SPPP Form 13 – Stormwater Facility Maintenance

Municipality Information

Municipality:Borough of Lindenwold County: *Camden*

NJPDES # :0148351PI ID #: 203139

Team Member/Title: Phil Beeler, Director - Lindenwold Sewer Authority

Effective Date of Permit Authorization (EDPA):*4/1/04*

Date of Completion: *1/18/05* Date of most recent update: *3/29/05*

Please describe your annual catch basin cleaning program and schedule. Attach a map/diagram or additional pages as necessary.

Lindenwold will implement an annual catch basin cleaning program to maintain catch basin function and efficiency. Catch basin cleaning is done by a jet-vac truck, and this cleaning is performed annually, following the final leaf collection of the year. At the time of cleaning, the catch basins will also be inspected for proper function. Maintenance will be scheduled for those catch basins that are in disrepair. A log book containing cleaning dates, by neighborhood, is kept by the Sewer Department. A street map of the Borough, with cleaning areas, by section, is attached.

Please describe your stormwater facility maintenance program for cleaning and maintenance of all stormwater facilities operated by the municipality. Attach additional pages as necessary.

(NOTE: Attach a maintenance log containing information on any repairs/maintenance performed on stormwater facilities to ensure their proper function and operation.)

Lindenwold will implement a stormwater facility maintenance program to ensure that all stormwater facilities operated by the Township function properly. Lindenwold operates the following:

- *catch basins*
- *storm drains*
- *buffer strips*
- *swales*

These stormwater facilities will be inspected annually to ensure that they are functioning properly. In high risk areas, preventative maintenance will be performed on all stormwater facilities to ensure that they do not begin to fail.

SPPP Form 14 - Outfall Pipe Stream Scouring Remediation

Municipality Information

Municipality:Borough of Lindenwold *County: Camden*

NJPDES # :0148351PI ID #: 203139

Team Member/Title: Robert E. Lodovici, Public Works Director

Effective Date of Permit Authorization (EDPA):*4/1/04*

Date of Completion: *1/18/05* Date of most recent update: *3/29/05*

Describe your stormwater outfall pipe scouring detection, remediation and maintenance program to detect and control active, localized stream and stream bank scouring. Attach additional pages as necessary.

(NOTE: Attach a prioritized list of sites observed to have outfall pipe stream and stream bank scouring, date of anticipated repair, method of repair and date of completion.)

When we are performing the illicit connections portion of this program, we will be inspecting all of our outfall pipes for signs of scouring. All sites will be placed on a prioritized list and repairs shall be made in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey. In addition, repairs that do not need NJDEP permits for those repairs may be done first.

We shall follow each reapir up with an annual inspection of the site to ensure that scouring has not resumed.

A list will be made of all sites with outfall pipe stream scouring, the date we plan on repairing the scouring, and the method of repair we will use. When repairs are completed, we will note the date of that repair on this form.

SPPP Form 15 – De-icing Material Storage

Municipality Information

Municipality: *Borough of Lindenwold* County *Camden*

NJPDES # :*0148351* PI ID #: *203139*

Team Member/Title: *Robert E. Lodovici, Public Works Director*

Effective Date of Permit Authorization (EDPA):*4/1/04*

Date of Completion: *1/18/05* Date of most recent update: *3/29/05*

De-icing Material Storage

Describe how you currently store your municipality's de-icing materials, and describe your inspection schedule for the storage area. If your current storage practices do not meet the de-icing material storage SBR describe your construction schedule and your seasonal tarping interim measures. If you plan on sharing a storage structure, please include its location, as well as a complete list of all concerned public entities. If you store sand outdoors, describe how it meets the minimum standard.

Lindenwold currently stores all of its de-icing salt and sand outdoors at the Public Works Yard, located at 861 Gibbsboro Road .Material is stored underneath a tarpaulin when not in use. In addition, at the completion of loading and unloading activities, we shall inspect for spilled salt.

The Borough plans to construct a permanent indoor structure to store salt and sand in the future, in the future, as funds become available.

SPPP Form 16 – Standard Operating Procedures

Municipality Information

Municipality: *Borough of Lindenwold* County *Camden*

NJPDES # :*0148351* PI ID #: *203139*

Team Member/Title: *Robert E. Lodovici, Public Works Director*

Effective Date of Permit Authorization (EDPA):*4/1/04*

Date of Completion: *1/18/05* Date of most recent update: *3/29/05*

BMP	Date SOP went into effect	Describe your inspection schedule
Fueling Operations (including the required practices listed in Attachment D of the permit)		*Fueling operations are performed in accordance with the Borough's SOPs (attached)*
Vehicle Maintenance (including the required practices listed in Attachment D of the permit)		*Vehicles are inspected monthly to ensure SOPs (attached) are being met.*
Good Housekeeping Practices (including the required practices listed in Attachment D of the permit) **Attach inventory list required by Attachment D of the permit.**		*"Right to know" Chemical Inventory is attached. Inspection will be performed monthly to ensure SOPs (attached) are being met.*

Lindenwold Borough
Standard Operating Procedures
Good Housekeeping

Lindenwold Borough Good Housekeeping Goals

- Proper Recycling
- Proper Waste Disposal
- Pollution Prevention

Introduction and Purpose

- This SOP contains the basic practices of good housekeeping to be implemented at maintenance yards including maintenance activities at ancillary operations in Lindenwold Borough. The purpose of this SOP is to provide a set of guidelines for the employees of Lindenwold Borough for Good Housekeeping Practices at their maintenance yards, including maintenance activities at ancillary operations.

Scope

- This SOP applies to all maintenance yards including maintenance activities at ancillary operations in Lindenwold Borough.

Standards and Specifications (General)

- All containers should be properly labeled and marked, and the labels must remain clean and visible.
- All containers must be kept in good condition and tightly closed when not in use.
- When practical, chemicals, fluids and supplies should be kept indoors.
- If containers are stored outside, they must be covered and placed on spill platforms.
- Keep storage areas clean and well organized.
- Spill kits and drip pans must be kept near any liquid transfer areas, and protected from rainfall.
- Absorbent spill clean-up materials must be available in maintenance areas and shall be disposed of properly after use.
- Place trash, dirt and other debris in the dumpster.
- Collect waste fluids in properly labeled containers and dispose of them properly.
- Establish and maintain a recycling program by disposing papers, cans, bottles and trash in designated bins.

Standards and Specifications (Salt and De-icing Materials Handling)

- During loading and unloading of salt and de-icing materials, prevent and/or minimize spills. If salt or de-icing materials are spilled, remove the materials using dry cleaning methods. All collected materials shall be either re-used or properly discarded.
- Sweeping should be conducted once a week to get rid of dirt and other debris. Sweeping should also be conducted immediately following loading/unloading activities, when practical.
- Minimize the tracking of materials from storage and loading/unloading areas.
- Minimize the distance that salt and de-icing materials are transported during loading/unloading activities.
- Any materials that are stored outside must be tarped when not actively being used.

- If interim seasonal tarping is being implemented, de-icing materials may be stored outdoors only between October 15th through April 30th.

Spill Response and Reporting

- Conduct cleanups of any spill(s) immediately after discovery.
- Spills are to be cleaned using dry cleaning methods only.
- Contact the Lindenwold Borough Spill Response Team at 856-784-7566.

Maintenance and Inspection

- Periodically check for leaks and damaged equipment and make repairs as necessary.
- Perform monthly inspections of all (indoor and outdoor if applicable) storage locations.

Lindenwold Borough
Standard Operating Procedures
Vehicle and Equipment Fueling

Lindenwold Borough Maintenance Yards with Fueling Operations

- **Public Works Facility at 861 Gibbsboro Road**

Introduction and Purpose

- Vehicle and equipment fueling procedures and practices are designed to minimize impact to surface or ground waters. Understanding the procedures for delivering fuel into vehicles, mobile fuel tanks, and storage tanks is critical for this purpose. Safety is always the priority.

Scope

- These procedures are to be implemented at all maintenance yards with fueling, including mobile fueling operations.

Standards and Specifications (for vehicle and equipment fueling)

- Shut the engine off
- Ensure that the fuel is the proper type of fuel
- Absorbent fuel clean-up materials and spill kits shall be available in fueling areas and on mobile fueling vehicles and shall be disposed of properly after use.
- Nozzles used in vehicle and equipment fueling shall be equipped with an automatic shut-off to prevent overfill.
- Fuel tanks shall not be "topped off".
- Mobile fueling shall be minimized. Whenever practical, vehicles and equipment shall be transported to the designated fueling area in the maintenance yard.
- Clearly post, in a prominent area of the facility, instructions for safe operation of fueling equipment, and appropriate contact information for the person(s) responsible for spill response.

Standard and Specifications (for bulk fueling)

- Drip pans or absorbent pads shall be used under all hose and pipe connections and other leak-prone areas during bulk fueling.
- Block storm sewer inlets or contain tank trucks used for bulk transfer, with temporary berms or temporary absorbent booms during the transfer process. If temporary berms are being used instead of blocking the inlets, all hose connection points associated with the transfer of fuel must be within the temporary berms during the loading/unloading of bulk fuels.
- Protect fueling areas with berms and/or dikes to prevent run-on, runoff and to contain spills.
- A trained employee must always be present to supervise during bulk transfer.

Spill Response

- Conduct cleanups of any fuel spills immediately after discovery.
- Uncontained spills are to be cleaned up using dry cleaning methods only. Spills shall be cleaned up with a dry, absorbent material (e.g., kitty litter, sawdust, etc.) and absorbent materials shall be swept up.

- Collected waste is to be disposed of properly.
- Contact the Lindenwold Borough Spill Response Team at 856-784-7566.

Maintenance and Inspection

- Fueling areas and storage tanks shall be inspected monthly.
- Keep an ample supply of spill cleanup material on the site.
- Any equipment, tanks, pumps, piping and fuel dispensing equipment found to be leaking or in disrepair must be repaired or replaced immediately.
- The valve on the discharge pipe from the secondary containment area of the aboveground fuel storage tanks shall remained closed at all times, except as described below. Visual inspections shall be performed before discharging to stormwater through that valve, to ensure that fuel in that tank has not come in contact with the stormwater to be discharged.

Lindenwold Borough
Standard Operating Procedures
Vehicle Maintenance

Lindenwold Borough Maintenance Yards BMP Objectives

- Waste Management
- Spill Prevention, Containment and Countermeasures
- Pollution Control

Introduction and Purpose

- This SOP contains the basic practices of vehicle maintenance to be implemented at all maintenance yards including maintenance activities at ancillary operations in Lindenwold Borough. The purpose of this SOP is to provide a set of guidelines for the Lindenwold Borough vehicle maintenance yards, including maintenance activities at ancillary operations.

Scope

- This SOP applies to all maintenance yards including maintenance activities at ancillary operations within Lindenwold Borough.

Standards and Specifications

- Conduct vehicle maintenance operation only in designated areas.
- When possible, perform all vehicle and equipment maintenance at an indoor location with a paved floor.
- Always use drip pans.
- Absorbent spill clean-up materials shall be available in maintenance areas and shall be disposed of properly after use.
- Maintenance areas shall be protected from stormwater run-on and runoff, and shall be located at least 50 feet from downstream drainage facilities and watercourses.
- Use portable tents or construct a roofing-device over long-term maintenance areas and for projects that must be performed outdoors.
- Do not dump or dispose oils, grease, fluids, and lubricants onto the ground.
- Do not dump or dispose batteries, used oils, antifreeze and other toxic fluids into a storm drain or watercourse.
- Do not bury tires.
- Collect waste fluids in properly labeled containers and dispose properly.

Spill Response and Reporting

- Provide spill containment dikes or secondary containment around stored oils and other fluid storage drums.
- Conduct cleanups of any fuel spills immediately after discovery.
- Spills are to be cleaned using dry cleaning methods only. Spills shall be cleaned up with a dry, absorbent material (e.g. kitty litter, sawdust, etc.) and the rest of the area is to be swept.
- Collected waste is to be disposed of properly.
- Contact the Lindenwold Borough Spill Response Team at 856-784-7566.

Maintenance and Inspection

- Periodically check for leaks and damaged equipment and make repairs as necessary.

SPPP Form 17 – Employee Training **ENVIRONMENTAL RESOLUTIONS, INC.**

Municipality Information

Municipality: *Borough of Lindenwold* County *Camden*

NJPDES # :*0148351* PI ID #: *203139*

Team Member/Title: *Environmental Resolutions, Kevin Becica*

Effective Date of Permit Authorization (EDPA): *4/1/04*

Date of Completion: *1/18/05* Date of most recent update: *3/29/05*

Describe your employee training program. For each required topic, list the employees that will receive training on that topic, and the date the training will be held. Attach additional pages as necessary.

The following topics will be covered by Environmental Resolutions:

Course:	*Who will attend:*
Waste Disposal Education	*hotline operators and Environmental Commission Members*
Municipal Ordinances	*code enforcement and local police departments, public works employees*
Yard Waste Collection Program	*public works employees*
Street Sweeping	*public works employees*
Stormwater Facility Maintenance	*public works employees*
Road Erosion Control	*public works employees*
Outfall Pipe Stream Scouring Remediation	*public works employees*
Construction Activity/Post Construction Stormwater Management in New Development and Redevelopment (for municipally owned projects	*public works employees*

The following topics will be part computer training and part practical field training:

Course:	*Who will attend:*
Illicit Connection Elimination and Outfall Pipe Mapping	*public works employees, hotline operator*

(field training will include procedures to properly conduct illicit connection detections, investigations & eliminations)

A training session for Public Works employees is tentatively scheduled for April, 2005.

Lindenwold Stormwater Management Plan

This Municipal Stormwater Management Plan documents the strategy for the Borough of Lindenwold to address stormwater-related impacts. The creation of this plan is required by N.J.A.C. 7:1 4A-25 Municipal Stormwater Regulations. This plan contains all of the elements required by April 1, 2005 as described in N.J.A.C. 7:8 Section 4.2 of the Stormwater Management Rules. The Borough of Lindenwold 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 N.J.A.C. 7: 8 Section 4.3, the completed elements of N.J.A.C. 7:8-4.2 (c) 8 & 9 will be provided on or before February 10, 2006.

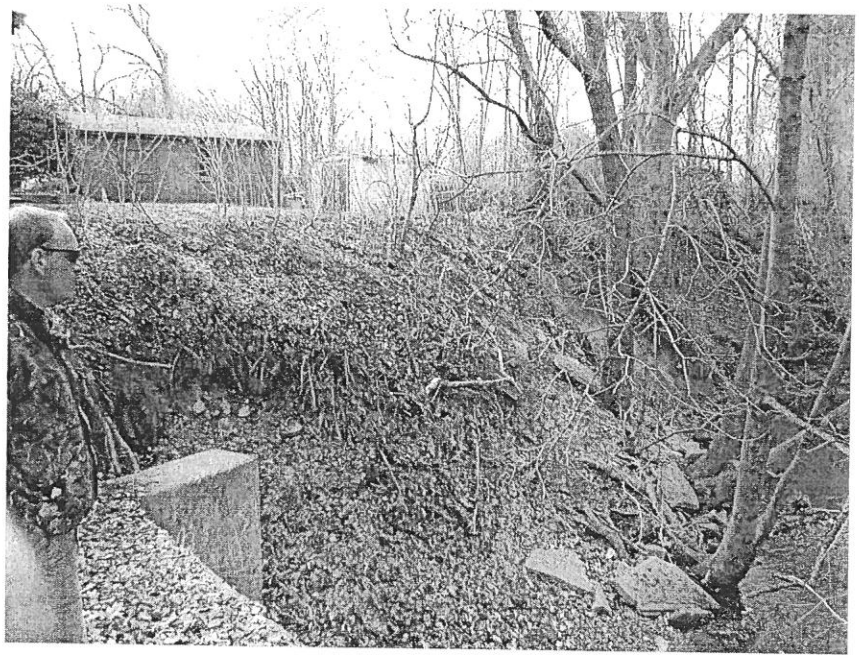
An aerial view of the Borough, which illustrates the major waterways, is provided in the Appendix, **Map 1, Existing Conditions**. This Municipal Stormwater Management Plan addresses groundwater recharge, stormwater quantity, and stormwater quality impacts by incorporating stormwater design and performance 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 Lindenwold 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 the Borough of Lindenwold and can be maintained by the Lindenwold Public Works Department.

Low Baseflow Conditions to OverBrook Lake

The Borough of Lindenwold does not currently have ordinances in place regulating stormwater management for non-residential development. Residential development is required to conform to the most current stormwater management requirements of N.J.A.C. 7:8 5.4 and 5.5 through conformance to the Residential Site Improvement Standards (RSIS). The implementation of this plan will have a major impact on the stormwater design of commercial development over one acre in size.

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 Lindenwold are to be 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 Lindenwold 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.



1 Erosion at Indian Steps, Possible Mitigation Project

4.0 Goals

The goals of the Lindenwold 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 the occur frequently with low rainfall amounts (water quality storm)
- Improve baseflow to streams by maintaining 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 the Borough of Lindenwold. The purpose of the Cooper River Watershed Plan was to examine a fully built out watershed without stormwater management improvements along the waterway. For this reason, the results from the Cooper River analysis can be applied to the Timber Creek Watershed.

5.0 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.

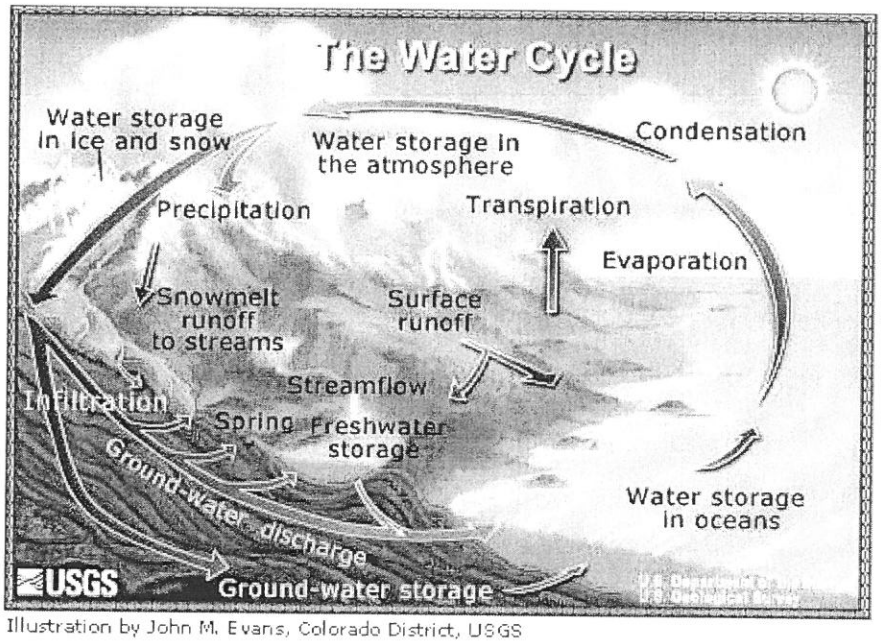


Illustration by John M. Evans, Colorado District, USGS

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, along the stream to Overbrook Lake.

Photograph 1. Sediment Deposits along stream to Overbrook Lake in Lindenwold

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.

Fallen tree along waterway blocking stream path. Note collection of floatable materials

7.0 Plan Consistency - 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 with the watershed. The Cooper River Watershed management plan provides specific guidance regarding basin design requirements, mitigation planning, existing basin retrofitting and stream restoration locations.

The Borough of Lindenwold 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.

8.0 Borough of Lindenwold

8.1 Population and Land Use

The Borough of Lindenwold encompasses a 3.9 square mile area of Camden County, New Jersey. Over the past thirty years, the Township has experienced some fluctuation in its population. The population increased from 12,199 in 1970 to 18,196 in 1980 to 18,734 in 1990. In recent years the population has appeared to decline to 17,414 based on the census of 2000. Nevertheless, the Township has been under general development pressure, as indicated by the number of new residential dwellings constructed over the past thirty years (see Table 1).

The Township has placed potions of the community into redevelopment. The Stormwater Management Plan anticipates and plans for this new development activity in order to mitigate any negative effects on the City's waterways, such as increased stormwater runoff volumes and pollutant loads. Figure C-2 illustrates the waterways in the Township.

Figure C-3 depicts the Township's boundaries on the USGS quadrangle maps.

Table 1 - New Residential Structures	
Year	Units
1999-2000	0
1995-1998	78
1990-1994	178
1980-1989	891
1970-1979	3,075
1960-1969	2,124

The majority of land use within the Borough of Lindenwold is urban. Limited areas of forest remain along the rail lines, adjacent to stream corridors and within undeveloped areas. Areas of wetlands remain within the Borough along the stream corridors, lakes and flood plains. The existing land uses within Lindenwold can be seen in the Appendix **Map 4, Land Use – Wetlands Designations.**

8.2 Description of Watershed

There are four separate sub watershed drainage delineations within the Borough of Lindenwold. 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 waterways, potential flood prone areas and flood prone areas are shown in the Appendix on **Map 7, Flood Prone Areas**.

The sub-watershed within Lindenwold that drains to the Cooper River located in Watershed Management Area 18 is the Southern Branch Cooper River (above Evesham Road), and is designated by the hydrologic unit code 02040202110030. The Cooper River begins at Edgewood Lake and at the municipal boundary to the north of Derby Avenue. The Cooper River then travels along the municipal boundary and picks up a tributary from Edgewood Lake before reaching Linden Lake. The Cooper River is then joined at the boundary of Lindenwold, Gibbsboro and Voorhees Township by the Nicholson Branch and Millard Creek before becoming Kirkwood Lake.

The sub-watersheds within Lindenwold that drain to the Big Timber Creek Watershed within Watershed Management Area 18 are

- North Branch of the Big Timber Creek above Laurel Road (HUC 02040202120010)
- North Branch of the Big Timber Creek below Laurel Road (HUC 02040202120020)

The North Branch of the Big Timber Creek above Laurel Road within Lindenwold started at the lake that was located at the apartment complexes to the east of Gibbsboro Road. The construction of the apartments eliminated the lake. The tributary now starts within the impervious coverage of the apartment complex and the only a ditch remains where the lake previously existed.

Ditch at Coachman Manor Apartments where Lake previously existed as headwater to Big Timber Creek

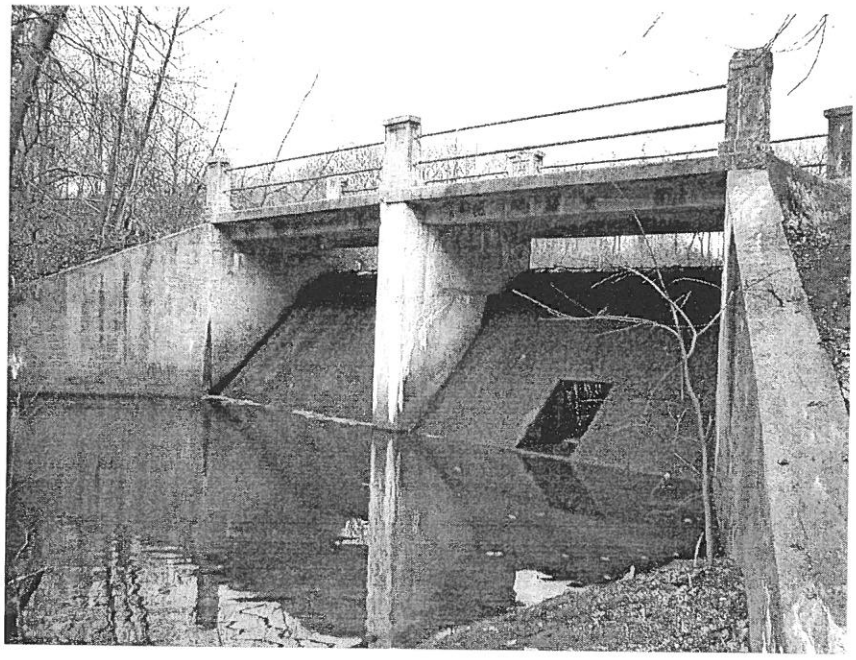
The stream (North Branch of the Big Timber Creek above Laurel Road) then is piped under Gibbsboro Road and travels through a wetlands area before becoming a lake within an apartment complex on the western side of Gibbsboro Road. The stream is then discharged into a wetlands area before being contained in reinforced concrete pipes under The White Horse Pike.

Storm Pipes Discharging from Under White Horse Pike

The stream (North Branch of the Big Timber Creek above Laurel Road) then continues toward Overbrook Lake. The flood plain area before Overbrook Lake and the embankments adjacent to the stream show signs of erosion, embankment failure, siltation and fallen trees. The Lindenwold

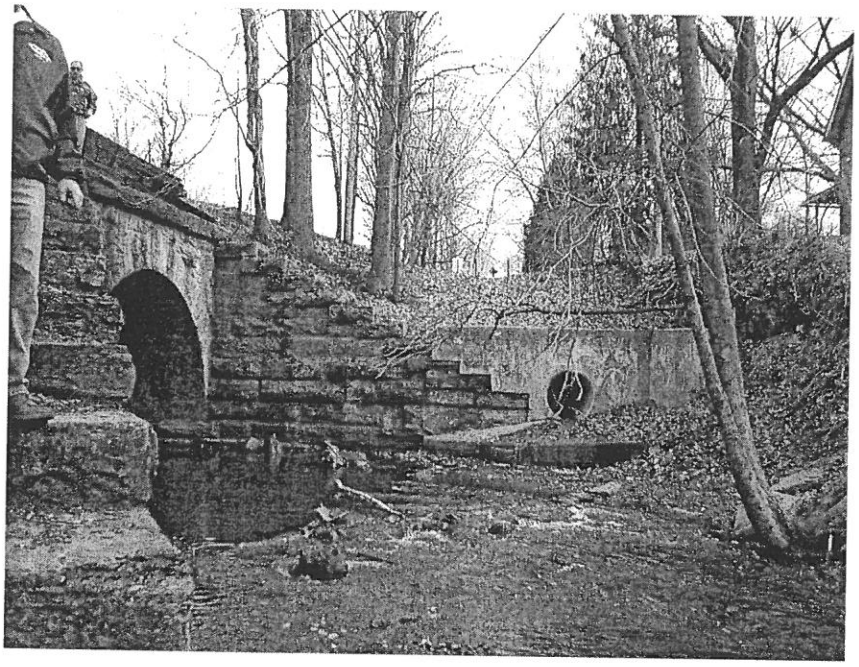
Environmental Commission performed a clean-up of this area in conjuction with the Lindenwold Schools and plans on doing so in the future.

Overbrook Lake is created by a structure built during the Depression. The structure appears to be in good condition but needs regular inspection and maintenance due to its age.



Dam Structure at Overbrook Lake

After Overbrook Lake, the stream (North Branch of the Big Timber Creek above Laurel Road) is joined by the main branch of Timber Creek coming from Clementon Borough and Trout Run from Berlin Borough. The stream widens and travels through a wetland area before crossing under East Atlantic Avenue and the railroad line at a structure known locally as the Indian steps. After the stream travels under the rail line, it must turn ninety degrees and a storm pipe also discharges flow into the stream from Atlantic Avenue to the east. The opposite embankment is severely eroded.



"Indian Steps" on North Branch of Big Timber Creek

The stream (North Branch of the Big Timber Creek above Laurel Road) continues to Laurel Lake. The stream appears to have experienced siltation in some areas at the head of Laurel Lake. The residents of Laurel Lake are concerned about the siltation of the lake, the number of trees that have fallen in the lake and the general condition of the lake. The Lindenwold Environmental Commission has submitted two grants to NJDEP for lake studies and improvements. A stormwater management plan for the subwatershed along with a hydrologic model would have to be created in order to fully understand and analyse the lake conditions. After Laurel Lake, the north branch of the Big Timber Creek continues until it joins with Masons Run.

Masons Run is located in the North Branch of the Big Timber Creek below Laurel Road. The stream starts in Pine Hill Borough and travels through a buffered area of Lindenwold.

8.3 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 generate a New Jersey Impairment Score (NJIS), which is based on a number of biomethcs related to benthic macroinvertebrate community dynamics. There are two AMNET sites in Lindenwold, one on the Big Timber Creek at Park Avenue and one on Masons Creek at Chews Landing Road. The AMNET sites within the Borough of Lindenwold are shown in the Appendix on **Map 8, AMNET and Stream Quality Monitoring Stations** and are listed in Attachment 1. The Big Timber Creek station at Chews Landing Road and the Big Timber Creek station at Park Avenue are both moderately impaired for Benthic Macroinvertebrates. The Cooper River station at Gibbsboro road along the Lindenwold boundary with Gibbsboro is severely impaired.

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

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 Streams 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.

Storm Inlet in Conformance with Attachment C of Stormwater Regulations

9.0 Design and Performance Standards

The Borough will adopt the design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8-5 to minimize the adverse impact of stormwater runoff on water quality and water quantity and loss of groundwater recharge in receiving water bodies. These design standards will apply to all non-residential development projects that disturb more than one acre of land. The design and performance standards include the language for maintenance of stormwater management measures consistent with the stormwater management rules at N.J.A.C. 7:8-5.8 Maintenance Requirements, and language for safety standards consistent with N.J.A.C. 7:8-6 Safety Standards for Stormwater Management Basins. The ordinances will be submitted to the county for review and approval by April 1, 2006.

For commercial development of less than one acre, the Borough of Lindenwold has the discretion to determine the stormwater management requirements. For non-residential development of less than one acre in size, our office recommends that the stormwater management peak rates of runoff from the 2, 10 and 100 year storm events to be equal or less than the pre-development peak rate of runoff from the 2, 10 and 100 year storm events, the design requirements for water quality based on the reduction of total suspended solid be required and recharge requirements apply if the site has not been previously developed. All stormwater management design requirements for site of less that one acre may be mitigated, especially for properties that were previously disturbed or developed.

The Lindenwold Planning and Zoning Boards will review development plans to meet the stormwater regulations of this plan, the requirements of N.J.A.C 7:8 and the Residential Site Improvement Standards. The Borough of Lindenwold inspectors will observe construction of all projects to ensure that the stormwater management measures are constructed and function as designed.

10.0 Nonstructural Stormwater Management Strategies

The evaluation of the master plan (including the land use element), official map and development regulations (including the zoning ordinance) is element 8 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 N.J.A.C. 7:8-4.2 (c) 8 & 9 will be provided on or before February 10, 2006.

Our office anticipates that a stream corridor protection ordinance will be an important part of the Lindenwold Nonstructural stormwater management strategy in order to maintain and preserve the be buffers adjacent to the stream corridors.

11.0 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 N.J.A.C. 7:8-4.2 (c) 9 will be provided on or before February 10, 2006.

12.0 Mitigation Plans

Exemptions are provided to lessen the impact of redevelopment of existing sites within the Borough of Lindenwold 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. 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 Lindenwold Township Engineer and Engineering Department. The following mitigation projects are proposed within the Borough of Lindenwold:

Lindenwold Mitigation Projects

1. Stormwater Basin Retrofit

Provide Water Quality and Recharge measures at existing stormwater basins within the same HUC14 under the guidance of the Lindenwold Borough 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

2. Stream and Stream Bank Stabilization

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

a. Stabilization of eroded steam 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

3. Stormwater Outfall Restoration

Mitigation of Existing Stormwater Outfalls within the same HUC14 under the guidance of the Lindenwold Borough 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.

4. Lake and Pond Management

Provide a comprehensive management plan and maintenance schedule for a publicly held lake/pond within the Borough of Lindenwold.

Appendix

Maps 1-8

EXISTING CONDITIONS

MUNICIPAL STORMWATER MANAGEMENT PLAN
LINDENWOLD BOROUGH
CAMDEN COUNTY, NEW JERSEY

ENVIRONMENTAL RESOLUTIONS, INC. MOUNT LAUREL, NEW JERSEY

1 inch equals 1,500 feet

0 0.25 0.5 0.75 1
Miles

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.

SIGNEY RUN
MILLARD CREEK
NORTH BR BIG TIMBER CK 72408 UNT TO 72408 @ 4.30
NORTH BR BIG TIMBER CK 72408 UNT TO 72408 @ 5.80
MASON RUN
UNT TO 72470 @ 1.10
MASON RUN 72470
UNT TO 72470 @ 2.70
TROUT RUN 72546
UNT TO 72546 @ .50
TROUT RUN
UNT TO 72408 @ 3.40

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GROUNDWATER RECHARGE AND WELLHEAD PROTECTION AREAS (WPAs)

MUNICIPAL STORMWATER MANAGEMENT PLAN
BOROUGH OF LINDENWOLD
CAMDEN COUNTY, NEW JERSEY

ENVIRONMENTAL RESOLUTIONS, INC. MOUNT LAUREL, NEW JERSEY

Legend

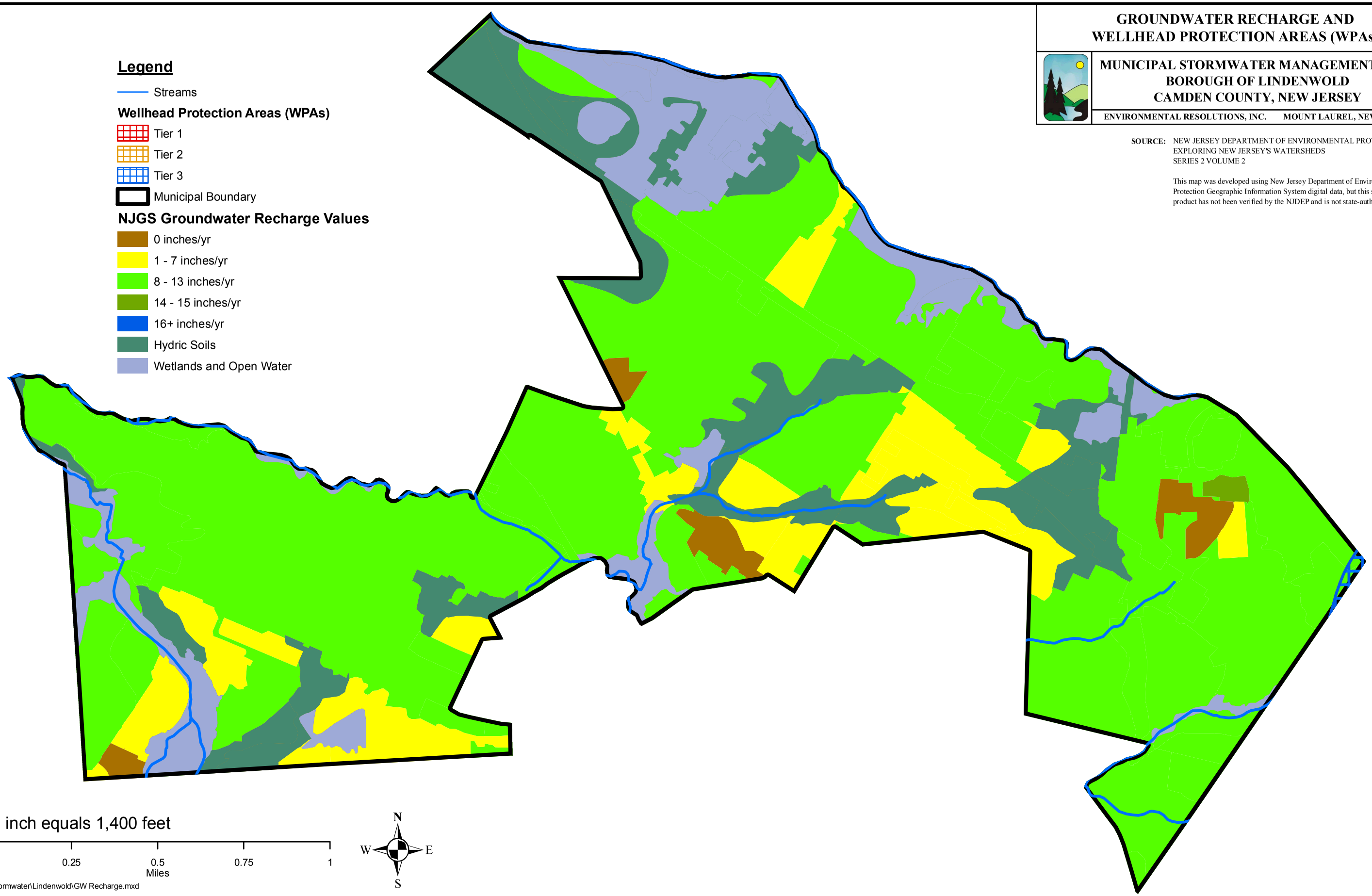
Streams

Wellhead Protection Areas (WPAs)

Tier 1
Tier 2
Tier 3
Municipal Boundary

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



1 inch equals 1,400 feet

0 0.25 0.5 0.75 1
Miles

N
W E
S

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

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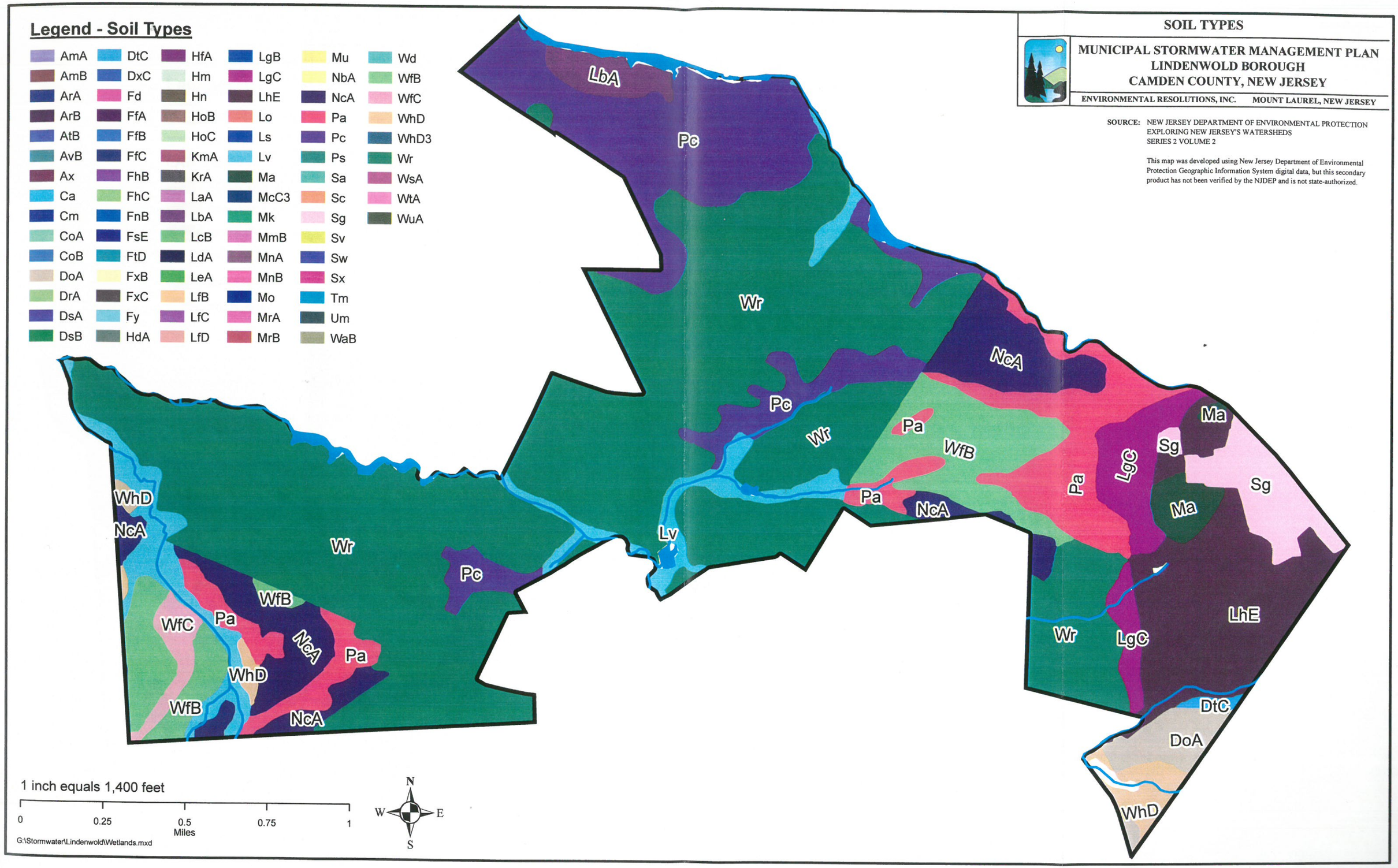
Legend - Soil Types

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



1 inch equals 1,400 feet

0 0.25 0.5 Miles 0.75 1

N W E S

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SOIL TYPES

MUNICIPAL STORMWATER MANAGEMENT PLAN
LINDENWOLD BOROUGH
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.

LAND USE - WETLANDS DESIGNATIONS

MUNICIPAL STORMWATER MANAGEMENT PLAN
LINDENWOLD BOROUGH
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

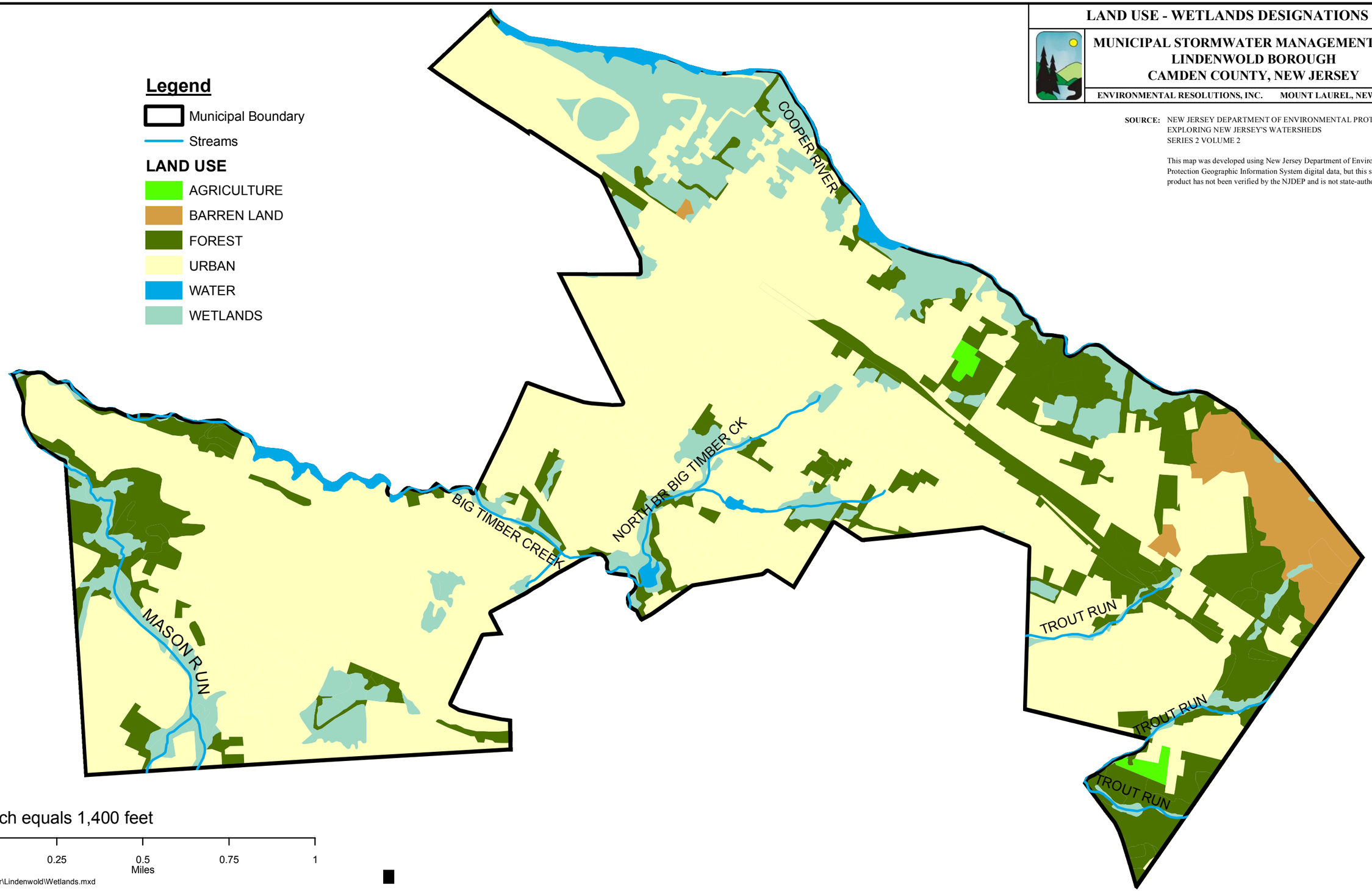
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by the NJDEP and is not state-authorized.

Legend

- Municipal Boundary
- Streams

LAND USE

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



1 inch equals 1,400 feet

0 0.25 0.5 0.75 1
Miles

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HUC-14 DELINEATION ON USGS QUADRANGLE MAP

MUNICIPAL STORMWATER MANAGEMENT PLAN
LINDENWOLD BOROUGH
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.

02040202110030
Cooper River (above Evesham Road)

02040202120010
NB Big Timber Creek
(above Laurel Rd)

02040202120020
NB Big Timber Creek
(below Laurel Rd)

1 inch equals 1,500 feet

0 0.25 0.5 0.75 1
Miles

N
W E
S

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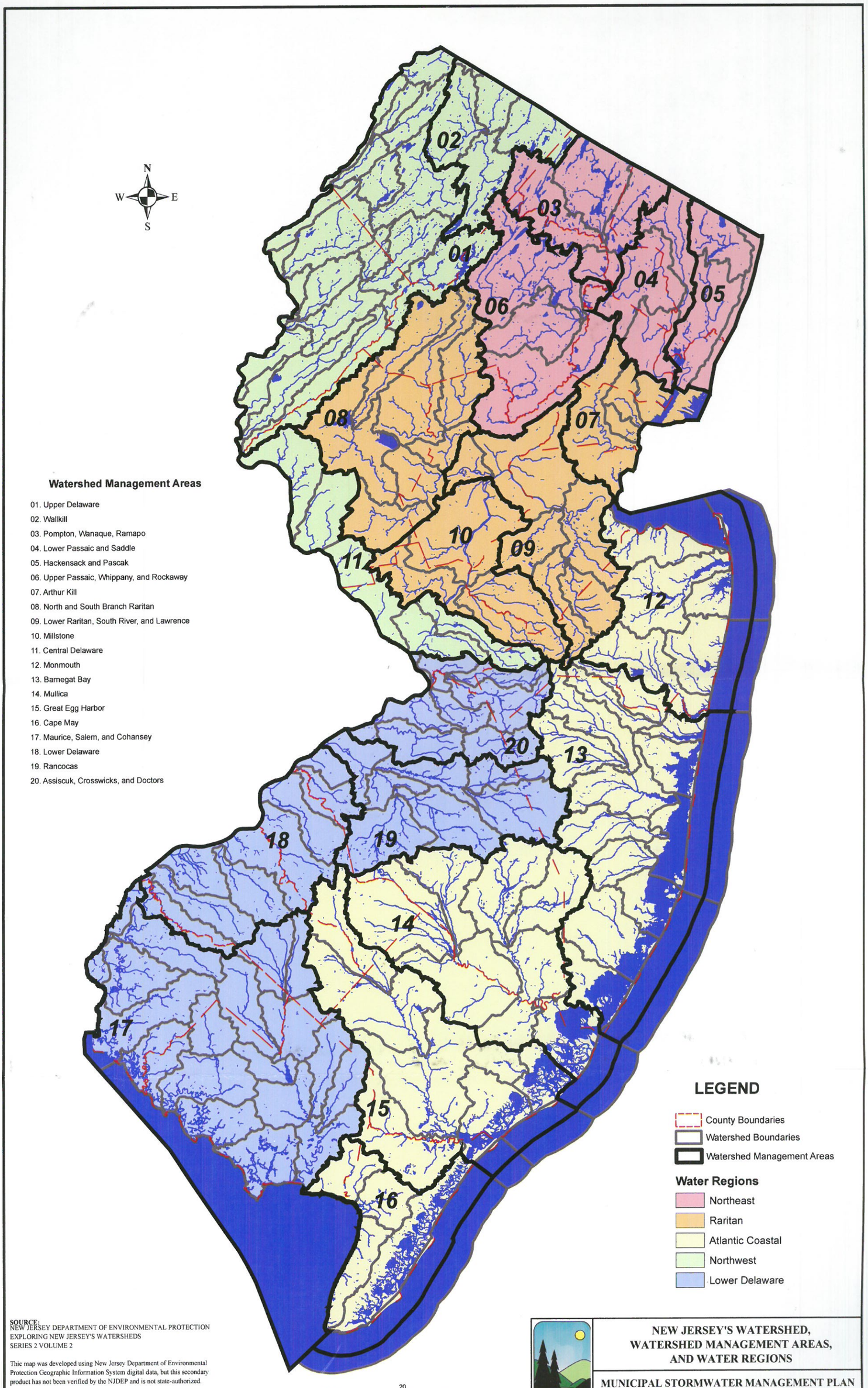

Watershed Management Areas

01. Upper Delaware
02. Wallkill
03. Pompton, Wanaque, Ramapo
04. Lower Passaic and Saddle
05. Hackensack and Pascak
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.

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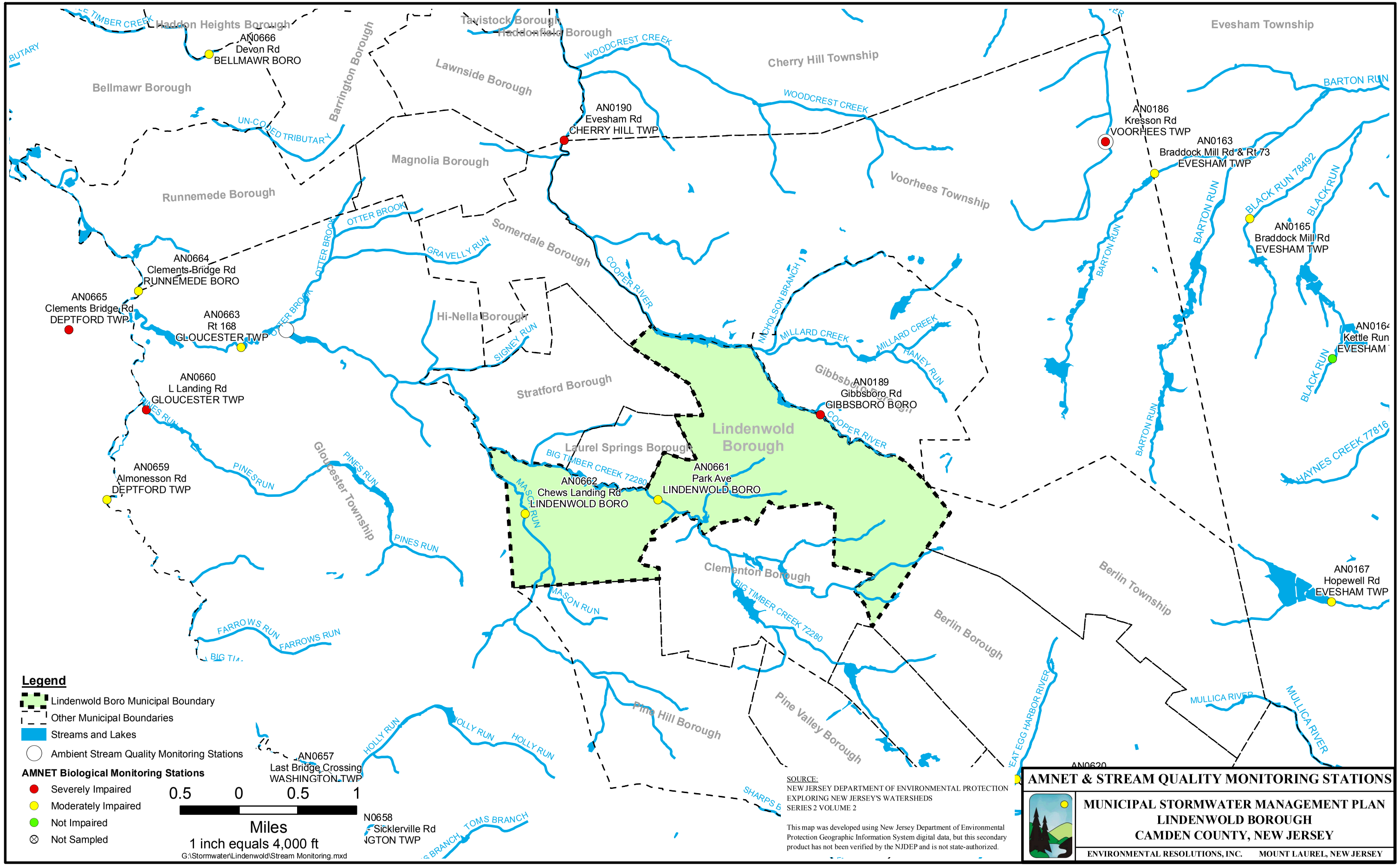
20 Miles

NEW JERSEY'S WATERSHED, WATERSHED MANAGEMENT AREAS, AND WATER REGIONS

MUNICIPAL STORMWATER MANAGEMENT PLAN

ENVIRONMENTAL RESOLUTIONS, INC. MOUNT LAUREL, NEW JERSEY

Map 9


Haddon Heights Borough
AN0666
Devon Rd
BELLMAWR BORO
Bellmawr Borough
Barrington Borough
Tavistock Borough
Haddonfield Borough
Lawnside Borough
WOODCREST CREEK
Cherry Hill Township
AN0190
Evesham Rd
CHERRY HILL TWP
Evesham Township
AN0186
Kresson Rd
VOORHEES TWP
AN0163
Braddock Mill Rd & Rt 73
EVESHAM TWP
BARTON RUN
BLACK RUN 78492
BLACK RUN
AN0165
Braddock Mill Rd
EVESHAM TWP
AN0164
Kettle Run
EVESHAM
Magnolia Borough
Runnemede Borough
Voorhees Township
OTTER BROOK
GRAVELLY RUN
Somerdale Borough
COOPER RIVER
NICHOLSON BRANCH
MILLARD CREEK
HANEY RUN
AN0664
Clements Bridge Rd
RUNNEMEDE BORO
AN0665
Clements Bridge Rd
DEPTFORD TWP
AN0663
Rt 168
GLOUCESTER TWP
Hi-Nella Borough
SIGNEY RUN
Stratford Borough
Gibbsboro Borough
AN0189
Gibbsboro Rd
GIBBSBORO BORO
Lindenwold Borough
AN0660
L Landing Rd
GLOUCESTER TWP
PINES RUN
Laurel Springs Borough
BIG TIMBER CREEK 72280
AN0661
Park Ave
LINDENWOLD BORO
AN0662
Chews Landing Rd
LINDENWOLD BORO
MASON RUN
HAYNES CREEK 77816
AN0659
Almonesson Rd
DEPTFORD TWP
Gloucester Township
FARROWS RUN
Clementon Borough
Berlin Township
Berlin Borough
AN0167
Hopewell Rd
EVESHAM TWP
Pine Hill Borough
Pine Valley Borough
EAT EGG HARBOR RIVER
MULLICA RIVER
AN0657
Last Bridge Crossing
WASHINGTON TWP
HOLLY RUN
TOMS BRANCH
N0658
Sicklerville Rd
NGTON TWP
AN0620
Legend
Lindenwold Boro Municipal Boundary
Other Municipal Boundaries
Streams and Lakes
Ambient Stream Quality Monitoring Stations
AMNET Biological Monitoring Stations
Severely Impaired
Moderately Impaired
Not Impaired
Not Sampled
0.5 0 0.5 1
Miles
1 inch equals 4,000 ft
G:\Stormwater\Lindenwold\Stream Monitoring.mxd
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.
AMNET & STREAM QUALITY MONITORING STATIONS
MUNICIPAL STORMWATER MANAGEMENT PLAN
LINDENWOLD BOROUGH
CAMDEN COUNTY, NEW JERSEY
ENVIRONMENTAL RESOLUTIONS, INC. MOUNT LAUREL, NEW JERSEY