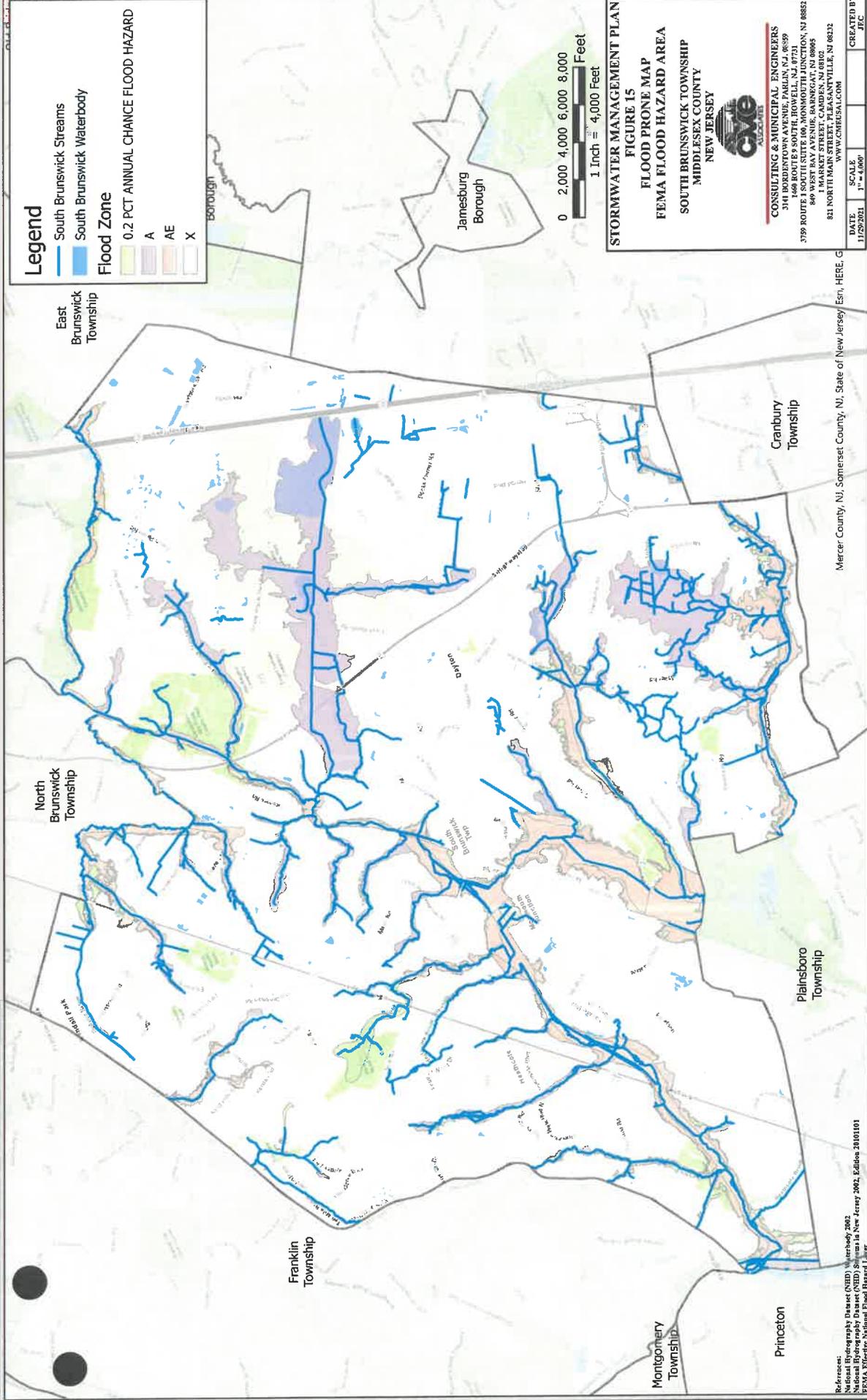
SOUTH BRUNSWICK TOWNSHIP
MIDDLESEX COUNTY
NEW JERSEY

CVE
CONSULTING & MUNICIPAL ENGINEERS
 311 660 ROUTE 5 SOUTH, HOWELL, NJ, 07731
 732-983-1100
 3759 ROUTE 1 SOUTH SUITE 104, MONMOUTH JUNCTION, NJ 08852
 732-241-1100
 823 NORTH MAIN STREET, FLEMINGTON, NJ, 08822
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 SCALE: 1" = 4,000'
 CREATED BY: JFC

Mercer County, NJ, Somerset County, NJ, State of New Jersey, East, HERE, G

References:
 National Hydrography Dataset (NHD) - webbody_2002
 National Wetlands Inventory (NWI) - webbody_2002
 Land Use/Land Cover 2015 Update, ESRI, 2016 (Land_U_2015)



Legend

- South Brunswick Streams
- South Brunswick Waterbody
- Flood Zone**
- 0.2 PCT ANNUAL CHANCE FLOOD HAZARD
- A
- AE
- X

0 2,000 4,000 6,000 8,000 Feet
1 Inch = 4,000 Feet

STORMWATER MANAGEMENT PLAN
FIGURE 15
FLOOD PRONE MAP
FEMA FLOOD HAZARD AREA
SOUTH BRUNSWICK TOWNSHIP
MIDDLESEX COUNTY
NEW JERSEY

CONSULTING & MUNICIPAL ENGINEERS
 314 BORDENTOWN AVENUE, PARLIN, NJ 08859
 5759 ROUTE 1 SOUTH SUITE 100, MONMOUTH JUNCTION, NJ 08852
 840 WEST RAY AVENUE, BARNEGAT, NJ 08005
 1 MARKET STREET, CAMDEN, NJ 08102
 821 NORTH MADISON AVENUE, WILMINGTON, NJ 08412
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DATE: 11/29/2021
 SCALE: 1" = 4,000'
 CREATED BY: JFC

Mercer County, NJ, Somerset County, NJ, State of New Jersey, Esri, HERE, G

References:
 National Hydrography Dataset (NHD) Waterbody 2002
 National Hydrography Dataset (NHD) Streamline
 FEMA, Effective National Flood Hazard Layer

APPENDIX B

2012 AMBIENT BIOMONITORING NETWORK DATA: Raritan Region

Benthic Macroinvertebrate Report Data

AMNET Site # AN0387

Stream Name: Devils Bk

Location: New Rd; South Brunswick Twp; Middlesex County

Collection Date: 9/22/2009 USGS Topo Map: Hightstown

| Genus | Tolerance Value | Amount |
|------------------|-----------------|--------|
| Gammarus | 6 | 23 |
| Caecidotea | 8 | 16 |
| Paratanytarsus | 6 | 12 |
| Pristina | 8 | 10 |
| Rheotanytarsus | 6 | 8 |
| Stylaria | 8 | 5 |
| Tanytarsus | 6 | 5 |
| Dubiraphia | 6 | 4 |
| * Cheumatopsyche | 5 | 3 |
| Tribelos | 5 | 3 |
| Musculium | 5 | 2 |
| Nais | 8 | 2 |
| Ablabesmyia | 8 | 1 |
| * Caenis | 7 | 1 |
| Enallagma | 9 | 1 |
| Microtendipes | 7 | 1 |
| Rheopelopia | 4 | 1 |
| Stenelmis | 5 | 1 |
| Stenochironomus | 5 | 1 |

* (EPT organism) Taxa Richness: 19 Population: 100

%Dominance / Dominant Taxon(s): 23.0% Gammarus

Hilsenhoff Biotic Index (HBI): 6.61 %Clingers: 17.00%

* E+P+T: 2 (1) Ephemeroptera, () Plecoptera, (1) Trichoptera %Ephemeroptera: 1.00%

CPMI Rating: 8 Fair

Habitat Analysis: 152 Suboptimal USEPA Protocol

Observations: Water temp: 14.92 C; Cond: 136 umhos; DO: 2.12 mg/L; pH: 6.36 SU

Clarity: clear, cedar brown; Flow Rate: slow; Width/Depth: 5' / < 1'; Substrate: gravel, sand

Canopy: mostly closed; Bank Stability: good; Bank Vegetation: trees, shrubs, grasses

Stream Gradient: Low Gradient Stream; Land Uses: rural, forested, "South Brunswick Open Space"

Other: fish, frogs, macrophytes, periphytes; gravel parking lot on LB; baseball field on RB

AMNET Site # AN0388

Stream Name: Shallow Bk

Location: Scotts Corner Rd; South Brunswick Twp; Middlesex County

Collection Date: 9/22/2009 USGS Topo Map: Hightstown

| Genus | Tolerance Value | Amount |
|------------------|-----------------|--------|
| Hyalella | 8 | 37 |
| Enallagma | 9 | 16 |
| Chironomus | 10 | 9 |
| Polypedilum | 6 | 6 |
| Aedes | 8 | 3 |
| Erythemis | 10 | 3 |
| Nais | 8 | 3 |
| Sympetrum | 4 | 3 |
| * Baetis | 6 | 2 |
| Bezzia | 6 | 2 |
| Dero | 10 | 2 |
| Musculium | 5 | 2 |
| Tubifex | 10 | 2 |
| Alboglossiphonia | 8 | 1 |
| * Caenis | 7 | 1 |
| Helobdella | 8 | 1 |
| Nematoda | 6 | 1 |
| Omisus | 6 | 1 |
| Peltodytes | 5 | 1 |
| Pisidium | 6.8 | 1 |
| Pristinella | 10 | 1 |
| Procladius | 9 | 1 |
| Tanytarsus | 6 | 1 |

* (EPT organism) Taxa Richness: 23 Population: 100

%Dominance / Dominant Taxon(s): 37.0% Hyalella

Hilsenhoff Biotic Index (HBI): 8.02 %Clingers: 0.00%

* E+P+T: 2 (2) Ephemeroptera, () Plecoptera, () Trichoptera %Ephemeroptera: 3.00%

CPMI Rating: 4 Poor

Habitat Analysis: 119 Suboptimal USEPA Protocol

Observations: Water temp: 17.14 C; Cond: 107 umhos; DO: 0.36 mg/L; pH: 5.91 SU

Clarity: clear, cedar brown; Flow Rate: slow; Width/Depth: 12' / 2'; Substrate: gravel, sand, silt, snags

Canopy: mostly open; Bank Stability: good; Bank Vegetation: trees, shrubs, grasses

Stream Gradient: Low Gradient Stream; Land Uses: rural, forested

Pipes / Ditches: storm sewers

Downstream of Impoundment: small dam

Other: macrophytes; surrounded by wetlands, power line easement crosses stream

AMNET Site # AN0395

Stream Name: Heathcote Bk

Location: Stouts Ln; South Brunswick Twp; Middlesex County

Collection Date: 10/29/2009 USGS Topo Map: Monmouth Junction

| <i>Genus</i> | <i>Tolerance Value</i> | <i>Amount</i> |
|------------------|------------------------|---------------|
| * Hydropsyche | 4 | 51 |
| * Cheumatopsyche | 5 | 19 |
| * Chimarra | 4 | 10 |
| Gammarus | 6 | 7 |
| Physella | 9.1 | 5 |
| Tipula | 4 | 4 |
| Lumbricidae | 10 | 3 |
| Microvelia | 6 | 1 |

| | | | | |
|--------------------------------|----------------|---------------------|----------------|-----|
| * (EPT organism) | Taxa Richness: | 8 | Population: | 100 |
| Hilsenhoff Biotic Index (HBI): | 4.79 | # Scrapers: | | 1 |
| % Sensitive EPT: | 10.0% | Attribute 2 genera: | | 0 |
| % Non-Insect Taxa: | 37.5% | Attribute 3 genera: | | 2 |
| HGMI Rating: | 23.46 | Fair | | |
| Habitat Analysis: | 120 | Suboptimal | USEPA Protocol | |

Observations: Water temp: 13.23 C; Cond: 370 umhos; DO: 9.17 mg/L; pH: 7.35 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 11' / < 1'; Substrate: cobble, gravel, sand

Canopy: mostly open; Bank Stability: fair; Bank Vegetation: trees, shrubs, grasses

Stream Gradient: High Gradient Stream; Land Uses: urban

Pipes / Ditches: storm sewers

Other: salamander, periphytes, filamentous algae; site adjacent to new shopping center

AMNET Site # AN0396 Stream Name: Heathcote Bk
 Location: Academy St; South Brunswick Twp; Middlesex County
 Collection Date: 10/29/2009 USGS Topo Map: Hightstown

| Genus | Tolerance Value | Amount |
|------------------|-----------------|--------|
| Gammarus | 6 | 20 |
| Stenelmis | 5 | 14 |
| * Hydropsyche | 4 | 11 |
| * Cheumatopsyche | 5 | 9 |
| * Chimarra | 4 | 9 |
| Amnicola | 4.8 | 7 |
| Nais | 8 | 5 |
| Dugesia | 4 | 3 |
| Dubiraphia | 6 | 2 |
| * Glossosoma | 0 | 2 |
| * Lepidostoma | 1 | 2 |
| Microtendipes | 7 | 2 |
| Optioservus | 4 | 2 |
| Rheotanytarsus | 6 | 2 |
| Caecidotea | 8 | 1 |
| Corynoneura | 4 | 1 |
| Naididae | 7 | 1 |
| Orthoclaadiinae | 5 | 1 |
| Oulimnius | 4 | 1 |
| Planorbidae | 6 | 1 |
| Psephenus | 4 | 1 |
| Tanytarsini | 6 | 1 |
| Tipula | 4 | 1 |
| Tribelos | 5 | 1 |

* (EPT organism) Taxa Richness: 24 Population: 100

Hilsenhoff Biotic Index (HBI): 5.02 # Scrapers: 7

% Sensitive EPT: 13.0% Attribute 2 genera: 2

% Non-Insect Taxa: 29.2% Attribute 3 genera: 1

HGMI Rating: 43.74 Good

Habitat Analysis: 140 Suboptimal USEPA Protocol

Observations: Water temp: 12.32 C; Cond: 161 umhos; DO: 7.23 mg/L; pH: 6.43 SU

Clarity: clear, brownish; Flow Rate: fast; Width/Depth: 35' / 3'; Substrate: cobble, gravel, sand, root mats

Canopy: mostly open; Bank Stability: good; Bank Vegetation: trees, shrubs, grasses

Stream Gradient: High Gradient Stream; Land Uses: suburban

Pipes / Ditches: storm sewers

Other: clams / mussels, macrophytes; USGS gage

AMNET Site # AN0397

Stream Name: Millstone River

Location: outlet of Carnegie Lake off Rt 27; South Brunswick Twp; Middlesex & Mercer County

Collection Date: 11/17/2009

USGS Topo Map: Hightstown

| <i>Genus</i> | <i>Tolerance Value</i> | <i>Amount</i> |
|------------------|------------------------|---------------|
| Gammarus | 6 | 38 |
| Lirceus | 8 | 16 |
| Musculium | 5 | 15 |
| * Cheumatopsyche | 5 | 7 |
| * Hydropsyche | 4 | 6 |
| Dugesia | 4 | 3 |
| Rheotanytarsus | 6 | 3 |
| Corbicula | 4 | 2 |
| Menetus | 6 | 2 |
| Stenelmis | 5 | 2 |
| Caecidotea | 8 | 1 |
| Glyptotendipes | 10 | 1 |
| Hemerodromia | 6 | 1 |
| Laevapex | 6 | 1 |
| Ripistes | 8 | 1 |
| Simulium | 6 | 1 |

* (EPT organism) Taxa Richness: 16 Population: 100

Hilsenhoff Biotic Index (HBI): 5.94 # Scrapers: 3

% Sensitive EPT: 0.0% Attribute 2 genera: 0

% Non-Insect Taxa: 56.3% Attribute 3 genera: 0

HGMI Rating: 18.81 Poor

Habitat Analysis: 169 Optimal USEPA Protocol

Observations: Water temp: 11.27 C; Cond: 267 umhos; DO: 10.59 mg/L; pH: 6.75 SU

Clarity: slightly turbid; Flow Rate: fast; Width/Depth: 30' / 2 - 3'; Substrate: cobble, gravel, sand, mud, snags, root mats

Canopy: partly open; Bank Stability: fair; Bank Vegetation: trees, shrubs, grasses, weeds, vines

Stream Gradient: High Gradient Stream; Land Uses: rural, forested

Downstream of Impoundment: Carnegie Lake

Other: fish, turtle, clams / mussels

AMNET Site # AN0430

Stream Name: Lawrence Bk

Location: Ridge Rd / Rt 522; South Brunswick Twp; Middlesex County

Collection Date: 8/19/2009 USGS Topo Map: Monmouth Junction

| <i>Genus</i> | <i>Tolerance Value</i> | <i>Amount</i> |
|-----------------|------------------------|---------------|
| * Callibaetis | 9 | 29 |
| Nais | 8 | 12 |
| Stylaria | 8 | 7 |
| * Caenis | 7 | 6 |
| Limnodrilus | 10 | 6 |
| Naididae | 7 | 6 |
| Corixidae | 9 | 4 |
| Thienemannimyia | 6 | 4 |
| Peltodytes | 5 | 3 |
| Tanypus | 10 | 3 |
| Dero | 10 | 2 |
| Planorbidae | 6 | 2 |
| Polypedilum | 6 | 2 |
| Stenelmis | 5 | 2 |
| Ablabesmyia | 8 | 1 |
| Amnicola | 4.8 | 1 |
| Ancyronyx | 2 | 1 |
| Aulodrilus | 8 | 1 |
| Caecidotea | 8 | 1 |
| Coenagrionidae | 9 | 1 |
| Culicidae | 8 | 1 |
| Ectopria | 5 | 1 |
| Gammarus | 6 | 1 |
| Simulium | 6 | 1 |
| Sphaeriidae | 8 | 1 |
| Tanypodinae | 7 | 1 |

| | | |
|--------------------------------|-------------------|-------------------------|
| * (EPT organism) | Taxa Richness: 26 | Population: 100 |
| Hilsenhoff Biotic Index (HBI): | 7.96 | # Scrapers: 4 |
| % Sensitive EPT: | 35.0% | Attribute 2 genera: 0 |
| % Non-Insect Taxa: | 42.3% | Attribute 3 genera: 0 |
| HGMI Rating: | 29.42 | Fair |
| Habitat Analysis: | 101 | Marginal USEPA Protocol |

Observations: Water temp: 22.64 C; Cond: 100 umhos; DO: 0.98 mg/L; pH: 6.73 SU

Clarity: turbid, brown; Flow Rate: slow; Width/Depth: 100' / 3'; Substrate: gravel, sand, mud

Canopy: open; Bank Stability: good; Bank Vegetation: trees, shrubs, grasses

Stream Gradient: High Gradient Stream; Land Uses: suburban, forested

Other: turtle, macrophytes, filamentous algae, waterfowl

AMNET Site # AN0431 Stream Name: Lawrence Bk
 Location: Davidson Mill Rd; South Brunswick Twp; Middlesex County
 Collection Date: 8/19/2009 USGS Topo Map: New Brunswick

| Genus | Tolerance Value | Amount |
|------------------|-----------------|--------|
| Caecidotea | 8 | 27 |
| Hydrolimax | 4 | 12 |
| Ablabesmyia | 8 | 6 |
| Amnicola | 4.8 | 6 |
| * Caenis | 7 | 6 |
| Polypedilum | 6 | 6 |
| Sphaeriidae | 8 | 5 |
| Limnodrilus | 10 | 4 |
| Tanypus | 10 | 3 |
| Campeloma | 7 | 2 |
| * Cheumatopsyche | 5 | 2 |
| Planariidae | 4 | 2 |
| Procladius | 9 | 2 |
| Tanytarsus | 6 | 2 |
| Tribelos | 5 | 2 |
| Aulodrilus | 8 | 1 |
| Cladopelma | 8 | 1 |
| Clinotanypus | 8 | 1 |
| Corbicula | 4 | 1 |
| Corixidae | 9 | 1 |
| Gammarus | 6 | 1 |
| Microtendipes | 7 | 1 |
| Naididae | 7 | 1 |
| Nanocladius | 3 | 1 |
| Paratendipes | 8 | 1 |
| Physella | 9.1 | 1 |
| Stenelmis | 5 | 1 |
| Tubifex | 10 | 1 |

| | | |
|--------------------------------|-------------------|-------------------------|
| * (EPT organism) | Taxa Richness: 28 | Population: 100 |
| Hilsenhoff Biotic Index (HBI): | 6.93 | # Scrapers: 4 |
| % Sensitive EPT: | 6.0% | Attribute 2 genera: 0 |
| % Non-Insect Taxa: | 46.4% | Attribute 3 genera: 0 |
| HGMI Rating: | 24.85 | Fair |
| Habitat Analysis: | 101 | Marginal USEPA Protocol |

Observations: Water temp: 26.56 C; Cond: 221 umhos; DO: 3.36 mg/L; pH: 6.48 SU
 Clarity: slightly turbid, brown; Flow Rate: slow; Width/Depth: 120' / 4'; Substrate: mud, silt
 Canopy: mostly open; Bank Stability: good; Bank Vegetation: trees, shrubs, weeds
 Stream Gradient: High Gradient Stream; Land Uses: suburban, forested
 Other: macrophytes, filamentous algae

AMNET Site # AN0432

Stream Name: Oakeys Bk

Location: Davidson Mill Rd; South Brunswick Twp; Middlesex County

Collection Date: 8/19/2009

USGS Topo Map: New Brunswick

| <i>Genus</i> | <i>Tolerance Value</i> | <i>Amount</i> |
|------------------|------------------------|---------------|
| Stenelmis | 5 | 68 |
| Cura , | 4 | 6 |
| Rheotanytarsus | 6 | 6 |
| * Hydropsyche | 4 | 4 |
| Optioservus | 4 | 3 |
| Simulium | 6 | 2 |
| Calopteryx | 6 | 1 |
| * Cheumatopsyche | 5 | 1 |
| Ectopria | 5 | 1 |
| Erpobdellidae | 8 | 1 |
| Gerris | 8 | 1 |
| Hemerodromia | 6 | 1 |
| Microvelia | 6 | 1 |
| Nematoda | 6 | 1 |
| Prostoma | 7 | 1 |
| * Stenacron | 4 | 1 |
| Tipula | 4 | 1 |

* (EPT organism) Taxa Richness: 17 Population: 100

Hilsenhoff Biotic Index (HBI): 5.05 # Scrapers: 3

% Sensitive EPT: 1.0% Attribute 2 genera: 0

% Non-Insect Taxa: 23.5% Attribute 3 genera: 2

HGMI Rating: 31.87 Fair

Habitat Analysis: 154 Suboptimal USEPA Protocol

Observations: Water temp: 23.97 C; Cond: 386 umhos; DO: 5.97 mg/L; pH: 7.15 SU

Clarity: clear; Flow Rate: slow; Width/Depth: 25' / 1 - 2'; Substrate: cobble, gravel, sand

Canopy: closed; Bank Stability: fair; Bank Vegetation: trees, shrubs, grasses

Stream Gradient: High Gradient Stream; Land Uses: suburban, forested

Pipes / Ditches: storm sewers (flowing)

Other: fish, periphytes

AMNET Site # AN0433 Stream Name: Ireland Bk
 Location: Riva Rd; North Brunswick Twp; Middlesex County
 Collection Date: 8/19/2009 USGS Topo Map: New Brunswick

| <i>Genus</i> | <i>Tolerance Value</i> | <i>Amount</i> |
|------------------|------------------------|---------------|
| Stenelmis | 5 | 51 |
| * Hydropsyche | 4 | 18 |
| * Cheumatopsyche | 5 | 12 |
| Simulium | 6 | 4 |
| Planariidae | 4 | 3 |
| Calopteryx | 6 | 2 |
| Polypedilum | 6 | 2 |
| Tvetenia | 5 | 2 |
| Lumbriculidae | 8 | 1 |
| Nais | 8 | 1 |
| Rhagovelia | 9 | 1 |
| Rheotanytarsus | 6 | 1 |
| Stylaria | 8 | 1 |
| Tanytarsus | 6 | 1 |

* (EPT organism) Taxa Richness: 14 Population: 100
 Hilsenhoff Biotic Index (HBI): 5.02 # Scrapers: 1
 % Sensitive EPT: 0.0% Attribute 2 genera: 0
 % Non-Insect Taxa: 28.6% Attribute 3 genera: 1
HGMI Rating: 24.98 Fair
 Habitat Analysis: 162 Optimal USEPA Protocol

Observations: Water temp: 22.05 C; Cond: 318 umhos; DO: 7.69 mg/L; pH: 6.39 SU
 Clarity: clear; Flow Rate: moderate; Width/Depth: 25' / < 1'; Substrate: cobble, gravel, sand, bedrock
 Canopy: mostly closed; Bank Stability: good; Bank Vegetation: trees, shrubs, grasses
 Stream Gradient: High Gradient Stream; Land Uses: forested
 Other: periphytes

APPENDIX C

2004 Integrated Water Quality Monitoring & Assessment Report

Integrated List Report Data

New Jersey's
2004 Integrated List of Waterbodies

June 22, 2004

| Sublist | Wtrshd Region | WMA | Station Name/Waterbody | Site ID | Parameters | Data Source |
|---------|---------------|-----|--|---------------|----------------------------|---|
| 1 | Raritan | 10 | Heathcote Brook at Academy St in South Brunswick | AN0396 | Benthic Macroinvertebrates | NJDEP AMNET |
| 3 | Raritan | 09 | Oakeys Brook at Davidsons Mill Rd in North Brunswick | AN0432 | Benthic Macroinvertebrates | NJDEP AMNET |
| 3 | Raritan | 10 | Shallow Brook at N of Scotts Cor in Plainsboro | AN0388 | Benthic Macroinvertebrates | NJDEP AMNET |
| 3 | Raritan | 10 | Heathcote Brook at Stouts Ln in South Brunswick | AN0395 | Benthic Macroinvertebrates | NJDEP AMNET |
| 3 | Raritan | 10 | Millstone River at off Rt 27 in Princeton | AN0397 | Benthic Macroinvertebrates | NJDEP AMNET |
| 3 | Raritan | 10 | Carnegie Lake-10 | Carnegie Lake | Phosphorus | NJDEP Clean Lakes, NJDEP Fish Tissue Monitoring |
| 5 | Raritan | 09 | Lawrence Brook at Ridge Rd in South Brunswick | AN0430 | Benthic Macroinvertebrates | NJDEP AMNET |
| 5 | Raritan | 09 | Lawrence Brook at Davidsons Mill Rd in South Brunswick | AN0431 | Benthic Macroinvertebrates | NJDEP AMNET |
| 5 | Raritan | 09 | Ireland Brook at Riva Rd in South Brunswick | AN0433 | Benthic Macroinvertebrates | NJDEP AMNET |
| 5 | Raritan | 10 | Devils Brook at New Rd in South Brunswick | AN0387 | Benthic Macroinvertebrates | NJDEP AMNET |
| 5 | Raritan | 10 | Carnegie Lake-10 | Carnegie Lake | Fish-Mercury | NJDEP Clean Lakes, NJDEP Fish Tissue Monitoring |

APPENDIX D

Total Maximum Daily Loads

TMDL Reports



U.S. Environmental Protection Agency

Total Maximum Daily Loads

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Listed Water Information

CYCLE : 2002

Click [here](#) to see metadata for this report.

Cycle: 2002 **State:** NJ **List ID:** NJ-02030105130050-AN0431

Waterbody Name: LAWRENCE BROOK

State Basin Name: 09 RARITAN

Listed Water Map Link: [MAP 303\(d\)](#)

State List IDs:

| Cycle | State List ID |
|-------|---------------|
| 2002 | AN0431 |

State Impairments:

| State Impairment | Parent Impairment | Priority | Rank | Targeted Flag | Anticipated TMDL Submittal |
|-----------------------------|---------------------|----------|------|---------------|----------------------------|
| BIOLOGY MODERATELY IMPAIRED | BIOLOGICAL CRITERIA | LOW | | N | DEC-31-2003 |

Potential Sources of Impairment:

There were no potential sources reported to EPA by the state.

Total Maximum Daily Load (TMDL) Information:

There were no TMDLs reported to EPA by the state.

Watershed Information:

| Watershed Name | Watershed States |
|----------------|------------------|
| RARITAN | NEW JERSEY |

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Last updated on Monday, March 28th, 2005
URL: <http://oaspub.epa.gov/pls/tmdl/enviro.control>



U.S. Environmental Protection Agency

Total Maximum Daily Loads

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Listed Water Information

CYCLE : 2002

Click [here](#) to see metadata for this report.

Cycle: 2002 **State:** NJ **List ID:** NJ-02030105130020-AN0430

Waterbody Name: LAWRENCE BROOK

State Basin Name: 09 RARITAN

Listed Water Map Link: [MAP 303\(d\)](#)

Comments:

LOCATION PREVIOUSLY GIVEN AS RIDGE RD, MONMOUTH JCT IN 1998

State List IDs:

| Cycle | State List ID |
|-------|---------------|
| 2002 | AN0430 |

State Impairments:

| State Impairment | Parent Impairment | Priority | Rank | Targeted Flag | Anticipated TMDL Submittal |
|-----------------------------|---------------------|----------|------|---------------|----------------------------|
| BIOLOGY MODERATELY IMPAIRED | BIOLOGICAL CRITERIA | LOW | | N | DEC-31-2003 |

Potential Sources of Impairment:

There were no potential sources reported to EPA by the state.

Total Maximum Daily Load (TMDL) Information:

There were no TMDLs reported to EPA by the state.

Watershed Information:

| Watershed Name | Watershed States |
|----------------|------------------|
| RARITAN | NEW JERSEY |

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Last updated on Monday, March 28th, 2005
URL: <http://oaspub.epa.gov/pls/tmdl/enviro.control>



Total Maximum Daily Loads

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Detailed TMDL Report

TMDL Document Information

TMDL ID: 10561

TMDL Name: DAVIDSON'S MILL POND

TMDL Status: APPROVED/ESTABLISHED

EPA Lead: No

Lead State: NJ

Actual Establishment Date: 09/23/2003

Comments: WLAS INCLUDES NPDES AND NJPDES-REGULATED, STORM WATER-DRIVEN SOURCES IN ADDITION TO URBAN NONPOINT SOURCES.

TMDL Documents

Click on the underlined Document Type to retrieve the actual document in PDF format.

| Document Type | Upload Date |
|----------------------|-------------|
| <u>TMDL Document</u> | 07/12/2004 |

TMDL Pollutants

Pollutant: PHOSPHORUS

TMDL Type: POINT/NONPOINT SOURCE

Total Waste Load Allocation: 116.7

Load Allocation: 343.74

Margin Of Safety: 230

Implicit Margin Of Safety: Y

Units for Total Waste Load Allocation, Load Allocation, and Margin of Safety: KG/YR

TMDL End Point: 0.05 MG/L

There was no detailed NPDES Waste Load Allocation entered for this TMDL. Detailed information may be present in the actual TMDL Document

Listed Water Impairments for PHOSPHORUS

Click on the underlined List ID for a Listed Water Information Report. Click on the underlined "MAP 303(d)" literal for a map of the Listed Water.

| List ID | State List ID | Waterbody Name | Listed Water Map | Cycle | Impairment |
|------------------|-------------------------------|---------------------|--------------------|-------|------------|
| <u>NJ-LM4096</u> | DAVIDSONS MILL POND NJ-LM4096 | DAVIDSONS MILL POND | <u>MAP 303 (d)</u> | 2002 | NUTRIENTS |

TMDL Methods

| Method Name | Method Description |
|---------------|--------------------|
| RECKHOW MODEL | RECKHOW MODEL |

Click [here](#) to see metadata for this report.

[Water](#) | [Wetlands, Oceans & Watersheds](#) | [Watershed Protection](#)



Total Maximum Daily Loads

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Listed Water Information

CYCLE : 2002

Click [here](#) to see metadata for this report.

Cycle: 2002 **State:** NJ **List ID:** NJ-LM4096
Waterbody Name: DAVIDSONS MILL POND
State Basin Name: 09 RARITAN
Listed Water Map Link: [MAP 303\(d\)](#)

State List IDs:

| Cycle | State List ID |
|-------|-------------------------------|
| 2002 | DAVIDSONS MILL POND NJ-LM4096 |

State Impairments:

| State Impairment | Parent Impairment | Priority | Rank | Targeted Flag | Anticipated TMDL Submittal |
|------------------|-------------------|----------|------|---------------|----------------------------|
| NUTRIENTS | | LOW | | N | |

Potential Sources of Impairment:

There were no potential sources reported to EPA by the state.

Total Maximum Daily Load (TMDL) Information:

Note: Click on the underlined TMDL Document Name for a detailed TMDL Document Report.

| TMDL Document Name | Status | Actual TMDL Establishment Date | TMDL Pollutant Description | TMDL Pollutant Type | State Impairment | Impairment Cycle |
|--------------------------------------|----------------------|--------------------------------|----------------------------|-----------------------|------------------|------------------|
| DAVIDSON'S MILL POND | APPROVED/ESTABLISHED | SEP-23-2003 | PHOSPHORUS | POINT/NONPOINT SOURCE | NUTRIENTS | 2002 |

Watershed Information:

| Watershed Name | Watershed States |
|----------------|------------------|
| RARITAN | NEW JERSEY |



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Listed Water Information

CYCLE : 2002

Click [here](#) to see metadata for this report.

Cycle: 2002 **State:** NJ **List ID:** NJ-02030105100110-AN0387

Waterbody Name: DEVILS BROOK

State Basin Name: 10 RARITAN

Listed Water Map Link: [MAP 303\(d\)](#)

State List IDs:

| Cycle | State List ID |
|-------|---------------|
| 2002 | AN0387 |

State Impairments:

| State Impairment | Parent Impairment | Priority | Rank | Targeted Flag | Anticipated TMDL Submittal |
|-----------------------------|---------------------|----------|------|---------------|----------------------------|
| BIOLOGY MODERATELY IMPAIRED | BIOLOGICAL CRITERIA | LOW | | N | DEC-31-2003 |

Potential Sources of Impairment:

There were no potential sources reported to EPA by the state.

Total Maximum Daily Load (TMDL) Information:

There were no TMDLs reported to EPA by the state.

Watershed Information:

| Watershed Name | Watershed States |
|----------------|------------------|
| RARITAN | NEW JERSEY |