

# VOORHEES TOWNSHIP



## MUNICIPAL STORMWATER MANAGEMENT PLAN

**PREPARED FOR:**

**TOWNSHIP OF VOORHEES**

620 Berlin Road

Voorhees, New Jersey 08043

**NJPES #NJG 0151653**

**PI ID # 167097**

Camden County

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## 1.0 Regulations Impacting the Township of Voorhees

The Township of Voorhees contains a Municipal Separate Storm Sewer System known as an MS4 and is considered a Tier A municipality under the New Jersey Pollution Discharge Elimination System (NJPDES). The regulations for the NJPDES Tier A Permits were issued on February 2, 2004 and became effective March 3, 2004. The municipalities were required to submit a Request for Authorization, known as a RFA on March 31, 2004 and the permit authorizations were dated April 1, 2004. April 1, 2004 is known as the effective date of the permit authorization or the EDPA date.

Under Section F.3.b.ii of the Tier A NJPDES Permit, municipalities are required to adopt a municipal stormwater management plan in accordance with NJAC 7:8-4 within 12 months of the effective date of the permit authorization, or by April 1, 2005. The municipal stormwater management plan is abbreviated as the MSWMP.

Under Section E.2 of the Tier A NJPDES Permit, municipalities are required to prepare and implement a written stormwater pollution prevention plan within 12 months of the effective date of the permit authorization, or by April 1, 2005. The municipal stormwater pollution prevention plan is abbreviated as the SPPP. The basic SPPP consists of seventeen forms to be completed and implemented by the team members of the pollution prevention team. Maps of the municipality are required to plan the implementation of the pollution prevention plan. The pollution prevention plan completed by April 1, 2005 will be signed and certified and kept on file within the municipality for inspection by NJDEP. The pollution prevention plan forms, maps, and lists will become a "living document" that will change throughout the year and will track how the pollution prevention plan has been implemented by the municipality.

Under Section F.5 of the Tier A NJPDES Permit and as a part of the municipal stormwater pollution prevention plan, the municipality must adopt **improper disposal of waste ordinances** to prevent pollution from entering the inlets and streams within the municipality by October 1, 2005. These ordinances include pet waste, litter control, improper disposal of waste, wildlife feeding, yard waste, and illicit connection ordinances.

Under Section H.3.a of the Tier A NJPDES Permit, the Township of Voorhees is required to file an Annual Report and Certification to the New Jersey Department of Environmental Protection on or before May 2, 2005 and every 12 months thereafter. The Annual Report and Certification shall be maintained by the municipality for a period of five years. The Annual Report and Certification is the only document required to be sent to NJDEP.

Under Section F.3.b.iii of the Tier A NJPDES Permit, municipalities are required to adopt ordinances to implement the municipal stormwater management plan 12 months after the adoption of the municipal stormwater plan. In effect, municipalities have 24 months from the effective date of the permit authorization, or by April 1, 2006 to adopt stormwater management ordinances that set forth exact stormwater management design standards for development and redevelopment.

The municipal plan is required to conform to the regional stormwater management plan and must be reviewed and approved by the County review agency and NJDEP. For the Township of Voorhees, the municipal stormwater management plan and ordinances must be reviewed and approved by Camden County and must conform to the Cooper River Regional Stormwater Management Plan Guidance Document and the Rancocas Creek Watershed Management Plan.

Subchapter 4 of NJAC 7:8 sets forth the specific requirements of a Municipal Stormwater Management Plan. The most difficult requirements of NJAC 7:8-4.2(c)8 and 9 require evaluation of the municipalities entire master plan, official map and development regulations, zoning ordinances, projected land use assuming full development, and future non-point source pollutant load assuming full build is required for municipalities with more than one square mile of vacant or agricultural land within the municipality. In addition, subsections 8 and 9 are not required until February 2, 2006. Voorhees Township has additional time to complete the more rigorous planning requirements of the municipal stormwater management plan.

Subchapter 5 of NJAC 7:8 sets forth the groundwater recharge, water quantity, and water quality standards (reduction of total suspended solids). If any exceptions are required from the design and performance standards for development projects submitted to the Planning or Zoning Board, the stormwater management plan identifies mitigation options to offset the exceptions. Voorhees has unique characteristics that may be creating water quality impairments.

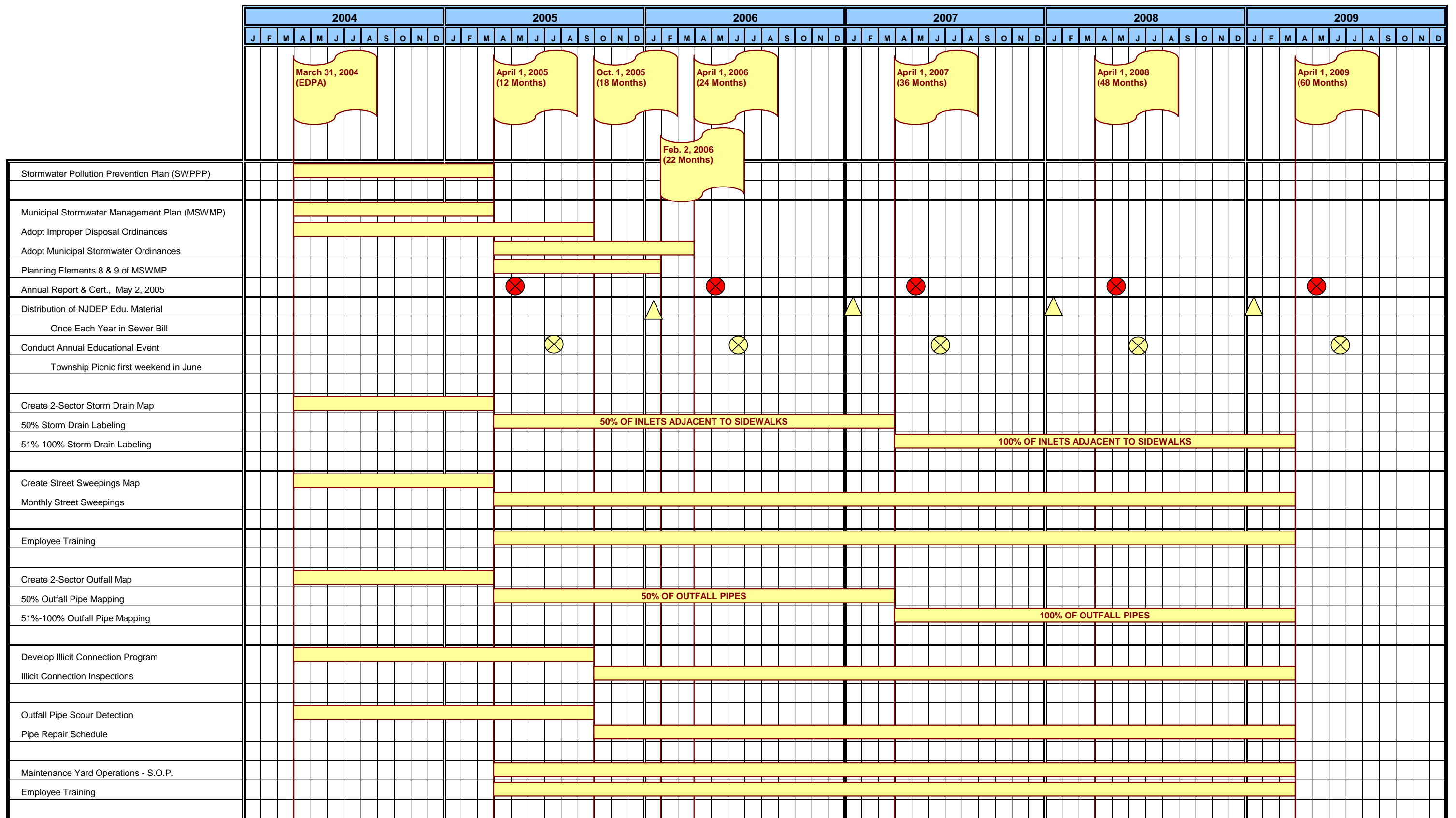


## **2.0 Completion Dates of MS4 Tier A Requirements**

### **2.1 MS4 Tier A Permit Timeline**

### **2.2 NJPDES Municipal Stormwater Regulation Program Summary of Statewide Basic Requirements**

## Voorhees Township- MS4 Tier A Permit Timeline



# **NJPDES Municipal Stormwater Regulation Program** **Summary of Statewide Basic Requirements (SBRs)**

**Tier A Municipal Stormwater Permit (NJ0141852)**

(Please refer to final permit for details on SBRs)

<b>Statewide Basic Requirement</b>	<b>Minimum Standard</b>	<b>Implementation Schedule</b>
<b>Stormwater Pollution Prevention Plan (SPPP)</b>	SPPP describes the municipality's stormwater program, which includes details on the implementation of required SBRs.	12 months from effective date of permit authorization (EDPA)
<b>Public Notice</b>	Comply with applicable State and local public notice requirements when providing for public participation.	Upon EDPA
<b>Post-Construction Stormwater Management in New Development and Redevelopment</b>		
<b>Stormwater Management Plan</b>	Adopt stormwater management (SWM) plan in accordance with N.J.A.C. 7:8-4.	Complete 12 mos. from EDPA
<b>Stormwater Control Ordinance</b>	Adopt and implement stormwater control ordinance in accordance with N.J.A.C. 7:8-4.	Adopt ordinance 12 months from SWM plan adoption.
<b>Residential Site Improvement Standards</b>	Ensure compliance with Residential Site Improvement Standards for stormwater management (N.J.A.C. 5:21-7), including any exception, waiver, or special area standard approved under N.J.A.C. 5:21-3.	Upon EDPA
<b>BMP Operation and Maintenance</b>	Ensure adequate long-term operation and maintenance of BMPs.	EDPA for BMPs on municipal property, 24 months for BMPs elsewhere.
<b>Storm Drain Inlets Design Standard for New Construction</b>	New storm drain inlets must meet the design standards specified in Attachment C of the permit.	12 months from EDPA if municipally installed. Otherwise 24 mos. from EDPA
<b>Local Public Education</b>		
<b>Local Public Education Program</b>	Copy and distribute educational brochure (provided by the Department) annually to residents and businesses, and conduct a yearly educational "event". Have brochure available at this event.	Start 12 months from EDPA
<b>Storm Drain Labeling</b>	Label all municipal storm drain inlets that are next to sidewalks, or within plazas, parking areas or maintenance yards. Coordinate efforts with watershed groups and volunteer organizations.	Within 60 months from EDPA
<b>Improper Disposal of Waste</b>		
<b>Pet Waste Ordinance</b>	Adopt and enforce an ordinance requiring owners and keepers to immediately and properly dispose of their pet's solid waste. Distribute information with pet licenses regarding the ordinance and the environmental benefits of proper disposal of pet waste.	Complete 18 mos. and ongoing
<b>Litter Ordinance</b>	Adopt and enforce a litter ordinance, or enforce the existing State litter statute (N.J.S.A. 13:1E-99.3).	Complete 18 mos. and ongoing
<b>Improper Waste Disposal Ordinance</b>	Adopt and enforce an ordinance prohibiting spilling, dumping or disposal of any materials other than stormwater into the MS4.	Complete 18 mos. from EDPA and ongoing



### **3.0 Township of Voorhees**

## **Stormwater Management Plan**

**March 23, 2005**

**NJPDES #NJG 0151653**

**PI ID 167097**

**Camden County, NJ**

### **3.1 Introduction to Voorhees Stormwater Management Plan**

This Municipal Stormwater Management Plan documents the strategy for Voorhees Township to address stormwater-related impacts. The creation of this plan is required by NJAC 7:1 4A-25 Municipal Stormwater Regulations. This plan contains all of the elements required by April 1, 2005 as described in NJAC 7:8 Section 4.2 of the Stormwater Management Rules. Voorhees Township contains more than one square mile of open space and agricultural land. As described in schedule for adoption of the stormwater management plan and ordinances NJAC 7:8 Section 4.3, the completed elements of NJAC 7:8-4.2(c)8 and 9 will be provided on or before February 10, 2006.

An aerial view of the Township, which illustrates the major waterways, is provided in the Appendix, **Map 1, Existing Conditions**. This Municipal Stormwater Management Plan addresses groundwater recharge, stormwater quantity, and stormwater quality impacts by incorporating stormwater design and performance standards for new major development, defined as projects that disturb one or more acre of land. Note that the definition of major development for the Stormwater Management Plan does not include the increase of impervious area by more than one quarter acre. The implementation of these standards into the Voorhees Master Plan is intended to minimize the adverse impact of stormwater runoff on water quality and water quantity and the loss of groundwater recharge that provides baseflow in receiving water bodies. The plan stresses best management practices with long-term operation and maintenance measures for existing and future stormwater facilities that perform well in the soil and water table conditions within Voorhees Township and can be maintained by the Voorhees Township Public Works Department.

Through the Voorhees Municipal Code, under Section 152.005, the most current stormwater management requirements of NJAC 7:8 5.4 and 5.5 are currently imposed to both residential and non-residential development through the requirement of conformance to the Residential Site Improvement Standards (RSIS). The implementation of this plan will not have a major impact on the stormwater design of commercial development.

The plan also addresses the review and update of existing ordinances, the Township Master Plan, and other planning documents to allow for project designs that include non-structural strategies and low impact development techniques. The Municipal Stormwater Management Plan has been reviewed for incorporation into the Township Master Plan which is scheduled to be examined in 2005.

The final component of this plan is a mitigation strategy for when an exemption of the design and performance standards is sought. As part of the mitigation section of the stormwater plan, specific stormwater management projects within Voorhees are identified as alternative projects if a development cannot meet the stormwater standards on site. Exemptions are provided to lessen the impact of redevelopment of existing sites within Voorhees where the current stormwater standards cannot be imposed due to the lack of open space. Exemptions are not to be granted for new development projects.

This plan has been prepared in conformance with the Cooper River Regional Stormwater Management Plan Guidance Document dated May 2004 prepared by the Camden County Soil Conservation District and the Management Plan for the Rancocas Creek Watershed dated March 2003 prepared by the Burlington County Department of Resource Conservation.



### **3.2 Goals of Management Plan**

The goals of the Voorhees Municipal Stormwater Management Plan are to:

- Reduce the impact of stormwater runoff for all stormwater events, especially high frequency events. High frequency events are storms that occur frequently with low rainfall amounts (water quality storm)
- Improve baseflow to streams by maintaining the groundwater recharge
- Reduce silting of lakes and ponds by providing total suspended solids reduction and reduction of soil erosion from any development or construction project;
- Improving in-stream and riparian habitat for all watershed residents (humans, wildlife, flora and fauna)
- Reduce flood damage, including damage to life and property;
- Prevent further degradation of existing stream features and structures
- 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; and
- Protect public safety through the proper design and operation of best management practices.

To achieve these goals, a variety of management strategies are proposed for implementation. These strategies have been developed from the Cooper River Regional Stormwater Management Plan Guidance Document dated May 2004 prepared by the Camden County Soil Conservation District. The Cooper River Watershed Management Plan examined the Cooper River system within twelve municipalities including Voorhees Township.

### 3.3 Stormwater Discussion

Land development can dramatically alter the hydrologic cycle (See Figure 1) of a site and, ultimately, an entire watershed. Prior to development, native vegetation can either directly intercept precipitation or draw that portion that has infiltrated into the ground and return it to the atmosphere through evapotranspiration.

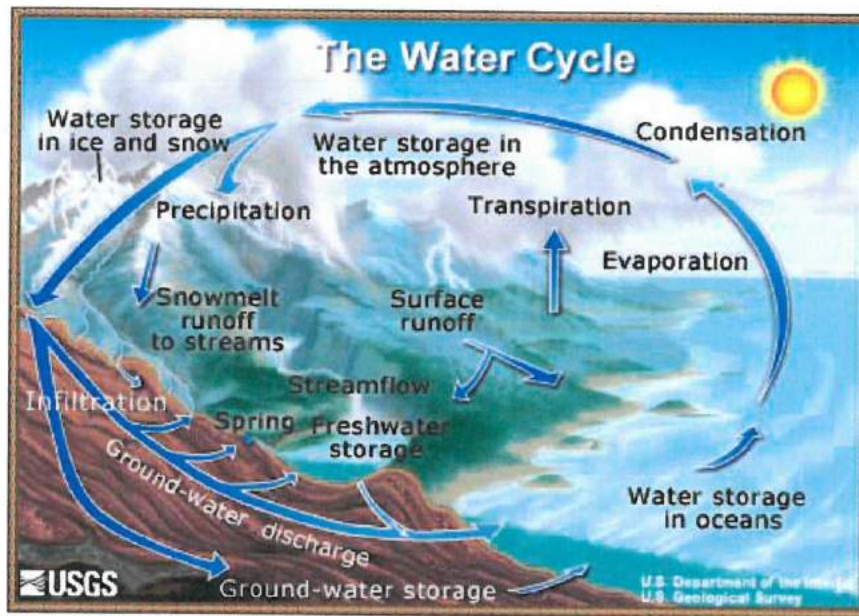


Illustration by John M. Evans, Colorado District, USGS

Figure 1. Hydrologic Cycle

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. Downstream erosion, sediment deposits can be seen in Photograph 1.



Photograph 1. Downstream Erosion and Sediment Deposits

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. Groundwater recharge and well head protection areas are shown in the Appendix, on **Map 2, Groundwater Recharge and Wellhead Protection Areas (WPAs)**. Soil types, which correspond to the recharge areas, are shown in the Appendix, on **Map 3, Soil Types**.



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 the stream biology. 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.

### **3.4 Cooper River Watershed Management Plan – Guidance Document**

The regional watershed management plan for the Cooper River Watershed involves 11 municipalities in Camden County and 1 municipality in Burlington County. The watershed encompasses 30 square miles with a significant portion of the land being fully developed. The NJDEP funded the Cooper River Watershed Management Plan. The scope of work for the Cooper River Watershed grew out of a pilot program to study five different but typical watershed regions in various parts of Southern New Jersey. The plan is the result of work done since September of 2000 by the Camden County Soil Conservation District, NJDEP, Burlington, Cape-Atlantic and Gloucester Soil Conservation Districts and to some extent the stakeholders of the watershed. Due to policy changes at NJDEP during 2002, funding of the Public Advisory Committee (PAC) disrupted the stakeholder process. The product created as of April of 2004 is a Guidance Document.

The Cooper River watershed management plan guidance document is a stream characterization and assessment from a hydrologic viewpoint. The assessment includes evaluation of the stream channel, stream bank, and riparian buffer. The Camden County Soil Conservation Service has located all stormwater outfalls, stormwater management basins, significant features and degraded areas within the watershed. The Cooper River Watershed management plan provides specific guidance regarding basin design requirements, mitigation planning, existing basin retrofitting and stream restoration locations.

### **3.5 Rancocas Creek Watershed Management Plan**

The Rancocas Creek Watershed Management Area 19 involves 29 municipalities within Burlington, Camden and Ocean Counties, and drains 360 square miles. The NJDEP has funded a watershed management plan through a grant with Burlington County. The Rancocas Creek Watershed Management Plan was finalized in March of 2003 by the Burlington County Department of Resources Conservation. The plan is the result of an effort from 1998 to 2003 by the New Jersey Department of Environmental Protection, the Public Advisory Committee (PAC), Omni Environmental, Burlington County Office of Land Use and six public subcommittees.

The Rancocas Creek Watershed Management Plan is a 29 page written summary report with a computer CD containing the Appendices. The characterization and Assessment Report of the watershed is a Microsoft Power Point presentation contained on the CD. The assessment report is based on a water quality approach from a chemical standpoint. The assessment reviews the NJDEP data and status of water quality for oxygen, phosphorous, nitrogen, fecal coliform, total dissolved solids and pH.

The Rancocas Creek Watershed Management Plan recommends that municipal ordinances should be enacted for commercial and industrial sites to require stormwater inserts to remove floatables, oils and other pollutants as well as long term maintenance insured by escrow accounts. The plan recommends strengthening buffer protection ordinances, with sample buffer protection ordinances provided. The report contains a ranking of open space parcels within Burlington County. A separate report by the Burlington County Soil Conservation compiling a prioritized list of "Action Now" projects for bank restoration and repair is referenced.

### 3.6 Voorhees Township

#### ➤ 3.6.1 Population and Land Use

The Township of Voorhees encompasses a 11.6 square mile area of Camden County, New Jersey. In recent years the Township has been under significant development pressure, as indicated by the number of new residential dwellings constructed over the past few years (see Table 1). The population of the Township has increased from 12,919 in 1980 to 24,559 in 1990 to 28,126 in 2000. The resulting development has likely increased stormwater runoff volumes and pollutant loads to the waterways of the municipality.

<b>Table 1 – New Residential Structures</b>	
<b><u>Year</u></b>	<b><u>Units</u></b>
1999-2000	78
1995-1998	1,111
1990-1994	928
1980-1989	4,776
1970-1979	2,300
1960-1969	1,093

The majority of land use within Voorhees Township is urban. Limited areas of forest and wetlands remain within the Township. The existing land uses within Voorhees can be seen in the Appendix **Map 4, Land Use – Wetlands Designations**.

#### ➤ 3.6.2 Description of Watershed

There are four separate sub watershed drainage delineations within Voorhees Township. Each is delineated by a code called a HUC-14 code shown in the Appendix on **Map 5, HUC-14 Delineation on USGS Quadrangle Map**. The sub-watersheds belong to one of the twenty major watersheds in the State of New Jersey shown in the Appendix on **Map 6, New Jersey's Watershed, Watershed management Areas and Water Regions**.

Voorhees Township is located within two separate Watershed Management Areas within the State of New Jersey. The northern side of Voorhees Township, north of Kresson-Gibbsboro Road is located in the Lower Delaware Watershed Management Area 19. The tributaries and drainage on the northern side of Voorhees flow to the Cooper River. As documented in the Cooper River Regional Stormwater Management Plan, the land area flowing to the Cooper River is 68% developed and the stream corridor has degraded stream channels, stream bank erosion, channel erosion, degraded aquatic habitat and impaired water quality. The southern side of Voorhees Township, south of Kresson-Gibbsboro Road is located in the Rancocas Watershed Management Area 18. The tributaries and lakes south of Kresson-Gibbsboro Road flow toward Medford and the southwest branch of the Rancocas River. The waterways, potential flood prone areas and flood prone areas are shown in the Appendix on **Map 7, Flood Prone Areas**.

The three watersheds within Voorhees that drain to the Cooper River and are located in Watershed Management Area are:

- North Branch Cooper River (above Springdale Road), 02040202110010
- Lower Cooper River (Wallworth gage to Evesham Road), 02040202110040
- Upper Cooper River (above Evesham Road), 02040202110030

The north branch above Springdale Road abbreviated as HUC-010 starts in the residential development of Beagle Club and discharges into a wide wetland area southwest of Kresson Road (CR 671). On the opposite side of Kresson Road, the upper north branch continues between the residential developments of Partridge Run and Kress Acres and then between Avian and Willow Oak/Chris Tract with a narrow buffer remaining along the waterway. The upper north branch then continues into Cherry Hill Township.

The Upper Cooper River above Evesham Road abbreviated as HUC-030 contains several branches. One originates at the west side of White Horse Road and flows to the detention pond within the Echelon Village Apartment Complex before connecting under Burnt Mill Road and under the PATCO high speed line to the Cooper River. A second originates at the

lake in the Carriage Brook neighborhood before flowing into Kirkwood Lake. A third originates in Voorhees at Wilderness Lake and then flows into Silver Lake in Gibbsboro.

The Lower Cooper River abbreviated as HUC-040 also contains several branches of interest. One originates near the intersection of Cooper Road and Centennial Boulevard and the development of Alluvium is shown over the stream bed (Sassafras Court, Oak Drive). As a result of the development over the stream corridor, the neighborhoods have large swales and storm pipes that must be maintained by the Voorhees Public Works Department. A second originates near the wetlands north of the Voorhees High School and travels behind the residential neighborhood to Evesham Road.

The Barton Run watershed south of Kresson-Gibbsboro Road drains to the Rancocas River. The main tributaries in this drainage area start in the Sunshine Park Lake on the western side of Cooper Road in Lake Villa and Alluvium Lake Condominiums. The stream runs under Cooper Road and connects to a series of lakes that run between Cooper Road and Route 73. A private golf course is located next to Cedar Lake. The Township has a park at Lions Lake. Kresson Lake is parallel to Kresson Gibbsboro Road before the intersection of Route 73. The second tributary is on the eastern side of Route 73. The developments of Sturbridge Estates, Sturbridge Woods and Sturbridge Lakes have been constructed in the area. The stream corridor runs through the residential development and several lakes have been created before the tributary connects to Kenilworth Lake to the East.

### ➤ 3.6.3 Stream Conditions

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

AMNET sites within Voorhees Township are shown in the Appendix on **Map 8, Amnet and Stream Quality Monitoring Stations.**

The New Jersey Integrated Water Quality Monitoring and Assessment Report, 305(b) and 303(d) is required by the Federal Clean Water Act. The report identifies waters that are impaired by watershed area. Sublist 5 of the Integrated List constitutes the list of waters impaired or threatened by pollutants. The list for Watershed 18 and 19 is included in Attachment 1 of the Appendix.

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

A TMDL Report was issued for the Cooper River by the New Jersey Department of Environmental Protection on April 19, 2004 entitled Amendment to the Tri-County Water Quality Management Plan, Total Maximum Daily Loads for Total Phosphorus To Address Four Stream Segments and Two Lakes in Cooper River Watershed, Camden County Lower Delaware Water Region.

A TMDL Report was issued for the Cooper River by the New Jersey Department of Environmental Protection on April 21, 2003 entitled Amendment to the Lower Delaware Water Quality Management Plan, Mercer County Water Quality Management Plan, Monmouth County Water Quality Management Plan, Ocean County Water Quality



Management Plan and Tri-County Water Quality Management Plan, Total Maximum Daily Loads for Fecal Coliform Address 27 Streams in the Lower Delaware Water Region.

As included in the Management Plan for the Rancocas Creek Watershed Plan, the NJDEP formulated an approach to deal with contaminants in the non-tidal reaches of the Rancocas creek and its tributaries. The document, Technical Approaches to Restore Impaired Waterbodies in the Non-Tidal Rancocas Creek Watershed, NJDEP, 2002, recommends steps to develop TMDLs or determine that no TMDL is needed. The technical approach paper was reviewed and approved by the Water Management Area 19 Technical Advisory Committee.

### **3.7 Design and Performance Standards**

Under Section 152.008, Voorhees Township has adopted the design and performance standards for residential and non-residential development to conform to the Residential Site Improvement Standards. By adopting the RSIS standards, the design and performance standards for stormwater management under NJAC 7:8-5 have been applied to residential and non-residential development. The design and performance standards that have been adopted under Section 152.008 conform to NJAC 7:8-5 as required.

Voorhees Township accepts responsibility for stormwater management basins created for residential subdivisions. Long term operation and preventative maintenance will be performed and preventative and corrective maintenance performed by the Voorhees Public Works Department.

The Planning and Zoning Board review development plans to meet the stormwater regulations of NJAC 7:8 including the safety standards for stormwater management basins under NJAC 7:8-6. Voorhees Township inspectors observe construction of all projects to ensure that the stormwater management measures are constructed and function as designed.

For projects that disturb one acre or more, there will be no change to stormwater management requirements currently in effect. Except that mitigation will be available for redevelopment projects.



Storm Inlet in Conformance with Attachment C of Stormwater Regulations

### **3.8 Plan Consistency**

Voorhees Township Stormwater Management Plan is consistent with Cooper River Regional Stormwater Management Plan Guidance Document dated May 2004 prepared by the Camden County Soil Conservation District and the Management Plan for the Rancocas Creek Watershed dated March 2003 prepared by the Burlington County Department of Resource Conservation.

### **3.9 Evaluation of Development Regulations & Master Plan**

The evaluation of the municipality's entire master plan (including the land use element), official map and development regulations (including the zoning ordinance) is element of NJAC 7:8-4.2. As described in the schedule for adoption of municipal stormwater management plan

and ordinances Section NJAC 7:8-4.3 the requirements of 4.2(c)8 and 9 are not operative until February 2, 2006. The information included in this section is an examination of the Voorhees Township Land Use ordinances. The completed element of NJAC 7:8-4.2(c)8 will be provided on or before February 10, 2006.

The Voorhees Township Municipal Code and maps have been reviewed to determine what adjustments are needed for the implementation of nonstructural stormwater management techniques. Specifically, ten policy areas were reviewed to pinpoint potential revisions. Once these Municipal Codes are revised they will be submitted to the Camden County Engineer/Department of Public Works for agency review. A copy will be sent to the Department of Environmental Protection at the time of submission. An illustration of the Township's agricultural, forest, and wetlands is provided in the Appendix on Map 4, Land Uses to help guide any revisions to land use and zoning code amendments.

➤ 3.9.1 Preservation of Natural Areas:

The Township's codes support the DEP's nonstructural stormwater management techniques for the preservation of natural areas. For example: Section 158.04 requires identification of vegetated area as a requirement of a development application; Section 152, et. seq. establishes suitable bulk area standards for the appropriate zones; Section 154 provides incentives for the use of vegetative areas to filter stormwater; and Section 152.032(J) provides for cluster development options as a means of preserving open space.

➤ 3.9.2 Tree Protection:

The Township's codes support the DEP's nonstructural stormwater management techniques for tree protection. Section 154.006 (Buffer and Landscape Design Standards) provides for the protection of trees and wooded areas before, during, and after development.

➤ 3.9.3 Landscape Island and Screening Ordinances:

The Township's codes generally support the nonstructural stormwater management techniques required by DEP regulations in this particular area, Section 154.006 may need to be amended to provide for the use and design of bioretention systems as part of its overall stormwater management strategy (see Appendix B). However, Section 154.010(B)(8) does require the use of landscape islands in parking lots and Section 154.006 provides for general screening and buffers.

➤ 3.9.4 Riparian Buffers:

The Township may need to review and amend Section 154.006 of the Municipal Code to integrate riparian buffer regulations with the existing buffer requirements.

➤ 3.9.5 Limits of Disturbance:

The Township may consider amending Section 154 to include a steep slopes ordinance as a means of protecting the buffer areas along its waterways and an ordinance to limit the access of heavy construction vehicles to particular areas of construction sites.

Also, although Section 154.006 provides for the protection and prohibition of removal of certain trees on construction sites and requires compensatory tree planting where certain caliper trees have been damaged or removed, these requirements may be amended to require the identification and protection of specific areas that provide hydrologic functions.

➤ 3.9.6 Open Space and Cluster Development:

Section 152.032(J) of the Municipal Codes provides for open space and cluster development. However, the Township may consider amending this code to place limits on the disturbance allowed in the vegetated area of existing and proposed open space, require re-establishment of vegetation and provide for a maximum cover in open space areas.

➤ 3.9.7 Management of Impervious Streets and Driveways:

The Township has adopted the standards for streets provided through the Residential Site Improvement Standards. The Township will research the feasibility of amending Section 154.008 to establish policies to provide for landscaped islands at cul-de-sacs, hammerhead configuration of short streets instead of cul-de-sacs, flush curbs, and maximum driveway widths.

➤ 3.9.8 Management of Impervious Parking Areas & Sidewalks:

The Township may need to amend Section 154.002 and Section 154.010 of its parking regulations to provide for pervious paving in overflow parking areas and sidewalks, reduction in parking ratios, flush curbs to direct drainage into landscaped areas and reduction of parking stall widths to allow for vehicle overhang into vegetated areas.

➤ 3.9.9 Unconnected Impervious Areas:

The Township may need to review Section 154.003 to clarify its policies related to encouraging unconnected impervious areas, which can disperse stormwater flows.

➤ 3.9.10 Vegetated Open Channels:

The Township may need to review Section 154.008 to clarify its policies related to allowing for vegetated open channels, rather than standard concrete curb and gutter configuration, which can decrease flow velocity, and allow for stormwater filtration and re-infiltrations.



### 3.10 Land Use/Build-Out Analysis

The Land Use/Build-Out Analysis is element 9 of NJAC 7:8-4.2. As described in the schedule for adoption of municipal stormwater management plan and ordinances Section NJAC 7:8-4.3 the requirements of 4.2(c)8 and 9 are not operative until February 2, 2006. The completed element of NJAC 7:8-4.2(c)9 will be provided on or before February 10, 2006.

### 3.11 Mitigation Plans

Exemptions are provided to lessen the impact of redevelopment of existing sites within Voorhees where the current stormwater standards cannot be imposed due to the lack of open space. Exemptions are not recommended (to be granted) for new development projects. Exemptions are to be granted only upon the condition that the applicant provides a mitigation project of equal value within the same sub-watershed as delineated by the HUC 14. All mitigation projects are to be under the review and approval of the Voorhees Township Engineer and Engineering Department. The mitigation projects within Voorhees Township are:

1. Glen and Dale Ditch Repair HUC 02040202110040  
Phased repair of Severe Erosion  
Value to be Determined
2. Acorn Hill Lake HUC  
02040202110040  
Lower Lake Lever & DeSilt Sediment  
\$10,000-\$15,000
3. Sturbridge Lakes HUC 02040202060040  
DeSilt Sediment Lake 1  
DeSilt Sediment Lake 2  
DeSilt Sediment Lake 3  
Associates obtain permit

4. Lake Villa Lake HUC  
02040202060040  
Submerged Port Opening  
Repair Base & Fence  
Value to be Determined
5. Green Ridge Playground HUC 02040202110030  
Water Quality Improvement Project  
Design and Installation of BMP  
Vegetative Buffer between Existing Playground and Stream  
200 Feet in Length  
Value to be Determined
6. Turkey Hollow Branch of Lake Willow Lake HUC  
02040202060040  
Provide Water Quality Measures at Thomas Road  
For 60 inch diameter pipe  
Value to be Determined
7. Stormwater Basin Retrofit  
Provide Water Quality and Recharge measures at existing stormwater basins within the same HUC14 under the guidance of the Voorhees Township Engineer and Engineering Department. The retrofit of existing basins may be accomplished through a variety and/or combination of options to meet the mitigation costs required. Review of each existing basin condition and surrounding condition should be reviewed with the Township before selecting one or more of the following options:
- a. Outlet Structure Modifications
  - b. Regrading and Planting
  - c. Elimination of Low Flow Channels

- d. Installation of in-line or end-of-pipe Best Management Practice (BMP) as approved by the NJDEP to pretreat stormwater draining into an existing stormwater management basin

8. Stream and Stream Bank Stabilization

Mitigation projects other than those listed meeting the following criteria may be presented for review and approval by the Voorhees Township Engineer and Engineering Department. Stabilization projects will be reviewed for the following benefits:

- a. Stabilization of eroded stream banks where public or private property or structures are threatened
- b. Reduced sediment deposition in lakes, ponds and other low velocity areas
- c. Improved water quality

9. Stormwater Outfall Restoration

Mitigation of Existing Stormwater Outfalls within the same HUC14 under the guidance of the Voorhees Township Engineer and Engineering Department. The retrofit of existing outfalls may be accomplished through a variety and/or combination of options to meet the mitigation costs required. Review of each existing outfall condition should be reviewed with the Township before selecting one or more of the following options:

- a. Replacement of failed outfall structure with outlet protection
- b. Replacement with installation of drop manhole to set outfall structure at invert of stream channel with outlet protection
- c. Installation of in-line or end-of-pipe Best Management Practice (BMP) as approved by the NJDEP to pretreat stormwater before the outfall structure
- d. Disconnect outfall from receiving waterway to eliminate erosion condition. Permitted only with detailed hydrologic analysis and stability analysis of the receiving area

10. Lake and Pond Management

Provide a comprehensive management plan and maintenance schedule for publicly held lakes and ponds within Voorhees Township

## **Summary**

Voorhees Township is implementing this stormwater management plan in order to meet the requirements of the Federal Clean Water Act that has been brought through the state of New Jersey as an MS4 permit. This management plan meets the requirements of the NJAC 7:8 Section 4. The plan will be modified and expanded to include the full build out analysis prior to February of 2006. In order for the Township to meet the permit requirements, it is requested that this plan be adopted tonight in order to meet the permit deadline.

# Appendix

## Maps

1-8





EXISTING CONDITIONS



MUNICIPAL STORMWATER MANAGEMENT PLAN  
VOORHEES TOWNSHIP  
CAMDEN COUNTY, NEW JERSEY

ENVIRONMENTAL RESOLUTIONS, INC. MOUNT LAUREL, NEW JERSEY

SOURCE: NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION  
EXPLORING NEW JERSEY'S WATERSHEDS  
SERIES 2 VOLUME 2

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



0 0.25 0.5 0.75 1  
Miles

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# GROUNDWATER RECHARGE AND WELLHEAD PROTECTION AREAS (WPAs)

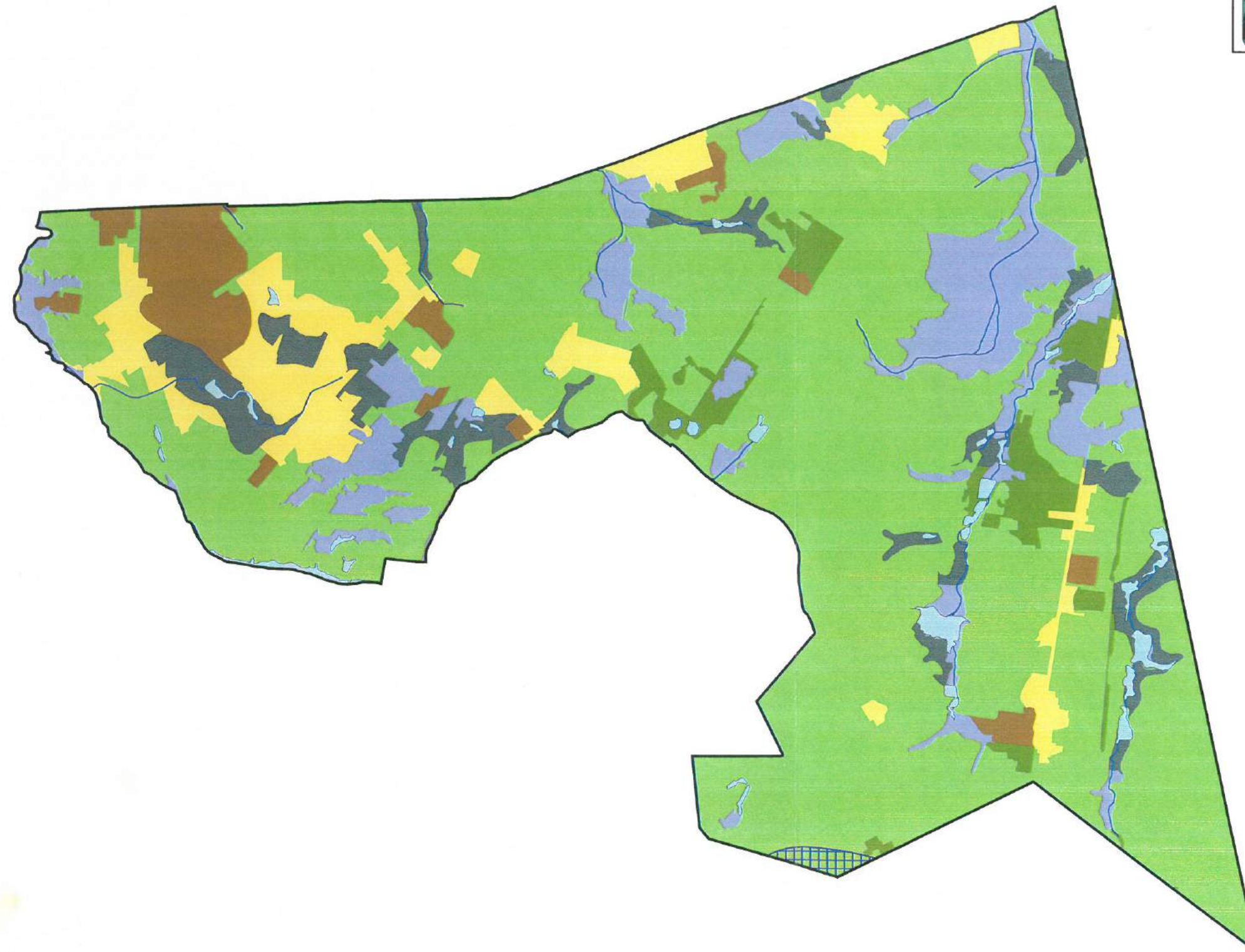


## MUNICIPAL STORMWATER MANAGEMENT PLAN VOORHEES TOWNSHIP CAMDEN COUNTY, NEW JERSEY

ENVIRONMENTAL RESOLUTIONS, INC. MOUNT LAUREL, NEW JERSEY

SOURCE: NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION  
EXPLORING NEW JERSEY'S WATERSHEDS  
SERIES 2 VOLUME 2

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



### Legend

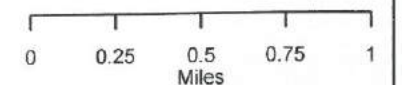
- Municipal Boundary
- Lakes
- Streams

### Wellhead Protection Areas (WPAs)

- Tier 1
- Tier 2
- Tier 3

### NJGS Groundwater Recharge Values

- 0 inches/yr
- 1 - 7 inches/yr
- 8 - 13 inches/yr
- 14 - 15 inches/yr
- 16+ inches/yr
- Hydric Soils
- Wetlands and Open Water



H:\GIS\27000\27094\_00\GW Recharge.mxd



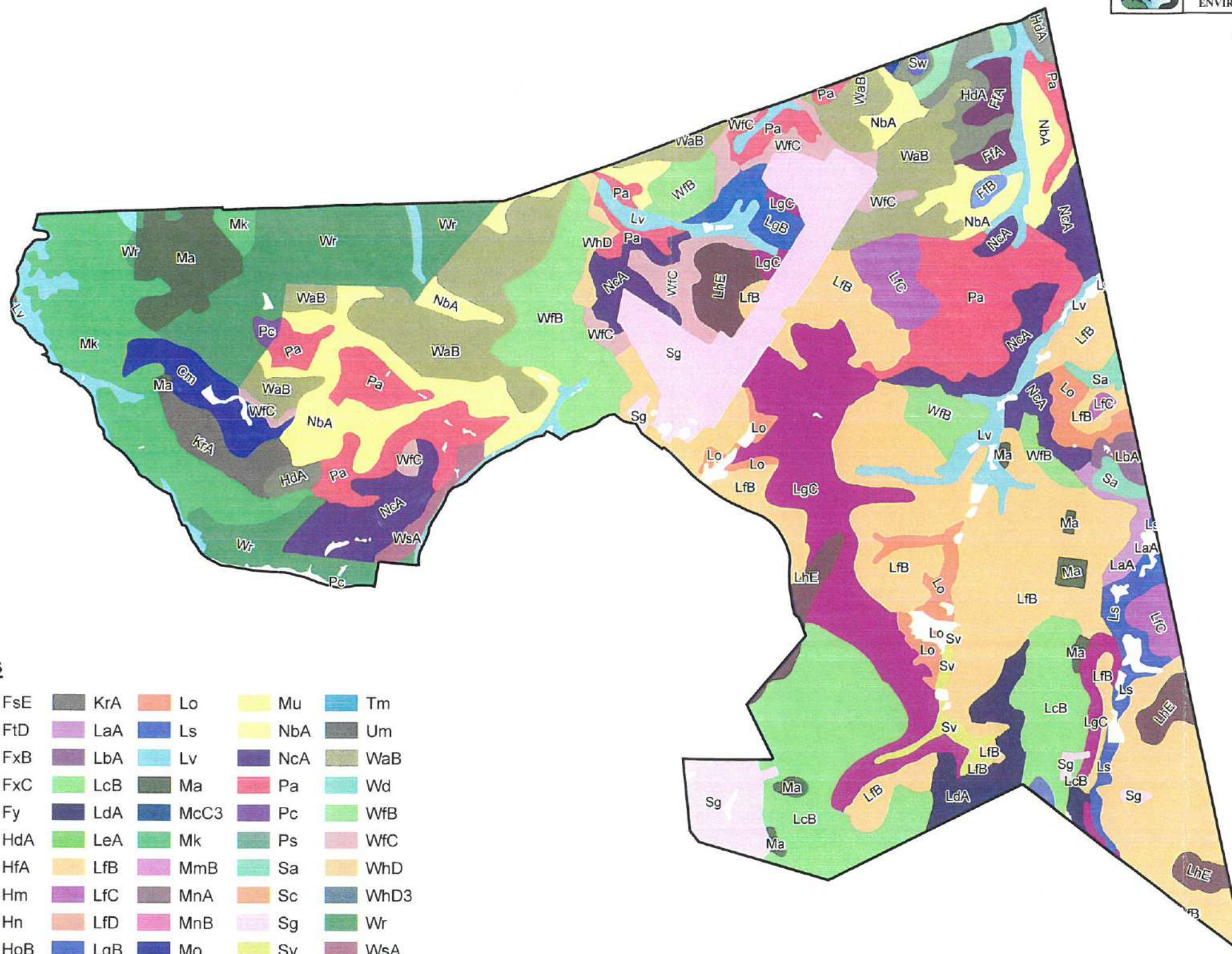
# SOIL TYPES

## MUNICIPAL STORMWATER MANAGEMENT PLAN VOORHEES TOWNSHIP CAMDEN COUNTY, NEW JERSEY

ENVIRONMENTAL RESOLUTIONS, INC. MOUNT LAUREL, NEW JERSEY

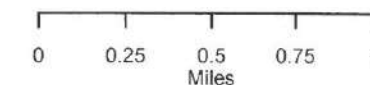
SOURCE: NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION  
EXPLORING NEW JERSEY'S WATERSHEDS  
SERIES 2 VOLUME 2

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



### Legend - Soil Types

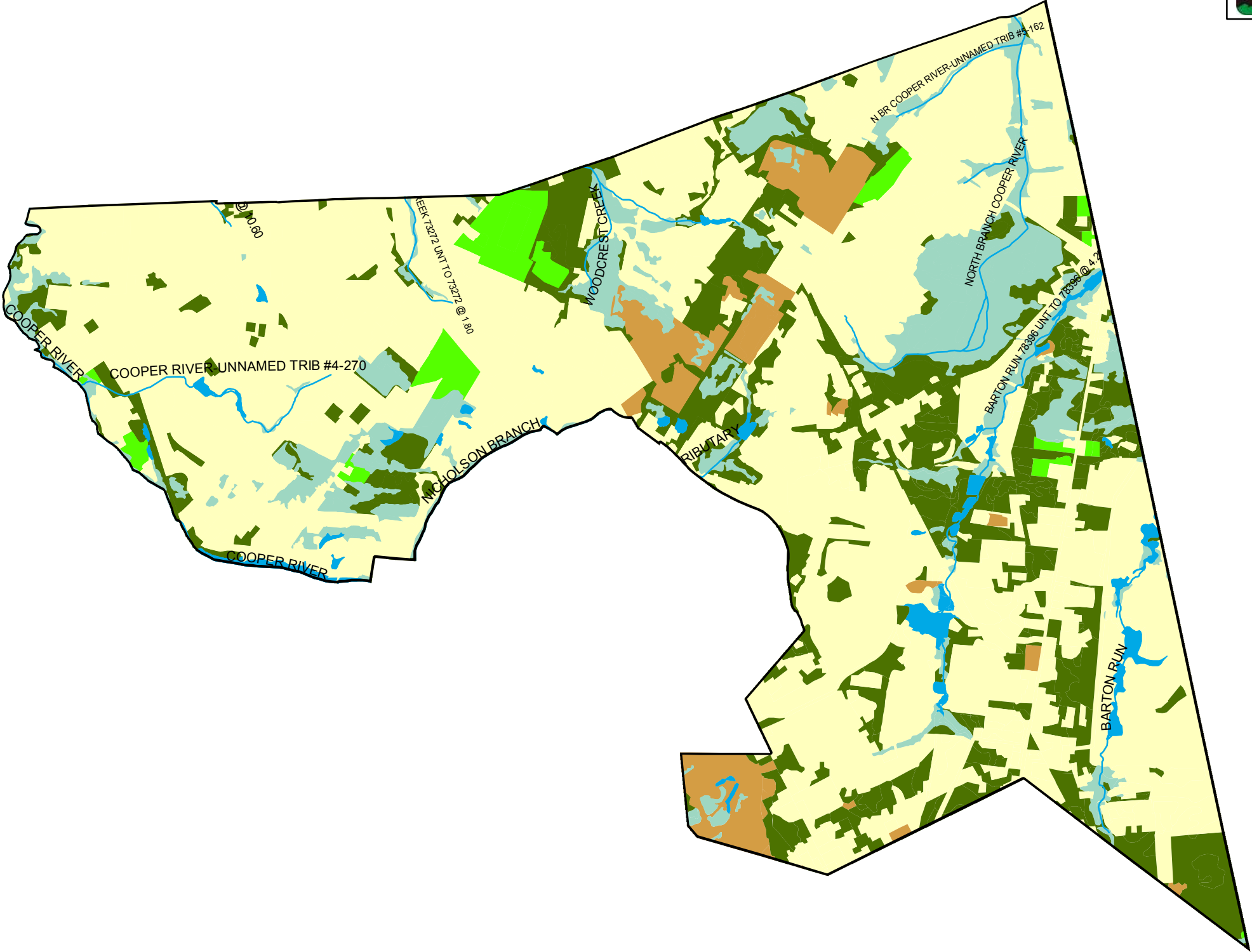
AmA	DrA	FsE	KrA	Lo	Mu	Tm
AmB	DsA	FtD	LaA	Ls	NbA	Um
ArA	DsB	FxB	LbA	Lv	NcA	WaB
ArB	DtC	FxC	LcB	Ma	Pa	Wd
AtB	DxC	Fy	LdA	McC3	Pc	WfB
AvB	Fd	HdA	LeA	Mk	Ps	WfC
Ax	FfA	HfA	LfB	MmB	Sa	WhD
Ca	FfB	Hm	LfC	MnA	Sc	WhD3
Cm	FfC	Hn	LfD	MnB	Sg	Wr
CoA	FhB	HoB	LgB	Mo	Sv	WsA
CoB	FhC	HoC	LgC	MrA	Sw	WtA
DoA	FnB	KmA	LhE	MrB	Sx	WuA





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SOURCE: NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION  
EXPLORING NEW JERSEY'S WATERSHEDS  
SERIES 2 VOLUME 2

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



Legend

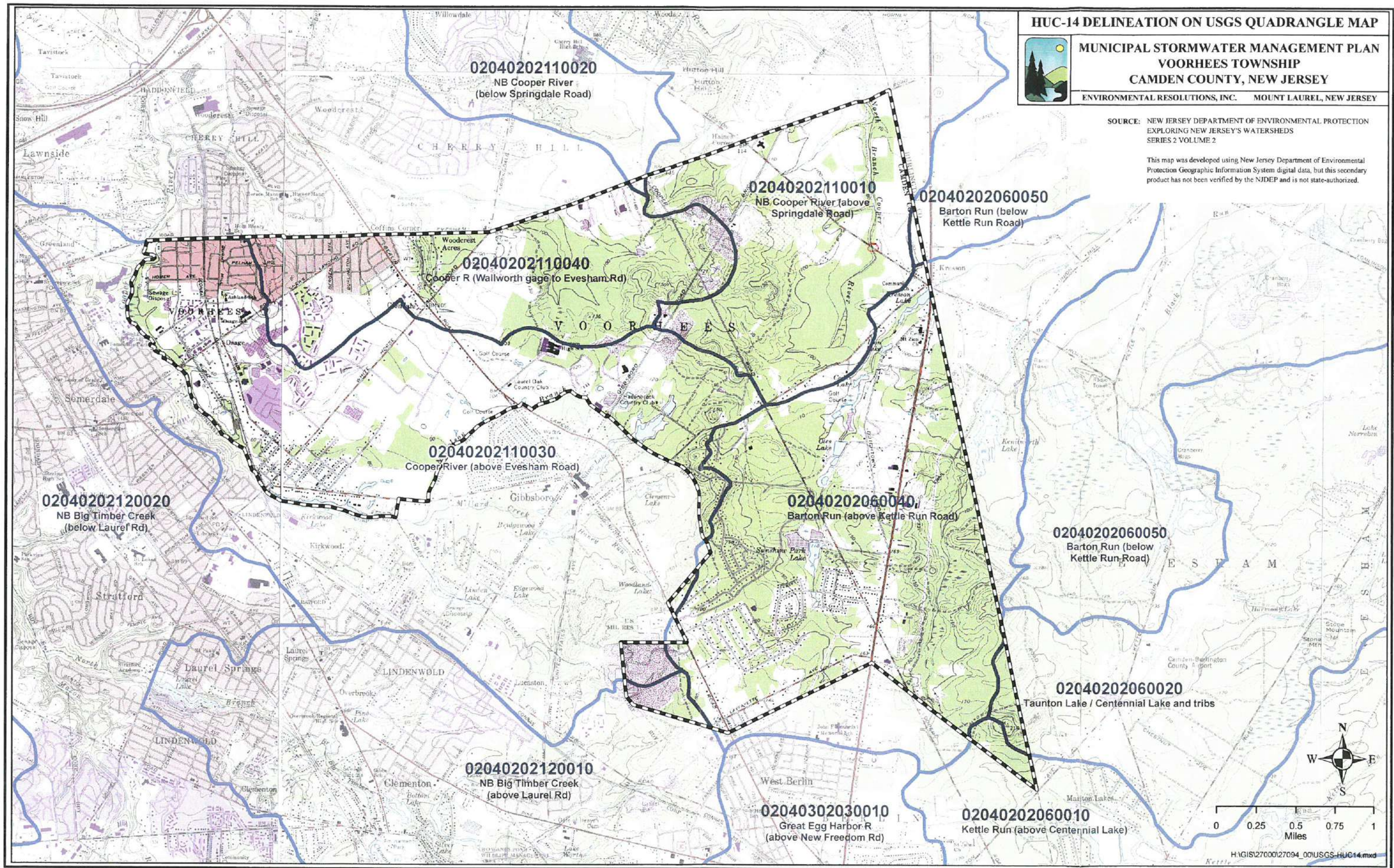
-  Municipal Boundary
-  Streams

LAND USE

-  AGRICULTURE
-  BARREN LAND
-  FOREST
-  URBAN
-  WATER
-  WETLANDS





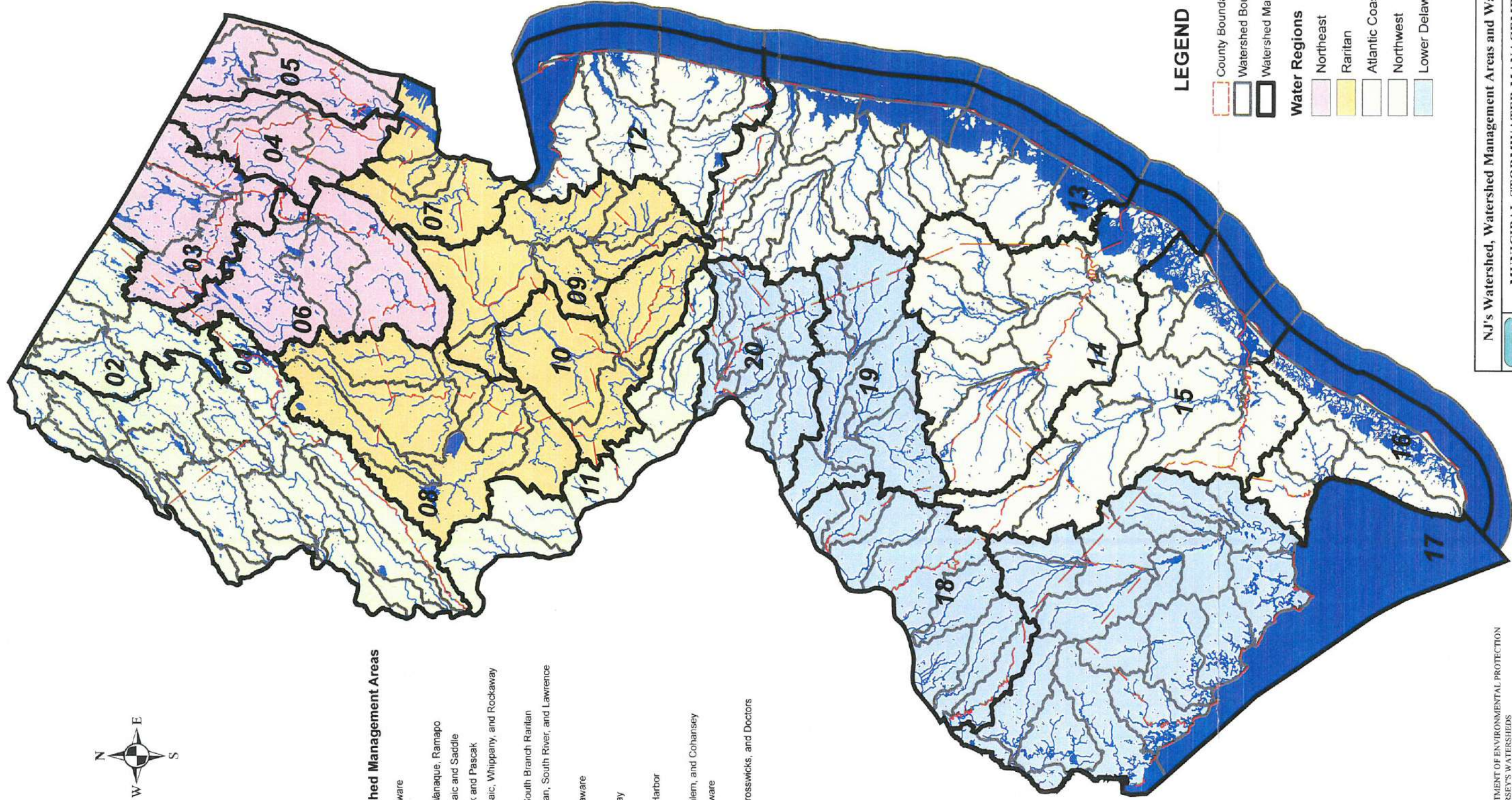






**Watershed Management Areas**

- 01. Upper Delaware
- 02. Wallkill
- 03. Pompton, Wanaque, Ramapo
- 04. Lower Passaic and Saddle
- 05. Hackensack and Pascack
- 06. Upper Passaic, Whippany, and Rockaway
- 07. Arthur Kill
- 08. North and South Branch Raritan
- 09. Lower Raritan, South River, and Lawrence
- 10. Millstone
- 11. Central Delaware
- 12. Monmouth
- 13. Barnegat Bay
- 14. Mullica
- 15. Great Egg Harbor
- 16. Cape May
- 17. Maurice, Salem, and Cohansey
- 18. Lower Delaware
- 19. Rancocas
- 20. Assiscuk, Crosswicks, and Doctors



**LEGEND**

- County Boundaries
- Watershed Boundaries
- Watershed Management Areas
- Water Regions**
  - Northeast
  - Raritan
  - Atlantic Coastal
  - Northwest
  - Lower Delaware

SOURCE:  
NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION  
EXPLORING NEW JERSEY'S WATERSHEDS  
SERIES 2 VOLUME 2

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



N.J.'s Watershed, Watershed Management Areas and Water Regions

**MUNICIPAL STORMWATER MANAGEMENT PLAN**  
**VOORHEES TOWNSHIP**  
**CAMDEN COUNTY, NEW JERSEY**

ENVIRONMENTAL RESOLUTIONS, INC. MOUNT LAUREL, NEW JERSEY

20 Miles



## FLOODPRONE AREAS



### MUNICIPAL STORMWATER MANAGEMENT PLAN VOORHEES TOWNSHIP CAMDEN COUNTY, NEW JERSEY

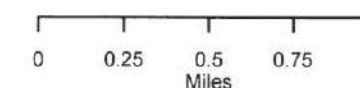
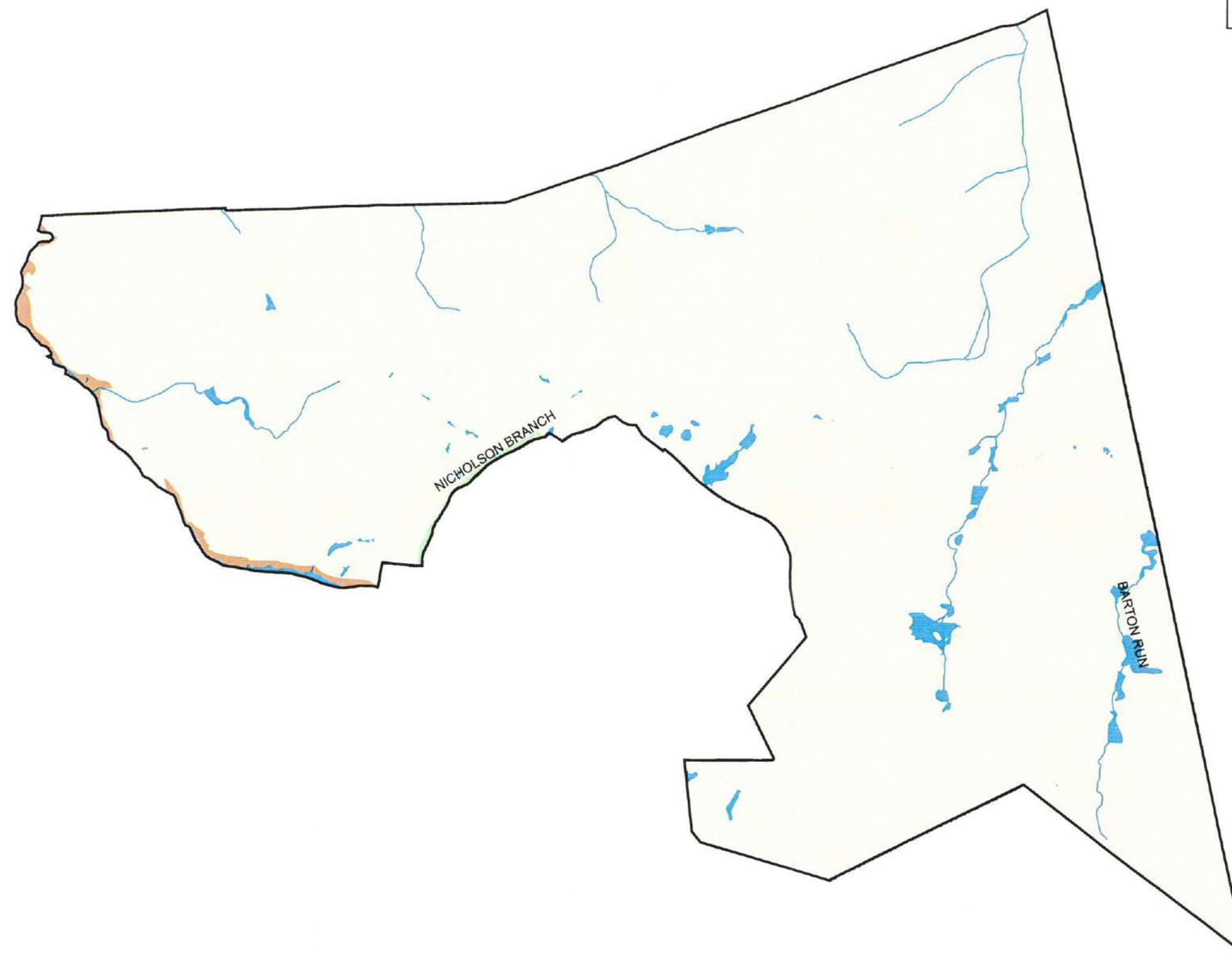
ENVIRONMENTAL RESOLUTIONS, INC. MOUNT LAUREL, NEW JERSEY

SOURCE: NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION  
EXPLORING NEW JERSEY'S WATERSHEDS  
SERIES 2 VOLUME 2

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

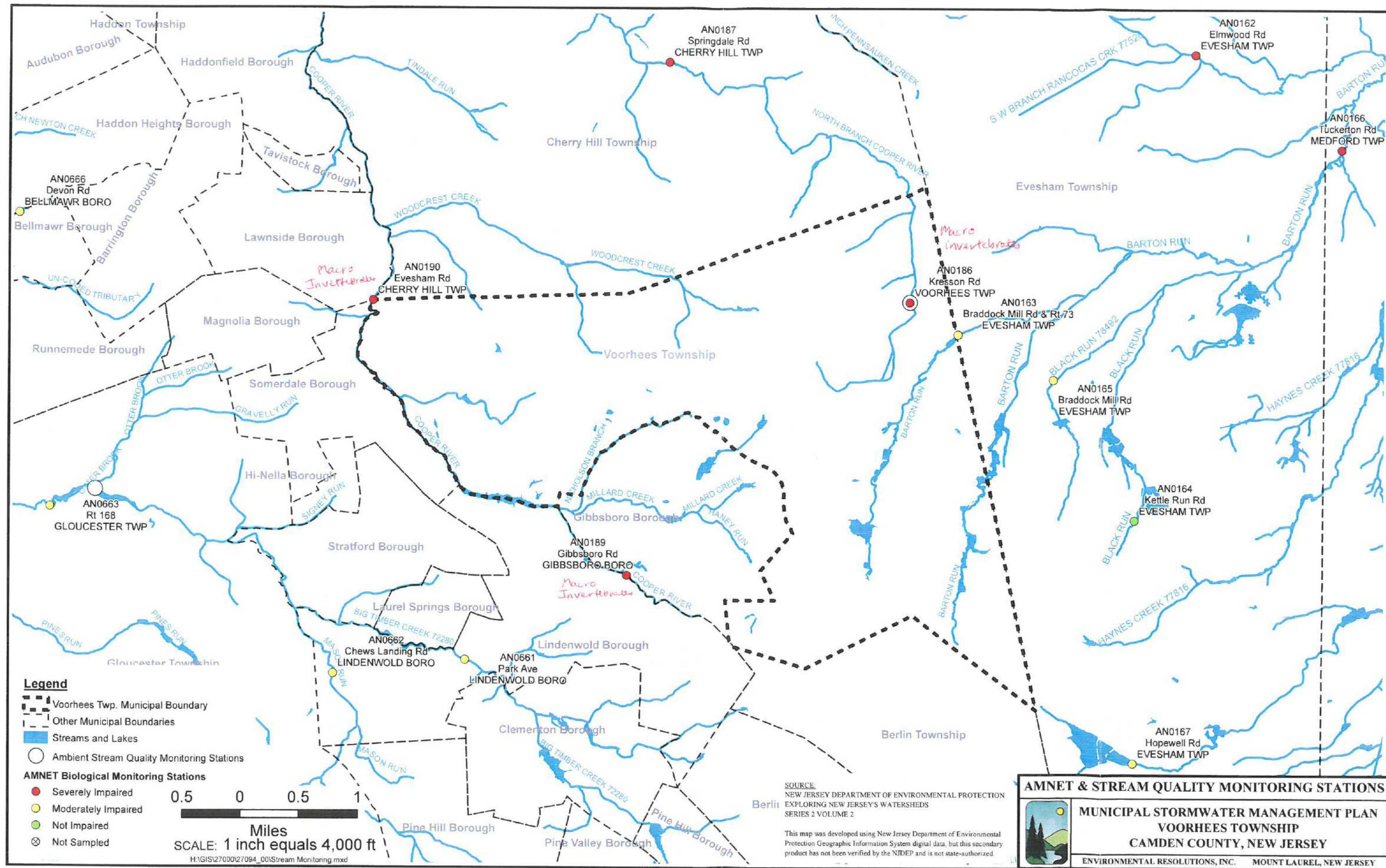
#### Legend

- Municipal Boundary
- USGS Documented Floodprone Area
- Potential Floodprone Area
- Water
- Not a Floodprone Area
- Streams



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# Attachment 1

## 2004 Integrated List of Waterbodies Watershed 18 & 19

New Jersey's 2004 Integrated List of Waterbodies  
Watershed Management Area 18 19  
Lower Delaware Rancocas

June 22, 2004

Sublist	Wtrshd Region	WMA	Station Name/Waterbody	Site ID	Parameters	Data Source
5	Lower Delaware	18	Alcyon Lake-18	Alcyon Lake	Phosphorus, Fish-Mercury	NJDEP Clean Lakes, NJDEP Fish Tissue Monitoring
4	Lower Delaware	18	Bell Lake-18	Bell Lake	Phosphorus	NJDEP Clean Lakes
1	Lower Delaware	18	Bellmawr Lake-18	Bellmawr Lake	Fecal Coliform	Camden Co HD
1	Lower Delaware	18	Bells Lake-18	Greenwood Park Bells Lake	Fecal Coliform	Gloucester Co HD
4	Lower Delaware	18	Bethel Lake-18	Bethel Lake	Phosphorus	NJDEP Clean Lakes
5	Lower Delaware	18	Big Timber Creek	Big Timber Creek	Fish-Mercury	NJDEP Fish Tissue Monitoring
4	Lower Delaware	18	Big Timber Creek N Br at Glendora	01467359	Fecal Coliform	NJDEP/USGS Data
5	Lower Delaware	18	Big Timber Creek N Br at Glendora	01467359	Phosphorus	NJDEP/USGS Data
1	Lower Delaware	18	Big Timber Creek N Br at Glendora	01467359	Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	NJDEP/USGS Data
5	Lower Delaware	18	Big Timber Creek N Br at Park Ave in Lindenwold	AN0661	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Big Timber Creek N Br at Rt 168 in Gloucester	AN0663	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Big Timber Creek S Br at Almonesson Rd in Blenheim	EWQ0659	Dissolved Oxygen, Total Suspended Solids	EWQ
1	Lower Delaware	18	Big Timber Creek S Br at Almonesson Rd in Blenheim	EWQ0659	Temperature, pH, Nitrate, Dissolved Solids, Unionized Ammonia	EWQ
5	Lower Delaware	18	Big Timber Creek S Br at Almonesson Rd in Blenheim	EWQ0659	Phosphorus	EWQ
4	Lower Delaware	18	Big Timber Creek S Br at Blackwood Terrace	01467329, 18-BIG-1	Fecal Coliform	NJDEP/USGS Data, Metal Recon
5	Lower Delaware	18	Big Timber Creek S Br at Blackwood Terrace	01467329, 18-BIG-1	Phosphorus	NJDEP/USGS Data, Metal Recon
3	Lower Delaware	18	Big Timber Creek S Br at Blackwood Terrace	01467329, 18-BIG-1	Arsenic, Cadmium, Lead, Mercury	NJDEP/USGS Data, Metal Recon
1	Lower Delaware	18	Big Timber Creek S Br at Blackwood Terrace	01467329, 18-BIG-1	Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Chromium, Copper, Nickel, Selenium, Zinc	NJDEP/USGS Data, Metal Recon
4	Lower Delaware	18	Big Timber Creek S Br at Glenloch	01467327	Fecal Coliform	NJDEP/USGS Data
3	Lower Delaware	18	Big Timber Creek S Br at Glenloch	01467327	Arsenic, Lead, Mercury, Silver	NJDEP/USGS Data



New Jersey's 2004 Integrated List of Waterbodies  
Watershed Management Area 18 19  
Lower Delaware Rancocas

June 22, 2004

Sublist	Wtrshd Region	WMA	Station Name/Waterbody	Site ID	Parameters	Data Source
1	Lower Delaware	18	Big Timber Creek S Br at Glenloch	01467327	Phosphorus, Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Cadmium, Chromium, Copper, Nickel, Selenium, Zinc	NJDEP/USGS Data
1	Lower Delaware	18	Big Timber Creek S Br at Turnersville	01467325	Phosphorus, Fecal Coliform, Temperature, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Chromium, Copper, Nickel, Selenium, Zinc	NJDEP/USGS Data
3	Lower Delaware	18	Big Timber Creek S Br at Turnersville	01467325	pH, Unionized Ammonia, Arsenic, Cadmium, Lead, Mercury, Silver	NJDEP/USGS Data
5	Lower Delaware	18	Big Timber Creek S Br at Turnersville - Sicklerville Rd in Washington	AN0658	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Big Timber Creek S Br UNK Trib at Ganttown Rd in Washington	AN0656	Benthic Macroinvertebrates	NJDEP AMNET
4	Lower Delaware	18	Blackwood Lake-18	Blackwood Lake	Phosphorus	NJDEP Clean Lakes
3	Lower Delaware	18	Chestnut Branch at Lambs Rd in Mantua	AN0670	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Chestnut Branch at Mantua Blvd in Mantua	AN0671	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Clementon Lake-18	Clementon Lake	Fish-Mercury	NJDEP Fish Tissue Monitoring
4	Lower Delaware	18	Cooper River at Haddonfield	01467150, 01467140, 18-CO-4	Fecal Coliform	NJDEP/USGS Data, Metal Recon
5	Lower Delaware	18	Cooper River at Haddonfield	01467150, 01467140, 18-CO-4	Phosphorus, Arsenic, Lead, Tetrachloroethylene	NJDEP/USGS Data, Metal Recon
3	Lower Delaware	18	Cooper River at Haddonfield	01467150, 01467140, 18-CO-4	Cadmium, Mercury	NJDEP/USGS Data, Metal Recon
1	Lower Delaware	18	Cooper River at Haddonfield	01467150, 01467140, 18-CO-4	Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Chromium, Copper, Nickel, Selenium, Zinc	NJDEP/USGS Data, Metal Recon
5	Lower Delaware	18	Cooper River at Hopkins Pond	Cooper River at Hopkins Pond	Fish-PCB, Fish-Dioxin	NJDEP Fish Tissue Monitoring
5	Lower Delaware	18	Cooper River at Kaighn Ave in Camden	1467191	Phosphorus, pH	EWQ
1	Lower Delaware	18	Cooper River at Kaighn Ave in Camden	01467191	Temperature, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	EWQ
4	Lower Delaware	18	Cooper River at Lindenwold	01467120	Fecal Coliform	NJDEP/USGS Data

New Jersey's 2004 Integrated List of Waterbodies  
Watershed Management Area 18 19  
Lower Delaware Rancocas

June 22, 2004

Sublist	Wtrshd Region	WMA	Station Name/Waterbody	Site ID	Parameters	Data Source
5	Lower Delaware	18	Cooper River at Lindenwold	01467120	Phosphorus	NJDEP/USGS Data
5	Lower Delaware	18	Cooper River at Rt 130 at Camden	18-CO-1	Arsenic, Lead, Mercury, Tetrachloroethylene	NJDEP Metal Recon
3	Lower Delaware	18	Cooper River at Rt 130 at Camden	18-CO-1	Cadmium, Mercury	NJDEP Metal Recon
1	Lower Delaware	18	Cooper River at Rt 130 at Camden	18-CO-1	Chromium, Copper, Nickel, Selenium, Zinc	NJDEP Metal Recon
3	Lower Delaware	18	Cooper River Lake-18	Cooper River Lake	Phosphorus	NJDEP Clean Lakes, NJDEP Fish Tissue Monitoring
5	Lower Delaware	18	Cooper River Lake-18	Cooper River Lake	Fish-PCB, Fish-Dioxin	NJDEP Clean Lakes, NJDEP Fish Tissue Monitoring
4	Lower Delaware	18	Cooper River N Br at Kresson	01467155, 18-CO-2	Fecal Coliform	NJDEP/USGS Data, Metal Recon
5	Lower Delaware	18	Cooper River N Br at Kresson	01467155, 18-CO-2	Phosphorus, Dissolved Oxygen, pH, Arsenic	NJDEP/USGS Data, Metal Recon
3	Lower Delaware	18	Cooper River N Br at Kresson	01467155, 18-CO-2	Cadmium, Mercury	NJDEP/USGS Data, Metal Recon
1	Lower Delaware	18	Cooper River N Br at Kresson	01467155, 18-CO-2	Temperature, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Chromium, Copper, Lead, Nickel, Selenium, Zinc	NJDEP/USGS Data, Metal Recon
3	Lower Delaware	18	Cooper River N Br at Kresson Rd in Voorhees	AN0186	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Cooper River N Br at River Dr in Cherry Hill	AN0188	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Cooper River N Br at Springdale Rd in Cherry Hill	AN0187	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Cooper River S Br at Evesham Rd in Cherry Hill	AN0190	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Cooper River S Br at Gibbsboro Rd in Gibbsboro	AN0189	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Cooper River S Br at Rt 41 in Cherry Hill	AN0191	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Cooper River, spillway below Evans Pond	Cooper River, spillway below Evans Pond	Fish-PCB, Fish-Dioxin	NJDEP Fish Tissue Monitoring
5	Lower Delaware	18	Edwards Run at Jefferson	01475090	Phosphorus, Fecal Coliform	NJDEP/USGS Data
1	Lower Delaware	18	Edwards Run at Jefferson	01475090	Temperature, Dissolved Oxygen, pH, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	NJDEP/USGS Data
5	Lower Delaware	18	Edwards Run at Jessups Mill Rd in Mantua	AN0674	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Edwards Run at Pitman - Jefferson Rd in Harrison	AN0673	Benthic Macroinvertebrates	NJDEP AMNET

New Jersey's 2004 Integrated List of Waterbodies  
Watershed Management Area 18 19  
Lower Delaware Rancocas

June 22, 2004

Sublist	Wtrshd Region	WMA	Station Name/Waterbody	Site ID	Parameters	Data Source
3	Lower Delaware	18	Evans Lake-18	Evans Lake	Phosphorus	NJDEP Clean Lakes
5	Lower Delaware	18	Evans Pond-18	Evans Pond	Fish-PCB, Fish-Dioxin	NJDEP Fish Tissue Monitoring
1	Lower Delaware	18	Gilman Lake-18	Lake Gilman	Fecal Coliform	Gloucester Co HD
3	Lower Delaware	18	Greenwich Lake-18	Greenwich Lake	Phosphorus	NJDEP Clean Lakes
5	Lower Delaware	18	Grenloch Lake-18	Grenloch Lake	Phosphorus	NJDEP Clean Lakes
3	Lower Delaware	18	Haddon Lake-18	Haddon Lake	Phosphorus	NJDEP Clean Lakes
4	Lower Delaware	18	Harrisonville Lake-18	Harrisonville Lake	Phosphorus	NJDEP Clean Lakes
1	Lower Delaware	18	Hurff Lake	Hurff Lake	Fecal Coliform	Gloucester Co HD
1	Lower Delaware	18	Kandle Lake-18	Lake Kandle	Fecal Coliform	Gloucester Co HD
4	Lower Delaware	18	Kirkwood Lake-18	Kirkwood Lake	Phosphorus	NJDEP Clean Lakes
5	Lower Delaware	18	Lake Silvestro	Lake Silvestro	Fecal Coliform	Gloucester Co HD
5	Lower Delaware	18	Linden Lake-18	Linden Lake	Fish-Mercury	NJDEP Fish Tissue Monitoring
5	Lower Delaware	18	Little Timber Creek	Little Timber Creek	Fish-Mercury	NJDEP Fish Tissue Monitoring
3	Lower Delaware	18	Little Timber Creek at Devon Rd in Bellmawr	AN0666	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Little Timber Creek at Paulsboro Rd in Logan	AN0678	Benthic Macroinvertebrates	NJDEP AMNET
1	Lower Delaware	18	Mantua Creek at Greentree Rd in Glassboro	AN0668	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Mantua Creek at Lambs Rd in Mantua	AN0669	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Mantua Creek at Mantua Ave in Wenonah	AN0672	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Mantua Creek at Rt 45 in W. Deptford	01475045	Phosphorus	EWQ
1	Lower Delaware	18	Mantua Creek at Rt 45 in W. Deptford	01475045	Temperature, Dissolved Oxygen, pH, Nitrate, Dissolved Oxygen, Total Suspended Solids, Unionized Ammonia	EWQ
5	Lower Delaware	18	Marlton Lake-18	Marlton Lake	Fish-Mercury	NJDEP Fish Tissue Monitoring
3	Lower Delaware	18	Mason Run at Chews Landing Rd in Lindenwold	AN0662	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Narraticon Lake-18	Narraticon Lake	Phosphorus	NJDEP Clean Lakes
5	Lower Delaware	18	Newton Creek	Newton Creek	Copper, Zinc	304(l)
5	Lower Delaware	18	Newton Creek at Rt 168 in W Collingswood	EWQ0653	pH, Phosphorus	EWQ
1	Lower Delaware	18	Newton Creek at Rt 168 in W Collingswood	EWQ0653	Temperature, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	EWQ

New Jersey's 2004 Integrated List of Waterbodies  
Watershed Management Area 18 19  
Lower Delaware Rancocas

June 22, 2004

Sublist	Wtrshd Region	WMA	Station Name/Waterbody	Site ID	Parameters	Data Source
5	Lower Delaware	18	Alcyon Lake-18	Alcyon Lake	Phosphorus, Fish-Mercury	NJDEP Clean Lakes, NJDEP Fish Tissue Monitoring
4	Lower Delaware	18	Bell Lake-18	Bell Lake	Phosphorus	NJDEP Clean Lakes
1	Lower Delaware	18	Bellmawr Lake-18	Bellmawr Lake	Fecal Coliform	Camden Co HD
1	Lower Delaware	18	Bells Lake-18	Greenwood Park Bells Lake	Fecal Coliform	Gloucester Co HD
4	Lower Delaware	18	Bethel Lake-18	Bethel Lake	Phosphorus	NJDEP Clean Lakes
5	Lower Delaware	18	Big Timber Creek	Big Timber Creek	Fish-Mercury	NJDEP Fish Tissue Monitoring
4	Lower Delaware	18	Big Timber Creek N Br at Glendora	01467359	Fecal Coliform	NJDEP/USGS Data
5	Lower Delaware	18	Big Timber Creek N Br at Glendora	01467359	Phosphorus	NJDEP/USGS Data
1	Lower Delaware	18	Big Timber Creek N Br at Glendora	01467359	Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	NJDEP/USGS Data
5	Lower Delaware	18	Big Timber Creek N Br at Park Ave in Lindenwold	AN0661	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Big Timber Creek N Br at Rt 168 In Gloucester	AN0663	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Big Timber Creek S Br at Almonesson Rd in Blenheim	EWQ0659	Dissolved Oxygen, Total Suspended Solids	EWQ
1	Lower Delaware	18	Big Timber Creek S Br at Almonesson Rd in Blenheim	EWQ0659	Temperature, pH, Nitrate, Dissolved Solids, Unionized Ammonia	EWQ
5	Lower Delaware	18	Big Timber Creek S Br at Almonesson Rd in Blenheim	EWQ0659	Phosphorus	EWQ
4	Lower Delaware	18	Big Timber Creek S Br at Blackwood Terrace	01467329, 18-BIG-1	Fecal Coliform	NJDEP/USGS Data, Metal Recon
5	Lower Delaware	18	Big Timber Creek S Br at Blackwood Terrace	01467329, 18-BIG-1	Phosphorus	NJDEP/USGS Data, Metal Recon
3	Lower Delaware	18	Big Timber Creek S Br at Blackwood Terrace	01467329, 18-BIG-1	Arsenic, Cadmium, Lead, Mercury	NJDEP/USGS Data, Metal Recon
1	Lower Delaware	18	Big Timber Creek S Br at Blackwood Terrace	01467329, 18-BIG-1	Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Chromium, Copper, Nickel, Selenium, Zinc	NJDEP/USGS Data, Metal Recon
4	Lower Delaware	18	Big Timber Creek S Br at Glenloch	01467327	Fecal Coliform	NJDEP/USGS Data

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3	Lower Delaware	18	Big Timber Creek S Br at Glenloch	01467327	Arsenic, Lead, Mercury, Silver	NJDEP/USGS Data
1	Lower Delaware	18	Big Timber Creek S Br at Glenloch	01467327	Phosphorus, Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Cadmium, Chromium, Copper, Nickel, Selenium, Zinc	NJDEP/USGS Data
1	Lower Delaware	18	Big Timber Creek S Br at Turnersville	01467325	Phosphorus, Fecal Coliform, Temperature, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Chromium, Copper, Nickel, Selenium, Zinc	NJDEP/USGS Data
3	Lower Delaware	18	Big Timber Creek S Br at Turnersville	01467325	pH, Unionized Ammonia, Arsenic, Cadmium, Lead, Mercury, Silver	NJDEP/USGS Data
5	Lower Delaware	18	Big Timber Creek S Br at Turnersville - Sicklerville Rd in Washington	AN0658	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Big Timber Creek S Br UNK Trib at Ganttown Rd in Washington	AN0656	Benthic Macroinvertebrates	NJDEP AMNET
4	Lower Delaware	18	Blackwood Lake-18	Blackwood Lake	Phosphorus	NJDEP Clean Lakes
3	Lower Delaware	18	Chestnut Branch at Lambs Rd in Mantua	AN0670	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Chestnut Branch at Mantua Blvd in Mantua	AN0671	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Clementon Lake-18	Clementon Lake	Fish-Mercury	NJDEP Fish Tissue Monitoring
4	Lower Delaware	18	Cooper River at Haddonfield	01467150, 01467140, 18-CO-4	Fecal Coliform	NJDEP/USGS Data, Metal Recon
5	Lower Delaware	18	Cooper River at Haddonfield	01467150, 01467140, 18-CO-4	Phosphorus, Arsenic, Lead, Tetrachloroethylene	NJDEP/USGS Data, Metal Recon
3	Lower Delaware	18	Cooper River at Haddonfield	01467150, 01467140, 18-CO-4	Cadmium, Mercury	NJDEP/USGS Data, Metal Recon
1	Lower Delaware	18	Cooper River at Haddonfield	01467150, 01467140, 18-CO-4	Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Chromium, Copper, Nickel, Selenium, Zinc	NJDEP/USGS Data, Metal Recon
5	Lower Delaware	18	Cooper River at Hopkins Pond	Cooper River at Hopkins Pond	Fish-PCB, Fish-Dioxin	NJDEP Fish Tissue Monitoring
5	Lower Delaware	18	Cooper River at Kaighn Ave in Camden	1467191	Phosphorus, pH	EWQ



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1	Lower Delaware	18	Cooper River at Kaighn Ave in Camden	01467191	Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	EWQ
4	Lower Delaware	18	Cooper River at Lindenwold	01467120	Fecal Coliform	NJDEP/USGS Data
5	Lower Delaware	18	Cooper River at Lindenwold	01467120	Phosphorus	NJDEP/USGS Data
5	Lower Delaware	18	Cooper River at Rt 130 at Camden	18-CO-1	Arsenic, Lead, Mercury, Tetrachloroethylene	NJDEP Metal Recon
3	Lower Delaware	18	Cooper River at Rt 130 at Camden	18-CO-1	Cadmium, Mercury	NJDEP Metal Recon
1	Lower Delaware	18	Cooper River at Rt 130 at Camden	18-CO-1	Chromium, Copper, Nickel, Selenium, Zinc	NJDEP Metal Recon
3	Lower Delaware	18	Cooper River Lake-18	Cooper River Lake	Phosphorus	NJDEP Clean Lakes, NJDEP Fish Tissue Monitoring
5	Lower Delaware	18	Cooper River Lake-18	Cooper River Lake	Fish-PCB, Fish-Dioxin	NJDEP Clean Lakes, NJDEP Fish Tissue Monitoring
4	Lower Delaware	18	Cooper River N Br at Kresson	01467155, 18-CO-2	Fecal Coliform	NJDEP/USGS Data, Metal Recon
5	Lower Delaware	18	Cooper River N Br at Kresson	01467155, 18-CO-2	Phosphorus, Dissolved Oxygen, pH, Arsenic	NJDEP/USGS Data, Metal Recon
3	Lower Delaware	18	Cooper River N Br at Kresson	01467155, 18-CO-2	Cadmium, Mercury	NJDEP/USGS Data, Metal Recon
1	Lower Delaware	18	Cooper River N Br at Kresson	01467155, 18-CO-2	Temperature, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Chromium, Copper, Lead, Nickel, Selenium, Zinc	NJDEP/USGS Data, Metal Recon
3	Lower Delaware	18	Cooper River N Br at Kresson Rd in Voorhees	AN0186	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Cooper River N Br at River Dr in Cherry Hill	AN0188	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Cooper River N Br at Springdale Rd in Cherry Hill	AN0187	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Cooper River S Br at Evesham Rd in Cherry Hill	AN0190	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Cooper River S Br at Gibbsboro Rd in Gibbsboro	AN0189	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Cooper River S Br at Rt 41 in Cherry Hill	AN0191	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Cooper River, spillway below Evans Pond	Cooper River, spillway below Evans Pond	Fish-PCB, Fish-Dioxin	NJDEP Fish Tissue Monitoring

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5	Lower Delaware	18	Edwards Run at Jefferson	01475090	Phosphorus , Fecal Coliform	NJDEP/USGS Data
1	Lower Delaware	18	Edwards Run at Jefferson	01475090	Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	NJDEP/USGS Data
5	Lower Delaware	18	Edwards Run at Jessups Mill Rd in Mantua	AN0674	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Edwards Run at Pitman - Jefferson Rd in Harrison	AN0673	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Evans Lake-18	Evans Lake	Phosphorus	NJDEP Clean Lakes
5	Lower Delaware	18	Evans Pond-18	Evans Pond	Fish-PCB, Fish-Dioxin	NJDEP Fish Tissue Monitoring
1	Lower Delaware	18	Gilman Lake-18	Lake Gilman	Fecal Coliform	Gloucester Co HD
3	Lower Delaware	18	Greenwich Lake-18	Greenwich Lake	Phosphorus	NJDEP Clean Lakes
5	Lower Delaware	18	Grenloch Lake-18	Grenloch Lake	Phosphorus	NJDEP Clean Lakes
3	Lower Delaware	18	Haddon Lake-18	Haddon Lake	Phosphorus	NJDEP Clean Lakes
4	Lower Delaware	18	Harrisonville Lake-18	Harrisonville Lake	Phosphorus	NJDEP Clean Lakes
1	Lower Delaware	18	Hurff Lake	Hurff Lake	Fecal Coliform	Gloucester Co HD
1	Lower Delaware	18	Kandle Lake-18	Lake Kandle	Fecal Coliform	Gloucester Co HD
4	Lower Delaware	18	Kirkwood Lake-18	Kirkwood Lake	Phosphorus	NJDEP Clean Lakes
5	Lower Delaware	18	Lake Silvestro	Lake Silvestro	Fecal Coliform	Gloucester Co HD
5	Lower Delaware	18	Linden Lake-18	Linden Lake	Fish-Mercury	NJDEP Fish Tissue Monitoring
5	Lower Delaware	18	Little Timber Creek	Little Timber Creek	Fish-Mercury	NJDEP Fish Tissue Monitoring
3	Lower Delaware	18	Little Timber Creek at Devon Rd in Bellmawr	AN0666	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Little Timber Creek at Paulsboro Rd in Logan	AN0678	Benthic Macroinvertebrates	NJDEP AMNET
1	Lower Delaware	18	Mantua Creek at Greentree Rd in Glassboro	AN0668	Benthic Macroinvertebrates	NJDEP AMNET

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3	Lower Delaware	18	Mantua Creek at Lambs Rd in Mantua	AN0669	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Mantua Creek at Mantua Ave in Wenonah	AN0672	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Mantua Creek at Rt 45 in W. Deptford	01475045	Phosphorus	EWQ
1	Lower Delaware	18	Mantua Creek at Rt 45 in W. Deptford	01475045	Nitrate, Dissolved Oxygen, Total Suspended Solids, Unionized Ammonia	EWQ
5	Lower Delaware	18	Marlton Lake-18	Marlton Lake	Fish-Mercury	NJDEP Fish Tissue Monitoring
3	Lower Delaware	18	Mason Run at Chews Landing Rd in Lindenwold	AN0662	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Narriticon Lake-18	Narriticon Lake	Phosphorus	NJDEP Clean Lakes
5	Lower Delaware	18	Newton Creek	Newton Creek	Copper, Zinc	304(l)
5	Lower Delaware	18	Newton Creek at Rt 168 in W Collingswood	EWQ0653	pH, Phosphorus	EWQ
1	Lower Delaware	18	Newton Creek at Rt 168 in W Collingswood	EWQ0653	Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	EWQ
5	Lower Delaware	18	Newton Creek N Br	Newton Creek N Br	Fish-Mercury	NJDEP Fish Tissue Monitoring
5	Lower Delaware	18	Newton Creek S Br	Newton Creek S Br	Fish-Mercury	NJDEP Fish Tissue Monitoring
3	Lower Delaware	18	Newton Creek S Br at Rt 168 in Mount Ephraim	AN0654	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Newton Lake-18	Newton Lake	Fish-PCB, Fish-Dioxin	NJDEP Fish Tissue Monitoring
3	Lower Delaware	18	Oldmans Creek at Jessups Mill	01477440	pH, Dissolved Solids, Total Suspended Solids	NJDEP/USGS Data
1	Lower Delaware	18	Oldmans Creek at Jessups Mill	01477440	Phosphorus, Temperature, Dissolved Oxygen, Nitrate, Unionized Ammonia	NJDEP/USGS Data
4	Lower Delaware	18	Oldmans Creek at Jessups Mill	01477440	Fecal Coliform	NJDEP/USGS Data
3	Lower Delaware	18	Oldmans Creek at Lk Rd in South Harrison	AN0687	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Oldmans Creek at Pointers - Auburn Rd in Auburn	EWQ0689	Phosphorus, Total Suspended Solids	EWQ
3	Lower Delaware	18	Oldmans Creek at Pointers - Auburn Rd in Auburn	EWQ0689	Dissolved Oxygen	EWQ

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1	Lower Delaware	18	Oldmans Creek at Pointers - Auburn Rd in Auburn	EWQ0689	Temperature, pH, Nitrate, Dissolved Solids, Unionized Ammonia	EWQ
1	Lower Delaware	18	Oldmans Creek at Porches Mill	01477510	Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	NJDEP/USGS Data
4	Lower Delaware	18	Oldmans Creek at Porches Mill	01477510	Fecal Coliform	NJDEP/USGS Data
5	Lower Delaware	18	Oldmans Creek at Porches Mill	01477510	Phosphorus	NJDEP/USGS Data
3	Lower Delaware	18	Oldmans Creek at Swedesboro-Monroeville Rd in South Harrison	AN0686	Benthic Macroinvertebrates	NJDEP AMNET
1	Lower Delaware	18	Oldmans Creek Lake-18	Oldmans Creek Lake	Fecal Coliform	Gloucester Co HD
1	Lower Delaware	18	Pargy Creek at Swedesboro Ave in E G	EWQ0677	Phosphorus, Temperature, Dissolved Oxygen, pH, Nitrate, Dissolved Solids, Unionized Ammonia	EWQ
3	Lower Delaware	18	Pargy Creek at Swedesboro Ave in E G	EWQ0677	Total Suspended Solids	EWQ
3	Lower Delaware	18	Pargy Creek at Swedesboro Ave in East Greenwich	AN0677	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Pennsauken Creek	Pennsauken Creek, Mainstem	Arsenic, Cadmium, Chromium, Copper, Lead, Mercury	304(l)
5	Lower Delaware	18	Pennsauken Creek at Forked Landing	Pennsauken Creek at Forked Landing	Fish-PCB, Fish-Dioxin	NJDEP Fish Tissue Monitoring
5	Lower Delaware	18	Pennsauken Creek at Rt 130 in Pennsauken	01467082	Phosphorus	EWQ
1	Lower Delaware	18	Pennsauken Creek at Rt 130 in Pennsauken	01467082	Suspended Solids, Unionized Ammonia	EWQ
3	Lower Delaware	18	Pennsauken Creek at Rt 130 in Pennsauken	01467082	Temperature, Dissolved Solids	EWQ
3	Lower Delaware	18	Pennsauken Creek N Br at Church Rd in Mount Laurel	AN0178	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Pennsauken Creek N Br at Fellowship Rd in Cherry Hill	Pennsauken Creek N Br at Fellowship Rd in Cherry Hill	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Pennsauken Creek N Br at Fellowship Rd in Mount Laurel	AN0179	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Pennsauken Creek N Br near Morrestown	01467069, 18-PE-1, 18-PE-2	Cadmium, Mercury	NJDEP/USGS Data, Metal Recon



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1	Lower Delaware	18	Pennsauken Creek N Br near Morrestown	01467069, 18-PE-1, 18-PE-2	Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Chromium, Copper, Lead, Nickel, Selenium, Zinc	NJDEP/USGS Data, Metal Recon
4	Lower Delaware	18	Pennsauken Creek N Br near Morrestown	01467069, 18-PE-1, 18-PE-2	Fecal Coliform	NJDEP/USGS Data, Metal Recon
5	Lower Delaware	18	Pennsauken Creek N Br near Morrestown	01467069, 18-PE-1, 18-PE-2	Phosphorus, Arsenic	NJDEP/USGS Data, Metal Recon
3	Lower Delaware	18	Pennsauken Creek S Br at Cherry Hill	01467081, 18-PE-3	Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Zinc	NJDEP/USGS Data, Metal Recon
1	Lower Delaware	18	Pennsauken Creek S Br at Cherry Hill	01467081, 18-PE-3	Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Unionized Ammonia	NJDEP/USGS Data, Metal Recon
4	Lower Delaware	18	Pennsauken Creek S Br at Cherry Hill	01467081, 18-PE-3	Fecal Coliform	NJDEP/USGS Data, Metal Recon
5	Lower Delaware	18	Pennsauken Creek S Br at Cherry Hill	01467081, 18-PE-3	Phosphorus, Total Suspended Solids, Arsenic	NJDEP/USGS Data, Metal Recon
5	Lower Delaware	18	Pennsauken Creek S Br at Greentree Rd in Evesham	AN0182	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Pennsauken Creek S Br at Rt 41 in Cherry Hill	AN0183	Benthic Macroinvertebrates	NJDEP AMNET
1	Lower Delaware	18	Pine Hill Scout Camp Lake-18	Camp Pine Hill	Fecal Coliform	Camden Co HD
5	Lower Delaware	18	Plank Run at Rt 322 in Harrison	AN0670A	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Pompeston Creek at Rt 130 in Cinnaminson	AN0177	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Raccoon Creek at Ellis Mill Rd in Elk	AN0679	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Raccoon Creek at Tomlin Sta Rd in Harrison	AN0683	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Raccoon Creek near Swedesboro	01477120, 18-RAC-1	Arsenic, Cadmium, Mercury	NJDEP/USGS Data, Metal Recon
1	Lower Delaware	18	Raccoon Creek near Swedesboro	01477120, 18-RAC-1	Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Chromium, Copper, Lead, Nickel, Selenium, Zinc	NJDEP/USGS Data, Metal Recon
4	Lower Delaware	18	Raccoon Creek near Swedesboro	01477120, 18-RAC-1	Fecal Coliform	NJDEP/USGS Data, Metal Recon

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5	Lower Delaware	18	Raccoon Creek near Swedesboro	01477120, 18-RAC-1	Phosphorus, Silver	NJDEP/USGS Data, Metal Recon
5	Lower Delaware	18	Raccoon Creek S Br at High St in Harrison	AN0682	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Raccoon Creek S Br at Swedesboro Rd in South Harrison	AN0681	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Rattling Run at Tomlin Rd in East Greenwich	AN0676	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Stewart Lake-18	Stewart Lake	Fish-PCB, Fish-Dioxin	NJDEP Fish Tissue Monitoring
3	Lower Delaware	18	Still Run at Quaker Rd in East Greenwich	AN0675	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Still Run at Union Rd in E Greenwich	AN0675A	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Still Run near Mickelton	01476600	Phosphorus, pH	NJDEP/USGS Data
1	Lower Delaware	18	Still Run near Mickelton	01476600	Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	NJDEP/USGS Data
4	Lower Delaware	18	Still Run near Mickelton	01476600	Fecal Coliform	NJDEP/USGS Data
5	Lower Delaware	18	Stone Bridge Branch above Waddell's Bridge in Gloucester	AN0655A	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Stone Bridge Branch below Waddell's Bridge in Gloucester	AN0655B	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Stone Bridge Branch trib at Waddell Farm in Gloucester	AN0655	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Stawbridge Lake-18	Stawbridge Lake	Fish-PCB, Fish-Dioxin	NJDEP Clean Lakes, NJDEP Fish Tissue Monitoring
4	Lower Delaware	18	Stawbridge Lake-18	Stawbridge Lake	Phosphorus	NJDEP Clean Lakes, NJDEP Fish Tissue Monitoring
3	Lower Delaware	18	Swedes Run at Rt 130 in Delran	EWQ00176	Dissolved Oxygen	EWQ
1	Lower Delaware	18	Swedes Run at Rt 130 in Delran	EWQ00176	Phosphorus, Temperature, pH, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	EWQ
5	Lower Delaware	18	Swedes Run at Rt 130 in Delran	AN0176	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Toms Dam Branch at Peter Cheeseaman Rd in Gloucester	AN0658A	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Turners Run at Last Bridge Crossing in Washington	AN0657	Benthic Macroinvertebrates	NJDEP AMNET



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1	Lower Delaware	18	Washington Lake-18	Washington Township Lake	Fecal Coliform	Gloucester Co HD
1	Lower Delaware	18	Wenonah Lake-18	Wenonah Lake Playground	Fecal Coliform	Gloucester Co HD
5	Lower Delaware	18	Woodbury Creek at Rt 45, Woodbury Ck Park in Woodbury	01474730	pH	EWQ
3	Lower Delaware	18	Woodbury Creek at Rt 45, Woodbury Creek Park in Woodbury	01474730	Phosphorus	EWQ
1	Lower Delaware	18	Woodbury Creek at Rt 45, Woodbury Creek Park, in Woodbury	01474730	Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	EWQ
4	Lower Delaware	18	Woodbury Lake-18	Woodbury Lake	Phosphorus	NJDEP Clean Lakes
3	Lower Delaware	19	Barton Run at Braddock Mill Rd & Rt 73 in Evesham	AN0163	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	19	Barton Run at Tuckerton Rd in Medford	AN0166, WBATUCKE	Pineland Biological Community	NJDEP AMNET, Pinelands
5	Lower Delaware	19	Barton Run at Tuckerton Rd on Hoot Owl Estate	EWQ0166	pH	EWQ
3	Lower Delaware	19	Barton Run at Tuckerton Rd on Hoot Owl Estate	EWQ0166	Dissolved Oxygen	EWQ
1	Lower Delaware	19	Barton Run at Tuckerton Rd on Hoot Owl Estate	EWQ0166	Phosphorus, Temperature, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	EWQ
5	Lower Delaware	19	Barton Run below Jennings Lake	WBAJENNS	Pineland Biological Community	Pinelands
5	Lower Delaware	19	Barton Run impoundment above Tuckerton Rd (Lake 1523-19)	WBACONDO	Pineland Biological Community	Pinelands
3	Lower Delaware	19	Bear Swamp River at Rt 70 in Southampton	AN0159, WBERTE70	Pineland Biological Community	NJDEP AMNET, Pinelands
3	Lower Delaware	19	Big Pine Lake-14	NJABPHAN	Pineland Biological Community	Pinelands
1	Lower Delaware	19	Birchwood Lake-19	Birchwood Lakes Beach	Fecal Coliform	Burlington Co HD
3	Lower Delaware	19	Bisphams Mill Creek at New Lisbon Rd in Pemberton	AN0147, GBITURKE	Pineland Biological Community	NJDEP AMNET, Pinelands
1	Lower Delaware	19	Black Run at Kettle Run Rd in Evesham	AN0164, WBLSPRAY	Pineland Biological Community	NJDEP AMNET, Pinelands
3	Lower Delaware	19	Black Run at Route 544	WBLRT544	Pineland Biological Community	Pinelands
1	Lower Delaware	19	Black Run Bog-19	WBLABBOG	Pineland Biological Community	Pinelands

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3	Lower Delaware	19	Black Run trib at Braddock Mill Rd in Evesham	AN0165, WBLTRKET	Pineland Biological Community	NJDEP AMNET, Pinelands
1	Lower Delaware	19	Blue Lake-19	Blue Lake Beach	Fecal Coliform	Burlington Co HD
3	Lower Delaware	19	Bobbys Run at Smithville Rd in Southampton	AN0171A	Benthic Macroinvertebrates	NJDEP AMNET
1	Lower Delaware	19	Braddocks Millpond-19	Braddocks Mill Lake	Fecal Coliform	Burlington Co HD
3	Lower Delaware	19	Bread and Cheese Run at New Rd	SBRNEWRD	Pineland Biological Community	Pinelands
5	Lower Delaware	19	Budds Run at Main St in Pemberton	AN0150, NBURT616	Pineland Biological Community	NJDEP AMNET, Pinelands
3	Lower Delaware	19	Burrs Mill Brook at Hedgerhouse Rd in Woodland	AN0153, SSBSSOOS	Pineland Biological Community	NJDEP AMNET, Pinelands
1	Lower Delaware	19	Burrs Mill Brook at Sooy Pl Rd in Southampton	AN0154, SBUSOOYS	Pineland Biological Community	NJDEP AMNET, Pinelands
1	Lower Delaware	19	Burrs Mill Brook S Br impoundment above Sooy Place Rd (Lake 1552-19)	SBUSOOYL	Pineland Biological Community	Pinelands
5	Lower Delaware	19	Camp Darkwaters	Camp Darkwaters	Fecal Coliform	Burlington Co HD
1	Lower Delaware	19	Cardinal Ridge-19	Cardinal Ridge Condos	Fecal Coliform	Burlington Co HD
1	Lower Delaware	19	Cedar Run at Burr's Mill Rd	SCEBURRS	Pineland Biological Community	Pinelands
3	Lower Delaware	19	Cedar Run below Cedar Run Lake	WCEREFUG	Pineland Biological Community	Pinelands
1	Lower Delaware	19	Cedar Run Lake-19	WCEDARLK	Pineland Biological Community	Pinelands
1	Lower Delaware	19	Centennial Lake-19	Centennial Lake	Fecal Coliform	Burlington Co HD
1	Lower Delaware	19	Cooper Branch below Pakim Pond	GCOPAKIS	Pineland Biological Community	Pinelands
1	Lower Delaware	19	Country Lake-19	Country Lakes	Fecal Coliform	Burlington Co HD
1	Lower Delaware	19	Delanco Camp Lake-19	Delanco Camp Meeting	Fecal Coliform	Cumberland Co HD
1	Lower Delaware	19	Flamingo Lake-19	Clubhouse Marlon Lake Civic Assn., East Lake Marlon Lake Civic Assn.	Fecal Coliform	Sussex Co HD
3	Lower Delaware	19	Friendship Creek at Friendship Rd in Tabernacle	AN0152, SFRPOWEL	Pineland Biological Community	NJDEP AMNET, Pinelands
3	Lower Delaware	19	Friendship Creek at Irick's Causeway	SFRIRICK	Pineland Biological Community	Pinelands

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Sublist	Wtrshd Region	WMA	Station Name/Waterbody	Site ID	Parameters	Data Source
3	Lower Delaware	19	Friendship Creek at Retreat Rd in Southampton	AN0155, SFRRETRE	Pineland Biological Community	NJDEP AMNET, Pinelands
3	Lower Delaware	19	Greenwood Branch at New Lisbon Rd	01466900	Fecal Coliform	NJDEP/USGS Data
1	Lower Delaware	19	Greenwood Branch at New Lisbon Rd	01466900	Phosphorus, Temperature, Dissolved Oxygen, pH, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	NJDEP/USGS Data
1	Lower Delaware	19	Greenwood Branch at New Lisbon Rd in Pemberton	AN0148, GGRMEADO, GGRIMPNT	Pineland Biological Community	NJDEP AMNET, Pinelands
3	Lower Delaware	19	Hanover Lake-19	NNOHANOV	Pineland Biological Community	Pinelands
1	Lower Delaware	19	Harmony Lake-19	Harmony Lake	Fecal Coliform	Burlington Co HD
5	Lower Delaware	19	Haynes Creek at Himmelein Rd in Medford	AN0168, WHART623	Pineland Biological Community	NJDEP AMNET, Pinelands
3	Lower Delaware	19	Haynes Creek below Breakneck Avenue	WHATAUNT	Pineland Biological Community	Pinelands
3	Lower Delaware	19	Haynes Creek below Falls Rd	WHAPINES	Pineland Biological Community	Pinelands
3	Lower Delaware	19	Haynes Creek Trib at Hopewell Rd	WHATRBLU	Pineland Biological Community	Pinelands
1	Lower Delaware	19	Holly Lake-19	Holly Lake Association	Fecal Coliform	Burlington Co HD
3	Lower Delaware	19	Indian Run at Birmingham Rd in Pemberton	EWQ0151A	Phosphorus, pH, Total Suspended Solids	EWQ
1	Lower Delaware	19	Indian Run at Birmingham Rd in Pemberton	EWQ0151A	Temperature, Dissolved Oxygen, Nitrate, Dissolved Solids, Unionized Ammonia	EWQ
5	Lower Delaware	19	Indian Run at Birmingham Rd in Pemberton	AN0151A	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	19	Jacks Run at Range Rd in New Hanover	AN0149B, NJARANGE	Pineland Biological Community	NJDEP AMNET, Pinelands
5	Lower Delaware	19	Jade Run at Rt 206 in Southampton	AN0157, SJART616	Pineland Biological Community	NJDEP AMNET, Pinelands
5	Lower Delaware	19	Jade Run at Rt 206 in Vincentown	01465847	Phosphorus, Dissolved Oxygen, pH, Nitrate	EWQ
3	Lower Delaware	19	Jade Run at Rt 206 in Vincentown	01465847	Nitrate	EWQ
1	Lower Delaware	19	Jade Run at Rt 206 in Vincentown	01465847	Suspended Solids, Unionized Ammonia	EWQ

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Sublist	Wtrshd Region	WMA	Station Name/Waterbody	Site ID	Parameters	Data Source
1	Lower Delaware	19	Jade Run at Stockton Bridge Rd in Pemberton	AN0157A, SJASTOCK	Pineland Biological Community	NJDEP AMNET, Pinelands
1	Lower Delaware	19	JCC Camp Lake-19	JCC Camps at Medford	Fecal Coliform	Burlington Co HD
5	Lower Delaware	19	Jennings Lake-19	WBAJENNL	Pineland Biological Community	Pinelands
3	Lower Delaware	19	Kettle Run at Hopewell Rd in Evesham	AN0167, WKEHOPEW	Pineland Biological Community	NJDEP AMNET, Pinelands
3	Lower Delaware	19	Kettle Run at Sawmill Rd	WKESAWMI	Pineland Biological Community	Pinelands
3	Lower Delaware	19	Kettle Run-19	Girl Scouts Kettle Run, WKEGIRLS	Pineland Biological Community	Burlington Co HD, Pinelands
1	Lower Delaware	19	Kettle Run-19	Girl Scouts Kettle Run, WKEGIRLS	Fecal Coliform	Burlington Co HD, Pinelands
3	Lower Delaware	19	Lake Inawendiwin-19	Camp Inawendiwin, SFRCAMPI	Pineland Biological Community	Burlington Co HD, Pinelands
1	Lower Delaware	19	Lake Inawendiwin-19	Camp Inawendiwin, SFRCAMPI	Fecal Coliform	Burlington Co HD, Pinelands
5	Lower Delaware	19	Lake James-19	Kings Grant	Fecal Coliform	Burlington Co HD
1	Lower Delaware	19	Lake Mishe-Mokwa-19	Medford Lakes Colony Club Beach 3 and Beach 4	Fecal Coliform	Burlington Co HD
1	Lower Delaware	19	Lake Stockwell-19	Camp Ockanickon Boys, Family, and Pomona	Fecal Coliform	Burlington Co HD
1	Lower Delaware	19	Lakeside	Lakeside	Fecal Coliform	Burlington Co HD
1	Lower Delaware	19	Lion Tamers Club	Lion Tamers Club	Fecal Coliform	Burlington Co HD
3	Lower Delaware	19	Little Creek at Chairville	01465893	Dissolved Solids	NJDEP/USGS Data
1	Lower Delaware	19	Little Creek at Chairville	01465893	Phosphorus, Temperature, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	NJDEP/USGS Data
5	Lower Delaware	19	Little Creek at Chairville	01465893	pH, Fecal Coliform	NJDEP/USGS Data
5	Lower Delaware	19	Little Creek at Eayrestown Rd in Lumberton	AN0160	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	19	Little Creek at Rt 70 in Southampton	AN0158, WLIRTE70, WLIHAWKI	Pineland Biological Community	NJDEP AMNET, Pinelands
1	Lower Delaware	19	Lower Aetna Lake-19	Medford Lakes Colony Club Beach 1 and Beach 2	Fecal Coliform	Burlington Co HD

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Sublist	Wtrshd Region	WMA	Station Name/Waterbody	Site ID	Parameters	Data Source
5	Lower Delaware	19	Masons Creek at Rt 38 in Hainesport	AN0173	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	19	Masons Creek UNK Trib at Ark Rd in Lumberton	AN0172	Benthic Macroinvertebrates	NJDEP AMNET
1	Lower Delaware	19	McDonalds Branch at USGS gage in Woodland	AN0146, GMCBUTTE	Pineland Biological Community	NJDEP AMNET, Pinelands
3	Lower Delaware	19	McDonalds Branch in Lebanon State Forest	01466500	Arsenic, Cadmium, Copper, Lead, Mercury, Zinc, Silver	NJDEP/USGS Data
1	Lower Delaware	19	McDonalds Branch in Lebanon State Forest	01466500	Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Chromium, Nickel, Selenium	NJDEP/USGS Data
1	Lower Delaware	19	Mill Creek at Levitt Pkwy in Willingboro	EWQ0175	Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	EWQ
5	Lower Delaware	19	Mill Creek at Levitt Pkwy in Willingboro	AN0175	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	19	Mill Creek at Levitt Pkwy in Willingboro	EWQ0175	Phosphorus	EWQ
1	Lower Delaware	19	Mimosa Lakes-19	Mimosa Lake Beach	Fecal Coliform	Burlington Co HD, NJDEP
3	Lower Delaware	19	Mirror Lake-19	Mirror Lake	Phosphorus	Clean Lakes, NJDEP Fish Tissue Monitoring
5	Lower Delaware	19	Mirror Lake-19	Mirror Lake	Fecal Coliform, Fish-Mercury	Burlington Co HD, NJDEP Clean Lakes, NJDEP Fish Tissue Monitoring
3	Lower Delaware	19	Mohegan Lake-19	Mohegan Lake YMCA Camp Moore, YMCA Camp Moore Family Lake, WHATRYMC	Pineland Biological Community	Burlington Co HD, Pinelands
1	Lower Delaware	19	Mohegan Lake-19	Mohegan Lake YMCA Camp Moore, YMCA Camp Moore Family Lake, WHATRYMC	Fecal Coliform	Burlington Co HD, Pinelands
1	Lower Delaware	19	Mount Misery Brook at Upton	01466100	Temperature, Dissolved Oxygen, pH, Nitrate, Phosphorus, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	NJDEP/USGS Data
5	Lower Delaware	19	Mount Misery Brook at Upton	01466100	Fecal Coliform	NJDEP/USGS Data
1	Lower Delaware	19	Mount Misery Brook M Br at Mount Misery-Pasadena Rd	GMIMOUNT	Pineland Biological Community	Pinelands



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Sublist	Wtrshd Region	WMA	Station Name/Waterbody	Site ID	Parameters	Data Source
1	Lower Delaware	19	Mount Misery Brook N Br at unnamed sand rd	GNOSANDR	Pineland Biological Community	Pinelands
3	Lower Delaware	19	Mt Misery Brook at Rt 70 in Pemberton	AN0145, GMRTE70	Pineland Biological Community	NJDEP AMNET, Pinelands
1	Lower Delaware	19	Mt. Misery Lake-19	Methodist Camps, GMOUCAMP	Pineland Biological Community	Burlington Co HD, Pinelands
1	Lower Delaware	19	Mt. Misery Lake-19	Methodist Camps, GMOUCAMP	Fecal Collform	Burlington Co HD, Pinelands
1	Lower Delaware	19	Oakwood Lake-19	Oakwood Lakes	Fecal Collform	Burlington Co HD
3	Lower Delaware	19	Old Forge Lake-14	SFRHAMPT	Pineland Biological Community	Pinelands
3	Lower Delaware	19	Ong Run at W Lake Shore Dr in Pemberton	AN0149A, NONWLAKE	Pineland Biological Community	NJDEP AMNET, Pinelands
5	Lower Delaware	19	Ong Run at West Lake Shore Dr in Pemberton	EWQ0149A	pH	EWQ
1	Lower Delaware	19	Ong Run at West Lake Shore Dr in Pemberton	EWQ0149A	Phosphorus, Temperature, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	EWQ
3	Lower Delaware	19	Pakim Lake-19	Pakim Lake, GCOPAKIM	Phosphorus	NJDEP Clean Lakes, Pinelands
1	Lower Delaware	19	Pakim Lake-19	Pakim Lake, GCOPAKIM	Pineland Biological Community	NJDEP Clean Lakes, Pinelands
5	Lower Delaware	19	Parkers Creek at Creek Rd in Moorestown	EWQ0174	Phosphorus	EWQ
1	Lower Delaware	19	Parkers Creek at Creek Rd in Moorestown	EWQ0174	Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	EWQ
5	Lower Delaware	19	Parkers Creek at Rt 603 in Mt Laurel	AN0174A	Benthic Macroinvertebrates	NJDEP AMNET
1	Lower Delaware	19	Pemberton Lake-19	Pemberton Lake	Fish Community	NJDEP Freshwater Fisheries
3	Lower Delaware	19	Pine Lake-19	East Lake Pine Colony Club, South Lake Pine Colony Club, Main Lake Pine Colony Club, WHAPINEL	Pineland Biological Community	Burlington Co HD, Pinelands
1	Lower Delaware	19	Pine Lake-19	East Lake Pine Colony Club, South Lake Pine Colony Club, Main Lake Pine Colony Club, WHAPINEL	Fecal Collform	Burlington Co HD, Pinelands
3	Lower Delaware	19	Pole Bridge Branch at biw Country Lk in Pemberton	AN0144, GPOWISSA	Pineland Biological Community	NJDEP AMNET, Pinelands



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Sublist	Wtrshd Region	WMA	Station Name/Waterbody	Site ID	Parameters	Data Source
1	Lower Delaware	19	Pole Bridge Branch at Whites Bogs-Pasadena Rd	GPOWHITE	Pineland Biological Community	Pinelands
1	Lower Delaware	19	Pole Bridge Branch impoundment below Rt 70 (Lake 1417-19)	GPORT70D	Pineland Biological Community	Pinelands
3	Lower Delaware	19	Pole Bridge Branch near Browns Mills	01466200	Phosphorus, Dissolved Solids, Total Suspended Solids	NJDEP/USGS Data
1	Lower Delaware	19	Pole Bridge Branch near Browns Mills	01466200	Temperature, pH, Dissolved Oxygen, Nitrate, Unionized Ammonia	NJDEP/USGS Data
5	Lower Delaware	19	Pompeston Creek at New Albany Rd in Moorestown	AN0177A	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	19	Presidential Lake-19	Presidential Lake, GBIPRESU	Phosphorus, Pineland Biological Community	NJDEP Clean Lakes, Burlington Co HD, Pinelands
1	Lower Delaware	19	Presidential Lakes-19	Presidential Lake, GBIPRESU	Fecal Coliform	NJDEP Clean Lakes, Burlington Co HD, Pinelands
3	Lower Delaware	19	Rancocas Creek N Br above New Lisbon-Four Mile Rd	NNONEWLI	Pineland Biological Community	Pinelands
5	Lower Delaware	19	Rancocas Creek N Br at Browns Mills	01465970	Phosphorus, Fecal Coliform, pH, Mercury	NJDEP/USGS Data, 304(i)
5	Lower Delaware	19	Rancocas Creek N Br at Hanover Furnace	01465950, 19-RA-1N	Copper, Mercury, Lead	NJDEP/USGS Data, Metal Recon
1	Lower Delaware	19	Rancocas Creek N Br at Hanover Furnace	01465950, 19-RA-1N	Phosphorus, Temperature, pH, Dissolved Oxygen, Nitrate, Unionized Ammonia, Chromium, Nickel, Selenium, Zinc	NJDEP/USGS Data, Metal Recon
3	Lower Delaware	19	Rancocas Creek N Br at Hanover Furnace	01465950, 19-RA-1N	Total Suspended Solids, Arsenic, Cadmium	NJDEP/USGS Data, Metal Recon
3	Lower Delaware	19	Rancocas Creek N Br at Iron Works Park at Mt Holly	01467005, 01467006, 01467003, 19-RA-4N	Cadmium, Mercury	NJDEP/USGS Data, EWQ, Metal Recon
1	Lower Delaware	19	Rancocas Creek N Br at Iron Works Park at Mt Holly	01467005, 01467006, 01467003, 19-RA-4N	Temperature, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Chromium, Nickel, Selenium, Zinc	NJDEP/USGS Data, EWQ, Metal Recon
4	Lower Delaware	19	Rancocas Creek N Br at Iron Works Park at Mt Holly	01467005, 01467006, 01467003, 19-RA-4N	Fecal Coliform	NJDEP/USGS Data, EWQ, Metal Recon
5	Lower Delaware	19	Rancocas Creek N Br at Iron Works Park at Mt Holly	01467005, 01467006, 01467003, 19-RA-4N	Phosphorus, pH, Arsenic, Copper, Lead	NJDEP/USGS Data, EWQ, Metal Recon
3	Lower Delaware	19	Rancocas Creek N Br at Main St in Pemberton	AN0149, NNORT616	Pineland Biological Community	NJDEP AMNET, Pinelands
5	Lower Delaware	19	Rancocas Creek N Br at Pemberton	01467000, 19-RA-3N	Copper, Lead	NJDEP/USGS Data, Metal Recon

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Sublist	Wtrshd Region	WMA	Station Name/Waterbody	Site ID	Parameters	Data Source
3	Lower Delaware	19	Rancocas Creek N Br at Pemberton	01467000, 19-RA-3N	Arsenic, Cadmium, Mercury	NJDEP/USGS Data, Metal Recon
1	Lower Delaware	19	Rancocas Creek N Br at Pemberton	01467000, 19-RA-3N	Phosphorus, Fecal Coliform, Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Chromium, Nickel, Selenium, Zinc	NJDEP/USGS Data, Metal Recon
5	Lower Delaware	19	Rancocas Creek N Br at Pine St Pk in Mount Holly		Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	19	Rancocas Creek N Br blw Hanover Lk in Pemberton	AN0143, NNOMILIT	Pineland Biological Community	NJDEP AMNET, Pinelands
1	Lower Delaware	19	Rancocas Creek N Br Trib above Magnolia Rd	NNOTRMGU	Pineland Biological Community	Pinelands
3	Lower Delaware	19	Rancocas Creek S Br at Buddtown - Beaverville Rd in Southampton	AN0156, SSORIDGE	Pineland Biological Community	NJDEP AMNET, Pinelands
3	Lower Delaware	19	Rancocas Creek S Br at Burr's Mill Rd	SSOUBURRS	Pineland Biological Community	Pinelands
1	Lower Delaware	19	Rancocas Creek S Br at Hainesport	Rancocas, EWQ0176S, 19-RA-1S	Temperature, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Chromium, Copper, Lead, Nickel, Selenium, Zinc	NJDEP/USGS Data, EWQ, Metal Recon
5	Lower Delaware	19	Rancocas Creek S Br at Hainesport	Rancocas, EWQ0176S, 19-RA-1S	Phosphorus, Fecal Coliform, Arsenic	NJDEP/USGS Data, EWQ, Metal Recon
3	Lower Delaware	19	Rancocas Creek S Br at Hainesport	Rancocas, EWQ0176S, 19-RA-1S	pH, Cadmium, Mercury	EWQ, Metal Recon
5	Lower Delaware	19	Rancocas Creek S Br at Mt Holly - Eayrestown Rd in Lumberton	AN0161	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	19	Rancocas Creek S Br at Ridge Rd in Southampton	EWQ0156	Phosphorus	EWQ
1	Lower Delaware	19	Rancocas Creek S Br at Ridge Rd in Southampton	EWQ0156	Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	EWQ
5	Lower Delaware	19	Rancocas Creek S Br at Vincentown	01465850, 19-RA-3S	Phosphorus, pH, Lead	NJDEP/USGS Data, Metal Recon
3	Lower Delaware	19	Rancocas Creek S Br at Vincentown	01465850, 19-RA-3S	Arsenic, Cadmium, Mercury	NJDEP/USGS Data, Metal Recon

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June 22, 2004

Sublist	Wtrshd Region	WMA	Station Name/Waterbody	Site ID	Parameters	Data Source
1	Lower Delaware	19	Rancocas Creek S Br at Vincentown	01465850, 19-RA-3S	Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Arsenic, Chromium, Copper, Nickel, Selenium, Zinc	NJDEP/USGS Data, Metal Recon
5	Lower Delaware	19	Rancocas Creek S Br Trib at Burr's Mill Rd	SSOTRBUR	Pineland Biological Community	Pinelands
3	Lower Delaware	19	Rancocas Creek SW Br at Elmwood Rd in Evesham	AN0162	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	19	Rancocas Creek SW Br at Hartford Rd	WSOHARTF	Pineland Biological Community	Pinelands
5	Lower Delaware	19	Rancocas Creek SW Br at Rt 70 in Medford	AN0169, WSORT541, WSORTE70, WSOMEDPK	Pineland Biological Community	NJDEP AMNET, Pinelands
5	Lower Delaware	19	Rancocas Creek SW Br at Rt 70 in Medford	EWQ00169, 19-RA-2S	Phosphorus, pH, Arsenic	EWQ, Metal Recon
1	Lower Delaware	19	Rancocas Creek SW Br at Rt 70 in Medford	EWQ00169, 19-RA-2S	Temperature, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Chromium, Copper, Lead, Nickel, Selenium, Zinc	EWQ, Metal Recon
3	Lower Delaware	19	Rancocas Creek SW Br at Rt 70 in Medford	EWQ00169, 19-RA-2S	Cadmium, Mercury	NJDEP Metal Recon
1	Lower Delaware	19	Salpe Lake-19	Medford Pines	Fecal Coliform	Burlington Co HD
1	Lower Delaware	19	Sharps Run at Rt 541 at Medford	01465884	Suspended Solids, Unionized Ammonia	NJDEP/USGS Data
4	Lower Delaware	19	Sharps Run at Rt 541 at Medford	01465884	Fecal Coliform	NJDEP/USGS Data
5	Lower Delaware	19	Sharps Run at Rt 541 at Medford	01465884	Phosphorus	NJDEP/USGS Data
3	Lower Delaware	19	Sharps Run at Rt 541 in Medford	AN0170	Benthic Macroinvertebrates	NJDEP AMNET
1	Lower Delaware	19	Shawnee Country Lake-19	Shawnee Country OSA	Fecal Coliform	Burlington Co HD
1	Lower Delaware	19	Sherwood Forest Pond-19	Sherwood Forest	Fecal Coliform	Burlington Co HD
3	Lower Delaware	19	Smithville Lake-19	Smithville Lake	Phosphorus	NJDEP Clean Lakes
1	Lower Delaware	19	Squaw Lake-19	Camp Ockanickon Girls, WHATRSQU	Fecal Coliform	Burlington Co HD, Pinelands
5	Lower Delaware	19	Squaw Lake-19	Camp Ockanickon Girls, WHATRSQU	Fecal Coliform, Pineland Biological Community	Burlington Co HD, Pinelands

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Sublist	Wtrshd Region	WMA	Station Name/Waterbody	Site ID	Parameters	Data Source
5	Lower Delaware	19	Sturbridge Lake-19	Chatham Lake, Foxview Beach	Fecal Coliform	Camden Co HD
3	Lower Delaware	19	Swan Lake-14	WIKEMARLT	Pineland Biological Community	Pinelands
5	Lower Delaware	19	Swedes Run at Garwood Rd in Moorestown	AN0176A	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	19	Tamarack Lake-19	Tamarack Lake, WHATROAK	Pineland Biological Community	Burlington Co HD, Pinelands
1	Lower Delaware	19	Tamarack Lake-19	Tamarack Lake, WHATROAK	Fecal Coliform	Burlington Co HD, Pinelands
5	Lower Delaware	19	Taunton Lake-19	Taunton Lake, WHATAUNL	Pineland Biological Community	Burlington Co HD, Pinelands
1	Lower Delaware	19	Taunton Lake-19	Taunton Lake, WHATAUNL	Fecal Coliform	Burlington Co HD, Pinelands
5	Lower Delaware	19	Timber Lake-19	Timber Lake	Fecal Coliform	Gloucester Co HD
1	Lower Delaware	19	Union Mill Lake-19	Union Mill Lake Colony Club	Fecal Coliform	Burlington Co HD
1	Lower Delaware	19	Upper Aetna Lake-19	Medford Lakes Colony Club Beach 5	Fecal Coliform	Burlington Co HD
5	Lower Delaware	19	Whitesbog Pond-19	Whitesbog Pond	Fish-Mercury	NJDEP Fish Tissue Monitoring
3	Lower Delaware	19	Wood Lake-19	Woodlake	Fecal Coliform	Burlington County HD



## Attachment 2

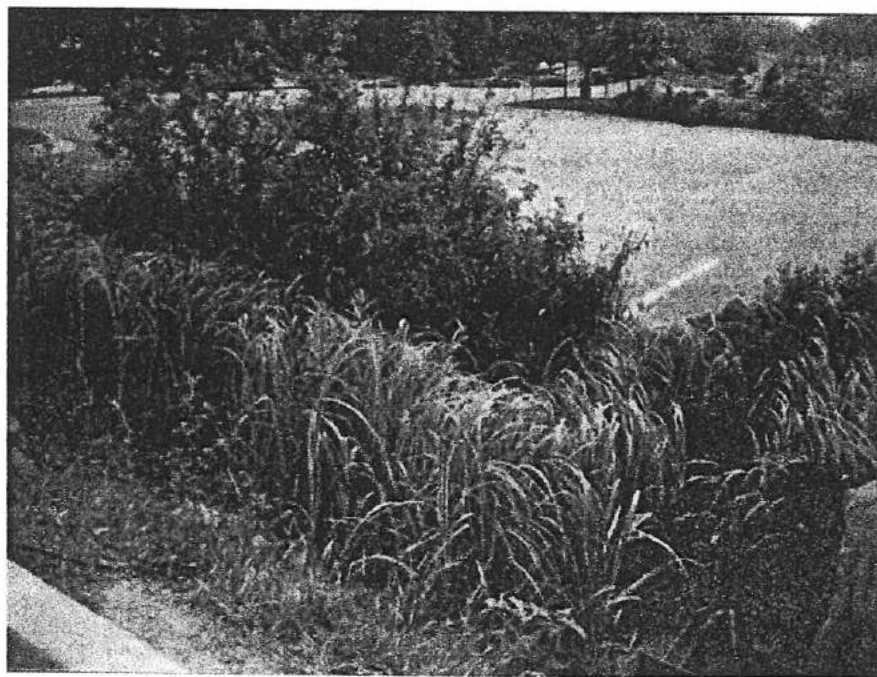
# Bioretention Systems for Stormwater Management



# Bioretention Systems for Stormwater Management

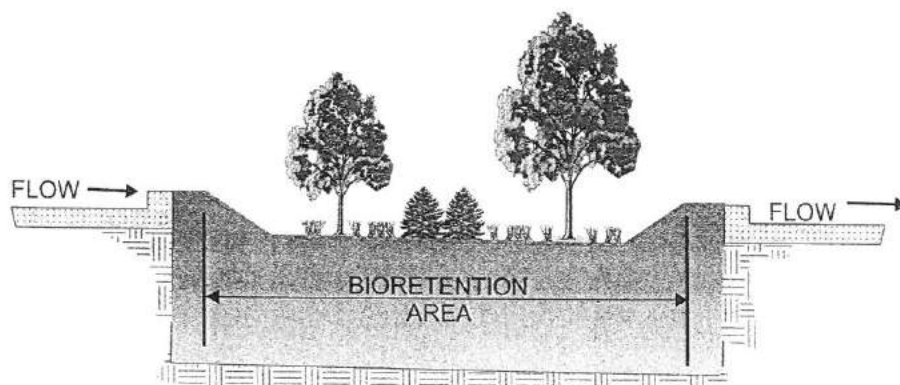
Ten Towns Great Swamp Watershed Management Committee

## What are Bioretention Systems?



Bioretention systems are stormwater best management practices (BMP's) that use filtration to treat stormwater runoff. Bioretention systems are modeled after the biological and physical characteristics of an upland terrestrial forest or meadow ecosystem. These systems use vegetation, such as trees, shrubs, and grasses, to remove pollutants from stormwater runoff. Sources of runoff are diverted into bioretention systems directly as overland flow or through a stormwater drainage system. Alternatively, a bioretention system can be constructed directly in a drainage channel or swale.

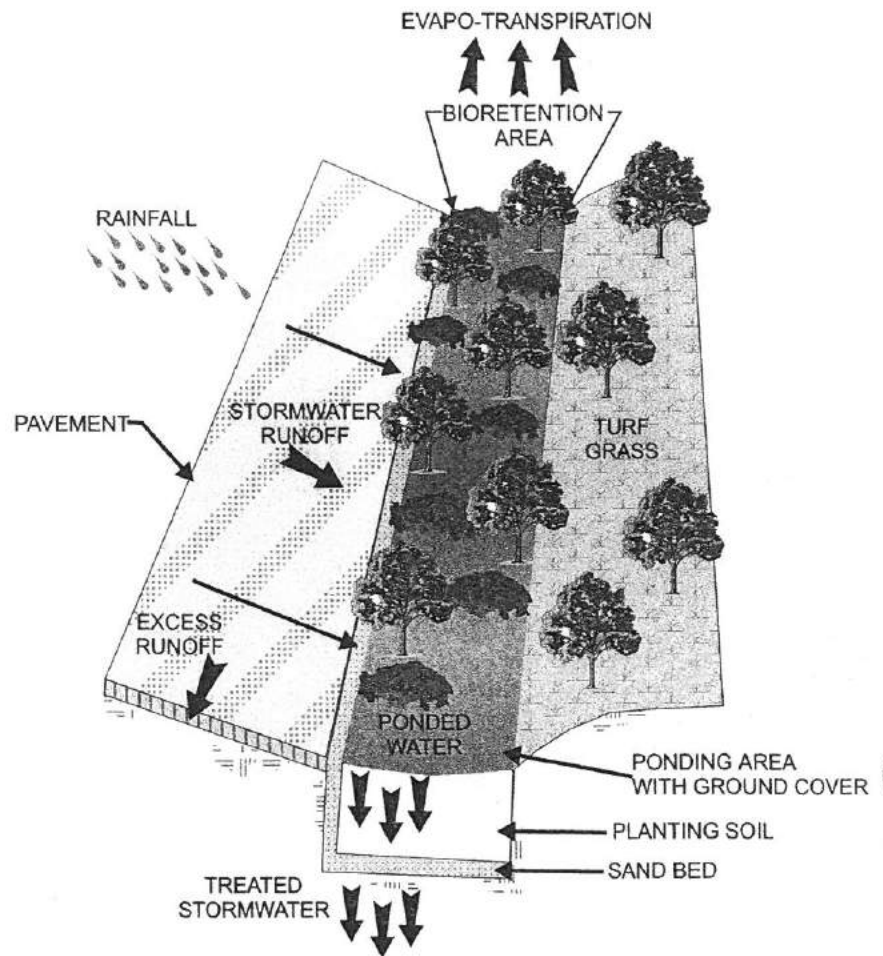
**Ten Towns  
Great Swamp Watershed  
Management Committee  
2 Ridgedale Avenue  
Cedar Knolls, NJ 07927  
(973) 984-2000  
[www.tentowns.org](http://www.tentowns.org)**





# Bioretention systems remove pollutants using an

## Components of a Typical Bioretention



## How Bioretention Systems Work

The first flush (initial runoff event at start of storm) stormwater runoff filters through the vegetation and soil within the bioretention area. This filtered runoff is either collected in an underdrain system or is allowed to infiltrate into the ground. Stormwater runoff after the first flush bypasses the bioretention system, as in a sand filter. Bioretention systems, like sand filters, can be used in new developments or to retrofit existing development.

## Advantages of Bioretention Systems

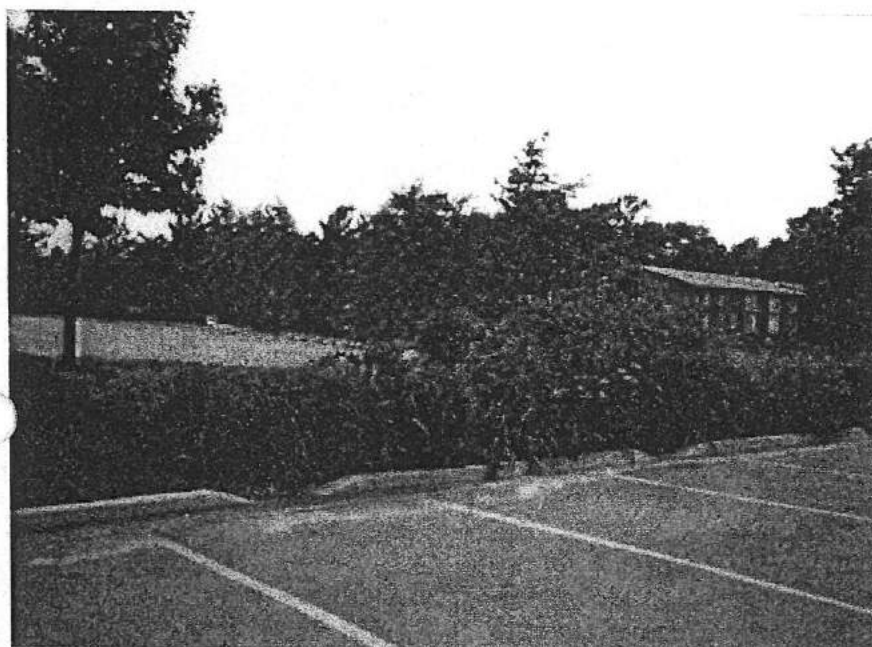
Bioretention systems have several advantages over sand filters. They:

- Provide a variety of pollutant removal mechanisms, including:
  - Filtration,
  - Adsorption to soil particles, and
  - Biological uptake by plants,
- Typically provide a higher degree of treatment due to the multiple removal mechanisms

***area modeled after upland forests and meadows.***

- Are more aesthetically pleasing than sand filters,
- Can be readily incorporated into green spaces, streetscapes, median strips, and parking islands,
- Provide stormwater peak flow and volume control as well as water quality control where stormwater infiltration is used, and
- Are efficient and cost-effective.

## **Advantages of Bioretention Systems (continued)**



The general design idea behind bioretention systems is to have a gentle slope for overland flow and adequate water storage. However, no water should be allowed to pond in the bioretention system for a period greater than 4 days. The ponded area should have a maximum depth of 6 inches and the planting soil should have a minimum depth of 4 feet.

The minimum width of the functional bioretention area should be 15 feet, although 25 feet is preferred. The minimum length of the functional bioretention area should be 40 feet. In all cases, the minimum length should be at least twice the width.

No special maintenance of bioretention systems is required. Only routine periodic maintenance typical of any landscaped area (mulching, plant replacement, pruning, weeding) is needed.

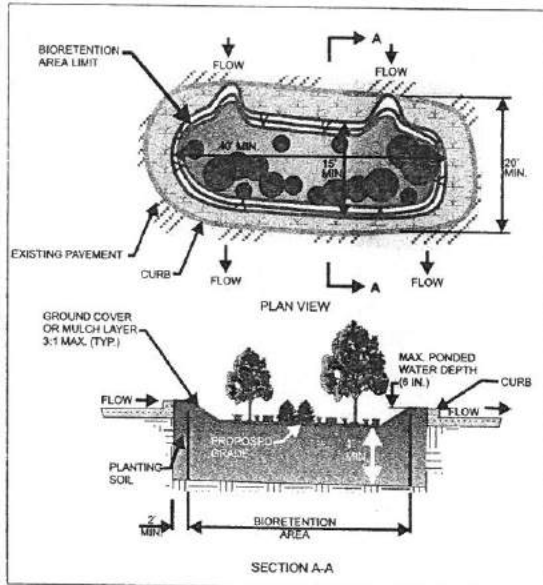
## **General Design and Maintenance of Bioretention Systems**



# Bioretention Systems for Stormwater Management

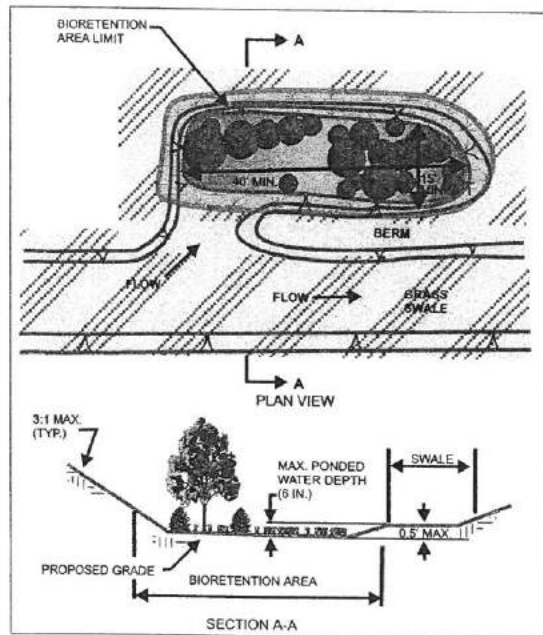
Ten Towns Great Swamp Watershed Management Committee

## Bioretention System for use in Parking Lots



The diagram to the left shows a typical design of a bioretention system for use adjacent to a parking lot. In this application, precast car stops with gaps between them are used. An alternative is to use curbing with cuts to allow for water flow into the bioretention system (see photograph on Page 3).

## Off-line Bioretention System for use with Swales



Bioretention systems work best if designed out of the main stormwater runoff conveyance system. The diagram to the left shows an off-line bioretention system for use with a swale. Flow in the swale is directed into the bioretention system for treatment. The berm is designed so that overflow is redirected back into the swale.

The Ten Towns Great Swamp Watershed Management Committee was formed in 1995 through an Intermunicipal Agreement for the specific purpose of developing and implementing a watershed management plan for the Great Swamp watershed. The organization has 501(c)(3) status and is supported by annual financial contributions from each of the ten Municipalities that have lands within the Great Swamp watershed and by Somerset and Morris Counties in New Jersey.

The ten municipalities that make up the Ten Towns Great Swamp Watershed Management Committee are as follows; Bernards Township, Bernardsville, Chatham Township, Harding Township, Long Hill Township, Madison Borough, Mendham Township, Mendham Borough, Morris Township, and Morristown.

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# Attachment 3

Voorhees Model Stormwater

Ordinance

## Voorhees Model Stormwater Ordinance

*This ordinance is provided within the Stormwater Management Plan as a requirement of NJAC 7:8-4.1(c)12. The Model Ordinance should be used in the forthcoming months in the development of specific municipal stormwater control ordinances and design and performance standards specific to Voorhees Township. This ordinance does not include a section on fees. The costs of reviewing development applications under this ordinance can be defrayed by fees charged for review of subdivisions and site plans under N.J.S.A. 40:55D-8.b.*

### Section 1: Scope and Purpose

#### A. Policy Statement

Flood control, groundwater recharge, and pollutant reduction through nonstructural or low impact techniques shall be explored before relying on structural BMPs. Structural BMPs should be integrated with nonstructural stormwater management strategies and proper maintenance plans. Nonstructural strategies include both environmentally sensitive site design and source controls that prevent pollutants from being placed on the site or from being exposed to stormwater. Source control plans should be developed based upon physical site conditions and the origin, nature, and the anticipated quantity or amount of potential pollutants. Multiple stormwater management BMPs may be necessary to achieve the established performance standards for water quality, quantity, and groundwater recharge.

#### B. Purpose

It is the purpose of this ordinance to establish minimum stormwater management requirements and controls for "major development," as defined in Section 2.

#### C. Applicability

1. This ordinance shall be applicable to all site plans and subdivisions for the following major developments that require preliminary or final site plan or subdivision review:

- a. Non-residential major developments; and
- b. Aspects of residential major developments that are not pre-empted by the Residential Site Improvement Standards at N.J.A.C. 5:21.

2. This ordinance shall also be applicable to all major developments undertaken by Voorhees Township.

#### D. Compatibility with Other Permit and Ordinance Requirements

Development approvals issued for subdivisions and site plans pursuant to this ordinance are to be considered an integral part of development approvals under the subdivision and site plan review process and do not relieve the applicant of the responsibility to secure required permits or approvals for activities regulated by any other applicable code, rule, act, or ordinance. In their interpretation and application, the provisions of this ordinance shall be held to be the minimum requirements for the promotion of the public health, safety, and general welfare. This ordinance is not intended to interfere with, abrogate, or annul any other ordinances, rule or regulation, statute, or other provision of law except that, where any provision of this ordinance imposes



## Voorhees Model Stormwater Ordinance

restrictions different from those imposed by any other ordinance, rule or regulation, or other provision of law, the more restrictive provisions or higher standards shall control.

### Section 2: Definitions

Unless specifically defined below, words or phrases used in this ordinance shall be interpreted so as to give them the meaning they have in common usage and to give this ordinance its most reasonable application. The definitions below are the same as or based on the corresponding definitions in the Stormwater Management Rules at N.J.A.C. 7:8-1.2.

“CAFRA Planning Map” means the geographic depiction of the boundaries for Coastal Planning Areas, CAFRA Centers, CAFRA Cores and CAFRA Nodes pursuant to N.J.A.C. 7:8E-5B.3.

“CAFRA Centers, Cores or Nodes” means those areas within boundaries accepted by the Department pursuant to N.J.A.C. 7:8E-5B.

“Compaction” means the increase in soil bulk density.

“Core” means a pedestrian-oriented area of commercial and civic uses serving the surrounding municipality, generally including housing and access to public transportation.

“County review agency” means an agency designated by the County Board of Chosen Freeholders to review municipal stormwater management plans and implementing ordinance(s). The county review agency may either be:

A county planning agency; or

A county water resource association created under N.J.S.A. 58:16A-55.5, if the ordinance or resolution delegates authority to approve, conditionally approve, or disapprove municipal stormwater management plans and implementing ordinances.

“Department” means the New Jersey Department of Environmental Protection.

“Designated Center” means a State Development and Redevelopment Plan Center as designated by the State Planning Commission such as urban, regional, town, village, or hamlet.

“Design engineer” means a person professionally qualified and duly licensed in New Jersey to perform engineering services that may include, but not necessarily be limited to, development of project requirements, creation and development of project design and preparation of drawings and specifications.

“Development” means the division of a parcel of land into two or more parcels, the construction, reconstruction, conversion, structural alteration, relocation or enlargement of any building or structure, any mining excavation or landfill, and any use or change in the use of any building or other structure, or land or extension of use of land, by any person, for which permission is required under the Municipal Land Use Law, N.J.S.A. 40:55D-1 et seq. In the case of development of agricultural lands, development means: any activity that requires a State permit; any activity reviewed by the County Agricultural Board (CAB) and the State Agricultural Development Committee (SADC), and municipal review of any activity not exempted by the Right to Farm Act, N.J.S.A. 4:1C-1 et seq.



## Voorhees Model Stormwater Ordinance

- “Drainage area” means a geographic area within which stormwater, sediments, or dissolved materials drain to a particular receiving waterbody or to a particular point along a receiving waterbody.
- “Environmentally critical areas” means an area or feature which is of significant environmental value, including but not limited to: stream corridors; natural heritage priority sites; habitat of endangered or threatened species; large areas of contiguous open space or upland forest; steep slopes; and well head protection and groundwater recharge areas. Habitats of endangered or threatened species are identified using the Department’s Landscape Project as approved by the Department’s Endangered and Nongame Species Program.
- “Empowerment Neighborhood” means a neighborhood designated by the Urban Coordinating Council “in consultation and conjunction with” the New Jersey Redevelopment Authority pursuant to N.J.S.A 55:19-69.
- “Erosion” means the detachment and movement of soil or rock fragments by water, wind, ice or gravity.
- “Impervious surface” means a surface that has been covered with a layer of material so that it is highly resistant to infiltration by water.
- “Infiltration” is the process by which water seeps into the soil from precipitation.
- “Major development” means any “development” that provides for ultimately disturbing one or more acres of land. Disturbance for the purpose of this rule is the placement of impervious surface or exposure and/or movement of soil or bedrock or clearing, cutting, or removing of vegetation.
- “Municipality” means any city, borough, town, township, or village.
- “Node” means an area designated by the State Planning Commission concentrating facilities and activities which are not organized in a compact form.
- “Nutrient” means a chemical element or compound, such as nitrogen or phosphorus, which is essential to and promotes the development of organisms.
- “Person” means any individual, corporation, company, partnership, firm, association, Voorhees Township, or political subdivision of this State subject to municipal jurisdiction pursuant to the Municipal Land Use Law , N.J.S.A. 40:55D-1 et seq.
- “Pollutant” means any dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, refuse, oil, grease, sewage sludge, munitions, chemical wastes, biological materials, medical wastes, radioactive substance (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.), thermal waste, wrecked or discarded equipment, rock, sand, cellar dirt, industrial, municipal, agricultural, and construction waste or runoff, or other residue discharged directly or indirectly to the land, ground waters or surface waters of the State, or to a domestic treatment works. “Pollutant” includes both hazardous and nonhazardous pollutants.
- “Recharge” means the amount of water from precipitation that infiltrates into the ground and is not evapotranspired.
- “Sediment” means solid material, mineral or organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water or gravity as a product of erosion.

## Voorhees Model Stormwater Ordinance

"Site" means the lot or lots upon which a major development is to occur or has occurred.

"Soil" means all unconsolidated mineral and organic material of any origin.

"State Development and Redevelopment Plan Metropolitan Planning Area (PA1)" means an area delineated on the State Plan Policy Map and adopted by the State Planning Commission that is intended to be the focus for much of the state's future redevelopment and revitalization efforts.

"State Plan Policy Map" is defined as the geographic application of the State Development and Redevelopment Plan's goals and statewide policies, and the official map of these goals and policies.

"Stormwater" means water resulting from precipitation (including rain and snow) that runs off the land's surface, is transmitted to the subsurface, or is captured by separate storm sewers or other sewage or drainage facilities, or conveyed by snow removal equipment.

"Stormwater runoff" means water flow on the surface of the ground or in storm sewers, resulting from precipitation.

"Stormwater management basin" means an excavation or embankment and related areas designed to retain stormwater runoff. A stormwater management basin may either be normally dry (that is, a detention basin or infiltration basin), retain water in a permanent pool (a retention basin), or be planted mainly with wetland vegetation (most constructed stormwater wetlands).

"Stormwater management measure" means any structural or nonstructural strategy, practice, technology, process, program, or other method intended to control or reduce stormwater runoff and associated pollutants, or to induce or control the infiltration or groundwater recharge of stormwater or to eliminate illicit or illegal non-stormwater discharges into stormwater conveyances.

"Tidal Flood Hazard Area" means a flood hazard area, which may be influenced by stormwater runoff from inland areas, but which is primarily caused by the Atlantic Ocean.

"Urban Coordinating Council Empowerment Neighborhood" means a neighborhood given priority access to State resources through the New Jersey Redevelopment Authority.

"Urban Enterprise Zones" means a zone designated by the New Jersey Enterprise Zone Authority pursuant to the New Jersey Urban Enterprise Zones Act, N.J.S.A. 52:27H-60 et. seq.

"Urban Redevelopment Area" is defined as previously developed portions of areas:

- (1) Delineated on the State Plan Policy Map (SPPM) as the Metropolitan Planning Area (PA1), Designated Centers, Cores or Nodes;
- (2) Designated as CAFRA Centers, Cores or Nodes;
- (3) Designated as Urban Enterprise Zones; and
- (4) Designated as Urban Coordinating Council Empowerment Neighborhoods.

"Waters of the State" means the ocean and its estuaries, all springs, streams, wetlands, and bodies of surface or ground water, whether natural or artificial, within the boundaries of the State of New Jersey or subject to its jurisdiction.

"Wetlands" or "wetland" means an area that is inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and that under normal circumstances

## Voorhees Model Stormwater Ordinance

does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation.

### Section 3: General Standards

#### A. Design and Performance Standards for Stormwater Management Measures

1. Stormwater management measures for major development shall be developed to meet the erosion control, groundwater recharge, stormwater runoff quantity, and stormwater runoff quality standards in Section 4. To the maximum extent practicable, these standards shall be met by incorporating nonstructural stormwater management strategies into the design. If these strategies alone are not sufficient to meet these standards, structural stormwater management measures necessary to meet these standards shall be incorporated into the design.
2. The standards in this ordinance apply only to new major development and are intended to minimize the impact of stormwater runoff on water quality and water quantity in receiving water bodies and maintain groundwater recharge. The standards do not apply to new major development to the extent that alternative design and performance standards are applicable under a regional stormwater management plan or Water Quality Management Plan adopted in accordance with Department rules.

*Note: Alternative standards shall provide at least as much protection from stormwater-related loss of groundwater recharge, stormwater quantity and water quality impacts of major development projects as would be provided under the standards in N.J.A.C. 7:8-5.*

### Section 4: Stormwater Management Requirements for Major Development

- A. The development shall incorporate a maintenance plan for the stormwater management measures incorporated into the design of a major development in accordance with Section 10.
- B. Stormwater management measures shall avoid adverse impacts of concentrated flow on habitat for threatened and endangered species as documented in the Department' Landscape Project or Natural Heritage Database established under N.J.S.A. 13:1B-15.147 through 15.150, particularly *Helonias bullata* (swamp pink) and/or *Clemmys muhlnebergi* (bog turtle).
- C. The following linear development projects are exempt from the groundwater recharge, stormwater runoff quantity, and stormwater runoff quality requirements of Sections 4.F and 4.G:
  1. The construction of an underground utility line provided that the disturbed areas are revegetated upon completion;
  2. The construction of an aboveground utility line provided that the existing conditions are maintained to the maximum extent practicable; and
  3. The construction of a public pedestrian access, such as a sidewalk or trail with a maximum width of 14 feet, provided that the access is made of permeable material.
- D. A waiver from strict compliance from the groundwater recharge, stormwater runoff quantity, and stormwater runoff quality requirements of Sections 4.F and 4.G may be obtained for the

## Voorhees Model Stormwater Ordinance

enlargement of an existing public roadway or railroad; or the construction or enlargement of a public pedestrian access, provided that the following conditions are met:

1. The applicant demonstrates that there is a public need for the project that cannot be accomplished by any other means;
2. The applicant demonstrates through an alternatives analysis, that through the use of nonstructural and structural stormwater management strategies and measures, the option selected complies with the requirements of Sections 4.F and 4.G to the maximum extent practicable;
3. The applicant demonstrates that, in order to meet the requirements of Sections 4.F and 4.G, existing structures currently in use, such as homes and buildings, would need to be condemned; and
4. The applicant demonstrates that it does not own or have other rights to areas, including the potential to obtain through condemnation lands not falling under D.3 above within the upstream drainage area of the receiving stream, that would provide additional opportunities to mitigate the requirements of Sections 4.F and 4.G that were not achievable on-site.

### E. Nonstructural Stormwater Management Strategies

1. To the maximum extent practicable, the standards in Sections 4.F and 4.G shall be met by incorporating nonstructural stormwater management strategies set forth at Section 4.E into the design. The applicant shall identify the nonstructural measures 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 measures identified in Paragraph 2 below into the design of a particular project, the applicant shall identify the strategy considered and provide a basis for the contention.
2. Nonstructural stormwater management strategies incorporated into site design shall:
  - a. Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;
  - b. Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces;
  - c. Maximize the protection of natural drainage features and vegetation;
  - d. Minimize the decrease in the "time of concentration" from pre-construction to post construction. "Time of concentration" is defined as the time it takes for runoff to travel from the hydraulically most distant point of the watershed to the point of interest within a watershed;
  - e. Minimize land disturbance including clearing and grading;
  - f. Minimize soil compaction;
  - g. Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides;



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- h. Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas;
  - i. 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. Such source controls include, but are not limited to:
    - (1) Site design features that help to prevent accumulation of trash and debris in drainage systems, including features that satisfy Section 4.E.3. below;
    - (2) Site design features that help to prevent discharge of trash and debris from drainage systems;
    - (3) Site design features that help to prevent and/or contain spills or other harmful accumulations of pollutants at industrial or commercial developments; and
    - (1) When establishing vegetation after land disturbance, applying fertilizer in accordance with the requirements established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq., and implementing rules.
3. Site design features identified under Section 4.E.2.i.(2) above shall comply with the following standard to control passage of solid and floatable materials through storm drain inlets. For purposes of this paragraph, "solid and floatable materials" means sediment, debris, trash, and other floating, suspended, or settleable solids. For exemptions to this standard see Section 4.E.3.c below.
- a. Design engineers shall use either of the following grates whenever they use a grate in pavement or another ground surface to collect stormwater from that surface into a storm drain or surface water body under that grate:
    - (1) The New Jersey Department of Transportation (NJDOT) bicycle safe grate, which is described in Chapter 2.4 of the NJDOT Bicycle Compatible Roadways and Bikeways Planning and Design Guidelines (April 1996); or
    - (2) A different grate, if each individual clear space in that grate has an area of no more than seven (7.0) square inches, or is no greater than 0.5 inches across the smallest dimension.
- Examples of grates subject to this standard include grates in grate inlets, the grate portion (non-curb-opening portion) of combination inlets, grates on storm sewer manholes, ditch grates, trench grates, and grates of spacer bars in slotted drains. Examples of ground surfaces include surfaces of roads (including bridges), driveways, parking areas, bikeways, plazas, sidewalks, lawns, fields, open channels, and stormwater basin floors.
- b. Whenever design engineers use a curb-opening inlet, the clear space in that curb opening (or each individual clear space, if the curb opening has two or more clear spaces) shall have an area of no more than seven (7.0) square inches, or be no greater than two (2.0) inches across the smallest dimension.
  - c. This standard does not apply:

## Voorhees Model Stormwater Ordinance

- (1) Where the review agency determines that this standard would cause inadequate hydraulic performance that could not practicably be overcome by using additional or larger storm drain inlets that meet these standards;
  - (2) Where flows from the water quality design storm as specified in Section 4.G.1 are conveyed through any device (e.g., end of pipe netting facility, manufactured treatment device, or a catch basin hood) that is designed, at a minimum, to prevent delivery of all solid and floatable materials that could not pass through one of the following:
    - (a) A rectangular space four and five-eighths inches long and one and one-half inches wide (this option does not apply for outfall netting facilities); or
    - (b) A bar screen having a bar spacing of 0.5 inches.
  - (3) Where flows are conveyed through a trash rack that has parallel bars with one-inch (1") spacing between the bars, to the elevation of the water quality design storm as specified in Section 4.G.1; or
  - (4) Where the New Jersey Department of Environmental Protection determines, pursuant to the New Jersey Register of Historic Places Rules at N.J.A.C. 7:4-7.2(c), that action to meet this standard is an undertaking that constitutes an encroachment or will damage or destroy the New Jersey Register listed historic property.
4. Any land area used as a nonstructural stormwater management measure to meet the performance standards in Sections 4.F and 4.G shall be dedicated to a government agency, subjected to a conservation restriction filed with the appropriate County Clerk's office, or subject to an approved equivalent restriction that ensures that measure or an equivalent stormwater management measure approved by the reviewing agency is maintained in perpetuity.
5. Guidance for nonstructural stormwater management strategies is available in the New Jersey Stormwater Best Management Practices Manual. The BMP Manual may be obtained from the address identified in Section 7, or found on the Department's website at [www.njstormwater.org](http://www.njstormwater.org).

### F. Erosion Control, Groundwater Recharge and Runoff Quantity Standards

1. This subsection contains minimum design and performance standards to control erosion, encourage and control infiltration and groundwater recharge, and control stormwater runoff quantity impacts of major development.
  - a. The minimum design and performance standards for erosion control are those established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq. and implementing rules.
  - b. The minimum design and performance standards for groundwater recharge are as follows:
    - (1) The design engineer shall, using the assumptions and factors for stormwater runoff and groundwater recharge calculations at Section 5, either:

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- (a) Demonstrate through hydrologic and hydraulic analysis that the site and its stormwater management measures maintain 100 percent of the average annual pre-construction groundwater recharge volume for the site; or
  - (b) Demonstrate through hydrologic and hydraulic analysis that the increase of stormwater runoff volume from pre-construction to post-construction for the 2-year storm is infiltrated.
- (2) This groundwater recharge requirement does not apply to projects within the "urban redevelopment area," or to projects subject to (3) below.
- (3) The following types of stormwater shall not be recharged:
  - (a) Stormwater from areas of high pollutant loading. High pollutant loading areas are areas in industrial and commercial developments where solvents and/or petroleum products are loaded/unloaded, stored, or applied, areas where pesticides are loaded/unloaded or stored; areas where hazardous materials are expected to be present in greater than "reportable quantities" as defined by the United States Environmental Protection Agency (EPA) at 40 CFR 302.4; areas where recharge would be inconsistent with Department approved remedial action work plan or landfill closure plan and areas with high risks for spills of toxic materials, such as gas stations and vehicle maintenance facilities; and
  - (b) Industrial stormwater exposed to "source material." "Source material" means any material(s) or machinery, located at an industrial facility, that is directly or indirectly related to process, manufacturing or other industrial activities, which could be a source of pollutants in any industrial stormwater discharge to groundwater. Source materials include, but are not limited to, raw materials; intermediate products; final products; waste materials; by-products; industrial machinery and fuels, and lubricants, solvents, and detergents that are related to process, manufacturing, or other industrial activities that are exposed to stormwater.
- (4) The design engineer shall assess the hydraulic impact on the groundwater table and design the site so as to avoid adverse hydraulic impacts. Potential adverse hydraulic impacts include, but are not limited to, exacerbating a naturally or seasonally high water table so as to cause surficial ponding, flooding of basements, or interference with the proper operation of subsurface sewage disposal systems and other subsurface structures in the vicinity or downgradient of the groundwater recharge area.
- c. In order to control stormwater runoff quantity impacts, the design engineer shall, using the assumptions and factors for stormwater runoff calculations at Section 5, complete one of the following:
  - (1) Demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the two, 10, and 100-year storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events;
  - (2) Demonstrate through hydrologic and hydraulic analysis that there is no increase, as compared to the pre-construction condition, in the peak runoff rates of stormwater



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leaving the site for the two, 10, and 100-year storm events and that the increased volume or change in timing of stormwater runoff will not increase flood damage at or downstream of the site. This analysis shall include the analysis of impacts of existing land uses and projected land uses assuming full development under existing zoning and land use ordinances in the drainage area;

- (3) Design stormwater management measures so that 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 peak runoff rates. The percentages apply only to the post-construction stormwater runoff that is attributable to the portion of the site on which the proposed development or project is to be constructed. The percentages shall not be applied to post-construction stormwater runoff into tidal flood hazard areas if the increased volume of stormwater runoff will not increase flood damages below the point of discharge; or
  - (4) In tidal flood hazard areas, stormwater runoff quantity analysis in accordance with (1), (2) and (3) above shall only be applied if the increased volume of stormwater runoff could increase flood damages below the point of discharge.
2. Any application for a new agricultural development that meets the definition of major development at Section 2 shall be submitted to the appropriate Soil Conservation District for review and approval in accordance with the requirements of this section and any applicable Soil Conservation District guidelines for stormwater runoff quantity and erosion control. For the purposes of this section, "agricultural development" means land uses normally associated with the production of food, fiber and livestock for sale. Such uses do not include the development of land for the processing or sale of food and the manufacturing of agriculturally related products.

### G. Stormwater Runoff Quality Standards

1. Stormwater management measures shall be designed to reduce the post-construction load of total suspended solids (TSS) in stormwater runoff by 80 percent of the anticipated load from the developed site, expressed as an annual average. Stormwater management measures shall only be required for water quality control if an additional 1/4 acre of impervious surface is being proposed on a development site. The requirement to reduce TSS does not apply to any stormwater runoff in a discharge regulated under a numeric effluent limitation for TSS imposed under the New Jersey Pollution Discharge Elimination System (NJPDES) rules, N.J.A.C. 7:14A, or in a discharge specifically exempt under a NJPDES permit from this requirement. The water quality design storm is 1.25 inches of rainfall in two hours. Water quality calculations shall take into account the distribution of rain from the water quality design storm, as reflected in Table 1. The calculation of the volume of runoff may take into account the implementation of non-structural and structural stormwater management measures.

Table 1: Water Quality Design Storm Distribution
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Time (Minutes)	Cumulative Rainfall (Inches)	Time (Minutes)	Cumulative Rainfall (Inches)
0	0.0000	65	0.8917
5	0.0083	70	0.9917
10	0.0166	75	1.0500
15	0.0250	80	1.0840
20	0.0500	85	1.1170
25	0.0750	90	1.1500
30	0.1000	95	1.1750
35	0.1330	100	1.2000
40	0.1660	105	1.2250
45	0.2000	110	1.2334
50	0.2583	115	1.2417
55	0.3583	120	1.2500
60	0.6250		

- For purposes of TSS reduction calculations, Table 2 below presents the presumed removal rates for certain BMPs designed in accordance with the New Jersey Stormwater Best Management Practices Manual. The BMP Manual may be obtained from the address identified in Section 7, or found on the Department's website at [www.njstormwater.org](http://www.njstormwater.org). The BMP Manual and other sources of technical guidance are listed in Section 7. TSS reduction shall be calculated based on the removal rates for the BMPs in Table 2 below. Alternative removal rates and methods of calculating removal rates may be used if the design engineer provides documentation demonstrating the capability of these alternative rates and methods to the review agency. A copy of any approved alternative rate or method of calculating the removal rate shall be provided to the Department at the following address: Division of Watershed Management, New Jersey Department of Environmental Protection, PO Box 418 Trenton, New Jersey, 08625-0418.

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3. If more than one BMP in series is necessary to achieve the required 80 percent TSS reduction for a site, the applicant shall utilize the following formula to calculate TSS reduction:

$$R = A + B - (AXB)/100$$

Where

R = total TSS percent load removal from application of both BMPs, and

A = the TSS percent removal rate applicable to the first BMP

B = the TSS percent removal rate applicable to the second BMP

Table 2: TSS Removal Rates for BMPs	
Best Management Practice	TSS Percent Removal Rate
Bioretention Systems	90
Constructed Stormwater Wetland	90
Extended Detention Basin	40-60
Infiltration Structure	80
Manufactured Treatment Device	See Section 6.C
Sand Filter	80
Vegetative Filter Strip	60-80
Wet Pond	50-90

4. If there is more than one onsite drainage area, the 80 percent TSS removal rate shall apply to each drainage area, unless the runoff from the subareas converge on site in which case the removal rate can be demonstrated through a calculation using a weighted average.
5. Stormwater management measures shall also be designed to reduce, to the maximum extent feasible, the post-construction nutrient load of the anticipated load from the developed site in stormwater runoff generated from the water quality design storm. In achieving reduction of nutrients to the maximum extent feasible, the design of the site shall include nonstructural strategies and structural measures that optimize nutrient removal while still achieving the performance standards in Sections 4.F and 4.G.
6. Additional information and examples are contained in the New Jersey Stormwater Best Management Practices Manual, which may be obtained from the address identified in Section 7.



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7. In accordance with the definition of FW1 at N.J.A.C. 7:9B-1.4, stormwater management measures shall be designed to prevent any increase in stormwater runoff to waters classified as FW1.
8. Special water resource protection areas shall be established along all waters designated Category One at N.J.A.C. 7:9B, and perennial or intermittent streams that drain into or upstream of the Category One waters as shown on the USGS Quadrangle Maps or in the County Soil Surveys, within the associated HUC14 drainage area. These areas shall be established for the protection of water quality, aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, and exceptional fisheries significance of those established Category One waters. These areas shall be designated and protected as follows:
  - a. The applicant shall preserve and maintain a special water resource protection area in accordance with one of the following:
    - (1) A 300-foot special water resource protection area shall be provided on each side of the waterway, measured perpendicular to the waterway from the top of the bank outwards or from the centerline of the waterway where the bank is not defined, consisting of existing vegetation or vegetation allowed to follow natural succession is provided. (2) Encroachment within the designated special water resource protection area under Subsection (1) above shall only be allowed where previous development or disturbance has occurred (for example, active agricultural use, parking area or maintained lawn area). The encroachment shall only be allowed where applicant demonstrates that the functional value and overall condition of the special water resource protection area will be maintained to the maximum extent practicable. In no case shall the remaining special water resource protection area be reduced to less than 150 feet as measured perpendicular to the top of bank of the waterway or centerline of the waterway where the bank is undefined. All encroachments proposed under this subparagraph shall be subject to review and approval by the Department.
  - b. All stormwater shall be discharged outside of and flow through the special water resource protection area and shall comply with the Standard for Off-Site Stability in the "Standards For Soil Erosion and Sediment Control in New Jersey," established under the Soil Erosion and Sediment Control Act , N.J.S.A. 4:24-39 et seq.
  - c. If stormwater discharged outside of and flowing through the special water resource protection area cannot comply with the Standard For Off-Site Stability in the "Standards for Soil Erosion and Sediment Control in New Jersey," established under the Soil Erosion and Sediment Control Act , N.J.S.A. 4:24-39 et seq., then the stabilization measures in accordance with the requirements of the above standards may be placed within the special water resource protection area, provided that:
    - (1) Stabilization measures shall not be placed within 150 feet of the Category One waterway;
    - (2) Stormwater associated with discharges allowed by this section shall achieve a 95 percent TSS post-construction removal rate;
    - (3) Temperature shall be addressed to ensure no impact on the receiving waterway;

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- (4) The encroachment shall only be allowed where the applicant demonstrates that the functional value and overall condition of the special water resource protection area will be maintained to the maximum extent practicable;
  - (5) A conceptual project design meeting shall be held with the appropriate Department staff and Soil Conservation District staff to identify necessary stabilization measures; and
  - (6) All encroachments proposed under this section shall be subject to review and approval by the Department.
- d. A stream corridor protection plan may be developed by a regional stormwater management planning committee as an element of a regional stormwater management plan, or by a municipality through an adopted municipal stormwater management plan. If a stream corridor protection plan for a waterway subject to Section 4.G(8) has been approved by the Department of Environmental Protection, then the provisions of the plan shall be the applicable special water resource protection area requirements for that waterway. A stream corridor protection plan for a waterway subject to G.8 shall maintain or enhance the current functional value and overall condition of the special water resource protection area as defined in G.8.a.(1) above. In no case shall a stream corridor protection plan allow the reduction of the Special Water Resource Protection Area to less than 150 feet as measured perpendicular to the waterway subject to this subsection.
- e. Paragraph G.8 does not apply to the construction of one individual single family dwelling that is not part of a larger development on a lot receiving preliminary or final subdivision approval on or before February 2, 2004 , provided that the construction begins on or before February 2, 2009.

### Section 5: Calculation of Stormwater Runoff and Groundwater Recharge

- A. Stormwater runoff shall be calculated in accordance with the following:
1. The design engineer shall calculate runoff using one of the following methods:
    - a. The USDA Natural Resources Conservation Service (NRCS) methodology, including the NRCS Runoff Equation and Dimensionless Unit Hydrograph, as described in the NRCS National Engineering Handbook Section 4 – Hydrology and Technical Release 55 – Urban Hydrology for Small Watersheds; or
    - b. The Rational Method for peak flow and the Modified Rational Method for hydrograph computations.
  2. For the purpose of calculating runoff coefficients and groundwater recharge, there is a presumption that the pre-construction condition of a site or portion thereof is a wooded land use with good hydrologic condition. The term “runoff coefficient” applies to both the NRCS methodology at Section 5.A.1.a and the Rational and Modified Rational Methods at Section 5.A.1.b. A runoff coefficient or a groundwater recharge land cover for an existing condition may be used on all or a portion of the site if the design engineer verifies that the hydrologic condition has existed on the site or portion of the site for at least five years without interruption prior to the time of application. If more than one land cover have existed on the

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site during the five years immediately prior to the time of application, the land cover with the lowest runoff potential shall be used for the computations. In addition, there is the presumption that the site is in good hydrologic condition (if the land use type is pasture, lawn, or park), with good cover (if the land use type is woods), or with good hydrologic condition and conservation treatment (if the land use type is cultivation).

3. In computing pre-construction stormwater runoff, the design engineer shall account for all significant land features and structures, such as ponds, wetlands, depressions, hedgerows, or culverts, that may reduce pre-construction stormwater runoff rates and volumes.
  4. In computing stormwater runoff from all design storms, the design engineer shall consider the relative stormwater runoff rates and/or volumes of pervious and impervious surfaces separately to accurately compute the rates and volume of stormwater runoff from the site. To calculate runoff from unconnected impervious cover, urban impervious area modifications as described in the NRCS Technical Release 55 – Urban Hydrology for Small Watersheds and other methods may be employed.
  5. If the invert of the outlet structure of a stormwater management measure is below the flood hazard design flood elevation as defined at N.J.A.C. 7:13, the design engineer shall take into account the effects of tailwater in the design of structural stormwater management measures.
- B. Groundwater recharge may be calculated in accordance with the following:
1. The New Jersey Geological Survey Report GSR-32 A Method for Evaluating Ground-Water Recharge Areas in New Jersey, incorporated herein by reference as amended and supplemented. Information regarding the methodology is available from the New Jersey Stormwater Best Management Practices Manual; at <http://www.state.nj.us/dep/njgs/>; or at New Jersey Geological Survey, 29 Arctic Parkway, P.O. Box 427 Trenton, New Jersey 08625-0427; (609) 984-6587.

### Section 6: Standards for Structural Stormwater Management Measures

- A. Standards for structural stormwater management measures are as follows:
1. Structural stormwater management measures shall be designed to take into account the existing site conditions, including, for example, environmentally critical areas, wetlands; flood-prone areas; slopes; depth to seasonal high water table; soil type, permeability and texture; drainage area and drainage patterns; and the presence of solution-prone carbonate rocks (limestone).
  2. Structural stormwater management measures shall be designed to minimize maintenance, facilitate maintenance and repairs, and ensure proper functioning. Trash racks shall be installed at the intake to the outlet structure as appropriate, and shall have parallel bars with one-inch (1") spacing between the bars to the elevation of the water quality design storm. For elevations higher than the water quality design storm, the parallel bars at the outlet structure shall be spaced no greater than one-third (1/3) the width of the diameter of the orifice or one-third (1/3) the width of the weir, with a minimum spacing between bars of one-inch and a maximum spacing between bars of six inches. In addition, the design of trash racks must comply with the requirements of Section 8.D.



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3. Structural stormwater management measures shall be designed, constructed, and installed to be strong, durable, and corrosion resistant. Measures that are consistent with the relevant portions of the Residential Site Improvement Standards at N.J.A.C. 5:21-7.3, 7.4, and 7.5 shall be deemed to meet this requirement.
  4. At the intake to the outlet from the stormwater management basin, the orifice size shall be a minimum of two and one-half inches in diameter.
  5. Stormwater management basins shall be designed to meet the minimum safety standards for stormwater management basins at Section 8.
- B. Stormwater management measure guidelines are available in the New Jersey Stormwater Best Management Practices Manual. Other stormwater management measures may be utilized provided the design engineer demonstrates that the proposed measure and its design will accomplish the required water quantity, groundwater recharge and water quality design and performance standards established by Section 4 of this ordinance.
- C. Manufactured treatment devices may be used to meet the requirements of Section 4 of this ordinance, provided the pollutant removal rates are verified by the New Jersey Corporation for Advanced Technology and certified by the Department.

### Section 7: Sources for Technical Guidance

- A. Technical guidance for stormwater management measures can be found in the documents listed at 1 and 2 below, which are available from Maps and Publications, New Jersey Department of Environmental Protection, 428 East State Street, P.O. Box 420, Trenton, New Jersey, 08625; telephone (609) 777-1038.
1. Guidelines for stormwater management measures are contained in the New Jersey Stormwater Best Management Practices Manual, as amended. Information is provided on stormwater management measures such as: bioretention systems, constructed stormwater wetlands, dry wells, extended detention basins, infiltration structures, manufactured treatment devices, pervious paving, sand filters, vegetative filter strips, and wet ponds.
  2. The New Jersey Department of Environmental Protection Stormwater Management Facilities Maintenance Manual, as amended.
- B. Additional technical guidance for stormwater management measures can be obtained from the following:
1. The "Standards for Soil Erosion and Sediment Control in New Jersey" promulgated by the State Soil Conservation Committee and incorporated into N.J.A.C. 2:90. Copies of these standards may be obtained by contacting the State Soil Conservation Committee or any of the Soil Conservation Districts listed in N.J.A.C. 2:90-1.3(a). The location, address, and telephone number of each Soil Conservation District may be obtained from the State Soil Conservation Committee, P.O. Box 330, Trenton, New Jersey 08625; (609) 292-5540;
  2. The Rutgers Cooperative Extension Service, 732-932-9306; and

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3. The Soil Conservation Districts listed in N.J.A.C. 2:90-1.3(a)4. The location, address, and telephone number of each Soil Conservation District may be obtained from the State Soil Conservation Committee, P.O. Box 330, Trenton, New Jersey, 08625, (609) 292-5540.

### Section 8: Safety Standards for Stormwater Management Basins

- A. This section sets forth requirements to protect public safety through the proper design and operation of stormwater management basins. This section applies to any new stormwater management basin.
- B. Requirements for Trash Racks, Overflow Grates and Escape Provisions
  1. A trash rack is a device designed to catch trash and debris and prevent the clogging of outlet structures. Trash racks shall be installed at the intake to the outlet from the stormwater management basin to ensure proper functioning of the basin outlets in accordance with the following:
    - a. The trash rack shall have parallel bars, with no greater than six inch spacing between the bars.
    - b. The trash rack shall be designed so as not to adversely affect the hydraulic performance of the outlet pipe or structure.
    - c. The average velocity of flow through a clean trash rack is not to exceed 2.5 feet per second under the full range of stage and discharge. Velocity is to be computed on the basis of the net area of opening through the rack.
    - d. The trash rack shall be constructed and installed to be rigid, durable, and corrosion resistant, and shall be designed to withstand a perpendicular live loading of 300 lbs/ft sq.
  2. An overflow grate is designed to prevent obstruction of the overflow structure. If an outlet structure has an overflow grate, such grate shall meet the following requirements:
    - a. The overflow grate shall be secured to the outlet structure but removable for emergencies and maintenance.
    - b. The overflow grate spacing shall be no less than two inches across the smallest dimension.
    - c. The overflow grate shall be constructed and installed to be rigid, durable, and corrosion resistant, and shall be designed to withstand a perpendicular live loading of 300 lbs./ft sq.
  3. For purposes of this paragraph 3, escape provisions means the permanent installation of ladders, steps, rungs, or other features that provide easily accessible means of egress from stormwater management basins. Stormwater management basins shall include escape provisions as follows:
    - a. If a stormwater management basin has an outlet structure, escape provisions shall be incorporated in or on the structure. With the prior approval of the reviewing agency identified in Section 8.C a free-standing outlet structure may be exempted from this requirement.

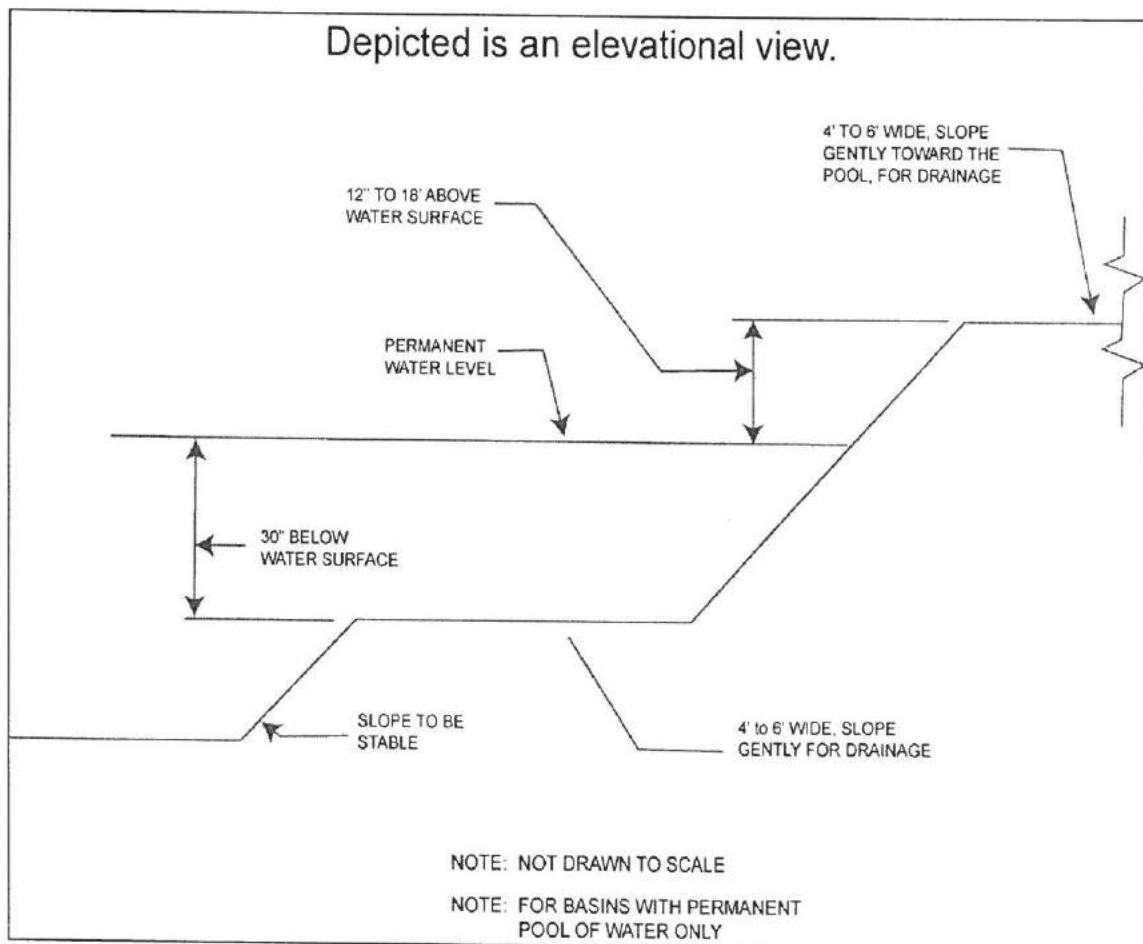
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- b. Safety ledges shall be constructed on the slopes of all new stormwater management basins having a permanent pool of water deeper than two and one-half feet. Such safety ledges shall be comprised of two steps. Each step shall be four to six feet in width. One step shall be located approximately two and one-half feet below the permanent water surface, and the second step shall be located one to one and one-half feet above the permanent water surface. See Section 8.D for an illustration of safety ledges in a stormwater management basin.
- c. In new stormwater management basins, the maximum interior slope for an earthen dam, embankment, or berm shall not be steeper than 3 horizontal to 1 vertical.

### C. Variance or Exemption from Safety Standards

1. A variance or exemption from the safety standards for stormwater management basins may be granted only upon a written finding by the appropriate reviewing agency (municipality, county or Department) that the variance or exemption will not constitute a threat to public safety.

### D. Illustration of Safety Ledges in a New Stormwater Management Basin





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### Section 9: Requirements for a Site Development Stormwater Plan

#### A. Submission of Site Development Stormwater Plan

1. Whenever an applicant seeks municipal approval of a development subject to this ordinance, the applicant shall submit all of the required components of the Checklist for the Site Development Stormwater Plan at Section 9.C below as part of the submission of the applicant's application for subdivision or site plan approval.
2. The applicant shall demonstrate that the project meets the standards set forth in this ordinance.
3. The applicant shall submit 15 copies of the materials listed in the checklist for site development stormwater plans in accordance with Section 9.C of this ordinance.

#### B. Site Development Stormwater Plan Approval

The applicant's Site Development project shall be reviewed as a part of the subdivision or site plan review process by the municipal board or official from which municipal approval is sought. That municipal board or official shall consult the engineer retained by the Planning and/or Zoning Board (as appropriate) to determine if all of the checklist requirements have been satisfied and to determine if the project meets the standards set forth in this ordinance.

#### C. Checklist Requirements

The following information shall be required:

##### 1. Topographic Base Map

The reviewing engineer may require upstream tributary drainage system information as necessary. It is recommended that the topographic base map of the site be submitted which extends a minimum of 200 feet beyond the limits of the proposed development, at a scale of 1"=200' or greater, showing 2-foot contour intervals. The map as appropriate may indicate the following: existing surface water drainage, shorelines, steep slopes, soils, erodible soils, perennial or intermittent streams that drain into or upstream of the Category One waters, wetlands and flood plains along with their appropriate buffer strips, marshlands and other wetlands, pervious or vegetative surfaces, existing man-made structures, roads, bearing and distances of property lines, and significant natural and manmade features not otherwise shown.

##### 2. Environmental Site Analysis

A written and graphic description of the natural and man-made features of the site and its environs. This description should include a discussion of soil conditions, slopes, wetlands, waterways and vegetation on the site. Particular attention should be given to unique, unusual, or environmentally sensitive features and to those that provide particular opportunities or constraints for development.

##### 3. Project Description and Site Plan(s)

A map (or maps) at the scale of the topographical base map indicating the location of existing and proposed buildings, roads, parking areas, utilities, structural facilities for stormwater

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management and sediment control, and other permanent structures. The map(s) shall also clearly show areas where alterations occur in the natural terrain and cover, including lawns and other landscaping, and seasonal high ground water elevations. A written description of the site plan and justification of proposed changes in natural conditions may also be provided.

### 4. Land Use Planning and Source Control Plan

This plan shall provide a demonstration of how the goals and standards of Sections 3 through 6 are being met. The focus of this plan shall be to describe how the site is being developed to meet the objective of controlling groundwater recharge, stormwater quality and stormwater quantity problems at the source by land management and source controls whenever possible.

### 5. Stormwater Management Facilities Map

The following information, illustrated on a map of the same scale as the topographic base map, shall be included:

- a. Total area to be paved or built upon, proposed surface contours, land area to be occupied by the stormwater management facilities and the type of vegetation thereon, and details of the proposed plan to control and dispose of stormwater.
- b. Details of all stormwater management facility designs, during and after construction, including discharge provisions, discharge capacity for each outlet at different levels of detention and emergency spillway provisions with maximum discharge capacity of each spillway.

### 6. Calculations

- a. Comprehensive hydrologic and hydraulic design calculations for the pre-development and post-development conditions for the design storms specified in Section 4 of this ordinance.
- b. When the proposed stormwater management control measures (e.g., infiltration basins) depends on the hydrologic properties of soils, then a soils report shall be submitted. The soils report shall be based on onsite boring logs or soil pit profiles. The number and location of required soil borings or soil pits shall be determined based on what is needed to determine the suitability and distribution of soils present at the location of the control measure.

### 7. Maintenance and Repair Plan

The design and planning of the stormwater management facility shall meet the maintenance requirements of Section 10.

### 8. Waiver from Submission Requirements

The municipal official or board reviewing an application under this ordinance may, in consultation with the municipal engineer, waive submission of any of the requirements in Sections 9.C.1 through 9.C.6 of this ordinance when it can be demonstrated that the information requested is impossible to obtain or it would create a hardship on the applicant to obtain and its absence will not materially affect the review process.

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### Section 10: Maintenance and Repair

#### A. Applicability

1. Projects subject to review as in Section 1.C of this ordinance shall comply with the requirements of Sections 10.B and 10.C.

#### B. General Maintenance

1. The design engineer shall prepare a maintenance plan for the stormwater management measures incorporated into the design of a major development.
2. The maintenance plan shall contain specific preventative maintenance tasks and schedules; cost estimates, including estimated cost of sediment, debris, or trash removal; and the name, address, and telephone number of the person or persons responsible for preventative and corrective maintenance (including replacement). Maintenance guidelines for stormwater management measures are available in the New Jersey Stormwater Best Management Practices Manual. If the maintenance plan identifies a person other than the developer (for example, a public agency or homeowners' association) as having the responsibility for maintenance, the plan shall include documentation of such person's agreement to assume this responsibility, or of the developer's obligation to dedicate a stormwater management facility to such person under an applicable ordinance or regulation.
3. Responsibility for maintenance shall not be assigned or transferred to the owner or tenant of an individual property in a residential development or project, unless such owner or tenant owns or leases the entire residential development or project.
4. If the person responsible for maintenance identified under Section 10.B.2 above is not a public agency, the maintenance plan and any future revisions based on Section 10.B.7 below shall be recorded upon the deed of record for each property on which the maintenance described in the maintenance plan must be undertaken.
5. Preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measure, including repairs or replacement to the structure; removal of sediment, debris, or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; and repair or replacement of nonvegetated linings.
6. The person responsible for maintenance identified under Section 10.B.2 above shall maintain a detailed log of all preventative and corrective maintenance for the structural stormwater management measures incorporated into the design of the development, including a record of all inspections and copies of all maintenance-related work orders.
7. The person responsible for maintenance identified under Section 10.B.2 above shall evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed.
8. The person responsible for maintenance identified under Section 10.B.2 above shall retain and make available, upon request by any public entity with administrative, health, environmental, or safety authority over the site, the maintenance plan and the documentation required by Sections 10.B.6 and 10.B.7 above.



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9. The requirements of Sections 10.B.3 and 10.B.4 do not apply to stormwater management facilities that are dedicated to and accepted by the municipality or another governmental agency.
  10. In the event that the stormwater management facility becomes a danger to public safety or public health, or if it is in need of maintenance or repair, the municipality shall so notify the responsible person in writing. Upon receipt of that notice, the responsible person shall have fourteen (14) days to effect maintenance and repair of the facility in a manner that is approved by the municipal engineer or his designee. The municipality, in its discretion, may extend the time allowed for effecting maintenance and repair for good cause. If the responsible person fails or refuses to perform such maintenance and repair, the municipality or County may immediately proceed to do so and shall bill the cost thereof to the responsible person.
- B. Nothing in this section shall preclude the municipality in which the major development is located from requiring the posting of a performance or maintenance guarantee in accordance with N.J.S.A. 40:55D-53.

### Section 11: Penalties

Any person who erects, constructs, alters, repairs, converts, maintains, or uses any building, structure or land in violation of this ordinance shall be subject to the following penalties: [*Voorhees to Specify*].

### Section 12: Effective Date

This ordinance shall take effect immediately upon the approval by the county review agency, or sixty (60) days from the receipt of the ordinance by the county review agency if the county review agency should fail to act.

### Section 13: Severability

If the provisions of any section, subsection, paragraph, subdivision, or clause of this ordinance shall be judged invalid by a court of competent jurisdiction, such order of judgment shall not affect or invalidate the remainder of any section, subsection, paragraph, subdivision, or clause of this ordinance.