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INTRODUCTION

A Stormwater Management Plan is required by N.J.A.C. 7:14A-25 Municipal Stormwater Regulations and the Township's Stormwater NJPDES Permit (NJG 0149098). This Stormwater Management Plan contains all the elements required in N.J.A.C. 7:8 Stormwater Management Rules and is consistent with the N.J. Residential Site Improvement Standards (NJSIS) at N.J.A.C. 5:21 and the Standards for Soil Erosion and Sediment Control in New Jersey. The Pennsville Township Stormwater Management Plan documents the strategy for the Township to address stormwater related issues and impacts in the Township and its water bodies. The plan addresses stormwater design and performance standards that the Township will implement to deal with stormwater quantity, stormwater quality and groundwater recharge. The design and performance standards shall be implemented for any new major development. New major development is defined as a project that disturbs one or more acres of land. The Standards are intended to minimize the adverse impact of stormwater runoff on water quality, water quantity and the loss of groundwater recharge that provides base flow to the aquifers and receiving water bodies. The plan describes long term operation and maintenance measures for existing and future stormwater facilities and the use of non-structural strategies to control and reduce the impacts of stormwater runoff.

The Plan provides background information on the Township with statistical data and maps, and addresses stormwater related issues in the Township. The plan also includes a review of and proposed amendments to existing ordinances and the Township Master Plan to allow for project designs that include the use of non-structural strategies and low impact development techniques. The final component is a mitigation plan for when a variance or exemption of the design and performance standards is sought. A mitigation plan allows for variances or exemptions by providing alternate strategies within the watershed to offset the impacts of the variance or exemption.

The Township's Stormwater Management Plan is subject to review by the Salem County Planning Board and/or Engineer to determine whether the plan meets the standards required by the Stormwater Management Rules. A copy of the adopted plan must also be sent to the NJDEP, Dept of Watershed Mgt. The County must approve, conditionally approve, or disapprove the plan in writing within 60 days. Generally the plan becomes effective upon approval by the County; however, in the case of conditional approvals, the plan becomes effective after the municipality meets the conditions of approval.

GOALS

The goals of the Pennsville Township Stormwater Management Plan are to:

- Reduce flood damage, including damage to life and property;
- Minimize, to the extent practical, any increase in stormwater runoff from any new development;
- Reduce soil erosion from any development or construction project;
- Assure the adequacy of existing and proposed culverts and bridges, and other in-stream structures;
- Maintain groundwater recharge;

- Prevent, to the greatest extent feasible, an increase in non-point pollution;
 - Maintain the integrity of stream channels for their biological functions, as well as for drainage;
 - Require use of low impact development techniques to protect the Township's material features and environmentally sensitive areas;
 - Protect water quality to preserve the Township's aquifers and public water supply;
 - Minimize pollutants in stormwater runoff from new and existing development to restore, enhance, and maintain the chemical, physical, and biological integrity of the waters of the state, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, and other uses of water; and
 - Protect public safety through the proper design and operation of stormwater basins.
- The goals and objectives of the Pennsville Township Master Plan that are related to and that comply with the intentions of the Stormwater Management Plan are:
- Pennsville should grow and develop. However, environmentally sensitive areas of the Township should be protected.
 - To continue and expand upon land use policies that promote controlled development at suitable locations and appropriate intensities, by attracting and limiting development to areas where sanitary sewer and public water supplies exist or are planned.
 - To provide sound land use policies, procedures and regulations that serve the needs of the community for housing, community services, communications and a safe and healthful environment.
 - To protect sensitive environmental resources from destruction or degradation, including, but not limited to rivers, wetlands, stream corridors, potable waters supplies and aquifers.

OBJECTIVES:

1. Minimize the impacts of development on environmentally sensitive areas including wetlands, stream corridors, wellhead protection and aquifer recharge areas.
2. Prepare development ordinances that provide for buffers to protect Wellhead Protection Areas, prevent contamination of the groundwater resources and provide for landscape buffers where development is permitted adjacent to existing residences.

STORMWATER DISCUSSION

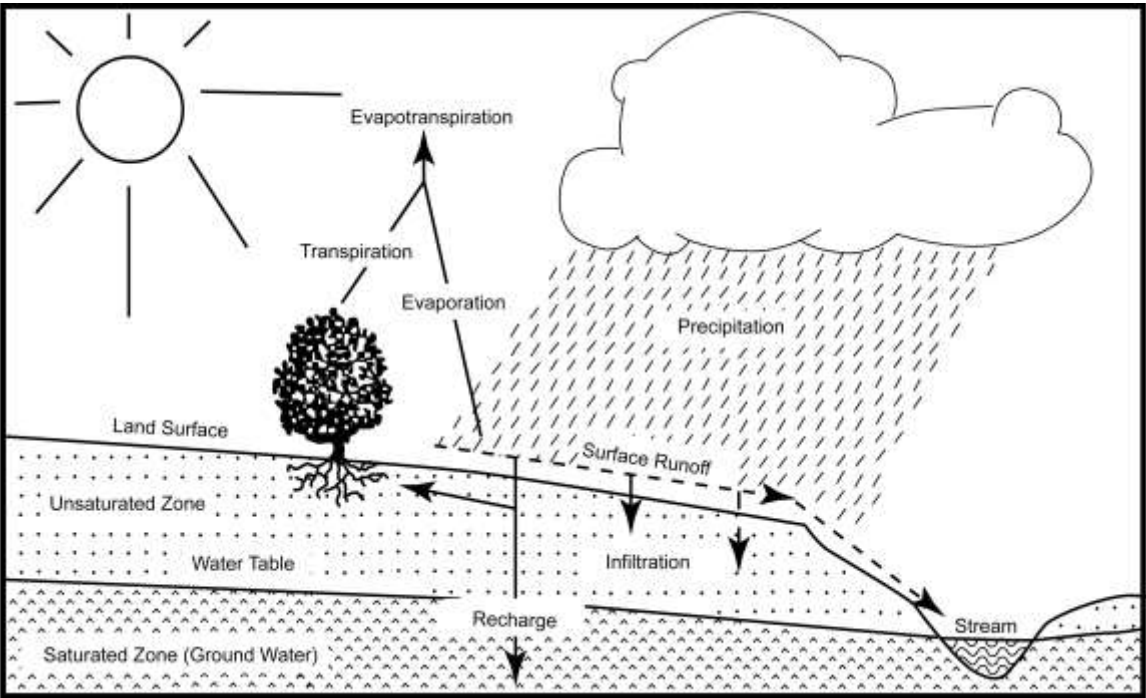
Land development can dramatically alter the hydrologic cycle (Figure 1) of a site and, ultimately, an entire watershed. Prior to development, native vegetation can either directly intercept precipitation or draw that portion that has infiltrated into the ground and return it to the atmosphere through 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. Increases in impervious area can also decrease opportunities for infiltration which, in turn, reduces stream base flow and groundwater recharge. Reduced base flows and increased peak flows produce greater fluctuations between normal and storm flow rates, which can increase channel erosion. Reduced base flows can also negatively impact the hydrology of adjacent wetlands and the health of biological communities that depend on base flows. Finally, erosion and sedimentation can destroy habitat from which some species cannot adapt.

In addition to increases in runoff peaks, volumes, and loss of groundwater recharge, land development often results in the accumulation of pollutants on the land surface that runoff can mobilize and transport to streams. New impervious surfaces and cleared areas created by development can accumulate a variety of pollutants from the atmosphere, fertilizers, animal wastes, and leakage and wear from vehicles. Pollutants can include metals, suspended solids, hydrocarbons, pathogens, and nutrients.

In addition to increased pollutant loading, land development can adversely affect water quality and stream biota in more subtle ways. For example, stormwater falling on impervious surfaces or stored in detention or retention basins can become heated and raise the temperature of the downstream waterway, adversely affecting cold water fish species such as trout. Development can remove trees along stream banks that normally provide shading, stabilization, and leaf litter that falls into streams and becomes food for the aquatic community. (NJDEP's Stormwater Best Management Practices Manual, 2004)

Figure 1: Groundwater Recharge in the Hydrologic Cycle



Source: New Jersey Geological Survey Report GSR-32.

BACKGROUND

Named after the famous colonist William Penn, Pennsville is a riverfront community, located along the Delaware River in the northwest corner of Salem County. Pennsville Township has historically been an agricultural community and faces the challenges of a declining industrial economy.

Pennsville Township is a geographically diverse municipality. It consists of marshes, wetlands and waterways in the east, fertile farmlands in the south and southwestern portions of the town, while the north and central parts have grown to be primarily environmentally constrained land in that 57 percent of its land area is undevelopable wetlands or water bodies. The land areas that lay above the 10 foot contour line are considered more appropriate for development as they would be less likely to flood. Those areas are located at the northern end of the Township. (Pennsville Township Master Plan, 2002)

The Township of Pennsville encompasses a 24.4 square mile (15,606+/- acre) area in Salem County, New Jersey. The population has decreased from 13,794 in 1990 to 13,194 in 2000 (2000 Census Information). This population decrease may be directly related to the declining industrial economy. The land use in the Township is limited due to the vast extent of wetlands along the boundaries of the Township with the Delaware River and its contributing waterways. The remaining portions of land consist primarily of urban and agricultural land. There is a minimal amount of forested areas within the Township. The significance of protecting the Township's waterways and providing design and performance standards is essential as all of the waterways in the Township are tributaries of the Delaware River. Figure 2 depicts the waterways in the Township and Figure 3 depicts the Township boundary on the USGS Quadrangle Map.

GEOLOGY AND SOILS

Pennsville Township is located in the Atlantic Coastal Plain Physiographic Province. The Coastal Plain Province encompasses an area of 4,667 square miles or approximately sixty percent of the State. All of Salem County is located within this Province. The Atlantic Coastal Plain is composed of a sequence of unconsolidated highly permeable to relatively impermeable quartzose gravel, sand, silt, glauconitic sand and clay strata.

The Coastal Plain Province in New Jersey is further broken down into the Inner and Outer Coastal Plain. Pennsville Township lies within the Inner Coastal Plain. Soils within this Province are sandier and have a lower proportion of clay as compared to those in the Outer Coastal Plain.

The topography in Pennsville Township has very little undulation and is flat and gently sloping, which is characteristic to most of southern New Jersey within the Inner Coastal Plain. There are few problems with erosion due to the high permeability of the mainly level landscape. According to the U.S. Geological Survey, topographic quadrangles, the highest elevation in Pennsville Township is approximately 10 feet above sea level at the northern end of the Township. Pennsville Township has very few areas with slopes greater than five percent. (USGS Topographical Map)

The soils in Pennsville Township are composed of water deposited clays, silts and gravel associated with the surficial sediment of the Coastal Plain.

Pennsville Township consists of major soil associations or aggregated groups of soils.

GROUNDWATER AQUIFERS & RECHARGE AREAS

Aquifer recharge is an essential component of the hydrologic cycle and in protecting the Township's drinking water supply and public community water supply wells. Figure 5 indicates the public community water supply wells and the wellhead protection areas in the Township. A Well Head Protection Area (WHPA) in New Jersey is a map area calculated around a Public Community Water Supply (PCWS) well in New Jersey that delineates the horizontal extent of ground water captured by a well pumping at a specific rate over a two, five, and twelve-year period of time. The area of capture over two-, five-, and twelve-years is defined using line boundaries and polygon areas generated with Geographic Information System (GIS). GIS shape files are produced for each PCWS well and for the set of all PCWS wells in a county. WHPA delineations are conducted in response to the Safe Drinking Water Act Amendments of 1986 and 1996 as part of the Source Water Protection Program (SWAP). The delineations are the first step in defining the sources of water to a public supply well. Within these areas, potential contamination will be assessed and appropriate monitoring will be undertaken as subsequent phases of the NJDEP SWAP.

Aquifers are recharged and maintained by groundwater flows. Protecting the Township's groundwater recharge areas is essential to assure the quantity and quality of the Township's water resources. Figure 4 indicates the groundwater recharge areas in the Township. The NJDEP provides an estimation of ground-water recharge for New Jersey. Ground-water recharge is estimated using the NJGS methodology from NJ Geological Survey Report GSR-32 "A Method for Evaluation of Ground-Water-Recharge Areas in New Jersey. Land-use/land-cover, soil and municipality-based climatic data were combined and used to produce an estimate of ground-water recharge in inches/year. Recharge is then ranked by volume (billions of gallons/year) using natural breaks in the percentage of total volume.

The primary ground surface formation in Pennsville Township is the surficial sediments of the Coastal Plain. The primary aquifer in the Township is the Potomac-Raritan-Magothy Aquifer (PRM) and is generally comprised of unconsolidated sand and gravels. The PRM provides water in excess of 500 gallons per minute. The PRM aquifer is the primary source of drinking water for Pennsville Township. Recent concerns with water supply from the PRM have prompted the NJDEP and United States Geological Service to initiate a study regarding the risk of salt water intrusion and the capacity of the PRM to support current and projected supply demands (Pennsville Township Master Plan, 2002)

RIVERS, STREAMS, AND WATER BODIES

There are twenty-one (21) Watershed Management Areas (WMA), designating the different watersheds in the State of New Jersey. Pennsville Township lies entirely within Watershed Management Area 17, also known as the Delaware Bay Drainage Area. All of the waterways in the Township are tributaries of the Delaware River. The main tributaries (waterbodies) listed from north to south as they converge with the Delaware River are: the Salem Canal, Miles Creek, an unnamed tributary that is just south of Fort Mott Park, Mill Creek, Baldrige Creek and the Salem River. All of the Township's waterways are classified by the NJDEP as FW2/NT, freshwater non-trout producing. Parts of the Baldrige Creek waterway have been classified as category one waters by the NJDEP, indicating the existence of exceptional environmental resources. Category one waters are protected from new development and redevelopment by 300 foot buffers. The Township's waterways and category one waters are indicated on the Township Waterways Map (Figure 2).

The Pennsville Township flood prone areas are associated with the vast wetlands and waterways throughout the Township. Flood prone areas provide a measurement of the danger or probability of flooding. Flooding results from the overflowing of a waterbody onto adjacent land and also can occur as the result of a rise in the water table. The areas adjacent to waterbodies that are at level or slightly higher elevations than the waterbody and that are subject to flooding and erosion are typically classified as flood prone areas.

Flood prone areas are classified on the probable occurrence of a storm event occurring once every 100 years or once every 500 years. Hazards in the flood prone areas are measured through determining the 100 year and 500 year floodplains. The "flood hazard" area is composed of three parts: 1) the stream channel, which is the normal stream flow; 2) the floodway, which is the area on either side of the stream or waterbody which must be kept free of obstruction in order to contain the 100 year flood flows; 3) the flood fringe which are areas that are susceptible to a 500 year flood flow.

WATER QUALITY

Surface water quality standards and assessments throughout the State are provided by the NJDEP through the Biological monitoring of freshwater systems. The Ambient Biomonitoring Network (AMNET) is one of the Department of Environmental Protection's major ongoing monitoring programs. This statewide network of over 800 stations employs sampling and taxonomic analysis of in-stream macroinvertebrate communities to assess the ecological condition at each station. Macroinvertebrates are larger than microscopic, primarily benthic (bottom-dwelling) fauna, which are generally ubiquitous in freshwater and estuarine environments, and play an integral role in the aquatic food web. Insects (largely immature forms) are especially characteristic of freshwaters; other major groups include worms, mollusks (snails, clams) and crustaceans (scuds, shrimp, crayfish, etc.). These bioassessments utilize several community "biometrics", such as pollution tolerances of individual taxa; the product of this multi-metric analysis assigns one of three biological "impairment" levels rating a given site as non-impaired, moderately impaired or severely impaired. The results are considered reflective of the water or habitat quality at each site. AMNET data is also very useful for designation of Category 1 waters based on exceptional ecological significance.

Results are reported separately for New Jersey's five major drainage basins or "Water Regions" (Upper and Lower Delaware, Northeast, Raritan and Atlantic), each encompassing several sub-basins ("Water Management Areas"). The Water Regions, with an average of 165 AMNET sites each, are sampled in consecutive years on a five-year rotational basis. Of 197 AMNET sites currently in the Lower Delaware Water Region, 31 (15.7%) were found non-impaired, 139 (70.6%) moderately impaired, and 27 (13.7%) severely impaired. Overall, there were considerably fewer non-impaired sites in the Lower Delaware Region than in the other four New Jersey Water Regions, previously sampled in the current AMNET round. Appendix "B" includes a map of the AMNET Stations and impairment status of the Waterways as provided by the NJDEP. Specific AMNET Macroinvertebrate Data is included as collected from AMNET Stations located within the Township.

Biological impairment is manifested by alterations or differences in macroinvertebrate community structure, compared to a reference or "ideal" condition. In an impaired situation, species of pollution-tolerant groups (such as worms and midges) tend to dominate over pollution-intolerant forms (e.g. mayflies, stoneflies, etc.), with an overall depression in species diversity. Such discrepancies are typically due to degraded instream environmental conditions, which may be caused by various human activities or land uses and, in some cases, by natural features or events.

Inter-related human activities or practices, land uses, and natural features or events contributing to degraded stream quality:

1. Deforestation/development/construction (largely via runoff from non-point sources)
2. Urbanization/industrialization (largely via runoff from non-point sources)
3. Agricultural operations (largely via runoff from non-point sources)
4. Municipal or industrial wastewater discharge (from point source)
5. Artificial channelization or habitat alteration
6. Upstream impoundment, lake or pond
7. Drought conditions

Study results reflect that, human land uses and practices, superimposed on the undisturbed physical terrain, play a major role in controlling the degree of pollution or degradation in a stream system. (NJDEP, Ambient Bio Monitoring Network Report, 2003).

Watershed Management Area Seventeen (#17) includes a total of 74 AMNET sites in the Maurice, Salem, and Cohansey River watersheds. The site data and results for WMA 17 indicate that 25.7% (nineteen sites) are nonimpaired, 66.2% (49 sites) are moderately impaired and 8.1% (six sites) are severely impaired. Comparing the current results to the earlier results, a significant improvement is seen at thirteen sites and a significant decline, at ten sites.

The number of nonimpaired sites is slightly higher than earlier data, and the number of moderately impaired sites is slightly decreased. The number of severely impaired sites remains

the same. The trend for NJIS scores is upward from moderately impaired to borderline nonimpaired levels and, for habitat scores, upward from high suboptimal to optimal levels. Abnormalities were found in significant numbers at two sites (both on Maurice River tributaries, Cumberland County), while fifteen additional sites exhibited lower numbers of abnormalities in chironomid larvae and other invertebrate families. The table below presents a synopsis AMNET data for WMA #17;

WMA #17 Combined Results - Table 1

NJIS Rating	1995/96		2000/2001		Habitat Assessment	2000/2001	
Non-Impaired	16	21.9%	19	25.7%	Optimal	38	51.4%
Moderate	51	69.9%	49	66.2%	Sub Optimal	34	45.9%
Severe	6	8.2%	6	8.1%	Marginal	2	2.7%
Total Sites	73		74			74	

The municipality should develop a list of specific areas that are affected by stormwater quantity problems so that they can be addressed with Township projects or new land development activities/projects.

WETLANDS

Wetlands consist of areas that are inundated or saturated by surface water or groundwater at a frequency and duration to support a prevalence of vegetation typically adopted for life in saturated soil conditions, commonly known as hydrophytic vegetation. Wetlands are designated using a three parameter approach evaluating hydrology, soils and vegetation. Wetlands, serve many important functions, including minimizing flooding and improving water quality. Wetlands also promote habitat for many species of wildlife including federal and state-listed endangered and/or threatened species.

Wetlands and waterways contribute 57% of the land use in Pennsville Township and are generally located along the Delaware River and the riparian corridors of the rivers and streams. The vast wetlands and marshlands contain unique vegetation and wildlife. Currently, the Atlantic White Cedar is the only endangered woodland species known in Pennsville. The most prevalent type of wetlands are coastal shallow freshwater marshes, such as Mannington Meadows and salt water meadows. The creeks, wetlands and marshland areas provide water quality benefits and excess storage capacity for stormwater (Pennsville Township Master Plan, 2000).

PROTECTED NATURAL AREAS

The protected natural areas and wildlife management areas in the Township are: Killcohook Wildlife Management Area, Fort Mott State Park and Supawna Meadows National Wildlife Refuge. These national areas are located in the southern portion of the Township and are associated with the tributaries and wetlands areas along the Delaware River.

DESIGN AND PERFORMANCE STANDARDS

The Township's Stormwater NJPDES Permit requires the amendment or adoption of a Stormwater Control Ordinance that is in conformance with the Stormwater Management Rules at NJAC 7:8-5 and the provided model stormwater control ordinance provided by the NJDEP. A stormwater control ordinance is required to be amended or adopted by April 1, 2006. A copy of the NJDEP model stormwater control ordinance is included in Appendix "A".

The Township will adopt the design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8-5 to minimize the adverse impact of stormwater runoff on water quality and water quantity and the 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 Township's Stormwater Management Control Ordinance is to be submitted to the Salem County Planning Board and the NJDEP Bureau of Non Point Pollution Control after it is adopted by the Township.

On February 2, 2004, the NJDEP's new Stormwater Management Rules were published in the New Jersey Register and became effective (36 N.J.R. 670(a) and 781(a)). The new Stormwater Management Rules provide a framework and incentives for managing runoff and resolving nonpoint source impairment on a drainage area basis for new development and redevelopment. The Stormwater Management Rules promote low impact site design techniques to maintain natural vegetation and drainage characteristics before incorporating structural Best Management Practices (BMP's).

Stormwater management measures for major development shall be developed to meet the erosion control, groundwater recharge, stormwater runoff quantity, and stormwater runoff quality standards. To the maximum extent practicable, these standards shall be met by incorporating nonstructural stormwater management strategies into the design. If these strategies alone are not sufficient to meet these standards, structural stormwater management measures necessary to meet these standards shall be incorporated into the design.

The standards apply only to new major development and redevelopment and are intended to minimize the impact of stormwater runoff on water quality and water quantity in receiving water bodies and maintain groundwater recharge. Major development is defined as a project that disturbs one or more acres. 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 NJDEP Rules.

The Stormwater Management rules, N.J.A.C. 7:8 specify stormwater management standards that are mandatory for new major development and redevelopment. The New Jersey Stormwater Best Management Practices Manual (BMP manual) is developed to provide guidance to address the standards in the Stormwater Management Rules. The BMP manual provides examples of ways to meet the standards contained in the rule. The methods referenced in the BMP manual are one way of achieving the standards. The BMP Manual was developed by the New Jersey Department of Environmental Protection, in coordination with the

New Jersey Department of Agriculture, the New Jersey Department of Community Affairs, the New Jersey Department of Transportation, municipal engineers, county engineers, consulting firms, contractors, and environmental organizations.

The Stormwater Management Standards for Major Development consist of the following:

- The development shall incorporate a maintenance plan for the stormwater management measures incorporated into the design of a major development (NJAC 7:8-5.8).
- Stormwater management measures shall avoid adverse impacts of stormwater runoff on habitat for threatened and endangered species (NJAC 7:8-5.2).
- To the maximum extent practicable, the standards shall be met by incorporating nonstructural stormwater management strategies into the design (NJAC 7:8-5.3).
- Major development projects shall meet the groundwater recharge requirements (NJAC 7:8-5.4) through either:

Demonstrating through hydrologic and hydraulic analysis that the site and its stormwater management measures maintain 100 percent of the average annual pre-construction groundwater recharge volume for the site; or

Demonstrating 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.

Hydraulic impact on the groundwater table must be reviewed. 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 down-gradient of the groundwater recharge area.

The groundwater recharge requirement does not apply to projects within the "urban-redevelopment area," or to projects subject to stormwater from areas of high pollutant loading or Industrial stormwater. Hydraulic impact on the groundwater table must be evaluated and the site shall be designed 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.

- Major development projects shall meet the stormwater runoff quantity requirements (NJAC 7:8-5.4) by completing one of the following:

Demonstrating through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction stormwater runoff for the two, 10, and 100-year storm events do not exceed, at any point in time, the pre-construction stormwater runoff for the same storm events; or

Demonstrating through hydrologic and hydraulic analysis that there is no increase, as compared to the pre-construction condition, in the peak runoff rates of stormwater leaving the site for the two, 10, and 100-year storm events and that the increased volume or change in timing of stormwater runoff will not increase flood damage at or downstream of the site; or

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.

- Major development projects shall meet the Stormwater quality requirements (NJAC 7:8-5.5) by designing:

Stormwater management measures 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. Stormwater management measures shall only be required for water quality control if an additional $\frac{1}{4}$ 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.

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.

Special water resource protection areas and category one designated waters are required to maintain 300 foot buffers for the protection of water quality, aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance and exceptional fisheries significance.

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

PLAN CONSISTENCY

The Township is not within the Regional Stormwater Management Planning Area and no TMDL's (total maximum Daily Loads) of pollutants have been developed for waters within the Township; therefore this plan does not need to be consistent with any regional stormwater management plans (RSWMPs) nor any TMDLs. If any RSWMPs or TMDLs are developed in the future, this Municipal Stormwater Management Plan will be updated to be consistent.

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

The Township shall adopt or amend a Stormwater Control Ordinance in accordance with the Stormwater Management Rules (N.J.A.C. 7:8) and the model stormwater control ordinance provided by the NJDEP. The stormwater management ordinance shall require all new development and redevelopment plans to comply with New Jersey's Soil Erosion and Sediment Control Standards. During construction, Township inspectors will observe on-site soil erosion and sediment control measures and report any inconsistencies to the Salem/Cumberland County Soil Conservation District.

NONSTRUCTURAL STORMWATER MANAGEMENT STRATEGIES

Applying Non Structural Stormwater Management Strategies requires the amending or adopting of ordinances to promote low impact development. Low impact development entails utilizing strategies to minimize or eliminate the adverse impacts of development on the environment and the Township's natural features. These strategies are intended to reduce and/or prevent adverse stormwater runoff impacts through sound site planning and both non-structural and structural techniques that preserves the predeveloped conditions of the site. The first and most important step to comply with this requirement is to adopt an ordinance that is in conformance with NJAC 7:8 Stormwater Management Rules and the model stormwater control ordinance provided by the NJDEP.

Nonstructural stormwater management strategies incorporated into site design shall:

- Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;
- Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces;
- Maximize the protection of natural drainage features and vegetation;
- 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;
- Minimize land disturbance including clearing and grading;
- Minimize soil compaction;
- Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides;
- Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas;

- 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.

In addition to the design and performance standards for nonstructural strategies, the municipal stormwater management plan must provide a review and evaluation to determine how the Township's Master plan and Land Development Ordinances should be amended to implement the principles of nonstructural stormwater management. Municipalities are required to evaluate the municipal master plan, and land use and zoning ordinances to determine what adjustments need to be made to allow the implementation of nonstructural stormwater management measures, also called low impact development techniques.

The Rules of N.J.A.C. 7:15 require a review of the Township's Master Plan. The Pennsville Township Master Plan, adopted in December of 2002, provides a detailed analysis of the Township and its goals and objectives. The Township Master Plan contains an environmental element and a land use section. The Plan identifies the importance of land use standards to protect the environment and the importance of open space and preservation. The Pennsville Township Master Plan is consistent with the goals of the NJDEP Stormwater Management Rules and Regulations.

The Pennsville Township Land Development Regulations have been reviewed for consistency with the strategies for low impact development as required by the Stormwater Management Rules at N.J.A.C. 7:8-4. This evaluation has been conducted to determine what adjustments need to be made to allow the implementation of non-structural stormwater management techniques. The following list contains the existing ordinance regulations that promote low impact development and a list of recommended modifications that are in **bold**. The ordinances identified for revision shall be reviewed and assessed by the Township. Upon completion of the revisions to the land development ordinances, the attached sections shall be submitted to the County Review Agency for review and approval by April 1, 2006. A copy shall also be sent to the NJDEP at the time of submission.

The consideration for and preservation of existing and proposed vegetation can provide protection against adverse impacts of stormwater runoff. Regulations should include requirements to preserve existing vegetated areas, minimize turf grass lawn areas, and use native vegetation. Minimizing Land Disturbance - The goal is to limit clearing, grading and other disturbance associated with development to protect existing features that provide stormwater benefits. Heavy construction vehicles should be limited to specific areas, such as proposed roadways. The intent is to minimize compaction of the soils. These areas should be required to be identified on the plans and marked in the field. The maximum setbacks recommended for low impact development designs are: front yard 20 feet, rear yard – 25 feet; side yards = 8 feet. Impervious Area Management – The amount of impervious area and its relationship to adjacent vegetated areas, can significantly change the amount of runoff that needs to be addressed by BMP's. Most of a site's impervious substances are typically located in the streets, sidewalks, driveways, rooftops and parking areas. Street widths of 18 to 22 feet are recommended for low impact development designs in low density residential developments. Minimum driveway width of 9 and 18 feet for one lane and two lanes respectively are also recommended. The use of vegetated channels, rather than standard concrete curb and gutters, can decrease stormwater flow velocity and allow for stormwater filtration and re-infiltration. A design option is to allow vegetated channels to convey smaller storm events and provide an overflow into a stormwater system for larger storm events.

Section 5.3 General Requirements - **This section should be amended to promote Low Impact Development Techniques. Any land disturbance over one (1) acre should be required to comply with the Stormwater Control Ordinance. This section should be amended to allow pervious material and/or porous paving.**

Section 5.16 Easements for Off-Lot Grading & Drainage - This section requires easements for off lot grading and drainage.

Section 5.16B Soil Erosion & Sediment Control Act Requirements - The requirements of this Section 5.16 are in addition to the requirements of the New Jersey Soil Erosion and Sediment Control Act (N.J.S.4:24-39, et seq.), which authorizes the New Jersey Soil Conservation Committee and the Salem County Soil Conservation District to evaluate project disturbance areas and off-site impacts (including general site grading and drainage) for purposes of soil erosion and sediment control, and to confirm compliance with vegetative and engineering standards promulgated by the Committee. **[Neither the Township Engineer nor any other Township official shall be required to inspect for compliance with the requirements of the Soil Erosion and Sediment Control Act at any development site. This sentence should be deleted.]**

Section 5.16C - **This section should require conformance with the Stormwater Control Ordinance and the NJAC Stormwater Rules for Land Disturbances greater than one (1) acre.**

Section 7.8 Design Standards for Major Subdivision **This section should allow and promote cluster developments. Specific requirements should be provided including provisions for open space and buffers.**

Section 8.1 Design Standards Purpose - The purpose of this Chapter is to provide design standards for improvements that are proposed or required as part of site plan, subdivision, variance and other applications for development made pursuant to this Ordinance. These standards will apply to all matters that are not subject to the requirements of the New Jersey Residential Site Improvement Standards.

Section 8.2 New Jersey Residential Site Improvement Standards - This section requires conformance with the NJRSIS.

Section 8.2A Site Design - **This section should promote low impact development and the use of non-structural stormwater management strategies.**

Section 8.3C Off Street Parking - **The NJDEP recommends this category should allow for previous paving or porous paving. Provisions should be included to disconnect impervious access to allow for bioretention and recharge areas, The percentage of required landscaping should be reviewed. Native vegetation should be promoted. Curbing & Guttering – Should not be required except where necessary.**

Section 8.3D - Drainage - **This section should promote non-structural stormwater management strategies and conformance with the Stormwater Control Ordinance.**

Section 8.3D - Storm Drain Inlets installed as part of new development and redevelopment projects (public or private) that disturb one acre or more are subject to the requirements of this subparagraph 9. In addition, retrofitting of existing storm drain inlets to this standard is required where such inlets are in direct contact with repaving, repairing, reconstruction or alterations of facilities owned or operated by the Township. The storm drain inlet requirement conforms to the NJDEP Design and Performance Standards for Storm Drain Inlets.

Section 8.3D13 – Road Drainage - The use of swales for road drainage purposes may be permitted at the discretion of the Township Planning Board for all development projects, provided that road drainage for subdivision projects must be reviewed according to the following provisions: In the case of subdivisions of fewer than twenty lots, the minimum lot sizes must be greater than one acre, and the swale grade must not exceed six percent or less than one-half of one percent. In the case of subdivisions with more than twenty lots, swales may only be permitted along roads in which reverse frontage has been provided. Where these conditions are not met or where drainage conditions warrant, curbing and guttering shall be required along all existing and proposed streets. In minor subdivisions, curbing and guttering may be required where drainage or traffic conditions warrant or when the subdivisions is in proximity to existing curbed and guttered areas.

Section 8.3D14 - Land Drainage - All surface drainage shall be piped unless the developer demonstrates that the use of swales is a more appropriate form of conveyance to the satisfaction of the Township Planning Board. The use of swales is discouraged where the adjacent lot sizes on the same tract are 25,000 square feet or less.

Section 8.3D15 - Swales – where permitted, are required to meet specific design criteria.

Section 8.3E Waterways & Outlets are to be protected against erosion by vegetative means as soon after construction as practical before diversions or other channels are outletted into them. Seeding, fertilizing, mulching and sodding shall be in accordance with the applicable standards as determined by the Soil Conservation Service of the State of New Jersey.

Section 8.3F - Buffering and Screening - **The use and presentation of native vegetation should be required. Buffer areas should be permitted to provide stormwater management measures.** Buffering shall be located around the perimeter of the site to minimize headlights of vehicles, noise, light from structures, the movement of people and vehicles, and to shield activities from adjacent properties when necessary. Buffering may consist of fencing, evergreens, shrubs, bushes, deciduous trees or combinations thereof to achieve the design objectives. All buffering must meet generally accepted standards and specifications. Landscaping techniques, such as terracing and creation of berms must be utilized for buffering and screening.

Section 8.3G - Landscaping: Trees - Every effort shall be made to preserve the landscape in its natural state or to improve existing site conditions in keeping with adjacent areas. Landscaping shall be provided as part of the overall project design and integrated into building arrangements, topography, parking and buffering requirements. Landscaping shall include trees, bushes, shrubs, ground cover, perennials, annuals and plants, and shall be designed according to generally accepted standards. A landscaping plan must be submitted

with each development application. The landscaping plan must identify and locate existing and proposed trees, shrubs, bushes, plants and ground cover. It also must indicate proposed alterations to the terrain. Additionally, the following principles should be followed:

The preservation of existing trees and vegetation is encouraged. Trees greater than fifteen (15) inches in diameter shall be incorporated into the landscaping plan. The grade around existing trees may not be varied more than six (6) inches unless properly designed tree wells are constructed.

The clearing of woodland shall be strictly controlled. The stripping of trees from a lot and the filling, or the alteration of the water table in wooded areas, shall be prohibited except if an extensive replacement tree planting program has been approved by the Township Planning Board. All development projects shall be designed to have minimal impact on existing woodland. The siting of structures shall be such as to preserve the maximum number of trees over fifteen inches in diameter and all trees over twenty four inches in diameter.

Shade Trees – In all development projects including major subdivisions, shade trees shall be provided along the frontage. Two trees properly planted, staked and fertilized shall be provided for every one hundred feet of road frontage except if an equivalent number of trees are preserved within fifty feet of the right –of-way. All shade trees shall meet the following requirements:

- a. Trees shall be a deciduous variety (oak, hard maple) native to the area and shall be approved by the Planning Board.
- b. Trees shall be nursery grown and shall have a mini-caliper of one and one-half inches measured three feet above the ground.
- c. Trees shall be planted where required by the Planning Board in a planting strip ten feet from the edge of the shoulder when the road has been designed according to the approved cross-sections.

Section 8.3J -Environmental Considerations - Environmental elements relating to soil erosion, preservation of trees, protection of watercourses, topography, soil and wildlife shall be reviewed and the design of the plan shall minimize any adverse impact on these elements.

Section 8.3K - Natural Features - The important natural features of a site shall be preserved in the design of all development projects in accordance with generally accepted standards. Natural features that shall be protected include the natural terrain, wetlands, wooded area, vistas, natural drainage-ways and lakes.

Section 9.2 Environmental Impact Statement - All applications for preliminary site plan approval requiring surface area land disturbance of more than 5,000 square feet, and all applications for major subdivision approval regardless of land disturbance area, must include a fully completed Checklist Schedule BB Environmental Impact Statement (EIS) unless waived.

Chapter 5 of the Township Code entitled “Zoning” has been reviewed for LID strategies. The Township is divided into the following zoning districts, differentiated according to use, area and bulk requirements:

CDB = Central Business District	CON - Conservation
C/O - Commercial/Office	R-1 – Residence District 1
COM - Commercial	R-2 – Residence District 2
LI - Light Industrial	R-3 – Residence District 3
HI - Heavy Industrial	

Each of these districts has a maximum percent impervious surface allocation. Although each zone has a maximum allowable percent impervious surface, the Township Code should remind developers that satisfying the percent of impervious requirements does not relieve them of responsibility for complying with the Design and Performance Standards for Stormwater Management Measures. The Township should also evaluate the maximum allowable impervious cover for each zone to determine whether a reduction in impervious cover is appropriate. **Approximately 25% of the Township lies within the Conservation District. The amount of impervious materials coverage permitted in the Conservation District (CONS), the R-2 and R-3 Residential should be reviewed to reduce the permitted amount of impervious coverage.** The Township should also evaluate a maximum percent of disturbance for each zone. Also, if a developer is given a variance to exceed the maximum allowable percent imperviousness, the developer should be required to mitigate the impact of the additional impervious surfaces. This mitigation effort must address water quality, flooding, and groundwater recharge. A detailed description of how to develop a mitigation plan is included in this Municipal Stormwater Management Plan.

Land Use/Build-Out Analysis

NJAC 7:8-4.2 requires that the stormwater management plan include a land use/build-out analysis. A build-out analysis allows the Township to project future development or redevelopment based on existing zoning and land use regulations. For each HUC 14 in the Township, the full development impervious cover and the anticipated pollutant loading is provided. A detailed land use build-out analysis for the Township was conducted. Figure 6 illustrates the existing land use in the Township based on 1995/97 GIS information from NJDEP. Figure 7 illustrates the HUC14s within the Township. HUC 14's are 14 digit Hydrologic Unit Codes assigned to small watersheds by the United States Geological Survey (USGS). These codes are used in the organization and assessment of the associated watersheds. The Township zoning

map is shown in Figure 8. Figure 2 (located in the Background section) illustrates the constrained lands within the Township. Constrained lands consist of land areas that are undevelopable or that contain physical and/or environmental constrictions. This would be the waterways and wetlands shown in Figure 2.

The build-out calculations for impervious cover are shown in Table 2. As expected when developing agricultural and forested lands, the build-out of these two HUC14s will result in a significant increase in impervious surfaces. Table 3 presents the pollutant loading coefficients by land cover as provided by NJDEP. The pollutant loads at full build-out are presented in Table 4. 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 3, converting agricultural lands to residential typically results in an increase in pollutant loads for metals and petroleum hydrocarbons. Also, total suspended solids loads due to stormwater runoff may decrease due to the conversion of agricultural lands to low density residential, but the percentage of impervious surfaces increases dramatically. If, due to the increase of impervious surfaces, increases in stormwater runoff flows are not managed properly, these high flows will increase streambank erosion, thereby increasing sediment loads to the receiving waters.

MITIGATION PLAN

A Mitigation Plan element is required in the Township's Stormwater Management Plan (NJAC 7:8-4.2). A Mitigation Plan provides measures to protect waterways and aquifers and prevents adverse impacts from stormwater runoff. The design and performance standards outlined in this plan focus on three areas: maintaining groundwater recharge, minimizing potential flooding impacts and minimizing water quality impacts from proposed development. Some projects have unique site specific conditions that prevent them from complying with the design and performance standards in this plan. In order for the Township to grant a waiver or exemption from the design and performance standards for groundwater recharge, stormwater runoff quality or quantity, the Stormwater Management Plan must include a mitigation progress documented in a Mitigation Plan.

The Mitigation Plan must identify the measures required to offset any potential impact created by granting the variance or exemption to the performances standards. Several strategies can be used to mitigate a development project and its impacts. Applicants can: identify, design and implement a compensating measure to mitigate impacts; complete a project identified by the Township as equivalent to the environmental impact created by the exemption or variance; or, provide funding for municipal projects that would address existing stormwater impacts.

All Mitigation Plans and review should consider the location of mitigation projects in relation to the property where the projected damage will occur. Mitigation should occur within the same drainage basin as that of the proposed development so that it provides benefits and protection similar to those that would have been achieved if the stormwater and recharge performance standards had been completely satisfied. Mitigation Plans should be prioritized towards the environmentally sensitive areas within the Township. The mitigation planning and approval process must also ensure that long term maintenance is achieved by clearly assigning responsibility for maintenance and by securing the funding and resources required to perform it. Mitigation should not be an option until it is clearly demonstrated that on-site compliance is not practical.

The Township is not required to grant a variance or exemption from the design and performance standards even though there is a mitigation plan. A mitigation plan simply provides options to meet the intent of the stormwater rules; The Township reserves the right to approve or deny any proposed mitigation measures, and any variances or exemptions in accordance with the Municipal Land Use Law.

Pennsville Township Mitigation Plan:

If a proposed development requests a variance or exemption from strict compliance with the groundwater recharge, stormwater quantity and stormwater quality requirements outlined in the Pennsville Township Stormwater Management Plan and ordinances, the applicant must provide mitigation in accordance with the following:

1. A Mitigation project must be implemented in the same drainage area as the proposed development. The project must provide additional groundwater recharge benefits, or protection from stormwater runoff quality and quantity from previously developed property that does not currently meet the design and performance standards outlined in the Stormwater Management Plan.
 - The applicant can select a project listed on the Municipal Stormwater Management Plan to compensate for the deficit from the performance standards resulting from the proposed project.
 - The applicant can obtain the necessary agreements to create a project to compensate for the deficit from the performance standards resulting from the proposed project.
2. The applicant must ensure the long-term maintenance of the project.
3. If a suitable mitigation site cannot be located in the same drainage area as the proposed development, the municipality may allow the applicant to provide funding to the municipality for an environmental enhancement project that has been identified in this Stormwater Management Plan. [This option would be available only if the MSWMP includes a list of environmental enhancement projects that provide groundwater recharge, control flooding, or control non point source pollution.] The funding must be equal to or greater than the cost to implement the mitigation outlined above, including the costs associated with purchasing the property or easement for mitigation and the costs associated with the long-term maintenance requirements of the mitigation measure.

List of Township's Environmental Enhancement Projects

The listed projects may be applied as a mitigation measure to compensate for a deficit from the Township's design and performance standards. The project must be reviewed and discussed with the Township and the Township Engineer prior to acceptance. More detailed information on the projects can be obtained from the Township Engineer.

GROUNDWATER RECHARGE

- Replacement of any impervious surface with permeable material or porous paving. This could include parking areas, sidewalks, walkways, bike paths.
- Riverview Park – Porous paving – additional recharge in basin.
- Retrofitting of any Township owned stormwater facility to provide additional recharge.
- Provide contribution to the revegetation and landscaping program.

WATER QUALITY

- Stream restoration project.
- Provide contribution to provide signs at parks – no wildlife feeding.
- Update or provide an Environmental Resources Inventory.
- Provide repairs at any stormwater outfall requiring repair or water quality measures.
- Provide contribution towards open space to preserve and protect the natural features and stormwater characteristics of the Township.

WATER QUANTITY

- Install stormwater management measures to reduce peak flow into a stream or water body.
- Possibility of reduce flooding.
- Reduce peak discharges in stormwater flow.

REFERENCES

New Jersey Department of Environmental Protection, Ambient Biomonitoring Network. 2000-2001

Benthic Macroinvertebrate Data, November, 2003.

New Jersey Department of Environmental Protection, Watershed Management.

New Jersey Department of Environmental Protection GIS Data.

New Jersey Department of Environmental Protection Guidance Document for Tier A Municipalities – Feb. 2004.

New Jersey Stormwater Best Management Practices Manual-Feb. 2004

Ron Rukenstein & Associates – Zoning Data

Salem County, New Jersey – GIS Data CD

Township of Pennsville – Master Plan & Land Development Ordinance

United States Department of Commerce, U.S. Census Bureau – 2000 US Census

United States Geological Survey (USGS) – Quadrangle Map.

APPENDIX “A”

NJDEP MODEL STORMWATER CONTROL ORDINANCE FOR MUNICIPALITIES

New Jersey Stormwater Best Management Practices Manual

April 2004

A P P E N D I X A

M O D E L S T O R M W A T E R C O N T R O L O R D I N A N C E F O R M U N I C I P A L I T I E S

Important note: *This sample ordinance is provided to assist municipalities in the development of municipal stormwater control ordinances and the incorporation of design and performance standards into municipal stormwater management plans. It is provided for information purposes only. It is important that current regulations are carefully reviewed before any portion of this draft ordinance is adopted.*

This model ordinance does not include a section on fees. The Department expects that the review of development applications under this ordinance would be an integral part of the municipal review of subdivisions and site plans. As a result, the costs to municipalities of reviewing development applications under this ordinance can be defrayed by fees charged for review of subdivisions and site plans under N.J.S.A. 40:55D-8.b.

Notes are provided in italics throughout this model stormwater control ordinance, and are not intended to be adopted as part of the ordinance.

An editable Word version of this model ordinance is available at <http://www.state.nj.us/dep/watershedmgt/bmpmanualfeb2004.htm>.

Section 1: Scope and Purpose

A. Policy Statement

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

Note: Municipalities are encouraged to participate in the development of regional stormwater management plans, and to adopt and implement ordinances for specific drainage area performance standards that address local stormwater management and environmental characteristics.

B. Purpose

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

C. Applicability

1. This ordinance shall be applicable to all site plans and subdivisions for the following major developments that require preliminary or final site plan or subdivision review:
 - a. Non-residential major developments; and
 - b. Aspects of residential major developments that are not pre-empted by the Residential Site Improvement Standards at N.J.A.C. 5:21.
2. This ordinance shall also be applicable to all major developments undertaken by *[insert name of municipality]*.

D. Compatibility with Other Permit and Ordinance Requirements

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

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

Section 2: Definitions

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

“CAFRA Planning Map” means the geographic depiction of the boundaries for Coastal Planning Areas, CAFRA Centers, CAFRA Cores and CAFRA Nodes pursuant to N.J.A.C. 7:7E-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, by any person, for which permission is required under the Municipal Land Use Law , N.J.S.A. 40:55D-1 et seq. In the case of development of agricultural lands, development means: any activity that requires a State permit; any activity reviewed by the County Agricultural Board (CAB) and the State Agricultural Development Committee (SADC), and municipal review of any activity not exempted by the Right to Farm Act , N.J.S.A 4:1C-1 et seq.

"Drainage area" means a geographic area within which stormwater, sediments, or dissolved materials drain to a particular receiving waterbody or to a particular point along a receiving waterbody.

"Environmentally critical areas" means an area or feature which is of significant environmental value, including but not limited to: stream corridors; natural heritage priority sites; habitat of endangered or threatened species; large areas of contiguous open space or upland forest; steep slopes; and well head protection and groundwater recharge areas. Habitats of endangered or threatened species are identified using the Department's Landscape Project as approved by the Department's Endangered and Nongame Species Program.

"Empowerment Neighborhood" means a neighborhood designated by the Urban Coordinating Council "in consultation and conjunction with" the New Jersey Redevelopment Authority pursuant to N.J.S.A 55:19-69.

"Erosion" means the detachment and movement of soil or rock fragments by water, wind, ice or gravity.

"Impervious surface" means a surface that has been covered with a layer of material so that it is highly resistant to infiltration by water.

"Infiltration" is the process by which water seeps into the soil from precipitation.

"Major development" means any "development" that provides for ultimately disturbing one or more acres of land. Disturbance for the purpose of this rule is the placement of impervious surface or exposure and/or movement of soil or bedrock or clearing, cutting, or removing of vegetation.

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

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

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

"Person" means any individual, corporation, company, partnership, firm, association, [*insert name of municipality*], or political subdivision of this State subject to municipal jurisdiction pursuant to the Municipal Land Use Law , N.J.S.A. 40:55D-1 et seq.

“Pollutant” means any dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, refuse, oil, grease, sewage sludge, munitions, chemical wastes, biological materials, medical wastes, radioactive substance (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.), thermal waste, wrecked or discarded equipment, rock, sand, cellar dirt, industrial, municipal, agricultural, and construction waste or runoff, or other residue discharged directly or indirectly to the land, ground waters or surface waters of the State, or to a domestic treatment works. “Pollutant” includes both hazardous and nonhazardous pollutants.

“Recharge” means the amount of water from precipitation that infiltrates into the ground and is not evapotranspired.

“Sediment” means solid material, mineral or organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water or gravity as a product of erosion.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

“Wetlands” or “wetland” means an area that is inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation.

Section 3: General Standards

A. Design and Performance Standards for Stormwater Management Measures

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

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

Section 4: Stormwater Management Requirements for Major Development

- A. The development shall incorporate a maintenance plan for the stormwater management measures incorporated into the design of a major development in accordance with Section 10.
- B. Stormwater management measures shall avoid adverse impacts of concentrated flow on habitat for threatened and endangered species as documented in the Department' Landscape Project or Natural Heritage Database established under N.J.S.A. 13:1B-15.147 through 15.150, particularly *Helonias bullata* (swamp pink) and/or *Clemmys muhlenbergi* (bog turtle).
- C. The following linear development projects are exempt from the groundwater recharge, stormwater runoff quantity, and stormwater runoff quality requirements of Sections 4.F and 4.G:
 - 1. The construction of an underground utility line provided that the disturbed areas are revegetated upon completion;
 - 2. The construction of an aboveground utility line provided that the existing conditions are maintained to the maximum extent practicable; and
 - 3. The construction of a public pedestrian access, such as a sidewalk or trail with a maximum width of 14 feet, provided that the access is made of permeable material.
- D. A waiver from strict compliance from the groundwater recharge, stormwater runoff quantity, and stormwater runoff quality requirements of Sections 4.F and 4.G may be obtained for the enlargement of an existing public roadway or railroad; or the construction or enlargement of a public pedestrian access, provided that the following conditions are met:
 - 1. The applicant demonstrates that there is a public need for the project that cannot be accomplished by any other means;
 - 2. The applicant demonstrates through an alternatives analysis, that through the use of nonstructural and structural stormwater management strategies and measures, the option selected complies with the requirements of Sections 4.F and 4.G to the maximum extent practicable;

3. The applicant demonstrates that, in order to meet the requirements of Sections 4.F and 4.G, existing structures currently in use, such as homes and buildings, would need to be condemned; and
4. The applicant demonstrates that it does not own or have other rights to areas, including the potential to obtain through condemnation lands not falling under D.3 above within the upstream drainage area of the receiving stream, that would provide additional opportunities to mitigate the requirements of Sections 4.F and 4.G that were not achievable on-site.

E. Nonstructural Stormwater Management Strategies

1. To the maximum extent practicable, the standards in Sections 4.F and 4.G shall be met by incorporating nonstructural stormwater management strategies set forth at Section 4.E into the design. The applicant shall identify the nonstructural measures incorporated into the design of the project. If the applicant contends that it is not feasible for engineering, environmental, or safety reasons to incorporate any nonstructural stormwater management measures identified in Paragraph 2 below into the design of a particular project, the applicant shall identify the strategy considered and provide a basis for the contention.
2. Nonstructural stormwater management strategies incorporated into site design shall:
 - a. Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;
 - b. Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces;
 - c. Maximize the protection of natural drainage features and vegetation;
 - d. Minimize the decrease in the "time of concentration" from pre-construction to post construction. "Time of concentration" is defined as the time it takes for runoff to travel from the hydraulically most distant point of the watershed to the point of interest within a watershed;
 - e. Minimize land disturbance including clearing and grading;
 - f. Minimize soil compaction;
 - g. Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides;
 - h. Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas;

- i. Provide other source controls to prevent or minimize the use or exposure of pollutants at the site, in order to prevent or minimize the release of those pollutants into stormwater runoff. Such source controls include, but are not limited to:
 - (1) Site design features that help to prevent accumulation of trash and debris in drainage systems, including features that satisfy Section 4.E.3. below;
 - (2) Site design features that help to prevent discharge of trash and debris from drainage systems;
 - (3) Site design features that help to prevent and/or contain spills or other harmful accumulations of pollutants at industrial or commercial developments; and
 - (4) When establishing vegetation after land disturbance, applying fertilizer in accordance with the requirements established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq., and implementing rules.
3. Site design features identified under Section 4.E.2.i.(2) above shall comply with the following standard to control passage of solid and floatable materials through storm drain inlets. For purposes of this paragraph, "solid and floatable materials" means sediment, debris, trash, and other floating, suspended, or settleable solids. For exemptions to this standard see Section 4.E.3.c below.
 - a. Design engineers shall use either of the following grates whenever they use a grate in pavement or another ground surface to collect stormwater from that surface into a storm drain or surface water body under that grate:
 - (1) The New Jersey Department of Transportation (NJDOT) bicycle safe grate, which is described in Chapter 2.4 of the NJDOT Bicycle Compatible Roadways and Bikeways Planning and Design Guidelines (April 1996); or
 - (2) A different grate, if each individual clear space in that grate has an area of no more than seven (7.0) square inches, or is no greater than 0.5 inches across the smallest dimension.

Examples of grates subject to this standard include grates in grate inlets, the grate portion (non-curb-opening portion) of combination inlets, grates on storm sewer manholes, ditch grates, trench grates, and grates of spacer bars in slotted drains. Examples of ground surfaces include surfaces of roads (including bridges), driveways, parking areas, bikeways, plazas, sidewalks, lawns, fields, open channels, and stormwater basin floors.

- b. Whenever design engineers use a curb-opening inlet, the clear space in that curb opening (or each individual clear space, if the curb opening has two or more clear spaces) shall have an area of no more than seven (7.0) square inches, or be no greater than two (2.0) inches across the smallest dimension.
- c. This standard does not apply:
 - (1) Where the review agency determines that this standard would cause inadequate hydraulic performance that could not practicably be overcome by using additional or larger storm drain inlets that meet these standards;
 - (2) Where flows from the water quality design storm as specified in Section 4.G.1 are conveyed through any device (e.g., end of pipe netting facility, manufactured treatment device, or a catch basin hood) that is designed, at a minimum, to prevent delivery of all solid and floatable materials that could not pass through one of the following:
 - (a) A rectangular space four and five-eighths inches long and one and one-half inches wide (this option does not apply for outfall netting facilities); or
 - (b) A bar screen having a bar spacing of 0.5 inches.
 - (3) Where flows are conveyed through a trash rack that has parallel bars with one-inch (1") spacing between the bars, to the elevation of the water quality design storm as specified in Section 4.G.1; or
 - (4) Where the New Jersey Department of Environmental Protection determines, pursuant to the New Jersey Register of Historic Places Rules at N.J.A.C. 7:4-7.2(c), that action to meet this standard is an undertaking that constitutes an encroachment or will damage or destroy the New Jersey Register listed historic property.
- 4. Any land area used as a nonstructural stormwater management measure to meet the performance standards in Sections 4.F and 4.G shall be dedicated to a government agency, subjected to a conservation restriction filed with the appropriate County Clerk's office, or subject to an approved equivalent restriction that ensures that measure or an equivalent stormwater management measure approved by the reviewing agency is maintained in perpetuity.
- 5. Guidance for nonstructural stormwater management strategies is available in the New Jersey Stormwater Best Management Practices Manual. The BMP Manual may be obtained from the address identified in Section 7, or found on the Department's website at www.njstormwater.org.

F. Erosion Control, Groundwater Recharge and Runoff Quantity Standards

1. This subsection contains minimum design and performance standards to control erosion, encourage and control infiltration and groundwater recharge, and control stormwater runoff quantity impacts of major development.
 - a. The minimum design and performance standards for erosion control are those established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq. and implementing rules.
 - b. The minimum design and performance standards for groundwater recharge are as follows:
 - (1) The design engineer shall, using the assumptions and factors for stormwater runoff and groundwater recharge calculations at Section 5, either:
 - (a) Demonstrate through hydrologic and hydraulic analysis that the site and its stormwater management measures maintain 100 percent of the average annual pre-construction groundwater recharge volume for the site; or
 - (b) Demonstrate through hydrologic and hydraulic analysis that the increase of stormwater runoff volume from pre-construction to post-construction for the 2-year storm is infiltrated.
 - (2) This groundwater recharge requirement does not apply to projects within the "urban redevelopment area," or to projects subject to (3) below.
 - (3) The following types of stormwater shall not be recharged:
 - (a) Stormwater from areas of high pollutant loading. High pollutant loading areas are areas in industrial and commercial developments where solvents and/or petroleum products are loaded/unloaded, stored, or applied, areas where pesticides are loaded/unloaded or stored; areas where hazardous materials are expected to be present in greater than "reportable quantities" as defined by the United States Environmental Protection Agency (EPA) at 40 CFR 302.4; areas where recharge would be inconsistent with Department approved remedial action work plan or landfill closure plan and areas with high risks for spills of toxic materials, such as gas stations and vehicle maintenance facilities; and

- (b) Industrial stormwater exposed to "source material." "Source material" means any material(s) or machinery, located at an industrial facility, that is directly or indirectly related to process, manufacturing or other industrial activities, which could be a source of pollutants in any industrial stormwater discharge to groundwater. Source materials include, but are not limited to, raw materials; intermediate products; final products; waste materials; by-products; industrial machinery and fuels, and lubricants, solvents, and detergents that are related to process, manufacturing, or other industrial activities that are exposed to stormwater.
 - (4) The design engineer shall assess the hydraulic impact on the groundwater table and design the site so as to avoid adverse hydraulic impacts. Potential adverse hydraulic impacts include, but are not limited to, exacerbating a naturally or seasonally high water table so as to cause surficial ponding, flooding of basements, or interference with the proper operation of subsurface sewage disposal systems and other subsurface structures in the vicinity or downgradient of the groundwater recharge area.
- c. In order to control stormwater runoff quantity impacts, the design engineer shall, using the assumptions and factors for stormwater runoff calculations at Section 5, complete one of the following:
- (1) Demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the two, 10, and 100-year storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events;
 - (2) Demonstrate through hydrologic and hydraulic analysis that there is no increase, as compared to the pre-construction condition, in the peak runoff rates of stormwater leaving the site for the two, 10, and 100-year storm events and that the increased volume or change in timing of stormwater runoff will not increase flood damage at or downstream of the site. This analysis shall include the analysis of impacts of existing land uses and projected land uses assuming full development under existing zoning and land use ordinances in the drainage area;
 - (3) Design stormwater management measures so that the post-construction peak runoff rates for the 2, 10 and 100 year storm events are 50, 75 and 80 percent, respectively, of the pre-construction peak runoff rates. The percentages apply only to the post-construction stormwater runoff that is attributable to the portion of the site on which the proposed

development or project is to be constructed. The percentages shall not be applied to post-construction stormwater runoff into tidal flood hazard areas if the increased volume of stormwater runoff will not increase flood damages below the point of discharge; or

- (4) In tidal flood hazard areas, stormwater runoff quantity analysis in accordance with (1), (2) and (3) above shall only be applied if the increased volume of stormwater runoff could increase flood damages below the point of discharge.

2. Any application for a new agricultural development that meets the definition of major development at Section 2 shall be submitted to the appropriate Soil Conservation District for review and approval in accordance with the requirements of this section and any applicable Soil Conservation District guidelines for stormwater runoff quantity and erosion control. For the purposes of this section, "agricultural development" means land uses normally associated with the production of food, fiber and livestock for sale. Such uses do not include the development of land for the processing or sale of food and the manufacturing of agriculturally related products.

G. Stormwater Runoff Quality Standards

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

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

2. For purposes of TSS reduction calculations, Table 2 below presents the presumed removal rates for certain BMPs designed in accordance with the New Jersey Stormwater Best Management Practices Manual. The BMP Manual may be obtained from the address identified in Section 7, or found on the Department's website at www.njstormwater.org. The BMP Manual and other sources of technical guidance are listed in Section 7. TSS reduction shall be calculated based on the removal rates for the BMPs in Table 2 below. Alternative removal rates and methods of calculating removal rates may be used if the design engineer provides documentation demonstrating the capability of these alternative rates and methods to the review agency. A copy of any approved alternative rate or method of calculating the removal rate shall be provided to the Department at the following address: Division of Watershed Management, New Jersey Department of Environmental Protection, PO Box 418 Trenton, New Jersey, 08625-0418.
3. If more than one BMP in series is necessary to achieve the required 80 percent TSS reduction for a site, the applicant shall utilize the following formula to calculate TSS reduction:

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

Where

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

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

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

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

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

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

- (1) Stabilization measures shall not be placed within 150 feet of the Category One waterway;
 - (2) Stormwater associated with discharges allowed by this section shall achieve a 95 percent TSS post-construction removal rate;
 - (3) Temperature shall be addressed to ensure no impact on the receiving waterway;
 - (4) The encroachment shall only be allowed where the applicant demonstrates that the functional value and overall condition of the special water resource protection area will be maintained to the maximum extent practicable;
 - (5) A conceptual project design meeting shall be held with the appropriate Department staff and Soil Conservation District staff to identify necessary stabilization measures; and
 - (6) All encroachments proposed under this section shall be subject to review and approval by the Department.
- d. A stream corridor protection plan may be developed by a regional stormwater management planning committee as an element of a regional stormwater management plan, or by a municipality through an adopted municipal stormwater management plan. If a stream corridor protection plan for a waterway subject to Section 4.G(8) has been approved by the Department of Environmental Protection, then the provisions of the plan shall be the applicable special water resource protection area requirements for that waterway. A stream corridor protection plan for a waterway subject to G.8 shall maintain or enhance the current functional value and overall condition of the special water resource protection area as defined in G.8.a.(1) above. In no case shall a stream corridor protection plan allow the reduction of the Special Water Resource Protection Area to less than 150 feet as measured perpendicular to the waterway subject to this subsection.
- e. Paragraph G.8 does not apply to the construction of one individual single family dwelling that is not part of a larger development on a lot receiving preliminary or final subdivision approval on or before February 2, 2004 , provided that the construction begins on or before February 2, 2009.

Section 5: Calculation of Stormwater Runoff and Groundwater Recharge

- A. Stormwater runoff shall be calculated in accordance with the following:
1. The design engineer shall calculate runoff using one of the following methods:
 - a. The USDA Natural Resources Conservation Service (NRCS) methodology, including the NRCS Runoff Equation and Dimensionless Unit Hydrograph, as described in the NRCS National Engineering Handbook Section 4 – Hydrology and Technical Release 55 – Urban Hydrology for Small Watersheds; or

- b. The Rational Method for peak flow and the Modified Rational Method for hydrograph computations.
 2. For the purpose of calculating runoff coefficients and groundwater recharge, there is a presumption that the pre-construction condition of a site or portion thereof is a wooded land use with good hydrologic condition. The term "runoff coefficient" applies to both the NRCS methodology at Section 5.A.1.a and the Rational and Modified Rational Methods at Section 5.A.1.b. A runoff coefficient or a groundwater recharge land cover for an existing condition may be used on all or a portion of the site if the design engineer verifies that the hydrologic condition has existed on the site or portion of the site for at least five years without interruption prior to the time of application. If more than one land cover have existed on the site during the five years immediately prior to the time of application, the land cover with the lowest runoff potential shall be used for the computations. In addition, there is the presumption that the site is in good hydrologic condition (if the land use type is pasture, lawn, or park), with good cover (if the land use type is woods), or with good hydrologic condition and conservation treatment (if the land use type is cultivation).
 3. In computing pre-construction stormwater runoff, the design engineer shall account for all significant land features and structures, such as ponds, wetlands, depressions, hedgerows, or culverts, that may reduce pre-construction stormwater runoff rates and volumes.
 4. In computing stormwater runoff from all design storms, the design engineer shall consider the relative stormwater runoff rates and/or volumes of pervious and impervious surfaces separately to accurately compute the rates and volume of stormwater runoff from the site. To calculate runoff from unconnected impervious cover, urban impervious area modifications as described in the NRCS Technical Release 55 – Urban Hydrology for Small Watersheds and other methods may be employed.
 5. If the invert of the outlet structure of a stormwater management measure is below the flood hazard design flood elevation as defined at N.J.A.C. 7:13, the design engineer shall take into account the effects of tailwater in the design of structural stormwater management measures.
- B. Groundwater recharge may be calculated in accordance with the following:
1. The New Jersey Geological Survey Report GSR-32 A Method for Evaluating Groundwater Recharge Areas in New Jersey, incorporated herein by reference as amended and supplemented. Information regarding the methodology is available from the New Jersey Stormwater Best Management Practices Manual; at <http://www.state.nj.us/dep/njgs/>; or at New Jersey Geological Survey, 29 Arctic Parkway, P.O. Box 427 Trenton, New Jersey 08625-0427; (609) 984-6587.

Section 6: Standards for Structural Stormwater Management Measures

- A. Standards for structural stormwater management measures are as follows:
1. Structural stormwater management measures shall be designed to take into account the existing site conditions, including, for example, environmentally critical areas, wetlands; flood-prone areas; slopes; depth to seasonal high water

table; soil type, permeability and texture; drainage area and drainage patterns; and the presence of solution-prone carbonate rocks (limestone).

2. Structural stormwater management measures shall be designed to minimize maintenance, facilitate maintenance and repairs, and ensure proper functioning. Trash racks shall be installed at the intake to the outlet structure as appropriate, and shall have parallel bars with one-inch (1") spacing between the bars to the elevation of the water quality design storm. For elevations higher than the water quality design storm, the parallel bars at the outlet structure shall be spaced no greater than one-third (1/3) the width of the diameter of the orifice or one-third (1/3) the width of the weir, with a minimum spacing between bars of one-inch and a maximum spacing between bars of six inches. In addition, the design of trash racks must comply with the requirements of Section 8.D.
 3. Structural stormwater management measures shall be designed, constructed, and installed to be strong, durable, and corrosion resistant. Measures that are consistent with the relevant portions of the Residential Site Improvement Standards at N.J.A.C. 5:21-7.3, 7.4, and 7.5 shall be deemed to meet this requirement.
 4. At the intake to the outlet from the stormwater management basin, the orifice size shall be a minimum of two and one-half inches in diameter.
 5. Stormwater management basins shall be designed to meet the minimum safety standards for stormwater management basins at Section 8.
- B. Stormwater management measure guidelines are available in the New Jersey Stormwater Best Management Practices Manual. Other stormwater management measures may be utilized provided the design engineer demonstrates that the proposed measure and its design will accomplish the required water quantity, groundwater recharge and water quality design and performance standards established by Section 4 of this ordinance.
- C. Manufactured treatment devices may be used to meet the requirements of Section 4 of this ordinance, provided the pollutant removal rates are verified by the New Jersey Corporation for Advanced Technology and certified by the Department.

Section 7: Sources for Technical Guidance

- A. Technical guidance for stormwater management measures can be found in the documents listed at 1 and 2 below, which are available from Maps and Publications, New Jersey Department of Environmental Protection, 428 East State Street, P.O. Box 420, Trenton, New Jersey, 08625; telephone (609) 777-1038.
 - 1. Guidelines for stormwater management measures are contained in the New Jersey Stormwater Best Management Practices Manual, as amended. Information is provided on stormwater management measures such as: bioretention systems, constructed stormwater wetlands, dry wells, extended detention basins, infiltration structures, manufactured treatment devices, pervious paving, sand filters, vegetative filter strips, and wet ponds.
 - 2. The New Jersey Department of Environmental Protection Stormwater Management Facilities Maintenance Manual, as amended.
- B. Additional technical guidance for stormwater management measures can be obtained from the following:
 - 1. The "Standards for Soil Erosion and Sediment Control in New Jersey" promulgated by the State Soil Conservation Committee and incorporated into N.J.A.C. 2:90. Copies of these standards may be obtained by contacting the State Soil Conservation Committee or any of the Soil Conservation Districts listed in N.J.A.C. 2:90-1.3(a)4. The location, address, and telephone number of each Soil Conservation District may be obtained from the State Soil Conservation Committee, P.O. Box 330, Trenton, New Jersey 08625; (609) 292-5540;
 - 2. The Rutgers Cooperative Extension Service, 732-932-9306; and
 - 3. The Soil Conservation Districts listed in N.J.A.C. 2:90-1.3(a)4. The location, address, and telephone number of each Soil Conservation District may be obtained from the State Soil Conservation Committee, P.O. Box 330, Trenton, New Jersey, 08625, (609) 292-5540.

Section 8: Safety Standards for Stormwater Management Basins

- A. This section sets forth requirements to protect public safety through the proper design and operation of stormwater management basins. This section applies to any new stormwater management basin.

Note: The provisions of this section are not intended to preempt more stringent municipal or county safety requirements for new or existing stormwater management basins. Municipal and county stormwater management plans and ordinances may, pursuant to their authority, require existing stormwater management basins to be retrofitted to meet one or more of the safety standards in Sections 8.B.1, 8.B.2, and 8.B.3 for trash racks, overflow grates, and escape provisions at outlet structures.

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

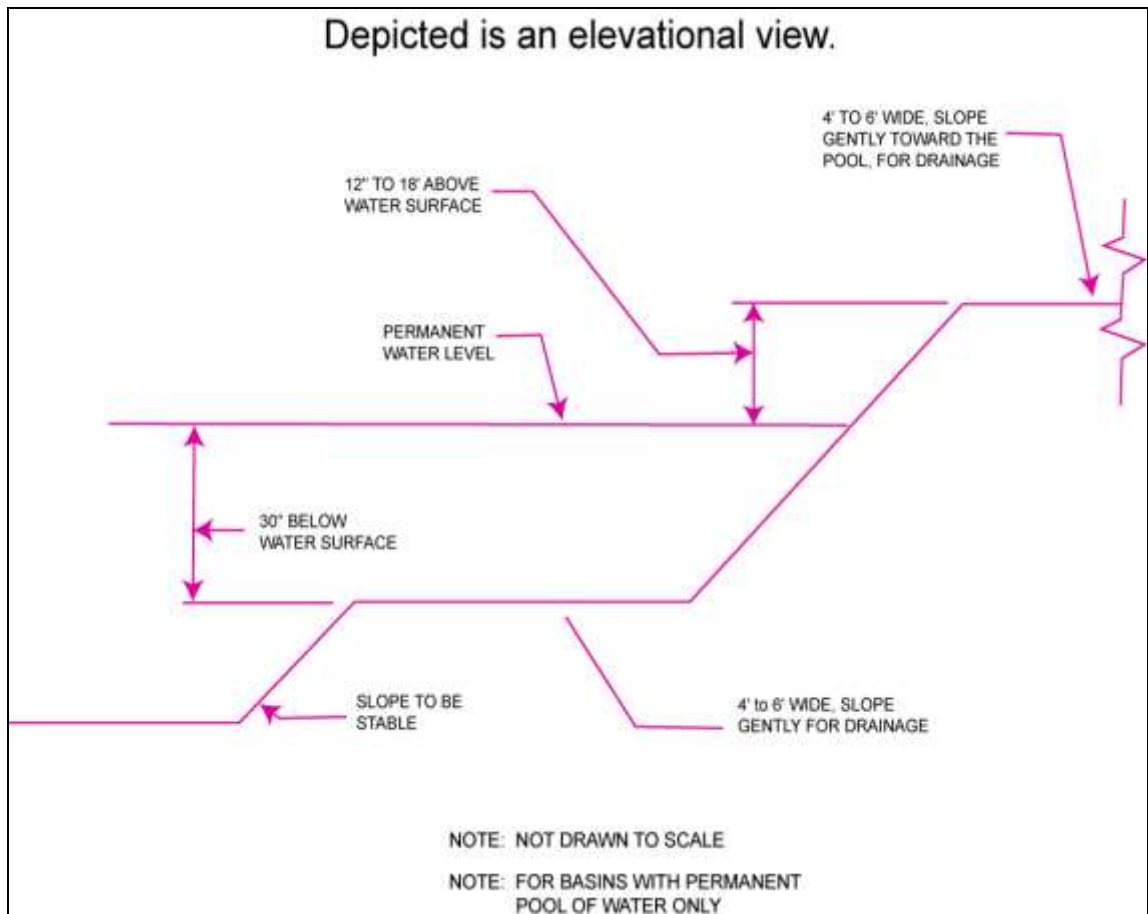
1. A trash rack is a device designed to catch trash and debris and prevent the clogging of outlet structures. Trash racks shall be installed at the intake to the outlet from the stormwater management basin to ensure proper functioning of the basin outlets in accordance with the following:
 - a. The trash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

- a. If a stormwater management basin has an outlet structure, escape provisions shall be incorporated in or on the structure. With the prior approval of the reviewing agency identified in Section 8.C a free-standing outlet structure may be exempted from this requirement.
- b. Safety ledges shall be constructed on the slopes of all new stormwater management basins having a permanent pool of water deeper than two and one-half feet. Such safety ledges shall be comprised of two steps. Each step shall be four to six feet in width. One step shall be located approximately two and one-half feet below the permanent water surface, and the second step shall be located one to one and one-half feet above the permanent water surface. See Section 8.D for an illustration of safety ledges in a stormwater management basin.
- c. In new stormwater management basins, the maximum interior slope for an earthen dam, embankment, or berm shall not be steeper than 3 horizontal to 1 vertical.

C. Variance or Exemption from Safety Standards

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

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



Section 9: Requirements for a Site Development Stormwater Plan

A. Submission of Site Development Stormwater Plan

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

B. Site Development Stormwater Plan Approval

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

C. Checklist Requirements

The following information shall be required:

1. Topographic Base Map

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

2. Environmental Site Analysis

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

3. Project Description and Site Plan(s)

A map (or maps) at the scale of the topographical base map indicating the location of existing and proposed buildings, roads, parking areas, utilities, structural facilities for stormwater management and sediment control, and other permanent structures. The map(s) shall also clearly show areas where alterations occur in the natural terrain and cover, including lawns and other landscaping, and seasonal high ground water elevations. A written description of the site plan and justification of proposed changes in natural conditions may also be provided.

4. Land Use Planning and Source Control Plan

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

5. Stormwater Management Facilities Map

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

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

6. Calculations

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

7. Maintenance and Repair Plan

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

8. Waiver from Submission Requirements

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

Section 10: Maintenance and Repair

A. Applicability

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

B. General Maintenance

1. The design engineer shall prepare a maintenance plan for the stormwater management measures incorporated into the design of a major development.
2. The maintenance plan shall contain specific preventative maintenance tasks and schedules; cost estimates, including estimated cost of sediment, debris, or trash removal; and the name, address, and telephone number of the person or persons responsible for preventative and corrective maintenance (including replacement). Maintenance guidelines for stormwater management measures are available in the New Jersey Stormwater Best Management Practices Manual. If the maintenance plan identifies a person other than the developer (for example, a public agency or homeowners' association) as having the responsibility for maintenance, the plan shall include documentation of such person's agreement to assume this responsibility, or of the developer's obligation to dedicate a stormwater management facility to such person under an applicable ordinance or regulation.
3. Responsibility for maintenance shall not be assigned or transferred to the owner or tenant of an individual property in a residential development or project, unless such owner or tenant owns or leases the entire residential development or project.

4. If the person responsible for maintenance identified under Section 10.B.2 above is not a public agency, the maintenance plan and any future revisions based on Section 10.B.7 below shall be recorded upon the deed of record for each property on which the maintenance described in the maintenance plan must be undertaken.
5. Preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measure, including repairs or replacement to the structure; removal of sediment, debris, or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; and repair or replacement of nonvegetated linings.
6. The person responsible for maintenance identified under Section 10.B.2 above shall maintain a detailed log of all preventative and corrective maintenance for the structural stormwater management measures incorporated into the design of the development, including a record of all inspections and copies of all maintenance-related work orders.
7. The person responsible for maintenance identified under Section 10.B.2 above shall evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed.
8. The person responsible for maintenance identified under Section 10.B.2 above shall retain and make available, upon request by any public entity with administrative, health, environmental, or safety authority over the site, the maintenance plan and the documentation required by Sections 10.B.6 and 10.B.7 above.
9. The requirements of Sections 10.B.3 and 10.B.4 do not apply to stormwater management facilities that are dedicated to and accepted by the municipality or another governmental agency.

(Note: It may be appropriate to delete requirements in the maintenance and repair plan that are not applicable if the ordinance requires the facility to be dedicated to the municipality. If the municipality does not want to take this responsibility, the ordinance should require the posting of a two year maintenance guarantee in accordance with N.J.S.A. 40:55D-53. Guidelines for developing a maintenance and inspection program are provided in the New Jersey Stormwater Best Management Practices Manual and the NJDEP Ocean County Demonstration Study, Stormwater Management Facilities Maintenance Manual, dated June 1989 available from the NJDEP, Watershed Management Program.)

10. In the event that the stormwater management facility becomes a danger to public safety or public health, or if it is in need of maintenance or repair, the municipality shall so notify the responsible person in writing. Upon receipt of that notice, the responsible person shall have fourteen (14) days to effect maintenance and repair of the facility in a manner that is approved by the municipal engineer or his designee. The municipality, in its discretion, may extend the time allowed for effecting maintenance and repair for good cause. If the responsible person fails or refuses to perform such maintenance and repair, the municipality or County may immediately proceed to do so and shall bill the cost thereof to the responsible person.

- B. Nothing in this section shall preclude the municipality in which the major development is located from requiring the posting of a performance or maintenance guarantee in accordance with N.J.S.A. 40:55D-53.

Section 11: Penalties

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

Section 12: Effective Date

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

Section 13: Severability

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

APPENDIX “B”

NJDEP AMBIENT BIOMONITORING NETWORK – WMA 17

MAPS & BENTHIC MACROINVERTEBRATE

APPENDIX “C”

IMPORTANT NAMES, ADDRESSES & CONTACTS

