

Municipal Stormwater Management Plan Master Plan Element

for the:

Township of Plainsboro Middlesex County, New Jersey



Plainsboro Township
Middlesex County

prepared by:

Michael J. McClelland, P.E., P.P.

New Jersey Professional Engineer Lic. No. 32468

New Jersey Professional Planner Lic. No. 3770

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Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for Township of Plainsboro ("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 water bodies.

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. Since this plan is an amendment to the existing Township Master Plan, all items within this stormwater management plan supersede items that may be contrary to the 'Utility Service Plan Element' of the existing Township Master Plan.

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 (SPPP) as implemented by the Township as of April 1, 2005, and last revised February 23, 2024.

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 has been established to permit the use of mechanisms such as a stormwater utility at the municipality's discretion.

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 areas 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 waste, 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 12.18 square miles of land area in Middlesex County, New Jersey (see *Figure 2: Vicinity Map*). In recent years, the Township population has increased from 20,215 persons in 2000, to 24,084 persons in 2020. This is 16.06% increase from 2000 to 2020. Consequently, the population density has increased from 1,660 persons per square mile of land area in 2000, to 1,977 persons per square mile of land area in 2020. The increase in population density has resulted in further development that could potentially affect waterway systems and their function. *Figure 3: Existing Land Use Map* depicts the Township's current land use and the existing land area that has been developed. *Figure 4: Zoning Map* displays the existing zoning districts and dictates the extent at which the existing undeveloped land can be developed.

Township Water Features

There are five (5) named streams located within the Township. The streams are as follows: Millstone River, Devils Brook, Shallow Brook, Bee Brook, and Cranbury Brook. Carnegie Lake is a



named body of water located within the Township. The Delaware and Raritan Canal forms the western boundary of the Township, and the Millstone River forms the Township's southern boundary. *Figure 5: Township Waterways* illustrates the location of waterways within the Township. There are no Category 1 water bodies present within the Township. *Figure 6: Boundary on USGS Quadrangles* 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 7: Developable and Un-developable Land*, there are approximately 0.48 square miles of future developable land within the Township. The Township is required to reevaluate the Master Plan and provide future non-point source pollution loads once every ten (10) years per the Tier A Municipal Stormwater General Permit and in accordance with N.J.A.C.7:8-4.3(a). The Township will provide future non-point source pollution loads and reevaluate and update the Master Plan as necessary in accordance with these requirements.

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 New Jersey Department of Environmental Protection (NJDEP). At present, there are over 760 AMNET sites throughout the State of New Jersey. These sites are sampled for benthic macroinvertebrates by the NJDEP were updated on a five-year cycle but have not been updated since 2012. The ratio of pollution tolerant to pollution sensitive benthic macroinvertebrates coupled with a visual site inspection is examined to assess water quality. Three indices are used to assess streams; High Gradient Macroinvertebrate Index (HGMI), Coastal Plain Macroinvertebrate Index (CPMI), and Pinelands Macroinvertebrate Index (PMI). These indices are used to account for the State's different geophysical ecoregions for calculating scores ranging from excellent, good, fair, and poor with results that are reflective of the water and/or habitat quality at each monitored site.

The MSWMP has looked at five (5) analyzed sites within the current AMNET study. Of these five (5) sites, three (3) have been assessed as fair and two (2) have been assessed as poor within the CPMI region. Of the five (5) assessed sites, three (3) sites are located within Township borders and the other two (2) sites are located near the Plainsboro Township borders with South Brunswick and West Windsor Townships.



Several AMNET site locations were tested for benthic macroinvertebrates abnormalities. Samples taken from specified AMNET assessment sites were examined for physical abnormalities via visual inspection. Morphological abnormalities are noted in the AMNET study because they may signify a possibility of stressful conditions or contaminants in 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 of the taxa observed are deformed. Sites with chronic macroinvertebrate abnormalities indicate that deformities were encountered during the most recent site assessment and previous site assessment. Significant macroinvertebrate abnormalities indicate that taxa deformities were only encountered during the most recent site inspection. Please see the *Appendix B* for the data referenced from the AMNET study.

Hydrologic Unit Code 14 (HUC-14)

The AMNET sites that have been analyzed are located throughout the Township's Hydrologic Unit Code 14 (HUC-14) drainage areas. The eleven (11) HUC-14 drainage areas within the Township fall within the Millstone River (above Carnegie Lake) Watershed region (WMA ID 10). See *Figure 8: Hydrologic Unit Code 14 (HUC)* for the boundaries of the Township's HUC-14's.

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), dated 2018/2020, 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 5R, which indicates an unhealthy waterway not meeting its intended use and requires an approved watershed restoration plan or 319(h) Watershed Based Plan. Sublist 1 waterways attain water quality standards and none of the designated uses are threatened. Sublist 5R 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 required. 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 cannot be determined if a designated use is threatened.

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 non-point sources, which include 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, whether structural and non-structural.

The New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d)) issued 2018/2020, examined: Shallow Brook, Millstone River, Cranbury Brook, Devils Brook, and Carnegie Lake. See *Figure 9: Water Quality Assessment Locations* for the locations of monitoring sites examined in both the AMNET study and 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

Over the years Plainsboro has addressed water quantity issues throughout the Township. However, flooding still occurs along Mapleton Road, and has continued along Schalks Crossing Road, Dey Road, Maple Avenue, and George Davison Road. The Township will continue to address water quantity issues through the application of stormwater management reductions across the 2-, 10-, and 100-year storm events and to reduce flooding wherever possible within the Township. Please see *Figure 14: Flood Prone Map (FEMA/FIRM Q3 Flood Data)* per the National Flood Insurance Program (NFIP) issued July 2010 for locations of the Township within Flood Hazard Areas.

Over the years, impervious coverage has increased, peak flows and runoff volumes to existing water courses have also increased. The increased amount of water can contribute to flooding. The impervious coverage also significantly decreases 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 depicted in *Figure 10: Groundwater Recharge Areas*.

Township Features

There are three (3) wellhead protection areas within the Township of Plainsboro. One of these protections areas lies completely within the Township's borders, whereas the other two (2) span into the neighboring towns. There are three Tiers associated with each wellhead protection area, Tiers 1,2, and 3, which delineate the extent of ground water captured by a pump at a specified rate calculated over a 2, 5 and 12-year period, 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 11: Wellhead Protection Areas* for wellhead protection area locations.

A map of the wetlands and other constrained land is displayed in *Figure 12: Wetlands and Water Land Uses Constrained Land*. A soil map of the Township is provided and references the latest SSURGO soil survey; see *Figure 13: Soil Survey Geographical (SSURGO) Database*.

Design and Performance Standards

The Township has adopted the design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8-5, 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 water bodies 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, green infrastructure, structural and non-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 Standards for Soil Erosion and Sediment Control in New Jersey dated January 2014 and last revised July 2017.

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 water bodies. In Chapter 2 of the *New Jersey Stormwater Best Management Practices (BMP) Manual* stormwater management design techniques are focused on non-structural stormwater management strategies. Non-structural Stormwater Management Strategies, Low Impact Development (LID) techniques are enumerated as follows:

1. Vegetation and Landscaping through the preservation of natural areas, installation of native ground cover, and providing vegetative filters and buffers.
2. Minimizing Land Disturbance by fitting the development into the terrain as opposed to changing the terrain to fit the development. This can be achieved by limiting clearing, grading, and other land disturbance necessary to construct the proposed project.
3. Impervious Area Management by disconnecting impervious surface to allow for re-infiltration of stormwater, porous impervious surfaces to allow for stormwater to infiltrate through the impervious surface and vegetated to roofs to reduce the impervious surface during design.



4. Time of Concentration Modifications by creating vegetation, reducing slopes, and providing conveyance features through vegetative swales in order to reduce the time of concentration through a drainage area.

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

Stormwater Management Regulations Overview **Groundwater Recharge Requirements**

Major developments must also meet one of two standards for groundwater recharge (N.J.A.C. 7:8-5.4(b)1.):

- (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 80 percent of the anticipated load from the major development.

Stormwater Quantity Requirements

To control stormwater runoff quantity impacts (N.J.A.C. 7:8-5.6(b)), 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, 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.

Maintenance, Safety and Ordinance

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 shall be submitted to the county for review and approval within 24 months of the effective date of the Stormwater Management Rules. The Township has adopted the following ordinances, which meet the minimum requirements set forth in the Tier A Municipal Stormwater General Permit:

1. *Pet Waste Ordinance* – requires owners and keepers to immediately and properly dispose of their pet's solid waste and requires information provided by NJDEP to be distributed with pet licenses regarding said ordinance;
2. *Litter Control Ordinance* – meets the minimum standards set forth in the State Litter Statue (N.J.S.A. 13:1E-99.3);
3. *Improper Disposal of Waste Ordinance* – prohibits spilling, dumping or disposing of any materials other than stormwater into the municipal separate storm sewer system;
4. *Wildlife Feeding Ordinance* – prohibits feeding of non-confined wildlife in any public park or property owned/operated by the municipality;
5. *Illicit Connections Ordinance* – prohibits illicit connections to the municipal separate storm sewer system;
6. *Yard Waste Ordinance* – establishes a yard waste and brush collection program to prevent waste at the curblane line or along the street unless during a scheduled or announced collection period;



7. *Private Storm Drain Inlet Retrofitting Ordinance* – requires the retrofitting of existing storm drain inlets which are in direct contact with repaving, repairing, reconstruction or resurfacing or alteration of facilities on private property, to prevent the discharge of solids and floatables into the municipal separate stormwater system;
8. *Privately-Owned Salt Storage Ordinance* – preventing the storage of salts and other solid de-icing materials from being exposed to stormwater; and
9. *Tree Removal-Replacement Ordinance* – establishing the requirements of tree removal and replacement to reduce soil erosion and pollutant runoff, while promoting infiltration of stormwater.

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

As a requirement of the Township's Stormwater Pollution Prevention Plan (SPPP), implemented April 1, 2005, and last revised February 23, 2024, the public will be provided with educational material and be able to participate in annual events focusing on stormwater management issues. From the implementation of the SPPP, the public will be knowledgeable of stormwater issues and be capable of relating stormwater management concerns to the above stated ordinances and recognizing their importance. As public education and involvement continues, it is anticipated that the public will work towards preventing stormwater quality, quantity and groundwater recharge problems within the Township.

Plan Consistency

Regional Stormwater Management Plan (RSWMP)

The Township is located 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, twenty-two (22) TMDL's have been adopted. The TMDL's are applicable to the Millstone River, Shallow Brook, Bear Brook, Cedar Brook, Cranbury Brook, Devils Brook, and Heathcote Brook. See *Appendix D* for a list of the TMDL locations with associated summaries.



Residential Site Improvement Standards (RSIS)

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

Freehold Soil Conservation District (FSCD)

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 in-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.

Delaware and Raritan Canal Commission

The Township's is entirely within the review zone of the Delaware and Raritan Canal Commission (D&RCC). Applicants shall design in accordance with the D&RCC regulations and abide by the Stream Corridor Easement requirements.

Nonstructural Stormwater Management Strategies

The Township's Master Plan and Land Development-related Ordinances were reviewed in order to identify potential sections that might be revised to include nonstructural stormwater management strategies. The following ordinance and master plan provisions have been identified for revision. Once the revisions are drafted, they should be submitted to Middlesex County for review and approval. A copy should also be sent to the New Jersey Department of Environmental Protection at the time of submission.

Plainsboro Township Code

Chapter 85, Subdivision and Site Plan Review:

Section 85-13. Preliminary Plat Details: This section requires that all existing natural features and proposed design elements, including those pertaining to stormwater management facilities, be identified on the plans. This section should be amended to also require that the locations of all vegetated areas to be used for the implementation of nonstructural stormwater management techniques be indicated on the plans. This information must also be incorporated on the Final Plans, pursuant to Section 85-18.

Section 85-20. Streets: This section contains principles to be followed by a developer in the design and layout of a subdivision development. This section should be amended to include a requirement that the layout of the development and the design of the stormwater management facilities shall



incorporate nonstructural stormwater management strategies to the maximum extent possible. A provision should also be included requiring an applicant to demonstrate how and where nonstructural stormwater management strategies, as listed in the NJDEP Best Management Practices Manual, Appendix 'A', Low Impact Development Checklist, are incorporated in the proposed development. If the applicant has made no provisions for Low Impact Development Techniques, they should be required to provide sufficient explanation as to why they cannot comply.

Section 85-22. Sidewalks, Walkways and Multi-Use Pathways: This section contains design and construction requirements for sidewalks along public and private streets. This section should be amended to include a requirement that the sidewalks not directly abut a curb or edge of pavement, to the extent possible; and that sidewalk should be separated from curbs or roadway edges by pervious area, such as turf, wherever possible.

Section 85-23. Curbing: This section contains requirements for curbing public and private streets. This section should be amended to permit construction of streets with flush curbing or curb cuts, where permitted by zoning regulation or at the discretion of the approving Board, and instead using vegetated swales or other nonstructural stormwater management techniques to be utilized to collect stormwater, prior to the collection in storm sewers or stormwater management facilities, such as detention basins, etc.

Section 85-28. Drainage: This section contains requirements and standards for stormwater drainage on streets and developments including minimum conveyance design standards.

Section 85-36. Details Required for Preliminary (Site Plan) Approval: This section requires that all existing natural features and proposed design elements, including those pertaining to stormwater management facilities, be identified on the plans. This section should be amended to require that the locations of all vegetated areas to be used for the implementation of nonstructural stormwater management techniques also be indicated on the plans. This information must also be incorporated on the Final Site Plans, pursuant to Section 85-40.

Section 85-43.1. Criteria to be Considered: This section contains requirements intended to limit or minimize soil disturbances. This section should be amended to include provisions that would require the developer to minimize soil compaction during the construction of the site.

Additional Design Criteria: Consideration should be given to adding new sections in the development codes that would:

- Require, to the greatest extent practicable, use of native vegetation for landscaping buffers; and



- Permit the incorporation of nonstructural stormwater management techniques into landscape buffers, where they would not detract from their purpose.

It is noted that an applicant and/or developer satisfying the percent impervious requirement in any zone is not relieved of the responsibility to comply with the nonstructural stormwater management strategies and associated stormwater management ordinance.

Plainsboro Township Master Plan:

VI. Utility Service Plan Element:

C. Drainage and Flood Control: This subsection has been amended to indicate that goals that the Township is incorporating per the Statewide Basic Requirements that are being implemented by the Township via the Tier A Municipal Stormwater Master General Permit (NJPDES #NJG0152391, P.I.I.D. #208518).

Land Use Build-Out Analysis

A land use build-out analysis is a planning tool to help the municipality evaluate anticipated pollutant loads resulting from future development, assuming full build-out potential and zoning requirements as of October 2024. Build-out pollutant load computations quantify the projection of pollutant loads from maximum build-out of developable areas and will provide insight on how it will environmentally impact the Township, its watersheds and downstream water quality conditions. A build-out analysis is not only useful for communities with undeveloped land, but for areas with significant redevelopment potential, as many urban and older suburban properties have the potential to be redeveloped in the future and are not currently developed to the full extent allowed under current zoning requirements.

The MSWMP is required to include a land use build-out analysis with information relative to the Township and HUC-14 boundaries. For every individual HUC14 drainage area in the Township, the following must be determined: (1) full development impervious coverage, (2) total developable area (either developed or undeveloped) and (3) anticipated pollutant loading based on full development.

The Township is divided into eleven (11) HUC-14 areas, as previously determined; see *Figure 8: Hydrologic Unit Code 14 (HUC)* for a visual representation of the HUC-14 boundary areas relative to the Township boundary. The eleven (11) HUC-14 drainage areas have been examined and a land use build-out analysis assuming full development meeting existing zoning criteria has been conducted for each HUC-14 respectively.



The land use build-out analysis consists of two phases. The first phase visually depicts changes on a map by manipulating spatial data and associated attribute tables, efficiently utilizing current computer software application, Geographic Information System (GIS). GIS is a computerized system for developing, analyzing, and displaying spatial data. GIS allows the municipality to combine GIS based data sources into “layers” that can be visually represented to convey spatial information and analysis; such as zoning districts, tax maps, HUC-14 drainage areas, land use parameters, and topography. The second phase calculates the pollutant loading for each zone within each HUC-14 drainage area, again assuming full land use build-out for all developable land to the maximum extent allowed under zoning requirements.

The steps associated with the build-out analysis procedure are as enumerated below. Please note that the analyzed GIS data files were provided by the New Jersey Department of Environmental Protection Bureau of Geographic Information Systems (GIS). GIS data is only as accurate as the sources it references. This information is not exact and should only be used for general comparison purposes; if further analysis within a HUC-14 drainage area is required or requested, it is recommended that an analysis of a defined drainage area be conducted and thoroughly performed in accordance with the standards set forth by the Environmental Protection Agency (EPA) and the New Jersey Department of Environmental Protection (NJDEP).

Build-Out Analysis Procedure:

- 1) The following GIS shape files were obtained for geoprocessing, references as noted:
 - a. State Municipal Coverage – obtained from NJDEP Bureau of GIS
 - b. HUC14 – obtained from NJDEP Bureau of GIS
 - c. Wetlands – obtained from NJDEP Bureau of GIS
 - d. Open Space – obtained from the NJDEP Bureau of GIS
- 2) The Township boundary was exported from the state municipality coverage via GIS.
- 3) A feature class was created in GIS consisting of the Land Use, HUC-14 and Wetlands data layers. The feature class was then clipped by the Township Boundary, as exported from the state municipal coverage data file.
- 4) The zoning districts and HUC-14 data files in GIS were intersected creating ‘unique’ polygons that associate zoning and HUC-14 parameters to each ‘unique’ polygon making them suitable for further geoprocessing.
- 5) Separate land use classifications relative to each HUC-14 and zone (i.e. urban and water polygons) were then created via GIS creating new data sets for further geoprocessing.



- 6) Three (3) excel spreadsheets were created to properly establish the land use build-out calculations. Comparative HUC-14 data relative to each zone was inputted into said spreadsheet as determined above.
 - a. *Table E1: Pollutant Loads by Land Cover* was created to determine pollutant loads relative to land cover for total phosphorus, total nitrogen and total suspended solids, as referenced by the *NJ BMP Manual*, July 2023.
 - b. *Table E2: Build-Out Calculations* was created to determine outputs of total developable area and maximum build-out impervious per zone for each associated HUC-14 drainage area. Input values consist of total zone area within HUC-14, percent existing impervious, wetlands/water area, open space lot area and percent allowable impervious.
 - c. *Table E3: Nonpoint Source Loads at Build-Out* were created to determine pollutant loads in lbs/yr for each zone and HUC-14 for total phosphorous, total nitrogen and total suspended solids assuming full build-out potential.
 - 7) Total areas for zones relative to HUC-14 drainage areas were determined via GIS geoprocessing; said values were input into *Table E2*.
 - 8) Land covers per zone were then classified in accordance with *Table E1* utilizing land cover descriptions and practical engineering judgment; land cover classifications per zones were then input into *Table E2*.
 - 9) Impervious coverage data, a field extracted from the land use data file, was analyzed and totaled for each zone within its relative HUC-14 via GIS. The calculated data was then input into *Table E2*.
 - 10) A visual examination of the land use coverage data was conducted and, if necessary, land use coverage data was revised accordingly.
 - 11) Wetlands and water land use data layers, fields extracted from the land use data file, were analyzed and summed for each zone within its relative HUC-14 via GIS geoprocessing. The calculated data was then inputted into *Table E2*.
 - 12) Open space areas relative to HUC-14 drainage areas were analyzed via GIS. The calculated data was then input into *Table E2*.
 - 13) Allowable impervious coverage values were inputted into *Table E2*; information based upon Township standards.
 - 14) *Table E2* then automatically computed the developable area, build-out impervious area and all summations via inputted excel formulas.
-



- 15) *Table E3* then automatically computed all pollutant loads and summations via inputted excel formulas and references.

A detailed land use build-out analysis for the Township was conducted as outlined above. See *Appendix E* for all associated tables; *Table E1: Pollutant Loads by Land Cover*, *Table E2: Build-out Calculations* and *Table E3: Nonpoint Source Loads at Build-Out*.

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. The Township Engineer, Board, and professionals will ensure all BMP options are explored prior to granting a variance or exemption. Presented is a hierarchy of options, which may be eliminated, updated, or revised by the Township when deemed necessary. The Township Engineer shall be consulted to determine availability of mitigation projects. All mitigation projects are subject to approval of the Township Engineer and Governing Body.

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 not equivalent to the impacts for which the variance or exemption is sought, but that addresses the same issue. 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 NJDEP Stormwater BMP Manual.

The Township Engineer must be contacted to obtain a list of potential mitigation projects, if any, to compensate for the deficit from the performance standards resulting from the proposed project. 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.



Where a list of potential mitigation projects has not been identified, the following process is provided through which an applicant has the responsibility to identify an appropriate mitigation project and a location to implement the mitigation project to offset the deficit that would be created by the grant of a waiver/exemption or to address a stormwater based impairment. Selection of an appropriate mitigation project for a requested waiver/exemption must adhere to the following requirements:

1. The project must be within the same area that would contribute to the receptor impacted by the project. If there are no specific sensitive receptors that would be impacted as the result of the grant of the waiver/exemption, then the location of the mitigation project can be located anywhere within the municipality, and should be selected to provide the most benefit relative to an existing stormwater problem in the same category (quality, quantity, or recharge).
2. Legal authorization must be obtained by the applicant to construct the project at the location selected. This includes the maintenance and any access needs for the project in the future.
3. The project should be close to the location of the original project, and if possible, be located upstream at a similar distance from the identified sensitive receptor. This distance should not be based on actual location, but on a similar hydraulic distance to the sensitive receptor. For example, if the project for which a waiver is obtained discharges to a tributary, but the closest location discharges to the main branch, it may be more beneficial to identify a location discharging to the same tributary.
4. For ease of administration, if sensitive receptors are addressed, it is preferable to have one location that addresses any and all of the performance standards waived, rather than one location for each performance standard.
5. It must be demonstrated that implementation of the mitigation project will result in no adverse impacts to other properties.
6. Mitigation projects that address stormwater runoff quantity can provide storage for proposed increases in runoff volume, as opposed to a direct peak flow reduction.

Mitigation projects are subject to the approval of the Township Engineer and Governing Body. Each project is approved on 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, Mosquito Commission, U.S. Army Corps of Engineers, N.J. Department of Environmental Protection, 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 Municipal Stormwater



Consulting & Municipal
ENGINEERS

Municipal Stormwater Management Plan
Master Plan Element

Township of Plainsboro
Middlesex County, New Jersey

Management Plan, or towards the development of a Regional Stormwater Management Plan. Funding quantities are subject to the approval of the Township Engineer and Governing Body and 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.

References

Bureau of Freshwater and Biological Monitoring. Ambient Biomonitoring Network Raritan Water Region Watershed Management Areas 7, 8, 9, and 10. State of New Jersey: NJDEP, December 2012.

Water Assessment Team. 2018/2020 New Jersey Integrated Water Quality Assessment Report Clean Water Act 305(b) and 303(d) Report. State of New Jersey: NJDEP, 2018/2020.

New Jersey Dept. of Environmental Protection. Total Maximum Daily Load (TMDL) Information for Plainsboro Township, Middlesex County, New Jersey. State of New Jersey: NJDEP. <https://nj.gov/dep/tmdl/1218.html>

Township of Plainsboro: Master Plan, Township of Plainsboro, Middlesex County, New Jersey. Adopted January 20, 2009, and last revised October 17, 2022.

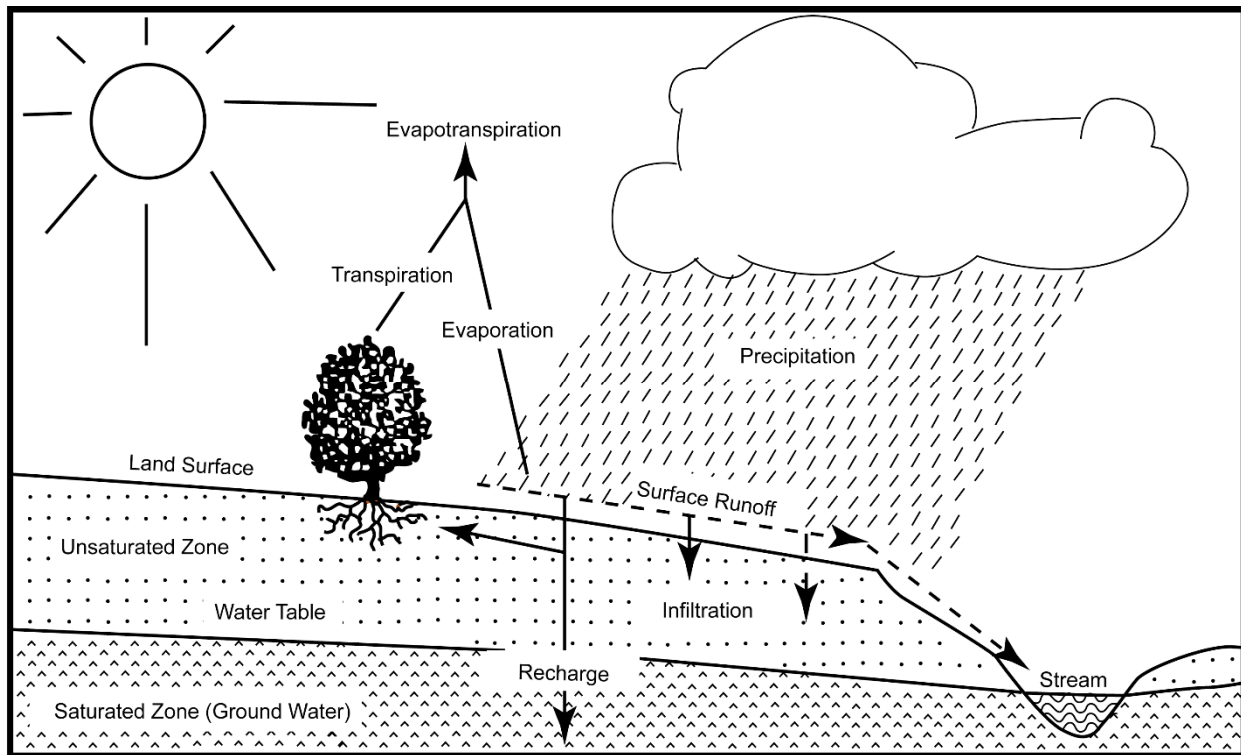
APPENDICES

APPENDIX A

Appendix of Figures

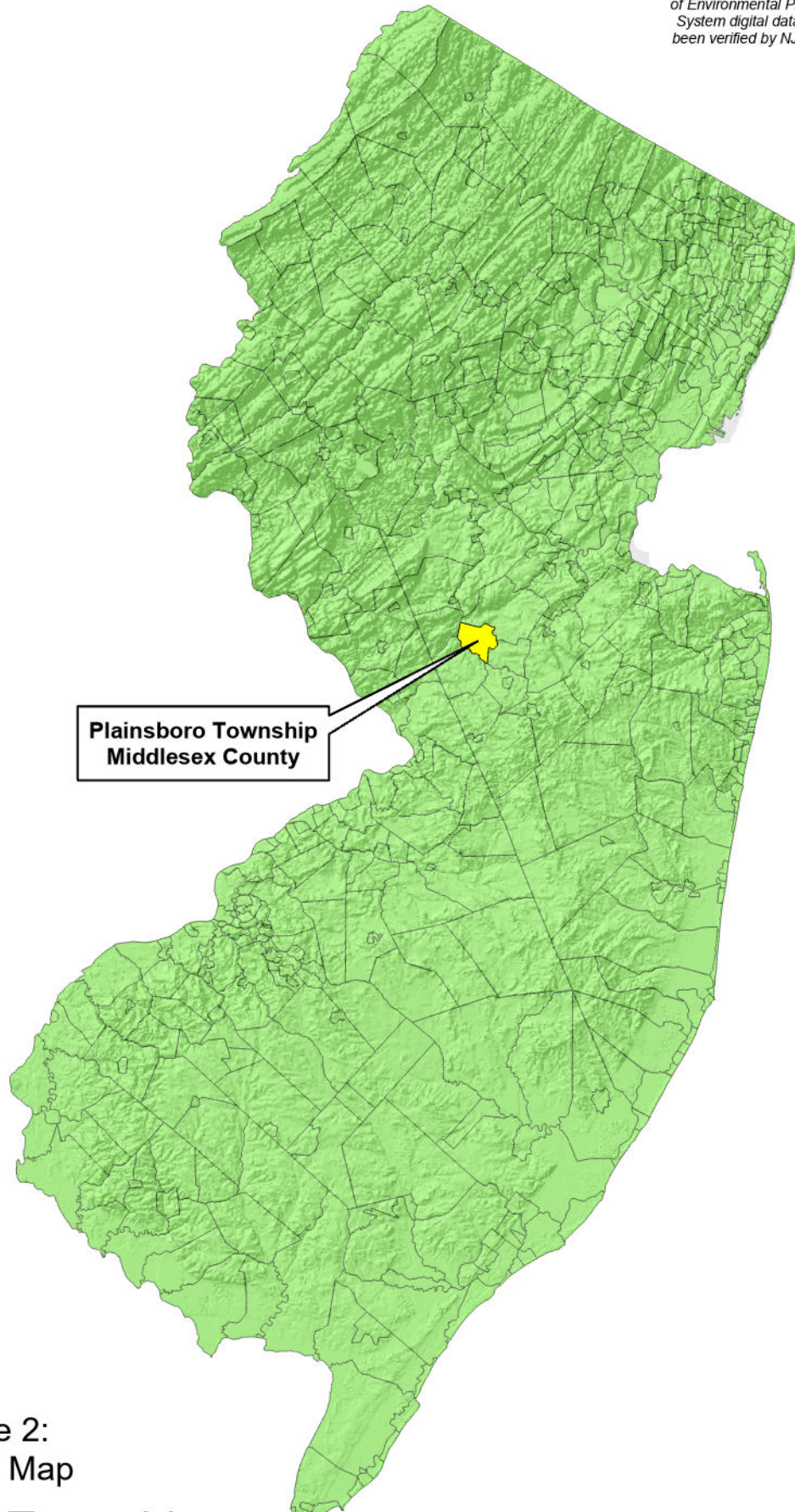
Figures 1 thru 14

Figure 1: Groundwater Recharge in the Hydrologic Cycle



Source: New Jersey Geological Survey Report GSR-32.

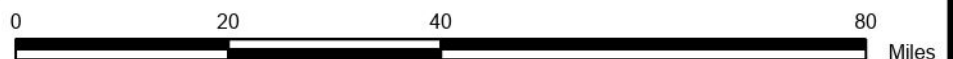
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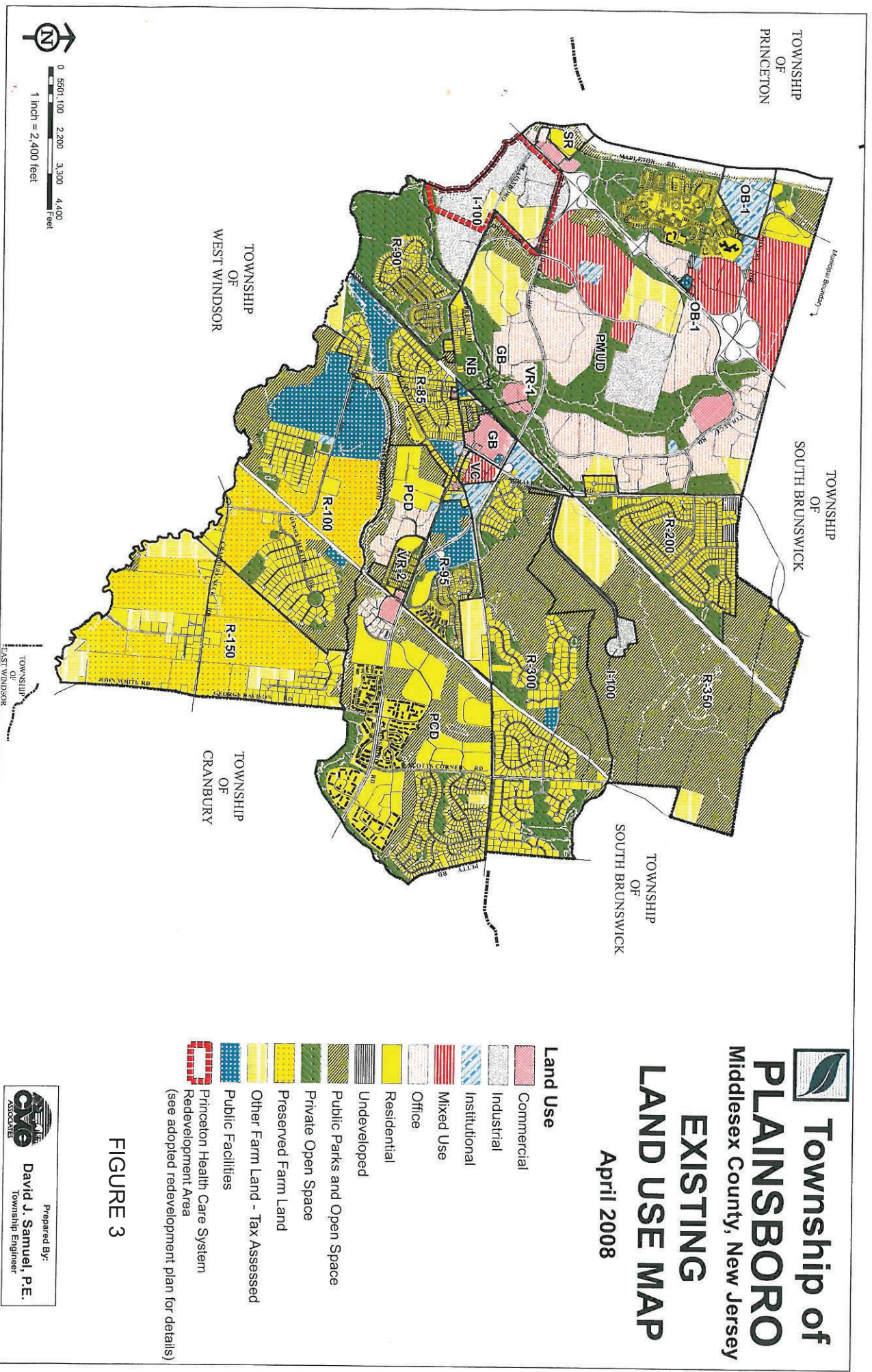


**Plainsboro Township
Middlesex County**

Figure 2:
Vicinity Map

**Plainsboro Township,
Middlesex County**







Township of PLAINSBORO

Middlesex County, New Jersey

ZONING MAP

- R-85** - Medium Density Residential
- R-90** - Planned Medium Density Residential
- R-95** - Planned Medium Density Residential
- R-100** - Rural Residential
- R-150** - Rural Residential
- R-200** - Low Density Residential
- R-300** - Low Density Residential
- R-350** - Low Density Residential
- VR-1** - Village Residential I
- VR-2** - Village Residential II
- VC** - Village Center
- SR** - Service Residential
- NB** - Neighborhood Business
- GB** - General Business
- OB-1** - Office Business
- ECA** - Educational and Cultural Arts
- I-100** - Limited Industrial
- PCD** - Planned Unit Development
- PMUD** - Planned Unit Development
- CEMETERY ZONE**



Zoning District Boundary

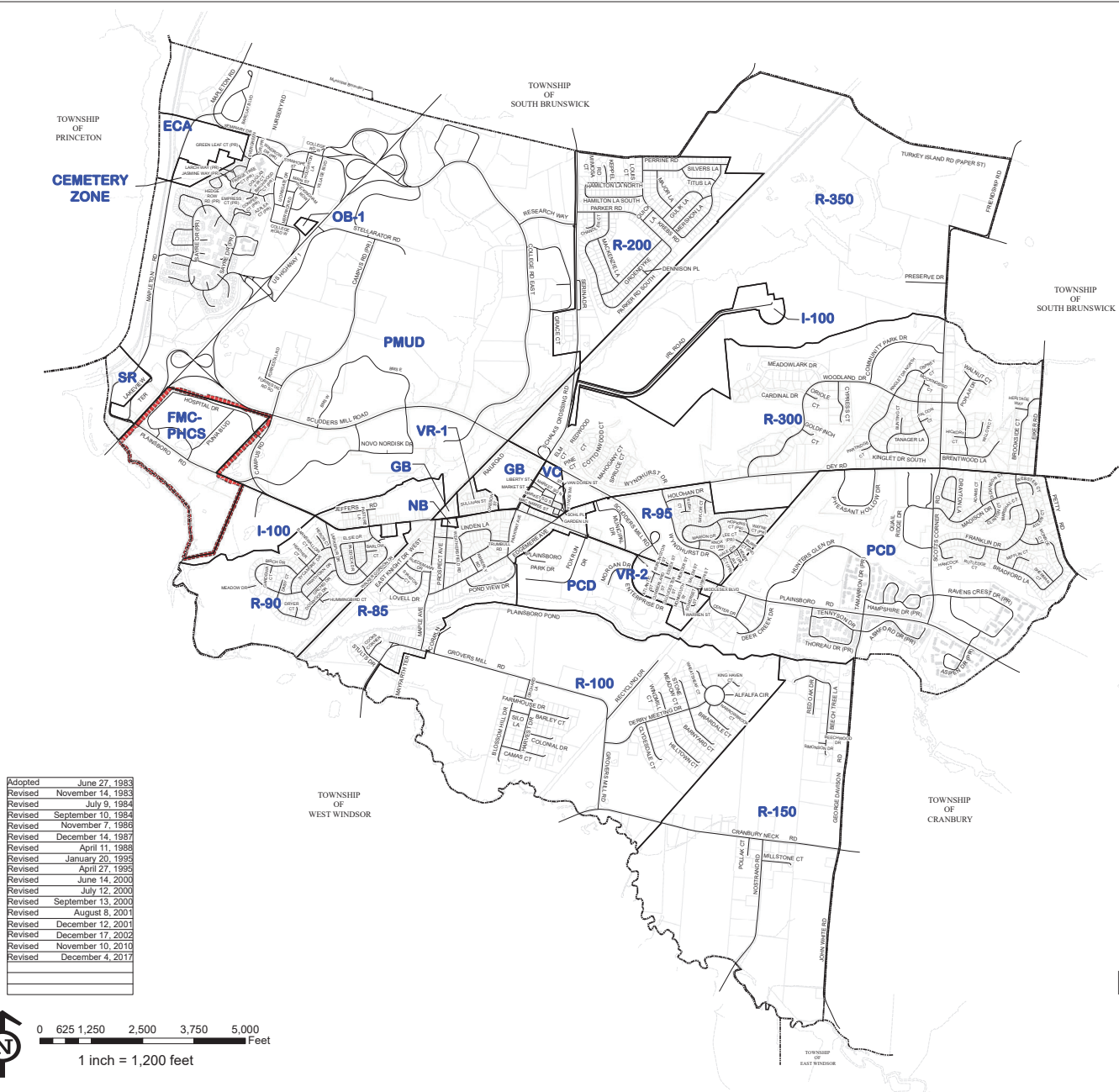


FMC Corporation / Princeton Healthcare
System Redevelopment Area
(see adopted redevelopment plan for details)

Figure 4



Prepared By:
David J. Samuel, P.E.
Township Engineer



Adopted	June 27, 1983
Revised	November 14, 1983
Revised	July 9, 1984
Revised	September 10, 1984
Revised	November 7, 1986
Revised	December 14, 1987
Revised	April 11, 1988
Revised	January 20, 1995
Revised	April 27, 1995
Revised	June 14, 2000
Revised	July 12, 2000
Revised	September 13, 2000
Revised	August 8, 2001
Revised	December 12, 2001
Revised	December 17, 2002
Revised	November 10, 2010
Revised	December 4, 2017

LEGEND

- Waterbody
- Stream

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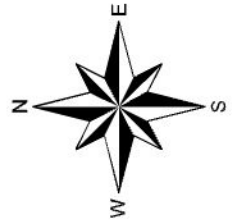


Figure 5: Township Waterways

Plainsboro Township
Middlesex County, NJ

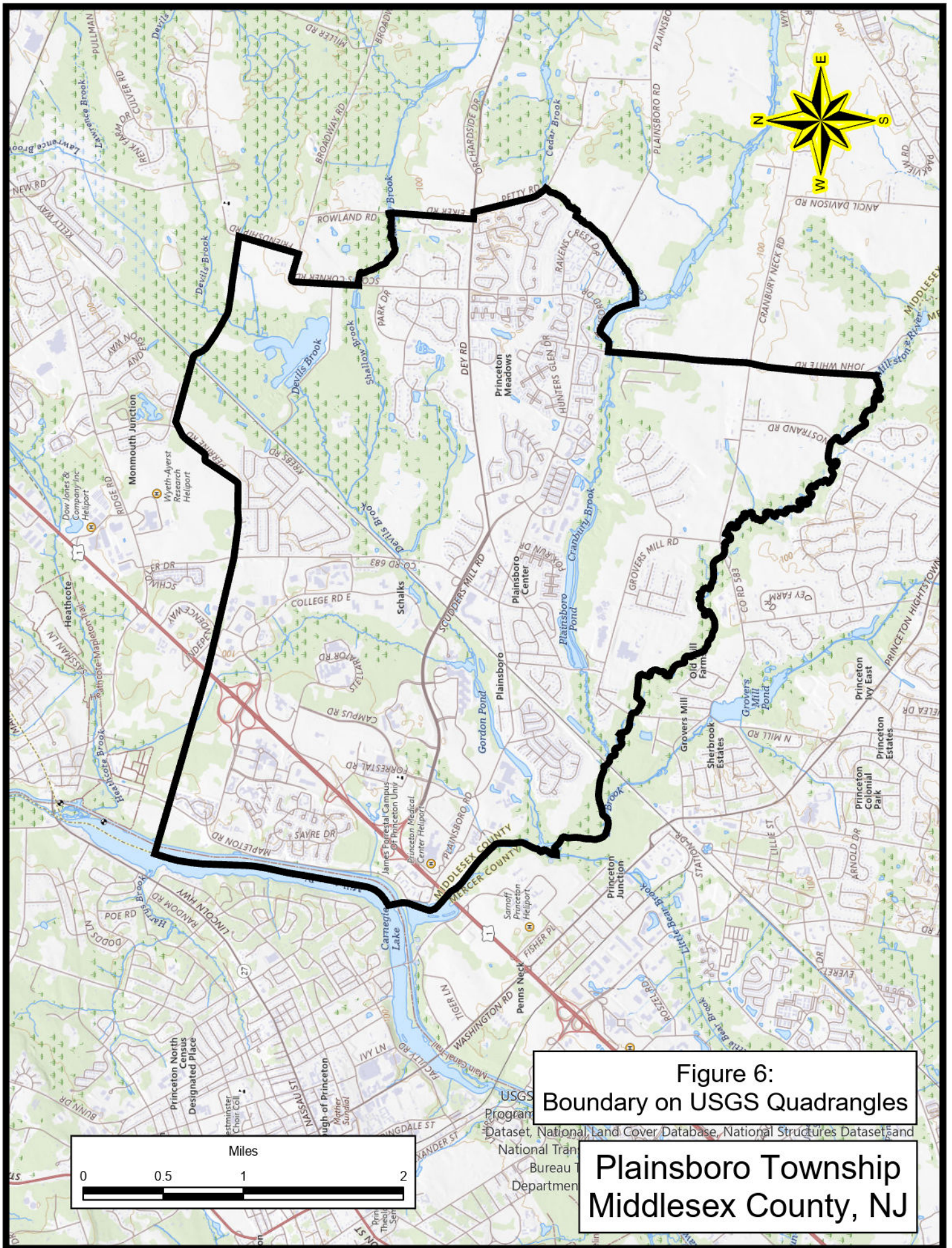
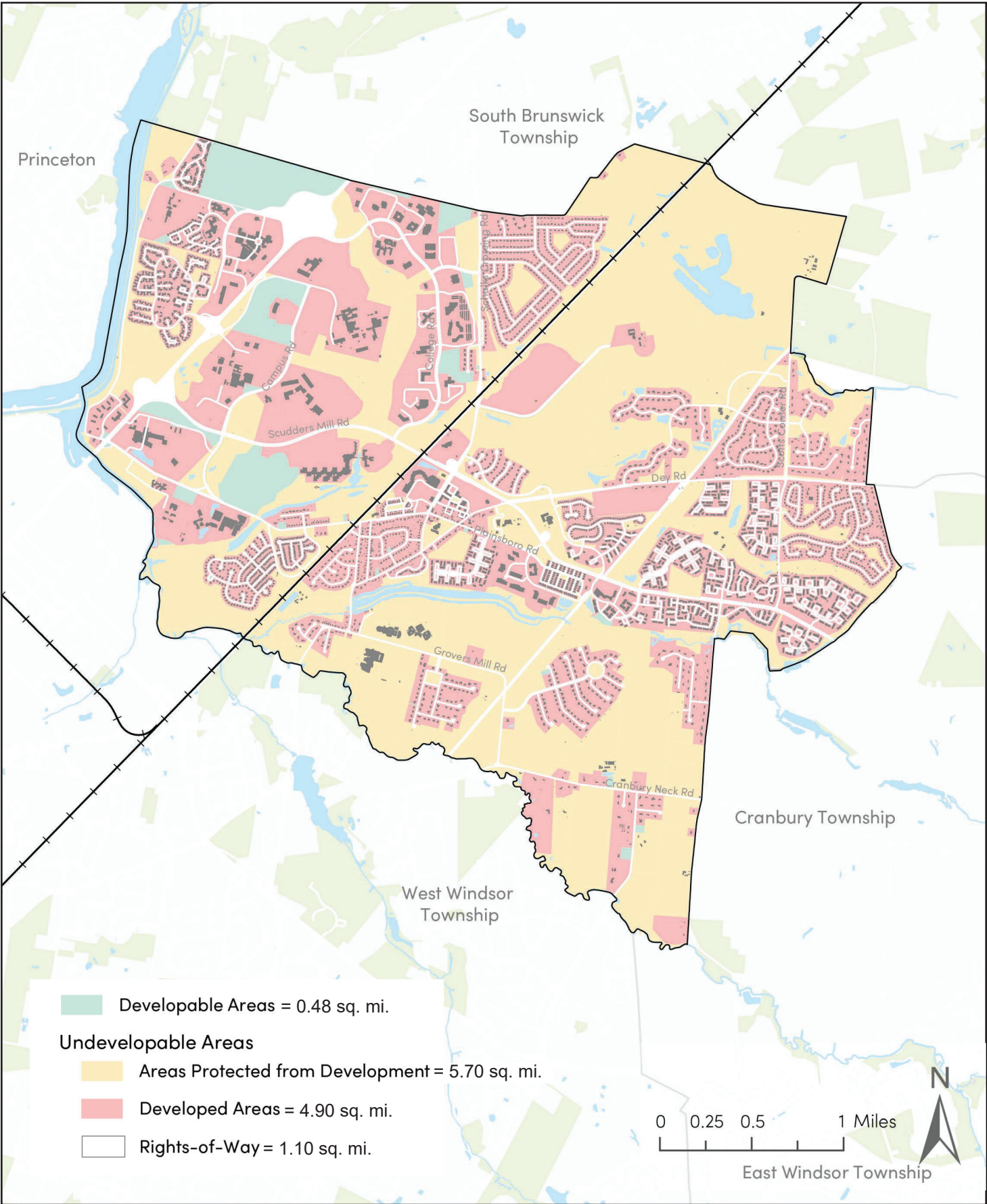


Figure 6:
Boundary on USGS Quadrangles

USGS
Program
Dataset, National Land Cover Database, National Structures Dataset, and
National Tran
Bureau
Department

**Plainsboro Township
Middlesex County, NJ**

Figure 7: Developable and Un-Developable Land



Source: Taken from Master Plan prepared by Pennoni Associates, Inc. adopted January 20, 2009 and last revised October 17, 2022.

HUC14

CRANBURY

EAST
WINDSOR

SOUTH
BRUNSWICK

WEST
WINDSOR

PRINCETON

Miles

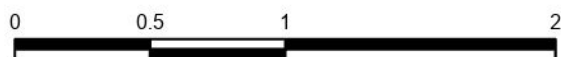


Figure 8:
Hydrologic Unit Code 14
(HUC)

Plainsboro Township
Middlesex County, NJ

This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, this secondary product has not been verified by NJDEP and is not state authorized.

LEGEND

- AMNET BIOLOGICAL MONITORING SITE
- INTEGRATED WATER QUALITY MONITORING STATION

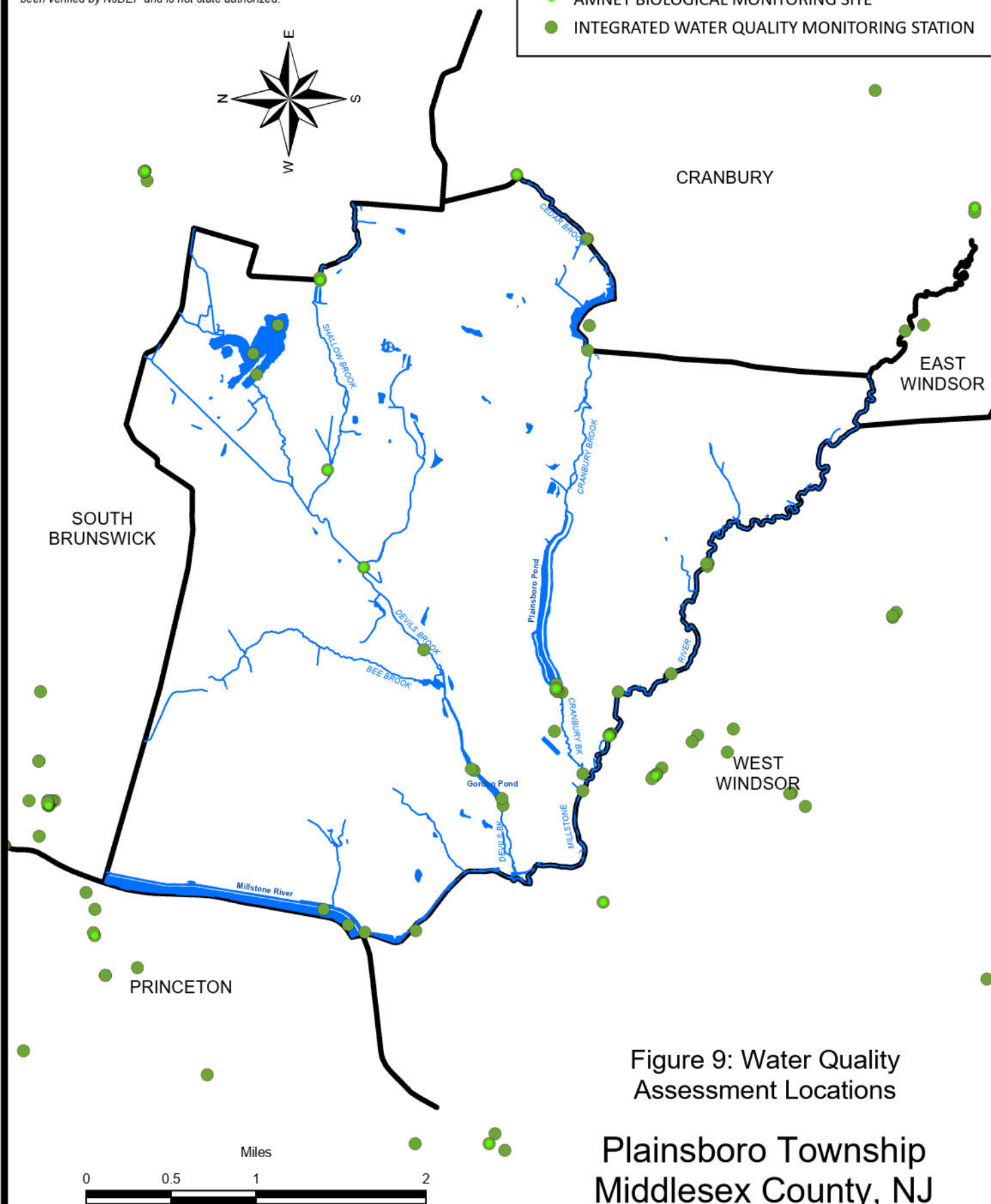
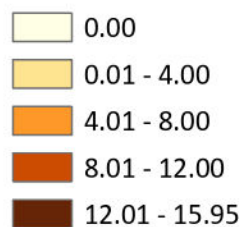


Figure 9: Water Quality Assessment Locations

Plainsboro Township
Middlesex County, NJ

Groundwater Recharge (inches per year)

LEGEND



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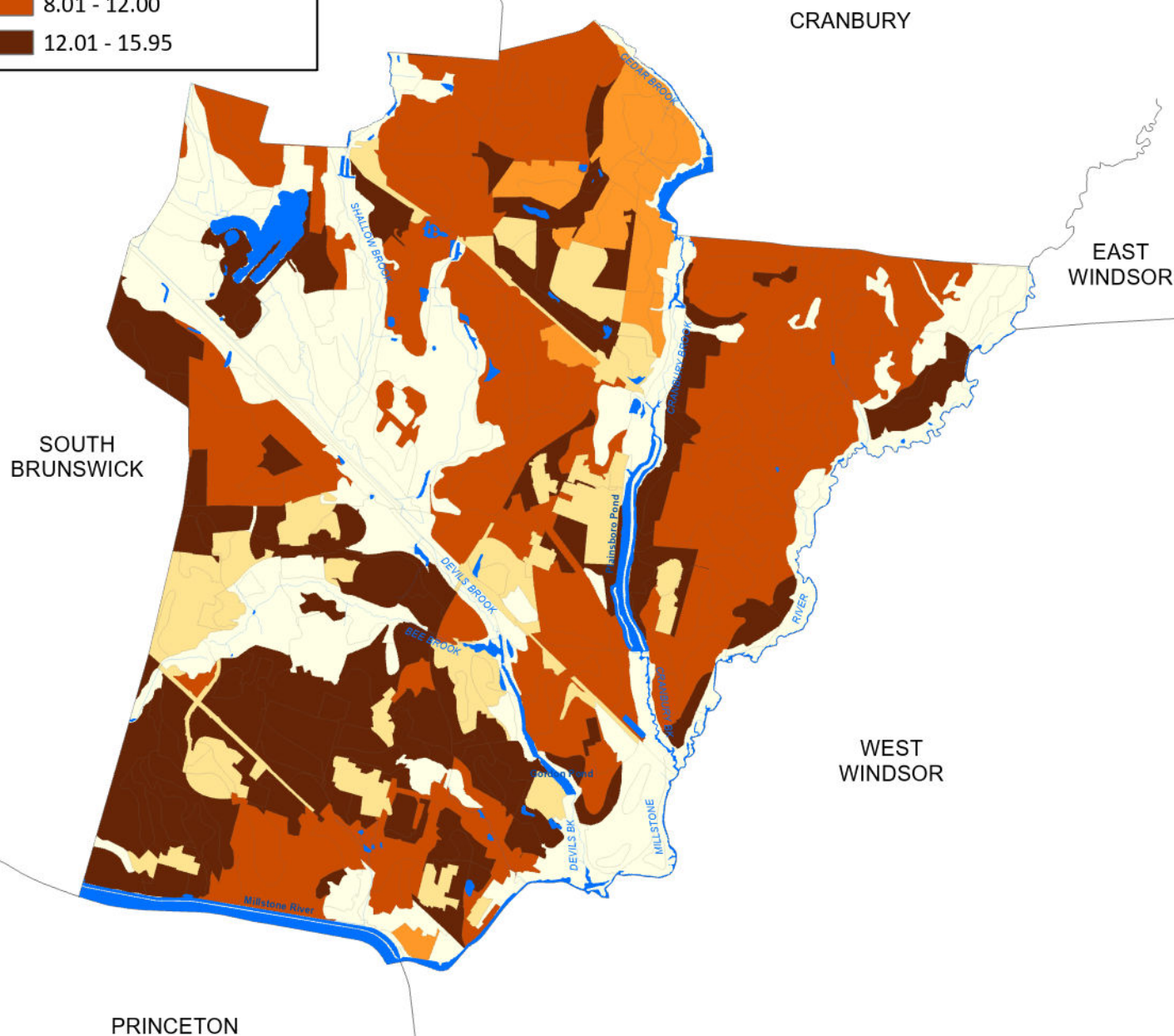
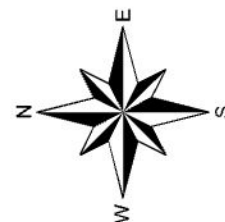
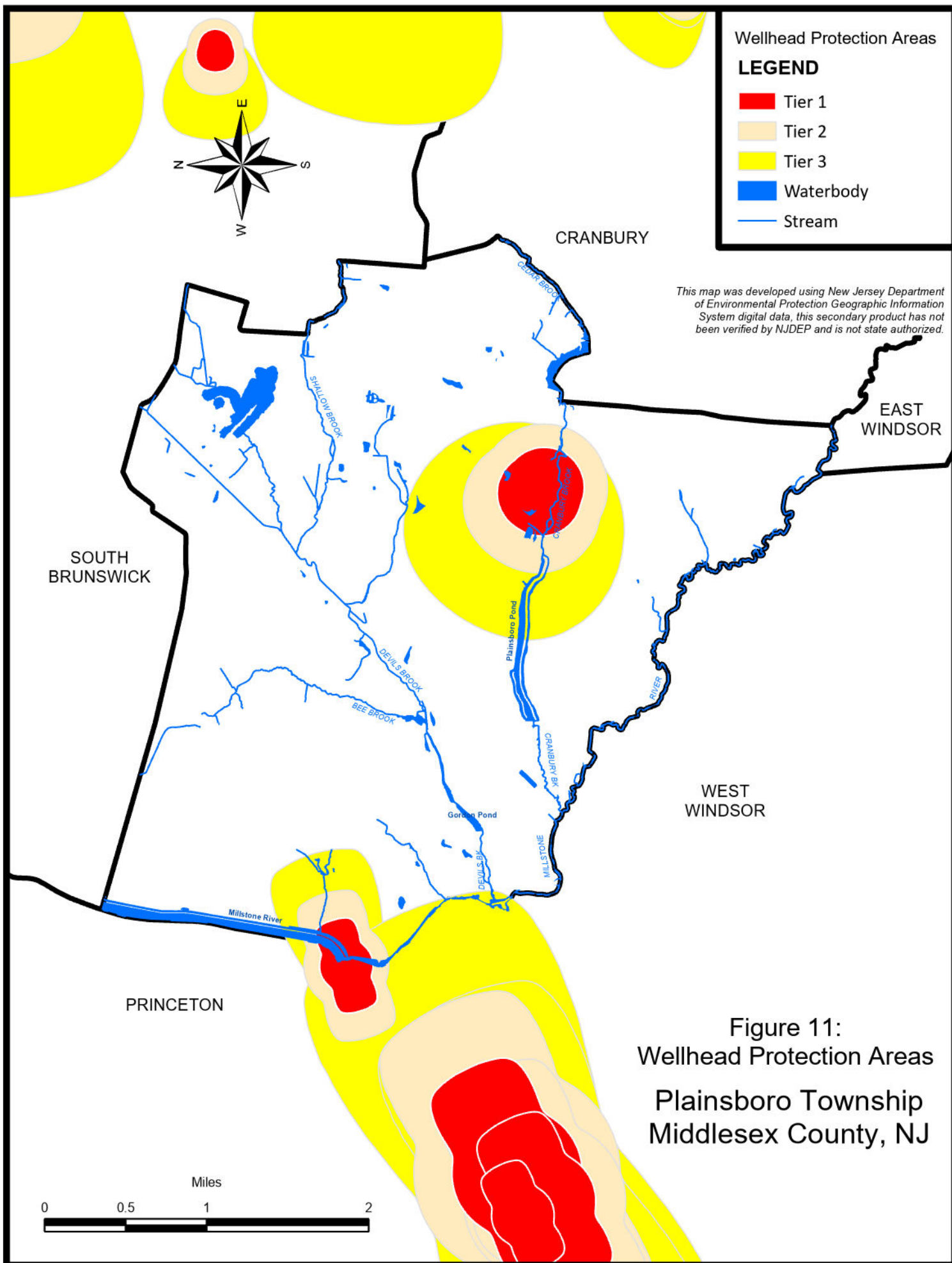


Figure 10:
Groundwater Recharge Areas
Plainsboro Township
Middlesex County, NJ



LEGEND

- Waterbody
- Stream
- Wetlands

This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, this secondary product has not been verified by NJDEP and is not state authorized.

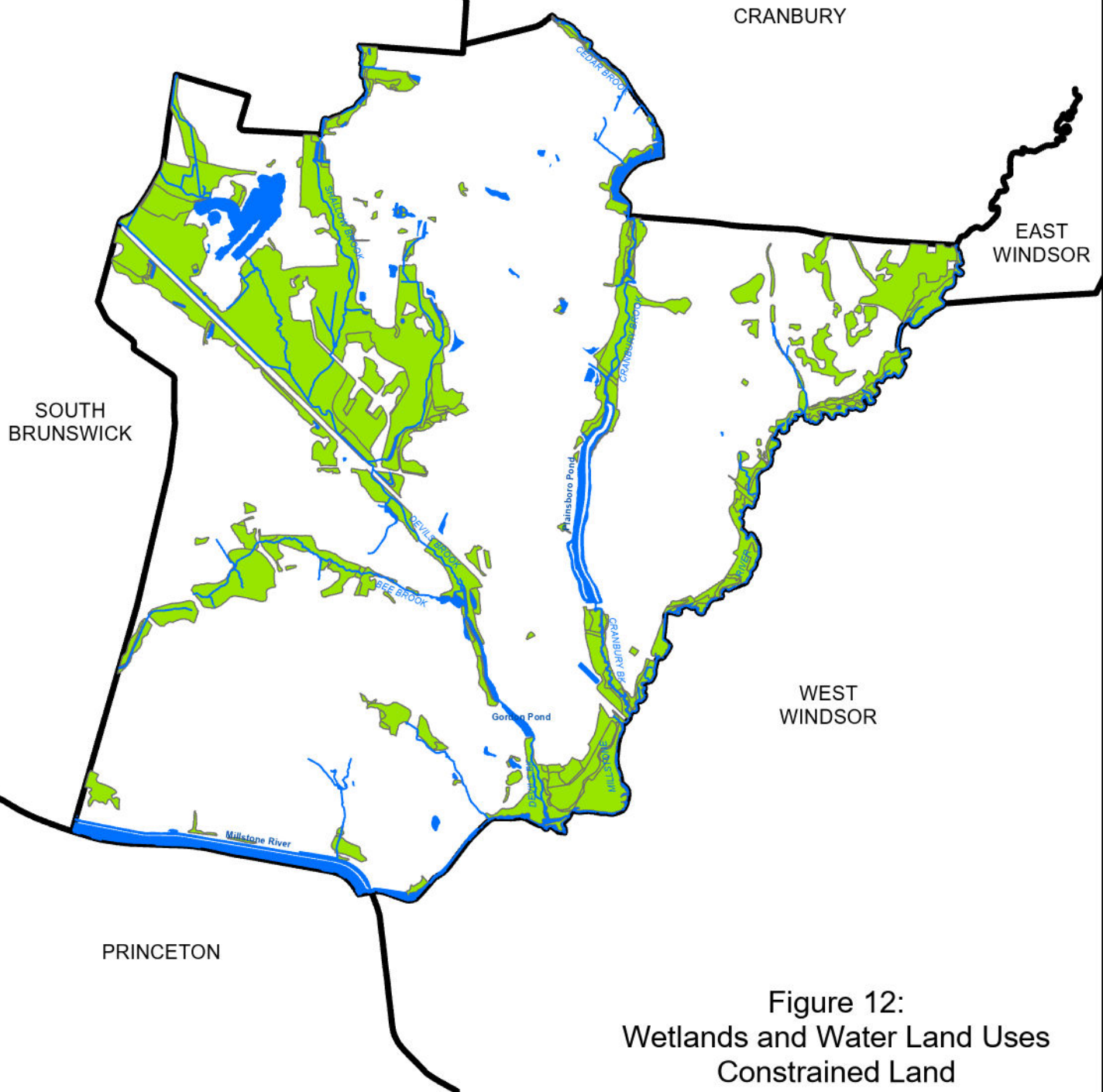
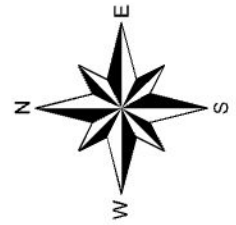
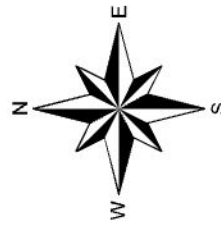


Figure 12:
Wetlands and Water Land Uses
Constrained Land

Plainsboro Township
Middlesex County, NJ



This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, this secondary product has not been verified by NJDEP and is not state authorized. The SSURGO soils layer was developed by the Natural Resources Conservation Service (NRCS), of the US Department of Agriculture, as part of the National Cooperative Soil Survey. The data are from the Soil Survey Geographic (SSURGO) database developed and maintained by the NRCS. This data set consists of georeferenced digital map data and computerized attribute data. All soil delineations and coding were performed by NRCS soil scientists. The NJDEP was responsible only for converting the original data to the ARCVIEW shapefiles in New Jersey State Plane Feet, NAD83, that are presented here. The New Jersey NRCS webpage (<http://www.nj.nrcs.usda.gov>) should be referenced for questions concerning the data.



LEGEND

Waterbody — Stream



Figure 13:
Soil Survey Geographic (SSURGO) Database

Plainsboro Township
Middlesex County, NJ

LEGEND

 Waterbody

 Stream

Flood Zone

 A

 AE

 X

This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, this secondary product has not been verified by NJDEP and is not state authorized.

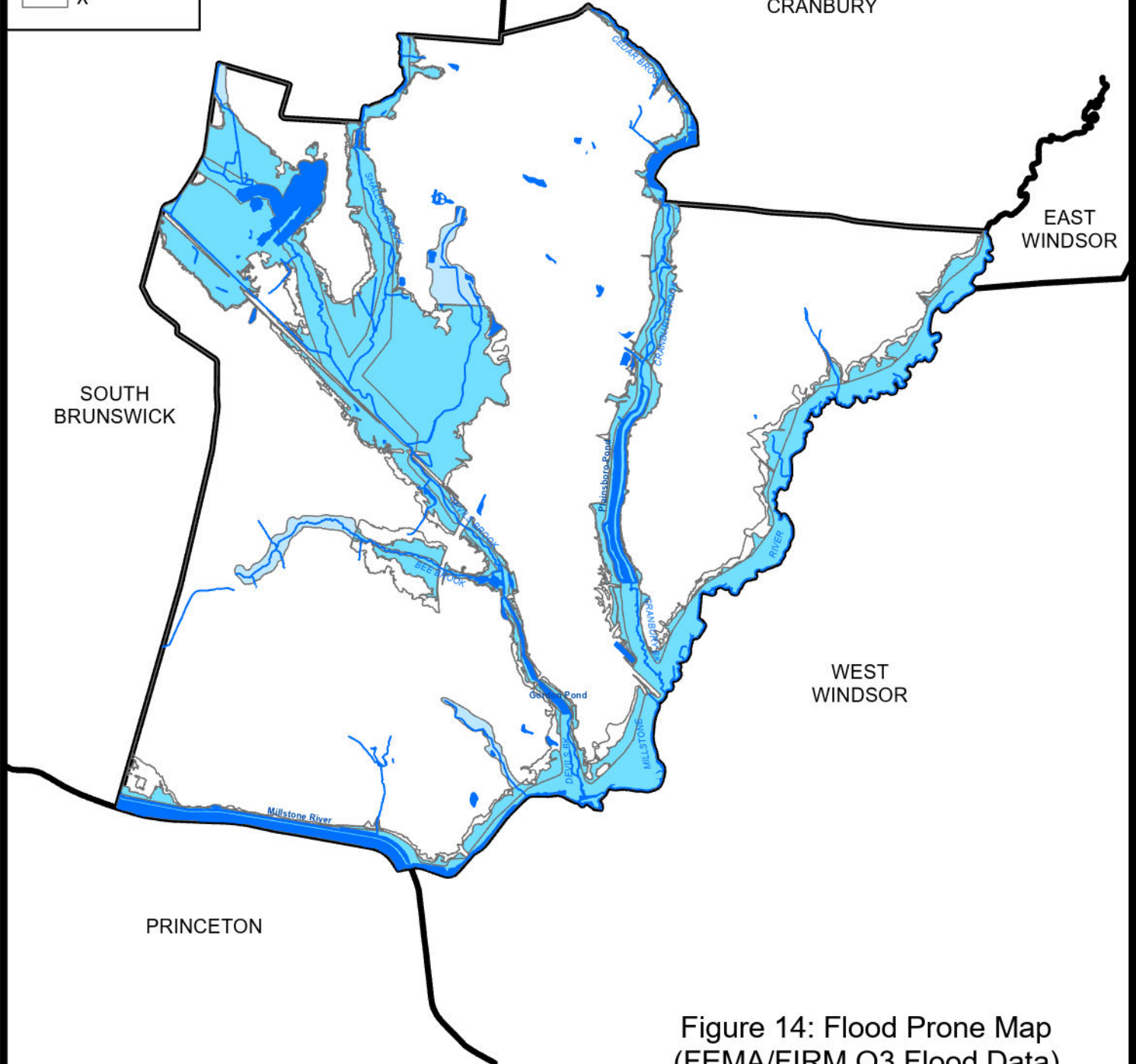
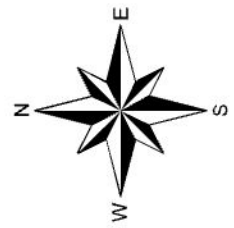


Figure 14: Flood Prone Map
(FEMA/FIRM Q3 Flood Data)

Plainsboro Township
Middlesex County, NJ

APPENDIX B

2012 AMBIENT BIOMONITORING NETWORK DATA: Raritan Region

Benthic Macroinvertebrate Report Data

AMNET Site # AN0382

Stream Name: Millstone River

Location: Grovers Mill Rd; West Windsor Twp; Mercer & Middlesex County

Collection Date: 9/29/2009 USGS Topo Map: Hightstown

Genus	Tolerance Value	Amount
Gammarus	6	40
Planorbidae	6	9
Dubiraphia	6	8
Amnicola	4.8	5
Corbicula	4	4
Ischnura	9	4
Physella	9.1	4
* Pseudocloeon	4	4
Argia	6	3
Paraponyx	5	3
* Acentrella	4	2
Calopteryx	6	2
Pisidium	6.8	2
Tribelos	5	2
Labrundinia	7	1
Libellulidae	9	1
Limnodrilus	10	1
Macronychus	2	1
* Nectopsyche	3	1
Paratanytarsus	6	1
Prostoma	7	1
Tubifex	10	1

* (EPT organism) Taxa Richness: 22 Population: 100

%Dominance / Dominant Taxon(s): 40.0% Gammarus

Hilsenhoff Biotic Index (HBI): 6.01

%Clingers: 12.00%

* E+P+T: 3 (2) Ephemeroptera, () Plecoptera, (1) Trichoptera

%Ephemeroptera: 6.00%

CPMI Rating: 8 Fair

Habitat Analysis: 167 Optimal USEPA Protocol

Observations: Water temp: 17.23 C; Cond: 190 umhos; DO: 5.97 mg/L; pH: 6.59 SU

Clarity: turbid; Flow Rate: moderate; Width/Depth: 90' / > 3'; Substrate: gravel, sand, undercut banks

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

Stream Gradient: Low Gradient Stream; Land Uses: forested

Other: turtle, macrophytes; flooded banks, Gage: 3.70

AMNET Site # AN0386

Stream Name: Cranbury Bk

Location: Maple Ave; Plainsboro Twp; Middlesex County

Collection Date: 9/29/2009 USGS Topo Map: Hightstown

<i>Genus</i>	<i>Tolerance Value</i>	<i>Amount</i>
Glyptotendipes	10	27
Rheotanytarsus	6	20
Cura	4	11
Nais	8	9
Prostoma	7	6
Gammarus	6	4
Nematoda	6	4
Simulium	6	4
Amnicola	4.8	3
Musculium	5	3
Tubifex	10	2
* Cheumatopsyche	5	1
Dicrotendipes	8	1
Helisoma	7	1
Phaenopsectra	7	1
Pristina	8	1
Sphaerium	8	1
Stenelmis	5	1

* (EPT organism) *Taxa Richness:* 18 *Population:* 100

%Dominance / Dominant Taxon(s): 27.0% Glyptotendipes

Hilsenhoff Biotic Index (HBI): 7.17

%Clingers: 27.00%

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

%Ephemeroptera: 0.00%

CPMI Rating: 8 Fair

Habitat Analysis: 153 Suboptimal USEPA Protocol

Observations: Water temp: 17.69 C; Cond: 181 umhos; DO: 7.30 mg/L; pH: 6.48 SU

Clarity: turbid; Flow Rate: moderate; Width/Depth: 23' / 2-3'; Substrate: gravel

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

Stream Gradient: Low Gradient Stream; Land Uses: suburban, park

Downstream of Impoundment: Plainsboro Pond

Other: macrophytes; fishermen, flooded banks, gabion along LB

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
Hyaella	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% Hyaella

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 # 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

APPENDIX C

2018/2020 Integrated Water Quality Monitoring & Assessment Report

Integrated List Report Data

Sublist 1-5
**New Jersey's
Integrated List of Waterbodies**
**June 2004
Revised: January 2025**

Sublist	Wtrshd Region	WMA	Station Name/Waterbody	Site ID	Parameters	Data Source	Sublist Change Since 2004
1	Raritan	10	Millstone River off Rt 1 in Plainsboro	10-MIL-7	Cadmium, Chromium, Copper, Nickel, Selenium, Zinc	NJDEP Metal Recon	No
3	Raritan	10	Shallow Brook at N of Scotts Cor in Plainsboro	AN0388	Benthic Macroinvertebrates	NJDEP AMNET	No
3	Raritan	10	Carnegie Lake-10	Carnegie Lake	Phosphorus	NJDEP Clean Lakes, NJDEP Fish Tissue Monitoring	No
3	Raritan	10	Heathcote Brook at Stouts Ln in South Brunswick	AN0395	Benthic Macroinvertebrates	NJDEP AMNET	No
5	Raritan	10	Carnegie Lake-10	Carnegie Lake	Fish-Mercury	NJDEP Clean Lakes, NJDEP Fish Tissue Monitoring	No
5	Raritan	10	Cranbury Brook at Edgemere Ave in Plainsboro	AN0386	Benthic Macroinvertebrates	NJDEP AMNET	No
5	Raritan	10	Devils Brook at Schalk's Rd in Plainsboro	AN0389	Benthic Macroinvertebrates	NJDEP AMNET	No
5	Raritan	10	Millstone River at Grovers Mills Rd in Plainsboro	AN0382	Benthic Macroinvertebrates	NJDEP AMNET	No
5	Raritan	10	Bear Brook at Stobbe Ln in West Windsor	AN0384	Unknown Toxicity	NJDEP AMNET	No
5	Raritan	10	Millstone River off Rte 1 in Plainsboro	10-MIL-7	Arsenic	NJDEP Metal Recon	No

APPENDIX D

Total Maximum Daily Loads

TMDL Reports



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Listed Water Information

CYCLE : 2002

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

Cycle: 2002 **State:** NJ **List ID:** NJ-02030105100060-AN0382

Waterbody Name: MILLSTONE RIVER

State Basin Name: 10 RARITAN

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

Comments:

LOCATION PREVIOUSLY GIVEN AS GROVERS MILLS RD, GROVERS MILLS IN 1998

State List IDs:

Cycle	State List ID
2002	AN0382

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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Listed Water Information

CYCLE : 2002

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

Cycle: 2002 **State:** NJ **List ID:** NJ-LM3848-A

Waterbody Name: CARNEGIE LAKE

State Basin Name: 10 RARITAN

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

State List IDs:

Cycle	State List ID
2002	CARNEGIE LAKE

State Impairments:

State Impairment	Parent Impairment	Priority	Rank	Targeted Flag	Anticipated TMDL Submittal
MERCURY IN FISH TISSUE	BIOLOGICAL CRITERIA	HIGH		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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Detailed TMDL Report

TMDL Document Information

TMDL ID: 9951

TMDL Name: MILLSTONE RIVER NEAR
GROVERS MILLS

TMDL Status: APPROVED/ESTABLISHED

EPA Lead: No

Lead State: NJ

Actual Establishment Date: 09/23/2003

Comments: UNITS ARE PERCENT REDUCTION OF THE AMBIENT CONCENTRATION GEOMETRIC MEAN;
PERCENTAGE OF THE TARGET CONCENTRATION OF 68 CFU/100 ML.

TMDL Documents

Click on the underlined Document Type to retrieve the actual document in PDF format.	
Document Type	Upload Date
TMDL Document	05/18/2004

TMDL Pollutants

Pollutant: FECAL COLIFORM

TMDL Type: NONPOINT SOURCE

Total Waste Load
Allocation:

Load Allocation: 89

Margin Of Safety: 27

Implicit Margin Of Safety: N

Units for Total
Waste Load
Allocation,
Load Allocation,
and Margin of
Safety: PERCENTTMDL End Point: FECAL COLIFORM LEVELS SHALL NOT EXCEED A GEOMETRIC AVERAGE OF 200 CFU/100
ML NOR SHOULD MORE THAN 10 PERCENT OF THE TOTAL SAMPLES TAKEN DURING
ANY 30-DAY PERIOD EXCEED 400 CFU/100 ML IN FW2 WATERS

Listed Water Impairments for FECAL COLIFORM

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
NJ-02030105-031- 100-01400650		MILLSTONE RIVER	MAP 303(d)	1998	FECAL COLIFORM

TMDL Methods

Method Name	Method Description
LOAD CURVE	LOAD CURVE

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



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Listed Water Information

CYCLE : 2002

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

Cycle: 2002 **State:** NJ **List ID:** NJ-02030105-031

Waterbody Name: MILLSTONE RIVER

State Basin Name: 10 RARITAN, 10 RARITAN

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

State List IDs:

Cycle	State List ID
2002	01400540, 10-MIL-1 NJ-02030105-031

State Impairments:

State Impairment	Parent Impairment	Priority	Rank	Targeted Flag	Anticipated TMDL Submittal
ARSENIC	METALS	HIGH		N	DEC-31-2003
LEAD	METALS	HIGH		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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Listed Water Information

CYCLE : 2002

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

Cycle: 2002 **State:** NJ **List ID:** NJ-02030105100090-AN0386

Waterbody Name: CRANBURY BROOK

State Basin Name: 01 NORTHWEST

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

State List IDs:

Cycle	State List ID
2002	AN0386

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.

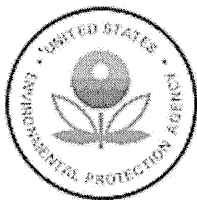
Watershed Information:

Watershed Name	Watershed States
RARITAN	NEW JERSEY

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Listed Water Information

CYCLE : 2002

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

Cycle: 2002 **State:** NJ **List ID:** NJ-02030105100110-AN0389

Waterbody Name:

DEVILS BROOK

State Basin Name:

09 RARITAN

Listed Water Map Link:

[MAP 303\(d\)](#)

State List IDs:

Cycle	State List ID
2002	AN0389

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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Listed Water Information

CYCLE : 2002

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

Cycle: 2002 **State:** NJ **List ID:** NJ-02030105-029-090-01401000-B

Waterbody Name: STONY BROOK

State Basin Name: 10 RARITAN

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

Comments:

(STATE_LIST_ID: NJ-02030105-029-090-01401000-B 01401000, 10-STO-1, 10-STO-4)

State List IDs:

Cycle	State List ID
2002	SEE INFO_COMMENT

State Impairments:

State Impairment	Parent Impairment	Priority	Rank	Targeted Flag	Anticipated TMDL Submittal
ARSENIC	METALS	HIGH		N	
COPPER	METALS	HIGH		N	
LEAD	METALS	HIGH		N	

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.

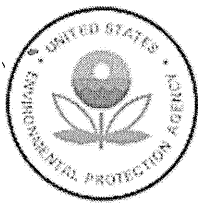
Watershed Information:

Watershed Name	Watershed States
RARITAN	NEW JERSEY

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Listed Water Information

CYCLE : 2002

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

Cycle: 2002 **State:** NJ **List ID:** NJ-02030105090030-AN0391

Waterbody Name: STONY BROOK

State Basin Name: 10 RARITAN

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

State List IDs:

Cycle	State List ID
2002	AN0391

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.

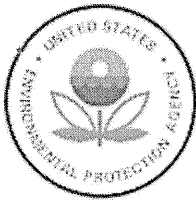
Watershed Information:

Watershed Name	Watershed States
RARITAN	NEW JERSEY

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Listed Water Information

CYCLE : 2002

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

Cycle: 2002 **State:** NJ **List ID:** NJ-02030105090060-AN0393
Waterbody Name: STONY BROOK
State Basin Name: 10 RARITAN
Listed Water Map Link: [MAP 303\(d\)](#)

State List IDs:

Cycle	State List ID
2002	AN0393

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

APPENDIX E

Land Use Build-Out Analysis

Table E1: Pollutant Loads by Land Cover

Table E2: Build-Out Calculations

Table E3: Nonpoint Source Loads at Build-Out

Table E1: Pollutant Loads by Land Cover

May 2006
Revised: January 2025

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

Source: New Jersey Best Management Practices (BMP) Manual, dated February 2004, last revised March 2021

Table E2: Build-Out Calculations

May 2006
Revised: January 2025

HUC14 and Zone	Land Cover	Total Area (acres)	Existing Impervious (%)	Existing Impervious (acres)	Wetlands/ Water Area (acres)	Open Space Area (acres)	Farmland Area (acres)	Developable Area (acres)	Allowable Impervious (%)	Build-Out Impervious (acres)
HUC-14 ID No. 02030105100060 (Millstone River (Cranbury Brook to Rocky Brook))										
R-100	Low Density, Rural Residential	516.32	2.7%	13.70	63.40	0.00	110.27	342.65	5%	17.13
R-150	High, Medium Density Residential	588.02	4.9%	29.06	177.23	0.00	398.30	12.49	40%	5.00
R-85	Low Density, Rural Residential	22.82	45.3%	10.33	8.86	0.00	0.00	13.96	25%	3.49
Totals:		1,127.16	4.7%	53.09	249.49	0.00	508.57	369.10	24%	12.41
HUC-14 ID No. 02030105100080 (Cedar Brook (Cranbury Brook))										
PCD	High, Medium Density Residential	155.04	76.7%	118.85	10.30	48.50	0.00	96.24	60%	57.74
Totals:		155.04	76.7%	118.85	10.30	48.50	0.00	96.24	60%	57.74
HUC-14 ID No. 02030105100090 (Cranbury Brook (below NJ Turnpike))										
NB	Commercial	1.40	48.6%	0.68	0.00	0.00	0.00	1.40	60%	0.84
PCD	High, Medium Density Residential	658.60	51.0%	335.61	0.00	191.81	0.00	466.79	60%	280.07
R-100	Low Density, Rural Residential	284.54	8.8%	25.13	0.00	0.00	103.96	180.58	5%	9.03
R-150	Low Density, Rural Residential	75.47	14.3%	10.81	0.00	0.00	21.37	54.10	40%	21.64
R-300	Low Density, Rural Residential	2.72	67.3%	1.83	0.00	0.00	0.00	2.72	40%	1.09
R-85	High, Medium Density Residential	253.65	50.1%	127.10	50.73	0.00	0.00	202.92	25%	50.73
R-90	High, Medium Density Residential	2.69	68.0%	1.83	0.00	0.00	0.00	2.69	40%	1.08
R-95	High, Medium Density Residential	120.31	33.0%	39.69	0.00	10.65	0.00	109.66	40%	43.86
VC	Commercial	3.49	48.7%	1.70	0.00	0.00	0.00	3.49	20%	0.70
VR-2	High, Medium Density Residential	41.07	12.7%	5.20	25.00	0.00	0.00	16.07	80%	12.86
Totals:		1,443.94	38.1%	549.58	75.73	202.46	125.33	1,040.42	6%	421.90

Table E2: Build-Out Calculations

May 2006
Revised: January 2025

HUC14 and Zone	Land Cover	Total Area (acres)	Existing Impervious (%)	Existing Impervious (acres)	Wetlands/ Water Area (acres)	Open Space Area (acres)	Farmland Area (acres)	Developable Area (acres)	Allowable Impervious (%)	Build-Out Impervious (acres)
HUC-14 ID No. 02030105100100 (Shallow Brook (Devils Brook))										
I-100	Industrial	15.68	26.8%	4.21	6.84	0.00	0.00	8.84	50%	4.42
R-300	Low Density, Rural Residential	207.37	13.9%	28.76	68.98	0.00	0.00	138.39	40%	55.36
R-350	Low Density, Rural Residential	190.46	1.6%	3.13	107.16	0.00	0.00	83.30	40%	33.32
Totals:		413.51	8.7%	36.10	182.98	0.00	0.00	230.53	40%	93.10
HUC-14 ID No. 02030105100110 (Devils Brook)										
GB	Commercial	45.81	83.9%	38.45	0.21	0.00	0.00	45.60	70%	31.92
I-100	Industrial	72.64	28.7%	20.84	21.46	0.00	0.00	51.18	50%	25.59
NB	Commercial	1.15	8.7%	0.10	0.00	0.00	0.00	1.15	60%	0.69
PCD	High, Medium Density Residential	140.41	77.0%	108.14	2.32	0.00	0.00	138.09	60%	82.85
PMUD	High, Medium Density Residential	887.05	30.1%	266.77	158.55	328.96	0.00	399.54	70%	279.68
R-200	High, Medium Density Residential	299.47	29.1%	87.14	36.00	69.63	0.00	193.84	25%	48.46
R-300	Low Density, Rural Residential	609.71	12.9%	78.88	153.35	83.97	0.00	372.39	40%	148.96
R-350	Low Density, Rural Residential	751.61	13.0%	97.77	434.34	281.62	0.00	35.65	40%	14.26
R-85	High, Medium Density Residential	64.69	86.6%	56.01	10.48	0.00	0.00	54.21	25%	13.55
R-90	High, Medium Density Residential	74.79	16.0%	12.00	20.70	0.00	0.00	54.09	40%	21.64
R-95	High, Medium Density Residential	38.04	62.7%	23.87	0.00	11.10	0.00	26.94	40%	10.78
VC	Commercial	19.74	71.8%	14.17	0.00	0.00	0.00	19.74	20%	3.95
VR-1	High, Medium Density Residential	14.00	8.6%	1.20	8.41	0.00	0.00	5.59	20%	1.12
Totals:		3,019.11	26.7%	805.34	845.82	775.28	0.00	1,398.01	48%	683.44

Table E2: Build-Out Calculations

May 2006
Revised: January 2025

HUC14 and Zone	Land Cover	Total Area (acres)	Existing Impervious (%)	Existing Impervious (acres)	Wetlands/ Water Area (acres)	Open Space Area (acres)	Farmland Area (acres)	Developable Area (acres)	Allowable Impervious (%)	Build-Out Impervious (acres)
HUC-14 ID No. 02030105100140 (Millstone River (Route 1 to Cranbury Brook))										
I-100	Industrial	162.73	33.1%	53.93	17.20	0.00	0.00	145.53	50%	72.77
PMUD	High, Medium Density Residential	221.29	46.6%	103.03	22.21	0.00	0.00	199.08	70%	139.36
R-85	High, Medium Density Residential	1.16	8.6%	0.10	0.00	0.00	0.00	1.16	25%	0.29
R-90	High, Medium Density Residential	172.55	5.6%	9.67	121.86	0.00	0.00	50.69	40%	20.28
SR	High, Medium Density Residential	17.14	81.5%	13.97	3.48	0.94	0.00	12.72	70%	8.90
Totals:		574.87	31.4%	180.70	164.75	0.94	0.00	409.18	55%	241.59
HUC-14 ID No. 02030105100130 (Millstone River (Above Carnegie Lake))										
R-90	High, Medium Density Residential	94.59	0.0%	0.00	0.00	94.59	0.00	0.00	70%	0.00
Totals:		94.59	0.0%	0.00	0.00	94.59	0.00	0.00	70%	0.00
HUC-14 ID No. 02030105110010 (Heathcote Brook)										
PMUD	High, Medium Density Residential	112.01	1.2%	1.36	11.38	0.00	0.00	100.63	70%	70.44
Totals:		112.01	1.2%	1.36	11.38	0.00	0.00	100.63	70%	70.44
HUC-14 ID No. 02030105110020 (Millstone River (Heathcote Brook to Harrison Street))										
I-100	Industrial	41.50	59.2%	24.57	0.00	0.00	0.00	41.50	50%	20.75
OB-1	Commercial	67.29	13.1%	8.81	8.10	5.41	0.00	53.78	50%	26.89
CEM	Low Density, Rural Residential	39.32	0.0%	0.00	0.00	0.00	0.00	39.32	25%	9.83
PMUD	High, Medium Density Residential	692.69	37.2%	257.87	57.87	274.45	0.00	360.37	70%	252.26
SR	High, Medium Density Residential	14.17	32.3%	4.57	1.40	4.65	0.00	8.12	70%	5.68
Totals:		854.97	34.6%	295.82	67.37	284.51	0.00	503.09	65%	315.41

Table E3: Nonpoint Source Loads at Build-Out

May 2006
Revised: January 2025

HUC14 and Zone	Land Cover <i>Classified in accordance with Table E1</i>	Total Developable Area (acres)	TP Load (lbs/acre/yr)	TP (lbs/yr)	TN Load (lbs/acre/yr)	TN (lbs/yr)	TSS Load (lbs/acre/yr)	TSS (lbs/yr)
HUC-14 ID No. 02030105100060 (Millstone River (Cranbury Brook to Rocky Brook))								
R-100	<i>Low Density, Rural Residential</i>	342.65	0.6	206	5	1,713	100	34,265
R-150	<i>High, Medium Density Residential</i>	12.49	1.4	17	15	187	140	1,749
R-85	<i>Low Density, Rural Residential</i>	13.96	0.6	8	5	70	100	1,396
Totals:		369.10		231		1,970		37,410
HUC-14 ID No. 02030105100080 (Cedar Brook (Cranbury Brook))								
PCD	<i>High, Medium Density Residential</i>	96.24	1.4	135	15	1,444	140	13,474
Totals:		96.24	1.4	135	15	1,444	140	13,474
HUC-14 ID No. 02030105100090 (Cranbury Brook (below NJ Turnpike))								
NB	<i>Commercial</i>	1.40	2.1	3	22	31	200	280
PCD	<i>High, Medium Density Residential</i>	466.79	1.4	654	15	7,002	140	65,351
R-100	<i>Low Density, Rural Residential</i>	180.58	0.6	108	5	903	100	18,058
R-150	<i>Low Density, Rural Residential</i>	54.10	0.6	32	5	271	100	5,410
R-300	<i>Low Density, Rural Residential</i>	2.72	0.6	2	5	14	100	272
R-85	<i>High, Medium Density Residential</i>	202.92	1.4	284	15	3,044	140	28,409
R-90	<i>High, Medium Density Residential</i>	2.69	1.4	4	15	40	140	377
R-95	<i>High, Medium Density Residential</i>	109.66	1.4	154	15	1,645	140	15,352
VC	<i>Commercial</i>	3.49	2.1	7	22	77	200	698
VR-2	<i>High, Medium Density Residential</i>	16.07	1.4	22	15	241	140	2,250
Totals:		1,040.42		1,270		13,267		136,456

Table E3: Nonpoint Source Loads at Build-Out

May 2006
Revised: January 2025

HUC14 and Zone	Land Cover <i>Classified in accordance with Table E1</i>	Total Developable Area <i>(acres)</i>	TP Load <i>(lbs/acre/yr)</i>	TP <i>(lbs/yr)</i>	TN Load <i>(lbs/acre/yr)</i>	TN <i>(lbs/yr)</i>	TSS Load <i>(lbs/acre/yr)</i>	TSS <i>(lbs/yr)</i>
HUC-14 ID No. 02030105100100 (Shallow Brook (Devils Brook))								
I-100	<i>Industrial</i>	8.84	1.5	13	16	141	200	1,768
R-300	<i>Low Density, Rural Residential</i>	138.39	0.6	83	5	692	100	13,839
R-350	<i>Low Density, Rural Residential</i>	83.30	0.6	50	5	417	100	8,330
Totals:		230.53		146		1,250		23,937
HUC-14 ID No. 02030105100110 (Devils Brook)								
GB	<i>Commercial</i>	45.60	2.1	96	22	1,003	200	9,121
I-100	<i>Industrial</i>	51.18	1.5	77	16	819	200	10,236
NB	<i>Commercial</i>	1.15	2.1	2	22	25	200	230
PCD	<i>High, Medium Density Residential</i>	138.09	1.4	193	15	2,071	140	19,333
PMUD	<i>High, Medium Density Residential</i>	399.54	1.4	559	15	5,993	140	55,936
R-200	<i>High, Medium Density Residential</i>	193.84	1.4	271	15	2,908	140	27,138
R-300	<i>Low Density, Rural Residential</i>	372.39	0.6	223	5	1,862	100	37,239
R-350	<i>Low Density, Rural Residential</i>	35.65	0.6	21	5	178	100	3,565
R-85	<i>High, Medium Density Residential</i>	54.21	1.4	76	15	813	140	7,589
R-90	<i>High, Medium Density Residential</i>	54.09	1.4	76	15	811	140	7,573
R-95	<i>High, Medium Density Residential</i>	26.94	1.4	38	15	404	140	3,772
VC	<i>Commercial</i>	19.74	2.1	41	22	434	200	3,948
VR-1	<i>High, Medium Density Residential</i>	5.59	1.4	8	15	84	140	783
Totals:		1,398.01		1,682		17,406		186,461

Table E3: Nonpoint Source Loads at Build-Out

May 2006
Revised: January 2025

HUC14 and Zone	Land Cover <i>Classified in accordance with Table E1</i>	Total Developable Area (acres)	TP Load (lbs/acre/yr)	TP (lbs/yr)	TN Load (lbs/acre/yr)	TN (lbs/yr)	TSS Load (lbs/acre/yr)	TSS (lbs/yr)
HUC-14 ID No. 02030105100140 (Millstone River (Route 1 to Cranbury Brook))								
I-100	<i>Industrial</i>	145.53	1.5	218	16	2,328	200	29,106
PMUD	<i>High, Medium Density Residential</i>	199.08	1.4	279	15	2,986	140	27,871
R-85	<i>High, Medium Density Residential</i>	1.16	1.4	2	15	17	140	162
R-90	<i>High, Medium Density Residential</i>	50.69	1.4	71	15	760	140	7,097
SR	<i>High, Medium Density Residential</i>	12.72	1.4	18	15	191	140	1,781
Totals:		409.18		587		6,283		66,017
HUC-14 ID No. 02030105100130 (Millstone River (Above Carnegie Lake))								
PMUD	<i>High, Medium Density Residential</i>	0.00	1.4	0	15	0	140	0
Totals:		0.00		0		0		0
HUC-14 ID No. 02030105110010 (Heathcote Brook)								
PMUD	<i>High, Medium Density Residential</i>	100.63	1.4	141	15	1,509	140	14,088
Totals:		100.63		141		1,509		14,088
HUC-14 ID No. 02030105110020 (Millstone River (Heathcote Brook to Harrison Street))								
I-100	<i>Industrial</i>	41.50	1.5	62	16	664	200	8,300
OB-1	<i>Commercial</i>	53.78	2.1	113	22	1,183	200	10,756
PMUD	<i>High, Medium Density Residential</i>	360.37	1.4	505	15	5,406	140	50,452
SR	<i>High, Medium Density Residential</i>	8.12	1.4	11	15	122	140	1,137
Totals:		463.77		691		7,375		70,645