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Bordentown Township Municipal Stormwater Management Plan

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**Municipal Stormwater
Management Plan
Bordentown Township
December, 2005
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**Municipal Stormwater Management Plan
For
Bordentown Township
Burlington County, New Jersey**

I. Introduction

The following Municipal Separate Stormwater System (MS4) stormwater plan was prepared by Remington, Vernick & Arango Engineers for Bordentown Township. The NJDEP "Sample Municipal Stormwater Management Plan" was used as a basis for preparation of the plan, as modified to provide specific information germane to the Bordentown Township.

The majority of Township-specific and natural resource information presented in this document is cited from the following sources:

1. Report, entitled "*Environmental Resource Inventory for the Township of Bordentown*", dated December, 2004, prepared by the Delaware Valley Regional Planning Commission (DVRPC). The ERI was prepared as a joint effort between the DVRPC and the Bordentown Township Environmental Commission.
2. NJDEP Geographic Information System (GIS) Mapping and data.
3. *Burlington County Guidance Supplement to the New Jersey Stormwater Best Management Practices Manual*, dated February, 2005, by the Burlington County Bridge Commission.

This **Municipal Stormwater Management Plan (MSWMP)** documents the strategy for Bordentown Township to address stormwater-related impacts. The creation of this plan is required by N.J.A.C.7:14A-25 (Municipal Stormwater Regulations). Accordingly, this plan contains all of the required elements described in N.J.A.C.7:8 (Stormwater Management Regulations).

The plan contained herein addresses groundwater recharge, stormwater quantity and stormwater quality impacts by incorporating stormwater design and performance standards for new major development; defined as projects that disturb one or more acre of land. These standards are intended to minimize the adverse impact of stormwater runoff on water quality/quantity and the loss of groundwater recharge that provides base flow in receiving water bodies.

In addition, this plan describes long-term operation and maintenance measures for existing and future stormwater facilities. Included in this plan is a buildout analysis with pollutant loading calculations based on existing zoning and developable lands (less environmentally-constrained lands). 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 low impact development techniques.

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

II. Goals

The goals of this MSWMP are as follows:

- Reduce flood damage, including damage to life and property;
- Minimize, to the extent practical, any increase in stormwater runoff from any new development;
- Reduce soil erosion from any development or construction project;
- Assure the adequacy of existing and proposed culverts, bridges and other in-stream structures;
- Maintain groundwater recharge;
- Prevent, to the greatest extent feasible, an increase in nonpoint pollution;
- Maintain the integrity of stream channels for their biological functions, as well as for drainage;
- Minimize pollutants in stormwater runoff from new and existing development to:
 - restore, enhance and maintain the chemical, physical and biological integrity of the waters of the state, protect public health, safeguard fish and aquatic life and scenic and ecological values, enhance the domestic, municipal, recreational, industrial and other uses of water
- Protect public safety through the proper design and operation of stormwater basins.

In order to achieve the goals for Bordentown Township has identified the following stormwater management techniques:

- Implementation of one or more stormwater management Best Management Practices (BMPs) as necessary to achieve the performance standards for stormwater runoff quantity and rate, groundwater recharge, erosion control and stormwater runoff quality per the NJ Stormwater Rule (NJAC 7:8) and established through the Township's stormwater ordinance.
- Compliance with the stormwater runoff quantity and rate, groundwater recharge, erosion control, and stormwater runoff quality standards established through N J A C 7 8 1 1 et. seq and the Township's stormwater ordinance shall be accomplished to the maximum extent practicable through the use of nonstructural BMPs before relying on structural BMPs.
- Nonstructural BMPs are also known as Low Impact Development (LID) techniques. Nonstructural BMPs shall 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 shall be developed based upon physical site conditions and the origin, nature and the anticipated quantity or amount of potential pollutants.

- Structural BMPs where necessary shall be integrated with nonstructural stormwater management strategies and proper maintenance plans.
- When using structural BMPs, multiple stormwater management measures smaller in size and distributed spatially throughout the land development site shall be used wherever possible to achieve the performance standards for water quality quantity and groundwater recharge established through the Township's stormwater ordinance before relying on a single larger stormwater management measure to achieve these performance standards.

III. Stormwater Discussion

Land development can dramatically alter the hydrologic cycle of a site and (ultimately) an entire watershed. Prior to development, native vegetation can either directly intercept precipitation or draw that portion that has infiltrated into the ground and return it to the atmosphere through evapotranspiration. Development can remove this beneficial vegetation and replace it with lawn or impervious cover; reducing the site's evapotranspiration and infiltration rates. Clearing and grading a site can remove depressions that store rainfall. Construction activities may also compact the soil and diminish its infiltration ability, resulting in increased volumes and rates of stormwater runoff from the site.

In addition, impervious areas that are connected to each other through gutters, channels and storm sewers can transport runoff more quickly than natural areas. This shortening of the transport or travel time quickens the rainfall-runoff response of the drainage area, causing flow in downstream waterways to peak faster and higher than natural conditions. These increases can create new and aggravate existing downstream flooding and erosion problems and increase the quantity of sediment in the channel.

Filtration of runoff and removal of pollutants by surface and channel vegetation is eliminated by storm sewers that discharge runoff directly into a stream. Increases in impervious area can also decrease opportunities for infiltration which reduces stream base flow and groundwater recharge. Reduced base flows and increased peak flows produce greater fluctuations between normal and storm flow rates, which can increase channel erosion. Reduced base flows can also negatively impact the hydrology of adjacent wetlands and the health of biological communities that depend on base flows.

Finally, erosion and sedimentation can destroy habitat from which some species cannot adapt. In addition to increases in runoff peaks, volumes, and loss of groundwater recharge, land development often results in the accumulation of pollutants on the land surface that runoff can mobilize and transport to streams. New impervious surfaces and cleared areas created by development can accumulate a variety of pollutants from the atmosphere, fertilizers, animal wastes, and leakage and wear from vehicles. Pollutants can include metals, suspended solids, hydrocarbons, pathogens, and nutrients.

In addition to increased pollutant loading, land development can adversely affect water quality and stream biota in more subtle ways. For example, stormwater falling on impervious surfaces or stored in detention or retention basins can become heated and raise the temperature of the downstream waterway, adversely affecting cold water fish species such as trout. Development can remove trees along stream banks that normally provide shading, stabilization, and leaf litter that falls into streams and becomes food for the aquatic community.

IV. Background

The following information is excerpted from the "*Environmental Resource Inventory for the Township of Bordentown*", and amended per NJDEP and County data:

A. History and Demographics

In 1849, the Borough of Bordentown was established within the Township of Chesterfield. It was formed from areas of Chesterfield and Mansfield Townships, and took its name from Joseph Borden (1687-1765), one of the original settlers of the Bordentown region. The Township of Bordentown was established in 1852. Its boundaries included the areas of what is known today as Bordentown Township, the City of Bordentown and Fieldsboro Borough. Bordentown City separated from the Township in 1867 and Fieldsboro Borough separated from the Township in 1894.

There were nearly 6,000 residents living in the Bordentown region during the 1870's. This large population was mainly due to the railroad and a Civil War era boom. From this point forward, the region felt a steady decline in population. In 1940, Bordentown Township had a population of 1,095, while the City of Bordentown had a population of 4,223. Suburbanization hit the Bordentown region in the 1950's. In 1950, both the population of the township and the city increased. Up until 1952, Bordentown Township was primarily rural. In 1960, however, the population of Bordentown Township skyrocketed, surpassing the population of the City of Bordentown. Since this time, the population of the township has steadily increased, while the population of the city has steadily decreased. According to the 2000 census, Bordentown Township had a population of 8,380, while the City of Bordentown had a population of 3,969.

Bordentown is an incorporated Township located in the northern tip of Burlington County, New Jersey. Four communities border the Township within Burlington County: Chesterfield Township to the east/southeast, the Borough of Fieldsboro and the City of Bordentown to the west, and Mansfield Township to the south/southwest. It is also bounded by Hamilton Township, in Mercer County to the north/northeast. The north/northwestern boundary is the Crosswicks Creek, which forms the dividing line between Mercer and Burlington Counties. Bordentown's western boundary is the Delaware River, which forms the dividing line between Pennsylvania and New Jersey, and the Crosswicks Creek, as it bends to the south before joining the Delaware.

In addition to Bordentown Township's mainland, Newbold Island, an island positioned in the Delaware River, is located within the Township's boundaries. The southern half of the island is owned by Public Service Electric and Gas Company (PSE&G), and the vacant land on the northern end of the island is privately owned. At present, there is no development on Newbold Island, and a pair of mating bald eagles has been sighted there. No development has occurred on the island.

B. Surface Water Resources

All of Bordentown's land drains to the Delaware River by way of three main stream systems – the Crosswicks Creek system on the northwestern end of the Township, the Blacks Creek across the center, and Spring Hill Brook on the southwestern end. The start of the main channel each of these streams lies outside of Bordentown, in the townships to the east and southeast, although there are some tributaries that are wholly within Bordentown's boundaries.

Watersheds

A watershed is all the land that drains to a particular waterway such as a river, stream lake or wetland. The boundaries of a watershed are defined by the high points in the terrain, such as hills and ridges. The percentage of Bordentown Township land that is within each of the four watersheds is listed in the following table.

Watershed	USGS Watershed Code	Stream Classification	Acreage within Bordentown	% of Bordentown land	Subwatersheds (HUC 14 Numbers) within Bordentown
Crosswicks Creek (Below Doctors Creek)	02040201070	FW2-NT	2,019	34%	02040201070020
Crosswicks Creek (Doctors Creek to New Egypt)	02040201050	FW2-NT	112	2%	02040201050070
Crafts Creek	02040201090	FW2-NT	2,118	36%	02040201090030
Blacks Creek	02040201080	FW2-NT	1,711	28%	02040201080030

Source: NJDEP

Crosswicks Creek Watershed

The Crosswicks watershed is a complex system of streams that drains a total of 146 square miles of land. It crosses four counties – Monmouth County, Mercer County, Ocean County and Burlington County – and fifteen municipalities – Millstone, Upper Freehold, Plumstead, Jackson, Hamilton, Washington, North Hanover, New Hanover, Chesterfield, Springfield and Bordentown Townships, the boroughs of Allentown and Wrightstown, and the cities of Trenton and Bordentown. The Crosswicks Creek watershed covers an extensive portion of New Jersey Watershed Management Area 20, which also includes Blacks, Crafts and Assiscunk Creek watersheds. In Bordentown, the Crosswicks watershed occupies 2,131 acres, including drainage to Jumble Gut Run, Mile Hollow Run, and Thorntown Creek.

The Crosswicks Creek complex system starts in Plumstead and Jackson Townships, Ocean County; in Upper Freehold Township, Monmouth County; and in New Township, Burlington County. From these starting points, the creek's numerous branches eventually flow together to form the border between Hamilton Township and Bordentown Township. Here, the creek flows south through the Trenton-Hamilton-Bordentown Marsh, where it empties into the Delaware River, just below Prince Street located in the City of Bordentown.

Jumble Gut Run, Mile Hollow Run and Thorntown Creek are all freshwater streams that flow to the Crosswicks. Jumble Gut Run and Mile Hollow Run are completely contained within Bordentown Township. However, the headwaters of Thorntown Creek begin in Chesterfield Township, to the east. Mile Hollow Run and Thorntown Creek are tidal only for a short portion of their length. Jumble Gut Run is tidal for its complete length.

The Crosswicks Creek corridor has wetlands along both sides for most of its length. Along its Bordentown extent, there is an extremely large wetland area, the Trenton-Hamilton-Bordentown Marsh. This freshwater tidal marsh is one of the premier wildlife areas in the state of New Jersey. Freshwater tidal marshes are rare and ecologically valuable. They support a wide variety of plant and wildlife species.

Blacks Creek Watershed

The Blacks Creek watershed covers an area of 30 square miles, of which 1,711 acres are located within Bordentown Township. The main waterway, Blacks Creek, is 13 miles long and flows northwest, from the Sykesville/Jacobstown area in the southeast, across Chesterfield and Bordentown Townships, to the Delaware River.

Blacks Creek forms the southern boundary between the City of Bordentown and Bordentown Township. While there are several tributaries to the creek, the main one is Bacons Run, which starts in Chesterfield Township, close to the southwestern edge where Chesterfield, Mansfield and Springfield Townships meet. Bacons Run continues its northwesterly flow into Mansfield Township where it joins the main branch of Blacks Creek.

There is one tributary of Blacks Creek, Laurel Run, located in Bordentown Township. It begins in both Bordentown Township and Chesterfield Township and meets Blacks Creek near Route 206. This is also the location where the waters Blacks Creek are no longer tidal. A small amount of tidal marsh is located where Blacks Creek meets the Delaware River.

Crafts Creek Watershed

The USGS has designated Spring Hill Brook and the water features on Newbold Island as part of the Crafts Creek watershed. However, they are actually independent waterways that flow directly to the Delaware River. The Crafts Creek watershed drains an area of 17 square miles and Crafts Creek is 8.5 miles long. Of the watershed, 2,118 acres are located in Bordentown Township.

Spring Hill Brook marks the boundary between Bordentown and Mansfield Townships. It begins in Mansfield Township and flows northwest to form Crystal Lake before meeting the Delaware River. Spring Hill Brook is a freshwater stream and is tidal up to the dam at Crystal Lake.

Spring Hill Brook has one main channel without significant branching, although it does have several short tributaries. The only sizeable tributary in Bordentown begins at the intersection of Interstate-295 and Rising Sun Road, and flows south to join the main channel. It is unnamed.

Streams

In Bordentown Township, there are a total of 32.5 stream miles flowing across the land. A few of the streams, located within all three of the Township's main watersheds, are considered to be headwater streams. That is, they are the initial sections of stream channels with no contributing tributaries (first-order streams), or they are stream channels formed from only one branching section of tributaries above them (second-order streams). The headwaters are where a stream is "born", and

actually begins to flow. In Bordentown Township, 14.09 miles of the total 32.5 miles of stream are first- or second-order streams, or headwaters.

These headwaters are of particular importance because they tend to contain a diversity of aquatic species and their condition affects the water quality found downstream. They are also the most vulnerable to human intrusion. They drain only a small area of land, usually no larger than one square mile (640 acres). First- and second-order streams are narrow and often shallow and are characterized by relatively small base flows. This makes them subject to greater temperature fluctuations, especially when forested buffers on their banks are removed. They are also easily over-silted by sediment-laden runoff and their water quality can be rapidly degraded. In addition, first-order streams are greatly affected by changes in the local water table because they are fed by groundwater sources. Headwaters are important sites for the aquatic life that is at the base of the food chain, and often serve as spawning or nursery areas for fish.

Stream Order	Miles
First Order streams (smallest)	10.64
Second Order streams	3.45
Third Order streams	2.31
Fourth Order streams	3.69
Fifth Order streams	9.14
Sixth Order streams	0.86
Ninety-ninth Order stream (Delaware River)	2.41
Total	32.5

Source: NJDEP

Tidal Water

Bordentown Township has tidal waters on the Crosswicks Creek, Blacks Creek and Spring Hill Brooks. Tidal flows bring Delaware River water into the streams twice a day. Tidal flows both help and hinder maintenance of good water quality in affected streams. The flood (incoming) tide carries and leaves nutrients that are beneficial to aquatic organisms, but it also limits the regular flushing out of silt and

pollutant-laden waters coming from upstream. Silt deposition within a stream tends to increase during ebb (outgoing) tides, although deposition is also a function of stream shape, the presence of specific flow barriers, and the quantity of silt (the load) being carried by the stream.

Surface Water Quality

Water quality standards are established by federal and state governments to ensure that water is suitable for its intended use. The Federal Clean Water Act (P.L. 95-217) requires that wherever possible the water-quality standards provide water suitable for fish, shellfish, and wildlife to thrive and reproduce and for people to swim and boat. All waterbodies in New Jersey are classified by NJDEP as either freshwater (FW), pinelands water (PL), saline estuarine water (SE) or saline coastal water (SC). Freshwater is further broken down into freshwater that originate and is wholly within federal or state parks, forests or fish and wildlife (FW1) and all other freshwater (FW2). The water quality for each of these groups must be able to support designated uses that are assigned to each waterbody classification (see Surface Water Quality Standards NJAC 7:9B-1.12). In addition to being classified as FW1 and FW2, fresh waterbodies are classified as trout-producing (TP), trout-maintaining (TM) or non-trout waters (NT). Each of these classifications may also be subject to different water quality standards.

All the creeks in Bordentown are classified as FW2-NT, which means that they are freshwater streams that are not trout producing or trout maintaining water. According to NJDEP rules, FW2-NT waters must provide for (1) the maintenance, migration and propagation of the natural and established biota; (2) primary and secondary contact recreation (i.e., swimming and boating); (3) industrial and agricultural water supply; (4) public potable water supply after conventional filtration and disinfections; and (5) any other reasonable uses.

The one lake in Bordentown, Crystal Lake, is listed on the New Jersey 2002 Integrated List of Waterbodies as being eutrophic. The term eutrophic means the water is overly rich with organic nutrients, causing an abundance of plant life, particularly algae. The algae blocks light from getting to the water, and in turn causes the extinction of other organisms.

Streams	Classification
Spring Hill Brook	FW2 - NT
Blacks Creek	FW2 - NT
Crosswicks Creek	FW2 - NT
Jumble Gut Run	FW2 - NT
Mile Hollow Run	FW2 - NT
Thorntown Creek	FW2 - NT

Source: NJDEP

Bordentown Township Stream Water Quality

There are four AMNET sites within Bordentown Township or along its borders. NJDEP sampled each of the four AMNET sites in January 1993, in January 1998 and in January 2001. Each AMNET site is tested for only one water quality parameter - aquatic life. In the first two samplings, three of the four sites were rated as "moderately impaired" for aquatic life support, and one site on Doctors Creek was rated at "non-impaired". All four sites were rated moderately impaired in the third sampling.

Although all of the four AMNET stations in Bordentown were moderately impaired for aquatic life (benthic macroinvertebrates), only two of these stations were placed on Sublist 5 (303(d) List) in the 2004 Integrated Water Quality Monitoring and Assessment Report. The remaining stations were not placed on any water quality list because they were located in tidal water. NJDEP determined that sites located in tidal water could no longer be assessed and listed due to new water quality testing standards.

NJDEP has issued guidance for associating stream segments with monitoring stations. Based on this guidance, the following waters in Bordentown are impaired for aquatic life: The entire Crosswicks Branch and all its tributaries. For impaired waters (waters on Sublist 5), the state is required to establish total maximum daily loads (TMDL's). A TMDL represents the assimilative or carrying capacity of a waterbody, taking into consideration point and non-point sources of the pollutant of concern, natural background conditions and surface water withdrawals. A TMDL quantified the amount of a pollutant a waterbody can assimilate without violating a state's water quality standards. A TMDL is intended to reduce pollutant loads so that a waterbody can meet its surface water quality standards.

Macroinvertebrate Assessments

Site ID	Water Body	Location	Municipality	January 1993 NJ Impairment Score	January 1998 NJ Impairment Score	January 2001 NJ Impairment Score
AN0126	Crosswicks Creek	Crosswicks Creek at Main Street	Hamilton	15	9	21
AN0130	Doctors Creek	Doctors Creek at Route 130	Hamilton	27	27	21
AN0131	Crosswicks Creek	Point Breeze	Bordentown Township	9	9	9
AN0134	Blacks Creek	Blacks Creek at Route 130	Bordentown Township	9	15	15

Source: NJDEP-Bureau of Freshwater and Biological Monitoring "Lower Delaware River Basin 2000 – 2001 Benthic Macroinvertebrate Data"

NJ Impairment Score	Biological Assessment
0-6	Severely Impaired
9-21	Moderately Impaired
24-30	Non-impaired

Source: NJDEP

Site ID	Water Body	Location	Municipality	1998	2002
Crystal Lake – 20	Crystal Lake	Crystal Lake	Bordentown Township	1) Eutrophic 2) Fish consumption discouraged – Mercury in fish tissue	Eutrophic

Source: NJDEP

In addition, In December 2003, the U.S. Environmental Protection Agency (EPA) established Stage 1 Total Maximum Daily Loads (TMDLs) for PCBs in the tidal Delaware River between Trenton, N.J. and the Delaware Bay under a court-mandated deadline based on several years of technical work conducted by the Delaware River Basin Commission (DRBC). Per NJDEP data, Stage 2 TMDLs are proposed in 2006, in accordance with the May 18 ruling by the DPMC.

Under this ruling, dischargers will identify known and potential sources of PCBs, identify procedures for tracking down unknown sources of the pollutant, and identify and implement strategies for minimizing or preventing releases from all identified sources. Dischargers will measure and periodically report progress made in reducing loadings. Initially, permittees responsible for 60 point source discharges will be required to develop and implement Pollutant Minimization Plans (PMPs) and to monitor their PCB discharges.

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 allocation. Implementation strategies may include improved stormwater management facilities, adoption of ordinances, retrofitting stormwater systems, and other BMPs. The New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d)) (Integrated List) is required by the Federal Clean Water Act to be prepared biennially and is a valuable source of water quality information. This combined report presents the extent to which New Jersey waters are attaining water quality standards, and identifies waters that are impaired.

Sublist 5 of the Integrated List constitutes the list of waters impaired or threatened by pollutants, for which one or more TMDLs are needed. It should be noted that as part of the Township's Municipal Separate Storm Sewer (MS4) regulations, existing inlets and outfalls will be inspected and repairs/maintenance will be made. At that time, existing water quantity and erosion problems (if any) will be assessed and abated to the maximum extent practicable.

Future major development will comply with the new NJDEP Stormwater design standards (NJAC 7:8), including the average annual recharge (retain increase in 2-year design storm) requirement.

V. **Design and Performance Standards**

The Township will adopt the design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8-5 to minimize the adverse impact of stormwater runoff on water quality/quantity and loss of groundwater recharge in receiving water bodies. This will be implemented by adoption of the NJDEP Model Stormwater ordinance (**Appendix B**), as amended for use and enforcement within Bordentown Township.

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).

Stormwater management measures will be operated and maintained in accordance with the General Maintenance requirements outlined within the Township's stormwater ordinance, including but not limited to the following requirements:

- A. The design engineer shall prepare a maintenance plan for the stormwater management measures incorporated into the design of a major development.
- B. 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).
- C. Preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measure(s), 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 non-vegetated linings.
- D. The person responsible for maintenance 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.
- E. The person responsible for maintenance shall evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed.

- F. The person responsible for maintenance 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 of the Township's stormwater ordinance.
- G. 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. 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.

During construction, Township inspectors will observe the construction of the project to ensure that the stormwater management measures are constructed and function as designed.

VI. Plan Consistency

The Township is not within a Regional Stormwater Management Planning Area, therefore this plan does not need to be consistent with any regional stormwater management plans (RSWMPs). As indicated previously, Total Maximum Daily Loads have been established for the Delaware River between Trenton and the Delaware Bay; as such future development must comply with the established TMDL's as appropriate.

If any RSWMPs or (new) TMDLs are developed in the future, this Municipal Stormwater Management Plan will be updated to be consistent.

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

The Township's Stormwater Management Ordinance requires all new development and redevelopment plans to comply with New Jersey's Soil Erosion and Sediment Control Standards. During construction, Township inspectors will observe on-site soil erosion and sediment control measures and report any inconsistencies to the Burlington County Soil Conservation District.

VII. Nonstructural Stormwater Management Strategies

Non-structural stormwater strategies for design of **new** developments, or redevelopment, as defined per the NJDEP Stormwater design Regulations (NJAC -5.3(b)), include the following objectives:

- A. Protection of areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss.
- B. Minimizing impervious surfaces and breakup or disconnecting the flow of runoff over impervious surfaces.
- C. Maximum protection of natural drainage features and vegetation.
- D. Minimizing the decrease in the "time of concentration" from pre-construction conditions to post-construction conditions.
- E. Minimizing land disturbance during clearing and grading.
- F. Minimizing soil compaction.
- G. Providing low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides.
- H. Providing vegetated open channel conveyance systems discharging into and through stable vegetative areas.
- I. Providing other source controls to prevent or minimize erosion or discharges.

As indicated previously, Bordentown Township has adopted the NJDEP model stormwater control ordinance, as amended for use and enforcement within the Township. This ordinance includes methodologies for incorporating non-structural stormwater strategies identified above, in design, "to the maximum extent practicable" for future major development projects. As such, the proposed Master Plan (existing Master Plan plus Municipal Stormwater Plan and ordinance, when approved) will adequately address non-structural stormwater management strategies.

Also included in **Appendix C** of Bordentown's Stormwater management plan is a review of the Township's existing ordinances for allowing use of non-structural stormwater management strategies using the "Municipal Regulations Checklist" from Appendix B of the New Jersey Stormwater Best Management Practices (BMP) Manual, dated February, 2004. As indicated, the Township's existing codes and Master Plan are compliant with many of the non-structural strategies.

Areas identified as "No" on the enclosed Checklist (i.e., regulations not addressing specific aspect of non-structural measures) should be reviewed by the Township and Planning Board to determine whether ordinance changes are warranted. **Again, it must be stressed that regardless of the adequacy of the existing ordinances to allow for non-structural stormwater measures, that the eventual adoption of the NJ Model Stormwater Ordinance as part of the Township's Ordinances will require incorporation of the above-referenced non-structural strategies into design of future "major development projects" (over 1 acre disturbance or 0.25 acres impervious cover) proposed within the Township.**

If an applicant (or his/her Engineer) contends that it is not feasible for engineering, environmental, or safety reasons to incorporate any nonstructural stormwater management strategies identified in (b) below into the design of a particular project, the applicant will identify the strategy and provide a basis for the contention. It is understood that any project requiring NJDEP Land Use Regulation Program permitting or approvals will also be subject to a similar stormwater review by the appropriate agency.

VIII. Land Use/Build-Out Analysis

An assessment of remaining developable lands within Bordentown Township (August, 2005) was performed using NJDEP GIS data, Township Parcel Map data, and developable lands mapping from the DVRPC's 2004 ERI report, as well as new large projects that have received Final planning board approvals and will commence construction prior to the MS4 "Operative date" of February, 2006. Said projects include but are not limited to:

- A. The Freedman-Cohen site, Block 125, Lots 1 and 2;
- B. The Old York Business Park, Block 137.02, Lots 1 and 11.03;
- C. Crescent Village, Block 58, Lots 35-38; and
- D. The Central Crossing Business Park, located west of I-295, north of the Mansfield Township Border.

In addition to existing and future developed property and environmentally-constrained lands (i.e., wetlands, floodplains) additional protected lands, such as State (DEP) owned land and Farmland Preservation within the remaining area were also eliminated as "developable". Based on our calculations as identified above, there is approximately **0.62 square miles** of upland developable area remaining within Bordentown Township.

Further, it should be noted that this figure does not include a minimum 50-foot (intermediate value) wetlands buffer that would be applied to virtually all existing freshwater wetlands within the Township that would further constrain undeveloped uplands property that contain or abut freshwater wetlands. *Inclusion of such a buffer in our calculations would result in an estimate of less than ½ square miles of developable land as defined per NJDEP policy. As such, there is (well) less than one (1) square mile of unconstrained, developable land remaining within Bordentown Township.*

Since there is less of one (1) square mile of vacant or developable lands, outside of environmentally-constrained areas remaining in the Township, Bordentown is exempt from the requirement to perform a build-out analysis of the municipality.

IX. Mitigation Plans

The Township has opted to consider mitigation projects as identified by future Developers on a case-by-case basis, in accordance with the NJDEP's "**Guidance for the Development of Municipal Mitigation Plans**" document, dated February, 2006.

As identified in NJDEP's Mitigation Plan Guidance Document, municipalities may

- 1) Identify a pool of specific mitigation projects that could be selected by an applicant to offset the effect of a requested waiver/exemption or to address an existing stormwater problem; or
- 2) Choose to provide a process through which an applicant has the flexibility and responsibility to identify an appropriate mitigation project and a location to implement the mitigation project to offset the deficit that would be created by the grant of a waiver/exemption or to address a stormwater based impairment.

Bordentown Township has opted to provide a mitigation plan using option #2 above (i.e., provision of a mitigation process).

It must be stressed that requested exceptions will be granted only at the discretion of the Township. In addition, the issuance of a waiver(s) granted by NJDEP under a Land Use permit does not automatically waive the requirement for mitigation to be performed under a municipal review.

In order to select an appropriate mitigation project to respond to a requested waiver/exemption requires, an assessment of the impact that would result from the requested deviation from full compliance with the standard(s) in the drainage area affected by the proposed project is required. For example, a waiver for stormwater quantity requirements must focus on the impacts of increased runoff on flooding, considering both quantity and location. Stormwater quality mitigation must aim to prevent an increase in pollutant load to the waterbodies that would be affected by the waiver/exemption. Ground water recharge mitigation must seek to maintain the baseflow and aquifer recharge in the area that would be affected by the waiver/exemption. For the purpose of this discussion, the term "sensitive receptor" is used to refer to a specific area or feature that would be sensitive to the impact assessed above.

Selection of an appropriate mitigation project for a requested waiver/exemption must adhere to the following requirements:

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

All necessary information to support a specific waiver request(s) must be provided by the Developer(s) for consideration by the Township, in accordance with applicable NJDEP and/or Township requirements, and as outlined in NJDEP's "**Guidance for the Development of Municipal Mitigation Plans**" document, dated February 2006.

At the Township's discretion, a developer may be permitted to fund analyses to identify potential mitigation projects that could be used to address deficits in complying with each of the performance standards. However, the funding option shall only be allowed where the project requesting the waiver will have no measurable impact with respect to flooding, erosion, water quality degradation, etc. The funding option may also be appropriate in situations where the size of an individual project requesting a waiver/exemption is small, or the degree of deficit in complying with the design and performance standard(s) is small. Or, where the project requiring mitigation is for one individual single family home, given authority constraints, a financial contribution may be a preferred option.

Finally, the following information will be obtained and provided by the Developer of an approved waiver for the Township to comply with its annual NJDEP MS4 permitting requirements:

1. Impact from noncompliance -- Provide a table quantifying what would be required for the project to achieve the standards, the extent to which this value will be achieved on site and the extent to which the value must be mitigated off site.

2. Narrative and supporting information regarding the need for the waiver including:

- The waiver cannot be due to a condition created by the applicant. If the applicant can comply with the Stormwater Management rules through a reduction in the scope of the project, the applicant has created the condition and a waiver cannot be issued. Demonstrate that the need for a waiver is not created by the applicant.
- Provide a discussion and supporting documentation of the site conditions peculiar to the subject property that prevent the construction of a stormwater management facility that would achieve full compliance with the design and performance standards. Site conditions may include soil type, the presence of karst geology, acid soils, a high groundwater table, unique conditions that would create an unsafe design, as well as conditions that may provide a detrimental impact to public health, welfare, and safety.
- Demonstration that the grant of the requested waiver/exemption would not result in an adverse impact that would not be compensated for by off site mitigation.

3. Identify the sensitive receptor(s) related to the performance standard from which a waiver is sought. Demonstrate that the mitigation site contributes to the same sensitive receptor.
4. Provide the design details of the mitigation project. This includes, but is not limited to, drawings, calculations, and other information needed to evaluate the mitigation project.
5. List the party or parties responsible for the construction and the maintenance of the mitigation project. Documentation must be provided to demonstrate that the responsible party is aware of, has authority to, and accepts the responsibility for construction and maintenance. Under no circumstance shall the responsible party be an individual single-family homeowner. Selection of a project location that is under municipal authority avoids the need to obtain authority from a third party for the construction and future maintenance of the project.
6. Include a maintenance plan that addresses the maintenance criteria at N.J.A.C. 7:8-5.8. In addition, if the maintenance responsibility is being transferred to the municipality or another entity, the entity responsible for the cost of the maintenance must be identified. The municipality may provide the option for the applicant to convey the mitigation project to the municipality, if the applicant provides for the cost of maintenance in perpetuity.
7. Obtain any and all necessary local, State or other applicable permits for the mitigation measure or project. Permits must be obtained prior to the municipal approval of the project for which mitigation is being provided.
8. Demonstrate that the construction of the mitigation project coincides with the construction of the proposed project. A certificate of occupancy or final approval by the municipality for the project requiring mitigation cannot be issued until the mitigation project or measure receives final approval. Any mitigation projects proposed by the municipality to offset the stormwater impacts of that municipality's own projects must be completed within 6 months of the completion of the municipal project, in order to remain in compliance with their NJPDES General Permit.

X. **Stream Corridor Protection Plan (Optional)**

There are no Special Water Resource protection areas designated Category One (NJAC 7:9B) or upstream perennial or intermittent streams of said waters within Bordentown Township.

It should be noted, however, that two (2) local water bodies, Blacks Creek and Crafts Creek, were Publicly nominated for consideration of Category One designation (and associated exceptional waters resource protection).

If such water bodies are found or designated at a later date, future major development within 300 feet of said waters will be regulated in accordance with NJAC 7:8-5.5(h) as outlined in the model stormwater ordinance.

Appendix A – Mapping

Figure 1 – U.S.G.S. Quadrangle/Hydrologic Units (HUC14s)

Figure 2 – Wellhead Protection Areas/Groundwater Recharge Areas

Figure 3 – Zoning Districts

Figure 4 – Wetlands

Figure 5 – Soils

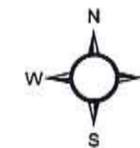
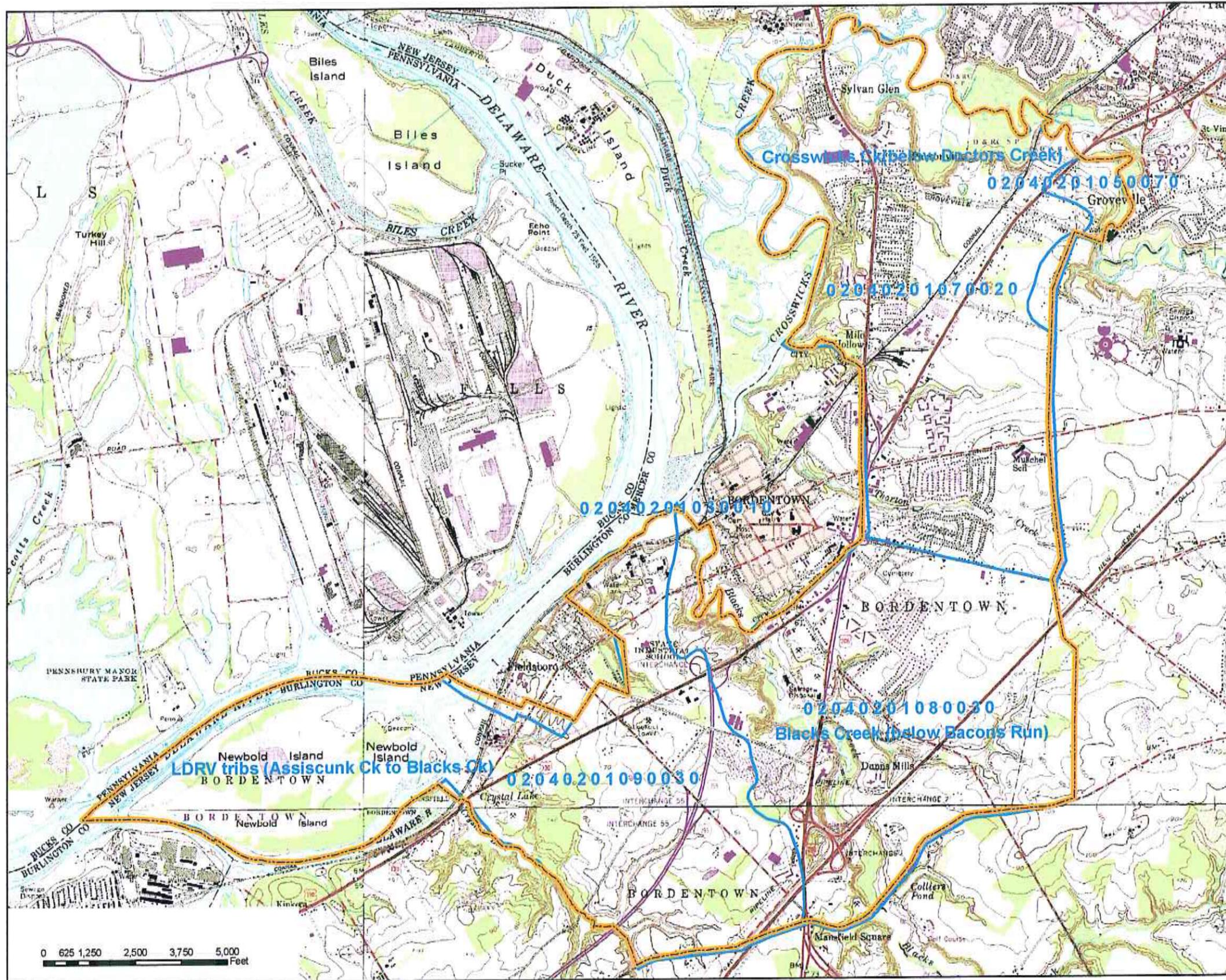
Figure 6 – Floodprone Areas

Figure 7 – Aerial Photo of Existing Conditions

Figure 8 – Development Constraints

Figure 9 – Developable land

Figure 10 – AMNET Stations



Legend

-  Municipal Boundary
-  HUC 14 Delineations

Bordentown Township
 Burlington County, NJ
**USGS Quad/
 HUC 14 Delineation**

RV & A Remington, Vernick and Arango Engineers
 243 Route 130 Suite 200
 Bordentown, NJ 08505
 Phone: (609)-298-6017 Fax: (609)-298-8257
 Web Site Address: www.rve.com

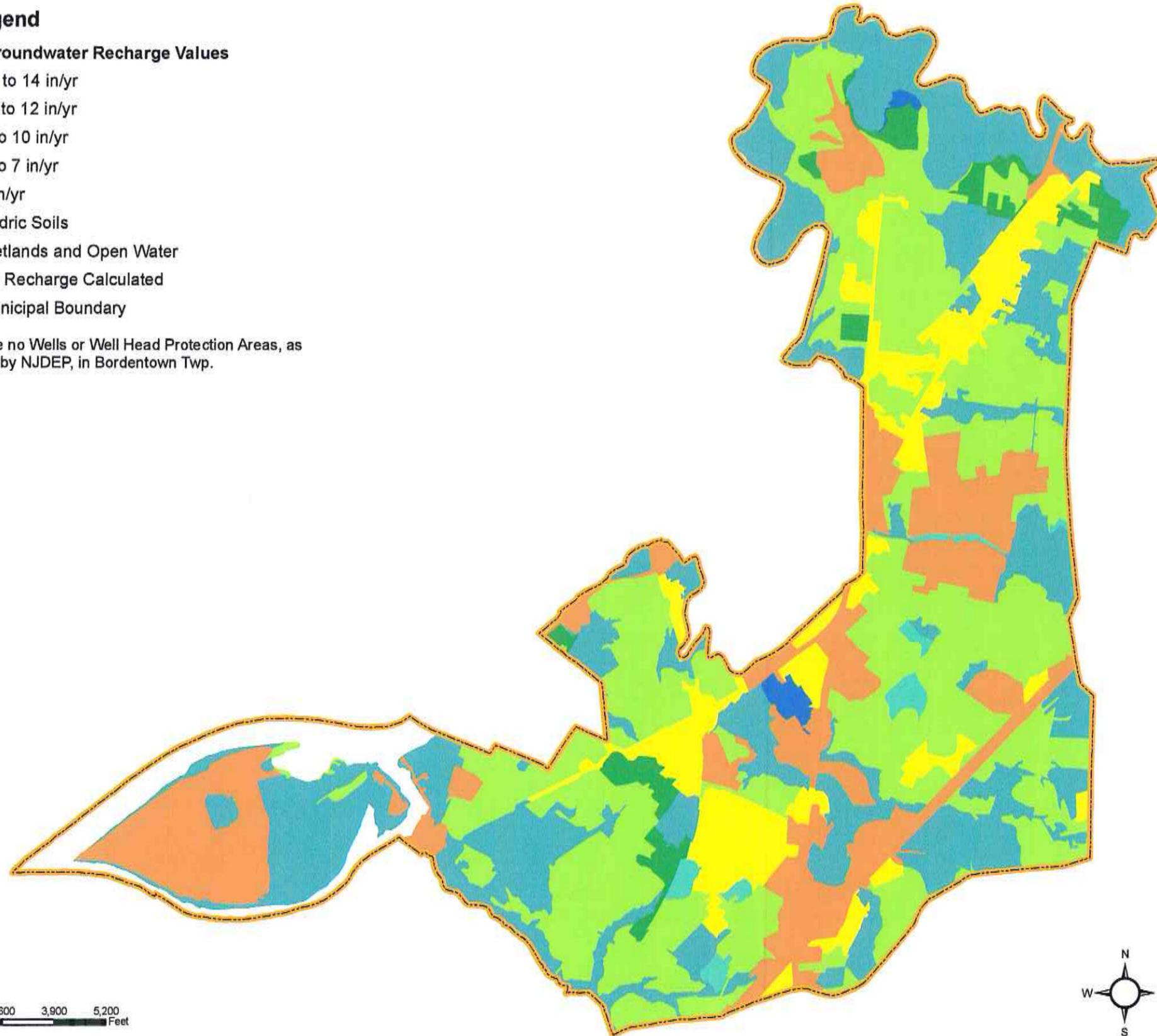
0 625 1,250 2,500 3,750 5,000 Feet

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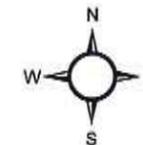
NJGS Groundwater Recharge Values

- 13 to 14 in/yr
- 11 to 12 in/yr
- 9 to 10 in/yr
- 1 to 7 in/yr
- 0 in/yr
- Hydric Soils
- Wetlands and Open Water
- No Recharge Calculated
- Municipal Boundary

*Note: There are no Wells or Well Head Protection Areas, as defined by NJDEP, in Bordentown Twp.



0 650 1,300 2,600 3,900 5,200 Feet



Bordentown Township
Burlington County, NJ
**Groundwater Recharge/
Well Head Protection Areas**

RV & A Remington, Vernick and Arango Engineers
243 Route 130 Suite 200
Bordentown, NJ 08505
Phone: (609)-298-6017 Fax: (609)-298-8257
Web Site Address: www.rve.com

REVISION	
DATE	DESCRIPTION



TOWNSHIP OF HAMILTON
MERCER COUNTY

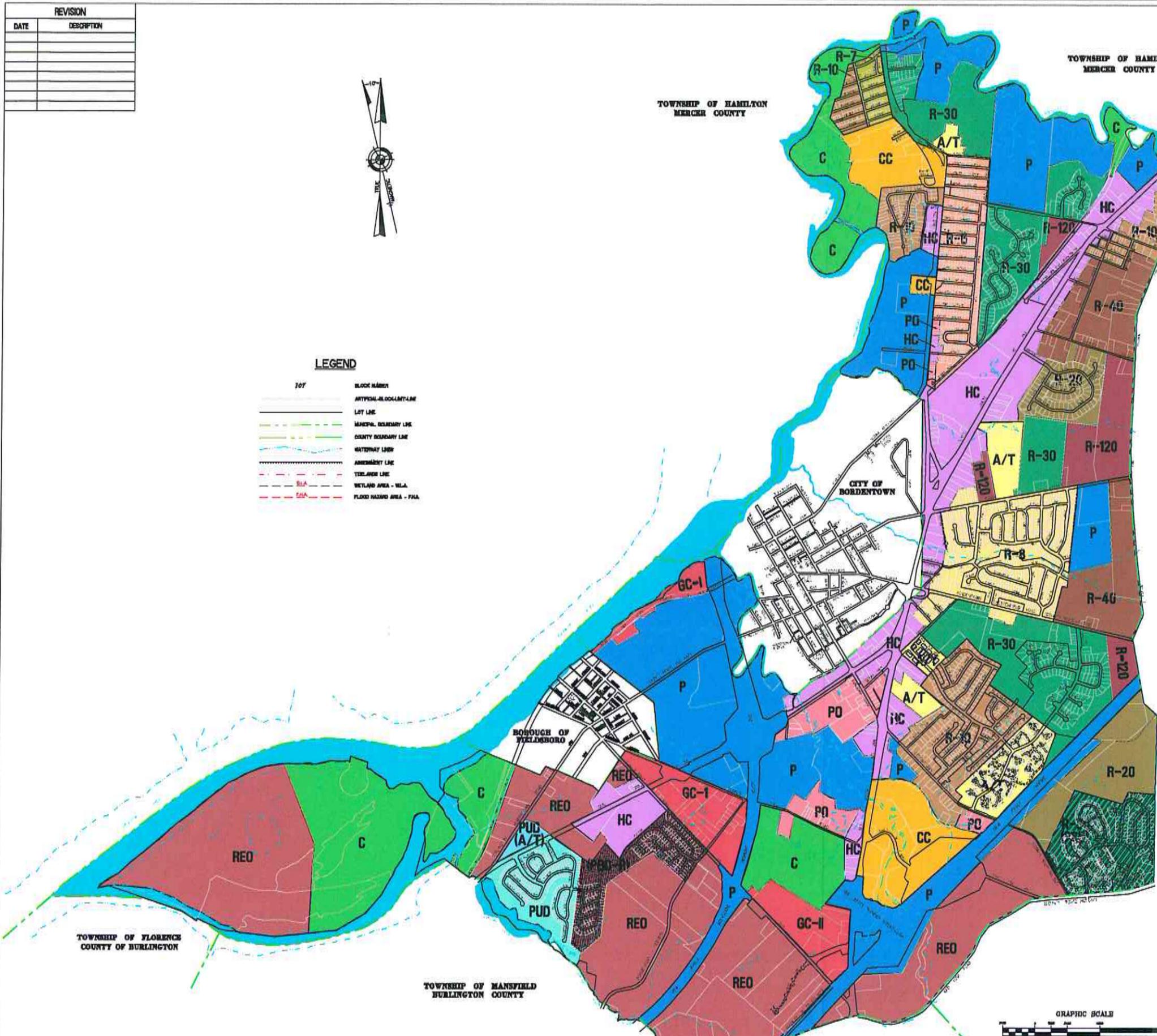
TOWNSHIP OF HAMILTON
MERCER COUNTY

LEGEND

	BLOCK NUMBER
	ARTIFICIAL BLOCK/LINE
	LOT LINE
	MUNICIPAL BOUNDARY LINE
	COUNTY BOUNDARY LINE
	WATERWAY LINE
	AMENDMENT LINE
	TIDELAND LINE
	WETLAND AREA - MHA
	FLOOD HAZARD AREA - FMA

ZONING DISTRICT DESIGNATIONS

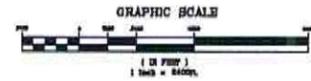
	P	PUBLIC DISTRICT
	C	CONSERVATION DISTRICT
	A/T	MULTIPLE FAMILY RESIDENTIAL DISTRICT
	R-6	HIGH DENSITY SINGLE FAMILY RESIDENTIAL DISTRICT
	R-7	HIGH DENSITY SINGLE FAMILY RESIDENTIAL DISTRICT
	R-8	HIGH DENSITY SINGLE FAMILY RESIDENTIAL DISTRICT
	R-10	MEDIUM DENSITY SINGLE FAMILY RESIDENTIAL DISTRICT
	R-20	MEDIUM DENSITY SINGLE FAMILY RESIDENTIAL DISTRICT
	R-30	MEDIUM DENSITY SINGLE FAMILY RESIDENTIAL DISTRICT
	R-40	LOW DENSITY SINGLE FAMILY RESIDENTIAL DISTRICT
	R-120	LOW DENSITY SINGLE FAMILY RESIDENTIAL DISTRICT
	PO	PROFESSIONAL OFFICE DISTRICT
	CC	COMMUNITY COMMERCIAL DISTRICT
	HC	HIGHWAY COMMERCIAL DISTRICT
	GC-I & II	GENERAL COMMERCIAL I AND II DISTRICT
	REO	RESEARCH, ENGINEERING AND OFFICE DISTRICT
	PUD	PLANNED UNIT DEVELOPMENT DISTRICT
	PUD (A/T)	PLANNED UNIT DEVELOPMENT/MULTIPLE FAMILY RESIDENTIAL DISTRICT
	(PCD)	PLANNED COMMUNITY DEVELOPMENT OPTION DISTRICT
	(PBD-R)	PLANNED BUSINESS DEVELOPMENT-RESIDENTIAL OPTION DISTRICT



TOWNSHIP OF CHESTERFIELD
BURLINGTON COUNTY

TOWNSHIP OF FLORENCE
COUNTY OF BURLINGTON

TOWNSHIP OF MANSFIELD
BURLINGTON COUNTY

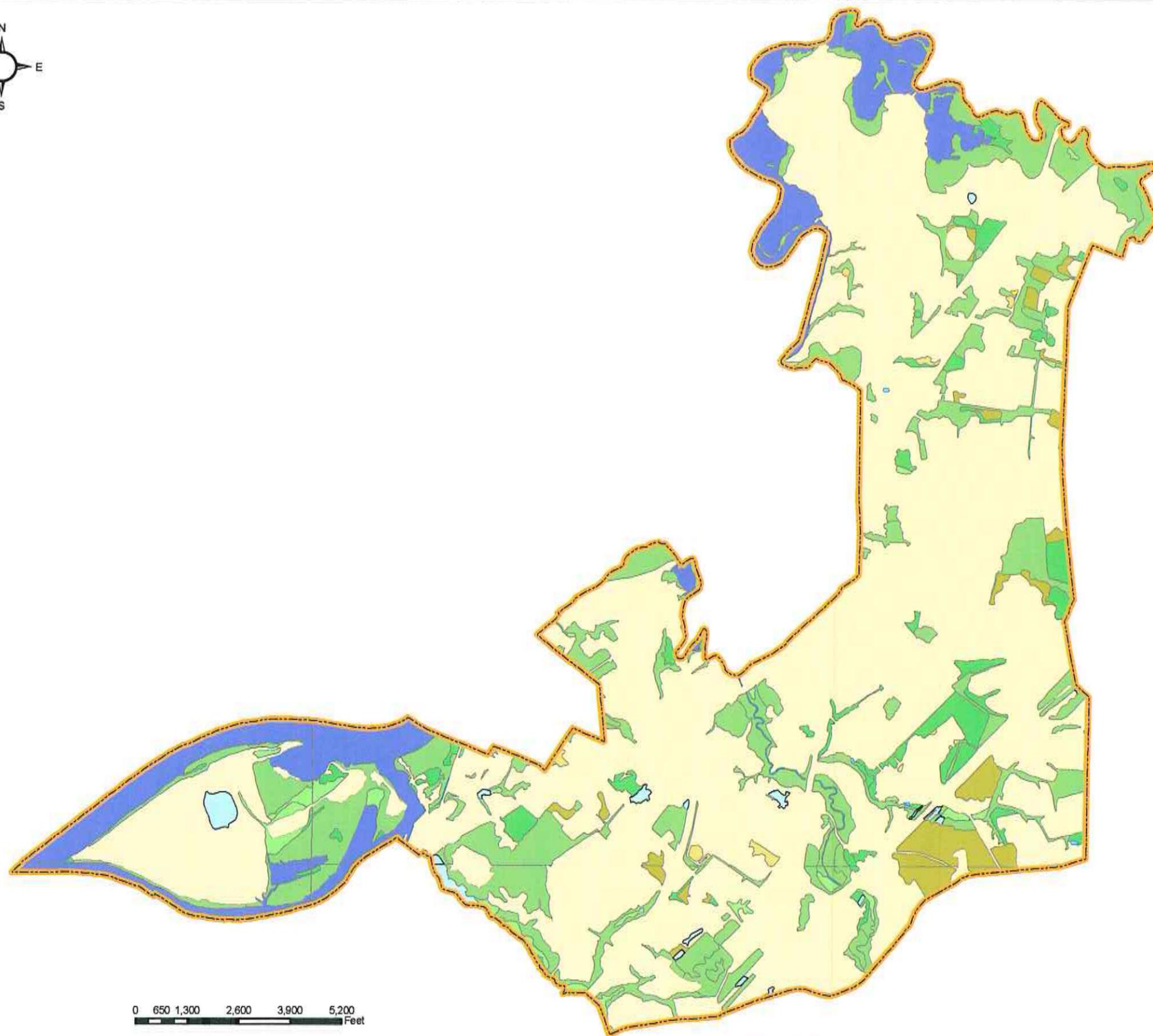
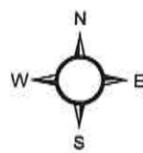


ZONING MAP
TOWNSHIP OF BORDENTOWN

BURLINGTON COUNTY NEW JERSEY
SCALE: 1" = 2400' DATE: 9-27-2005

CRAIG F. REMINGTON PROFESSIONAL PLANNER LIC. NO. 1877
JOSEPH M. PETRONGOLO PROFESSIONAL PLANNER LIC. NO. 6251

REMINGTON, VERNICK & ARANCO ENGINEERS
2410 W. 10TH ST. SUITE 200, BORDENTOWN, NJ 08805
(609) 688-8877, FAX (609) 688-8877
WEB SITE ADDRESS WWW.RVA.COM



0 650 1,300 2,600 3,900 5,200 Feet

Legend

-  MUNICIPAL BOUNDARY
- WETLANDS**
-  AGRICULTURAL WETLANDS (MODIFIED)
-  ARTIFICIAL LAKES
-  DECIDUOUS SCRUB/SHRUB WETLANDS
-  DECIDUOUS WOODED WETLANDS
-  DISTURBED WETLANDS (MODIFIED)
-  HERBACEOUS WETLANDS
-  MANAGED WETLANDS (MODIFIED)
-  NATURAL LAKES
-  STREAMS AND CANALS
-  TIDAL WATER
-  UPLANDS
-  WETLAND RIGHTS-OF-WAY (MODIFIED)

Bordentown Township

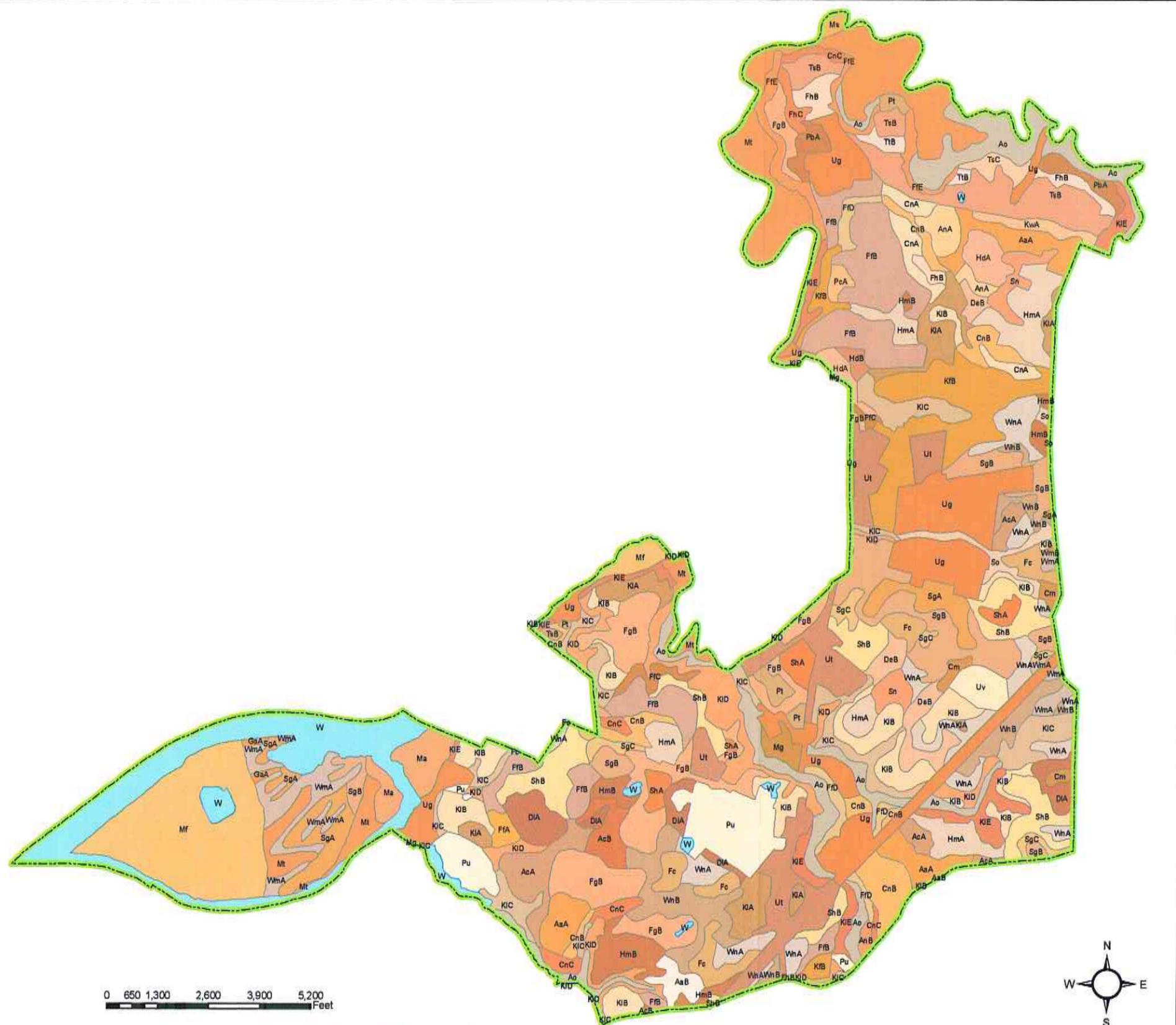
Burlington County, NJ

Wetlands



Remington, Vernick and Arango Engineers
243 Route 130 Suite 200
Bordentown, NJ 08505
Phone: (609)-298-6017 Fax: (609)-298-8257
Web Site Address: www.rve.com

- Legend**
- Soil Types**
- AaA
 - AaB
 - AcA
 - AcB
 - AnA
 - AnB
 - Ao
 - Cm
 - CnA
 - CnB
 - CnC
 - DeB
 - DIA
 - Fc
 - FtA
 - FtB
 - FtC
 - FtD
 - FtE
 - FgB
 - FhB
 - FhC
 - GaA
 - HdA
 - HdB
 - HmA
 - HmB
 - KtB
 - KtA
 - KtB
 - KtC
 - KtD
 - KtE
 - KwA
 - Ma
 - Mf
 - Mg
 - Ms
 - Mt
 - PbA
 - PcA
 - Pt
 - Pu
 - SgA
 - SgB
 - SgC
 - ShA
 - ShB
 - Sn
 - So
 - TsB
 - TsC
 - TtB
 - Ug
 - Ut
 - Uv
 - Water
 - WmA
 - WmB
 - WnA
 - WnB
- Municipal Boundary

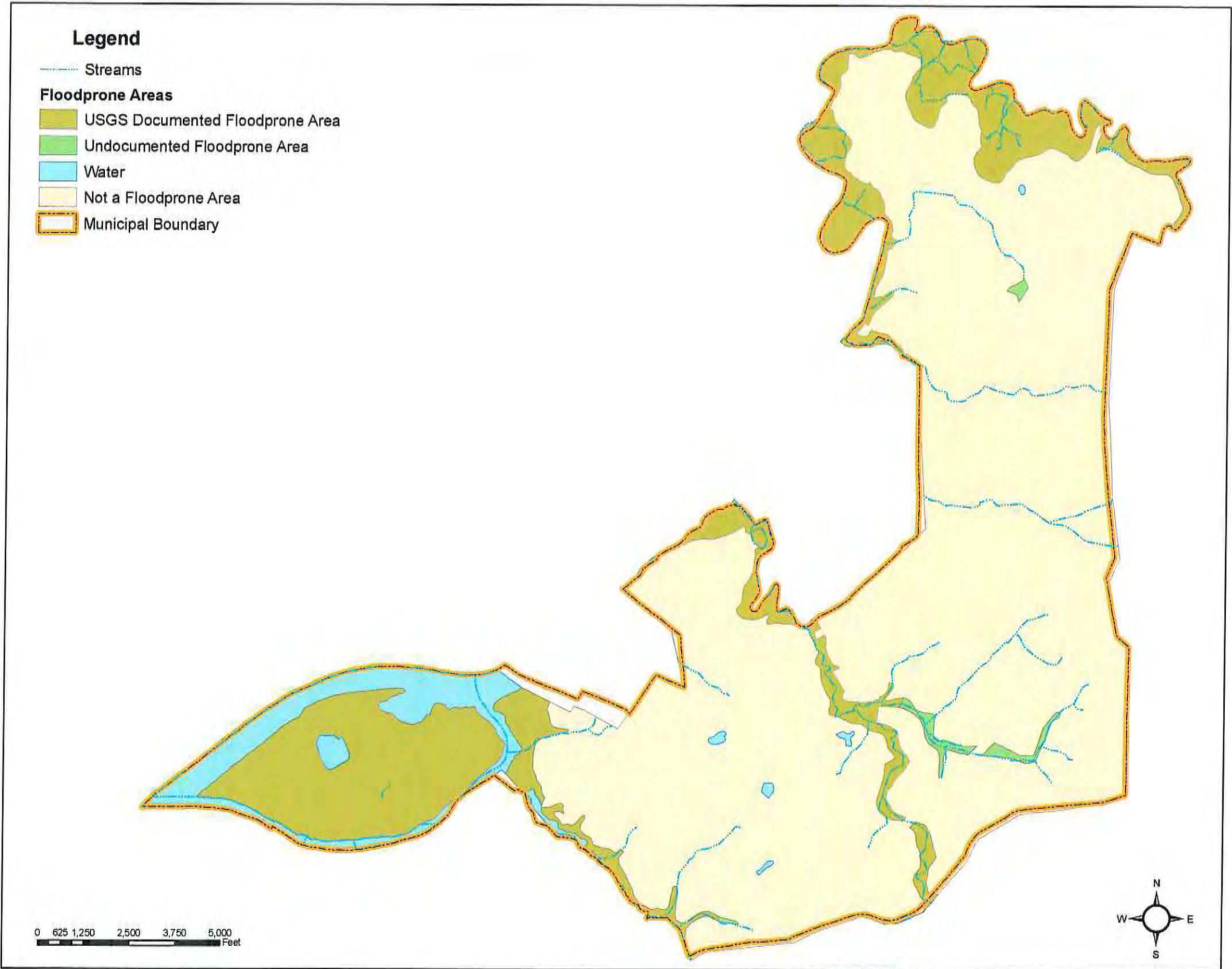


Bordentown Township

Burlington County, NJ

Soils

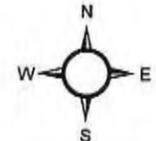
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Legend

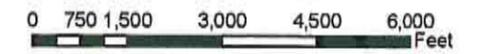
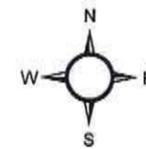
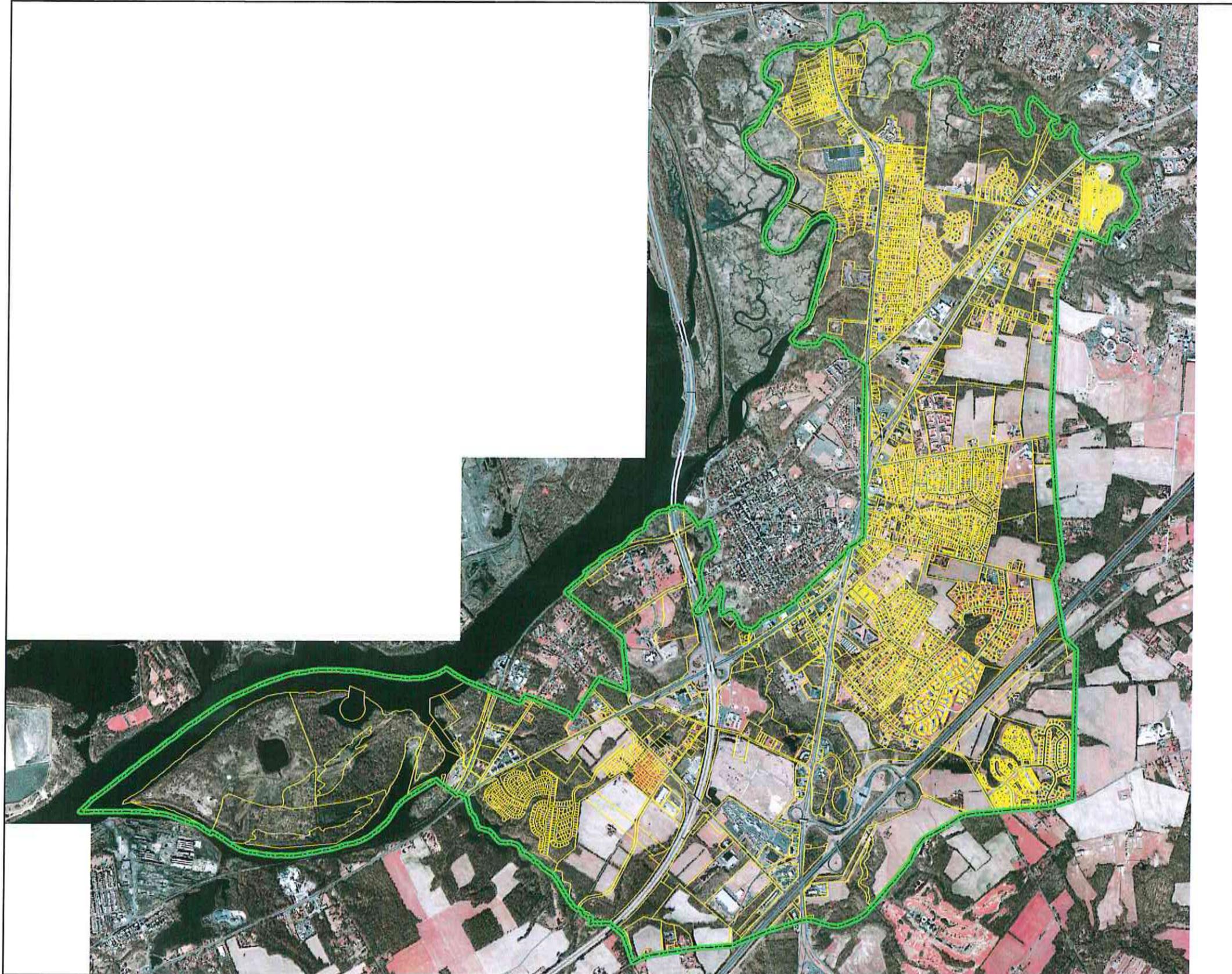
- Streams
- Floodprone Areas**
- USGS Documented Floodprone Area
- Undocumented Floodprone Area
- Water
- Not a Floodprone Area
- Municipal Boundary

0 625 1,250 2,500 3,750 5,000 Feet



Bordentown Township
 Burlington County, NJ
Floodprone Areas

RV & A Remington, Vernick and Arango Engineers
 243 Route 130 Suite 200
 Bordentown, NJ 08505
 Phone: (609)-298-6017 Fax: (609)-298-8257
 Web Site Address: www.rva.com

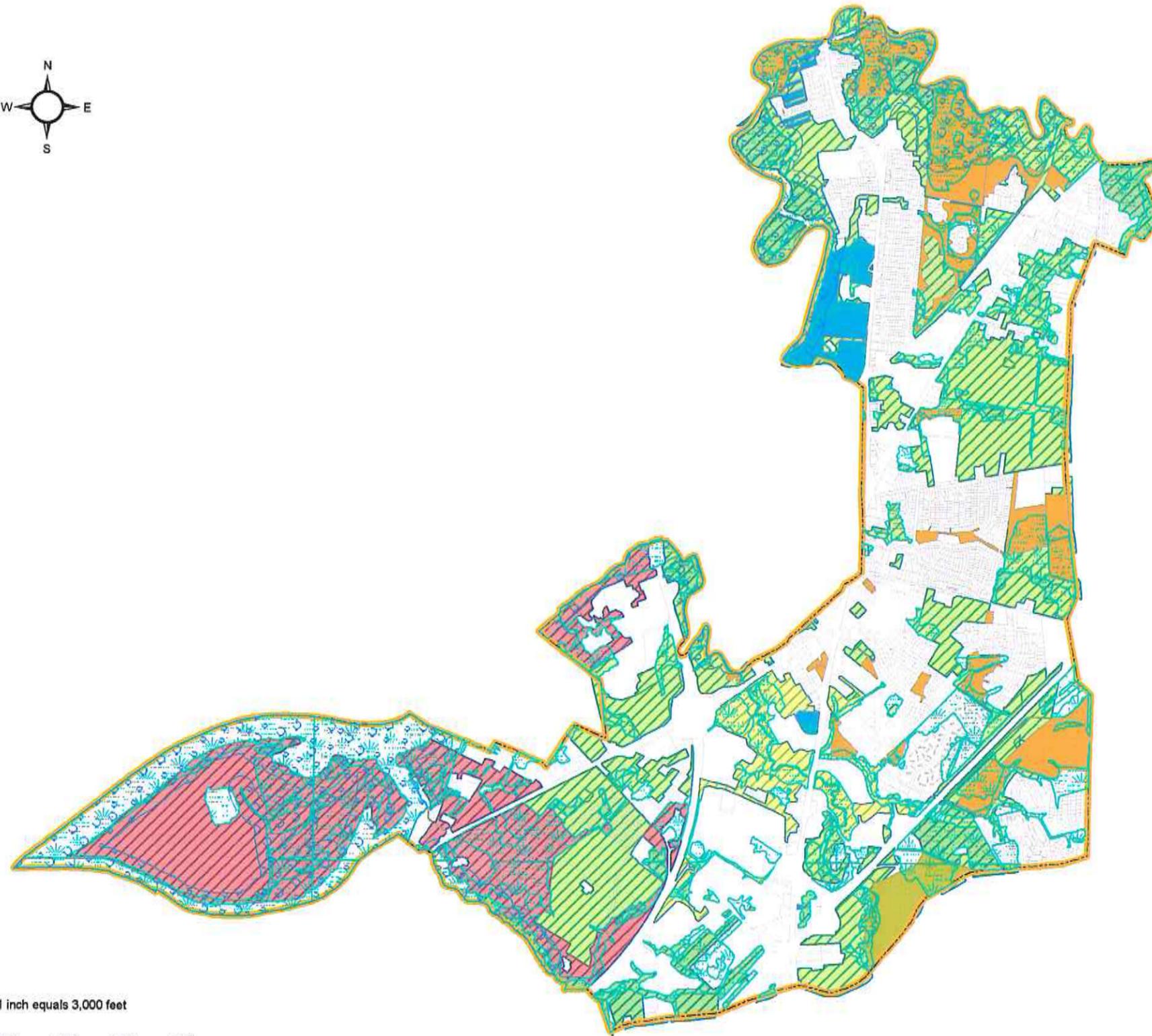
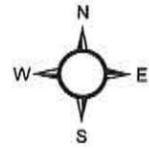


Legend

-  Parcels
-  Municipal Boundary

Bordentown Township
Burlington County, NJ
Existing Conditions

RV &A	Remington, Vernick and Arango Engineers
	243 Route 130 Suite 200
	Bordentown, NJ 08505
	Phone: (609)-298-6017 Fax: (609)-298-8257
Web Site Address: www.rva.com	



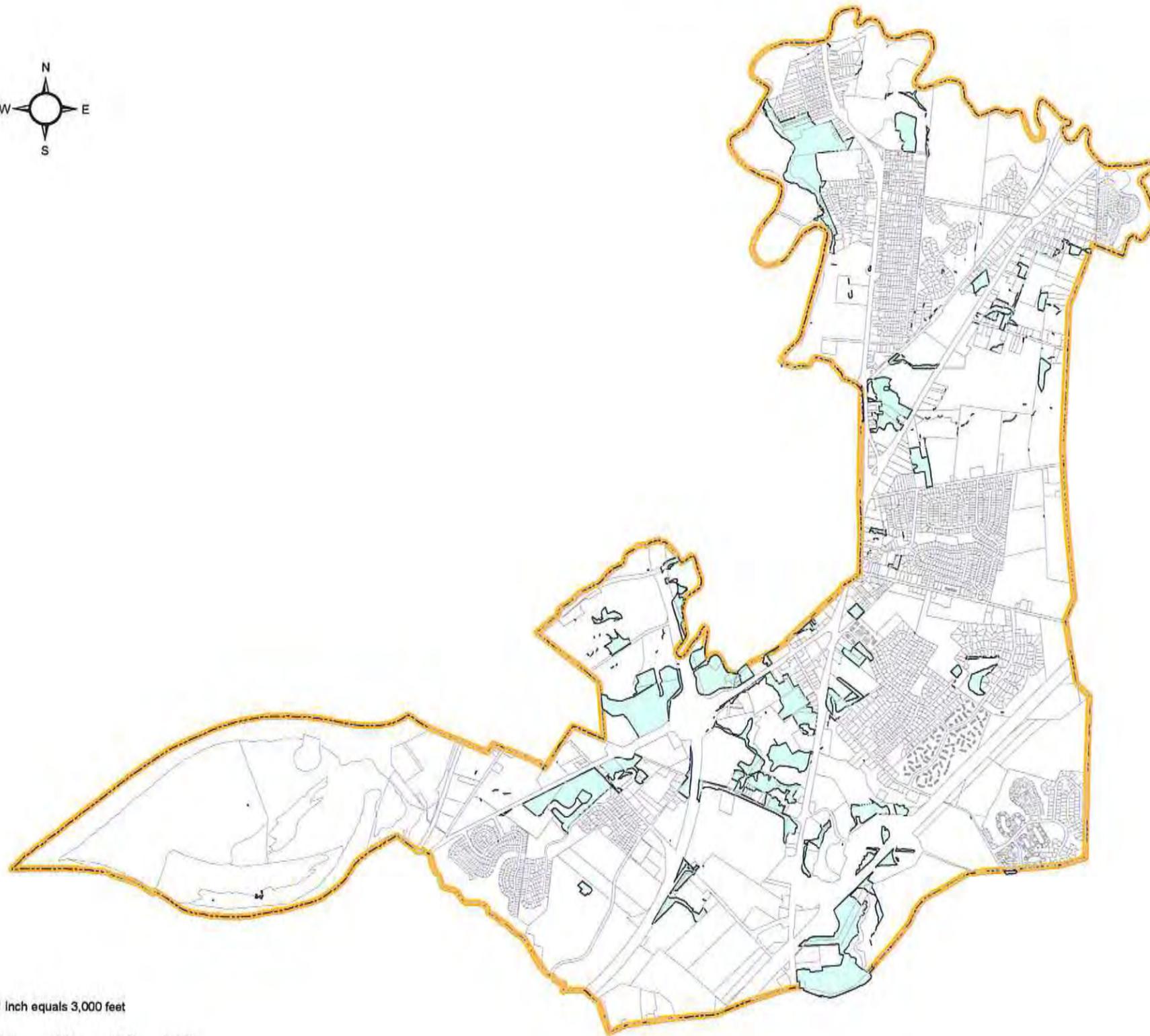
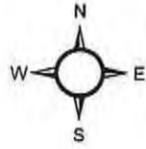
Legend

- Parcels
- Municipal Boundary
- Critical Undeveloped/Underdeveloped Areas
- NJDFW Habitat Areas**
 - Suitable Habitat
 - Priority Species
 - State Threatened
 - State Endangered
 - Federal T & E
 - Township Owned Land
 - NJ DEP Owned Land
 - Farmland Preservation
 - Bald Eagle Foraging Area
 - Wetlands

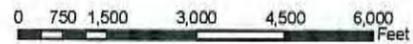
Bordentown Township Burlington County, NJ

Development Constraints

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	243 Route 130 Suite 200
	Bordentown, NJ 08505
	Phone: (609)-298-6017 Fax: (609)-298-8257 Web Site Address: www.rve.com



1 inch equals 3,000 feet



Legend

-  Parcels
-  Developable Land (Approx. 0.62 Sq Mi.)
-  Municipal Boundary

Bordentown Township

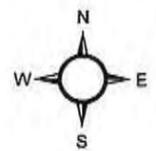
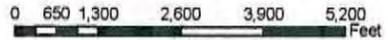
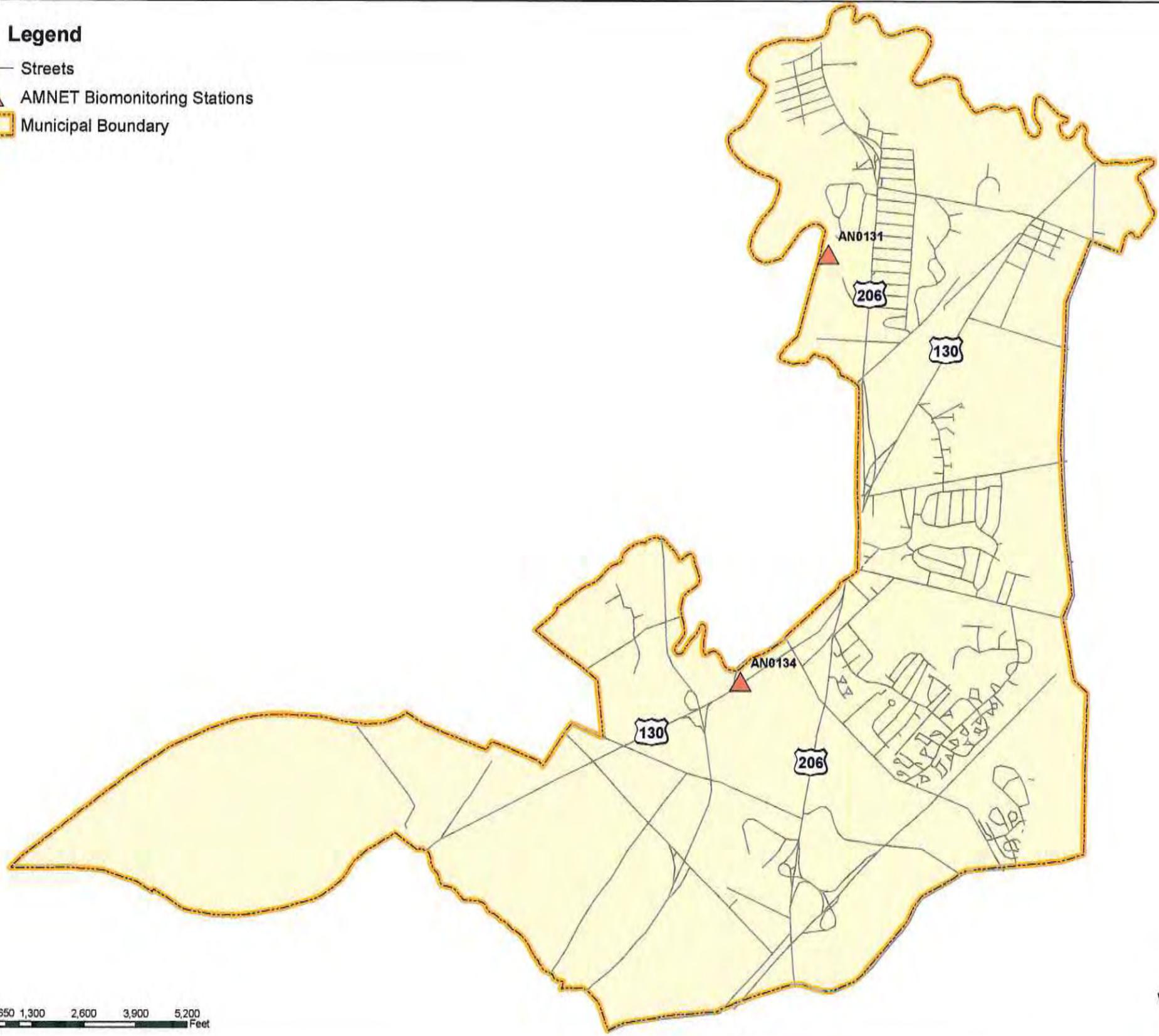
Burlington County, NJ

Developable Land

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	243 Route 130 Suite 200
	Bordentown, NJ 08505
	Phone: (609)-298-6017 Fax: (609)-298-8257
Web Site Address: www.rve.com	

Legend

- Streets
- ▲ AMNET Biomonitoring Stations
- ▭ Municipal Boundary



Bordentown Township
Burlington County, NJ
AMNET Stations

RV &A	Remington, Vernick and Arango Engineers
	243 Route 130 Suite 200
	Bordentown, NJ 08505
	Phone: (609)-298-6017 Fax: (609)-298-8257
Web Site Address: www.rve.com	

Appendix B – Model Stormwater Ordinance

Bordentown Township Stormwater Control Ordinance December, 2005

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 Bordentown 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 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. For purposes of stormwater control, the requirements stipulated in this code shall supercede any other references or standards applying to stormwater management found elsewhere in the Bordentown Township Code, including but not limited to the following sections:

1. Chapter 25, Section 500 of Land Development Ordinance, "General Provisions and Design Standards".
2. Chapter 25, Subsection 25:502, Drainage.
3. Chapter 25, Subsection 25:605, Flood Plain Areas.

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, unless modified specifically for Bordentown Township:

“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.

“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 more than 1 acre of land or increasing impervious cover by 0.25 acres or more.

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 Bordentown Township.

“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, Bordentown 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.

“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 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.

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 muhlenbergi* (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 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;
 - 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
 - (4) 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:

- (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.

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:
 - (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 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			
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		

2. 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. 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.

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.
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;

- (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 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.
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)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;
2. The Rutgers Cooperative Extension Service, 732-932-9306; and
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.

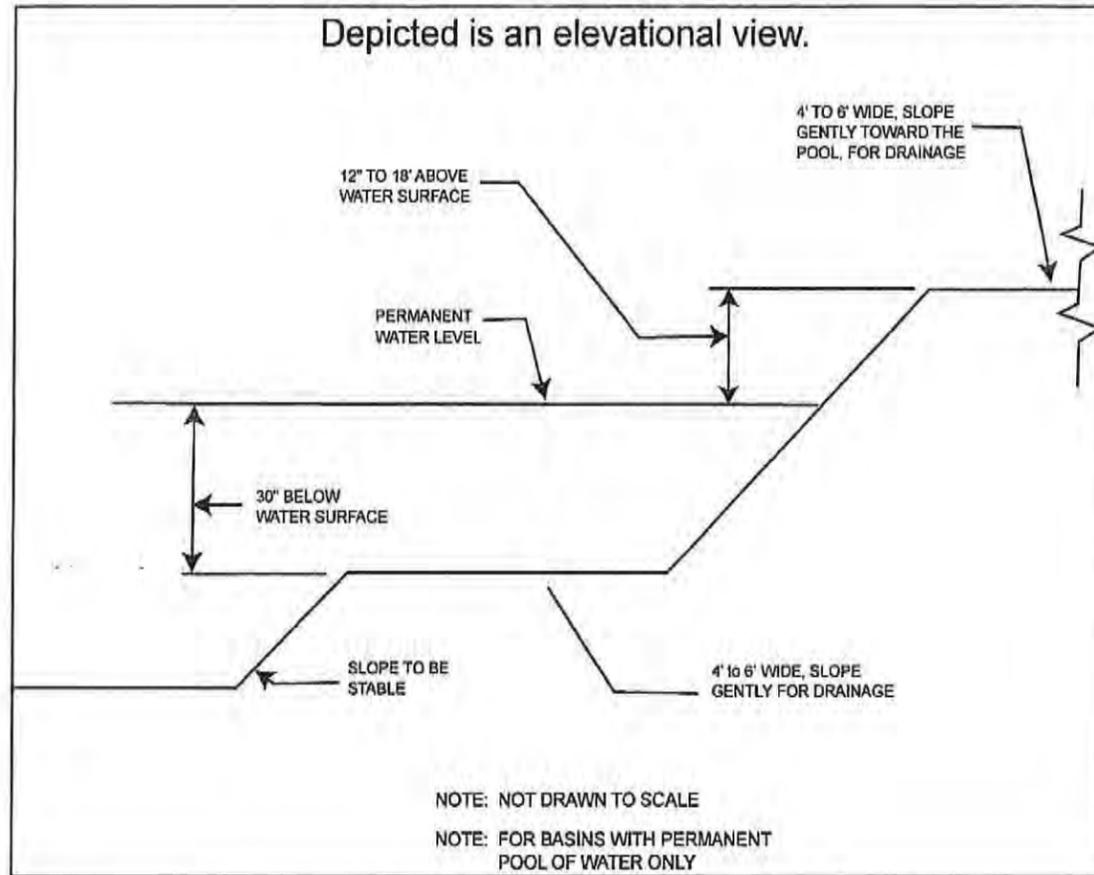
B. Requirements for Trash Racks, Overflow Grates and Escape Provisions

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.
 - 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



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 [*specify number*] 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 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.

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.
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: *[Municipality 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.

Appendix C – MS4 Municipal Regulations Checklist

Municipal Regulations Review

Township of Bordentown

As part of the requirements for municipal stormwater management plans in the Stormwater Management Rules at N.J.A.C. 7:8-4, municipalities are required to evaluate the municipal master plan, and land use and zoning ordinances to determine what adjustments need to be made to allow the implementation of nonstructural stormwater management techniques, also called low impact development techniques.

This checklist, included in the New Jersey Best Management Practices (BMP) Manual, was prepared to assist municipalities in identifying the specific ordinances that should be evaluated, and the types of changes to be incorporated to address the requirements of the Stormwater Management Rules. It was used to review the Township of Bordentown's compatibility with the nonstructural stormwater management techniques, including the Township Master Plan and Ordinances:

Part 1: Vegetation and Landscaping

Effective management of both existing and proposed site vegetation can reduce a development's adverse impacts on groundwater recharge and stormwater runoff quality and quantity.

A. Preservation of Natural Areas

Municipal regulations should include requirements to preserve existing vegetated areas, minimize turf grass lawn areas, and use native vegetation.

Yes **No** Are applicants required to provide a layout of the existing vegetated areas, and a description of the conditions in those areas?

YES – Site plans, §25:506(B), Subdivisions, §25:(803,804), and Environmental Impact Statement §25:804(C).

Yes **No** Does the municipality have maximum as well as minimum yard sizing ordinances?

Minimum yard size only, per Code Section 400, district regulations.

Yes **No** Are residents restricted from enlarging existing turf lawn areas?

Yes No Do the ordinances provide incentives for the use of vegetation as filters for stormwater runoff?

Per Code Section 25:506(E)1, "Buffering", a buffer strip of 100 feet in width is required for developments abutting Crystal Lake, Crosswicks Creek and the Delaware River.

Yes No Do the ordinances require a specific percentage of permanently preserved open space as part of the evaluation of cluster development?

Per Planned Developments, Section 25:606(E)1, 40% of land shall be set aside for conservation, open space and/or recreation purposes .

B. Tree Protection Ordinances

Municipalities often have a tree ordinance to minimize the removal of trees and to replace trees that are removed. However, while tree ordinances protect the number of trees, they do not typically address the associated leaf litter or smaller vegetation that provides additional water quality and quantity benefits. Municipalities should consider enhancing tree ordinances to a forest ordinance that would also maintain the benefits of a forested area.

Yes No Does the municipality have a tree protection ordinance?

Section 25:506.8, "Tree Protection" in Township Code.

Yes No Can the municipality include a forest protection ordinance?

Not needed. Per Section 25:506.8(b), a Tree-Protection-Management Plan must be submitted for any site plan or subdivision where one (1) or more live trees are proposed to be cut or removed from the property.

Yes No If forested areas are present at development sites, is there a required percentage of the stand to be preserved?

C. Landscaping Island and Screening Ordinances

Municipalities often have ordinances that require landscaping islands for parking areas. The landscaping islands can provide ideal opportunities for the filtration and disconnection of runoff, or the placement of small LID-BMPs. Screening ordinances limit the view of adjoining properties, parking areas, or loading areas. Low maintenance vegetation can be required in islands and areas used for screening to provide stormwater quality, groundwater recharge, or stormwater quantity benefits.

Yes No Do the ordinances require landscaping islands in parking lots, or between the roadway and the sidewalk? Can the ordinance be adjusted to require vegetation that is more beneficial for stormwater quality, groundwater recharge, or stormwater quantity, but that does not interfere with driver vision at the intersections?

Landscaping is required for parking, loading areas and dwellings (Section 25:508(H)), but not for stormwater quality.

Yes No Is the use of bioretention islands and other stormwater practices within landscaped areas or setbacks allowed?

Not excluded per "Drainage", Section 25:502.

Yes No Do the ordinances require screening from adjoining properties? Can the screening criteria require the use of vegetation to the maximum extent practicable before the use of walls or berms?

Per "Buffering", Section 25:506E, per Subsection 2, buffering "...must be made on the basis of the identified local need".

D. Riparian Buffers

Municipalities may have existing buffer and/or floodplain ordinances that require the protection of vegetation adjacent to streams. Municipalities should consult existing regulations adopted by the Department to ensure that riparian buffer or floodplain ordinances reflect the requirements of the Department within these areas. The municipality should consider conservation restrictions and allowable maintenance to ensure the preservation of these areas.

Yes No Is there a stream buffer or floodplain ordinance in the community?

Section 25:605, "Flood Plain Areas" within Township Code.

Yes No Is the ordinance consistent with existing state regulatory requirements?

Ordinances are consistent with Federal Insurance Agency, NJDEP requirements.

Yes No Does the ordinance require a conservation easement, or other permanent restrictions on buffer areas?

No. However, as indicated previously, 100-foot wide buffer strips are required for any developments fronting Crystal Lake, Crosswicks Creek and the Delaware River.

Yes No Does the ordinance identify or limit when stormwater outfall structures can cross the buffer?

However, per Section 25:502(A), "Drainage", drainage systems must "outlet into an adequate water course or drainage system".

Yes No Does the ordinance give detailed information on the type of maintenance and/or activities that is allowed in the buffer?

Permitted uses in Flood Plain and Flood Fringe Areas are identified in Section 25:605(C) of the Township Code.

Part 2: Minimizing Land Disturbance

The minimization of disturbance can be used at different phases of a development project. The goal is to limit clearing, grading, and other disturbance associated with development to protect existing features that provide stormwater benefits. Zoning ordinances typically limit the amount of impervious surfaces on building lots, but do not limit the amount of area that can be disturbed during construction. This strategy helps preserve the site's existing hydrologic character, as well as limiting the occurrence of soil compaction.

A. Limits of Disturbance

Designing with the terrain, or site fingerprinting, requires an assessment of the characteristics of the site and the selection of areas for development that would minimize the impact. This can be incorporated into the requirements for existing site conditions and the environmental impact statement. Limits of disturbance should be incorporated into construction plans reviewed and approved by the municipality. Setbacks should be evaluated to determine whether they can be reduced. The following maximum setbacks are recommended for low impact development designs:

- front yard – 20 feet;
- rear yard – 25 feet; and
- side yard – 8 feet.

Yes **No** As part of the depiction of existing conditions, are environmentally critical and environmentally constrained areas identified? (Environmentally critical areas are areas or features with significant environmental value, such as steep slopes, stream corridors, natural heritage priority sites, and habitats of threatened and endangered species. Environmentally constrained areas are those with development restrictions, such as wetlands, floodplains, and sites of endangered species.)

Identification of critical areas are required in several places within the Township's Land Code, including Code Sections 25:803(B), 25:804(B), 25:804(C) (Environmental Impact Statements), as well as the Township's Land Development Checklists.

Yes **No** Can any of the existing setbacks be reduced?

Yes **No** Are there maximum turf grass or impervious cover limits in any of the setbacks?

Yes **No** Do the ordinances inhibit or prohibit the clearcutting of the project site as part of the construction?

Per Sections 25:804C3(c), minimizing or eliminating "vegetation destruction" must be provided.

Yes **No** Is the traffic of heavy construction vehicles limited to specific areas, such as areas of proposed roadway? Are these areas required to be identified on the plans and marked in the field?

Yes **No** Do the ordinances require the identification of specific areas that provide significant hydrologic functions, such as existing surface storage areas, forested areas, riparian corridors, and areas with high groundwater recharge capabilities?

Per EIS Section 25:804C2, "Site Description and Inventory.

Yes **No** Does the municipality require an as-built inspection before issuing a certificate of occupancy? If so, does the inspection include identification of compacted areas, if they exist within the site?

Chapter XIX of the Township's Revised General Ordinances.

Yes **No** Does the municipality require the restoration to compacted areas in accordance with the Soil Erosion and Sediment Control Standards?

All construction work is subject to Burlington County SCD standards.

B. Open Space and Cluster Development

Open space areas are restricted land that may be set aside for conservation, recreation, or agricultural use, and are often associated with cluster development requirements. Since open space can have a variety of uses, the municipality should evaluate its open space ordinances to determine whether amendments are necessary to provide improved stormwater benefits.

Yes **No** Are open space or cluster development designs allowed in the municipality?

As referenced in Section 25:606(B), "Single Family Clusters" and subsequent sections, including as referenced below. In addition, the 2002 Master Plan re-examination recommended open space set asides in residential districts.

Yes **No** Are flexible site design incentives available for developers that utilize open space or cluster design options?

Per Section 25:606(A)1, clusters are permitted in numerous residential zones (R-120, R-40, R-40S, R 30/R, R-30, R-20, and R-10) for properties that are 10-acres or more and have public water and sewer. In addition, the 2002 Master Plan recommended Transfer of Development Rights (TDR's) in the R-40S district to designated receiving areas with bonus density increase.

Yes **No** Are there limitations on the allowable disturbance of existing vegetated areas in open space?

Per Code Section 25:606(E)2(c), and the Master Plan, protection of buffers, floodplain, wetlands and trees is given high priority.

Yes **No** Are the requirements to re-establish vegetation in disturbed areas dedicated for open space?

Yes **No** Is there a maximum allowable impervious cover in open space areas?

Part 3: Impervious Area Management

The amount of impervious area, and its relationship to adjacent vegetated areas, can significantly change the amount of runoff that needs to be addressed by BMPs. Most of a site's impervious surfaces are typically located in the streets, sidewalks, driveway, and parking areas. These areas are further hampered by requirements for continuous curbing that prevent discharge from impervious surfaces into adjacent vegetated areas.

A. Streets and Driveways

Street widths of 18 to 22 feet are recommended for low impact development designs in low density residential developments. Minimum driveway widths of 9 and 18 feet for one lane and two lanes, respectively, are also recommended. The minimum widths of all streets and driveways should be evaluated to demonstrate that the proposed width is the narrowest possible consistent with safety and traffic concerns and requirements. Municipalities should evaluate which traffic calming features, such as circles, rotaries, medians, and islands, can be vegetated or landscaped. Cul-de-sacs can also be evaluated to reduce the radius area, or to provide a landscape island in the center.

Yes No Are the street widths the minimum necessary for traffic density, emergency vehicle movement, and roadside parking?

As per Section 25:515(A)5, "Streets" of the Township Code.

Yes No Are street features, such as circles, rotaries, or landscaped islands allowed to or required to receive runoff?

Runoff is not precluded from these areas as long as "adequate drainage system" is provided, per Section 25:502(A) of the Code.

Yes No Are curb cuts or flush curbs with curb stops an allowable alternative to raised curbs?

Section 25:515(B), "Curbs" does not require raised curbs. Curbing shall "be laid as approved in the manner approved by the Township".

Yes No Can the minimum cul-de-sac radius be reduced or is a landscaped island required in the center of the cul-de-sac?

Yes No Are alternative turn-arounds such as "hammerheads" allowed on short streets in low density residential developments?

Yes No Can the minimum driveway width be reduced?

Minimum driveway widths not specified.

Yes No Are shared driveways permitted in residential developments?

B. Parking Areas and Sidewalks

A mix of uses at a development site can allow for shared parking areas, reducing the total parking area. Municipalities require minimum parking areas, but seldom limit the total number of parking spaces. Table 1 shows recommendations for minimum parking space ratios for low impact design:

Table 1: Low Impact Development Parking Space Ratios

Use Parking Ratio per 1000 sq. ft. of Gross Floor Area
Professional office building Less than 3.0
Shopping centers Less than 4.5

Yes No Can the parking ratios be reduced?

Only if the Township Traffic Engineer deems existing parking ratios to be excessive.

Yes No Are the parking requirements set as maximum or median rather than minimum requirements?

However, Section 25:508.A.1(f) of the Code allows for 65% staged parking for development when all parking for a project is not immediately required..

Yes No Is the use of shared parking arrangements allowed to reduce the parking area?

Yes No Are model shared parking agreements provided?

Yes No Does the presence of mass transit allow for reduced parking ratios?

Yes No Is a minimum stall width of 9 feet allowed?

As per Section 25:508(A)5.

Yes No Is a minimum stall length of 18 feet allowed?

As per Section 25:508(A)5.

Yes No Can the stall lengths be reduced to allow vehicle overhang into a vegetated area?

Yes No Do ordinances allow for permeable material to be used in overflow parking areas?

Yes No Do ordinances allow for multi-level parking?

Yes No Are there incentives to provide parking that reduces impervious cover, rather than providing only surface parking lots?

Although paving is standard, Section 25:508(A)3 of the Township Code gives Planning and Zoning Board the option to approve alternate designs for Site Plan and Subdivision approvals.

Sidewalks can be made of pervious material or disconnected from the drainage system to allow runoff to re-infiltrate into the adjacent pervious areas.

Yes No Do ordinances allow for sidewalks constructed with pervious material?

Yes No Can alternate pedestrian networks be substituted for sidewalks (e.g., trails through common areas)?

Section 25:515(C) of the Code allows for "alternate plans proposed for the movement of people and bicycles", vs. sidewalks, for secondary collector and local streets in non-residential and "planned" residential developments.

In addition, the 2002 Master Plan re-examination cited the need for a "continuous pedestrian path/bikeway connecting the northern and southern portions of the Township".