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# **Pilesgrove Township Master Plan Stormwater Management Plan Element**

*Prepared for the:*  
Pilesgrove Township Planning Board  
1180 U.S. Route 40  
Pilesgrove, New Jersey 08098

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**Pilesgrove Township Master Plan  
Stormwater Management Plan Element**

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**1.0 INTRODUCTION**

In accordance with the recently adopted Municipal Stormwater Regulations (N.J.A.C. 7:14A-25), Pilesgrove Township is required to adopt a Municipal Stormwater Management Plan (MSWMP) that outlines the Township's strategy for addressing stormwater-related impacts. Pilesgrove is classified as a Tier B community which means that it must implement less stringent and extensive regulations than more developed communities.

This MSWMP contains all of the required elements described in the Stormwater Management Rules (N.J.A.C. 7:8) including stormwater design and performance standards for new major development. These standards are intended to minimize the adverse impact of stormwater runoff on water quality and water quantity and the loss of groundwater recharge that provides the base flow for receiving water bodies.

The MSWMP also contains the following:

- Describes stormwater management and surface water quality issues that are relevant to Pilesgrove Township;
- Describes the key design and performance standards that will be implemented in the Township Stormwater Management Ordinance in accordance with the Municipal Stormwater Regulations promulgated by the NJDEP;
- Describes long-term operation and maintenance measures for existing and future stormwater facilities;
- Conducts a "build-out" analysis based upon existing and proposed zoning regulations and land available for development to indicate the extent of potential stormwater run-off and pollutant loadings to the Township surface water system;
- Proposes changes to existing design standards to define when low impact development techniques are to be permitted or encouraged;
- Proposes a mitigation strategy for when a variance or exemption of the design and performance standards is sought;
- Describes other measures that will be pursued by the Township to improve stormwater management; and,
- Addresses Plan implementation strategies.

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**2.0 STORMWATER MANAGEMENT GOALS**

The goals of the Piles Grove Township Stormwater Management Plan are as follows:

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

To achieve these goals, the Piles Grove MWSWP will outline the following:

- Specific stormwater design and performance standards for new development;
- Stormwater management controls to address impacts from existing development.
- Preventative and corrective maintenance strategies to ensure long-term effectiveness of stormwater management facilities; and,
- Safety standards for stormwater infrastructure to be implemented to protect public safety.

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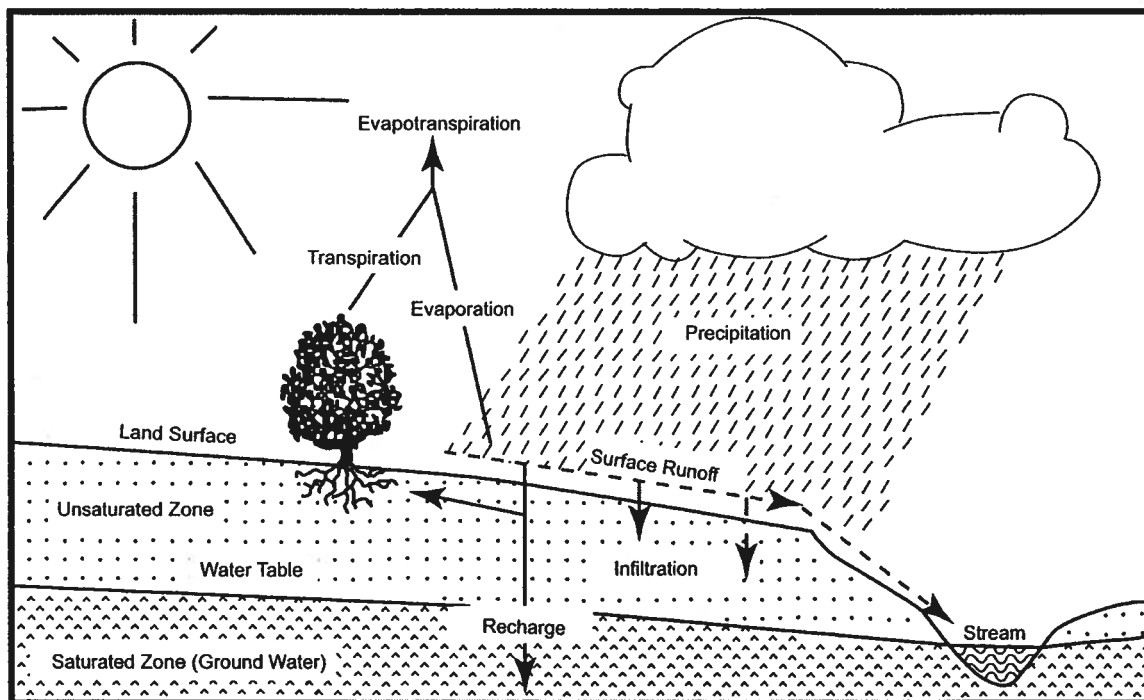
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**3.0 STORMWATER DISCUSSION**

**3.1 General**

Land development can dramatically alter the hydrologic cycle (See Figure 1) of a site and, ultimately, an entire watershed. Prior to development, native vegetation can either directly intercept precipitation or draw that portion that has infiltrated into the ground and return it to the atmosphere through evapotranspiration. Development can remove this beneficial vegetation and replace it with lawn or impervious cover, reducing the site's evapotranspiration and infiltration rates. Clearing and grading a site can remove depressions that store rainfall. Construction activities may also compact the soil and diminish its infiltration ability, resulting in increased volumes and rates of stormwater runoff from the site. Impervious areas that are connected to each other through gutters, channels, and storm sewers can transport runoff more quickly than natural areas. This shortening of the transport or travel time quickens the rainfall-runoff response of the drainage area, causing flow in downstream waterways to peak faster and higher than natural conditions. These increases can create new and aggravate existing downstream flooding and erosion problems and increase the quantity of sediment in the channel. Filtration of runoff and removal of pollutants by surface and channel vegetation is eliminated by storm sewers that discharge runoff directly into a stream.

*Figure 1  
Groundwater Recharge in the Hydrologic Cycle*



Source: New Jersey Geological Survey Report GSR-32.

Increases in impervious area can also decrease opportunities for infiltration which, in turn, reduces stream base flow and groundwater recharge. Reduced base flows and increased peak flows produce greater fluctuations between normal and storm flow rates, which can increase channel erosion.

Reduced base flows can also negatively impact the hydrology of adjacent wetlands and the health of biological communities that depend on base flows. Finally, erosion and sedimentation can destroy habitat from which some species cannot adapt.

Land development can also result 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 also 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.

Therefore, land development can have an adverse impact on stormwater runoff patterns and surface water quality. The purpose of this management plan is to outline a process to address these concerns and to achieve the plans' goals and objectives.

### **3.2 Relevant Local Issues**

One issue in agricultural communities such as Piles Grove is that the run-off from agricultural areas varies depending upon the type of farm and the time of year. Cropland may generate substantial run-off at certain times of the year after being tilled but considerable less runoff when a stable cover crop has been established. Land developers often calculate run-off from agricultural areas using runoff coefficients that are appropriate for disturbed lands to demonstrate that the run-off from residential development is less even without any structural or non-structural stormwater management measures. Piles Grove Township intends to require developers to use coefficients that are representative of stable agricultural conditions and to apply best stormwater management practices when it is feasible to reduce the quantity or improve the quality of the run-off even when it can be established that residential conditions do not aggravate existing runoff conditions.

Piles Grove Township is also concerned about the potential runoff from agricultural operations such as wholesale nursery operations that require permanent or temporary structures. These "high intensity land cover" agricultural operations will be permitted under a conditional use provision to ensure that stormwater runoff quality and quantity is being properly managed. The intent of the conditional use provision is not to discourage this type of agriculture but rather to ensure that the potential impacts are being addressed.

As a rural community, Piles Grove Township is very concerned about the long-term maintenance responsibilities for stormwater management facilities. The Township has limited resources and does not intend to accept responsibility for the maintenance of basins and infiltration systems. In this regard, the Township supports the establishment of Homeowners Associations to maintain and repair stormwater management systems for each major development. The Township will also require that it have the ability, but not the obligation, to take action if stormwater management facilities are not being properly maintained and to assess the members of the association for any costs incurred by the Township. To prevent any township involvement or intervention, it is imperative that proposed developments have an approved Stormwater Management Maintenance Plan (SMMP) that contains maintenance, inspection, and financial planning components in accordance with this Plan.

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**4.0 BACKGROUND**

**4.1 Community Characteristics**

Pilesgrove Township is located in the north-central part of Salem County, New Jersey. The Township encompasses a 35 ± square mile area on the rural fringe of the Philadelphia metropolitan area. The Township surrounds the Borough of Woodstown that is a designated rural town center in the State Development and Redevelopment Plan (the “SDRP”).

Pilesgrove has experienced moderate growth over the last 20 years. According to the U.S. Census, the Township’s population in the year 2000 was 3,923 persons, which represented a 20% increase over the 3,250 persons recorded by the 1990 Census. The Census further indicates that the population of Pilesgrove has more than doubled since 1950 when the Township had only 1,942 residents. In contrast, the population of Salem County has been virtually stagnant over the last 20 years. The County’s population in 2000 of 64,285 persons was actually lower than that recorded in 1980.

The residential land development pressures in Pilesgrove Township have increased significantly over the last five years as the land available for development in the communities that are more proximate to regional growth centers is being exhausted. The recent adoption of Highlands Protection legislation to protect the extreme northern part of New Jersey has also caused land developers to re-focus on southern New Jersey. Recent land speculation and subdivision activity may be indicative of the imminence of substantive change in this municipality.

Much of the land development to dated in the Township has been dispersed on large lots. However, it is anticipated that developers will be pursuing larger scale developments to take advantage of the strong real estate market. Since the Township is not prepared to manage or maintain detention basins or other stormwater management facilities, it has been requiring the establishment of Homeowners Associations to manage stormwater control measures.

Pilesgrove Township remains a strong agricultural community. Approximately 70% of the Township is qualified farmland under the Farmland Assessment Act. In addition, the community has initiated an extensive farmland preservation program.

**4.2 Surface Water Resources**

Figure 2 illustrates the primary permanent watercourses in the Township and their watersheds. These watersheds are defined by a 14 digit code under the hydrologic unit classification (HUC) system of the NJDEP. Most of the Township is within the Salem River watershed. The northern tier of the Township is within the Oldmans Creek watershed. The extreme southeastern corner of the township is within the Alloways Creek watershed.

Figure 3 is a USGS quadrangle map that illustrates the location of the Township within the region. As the Figure indicates, the major routes in the Township are State highways 40 and 45 that intersect in the center of the Borough of Woodstown.

Figure 4 is a generalized topographic map of the Township. The color bands depict twenty-foot contour intervals and demonstrate that land elevations range from a high of 170 mean sea level (MSL) in the northeastern corner to a low of about 10 MSL in the southwestern corner of the Township. Figure 4



also indicates that the Township has gently rolling topography to the east of Woodstown and generally flat topography to the west of Woodstown and that the Township has very limited steep slopes. The only slopes in excess of 10% are found along the Oldmans Creek corridor. Figure 4 also clearly indicates the drainage divide between the Oldmans Creek and Salem River watersheds.

### **4.3 Surface Water Quality**

#### **4.3.1 Ambient Biomonitoring Network (AMNET)**

The New Jersey Department of Environmental Protection (NJDEP) has established an Ambient Biomonitoring Network (AMNET) to document the health of the state's waterways. There are over 800 AMNET sites throughout the state of New Jersey. These sites are sampled for benthic macroinvertebrates by NJDEP on a five-year cycle. Streams are classified as non-impaired, moderately impaired, or severely impaired based on the AMNET data. The data is used to generate a New Jersey Impairment Score (NJIS), which is based on a number of biometrics related to benthic macroinvertebrate community dynamics. The AMNET monitoring locations in Pilesgrove Township are shown on Figure 2 and the impairment score for each location is shown in Table 1.

*Table 1  
Pilesgrove Township  
AMNET Monitoring Stations (1995; 2001)*

<b>Station No.</b>	<b>Location</b>	<b>Impairment Score (1995-96)</b>	<b>Impairment Score (2001)</b>	<b>Habitat Value</b>
AN0687	Oldmans Creek, Harrisonville Lake Road Pilesgrove Township	18; Moderately Impaired	21; Moderately Impaired	186; Optimal habitat
AN0688	Oldmans Creek, Kings Highway Pilesgrove Township	18; Moderately Impaired	12; Moderately Impaired	145; Sub-Optimal
AN0689	Oldmans Creek, Pointers-Auburn Road Oldmans Township	12; Moderately Impaired	6; Severely Impaired	160; Optimal
AN0690	Salem River; Commissioners Pike Upper Pittsgrove Township	9; Moderately Impaired	12; Severely Impaired	163; Optimal
AN0691	Salem River; Memorial Lake Outlet; Woodstown;	6; Severely Impaired	15; Moderately Impaired	147; Sub-Optimal
AN0692	Nichomus Run; Route 45 Pilesgrove Township	6; Severely Impaired	15; Moderately Impaired	138; Sub-Optimal
AN0693	Salem River; Kings Highway Pilesgrove Township	12; Moderately Impaired	12; Moderately Impaired	135; Sub-Optimal
AN0694	Majors Run; Sharptown-Auburn road Pilesgrove Township	6; Severely Impaired	0; Severely Impaired	94; Marginal
AN0695	Two Penny Run; East Quilleytown Road; Carney's Point Township	15; Moderately Impaired	15; Moderately Impaired	126; Sub-Optimal

In general, the AMNET monitoring data indicates that the major waterways in the Township are moderately to severely impaired. Table 1 also indicates changes in the characterizations since 1995. Certain segments have improved while others have been degraded. Majors Run is the only station that has consistently been rated as severely impaired. This tributary of the Salem River is located along the Township's southern boundary near Sharptown.

The AMNET data also includes a qualitative habitat assessment based on an evaluation of the condition of the stream habitat. As shown in Table 1, three locations in the Township were determined to have optimal habitat value, four locations were determined to have sub-optimal value, and one location (Majors Run) was determined to have marginal value.

The fact that there are three severely impaired sites within or immediately adjacent to Pilesgrove Township is of concern. These sites include Majors Run, Salem River at Commissioners Pike, (upgradient) and Oldmans Creek at Pointers-Auburn Road (down-gradient).

Pilesgrove Township is located in Watershed Management Area (WMA) 17. Within this WMA, 25% of the AMNET monitoring stations were non-impaired, 66% were moderately impaired, and 8 % were severely impaired. It should be noted that the percentage of non-impaired sites in WMA 17 was higher and the percentage of severely impaired sites was lower than any of the other watershed management areas along the Delaware River.

Two sediment toxicity tests were conducted in the Township on Majors Run and Nichomus Run. Neither test demonstrated acute toxicity conditions.

#### **4.3.2 Ambient Surface Water Monitoring (ASWM)**

The NJDEP also maintains three Ambient Surface Water Monitoring locations that monitor the conditions of the watercourses in Pilesgrove Township. These monitoring stations are located on the Salem River at Woodstown, on Majors Run at Sharptown, and on Two Penny Run near Dancer's Corner in Carney's Point. The results of the monitoring data indicate that the Salem River at Woodstown and Major's Run at Sharptown are attaining all of the water quality parameters except for fecal coliform and phosphorus. Two Penny Run is reportedly attaining the criteria for dissolved oxygen and ammonia but has been determined to be impaired for fecal coliform and phosphorus. Insufficient data is available at this location to assess the status of various other water quality parameters.

#### **4.3.3 Sublist 5 of Integrated List**

The NJDEP is required under the Clean Water Act to submit the New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) including the Integrated List (303(d)) on a biennial basis to the EPA. This combined report is a valuable source of water quality information since it 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 total maximum daily load limits (TMDLs) are needed.

Table 2 contains the 2004 Integrated List of locations within, or proximate to, Pilesgrove Township. This Table indicates the water quality problems in the Township and their priority ranking. The highest ranked conditions are the fecal coliform problems at the Four Seasons Campground and along Majors Run and the high mercury levels reported for Memorial Lake based on fish tissue sampling. The medium priority problems are the elevated phosphorus levels in certain segments of Oldmans Creek, Salem River, and Majors Run. The low priority ranking relates to the benthic macroinvertebrates problems listed in Table 1.

**Table 2**  
**Pilesgrove Township**  
**2004 Integrated List (Sublist 5) with Priority Ranking**

Station No.	Location	Impairment	Priority	Data source
	Four Seasons Campground Pilesgrove	Fecal Coliform	High	Salem County HD
AN0688	Oldmans Creek, Kings Highway Pilesgrove/Woolwich	Benthic Macroinvertebraes	Low	NJDEP AMNET
EWQ0689	Oldmans Creek, Pointers-Auburn Road Oldmans	Phosphorus	Medium	EWQ
EWQ0689	Oldmans Creek, Pointers-Auburn Road Oldmans	Total Suspended Solids		EWQ
AN0690	Salem River; Commissioners Pike Upper Pittsgrove	Benthic Macroinvertebraes	Low	NJDEP AMNET
01482500	Salem River; Memorial Lake Woodstown	Phosphorus	Medium	NJDEP/USGS Data
01482500	Salem River; Memorial Lake Woodstown	Mercury	High	Tissue Monitoring
AN0693	Salem River; Kings Highway Pilesgrove Township	Benthic Macroinvertebraes	Low	NJDEP AMNET
AN0694	Majors Run; Sharptown-Auburn Road Pilesgrove Township	Benthic Macroinvertebraes	Low	NJDEP AMNET
01482530	Majors Run; Sharptown-Auburn Road Pilesgrove Township	Fecal Coliform	High	NJDEP/USGS Data
01482530	Majors Run; Sharptown-Auburn Road Pilesgrove Township	Phosphorus	Medium	NJDEP/USGS Data

#### **4.3.4 Proposed Total Maximum Daily Loads (TMDLs)**

The NJDEP is required to develop a Total Maximum Daily Load (TMDL) for the specified pollutants for each impaired waterway. These TMDLs will address the elevated phosphorus at Memorial Lake and the elevated fecal coliform levels on Majors Run and the upper reaches of the Salem Creek. It is not clear whether a TMDL will be pursued for the high mercury levels in the fish at Memorial Lake.

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

### **TMDL for Phosphorus**

There are two TMDLs that have been proposed by the NJDEP that impact Pilesgrove Township. In April of 2003, the NJDEP proposed a TMDL for Phosphorus to address 13 eutrophic lakes in the Lower Delaware region. Two of these lakes are Memorial Lake in Woodstown and Harrisonville Lake along the Pilesgrove Township boundary with South Harrison. Phosphorus is the pollutant of concern for the TMDL since it is the nutrient that is primarily responsible for overfertilization of inland lakes leading to eutrophication. Phosphorus sources are characterized on an annual scale (kg TP/yr) since long term pollutant loadings are more critical to overall lake water quality than the load at any particular time.

While Memorial Lake is located outside of the Township, about 50% of the Salem River watershed that feeds the lake is within Pilesgrove Township. The 22 acre lake has an average depth of four feet. Because the lake has such a large drainage area (9,300 acres), it has been classified by the NJDEP as a "rapidly flushing system". The mean detention time is reported to be 1.5 days. The NJDEP has indicated that there are no known point sources to Memorial Lake but "agricultural runoff specifically from livestock may be significant".

Harrisonville Lake is an 18 acre impoundment along Oldmans Creek that is owned by the New Jersey Division of Fish and Wildlife. According to the NJDEP, the lake has developed a severe eutrophication problem over the last 20 years that progressively worsens in the late summer. An analysis of this lake has determined that the lake has a mean depth of 3.1 feet and a hydraulic residence time of 1.9 days. As with Memorial Lake, the lake shed to lake surface ratio is very high (over 300 to 1). The total amount of unconsolidated sediments was estimated to be over 45,000 cubic yards.

Runoff from land surfaces comprises most of the point and non-point sources of phosphorus into lakes. The NJDEP has estimated the breakdown of the current phosphorus loads by applying export coefficients to land cover information. The breakdown in the relevant lakes is as follows:

**Table 3**  
**NJDEP TMDL for Phosphorus**  
**Estimated Land Cover Sources**

<b>Land Use Loadings</b>	<b>Memorial Lake</b>			<b>Harrisonville Lake</b>		
	<b>Acres</b>	<b>Kg/Yr</b>	<b>Percent</b>	<b>Acres</b>	<b>Kg/Yr</b>	<b>Percent</b>
Medium density residential	22.8	14.7	0.3	9.8	6.3	0.3
Low density rural residential	485	137	3	567	161	7
Commercial	62.2	50.4	1	8.7	7	0.3
Industrial	73.9	50.9	1	4.3	3	0.1
Mixed urban	185	74.9	2	61.1	24.7	1
Agricultural	6,530	3,970	91	2,780	1,690	77
Forest wetlands water	1,930	78.1	2	2,170	88	4
Barren land	20.7	4.2	0.1	23.2	4.7	0.2
Septic systems					157	8
Internal load					5.2	0.2
Natural loads	21.7	0.6	0.01	18	0.5	0.02
<b>Totals</b>	<b>9,340</b>	<b>4,380</b>	<b>100</b>	<b>5,640</b>	<b>2,210</b>	<b>100</b>

The current average Total Phosphorus influent is 0.175 mg/l to Memorial Lake and 0.168 mg/l to Harrisonville Lake. The target average influent for both lakes is 0.025 mg/l. The current steady state condition of 0.141 mg/l for Memorial Lake and 0.133 mg/l for Harrisonville Lake must be reduced to a steady state concentration of 0.03 mg/l to avoid exceeding the 0.05 mg/l total phosphorus water quality criterion. The overall TP load reduction for Memorial Lake is 86% and for Harrisonville Lake 85%.

The NJDEP intends to achieve these reductions through a variety of means including the implementation of the stormwater management regulations, the development of lake restoration plans, and the development of various nonpoint source control measures.

#### **TMDL for Fecal Coliform**

In April of 2003, the NJDEP also proposed a TMDL for fecal coliform to address 27 streams in the Lower Delaware Water region. The stream segments identified included the Salem River at Woodstown, the Salem River at Courses Landing and Two Penny Run near Dancer's corner. The watersheds for each of these stream segments includes a portion of Pilesgrove Township.

The TMDL indicates that nonpoint and stormwater point sources are the primary contributors to fecal coliform loads in these streams. These sources include "storm-driven loads transporting fecal coliform from sources such as geese, livestock, and domestic pets to receiving waters as well as failing sewage conveyance and inappropriately located or designed septic systems. Publicly owned treatment works (POTWs) are not believed to be a source of fecal coliform since these systems are required to use disinfection to achieve discharge limitations. Treatment plants should only be a significant source of fecal coliform due to substantive equipment malfunctions.

The options available to control nonpoint sources of fecal coliform typically include wildlife (goose) management, pet waste ordinances, agricultural conservation management plans, and septic system maintenance and replacement. Detailed water modeling is needed to determine the effectiveness of these control measures.

The NJDEP is proposing to establish wasteload allocations (WLAs) for all NJPDES regulated point sources (including regulated stormwater) and Load Allocations (LAs) for all nonpoint sources that are not regulated by the NJDEP. The proposed TMDL indicates that an 84% reduction will be needed in both the wasteload allocation and load allocations to achieve the fecal coliform water quality criterion.

The key to reducing fecal coliform levels is understanding the potential sources in the Township and matching the implementation of specific strategies to address these sources. Because of the presence of numerous livestock and horse farms within the Salem River watershed, attention will need to be focused on the implementation of conservation, management plans and best management practices. There are several programs to assist the farmer in implementing improved management practices including the Environmental Quality Incentive Program (EQIP), the Conservation Reserve Program (CRP), the State Conservation Cost-Sharing Program and the Soil & Water Conservation Cost-Sharing Program under the voluntary farmland preservation program.

#### **4.4 Groundwater Recharge**

Figure 5 is a map of the groundwater recharge areas in the Township. This figure color codes the surficial soils in the Township based on the permeability rate. The figure illustrates that recharge rates are the highest along the western, northern, and eastern portions of the Township and are the lowest in and around Woodstown in the center of the Township. Figure 5 also indicates the location of public wells in and around the Township. The NJDEP has not defined any wellhead protection areas in the Township

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**5.0 DESIGN AND PERFORMANCE STANDARDS**

Pilesgrove 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 and water quantity and loss of groundwater recharge in receiving water bodies. The design and performance standards include the language for maintenance of stormwater management measures consistent with the stormwater management rules at N.J.A.C. 7:8-5.8 Maintenance Requirements, and language for safety standards consistent with N.J.A.C. 7:8-6 Safety Standards for Stormwater Management Basins. The ordinances will be submitted to the county for review and approval within one year of the adoption of this plan. A draft ordinance is presented in the Appendix to this Stormwater Management Plan. The key performance standards are as follows:

**5.1 Stormwater Pollutant Removal Criteria.**

Pilesgrove Township will require all major developments that create at least 0.25 acres of new or additional impervious surfaces to utilize stormwater management measures that will reduce total suspended solids (TSS) in the Site's post-construction run-off by 80 percent. The stormwater management measures must also reduce nutrient loads in the post-construction run-off to the maximum extent feasible since nitrogen and phosphorus are critical water quality components of non-point source pollution. The structural or nonstructural stormwater management measures shall be designed to reduce the average annual TSS and nutrient loadings based on a defined water quality design storm of 1.25 inches/2 hour variable rate rainfall event.

**5.2 Groundwater Recharge Criteria.**

Pilesgrove Township will require that all major land development be designed to demonstrate that the stormwater management measures maintain 100% of the average annual pre-construction groundwater recharge volume for the site or demonstrate that the increase in stormwater runoff from pre-construction to post-construction for the 2 year storm will be infiltrated.

**5.3 Stormwater Quantity Runoff criteria.**

Pilesgrove Township will require proposed all major land development projects to demonstrate that the post-construction runoff hydrographs for the 2, 10, and 100 year storms do not exceed at any point in time based on the pre-construction runoff hydrographs for the same storm events; demonstrate that there is no increase in the peak runoff rates of stormwater leaving the site for 2, 10, and 100 year storm events and that the increased volume or change in timing will not increase flood damage at or downstream of the site; and demonstrate that the implementation of stormwater management measures will reduce the post-construction run-off rates for the 2, 10, and 100 year storm events by 50, 75, and 80 percent respectively.

**5.4 Compliance**

During construction, Township inspectors will observe the construction of the project to ensure that the stormwater management measures are constructed and function as designed. After construction, the Township will require the submission of annual reports from the responsible parties to ensure that the stormwater system is being maintained and repaired.

*Pilesgrove Township Master Plan*  
*Stormwater Management Plan Element*

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**6.0 NONSTRUCTURAL STORMWATER MANAGEMENT STRATEGIES**

**6.1 Township Master Plan Revision**

Pilesgrove Township has recently adopted an updated Land Use Plan Element, a Conservation and Recreation Plan Element, a Farmland Preservation Plan Element, and a Housing Plan Element. The Township will be completing other master plan elements over the next two years. In addition, the Township Planning Board and Township Committee will be revising the Township Land Use Ordinance to reflect changes in these master plan elements as well as to incorporate appropriate nonstructural elements. There are numerous recommendations in the recent Master Plan revision that are consistent with the objectives of the Stormwater Management Regulations.

**6.2 Township Land Use Ordinance**

Chapter 145 of the Township Code, entitled the Land Development Ordinance of the Township of Pilesgrove has been reviewed with regard to incorporating nonstructural stormwater management strategies. A list of the sections in the Land Development Ordinance that need to be modified have been identified below. Once the ordinance revisions are completed, they will be submitted to the County review agency for review and approval.

**6.3 District Regulations**

Several changes are proposed to Article IV of the Township Code entitled “District Regulations” to reflect the changes from the adopted Master Plan elements. These changes are summarized below:

Agricultural buffers. The adopted Land Use plan recommends that the Land Development Ordinance require the establishment of agricultural buffers around residential development. These buffers will not only separate the uses but will also function as a visual and dust barrier. The buffers may also help filter agricultural runoff that enters a development site in a sheet pattern.

Conservation Zoning District. The adopted land use plan recommends that the Land Development Ordinance be amended to establish a separate Conservation zoning district that will consist of potential wetlands based on GIS mapping or delineated wetlands verified by the NJDEP. The Conservation zoning district will be a curvilinear overlay district consisting of wetlands related to permanent streams. The import of this planning approach is to require that land development satisfy lot size, setback, and other bulk requirements exclusive of wetlands. The proposed Conservation zoning district will help ensure that wetlands are preserved.

Impervious Cover. Pilesgrove Township currently has a maximum building and impervious cover limitation for most of its zoning districts. In many cases, the standard is too high to encourage the use of pervious cover materials or efficient land planning. Therefore, the building and impervious cover standards will be reviewed for each zoning district and revised to allow compact well-designed development. In the event that variances need to be granted, the Planning Board would have the option of requiring mitigation for the excess coverage. The current and proposed impervious cover standards are shown below:

**Table 4**  
**Pilesgrove Township**  
**Existing/Proposed Impervious Cover Standards**

Planning District	Land Use	Existing Building Coverage	Proposed Building Coverage	Existing Lot Coverage	Proposed Lot Coverage
AR, RR	Farms	Unregulated	4%	Unregulated	5%*
AR, RR	Dwellings	10%	4%	15%	5%
SR	Dwellings	10%	8%	15%	12%
VN	Dwellings	15%	15%	25%	22.5%
CC	Retail			55%	55%
HC	Retail			55%	55%
LM	Industrial			50%	50%

*\*Proposed conditional use permit for agricultural operations in excess of 5%*

The Township is proposing to reduce the maximum allowable impervious cover for each zone. In the event that a developer is given a variance to exceed the maximum allowable percent imperviousness, the developer would be required to mitigate the impact of the additional impervious surfaces in accordance with this Stormwater Management Plan (see Section 10.0).

Minimum Off-street parking Requirements The district regulations establish the minimum parking space requirements for particular uses based on the type and number of dwelling units and/or gross floor area. This section will be amended to allow a developer to demonstrate that fewer parking spaces would be required provided that the area needed for the additional spaces is set aside. This concept is often referred to as “landscaped parking” and would allow the Township to require the additional parking if warranted by site conditions in the future. This section will also be amended to allow shared parking when it is demonstrated that adjacent uses compliment each other.

Minimum Buffer Requirements. The district regulations require the establishment of buffers between commercial uses and between commercial and residential uses. These buffer requirements will be amended to require more effective buffers between uses and to encourage the use of buffer areas for stormwater management provided that these measures will enhance rather than detract from the purposes of the buffer.

#### **6.4 General Provisions and Design Standards**

Several changes will be considered to Article V of this Chapter, entitled “General Provisions and Design Standards” to incorporate nonstructural management measures. While a comprehensive review will be undertaken of the Ordinance, several key sections are discussed below:

Section 145-24 Drainage outlines the stormwater management design principles of the Township. These design standards need to be updated to conform to Residential Site Improvement Standards (RSIS) and the Stormwater Management Regulations. In addition, this section currently indicates that nonstructural means of controlling surface runoff are permitted when determined to be feasible and adequate by the Township Engineer. This section will be changed to more clearly establish when nonstructural measures may be employed and the types of measures that are being encouraged in the Township. The Township’s site design preferences for residential development are as follows:



### Conveyance

- The Township prefers the use of curbing along residential streets since it stabilizes the edge of the road, controls traffic movement, directs stormwater runoff, and creates a superior residential appearance;
- Where curbing is not utilized, roadside swales are permitted provided that the entire swale is within the public right-of-way or the entire swale is within a utility easement owned and maintained by a Homeowner's Association; When the latter option is selected, the roadside drainage easement shall be exclusive of lot area and setback requirements;
- Swales within defined drainage easements will be permitted away from the roadside condition to convey stormwater to the control facilities when certain conditions are satisfied.
- The use of pipes under driveways is discouraged in major developments;

### Detention Facilities

- The Township will require that run-off coefficients for pre-developed farmland conditions be based on the best land cover condition (cover crop stabilization) rather than disturbed conditions to ensure that land development will not increase surface water runoff at any time of the year;
- The Township prefers infiltration basins over conventional detention basins to maximize groundwater recharge;
- The Township prefers detention basins compared to bio-detention systems since detention basins are more easily monitored and maintained;
- The Township supports the use of bio-detention swales prior to detention basins as a means of promoting infiltration and the filtration of suspended solids. Bio-detention swales should be used in offline applications rather than positioned in the front yard of residences.
- The Township will permit the use of wet ponds when they are properly designed to ensure infiltration, aeration and to prevent mosquitoes.
- Constructed stormwater wetlands would be permitted where flow rates do not justify a basin and where these systems are properly designed to avoid mosquito infestations.
- The Township does not support the use of pervious pavement due to concerns about long-term durability and clogging.
- The use of dry wells will only be permitted when all of the potential drawbacks are adequately addressed by the design engineer including potential impacts to basements and septic systems, the need for an overflow connection to the storm water conveyance system and the designation of a management entity;

### Water quality

- The Township encourages the use of vegetated filter strips to control the quality of the runoff in sheet flow conditions.
- The Township encourages the use of forebays and extended basins to achieve water quality objectives;
- The Township will accept the use of manufactured filtration devices where it is demonstrated that the devices are reliable and can be easily maintained;

The above-cited principles will be included in a revised Drainage section and will be the basis of the development review process.

Section 145-25 Fences, Walls and Sight Triangles shall be revised to indicate whether stormwater management facilities need to be enclosed by fencing. The Township has in the past required fencing of stormwater detention basins that has made them appear more utilitarian in nature. In recent years, fencing has not been required provided that the basins are designed in accordance with the RSIS safety standards. The Township policy will be clarified to require fencing only in specific circumstances.

Section 145-28 Natural Features and Landscaping requires that natural features be preserved whenever possible. This section will be revised to protect existing filter strips and to encourage the development of filter strips when sheet runoff from agricultural areas enters a residential development site or vice versa. This section will be reviewed to ensure that it emphasizes the need for developers to preserve and protect important natural resources (i.e., trees, brooks, swamps, natural drainage corridors, hilltops, and views) whenever possible.

Section 145-28D: This section requires the planting of a minimum of ten (10) shade trees per acre of gross tract area. This section will be amended to require developers to provide eight (8) trees per lot in the front and side yards provided that they satisfy the landscaping and buffering performance standards of the ordinance.

Tree Preservation. The Natural Features section will be amended to further restrict and control the removal of mature trees throughout the Township. The preservation of mature trees and forested areas is a key strategy in the management of environmental resources. Unless required by site grading, tree clearing on wooded sites will be limited to 20 feet beyond the driveway and building footprint. This requirement complies with minimizing land disturbance, which is a nonstructural stormwater management strategy. In the event that tree clearing is determined to be unavoidable, developers will be required to mitigate the loss of the woodlands by transplanting trees or planting replacement trees of substantive size.

Section 145-27 Lot Configuration. The Township requires that stormwater management facilities be located on separate lots. This section will be amended to allow irregular shaped lots designed specifically for stormwater management facilities. These basin lots often have minimal road frontage. This section will be amended to eliminate the need for frequent bulk variance requests for basin lots provided that access is suitable for site maintenance purposes.

Section 145-29: Nonconforming Uses, Structures or Lots requires a variance for existing single family homes proposing additions that exceed the maximum percent impervious. The section will be modified to require the homeowner to mitigate the impact of the additional impervious surfaces unless the stormwater management plan for the development provided for this increase in impervious surfaces. This

mitigation effort must address water quality, flooding, and groundwater recharge as described in the Stormwater Management Plan.

Section 145-30 Off-street parking, loading areas, and driveways All paved parking lots and loading areas are required to be curbed. This section will be amended to allow for curb cuts when this provision would result in the discharge of impervious areas into landscaped areas for stormwater management. This section will also be amended to allow for the use of natural vegetated swales for the water quality design storm with overflow for larger storm events into storm sewers. This section will also be amended to allow pervious paving for overflow parking in low impact uses.

Section 145-30A Landscaping requires buffer areas consisting of landscaped berms between any non-residential development and any street or lot line. The buffer requirement will be extended to require landscaped berms or similar buffering techniques along all collector roads for major residential development as well. In addition, this section currently requires one parking space per 30 parking spaces to be landscaped within large parking areas. This section will be amended to require one parking space per 10 spaces to be dedicated to landscaped islands or medians. The language of this section will also be amended to encourage the use of native vegetation, which requires less fertilization and watering than non-native species. In addition, language will be added to allow buffer areas to be used for stormwater management by disconnecting impervious surfaces and treating runoff from these impervious surfaces.

Section 145-31: Performance Standards for all Uses prohibits materials or wastes to be deposited upon a lot in such form or manner that they can be transferred off the lot, directly or indirectly, by natural forces such as precipitation, evaporation or wind. It also requires that all materials and wastes that might create a pollutant or a hazard be enclosed in appropriate containers. This section will be reviewed to determine if the performance standards need to be refined to achieve the stormwater management goals. In particular, the open storage of bulk materials, such as salt, that can impact water quality will be addressed.

Section 145-35...Streets, Curbs, sidewalks and street trees describes the requirements for street design and construction in the Township. The Township standards will be revised to conform to RSIS. In addition, the street design standards will be revised to reflect the objectives of this Stormwater Management Plan and to reconcile these objectives with the Township's site design policies.

The minimum right-of-way widths will be revised to conform to RSIS. The Ordinance will clarify that all stormwater facilities along public roads shall either be entirely within the public right-of-way or entirely within an easement dedicated to a Homeowners Association. The Township prefers that swales be maintained by the Homeowners Association. In the event that stormwater conveyance facilities are located within the right-of-way, the Township will accept responsibility for the inspection, maintenance and repair of these conveyance facilities. In the event that the stormwater conveyance facilities are located outside of the right-of-way, the Homeowners Association will be entirely responsible for the inspection, maintenance and repair of the conveyance facilities. In the latter case, the Township will have the ability, but not the obligation, to undertake maintenance activities if the approved Stormwater Management Maintenance Plan (SMMP) is not being followed and in that event, to charge the Homeowners Association for all costs incurred by the Township.

Whenever the Township allows the use of roadside swales within easements in single-family detached residential development, the ordinance will require that these easements not be included in the minimum lot size requirement since the swales will serve a public road drainage function. This provision will ensure that residential lots will be unencumbered by drainage easements along the road and will encourage the use of more land efficient conveyance methods.

The ordinance will also prohibit stormwater control facilities such as bio-detention swales within the public right-of-way. All stormwater control facilities must be located on separate lots owned and maintained by the Homeowners Association. This provision will ensure that bio-detention facilities are used in offline applications rather than along the street.

The RSIS specifies the minimum width of residential streets. The Township is concerned about the adequacy of the minimum road width requirement for vehicular, pedestrian and bike usage particularly when curbing is not used for road edge stabilization. Therefore, the ordinance will encourage either cartways that are capable of serving all forms of transport or separate sidewalk/bikeways from the roadway. This section will also be amended to encourage developers to restrict on-street parking to allow for maximum usage of the public roadways.

This section will also be amended to specify the minimum radius of different cul-de-sac designs such as cul-de-sacs with landscaped islands and cul-de-sacs with flush curbs and reinforced shoulders to accommodate larger equipment and emergency vehicles.

Section 145-35C: Sidewalks describes the sidewalk requirements for the Township. This section will be revised to conform to the Residential Site Improvement Standards (RSIS). The Township believes that sidewalks should either be provided or the public roadway should be designed to be capable of supporting safe pedestrian movements. The Township will require sidewalks wherever warranted by the site conditions such as the probable volume of pedestrian traffic, the development's location in relation to other populated areas and high vehicular traffic, the need for pedestrian access to bus stops, schools, parks, and other public places, and the general type of improvement intended indicate the advisability of providing a pedestrianway.

Sidewalks are to be a minimum of four feet wide and constructed of concrete. However, the ordinance does allow the use of bituminous concrete sidewalks in rural areas. The ordinance will be amended to require developers to design sidewalks to discharge stormwater to neighboring lawns or swales where feasible to disconnect these impervious surfaces.

Section 145-35B: Curbs and Gutters requires that concrete curb and gutter be provided along all proposed streets. This section will be amended to conform to RSIS. The Township supports the use of Belgian block curbing in major residential developments wherever permitted by RSIS and/or warranted by site conditions. This section will be amended to allow for curb cuts to allow vegetated swales to be used for stormwater conveyance and to allow the disconnection of impervious areas.

Section 145-39 Conditional Uses Specified includes a provision for *intensive fowl or livestock farms* that requires proper waste management. This provision will be reviewed and if necessary refined. In addition, a new section will be established for *intensive land cover farms* to ensure that agricultural operations that exceed the impervious cover standard on a permanent or temporary basis make adequate provision for the stormwater management. A conditional use permit will be required for agricultural operations that exceed the 5% maximum impervious coverage standard by demonstrating that the facility will make adequate provision to control stormwater runoff.

Section 145-41 Planned Developments. This section currently provides for a cluster option in the agricultural district, age restricted residential development in one portion of the SR district, and planned industrial development in the LM district. This section will be amended to encourage cluster development in certain situations in the AR district, to encourage clustering throughout the SR district, and to encourage planned industrial development in a new PLI district. The objective of all of these planned development options is to preserve land for public and agricultural purposes, to prevent development on environmentally sensitive areas, and to aid in reducing the cost of providing streets, utilities and services,

and to increase the efficiency and flexibility of land development. While the intensity of land development will increase for the developed portions, the overall amount of impervious cover will be substantially reduced by planned development options. It also minimizes the disturbance of large tracts of land, which is a key nonstructural stormwater management strategy.

Conservation Design. The Township is considering the development of a conservation design ordinance that will allow more flexible land development than cluster options and will further achieve the performance design objectives of the stormwater management regulations.

Section 145-63: Off-tract Improvements provides for a cost-sharing arrangement to pay for off-tract improvements including stormwater management facilities. Language will be added to this section to require that any off-tract stormwater management and drainage improvements must conform to the "Design and Performance Standards" described in this plan.

Section 145--- Soil Erosion and Sediment Control This section will be created to address soil erosion and sediment control requirements by referencing Chapter 128, the Township's Soil Erosion and Sediment Control Ordinance. This ordinance requires developers to comply with the New Jersey Soil Erosion and Sediment Control Standards and outlines some general design principles, including: whenever possible, retain and protect natural vegetation; minimize and retain water runoff to facilitate groundwater recharge; and, install diversions, sediment basins, and similar required structures prior to any on-site grading or disturbance. The threshold for compliance with these requirements is the disturbance of 5,000 square feet or more, regardless of the nature of the use.

***Pilesgrove Township Master Plan  
Stormwater Management Plan Element***

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**7.0 OTHER MEASURES**

At the discretion of the Tier B municipality, the Stormwater Program may also include *Other Measures* to prevent or reduce the pollution of the community's surface water system. The applicability of the *Other Measures* cited by the NJDEP is described below. It is recognized that Pilesgrove Township is a rural community that is resistant to excessive regulation and that some of these issues may not presently be a substantive concern. But, since these issues could become substantive concerns in the future as the community develops, appropriate that control measures need to be established.

**7.1 Road Deicing.**

Issue. The use of salt and related de-icing compounds is essential during severe winter storms to ensure the safety of the traveling public. However, the use of salt can have a significant adverse impact on water quality particularly if it is not stored or applied properly.

Proposed Control Measure. Pilesgrove Township should adopt a salt control policy based on established best management practices that will include salt storage requirements, road se-icing policies, and salt application procedures. It is further recommended that the Township ensure that the design of its salt storage facilities and that its salt handling/application practices conform to the stated policies. The Township should also coordinate with the County to ensure that its practices within the Township conform to recommended best management practices.

**7.2 Stormwater Management Coordination**

Issue. Stormwater management basins are often not properly maintained by Homeowners Associations. Municipalities are often asked to intervene to cause them to be properly maintained.

Control Measure. The Township Planning Board should require that Homeowners Associations be established to maintain basins in residential developments. The Homeowner Association documents shall permit the municipality to enter and maintain or repair a basin that is not being maintained by the Association. In any such event, all of the costs incurred by the Township shall be subsequently paid by members of the Association via an assessment or lien. The design, condition, and maintenance responsibility of all existing detention basins should be determined to understand the extent of this potential concern and the need for basin modifications.

Pilesgrove Township should implement a policy of encouraging Associations to communicate with each other and to enter into maintenance agreements with reputable contractors to ensure proper management and to reduce costs. The Township should also explore means of coordinating and assisting Homeowners Associations. One alternative that should be evaluated is the establishment of a public utility or authority to undertake maintenance activities under a user fee system.

**7.3 Planting of Native Vegetation**

Issue. Since the Township will be encouraging the planting of native vegetation at proposed major land developments to improve water quality, existing land development should also be encouraged to improve the use of vegetation for buffering and water quality purposes. However, it is acknowledged that the Township does not have the means to requiring existing development to improve landscaping.

Control Measure. Pilesgrove Township should undertake a program to improve the use of native vegetation on public and private lands that serve common open space or buffer purposes. The program could include improved buffer plantings at Marlton Park, the municipal building, and the former landfill site. The Township should also consider ways of encouraging improved landscaping on private lands such as the establishment of an awards program to publicly acknowledging quality landscaping or by making native plants available at cost to neighborhoods through a bulk purchase program. The Joint Environmental Commission could be in charge of implementing an environmental awards program.

#### **7.4 Fertilizer and Pesticide Management**

Issue. The improper application of fertilizers and pesticides can have significant water quality impacts. However, in a rural community, the proper application of fertilizers and pesticides by agricultural operations is of more significance than residential applications.

Control Measure. Pilesgrove Township should consider adopting a fertilizer and pesticide ordinance to ensure that these materials are properly stored and applied. The ordinance would include specific criteria for the use of these chemicals. This program would be part of a larger public education program relating to the importance of improving and protecting surface water quality in the Township. Agricultural practices will continue to be governed by best management practices implemented by the Natural Resources Conservation Service (NRCS) and related agencies.

#### **7.5 Pet & Animal Waste.**

Issue. The solid waste from pets in residential communities needs to be managed to prevent fecal coliform from entering the surface water system even though in rural communities, the management of fecal coliform from agricultural animals is a much greater concern.

Control Measure. Pilesgrove Township should consider adopting an ordinance requiring the immediate removal of solid waste from any property that is not owned and possessed by the owner of the pet. The Township should also review its existing ordinances to ensure proper waste management materials from intensive fowl or livestock farms, horse stables, dog kennels, and residential agriculture.

#### **7.6 Improper Disposal of Waste**

Issue. Even though, Pilesgrove Township has a very limited storm water conveyance system, residents could use catch basins as a place to dispose of waste oil or other household products.

Control Measure. Pilesgrove Township should review its ordinances to determine whether it specifically prohibits waste disposal activities in the storm sewer system. If not, an ordinance should be adopted to clearly indicate what activities are permitted and prohibited near storm water conveyance systems. The Township should also implement a storm drain labeling program in accordance with NJDEP requirements and a public education program to make the public aware of this potential problem.

#### **7.7 Illicit Connections**

Issue. There is the potential for residents or businesses to connect discharge pipes into the stormwater system for the purpose of discharging wastewater. While the Township has a very limited storm water conveyance system, this issue could be more of a concern in the future.

Control Measure. Pilesgrove Township should review its ordinances to determine whether it specifically prohibits illicit connections to the storm sewer system. If not, an ordinance should be adopted

to clearly indicate what connections are permitted and prohibited to the storm water conveyance system. These prohibitions should be included in any declaration of restrictions governing land development.

#### **7.8 Discarded Material/Litter Control**

**Issue.** The discarding of waste material or the improper storage of discarded materials could be a source of contaminants to surface watercourses. These practices are unsightly and can have significant offsite impacts. Since the Township does not have a solid waste collection program, it is imperative that waste materials are properly managed by the residents and taken to the Township convenience center or directly to the County landfill.

**Control Measure.** Pilesgrove Township should review its ordinances to ensure that it has a suitable litter control ordinance and discarded waste material ordinance.

#### **7.9 Wildlife Management**

**Issue.** The presence of certain species of wildlife (i.e., Canada Geese) can be a surface water quality concern that should not be encouraged by residents or visitors.

**Control Measure.** The feeding of unconfined wildlife on public lands should be prohibited. The Township should also discourage any practice on private lands that could have impacts to surface water quality and should identify the practices that can be used by private landowners to control wildlife.

#### **7.10 Yard/Vegetative Waste Management**

**Issue.** Pilesgrove Township is a rural community that does not collect yard or vegetative waste. Because of the low density of residential developments, these materials are usually handled by property owners by composting. There is the potential that yard waste may be allowed to accumulate, may be improperly handled, or may be improperly discharged into stream corridors or catch basins.

**Control Measure.** The Township should ensure that yard waste is properly handled by educating residents on composting methods, by providing a location for the disposal of excess material, and by prohibiting activities that can impact surface water quality.

#### **7.11 Septic Management**

**Issue.** Because of the very limited availability of wastewater collection and treatment services in the Township, land development in the Township must rely on individual septic disposal systems. If these systems are not properly designed or maintained, they can have a significant impact on ground and surface water quality.

**Control Measure.** The Township should adopt a Wastewater Management Plan (WMP) that clearly establishes the Township's wastewater management policies and addresses the appropriate means of managing septic systems. The WMP should address the limits of any sewer service areas in the Township. The WMP should also address the use of innovative systems that can overcome certain site limitations and can reduce the concentration of nitrates in the effluent. The Township should also study whether pre-existing systems on difficult sites can be improved through the use of alternate systems. Nitrate dilution modeling should also be required in Environmental Impact Statements to understand the cumulative impact of septic systems on the hydrologic environment. This planning program should be conducted in coordination with the NJDEP and the Salem County Health Department.



*Pilesgrove Township Master Plan*  
*Stormwater Management Plan Element*

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**8.0 STORMWATER MANAGEMENT MAINTENANCE PLAN (SMMP) REQUIREMENTS**

The Township will require the approval of a Stormwater Management Maintenance Plan (SMMP) prior to the issuance of final land development approval in accordance with the following requirements:

- Responsible party. The SMMP shall clearly define the entity and party responsible for implementation of the SMMP. A viable corporate entity such as a Homeowner's Association shall be identified. Developers shall be designated as the responsible entity prior to the establishment of the Association. Subsequently, the President of the Association shall be designated as the responsible party. If contractors are used, the service contracts shall be appended to the SMMP and shall clearly indicate the contractor's responsibilities and ability to perform the assigned tasks.
- Maintenance Tasks and schedules. The SMMP shall identify the maintenance, repair, and inspection tasks that will be undertaken on the project site and the scheduling of these tasks. The SMMP shall indicate whether these preventive measures will be accomplished by Association members, employees, or by service contractors.
- Inspection. The SMMP shall establish an inspection plan to ensure that the condition of the system is properly monitored by trained and professional personnel. At a minimum, an annual inspection shall be prepared by a licensed professional engineer certifying that all components are in good repair or identifying components requiring maintenance.
- Financial plan. The SMMP shall establish a financial plan that ensures that the responsible entity sets aside sufficient funds for annual maintenance activities as well as major structural repairs.
- Recording of SMMP. The maintenance plan and all subsequent revisions shall be recorded upon the deed of record for each property upon which the maintenance described in the SMMP must be undertaken.
- Annual update. The responsible person and entity shall review and revise the SMMP as necessary on an annual basis. All revisions to the SMMP shall be recorded.
- Equipment. The SMMP shall identify the equipment that is available onsite for maintenance and repair activities as well as specialized equipment and services that will be made available on an as-needed basis.
- As-built plans. The SMMP shall contain a copy of the stormwater management plan(s) that provide all of the information necessary to inspect, maintain and repair all structural and non-structural elements.
- Township Information. The SMMP shall specify the records that will be provided to the Township including responsible party designation, financial reports, and annual inspection reports.

*Pilesgrove Township Master Plan*  
*Stormwater Management Plan Element*

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**9.0 LAND USE/BUILD-OUT ANALYSIS**

**9.1 Buildout Analysis**

In accordance with the Stormwater Management Plan Regulations, a full development build-out analysis was conducted based on the recently adopted 2005 Revision of the Land Use Plan element. It should be emphasized that the build-out analysis for this Stormwater Management Plan is different than the housing build-out analysis contained in the Land Use and Housing Plan Elements since this analysis is intended to project total impervious cover and the pollutant loadings that may be associated with the buildout.

Figure 6 illustrates the existing land use in the Township based on 2000 Tax assessment information. Figure 7 illustrates the proposed zoning districts within the Township based on the recently adopted Land Use Plan map. Figure 8 illustrates the constrained lands within the Township where development cannot take place due to the public acquisition of lands or development rights..

The build-out calculations for impervious cover are shown in Table 6 based on current impervious cover limitations. Table 6 indicates that 19% of the developable lands in the township would be covered with impervious surfaces based on the current Land Development Ordinance under full build-out conditions. This percentage equates to 3,044 acres or about 4.8 square miles of land coverage. The build-out analysis is classified by the HUC14 subwatersheds. The highest potential impervious coverage percentages are in the planned industrial park in the southwest corner of the Township. The elevated impervious coverage permitted within this district will need require careful management.

Table 7 presents the alternate calculation based on revised impervious cover standards. This table indicates that the total impervious cover under the proposed Land development Regulations would be 1,353 acres or about 2.1 square miles. Therefore, the proposed regulations would ensure that the impervious coverage in the Township is kept to a minimum.

The actual difference between the existing and proposed regulations is significantly less than that indicated by these tables since most land development under the current regulations is well below the maximum permitted impervious coverage. Nevertheless, the revised standards will focus more attention on the need to control impervious coverage through structural design changes, more compact site layout, and the use of pervious materials. The establishment of more stringent impervious cover standards will require developers to address this concern and to mitigate any exceedances of these standards.

**9.2 Pollutant Loading Analysis**

Table 5 indicates that the estimated pollutant loading coefficients by land cover type from the NJDEP Best Management Practices (BMP) Manual. It is important to note that, although the pollutant loads for agricultural lands are higher than those for low density residential for the parameters in Table 5, converting agricultural lands to residential typically results in an increase in pollutant loads for metals and petroleum hydrocarbons.

**Table 5**  
**Pollutant Loads by Land Cover**

Land Cover	Total Phosphorus Load (lbs/acre/year)	Total Nitrogen Load (lbs/acre/year)	Total Suspended Solids Load (lbs/acre/yr)
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
Commercial	2.1	22	200
Industrial	1.5	16	200
Urban, Mixed Urban, Other Urban	1.0	10	120
Agricultural	1.3	10	300
Forest, Water, Wetlands	0.1	3	40
Barrenland/Transitional Area	0.5	5	60

*Source: NJDEP Stormwater BMP Manual 2004.*

The conversion of agricultural lands to low density residential will most likely result in a reduction of total suspended solids loads but an increase in stormwater runoff due to the dramatic increase in the impervious cover percentage. If the increased stormwater runoff is not managed properly, the stormwater discharge from land development may increase stream bank erosion and thereby result in an increase in the sediment loads to the receiving waters.

It should be noted that there are methods of reducing the loadings from land development and these methods need to be required as part of any land development application. The water quality benchmark for land development in the Township should not be the estimated loadings from agricultural use but rather the level of reduction that can be achieved by accepted design techniques. Proper land development should not only prevent adverse impacts to the Township's surface water resources but can significantly improve water quality conditions.

Pilesgrove Township strongly supports its farmers and agricultural enterprises. Agricultural communities are typically opposed to any form of local regulation that addresses agricultural operations. However, it is important to recognize that there is considerable disparity in the management practices employed in the Township and that efforts need to be made to encourage the use of best management practices. In particular, the Township actively supports programs such as the CREP program that provides financial support for farmers to take land out of production along stream corridors so that filter strips can be constructed. This program and other state and federal programs can have a major impact on stormwater management and surface water quality in an agricultural community.

The pollutant loads at full build-out are presented in Table 8. Under full build-out conditions, Pilesgrove Township could release about 6.3 tons of Total Phosphorus, 57 tons of Total Nitrogen, and 920 tons of Total Suspended Solids each year to the local watercourses. The intent of this Stormwater Management Plan is to achieve an effective reduction in pollutant loadings to protect and improve surface water quality.

**TABLE 6**  
**PILESGROVE TOWNSHIP BUILD-OUT CALCULATIONS**

HUC14 and Zone	Total Area (Acres)	Preserved Farmland/ Open Space(Acres)	Wetlands/ Water Area (Acres)	Developable Area (Acres)	Allowable Impervious (%)	Build-Out Impervious (Acres)
<b>02040202160050 Oldmans Creek --West</b>						
Agricultural Retention (AR)	176.19	1.40	0.00	174.79	15%	26.22
Conservation District (CD)	80.72	0.00	80.72	0.00	0%	0.00
Single-Family Residential (SR)	1,082.53	0.00	0.00	1,082.53	15%	162.38
<b>TOTALS</b>	<b>1,339.44</b>	<b>1.40</b>	<b>80.72</b>	<b>1,257.32</b>	<b>15%</b>	<b>188.60</b>
<b>02040202160030 Oldmans Creek Central</b>						
Agricultural Retention (AR)	839.29	0.00	0.00	839.29	15%	125.89
Conservation District (CD)	381.13	0.00	381.13	0.00	0%	0.00
Restricted Residential (RR)	104.42	0.00	0.00	104.42	15%	15.66
Single-Family Residential (SR)	1,268.98	0.00	0.00	1,268.98	15%	190.35
<b>TOTALS</b>	<b>2,593.82</b>	<b>0.00</b>	<b>381.13</b>	<b>2,212.69</b>	<b>15%</b>	<b>331.90</b>
<b>02040206030050 Salem River --West (North)</b>						
Agricultural Retention (AR)	1,053.69	403.28	0.00	650.41	15%	97.56
Conservation District (CD)	61.14	0.00	61.14	0.00	0%	0.00
Single-Family Residential (SR)	76.13	0.00	0.00	76.13	15%	11.42
<b>TOTALS</b>	<b>1,190.96</b>	<b>403.28</b>	<b>61.14</b>	<b>726.54</b>	<b>15%</b>	<b>108.98</b>
<b>02040202160020 Oldmans Creek East</b>						
Agricultural Retention (AR)	157.11	0.00	0.00	157.11	15%	23.57
Conservation District (CD)	159.44	0.00	159.44	0.00	0%	0.00
Restricted Residential (RR)	906.48	0.00	0.00	906.48	15%	135.97
Single-Family Residential (SR)	118.27	0.00	0.00	118.27	15%	17.74
<b>TOTALS</b>	<b>1,341.30</b>	<b>0.00</b>	<b>159.44</b>	<b>1,181.86</b>	<b>15%</b>	<b>177.28</b>
<b>02040206030060 Salem River--West (South)</b>						
Agricultural Retention (AR)	236.13	0.00	0.00	236.13	15%	35.42
Conservation District (CD)	6.62	0.00	6.62	0.00	0%	0.00
Planned Light Industrial (PLI)	65.56	0.00	0.00	65.56	50%	32.78
<b>TOTALS</b>	<b>308.31</b>	<b>0.00</b>	<b>6.62</b>	<b>301.69</b>	<b>23%</b>	<b>68.20</b>
<b>02040206030040 Salem River--Sharptown</b>						
Agricultural Retention (AR)	2,073.02	127.33	0.00	1,945.69	15%	291.85
Conservation District (CD)	342.14	0.00	342.14	0.00	0%	0.00
Highway Commercial (HC)	192.58	0.00	0.00	192.58	55%	105.92
Neighborhood Commercial (NC)	22.12	0.00	0.00	22.12	55%	12.17
Planned Light Industrial (PLI)	359.44	0.00	0.00	359.44	50%	179.72
Public - Parks - Education (PPE)	92.52	92.52	0.00	0.00	60%	0.00
Restricted Residential (RR)	39.82	0.00	0.00	39.82	15%	5.97
Single-Family Residential (SR)	33.95	0.00	0.00	33.95	15%	5.09
Village Neighborhood (VN)	54.10	0.00	0.00	54.10	25%	13.53
<b>TOTALS</b>	<b>3,209.69</b>	<b>219.85</b>	<b>342.14</b>	<b>2,647.70</b>	<b>23%</b>	<b>614.25</b>

**TABLE 6**  
**PILEGROVE TOWNSHIP BUILD-OUT CALCULATIONS**

HUC14 and Zone	Total Area (Acres)	Preserved Farmland/ Open Space (Acres)	Wetlands/ Water Area (Acres)	Developable Area (Acres)	Allowable Impervious (%)	Build-Out Impervious (Acres)
<b>02040206030030 Salem River--Central (North)</b>						
Affordable Housing 1 (AH1)	7.81	0.00	0.00	7.81	60%	4.69
Agricultural Retention (AR)	2,341.55	1,065.22	0.00	1,276.33	15%	191.45
Conservation District (CD)	352.62	0.00	352.62	0.00	0%	0.00
Highway Commercial (HC)	48.66	0.00	0.00	48.66	55%	26.76
Neighborhood Commercial (NC)	13.42	0.00	0.00	13.42	55%	7.38
Public - Parks - Education (PPE)	66.00	66.00	0.00	0.00	60%	0.00
Restricted Residential (RR)	945.60	0.11	0.00	945.49	15%	141.82
Single-Family Residential (SR)	282.29	0.00	0.00	282.29	15%	42.34
Single-Family Residential 5 Un (	15.63	0.00	0.00	15.63	15%	2.34
Single-Family Residential Clus (	87.83	0.00	0.00	87.83	15%	13.17
Village Neighborhood (VN)	10.01	0.00	0.00	10.01	25%	2.50
<b>TOTALS</b>	<b>4,171.42</b>	<b>1,131.33</b>	<b>352.62</b>	<b>2,687.47</b>	<b>16%</b>	<b>432.47</b>
<b>02040206030020 Salem River --Central (South)</b>						
Agricultural Retention (AR)	1,109.76	53.42	0.00	1,056.34	15%	158.45
Conservation District (CD)	512.03	0.00	512.03	0.00	0%	0.00
Highway Commercial (HC)	49.58	0.00	0.00	49.58	55%	27.27
Public - Parks - Education (PPE)	8.28	8.28	0.00	0.00	60%	0.00
Restricted Residential (RR)	1,022.14	0.00	0.00	1,022.14	15%	153.32
Single-Family Residential (SR)	232.92	0.00	0.00	232.92	55%	128.11
<b>TOTALS</b>	<b>2,934.71</b>	<b>61.70</b>	<b>512.03</b>	<b>2,360.98</b>	<b>20%</b>	<b>467.15</b>
<b>02040206030010 Salem River--East</b>						
Agricultural Retention (AR)	2,299.36	156.23	0.00	2,143.13	15%	321.47
Conservation District (CD)	428.47	0.00	428.47	0.00	0%	0.00
Highway Commercial (HC)	133.42	0.00	0.00	133.42	55%	73.38
Public - Parks - Education (PPE)	275.39	275.39	0.00	0.00	60%	0.00
Restricted Residential (RR)	950.85	156.23	0.00	794.62	15%	119.19
Single-Family Residential (SR)	85.36	0.00	0.00	85.36	15%	12.80
<b>TOTALS</b>	<b>4,172.85</b>	<b>587.85</b>	<b>428.47</b>	<b>3,156.53</b>	<b>17%</b>	<b>526.85</b>
<b>02040206040010 Salem River --South</b>						
Conservation District (CD)	3.22	0.00	3.22	0.00	0%	0.00
Public - Parks - Education (PPE)	5.08	0.00	0.00	5.08	60%	3.05
Restricted Residential (RR)	7.22	0.00	0.00	7.22	15%	1.08
Single-Family Residential (SR)	23.49	0.00	0.00	23.49	15%	3.52
<b>TOTALS</b>	<b>39.01</b>	<b>0.00</b>	<b>3.22</b>	<b>35.79</b>	<b>21%</b>	<b>7.65</b>
<b>02040206060020 Alloways Creek</b>						
Agricultural Retention (AR)	696.87	137.68	0.00	559.19	15%	83.88
Conservation District (CD)	184.74	0.00	184.74	0.00	0%	0.00
Public - Parks - Education (PPE)	35.88	35.88	0.00	0.00	60%	0.00
Restricted Residential (RR)	138.09	0.00	0.00	138.09	15%	20.71
Single-Family Residential (SR)	108.12	0.00	0.00	108.12	15%	16.22
<b>TOTALS</b>	<b>1,163.70</b>	<b>173.56</b>	<b>184.74</b>	<b>805.40</b>	<b>15%</b>	<b>120.81</b>
<b>TOWNSHIP TOTALS</b>	<b>22,465.21</b>	<b>2,578.97</b>	<b>2,512.27</b>	<b>17,373.97</b>	<b>18%</b>	<b>3,044.14</b>

**TABLE 7**  
**REVISED PILESGROVE TOWNSHIP BUILD-OUT CALCULATIONS**

<b>HUG14 and Zone</b>	<b>Total Area (Acres)</b>	<b>Preserved Farmland/ Open Space(Acres)</b>	<b>Wetlands/ Water Area (Acres)</b>	<b>Developable Area (Acres)</b>	<b>Allowable Impervious (%)</b>	<b>Build-Out Impervious (Acres)</b>
<b>02040202160050 Oldmans Creek --West</b>						
Agricultural Retention (AR)	176.19	1.40	0.00	174.79	5%	8.74
Conservation District (CD)	80.72	0.00	80.72	0.00	0%	0.00
Single-Family Residential (SR)	1,082.53	0.00	0.00	1,082.53	12%	129.90
<b>TOTALS</b>	<b>1,339.44</b>	<b>1.40</b>	<b>80.72</b>	<b>1,257.32</b>	<b>11%</b>	<b>138.64</b>
<b>02040202160030 Oldmans Creek Central</b>						
Agricultural Retention (AR)	839.29	0.00	0.00	839.29	5%	41.96
Conservation District (CD)	381.13	0.00	381.13	0.00	0%	0.00
Restricted Residential (RR)	104.42	0.00	0.00	104.42	5%	5.22
Single-Family Residential (SR)	1,268.98	0.00	0.00	1,268.98	12%	152.28
<b>TOTALS</b>	<b>2,593.82</b>	<b>0.00</b>	<b>381.13</b>	<b>2,212.69</b>	<b>9%</b>	<b>199.46</b>
<b>02040206030050 Salem River --West (North)</b>						
Agricultural Retention (AR)	1,053.69	403.28	0.00	650.41	5%	32.52
Conservation District (CD)	61.14	0.00	61.14	0.00	0%	0.00
Single-Family Residential (SR)	76.13	0.00	0.00	76.13	12%	9.14
<b>TOTALS</b>	<b>1,190.96</b>	<b>403.28</b>	<b>61.14</b>	<b>726.54</b>	<b>6%</b>	<b>41.66</b>
<b>02040202160020 Oldmans Creek East</b>						
Agricultural Retention (AR)	157.11	0.00	0.00	157.11	5%	7.86
Conservation District (CD)	159.44	0.00	159.44	0.00	0%	0.00
Restricted Residential (RR)	906.48	0.00	0.00	906.48	5%	45.32
Single-Family Residential (SR)	118.27	0.00	0.00	118.27	12%	14.19
<b>TOTALS</b>	<b>1,341.30</b>	<b>0.00</b>	<b>159.44</b>	<b>1,181.86</b>	<b>6%</b>	<b>67.37</b>
<b>02040206030060 Salem River--West (South)</b>						
Agricultural Retention (AR)	236.13	0.00	0.00	236.13	5%	11.81
Conservation District (CD)	6.62	0.00	6.62	0.00	0%	0.00
Planned Light Industrial (PLI)	65.56	0.00	0.00	65.56	50%	32.78
<b>TOTALS</b>	<b>308.31</b>	<b>0.00</b>	<b>6.62</b>	<b>301.69</b>	<b>15%</b>	<b>44.59</b>
<b>02040206030040 Salem River--Sharptown</b>						
Agricultural Retention (AR)	2,073.02	127.33	0.00	1,945.69	5%	97.28
Conservation District (CD)	342.14	0.00	342.14	0.00	0%	0.00
Highway Commercial (HC)	192.58	0.00	0.00	192.58	55%	105.92
Neighborhood Commercial (NC)	22.12	0.00	0.00	22.12	55%	12.17
Planned Light Industrial (PLI)	359.44	0.00	0.00	359.44	50%	179.72
Public - Parks - Education (PPE)	92.52	92.52	0.00	0.00	60%	0.00
Restricted Residential (RR)	39.82	0.00	0.00	39.82	5%	1.99
Single-Family Residential (SR)	33.95	0.00	0.00	33.95	12%	4.07
Village Neighborhood (VN)	54.10	0.00	0.00	54.10	23%	12.17
<b>TOTALS</b>	<b>3,209.69</b>	<b>219.85</b>	<b>342.14</b>	<b>2,647.70</b>	<b>16%</b>	<b>413.33</b>



**TABLE 7**  
**REVISED PILESGROVE TOWNSHIP BUILD-OUT CALCULATIONS**

HUC14 and Zone	Total Area (Acres)	Preserved Farmland/ Open Space(Acres)	Wetlands/ Water Area (Acres)	Developable Area (Acres)	Allowable Impervious (%)	Build-Out Impervious (Acres)
<b>02040206030030 Salem River--Central (North)</b>						
Affordable Housing 1 (AH1)	7.81	0.00	0.00	7.81	60%	4.69
Agricultural Retention (AR)	2,341.55	1,065.22	0.00	1,276.33	5%	63.82
Conservation District (CD)	352.62	0.00	352.62	0.00	0%	0.00
Highway Commercial (HC)	48.66	0.00	0.00	48.66	55%	26.76
Neighborhood Commercial (NC)	13.42	0.00	0.00	13.42	55%	7.38
Public - Parks - Education (PPE)	66.00	66.00	0.00	0.00	60%	0.00
Restricted Residential (RR)	945.60	0.11	0.00	945.49	5%	47.27
Single-Family Residential (SR)	282.29	0.00	0.00	282.29	12%	33.87
Single-Family Residential (SR-5)	15.63	0.00	0.00	15.63	30%	4.69
Single-Family Residential (SR-CL)	87.83	0.00	0.00	87.83	15%	13.17
Village Neighborhood (VN)	10.01	0.00	0.00	10.01	25%	2.50
<b>TOTALS</b>	<b>4,171.42</b>	<b>1,131.33</b>	<b>352.62</b>	<b>2,687.47</b>	<b>8%</b>	<b>204.16</b>
<b>02040206030020 Salem River --Central (South)</b>						
Agricultural Retention (AR)	1,109.76	53.42	0.00	1,056.34	5%	52.82
Conservation District (CD)	512.03	0.00	512.03	0.00	0%	0.00
Highway Commercial (HC)	49.58	0.00	0.00	49.58	55%	27.27
Public - Parks - Education (PPE)	8.28	8.28	0.00	0.00	60%	0.00
Restricted Residential (RR)	1,022.14	0.00	0.00	1,022.14	5%	51.11
Single-Family Residential (SR)	232.92	0.00	0.00	232.92	12%	27.95
<b>TOTALS</b>	<b>2,934.71</b>	<b>61.70</b>	<b>512.03</b>	<b>2,360.98</b>	<b>7%</b>	<b>159.14</b>
<b>02040206030010 Salem River--East</b>						
Agricultural Retention (AR)	2,299.36	156.23	0.00	2,143.13	5%	107.16
Conservation District (CD)	428.47	0.00	428.47	0.00	0%	0.00
Highway Commercial (HC)	133.42	0.00	0.00	133.42	55%	73.38
Public - Parks - Education (PPE)	275.39	275.39	0.00	0.00	60%	0.00
Restricted Residential (RR)	950.85	156.23	0.00	794.62	5%	39.73
Single-Family Residential (SR)	85.36	0.00	0.00	85.36	12%	10.24
<b>TOTALS</b>	<b>4,172.85</b>	<b>587.85</b>	<b>428.47</b>	<b>3,156.53</b>	<b>7%</b>	<b>230.51</b>
<b>02040206040010 Salem River --South</b>						
Conservation District (CD)	3.22	0.00	3.22	0.00	0%	0.00
Public - Parks - Education (PPE)	5.08	0.00	0.00	5.08	60%	3.05
Restricted Residential (RR)	7.22	0.00	0.00	7.22	5%	0.36
Single-Family Residential (SR)	23.49	0.00	0.00	23.49	12%	2.82
<b>TOTALS</b>	<b>39.01</b>	<b>0.00</b>	<b>3.22</b>	<b>35.79</b>	<b>17%</b>	<b>6.23</b>
<b>02040206060020 Alloways Creek</b>						
Agricultural Retention (AR)	696.87	137.68	0.00	559.19	5%	27.96
Conservation District (CD)	184.74	0.00	184.74	0.00	0%	0.00
Public - Parks - Education (PPE)	35.88	35.88	0.00	0.00	60%	0.00
Restricted Residential (RR)	138.09	0.00	0.00	138.09	5%	6.90
Single-Family Residential (SR)	108.12	0.00	0.00	108.12	12%	12.97
<b>TOTALS</b>	<b>1,163.70</b>	<b>173.56</b>	<b>184.74</b>	<b>805.40</b>	<b>6%</b>	<b>47.84</b>
<b>Township Totals</b>	<b>22,465.21</b>	<b>2,578.97</b>	<b>2,512.27</b>	<b>17,373.97</b>	<b>8%</b>	<b>1,353.46</b>

**TABLE 8**  
**PILEGROVE TOWNSHIP NON POINT SOURCE LOADS AT BUILD-OUT**

HUC14 and Zone	Build-out zoning	Developable Area (Acres)	Total Phosphorus Load (lbs/acre/yr)	TP(lbs/yr)	Total Nitrogen Load (lbs/acre/yr)	TN(lbs/yr)	Total Suspended Solids Load (lbs/acre/yr)	TSS(lbs/yr)
<b>02040202160050</b>								
Agricultural Retention (AR)	Low Density Rural Residential	174.79	0.60	104.87	5.00	873.95	100.00	17,479.00
Conservation District (CD)		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Single-Family Residential (SR)	Moderate Density Residential	1,082.53	1.00	1,082.53	10.00	10,825.30	120.00	129,903.60
<b>TOTALS</b>		<b>1,257.32</b>		<b>1,187.40</b>		<b>11,699.25</b>		<b>147,382.60</b>
<b>02040202160030</b>								
Agricultural Retention (AR)	Low Density Rural Residential	839.29	0.60	503.57	5.00	4,196.45	100.00	83,929.00
Conservation District (CD)		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Restricted Residential (RR)	Low Density Rural Residential	104.42	0.60	62.65	5.00	522.10	100.00	10,442.00
Single-Family Residential (SR)	Moderate Density Residential	1,268.98	1.00	1,268.98	10.00	12,689.80	120.00	152,277.60
<b>TOTALS</b>		<b>2,212.69</b>		<b>1,835.21</b>		<b>17,408.35</b>		<b>246,648.60</b>
<b>02040206030050</b>								
Agricultural Retention (AR)	Low Density Rural Residential	650.41	0.60	390.25	5.00	3,252.05	100.00	65,041.00
Conservation District (CD)		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Single-Family Residential (SR)	Moderate Density Residential	76.13	1.00	76.13	10.00	761.30	120.00	9,135.60
<b>TOTALS</b>		<b>726.54</b>		<b>466.38</b>		<b>4,013.35</b>		<b>74,176.60</b>
<b>02040202160020</b>								
Agricultural Retention (AR)	Low Density Rural Residential	157.11	0.60	94.27	5.00	785.55	100.00	15,711.00
Conservation District (CD)		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Restricted Residential (RR)	Low Density Rural Residential	906.48	0.60	543.89	5.00	4,532.40	100.00	90,648.00
Single-Family Residential (SR)	Moderate Density Residential	118.27	1.00	118.27	10.00	1,182.70	120.00	14,192.40
<b>TOTALS</b>		<b>1,181.86</b>		<b>756.42</b>		<b>6,500.65</b>		<b>120,551.40</b>
<b>02040206030060</b>								
Agricultural Retention (AR)	Low Density Rural Residential	236.13	0.60	141.68	5.00	1,180.65	100.00	23,613.00
Conservation District (CD)		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Planned Light Industrial (PLI)	Industrial	65.56	1.50	98.34	16.00	1,048.96	200.00	13,112.00
<b>TOTALS</b>		<b>301.69</b>		<b>240.02</b>		<b>2,229.61</b>		<b>36,725.00</b>



**TABLE 8**  
**PILEGROVE TOWNSHIP NON POINT SOURCE LOADS AT BUILD-OUT**

HUC14 and Zone	Build-out zoning	Developable Area (Acres)	Total Phosphorus Load (lbs/acre/yr)	TP(lbs/yr)	Total Nitrogen Load (lbs/acre/yr)	TN(lbs/yr)	Total Suspended Solids Load (lbs/acre/yr)	TSS(lbs/yr)
<b>02040206030040</b>								
Agricultural Retention (AR)	Low Density Rural Residential	1,945.69	0.60	1,167.41	5.00	9,728.45	100.00	194,569.00
Conservation District (CD)		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Highway Commercial (HC)	Commercial	192.58	2.10	404.42	22.00	4,236.76	200.00	38,516.00
Neighborhood Commercial (NC)	Commercial	22.12	2.10	46.45	22.00	486.64	200.00	4,424.00
Planned Light Industrial (PLI)	Industrial	359.44	1.50	539.16	16.00	5,751.04	200.00	71,888.00
Public - Parks - Education (PPE)		0.00	0.60	0.00	0.00	0.00	100.00	0.00
Restricted Residential (RR)	Low Density Rural Residential	39.82	0.60	23.89	5.00	199.10	100.00	3,982.00
Single-Family Residential (SR)	Moderate Density Residential	33.95	1.00	33.95	10.00	339.50	120.00	4,074.00
Village Neighborhood (VN)	Medium Density Residential	54.10	1.40	75.74	15.00	811.50	140.00	7,574.00
<b>TOTALS</b>		<b>2,647.70</b>		<b>2,291.03</b>		<b>21,552.99</b>		<b>325,027.00</b>
<b>02040206030030</b>								
Affordable Housing 1 (AH1)	High Density Residential	7.81	1.40	10.93	15.00	117.15	140.00	1,093.40
Agricultural Retention (AR)	Low Density Rural Residential	1,276.33	0.60	765.80	5.00	6,381.65	100.00	127,633.00
Conservation District (CD)		0.00	0.60	0.00	0.00	0.00	0.00	0.00
Highway Commercial (HC)	Commercial	48.66	2.10	102.19	22.00	1,070.52	200.00	9,732.00
Neighborhood Commercial (NC)	Commercial	13.42	2.10	28.18	22.00	295.24	200.00	2,684.00
Public - Parks - Education (PPE)		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Restricted Residential (RR)	Low Density Rural Residential	945.49	0.60	567.29	5.00	4,727.45	100.00	94,549.00
Single-Family Residential (SR)	Moderate Density Residential	282.29	1.00	282.29	10.00	2,822.90	120.00	33,874.80
Single-Family Residential 5 Un (SR-5)	High Density Residential	15.63	1.40	21.88	15.00	234.45	140.00	2,188.20
Single-Family Residential Clus (SR-CL)	Moderate Density Residential	87.83	1.00	87.83	10.00	878.30	120.00	10,539.60
Village Neighborhood (VN)	Medium Density Residential	10.01	1.40	14.01	15.00	150.15	140.00	1,401.40
<b>TOTALS</b>		<b>2,687.47</b>		<b>1,880.41</b>		<b>16,677.81</b>		<b>283,695.40</b>
<b>02040206030020</b>								
Agricultural Retention (AR)	Low Density Rural Residential	1,056.34	0.60	633.80	5.00	5,281.70	100.00	105,634.00
Conservation District (CD)		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Highway Commercial (HC)	Commercial	49.58	2.10	104.12	22.00	1,090.76	200.00	9,916.00
Public - Parks - Education (PPE)		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Restricted Residential (RR)	Low Density Rural Residential	1,022.14	0.60	613.28	5.00	5,110.70	100.00	102,214.00
Single-Family Residential (SR)	Moderate Density Residential	232.92	1.00	232.92	10.00	2,329.20	120.00	27,950.40
<b>TOTALS</b>		<b>2,360.98</b>		<b>1,584.13</b>		<b>13,812.36</b>		<b>245,714.40</b>

**TABLE 8**  
**PILEGROVE TOWNSHIP NON POINT SOURCE LOADS AT BUILD-OUT**

HUC14 and Zone	Build-out zoning	Developable Area (Acres)	Total Phosphorus Load (lbs/acre/yr)	TP(lbs/yr)	Total Nitrogen Load (lbs/acre/yr)	TN(lbs/yr)	Total Suspended Solids Load (lbs/acre/yr)	TSS(lbs/yr)
<b>02040206030010</b>								
Agricultural Retention (AR)	Low Density Rural Residential	2,143.13	0.60	1,285.88	5.00	10,715.65	100.00	214,313.00
Conservation District (CD)		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Highway Commercial (HC)	Commercial	133.42	2.10	280.18	22.00	2,935.24	200.00	26,684.00
Public - Parks - Education (PPE)		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Restricted Residential (RR)	Low Density Rural Residential	794.62	0.60	476.77	5.00	3,973.10	100.00	79,462.00
Single-Family Residential (SR)	Moderate Density Residential	85.36	1.00	85.36	10.00	853.60	120.00	10,243.20
<b>TOTALS</b>		<b>3,156.53</b>		<b>2,128.19</b>		<b>18,477.59</b>		<b>330,702.20</b>
<b>02040206040010</b>								
Conservation District (CD)		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Public - Parks - Education (PPE)		5.08	0.00	0.00	0.00	0.00	0.00	0.00
Restricted Residential (RR)	Low Density Rural Residential	7.22	0.60	4.33	5.00	36.10	100.00	722.00
Single-Family Residential (SR)	Moderate Density Residential	23.49	1.00	23.49	10.00	234.90	120.00	2,818.80
<b>TOTALS</b>		<b>35.79</b>		<b>27.82</b>		<b>271.00</b>		<b>3,540.80</b>
<b>02040206060020</b>								
Agricultural Retention (AR)	Low Density Rural Residential	559.19	0.00	0.00	0.00	0.00	0.00	0.00
Conservation District (CD)		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Public - Parks - Education (PPE)		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Restricted Residential (RR)	Low Density Rural Residential	138.09	0.60	82.85	5.00	690.45	100.00	13,809.00
Single-Family Residential (SR)	Moderate Density Residential	108.12	1.00	108.12	10.00	1,081.20	120.00	12,974.40
<b>TOTALS</b>		<b>805.40</b>		<b>190.97</b>		<b>1,771.65</b>		<b>26,783.40</b>
<b>Township Totals</b>								
		<b>17,373.97</b>		<b>12,587.98</b>		<b>114,414.61</b>		<b>1,840,947.40</b>

***Piles Grove Township Master Plan  
Stormwater Management Plan Element***

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**10.0 MITIGATION PLANS**

All drainage areas of a land development project shall be required to conform with the performance standards of the stormwater management regulations and the Township Land Use Ordinance. Land developers that are granted a variance or exemption from the stormwater management design and performance standards will be required to mitigate the impact of the variance or exemption. The mitigation will consist of a project that Piles Grove Township or another public agency intends to undertake within the same drainage area. If there are none, the Planning Board may develop a mitigation plan or may require the contribution of funds to an off-tract project. Piles Grove Township will develop a specific list of mitigation projects as part of a comprehensive review of the existing stormwater conveyance and management system. The mitigation project criteria are as follows:

1. Whenever possible, the mitigation project shall be implemented in the same drainage shed as the proposed development.
2. The project must provide additional groundwater recharge benefits or improvements in stormwater runoff quality and quantity control at a previously developed property that does not currently meet the design and performance standards outlined in this Plan. The mitigation project should but need not provide an equivalent level of improvement in water quality or runoff control as the variance or exemption.
3. Whenever possible, the mitigation should address the same type of issue as the variance or exemption. The applicant will be permitted to select from several projects that will be identified to compensate for the variance or exemption from the performance standards. The types of mitigation projects will include the following:
  - Retrofit an existing detention basin to provide for the removal of 80% of total suspended solids;
  - Retrofit an existing stormwater facility to increase groundwater recharge;
  - Install stormwater management measures to reduce the peak flow from the upstream development on a stream; or to,
  - Establish a vegetative buffer along a stream to filter stormwater runoff;.
4. The developer shall bond for the mitigation work based on an estimate prepared by the township engineer. The mitigation cost estimate shall include direct as well as indirect costs such as permitting. All mitigation work shall be conducted on public property or within a drainage easement conveyed to the township to allow for future repair and maintenance.
5. The developer must ensure the long-term maintenance of the mitigation project in accordance with this Plan.

*Pilesgrove Township Master Plan*  
*Stormwater Management Plan Element*

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**11.0 PLAN CONSISTENCY**

**11.1 Soil Conservation District**

The intent of this plan is to be consistent with other plans and policies of other regulatory agencies having jurisdiction in stormwater management including the Salem/Cumberland Soil conservation district. 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 local Soil Conservation District.

**11.2 Regional Stormwater Management Plan**

Pilesgrove Township is not within a Regional Stormwater Management Planning Area and does not need to be consistent with any regional stormwater management plans (RSWMPs).

**11.3 Total Maximum Daily Loads (TMDLS)**

It is our understanding that there are no TMDLs that have been adopted for waters within the Township. As noted earlier, two TMDLs have been proposed and one TMDL has been established that relate to stormwater management in Pilesgrove Township. While these TMDLs do not include specific measures that must be implemented in the Township, this SWMP includes measures to address the phosphorus and fecal coliform contaminants of concern. If these TMDLs are adopted in the future and require the implementation of additional measures, this Municipal Stormwater Management Plan will be amended to be consistent with TMDL and to assist in the implementation of the TMDL.

**11.4 Residential Site Improvement Standards (RSIS)**

The Pilesgrove Township Stormwater Management Plan is consistent with the Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21. The municipality will utilize the most current update of the RSIS in the stormwater management review of proposed residential development and will be updated to be consistent with any future updates to the RSIS. While the Township Planning Board recognizes that it must comply with RSIS, it does not agree with the standards that allow narrow roads without sidewalks in major large lot residential developments. The Township believes that the public right-of-ways should be capable of supporting pedestrian, biking, and vehicular use in a safe manner in major developments. The Township Planning Board's positions on stormwater management conveyance and control are presented in Section 6.0.

*Pilesgrove Township Master Plan*  
*Stormwater Management Plan Element*

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**12.0 PLAN IMPLEMENTATION**

This Stormwater Management Plan will be adopted by the Township Planning Board but primarily implemented by a Stormwater Management Ordinance adopted by the Pilesgrove Township Committee. A draft Stormwater Ordinance is contained in Appendix A of this Plan. This draft Ordinance may be refined prior to final adoption by the Township.

Various other ordinances will be considered or adopted to address the Other Measures presented in Section 9.0 of this Stormwater Management Plan and to address related environmental concerns. The Pilesgrove Township Planning Board and Township Committee are committed to the protection of the Township's environmental quality.

**12.1 Enforcement**

The enforcement of most of the stormwater management measures described in this Plan will be through the land development review process. The zoning and construction official and the township engineer will be primarily responsible for ensuring that the conditions of land development approval are implemented.

The zoning officer will also be a key official in initiating enforcement actions or in responding to citizen complaints that require enforcement actions. However, most of the measures in this report need to be voluntarily implemented by residents when the implications of the consequences are recognized.

**12.2 County Coordination**

In accordance with the stormwater management regulations, the adopted Stormwater Management Plan will be forwarded to the Salem County Planning Board for review and approval. The adopted plan cannot take effect without the approval of the county review agency. Once adopted, the Stormwater Management Ordinance will also be forwarded to the County for review and approval. The County will determine whether the plan and ordinance conform to the requirements of the NJDEP Stormwater Management regulations. The Township will address any comments or amendments to the Stormwater Management Plan or Ordinance required by the County. The Township and the County have made recent efforts to improve coordination on land development matters.

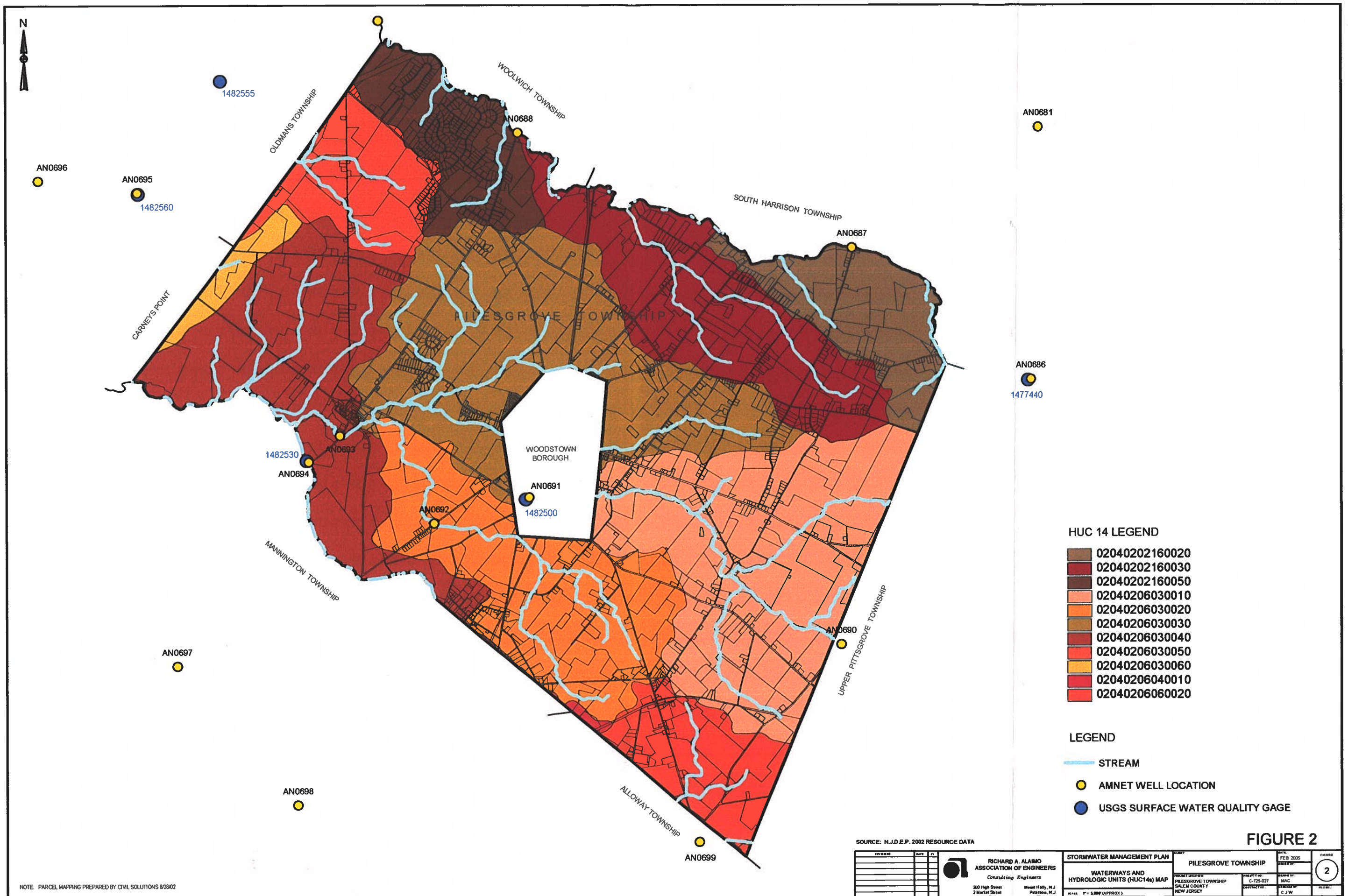
**12.3 Public Education**

The Plan will also be implemented through a public education process that will make the public aware of the program and the measures that will be implemented. Particular attention will be focused on developers and the parties responsible for the maintenance of existing and future stormwater management systems.

**12.4 Plan Reexamination**

The Stormwater Management Plan Element of the Township Master Plan will be periodically reexamined along with the other Master plan elements in accordance with NJSA 40:55D-89.







S:\STATE\NJ\SALEM\PROJECTS\PILES GROVE\725027 Map\CAL-F3-USGS-Map DATE: MAY 25, 2005 TIME: 6:05 AM

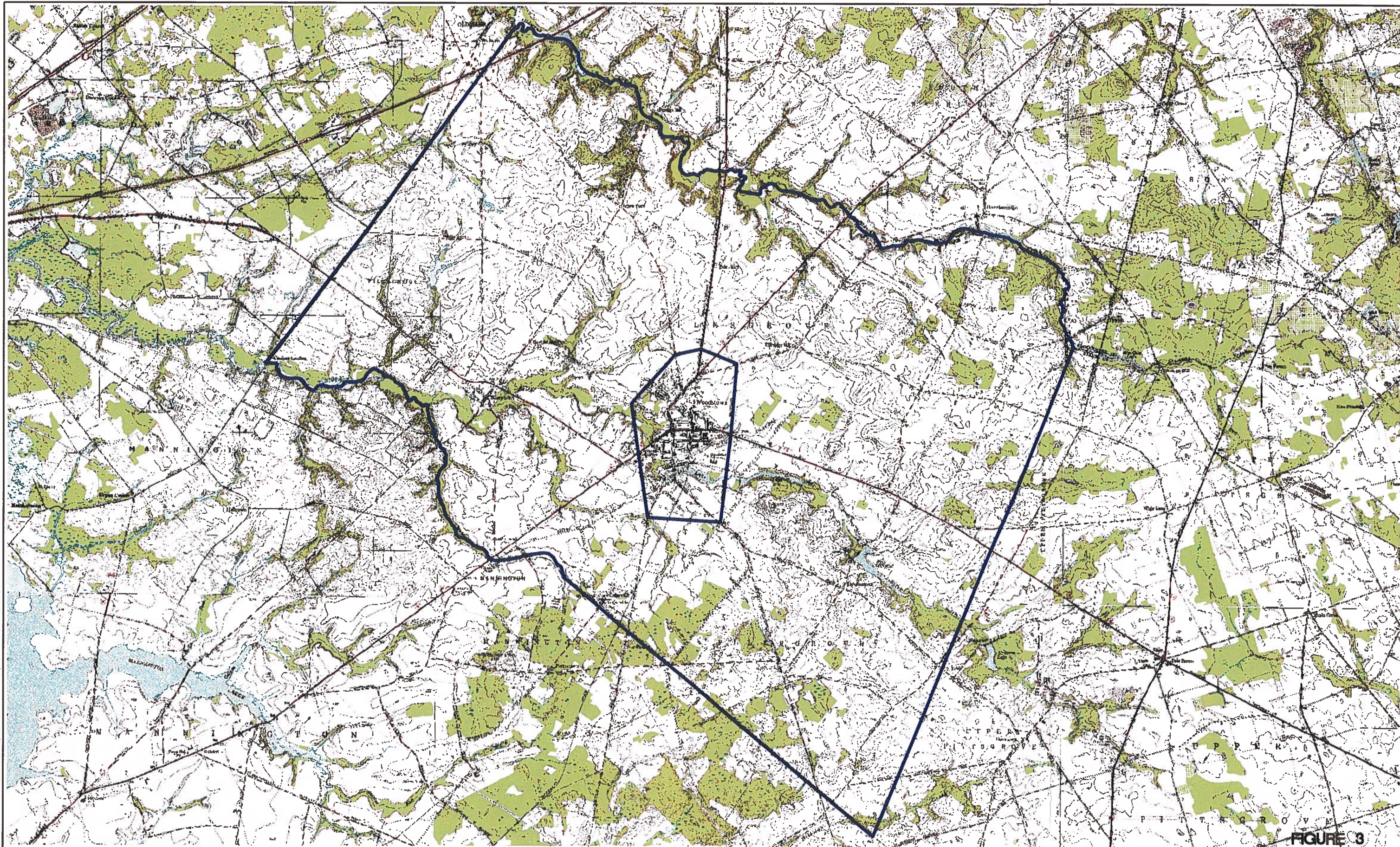


FIGURE 3

REVISIONS	DATE	BY



RICHARD A. ALAIMO  
ASSOCIATION OF ENGINEERS  
Consulting Engineers

200 HIGH STREET  
2 MARKET STREET

MOUNT HOLLY, N.J.  
PATERSON, N.J.

STORMWATER MANAGEMENT PLAN

U.S.G.S. QUAD

SCALE: 1" = 5000'

CLIENT: PILESGROVE TOWNSHIP

PROJECT LOCATION:  
PILESGROVE TOWNSHIP  
SALEM COUNTY  
NEW JERSEY

PROJECT NO.:  
C-725-027  
CONTRACT NO.:

DATE:  
FEB. 05

DESIGNED BY:

DRAWN BY:  
MAC

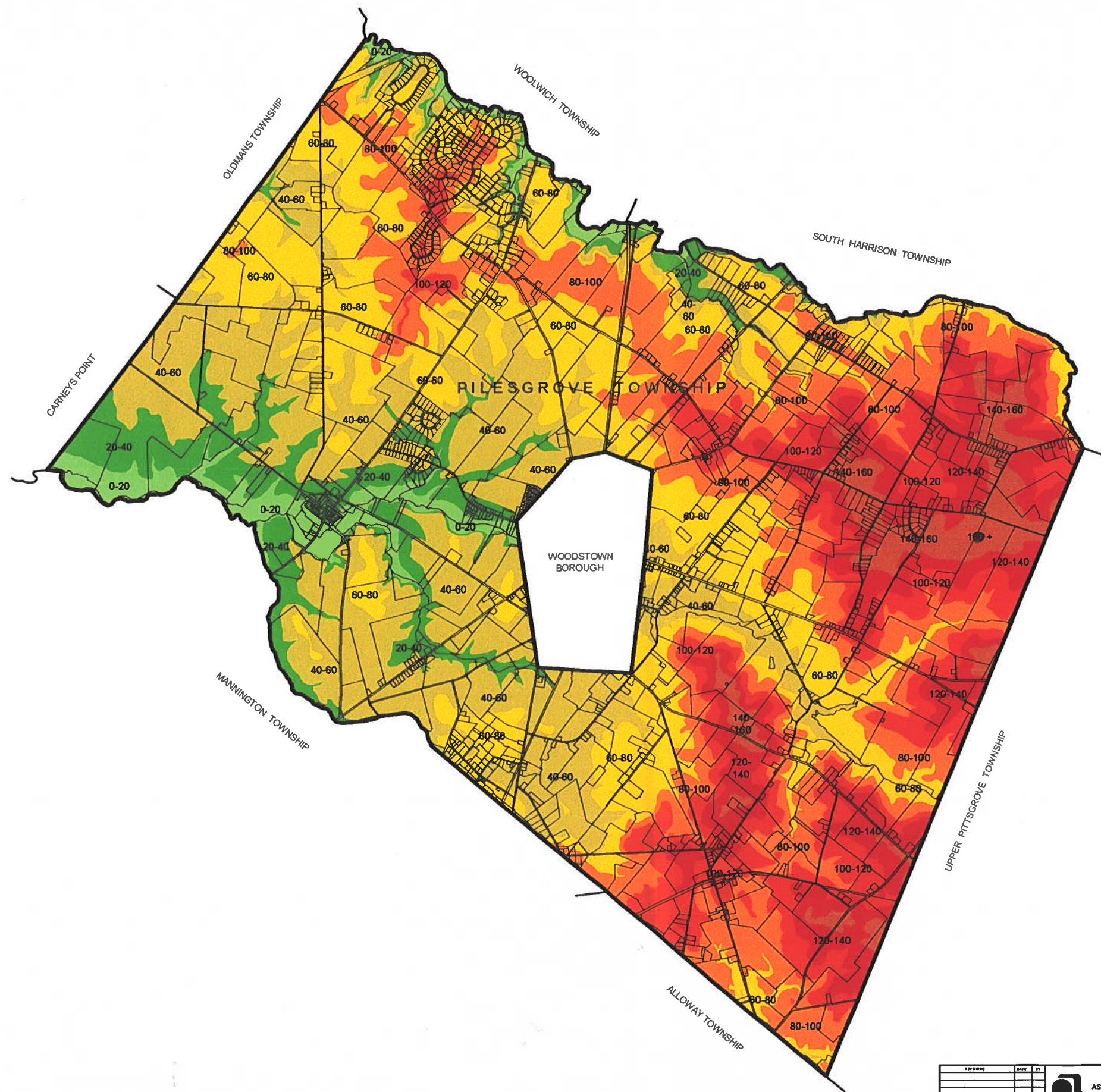
CHECKED BY:  
C.J.W.

SHEET

3

FILE NO.:





CONTOUR LEGEND:

- CONTOUR 0 - 20
- CONTOUR 20 - 40
- CONTOUR 40 - 60
- CONTOUR 60 - 80
- CONTOUR 80 - 100
- CONTOUR 100 - 120
- CONTOUR 120 - 140
- CONTOUR 140 - 160
- CONTOUR 160 - 180

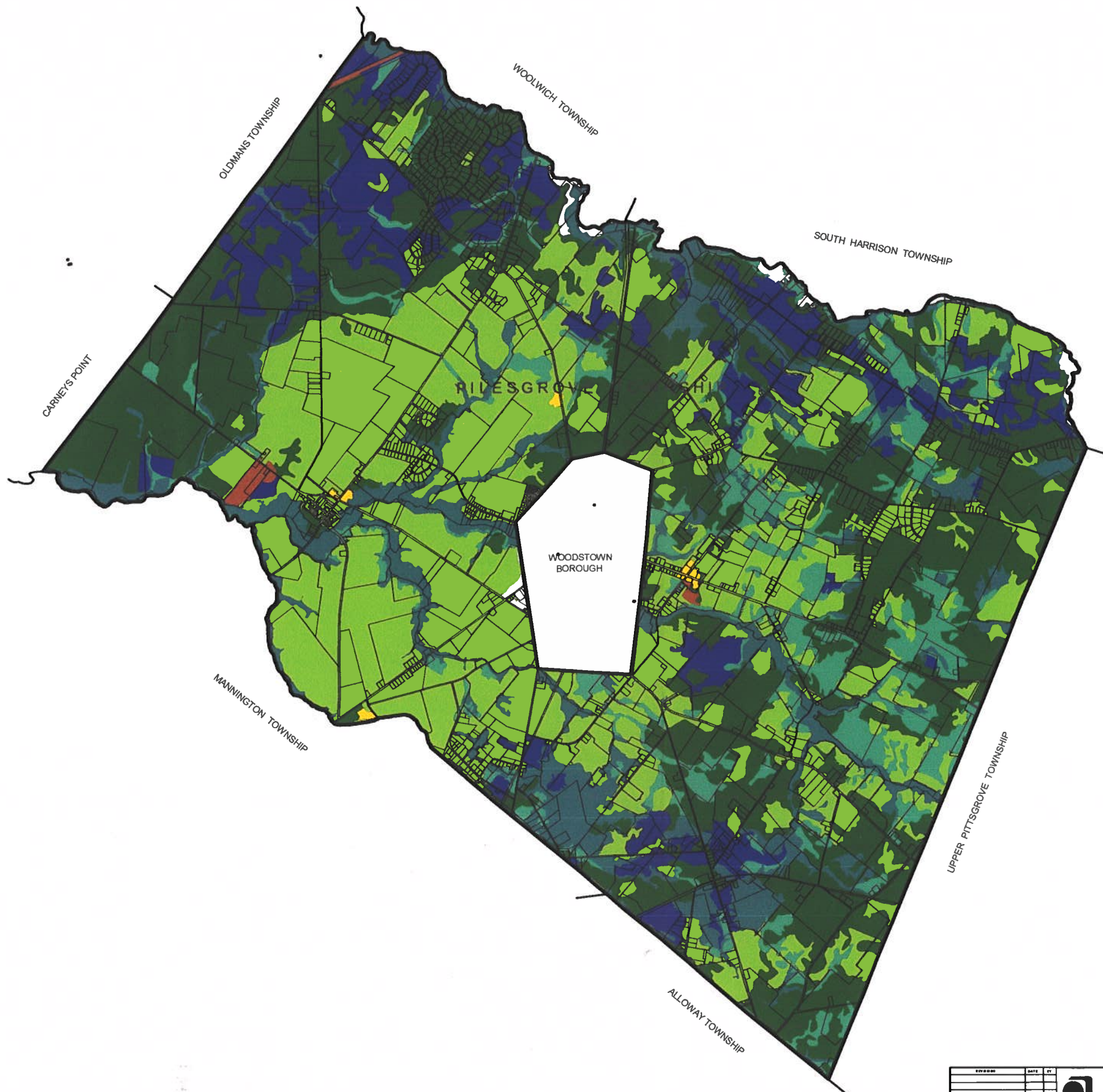
SOURCE:  
WOODSTOWN, N.J. PENNS-GROVE, N.J. & ALLOWAY, N.J.  
USGS 7.5 MINUTE QUADS

FIGURE 4

NOTE: PARCEL MAPPING PREPARED BY CIVIL SOLUTIONS 8/28/02

<div><div></div><div><div></div><div></div></div><div><div></div><div></div></div></div>	RICHARD A. ALAIMO ASSOCIATION OF ENGINEERS Consulting Engineers 200 High Street 2 Market Street Mount Holly, N.J. Petersen, N.J.	STORMWATER MANAGEMENT PLAN  GENERALIZED TOPOGRAPHY MAP  SCALE: 1" = 5,000' (APPROX.)	PROJECT: PILESGROVE TOWNSHIP SALEM COUNTY NEW JERSEY	DATE: FEB 2005	FIGURE: 4
				DESIGNED BY: C-725-027	
				CHECKED BY: MAC	
				DRAWN BY: C.J.W.	





- LEGEND**
- 12 to 15 in/yr
  - 10 to 11 in/yr
  - 7 to 9 in/yr
  - 1 to 6 in/yr
  - 0 in/yr
  - Hydric Soils
  - Wetlands and Open Water
  - No Recharge Calculated

**FIGURE 5**

NOTE: PARCEL MAPPING PREPARED BY CIVIL SOLUTIONS 9/28/02

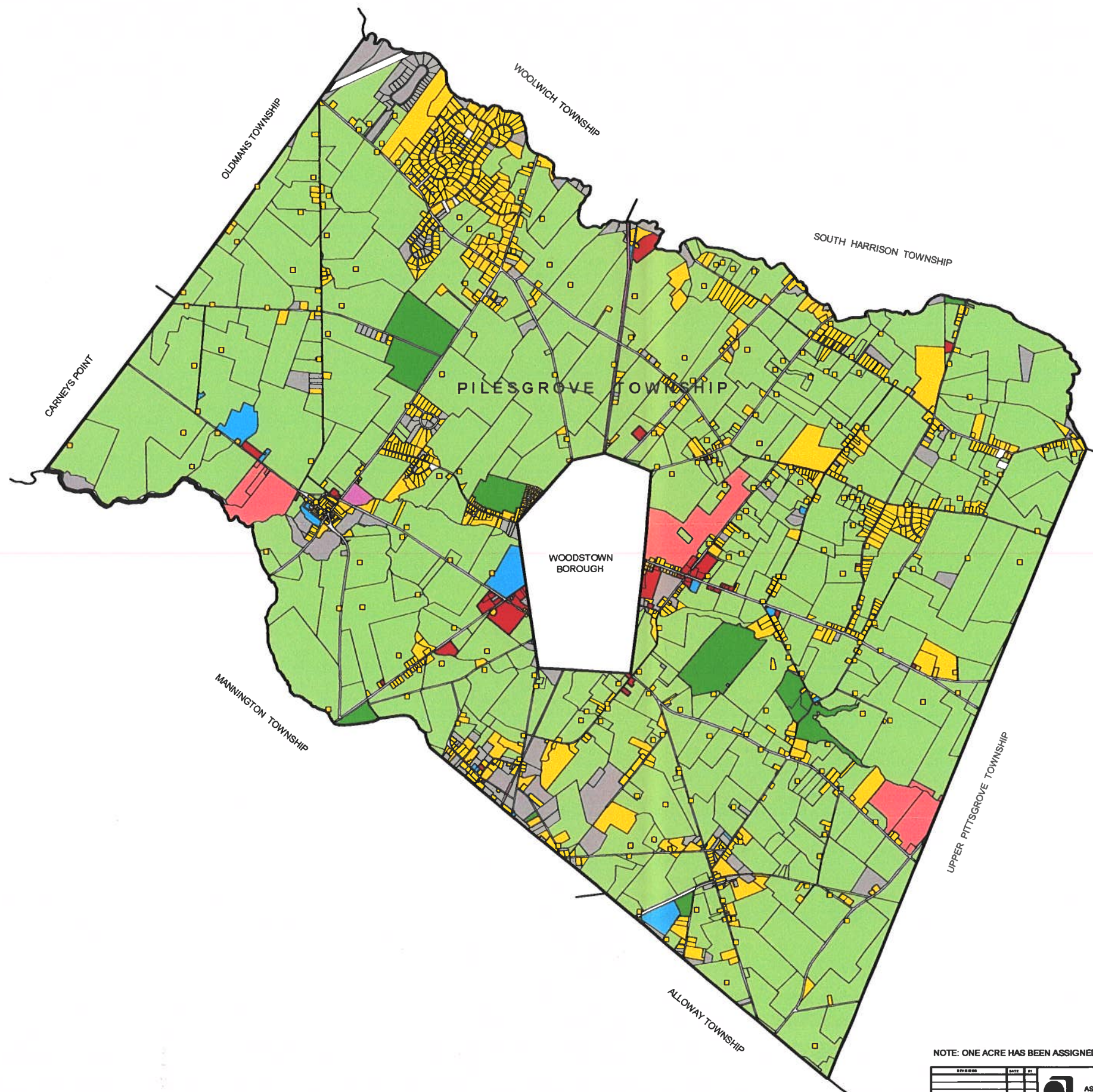
	<b>RICHARD A. ALAIMO</b> ASSOCIATION OF ENGINEERS Consulting Engineers 200 High Street 2 Market Street Mount Holly, N.J. Patterson, N.J.	<b>STORMWATER MANAGEMENT PLAN</b>		<b>PILESGROVE TOWNSHIP</b>	
		<b>GROUNDWATER RECHARGE AREAS AND WELLHEAD PROTECTION AREAS MAP</b>		PROJECT NO. C-725-027	
		SALEM COUNTY NEW JERSEY		DATE: FEB. 2005	
		SCALE: 1" = 5,000' (APPROX.)		DRAWN BY: C.J.W.	

FIGURE NO.

5

FILE NO.





- LEGEND:
- VACANT LAND
  - RESIDENTIAL
  - FARM (QUALIFIED)
  - COMMERCIAL RECREATION
  - COMMERCIAL
  - INDUSTRIAL
  - APARTMENT
  - PUBLIC / QUASI-PUBLIC FACILITY
  - PUBLIC PROPERTY (OPEN SPACE & RECREATION)

NOTE: ONE ACRE HAS BEEN ASSIGNED FOR RESIDENTIAL LAND USE ON QUALIFIED FARMS.

FIGURE 6

NOTE: PARCEL MAPPING PREPARED BY CIVIL SOLUTIONS 8/28/02

STORMWATER MANAGEMENT PLAN		PIESGROVE TOWNSHIP		DATE: FEB 2006	FIGURE: 6
EXISTING LAND USE MAP (2003)		PROJECT: PILES GROVE TOWNSHIP, SALEM COUNTY, NEW JERSEY		PROJECT NO: C-725-027	SCALE: 1" = 5,000' (APPROX.)
RICHARD A. ALAIMO ASSOCIATION OF ENGINEERS Consulting Engineers 200 High Street 2 Market Street Mount Holly, N.J. Petersburg, N.J.					





PLANNING DISTRICT LEGEND:

- AR-1** AGRICULTURAL RETENTION (ADA)
- AR-2** AGRICULTURAL RETENTION
- RR** RESTRICTED RESIDENTIAL
- SR** SINGLE FAMILY RESIDENTIAL
- SR-5** SINGLE FAMILY RESIDENTIAL (5 UNITS / ACRE)
- VN** VILLAGE NEIGHBORHOOD
- NC** NEIGHBORHOOD COMMERCIAL
- HC** HIGHWAY COMMERCIAL DISTRICTS
- PLI** PLANNED LIGHT INDUSTRIAL
- PPE** PUBLIC, PARKS, EDUCATION
- AFFORDABLE HOUSING**
- AGE RESTRICTED RESIDENTIAL CLUSTER OPTION**
- CONSERVATION DISTRICT**
- (CL)** CLUSTER OPTION

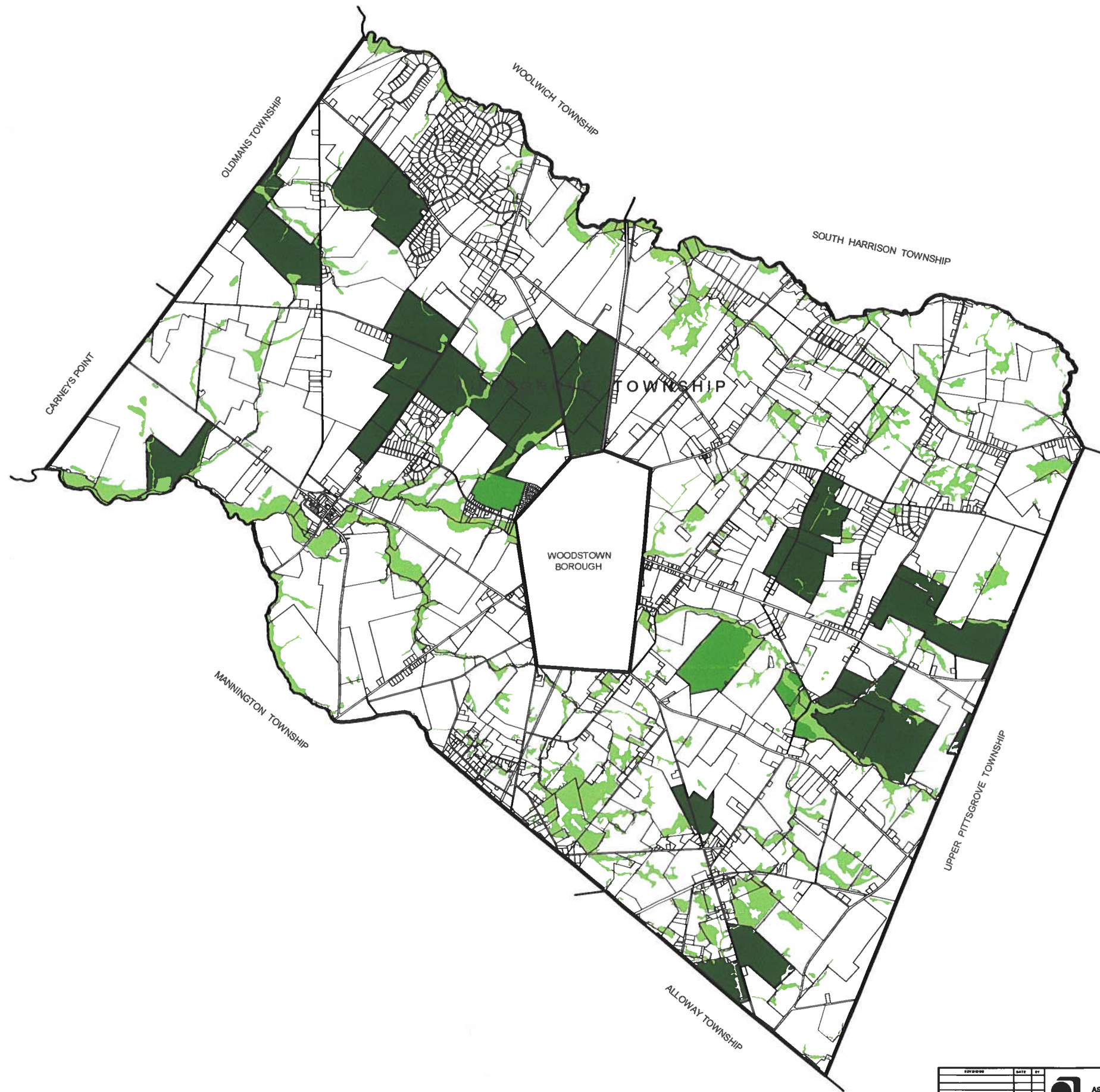
NOTE: CURRENT ZONING IN ADJACENT MUNICIPALITIES IS SHOWN FOR COMPARISON PURPOSES.

FIGURE 7

NOTE: PARCEL MAPPING PREPARED BY CIVIL SOLUTIONS 8/28/2002

	<b>RICHARD A. ALAIMO</b> ASSOCIATION OF ENGINEERS Consulting Engineers 200 High Street 2 Market Street Mount Holly, N.J. Patterson, N.J.	<b>STORMWATER MANAGEMENT PLAN</b>  <b>ZONING DISTRICT MAP</b>	CLIENT: <b>PILESGROVE TOWNSHIP</b>  PROJECT OWNER: PILESGROVE TOWNSHIP SALEM COUNTY NEW JERSEY	DATE: FEB 2005 DESIGNED BY: MAC CHECKED BY: C.J.W.	FIGURE <b>7</b> FILE NO.:





LEGEND:





-  N.J.D.E.P. 1995, WETLANDS RESOURCE DATA
-  PRESERVED FARMLAND
-  PUBLIC LANDS

FIGURE 8

NOTE: PARCEL MAPPING PREPARED BY CIVIL SOLUTIONS 8/28/02

DIVISION	DATE	BY		STORMWATER MANAGEMENT PLAN		PROJECT NO.		DATE	FIGURE NO.
				CONSTRAINED LANDS		PILES GROVE TOWNSHIP		FEB. 2005	8
						PROJECT NO.		08/27/07	
						PILES GROVE TOWNSHIP			
						SALEM COUNTY			
			200 High Street	Mount Holly, N.J.	NEW JERSEY		DESIGNED BY	C.J.W.	FIGURE NO.
			2 Market Street	Pittsboro, N.J.			CONTRACT NO.		
					SCALE: 1" = 5,000' (APPROX.)				

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**Piles Grove Township Master Plan  
Stormwater Management Plan Element**

**Appendix  
Draft Solid Waste Management Ordinance**

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**Pilesgrove Township Master Plan  
Stormwater Management Plan Element  
*Draft Solid Waste Management Ordinance***

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**Section 1: 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 measures and proper maintenance plans. Nonstructural measures include both environmentally sensitive site design and source controls that prevent pollutants from being placed on the site. Source control plans should be developed based upon physical site conditions and the origin, nature, and the anticipated loading 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.

**C. Applicability**

This ordinance shall be applicable to any site plan or subdivision that requires preliminary or final site plan review.

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

Development approvals issued 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.

**Section 2: 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 this section. To the maximum extent feasible, 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. Such alternative standards shall provide at least as much protection from stormwater-related loss of groundwater recharge, stormwater quantity and water quality impacts of major development projects as would be provided under the standards in this subchapter.
3. For site improvements regulated under the Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21, the RSIS shall apply in addition to this section except to the extent the RSIS are superseded by this section or alternative standards applicable under a regional stormwater management plan or Water Quality Management Plan adopted in accordance with Department rules.

### **Section 3: 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.
- 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 at Sections 3.F and 3.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 at Sections 3.F and 3.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 3.F and 3.G to the maximum extent

practicable;

3. The applicant demonstrates that, in order to meet the requirements at Sections 3.F and 3.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 for requirements of Sections 3.F and 3.G that were not achievable on-site.

**E. Nonstructural Stormwater Management Strategies**

1. To the maximum extent practicable, the standards in 3.F and 3.G shall be met by incorporating nonstructural stormwater management strategies at 3.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 3.E.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 measures 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. These source controls include, but are not limited to:



- (1) Site design features that help to prevent accumulation of trash and debris in drainage systems;
  - (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. Any land area used as a nonstructural stormwater management measure to meet the performance standards in Sections 3.F and 3.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.
4. Guidance for nonstructural stormwater management measures is available in the New Jersey Stormwater Best Management Practices Manual. The manual is available on the Department of Environmental Protection's stormwater web page at <http://www.njstormwater.org>.

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

1. This section 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 4, either:
      - (a) Demonstrate through hydrologic and hydraulic analysis that the site and its stormwater management measures maintain 100% 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 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 4, complete one of the following:
  - (1) Demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the 2, 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 2, 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 12 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 6, or found on the Department's website at [www.njstormwater.org](http://www.njstormwater.org). The BMP Manual and other sources of technical guidance are listed in Section 6. 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% 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

<b>Table 2: TSS Removal Rates for BMPs</b>	
<b>Best Management Practice</b>	<b>TSS % Removal Rate</b>
Bioretention Systems	90
Constructed Stormwater Wetland	90
Extended Detention Basin	40-60
Infiltration Structure	80
Manufactured Treatment Device	See Section 5.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% 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 3.F and 3.G.
6. Additional information and examples are contained in the New Jersey Stormwater Best Management Practices Manual.
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. 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% TSS post-construction removal rate;
    - (3) Temperature shall be addressed to ensure no impact on 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 2.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. This subsection 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 effective date of the Stormwater Management Rules, provided that the construction begins on or before five years from effective date of the Stormwater Management Rules.

#### **Section 4: 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 4.A.1.a and the Rational and Modified Rational Methods at Section 4.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 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 5: 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 7.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 7.
- 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 this subchapter.
- C. Manufactured treatment devices may be used to meet the requirements of this subchapter, provided the pollutant removal rates are verified by the New Jersey corporation for Advanced Technology and certified by the Department.

#### **Section 6: 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, 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 7: 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 subchapter applies to any new stormwater management basin.
- B. The provisions of this section are not intended to preempt more stringent municipal or county safety requirements for new or existing stormwater management basins.
- C. 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 subsection, 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

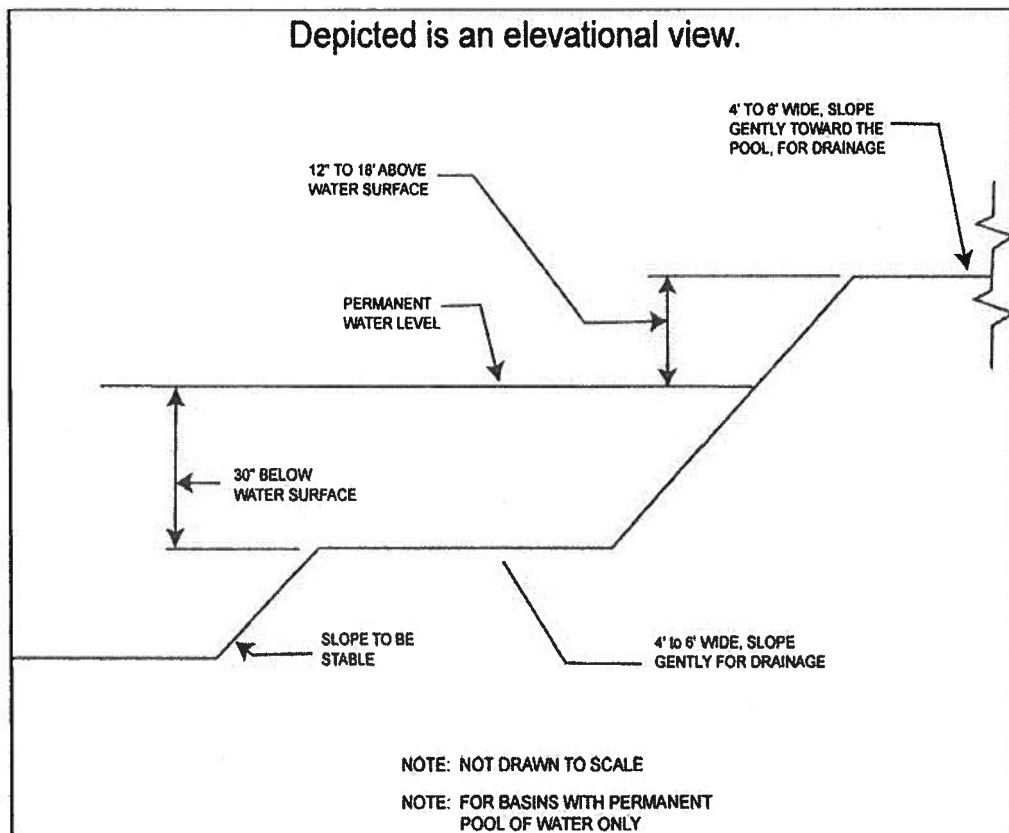
agency identified in Section 7.D a freestanding outlet structure may be exempted from this requirement.

- 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 7.E 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.

D. 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.

E. Illustration of Safety Ledges in a New Stormwater Management Basin



## **Section 8: 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 8.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 8.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 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 1 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 2 through 5 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 3 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 soil types 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 9.

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 8.C.1 through 8.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 9: Maintenance and Repair**

A. Applicability

1. Projects subject to review as in Section 1.C of this ordinance shall comply with the requirements of Section 9.B and 9.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 9.B.2 above is not a public agency, the maintenance plan and any future revisions based on Section 9.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 9.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 9.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 9.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 9.B.6 and 9.B.7 above.
  9. The requirements of Sections 9.B.3 and 9.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, 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. 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.
- C. Penalties

Any responsible person who violates any portion or section of this ordinance shall be subject to the following penalties: [Municipality to specify].

#### **Section 10: Effective Date**

This ordinance shall take effect upon the approval by the county review agency, or sixty (60) days after submission to the county review agency if they fail to act.

#### **Section 11: Severability**

If the provisions of any article, 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 article, section, subsection, paragraph, subdivision, or clause of this ordinance.

#### **Section 12: 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.

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

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

"Compaction" means the increase in soil bulk density.

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

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

A county planning agency; or

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

"Department" means the New Jersey Department of Environmental Protection.

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

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

"Development" means the division of a parcel of land into two or more parcels, the construction, reconstruction, conversion, structural alteration, relocation or enlargement of any building or structure, any mining excavation or landfill, and any use or change in the use of any building or other structure, or land or extension of use of land, 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 constrained area" means the following areas where the physical alteration of the land is in some way restricted, either through regulation, easement, deed restriction or ownership such as: wetlands, floodplains, threatened and endangered species sites or designated habitats, and parks and preserves. 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.

"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 that seeps into the soil from precipitation.

"Major development" means any "development" that provides for ultimately disturbing one or more acres of land or increasing impervious surface by one-quarter acre 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. Projects undertaken by any government agency which otherwise meet the definition of "major development" but which do not require approval under the Municipal Land Use Law, N.J.S.A. 40:55D-1 et seq. are also considered "major development."

"Municipality" means any city, borough, town, township, or village.

"Node" means an area designated by the State Planning Commission concentrating facilities and activities which are not organized in a compact form.

"Nutrient" means a chemical element or compound, such as nitrogen or phosphorus, which is essential to and promotes the development of organisms.

"Person" means any individual, corporation, company, partnership, firm, association, or political subdivision of this State and any state, interstate or federal agency.

"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.

“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.