

# TOWNSHIP OF WOODBRIDGE



## STORMWATER MANAGEMENT PLAN

**PREPARED FOR:**

**TOWNSHIP OF WOODBRIDGE  
MUNICIPAL BUILDING  
ONE MAIN STREET  
WOODDBRIDGE, MIDDLESEX COUNTY, NEW JERSEY**

**PREPARED BY:**

**WOODBRIDGE TOWNSHIP  
DIVISION OF ENGINEERING**

**January 2020**

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## 1.0 INTRODUCTION

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for the Township of Woodbridge (Township) to address stormwater-related impacts. The creation of this plan is required by the *Municipal Stormwater Regulations* (N.J.A.C. 7:14A-25) and contains all of the required elements described in the *Stormwater Management Rules* (Rules, N.J.A.C. 7:8). The plan addresses groundwater recharge, stormwater quantity, and stormwater quality impacts by incorporating stormwater design and performance standards for new major development, as defined within the Rules. These standards are intended to minimize the adverse impact of stormwater runoff on water quality and water quantity and the loss of groundwater recharge that provides baseflow in receiving water bodies. The plan describes long-term operation and maintenance measures for existing and future stormwater facilities.

The last full Master Plan was completed in 2009. Master Plan Reexaminations were completed in 2016 and adopted in 2017.

According to the 2016 Master Plan, 970 acres of vacant land exist in the Township, much of which is environmentally constrained. There is no information available regarding the specific acreage of developable land remaining in the Township. However, the Township indicated that any undeveloped land remaining in the Township is constrained by wetlands, floodplains or lot size and that there is little, if any, developable land remaining. Therefore, less than one square mile of developable land remains in the Township and, according to N.J.A.C. 7:8-4.2(c)10, a “build-out” analysis is not required. However, the plan addresses the review and update of existing ordinances, the Township Master Plan, and other planning documents to provide guidance for future development to include low impact development techniques. The final component of this plan includes a mitigation plan to allow for variances or exemptions from the requirements. As part of the mitigation plan of the stormwater plan, specific stormwater management measures are identified to lessen the impact of existing development.

## 2.0 GOALS

The goals of this MSWMP 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 nonpoint pollution;
- Maintain the integrity of stream channels for their biological functions, as well as for drainage;
- Minimize pollutants in stormwater runoff from new and existing development to restore, enhance, and maintain the chemical, physical, and biological integrity of the waters of the state, 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;
- Protect public safety through the proper design and operation of stormwater basins; and
- Promote public education.

Within the Township's 2016 Master Plan Reexamination Report, the following goals were described:

- Regulate storm drainage effectively and alleviate flooding damage in the Township and downstream areas by: preserving natural stream corridors, restricting development in flood hazard areas, and preparation of a comprehensive stormwater plan for the Township;
- Protect streams, waterways and wetlands through careful stormwater and wastewater management practices;
- Preserve and enhance existing stream corridors and tributaries by providing linkages among parks where possible; and
- To promote the preservation of natural systems and environmentally sensitive areas, particularly wetlands and flood hazard areas.

To achieve these goals, this plan outlines specific stormwater design and performance standards for new development. Additionally, the plan proposes stormwater management controls to address impacts from existing development. Preventative and corrective maintenance strategies are included in the plan to ensure long-term effectiveness of stormwater management facilities. The plan also outlines safety standards for stormwater infrastructure to be implemented to protect public safety.

## 3.0 STORMWATER DISCUSSION

### 3.1 HYDROLOGIC CYCLE

The hydrologic cycle or water cycle (Figure 1) is the continuous circulation of water between the ocean, atmosphere and land. The driving force of this natural cycle is the sun. Water, stored in oceans, depressions, streams, rivers, waterbodies, vegetation and even land surface, continuously evaporates due to solar energy. This water vapor then condenses in the atmosphere to form clouds and fog. After water condenses, it precipitates, usually in the form of rain or snow, onto land surfaces and waterbodies. Precipitation falling on land surfaces is often intercepted by vegetation. Plants and trees transpire water vapor back into the atmosphere, as well as aid in the infiltration of water into the soil. The vaporization of water through transpiration and evaporation is called evapotranspiration. Infiltrated water percolates through the soil as groundwater, while surface water flows overland. Groundwater and surface water flow to major water bodies and eventually flows to the Earth's seas and oceans. This constant process of evapotranspiration, condensation, precipitation, and infiltration comprises the hydrologic cycle.

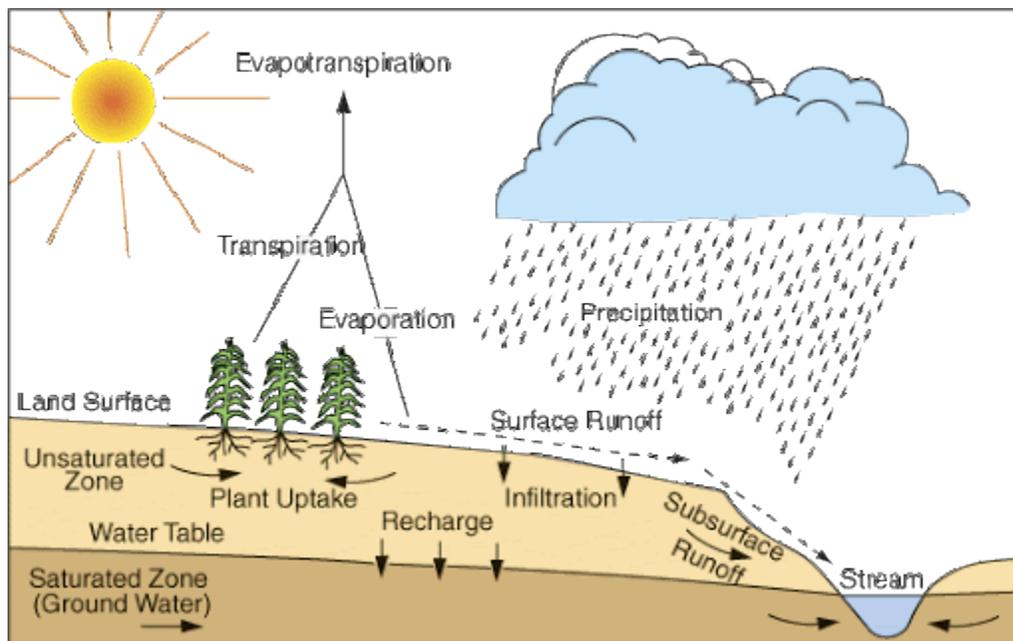


Figure 1: Groundwater Recharge in the Hydrologic Cycle

Source: New Jersey Geological Survey Report GSR-32

### **3.2 STORMWATER IMPACTS**

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

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 infiltrations 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.

Water quantity impacts combined with land development often adversely impacts stormwater quality. Impervious surfaces and cleared areas created by development collect pollutants from the atmosphere, fertilizers and pesticides, animal wastes, as well as pollutants from motor vehicle usage. Pollutants such as metals, suspended solids, hydrocarbons, pathogens, and nutrients collect and concentrate on impervious surfaces. During storm events, these pollutants are washed directly into municipal sewer systems.

In addition to chemical and biological pollution, thermal pollution can occur when water travels over heated impervious surfaces or collects in stormwater impoundments that are not shielded from the sun. Thermal pollution can affect aquatic habitats, adversely impacting cold water fish species such as trout. Removal of shade trees and stabilizing vegetation from stream banks also contributes to thermal pollution.

Proper stormwater management will help mitigate the negative impact of land development and its effect on stormwater. This MSWMP outlines the Township's plan to improve stormwater quality, decrease stormwater quantity, and increase groundwater recharge. By managing stormwater, the Township will improve the quality of aquatic ecosystems and restore some of the natural balance to the environment.

## 4.0 BACKGROUND

### **4.1 TOWNSHIP CHARACTERISTICS**

The Township of Woodbridge comprises a 20.2 square mile area in Middlesex County, New Jersey. The Township is a mature suburb of the New York metropolitan region. It is surrounded by Sayreville Borough, Linden City, Carteret Borough, Rahway City, Perth Amboy City, Clark Township and Edison Township. The Township is comprised of nine (9) neighborhoods: Avenel, Colonia, Fords, Hopelawn, Keasby, Iselin, Port Reading, Sewaren, and Woodbridge. A substantial number of waterways are located in the Township.

Figure 2, Vicinity Map, illustrates the location of the Township within the State of New Jersey. Figure 3, Township and its Waterways, illustrates the waterways in the Township. Figure 4, USGS Topographic Map, depicts the Township boundary on USGS quadrangle maps.

#### **4.1.1 Population and Housing Trends**

The following population data was obtained from the *2016 Master Plan* and U.S. Census Bureau Data.

| <b>Year</b> | <b>Population (persons)</b> |
|-------------|-----------------------------|
| 1950        | 35,578                      |
| 1960        | 78,846                      |
| 1970        | 98,944                      |
| 1980        | 90,074                      |
| 1990        | 93,086                      |
| 2000        | 97,203                      |
| 2010        | 99,585                      |

##### **4.1.1.2 Woodbridge's Demographics**

The Township of Woodbridge had a population of 99,585 residents at the time of the 2010 US Census. This figure represents a 2.5 percent increase over the 2000 US Census population figure of 97,203, which represented a 4.4 percent increase over the 1990 US Census population figure of 93,086. By comparison, Middlesex County's population grew by 8.0 percent during the period between 2000 and 2010 and 11.7 percent between 1990 and 2000. Table 1 shows the rate of growth experienced by the Township of Woodbridge and Middlesex County from 1990 through 2010.

According to the *2016 Master Plan*, Middlesex County has projected the Township's population to be 101,952 persons by 2010.

The number of housing units has also steadily increased over the years.

| <b>Year</b> | <b>Housing Units</b> |
|-------------|----------------------|
| 1990        | 34,498               |
| 2000        | 35,298               |
| 2010        | 36,124               |

#### **4.1.2 Land Use**

According to Table 1 of the *2016 Master Plan*, 43 % of Township is comprised of residential housing; 13 % is commercial; 19 % is industrial; 4 % is public school property; 1 % is church-owned land; 5 % is cemeteries; and 15 % is public properties. The *2016 Master Plan* indicates that there are 913 acres of open space and recreational space in the Township.. There is no information available regarding the specific acreage of developable land remaining the Township. However, the Township indicated that nay undeveloped land remaining in the Township is constrained by wetlands, floodplains or lot size and that there is little, if any, developable land remaining the Township.

#### **4.1.3 Water and Sewer Service**

Water service throughout the entire Township is provided by Middlesex Water Company.

According to the *2016 Master Plan*, Woodbridge Township is divided into two (2) sewer service areas – Middlesex Bounty Utilities Authority (MCUA) and Rahway Valley Sewage Authority (RVSA) in Rahway. There remain some privately owned package treatment plants that serve a few of the Township’s industries.

According to the Woodbridge Health Department, septic tank(s) are located on fifty-one (51) properties; according to the Septic Report dated July 7, 2000, holding tanks are located on seven (7) properties throughout the Township. Currently, there is no plan to reduce the number of septic systems in the Township.

#### **4.1.4 State Development and Redevelopment Plan**

The purpose of the *State Development and Redevelopment Plan (State Plan)* is to coordinate planning activities and establish State-wide planning objectives in the areas of land use, housing, economic, development, transportation, natural resource conservation, agriculture and farmland retention, recreation, urban and suburban redevelopment, historic preservation, public facilities and services, and intergovernmental coordination. The *State Plan* designates planning areas that share common conditions with regard to development and environmental features:

- Areas for Growth: Metropolitan Planning Areas (PA-1), Suburban Planning Areas (PA-2) and Designated Centers in any planning area.
- Areas for Limited Growth: Fringe Planning Areas (PA-3), Rural Planning Areas (PA-4), and Environmentally Sensitive Planning Areas (PA-5). In these planning areas, planning

should promote a balance of conservation and limited growth-environmental constraints affect development and preservation is encouraged in large contiguous tracts.

- Areas for Conservation: Fringe Planning Area (PA-3), Rural Planning Areas (PA-4), and Environmentally Sensitive Planning Areas (PA-5).

The entire Township is located in the Metropolitan Planning Area (PA-1).

#### **4.1.5 Brownfields Sites and Known Contaminates Sites**

A brownfield is defined under NJ state law (N.J.S.A. 58:10B-23.d) as “any former or current commercial or industrial site that is currently vacant or underutilized and on which there has been, or there is suspected to have been, a discharge of a contaminant.” According to both the United States Environmental Protection Agency (USEPA) and New Jersey Department of Environmental Protection (NJDEP) brownfields websites, there are no brownfields in the Township. The Township has not identified any brownfields other than those sites currently on the list of Know Contaminates Sites in New Jersey.

The *Known Contaminated Sites in New Jersey report (2001 Edition)* is a municipal listing of sites where contamination of soil and/or ground water is confirmed at levels greater than the applicable cleanup criteria or standards. Remedial activities are underway or required at the sites with an on-site source(s) of contamination and at locations where the source(s) of contamination is unknown. Sites with completed remedial work that require engineering and/or institutional controls have reporting measures in place to ensure the effectiveness of past actions, and some include maintenance and/or monitoring. There are 132 sites in the Township with on-site sources of contamination, two (2) sites with unknown source(s) of contamination, and twelve (12) sites with closed case(s) with restrictions on the *Known Contaminated Sites report*.

#### **4.2 WATERWAYS**

The following waterways are located in or immediately adjacent to the Township:

- Arthur Kill
- Black Ditch
- Coppermine Brook
- Crows Mill Creek
- Heards Brook
- Kinsey Creek
- Orchard Creek
- Parkway Branch
- Pumpkin Patch Brook
- Rahway River
- Raritan River
- Red Root Creek
- Smith Creek
- South Branch of the Rahway River

- Spa Spring Creek
- Wedgewood Brook
- Woodbridge River

Figure 3, Township and its Waterways, illustrates the waterways in the Township.

Approximately 80% of the Township of Woodbridge is located within the Arthur Kill Watershed Management Area (WMA #7). The remainder of the Township is located in the Lower Raritan, South River and Lawrence Watershed Management Area (WMA #9). A Watershed Management Area is subdivided into smaller drainage area units which are defined as HUC-14s. The term “HUC-14” is from the hydrologic unit code system developed by the United States Geological Service for delineating and identifying drainage areas. The system starts with the largest possible drainage areas and progressively smaller subdivisions of the drainage area are delineated and numbered in a nested fashion. A drainage area with a hydrologic unit code (HUC) designation with 14 numbers, or HUC-14, is one of several sub-watersheds of a larger watershed. There are portions of nine (9) HUC-14s within the Township:

- 02030104050070 – Robinsons Branch Rahway River (above Lake Avenue)
- 02030104050080 – Robinsons Branch Rahway River (above Lake Avenue)
- 02030104050090 – Rahway River SB
- 02030104050100 – Rahway Rive (below Robinsons Branch)
- 02030104050110 – Woodbridge Creek
- 02030104050120 – Arthur Kill waterfront (below Grasselli)
- 02030105160080 – Mill Brook/Martins Creek
- 02030105160090 – Red Root Creek/Crows Mill Creek
- 02030105160100 – Raritan River Lower (below Lawrence Brook)

Figure 8, Hydrologic Units (HUC-14s), illustrates the HUC-14s within the Township.

Table 1, Watercourse Information, provides the name, HUC-14 drainage area, and classification of each of the Township’s water courses. It should be noted that none of the Township’s watercourses are classified as a Category One (C-1) watercourse.

**TABLE 1: Watercourse Information**

| <b>Name of Watercourse</b>       | <b>HUC-14</b>  | <b>Classification</b> |
|----------------------------------|----------------|-----------------------|
| Arthur Kill                      | 02030104050120 | SE3 (C-2)             |
| Black Ditch                      | 02030105160090 | FW2-NT/SE1 (C-2)      |
| Coppermine Brook                 | 02030105160090 | FW2-NT (C-2)          |
| Crows Mill Creek                 | 02030105160090 | FW2-NT/SE1 (C-2)      |
| Heards Brook                     | 02030104050110 | FW2-NT/SE3 (C-2)      |
| Kinsey Creek                     | 02030105160100 | FW2-NT/SE1 (C-2)      |
| Orchard Creek                    | 02030104050090 | FW2-NT (C-2)          |
| Parkway Branch                   | 02030104050090 | FW2-NT (C-2)          |
| Pumpkin Patch Brook              | 02030104050070 | FW2-NT (C-2)          |
| Rahway River                     | 02030104050100 | SE3 (C-2)             |
| Raritan River                    | 02030105160100 | FW2-NT/SE1 (C-2)      |
| Red Root Creek                   | 02030105160090 | FW2-NT/SE1 (C-2)      |
| Smith Creek                      | 02030104050120 | FW2-NT/SE3 (C-2)      |
| South Branch of the Rahway River | 02030104050090 | FW2-NT (C-2)          |
| Spa Spring Creek                 | 02030104050110 | FW2-NT/SE3 (C-2)      |
| Wedgewood Brook                  | 02030104050110 | FW2-NT/SE3 (C-2)      |
| Woodbridge River                 | 02030104050110 | FW2-NT/SE3 (C-2)      |

## Legend:

FW2 – General surface water classification applied to those fresh waters that are not designated as FW1 or Pinelands waters.

NT (non trout) – means fresh waters that have not been designated in *NJAC 7:9B-1.15(b) through (h)* as trout production or trout maintenance waters.

SE 1 – General surface water classification applied to saline waters of estuaries, where the designated uses are shellfish harvesting in accordance with *N.J.A.C. 7:12*; maintenance, migration and propagation of the natural and established biota; primary and secondary contact recreation; and any other reasonable uses.

SE 3 General surface water classification applied to saline waters of estuaries, where the designated uses are secondary contact recreation; maintenance and migration of fish populations; migration of diadromous fish; maintenance of wildlife; and any other reasonable uses.

C-2 (Category Two) means those waters not designated as Category One.

### **4.3 Water Quality**

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

There do not appear to be any AMNET testing sites in Woodbridge. Classifications for the Rahway River, South Branch of the Rahway River, and Raritan River were available from nearby AMNET sites. The following are the watercourses with their AMNET testing location and classification:

- Rahway River at River Road and Church Street in Rahway, Union County – Severely Impaired
- South Branch of Rahway River at Parsonage Road in Menlo Park – Severely Impaired
- Raritan River at Bakelite Park (Fieldville Dam) in Piscataway – Non-Impaired

No data were available for the remaining waterways.

In addition to the AMNET data, the NJDEP and other regulatory agencies collect water quality chemical data on the streams in the state. The *New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d)) (Integrated List)* is required by the federal Clean Water Act to be prepared biennially and is a valuable source of water quality information. This combined report presents the extent to which New Jersey waters are attaining water quality standards, and identifies waters that are impaired. The *Integrated List* is composed of the following five (5) Sublists:

- Sublist 1: Attaining the water quality standard and no use is threatened.
- Sublist 3: Insufficient or no data and information to determine if any designated use is threatened.
- Sublist 4: Impaired or threatened for one or more designated uses but does not require the development of a TMDL.
- Sublist 5: The water quality standard is not attained. The waterway is impaired or threatened for one or more designated uses by a pollutant(s), and requires a TMDL.

The TMDL is the amount of a pollutant that can be accepted by a waterbody without causing an exceedance of water quality standards or interfering with the ability to use a waterbody for or

more of its designated uses. The allowable load is allocated to the various sources of the pollutant, such as stormwater and wastewater discharges, which require a New Jersey Pollutant Discharge Elimination System (NJPDES) permit to discharge, and nonpoint source, which includes stormwater runoff from agricultural areas and residential areas, along with a margin of safety. Provisions may also be made for future sources in the form of reserve capacity. An implementation plan is developed to identify how the various sources will be reduced to the designated allocations. Implementation strategies may include improved stormwater treatment plants, adoption of ordinances, reforestation of stream corridors, retrofitting stormwater systems, and other BMPs.

The following are the watercourses with their locations, sublists, and sublist constituents:

- Arthur Kill  
This section is on Sublist 1 for Dissolved Oxygen, Copper, Lead, and Nickel. It is on Sublist 3 for Fecal Coliform. It is on Sublist 4 for Mercury. It is on Sublist 5 for Total Coliform and PCBs and Dioxin in fish tissue.
- Raritan River  
This section is on Sublist 5 for Mercury in fish tissue.
- Raritan River at Fieldville Dam (I-287) in Piscataway  
This section is on Sublist 1 for benthic macroinvertebrates.
- Raritan River at Landing Lane in Johnson Park in Piscataway  
This section is on Sublist 1 for Temperature, Dissolved Oxygen, Nitrate, Dissolved Solids, and Unionized Ammonia. It is on Sublist 3 for pH. It is on Sublist 5 for Phosphorus and Total Suspended Solids.
- Raritan River at Route 1  
This section is on Sublist 5 for Mercury in fish tissue.
- Rahway River at Rahway  
This section is on Sublist 1 for Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Cadmium, Chromium, Cooper, Lead, Selenium, Silver, and Zinc. It is on Sublist 3 for Mercury. It is on Sublist 4 for Fecal Coliform. It is on Sublist 5 for Phosphorus, Arsenic and TCE.
- Rahway River at River Road and Church Street in Rahway  
This section is on Sublist 5 for benthic macroinvertebrates.
- Rahway River South Branch at Colonia  
This section is on Sublist 1 for Temperature, pH, Dissolved Oxygen, Nitrate, Unionized Ammonia, and Total Suspended Solids. It is on Sublist 3 for Dissolved Solids. It is on Sublist 5 for Phosphorus and Fecal Coliform.
- Rahway River South Branch at Merrill Park in Woodbridge  
This section is on Sublist 5 for benthic macroinvertebrates.
- Rahway River South Branch at Parsonage Road in Edison  
This section is on Sublist 5 for benthic macroinvertebrates.
- Rahway River South Branch near Maple Avenue in Woodbridge

This section is on Sublist 3 for Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Silver, Thallium, and Zinc.

No data were available for the remaining waterways. *Detailed TMDL Reports and Listed Water Information Reports* obtained from the USEPA website indicates that the following TMDLs have been approved/ established by the EPA:

- Arthur Kill/ Kill Van Kull – A TMDL Report from 1996 indicates that TMDLs were established for Copper, Lead, Mercury, and Nickel. A 1997 TMDL Report indicates that the Copper TMDL was withdrawn.
- Raritan River/Bay – A TMDL Report from 1996 indicates that TMDLs were established for Copper, Lead, Mercury, and Nickel.
- Rahway River - A TMDL Report from 2002 indicates that a TMDL was established for Fecal Coliform.
- South Branch of Rahway River – There were no TMDLs reported to EPA by the State for this waterway.

There are several other constituents listed on Sublist 5 for the various waterways that are not covered by the TMDLs listed above; however, no further TMDL information could be located.

The *Draft Characterization and Assessment of the Regional Stormwater Management Planning Area for the Robinsons Branch Watershed (Draft Report)*, prepared by the Rutgers Cooperative Research and Extension Water Resources Program and dated July 2005, lists the Pumpkin Patch drainage area in Colonia as a subbasin of concern. The *Draft Report* states that the Pumpkin Patch subbasin is a large drainage area with residential use that ranges from high density to low and rural density. These aspects of land use contributed to high total phosphorus, total nitrogen, and total suspended solids loading, as well as a significant source of ammonia. The land use in this subbasin also contributes some of the highest loads of the trace metals lead, zinc and copper due to the mixed urban and commercial uses.

#### **4.4 WATER QUANTITY**

According to Scott Lee Thompson, Woodbridge Township Engineer, there are numerous areas in the Township that flood periodically, but the majority are nuisance flooding problems caused by heavy rainfall events and inadequate drainage systems that are maintained. Each of the following areas has a flooding problem that is caused by inadequate drainage systems or a lack thereof:

1. Beekman Avenue, Colonia - entire length
2. Hawthorne Avenue, Colonia – Edgewood to Amherst
3. Gaywood Avenue, Colonia – Inwood to Amherst
4. Stafford Road, Colonia – Ridge to Ravine
5. Ravine Drive, Colonia – Beechwood to Devon
6. Beechwood Court, Colonia – entire length
7. East Cliff road, Colonia – Colonia Place to Valley
8. Temple Way, Colonia – Cavour to Arthur

9. Pumpkin Patch Storm Drain, Colonia – Wood to New Dover
10. Avenel Street, Avenel – railroad underpass vicinity
11. Brown Avenue, Iselin – Julius Street vicinity
12. Green Street Detention Basin, Iselin – failure of gabion outlet protection upstream of basin
13. Smith Street, Keasby – Conrail overpass and Old Smith Street vicinity
14. Leesville Avenue, Avenel – railroad underpass vicinity
15. Clark Place, Avenel – S. Inman Avenue vicinity
16. Mileed Way, Avenel – entire length
17. Prall Street, Port Reading – entire length
18. Sixth Avenue, Port Reading – Langford to Saints
19. Park Place, Port Reading – entire length
20. Saints Boulevard, Port Reading – entire length
21. Bridge Street, Sewaren – Woodbridge to terminus
22. South Robert Street, Sewaren – Woodbridge to terminus
23. 16 Central Avenue, Sewaren – repairs to damaged storm drain on Vernon Street
24. Ford Avenue, Fords – Denman to Webb
25. Arlington Drive, Fords – entire length
26. Concannon Drive, Fords – entire length
27. Burnham Drive, Fords – Webb to Ford
28. Entrance to School Number 25, Fords
29. Kensington Apartments, Fords – entire complex
30. Wall Street, Fords – Ford to Mercer
31. Easement, Fords – King Georges Post Road to Raymond Street
32. Vesper Avenue, Woodbridge – entire length
33. Watson Avenue, Woodbridge – entire length  
 A Flood Hazard permit has been obtained for Watson Avenue and the ditches will be cleaned following completion of the Omar Avenue project.
34. Heidelberg Avenue, Woodbridge – entire length  
 A Flood Hazard permit has been obtained for Heidelberg Avenue and the ditches will be cleaned following completion of the Omar Avenue project.
35. Brookfield Avenue, Woodbridge – Watson to Vesper
36. Claire Avenue, Woodbridge – Bamford to Watson
37. Pearl Street, Woodbridge – entire length
38. Crampton Avenue, Woodbridge – Bamford to terminus
39. VanVetchen Avenue, Woodbridge – Bamford to terminus
40. Port Reading Avenue, Woodbridge – Lewis to Sixth
41. Fulton Street, Woodbridge – Cutters Dock Road and RR vicinity
42. Rahway Avenue, Woodbridge – Bucknell Ave box culvert leaking onto sanitary sewer vicinity

Additionally, the following water quantity issues were identified:

- The culvert which carries the South Branch of the Rahway Rive near the new Home Depot is undersized and causes major floods in the area which affects commercial and residential circulation.
- The Pumpkin Patch Brook floods frequently. The Draft Report indicates that the stream bank of Pumpkin Patch at Amherst Avenue in Colonia has failed due to erosion.
- The Woodbridge River floods frequently as a result of sedimentation.

#### **4.5 GROUNDWATER RECHARGE**

According to NJDEP digital GIS data, recharge rates are variable throughout the Township. However, the majority of the Township has recharge rates between 9 and 11 inches per year. Please refer to Figure 5, Groundwater Recharge Areas.

#### **4.6 WELLHEAD PROTECTION AREAS**

Public community water systems either pipe water for human consumption to at least 15 service connections used by year-round residents, or regularly serve at least 25 year-round residents (e.g. municipality or subdivision). No mapped public community water supply wells or associated wellhead protection areas are located in the Township of Woodbridge.

Figure 6, Wellhead Protection Areas, depicts the absence of wells and wellhead protection areas in the Township.

Please note that due to the absence of wells and wellhead protection areas in the Township, adoption of an ordinance protecting such areas is not necessary.

## **5.0 DESIGN AND PERFORMANCE STANDARDS**

The Township will adopt the design and performance standards for stormwater management measures as presented in *N.J.A.C. 7:8-5* to minimize the adverse impact of stormwater runoff on water quality and water quantity and loss of groundwater recharge in receiving water bodies. The design and performance standards include the language for maintenance of stormwater management measures consistent with the *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*.

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

## 6.0 PLAN CONSISTENCY

As stated previously throughout Section 4.0, a *Draft Characterization and Assessment of the Regional Stormwater Management Planning Area for the Robinsons Branch Watershed (Draft Report)* was prepared by Rutgers Cooperative Research and Extension Water Resources Program in July 2005. This MSWMP should be made consistent with the *Draft Report*, once it is made final.

Three (3) TMDLs have been developed for the waters of the Township; therefore, this plan must be consistent with the established TMDLs. If any additional Regional Stormwater Management Plans or additional TMDLs are developed in the future, this MSWMP will be updated to be consistent.

The Township currently utilizes the *Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21*. The MSWMP is consistent with the *RSIS*. The municipality will utilize the most current update of the *RSIS* in the stormwater management review of residential areas. This MSWMP will be updated to be consistent with any future updates to the *RSIS*.

As stated earlier in Section 4.1.4, State Development and Redevelopment Plan, the entire Township is located in the Metropolitan Planning Area, PA-1.

During construction, Township inspectors will perform periodic inspections of on-site soil erosion and sediment control measures and report any inconsistencies to the Freehold Soil Conservation District.

## **7.0 NONSTRUCTURAL STORMWATER MANAGEMENT STRATEGIES**

The *Master Plan* and the *Land Use and Development Ordinance* were reviewed with regard to incorporating nonstructural stormwater management strategies. Please refer to Appendix 1 for the listing of Nonstructural Stormwater Management Strategies provided at *N.J.A.C 7:8-5.3*.

Below is a list of recommended revisions to existing ordinances and new strategies that the Township should consider implementing in order to incorporate the NJDEP's nonstructural strategies for stormwater management. It should be noted that the Township is near full development and future development projects may not meet the "major development" criteria. The definition of major development is provided in Section 2 of the Stormwater Control Ordinance provide in Appendix 2. Development and redevelopment projects not meeting the definition of "major development" must comply with the current Township ordinances.

### **7.1 Section 150-20.2: REPLACEMENT OF TREES**

Section 150-20.2A states that the developer and/or property owner responsible for the construction on any site other than an owner-occupied single-family residential lot shall conduct an inventory of all trees on such site prior to clearing same. The inventory shall be included as part of any application for development and shall be produced by the licensed professional preparing the application documents. This section should be revised to inhibit or prohibit the clearcutting of project sites. Additionally, the Township should establish a "critical footprint area" that extends 20 feet beyond the driveway, building or recreation area (tennis courts, swimming pools or similar facilities) footprint where clearing of trees cannot occur.

### **7.2 SECTION 150-42: OFF-STREET PARKING AND LOADING**

#### **Section 150-42A (4): Required Area for Each Parking Space**

This section indicates that each parking space shall not be less than nine (9) feet by eighteen (18) feet, exclusive of passageways. This section is in compliance with NJDEP recommendations.

However, there should be an option to allow reduced stall lengths with vehicle overhang into vegetated areas.

#### **Section 150-42A (5): Provision for Proper Drainage and Maintenance**

This section states that all off-street parking, off-street loading and service facilities shall be graded and drained so as to dispose of all surface water accumulation in a safe manner while preventing damage to abutting properties and/or public streets. This section should be amended to allow for flush curb with curb stop, or curbing with curb cuts to encourage applicants to allow for the discharge of impervious area into landscape areas for stormwater management.

### **Section 150-42A (10): Size of Driveways**

This section states that a driveway shall not be less than ten (10) feet in width in all residential zones. Zoning regulations should require a minimum driveway width of 9 feet for one lane and 18 feet for two lanes.

### **Section 150-42A (18): Sharing of Parking Facilities**

This section states that off-street parking facilities for one use shall not be considered as providing the required facilities for any other use, except that one-half (1/2) of the off-street parking space required by any use whose peak attendance will be at night or on Sundays, such as churches, theaters and assembly halls, may be assigned to a use which will be closed at night or on Sundays. This provision will only apply with approval of the municipal agency. This provision of shared parking arrangements to reduce the parking area is in compliance with the NJDEP recommendations.

### **Section 150-42A (25): Parking Area Site Layout**

This section states that parking areas shall be divided into lots separated by appropriate landscaping, where possible. In addition, driveways and internal roads shall be separated from parking areas by curbed landscaped islands, where possible. Landscaping for parking areas, except for single-family residences, shall be subject to approval as part of the submitted site development plans. This section should be amended to require the use of native vegetation, which requires less fertilization and watering than non-native species, to the maximum extent practical. Also, this section should be amended to allow for flush curb with curb stop, or curbing with curb cuts to encourage applicants to allow for the discharge of impervious areas into landscaped areas for stormwater management.

### **Section 150-42B: Minimum Off-Street Parking Spaces**

Section 150-42B provides guidance on minimum parking space requirements. Section 150-42B (2) (h) provides minimum parking space requirement for offices, office buildings, and office-research buildings (not including medical and dental). The current requirement for office buildings is one (1) space per 300 feet GFA. The Low Impact Development Parking Space Ratios provided by the NJDEP indicate that ratios at professional office buildings shall be less than three (3) spaces per 1,000 square feet GFA. The parking ratios should be reduced to comply with the NJDEP's recommendation.

Additionally, Section 150-42B (2)(m) requires one (1) parking space per 200 feet of GFA for retail stores, personal services, or custom shops or studios. The Low Impact Development Parking Space Ratios provided by the NJDEP indicate that ratios at shopping centers shall be less than 4.5 spaces per 1,000 square feet GFA. Therefore, this requirement should also be reduced to comply with the NJDEP's recommendation.

### **7.3 SECTION 150-43: LANDSCAPING**

#### **Section 150-43C: Additional Regulations for Non-Single Family Zones**

Section 150-43C(2) states that all buffers and landscaped areas shall be protected from adjacent parking areas by curbs, or concrete, metal or wood bumpers at least six (6) inches in height and securely anchored into the ground. This section should be amended to allow for flush curb with curb stop, or curbing with curb cuts to encourage applicants to allow for the discharge of impervious areas into landscaped areas for stormwater management.

### **7.4 SECTION 150-45.1: AREAS OF SPECIAL FLOOD HAZARD**

#### **Section 150-43C: Standards**

This section states that no structure or land shall hereafter be constructed, located, extended, converted or altered in an area of special flood hazard without the person(s) proposing such work first obtaining a permit from the Municipal Engineer in accordance with the provisions of the section. Such permit shall be required notwithstanding the issuance of any construction permit, as defined by N.J.S.A. 13:1D-29, issued by the New Jersey Department of Environmental Protection [NJDEP]. Since all flood plain and water course activities must comply with the NJDEP *Flood Hazard Area Control Act Rule (N.J.A.C 7:13)*, this section should be amended to state “The NJDEP *Flood Hazard Area Control Act Rules (N.J.A.C. 7:13)* contains detailed regulations regarding development in and maintenance of the flood plain and the watercourses that create them. All flood plain and watercourse activities must comply with the NJDEP regulations.”

#### **Section 150-43D: Establishment of Permit**

This section should be amended to require that “proof or statement of compliance with the *Flood Hazard Area Control Act Rules (N.J.A.C 7:13)*” be provided as part of the permit application.

#### **Section 150-43E(3): Alteration of Watercourses**

This section discusses alteration of watercourses. The ordinance states that when alteration of a watercourse is proposed, the Municipal Engineer shall:

- 1) Notify adjacent communities and the New Jersey Department of Environmental Protection prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Insurance Administration, and,
- 2) Require that maintenance is provided within the altered or relocated portion of said watercourse so that the flood-carrying capacity is not diminished.

This section is inconsistent with the NJDEP Flood Hazard Area Control Act Rules (N.J.A.C. 7:13). Therefore, this section should be amended to state: “Alteration of watercourses is prohibited except where necessary to control existing flooding and or erosion which threatens life or

property or in cases in which the New Jersey Department of Environmental Protection (NJDEP) determines that the effects of channelization are offset by the resulting restoration or improvement of the natural characteristics of the nearby environment. Any alteration to a watercourse requires an NJDEP-issued permit.”

#### **Section 150-43E(4): Interpretation of FIRM Boundaries**

Section 150-43E (4) states that the Municipal Engineer shall also make interpretations, where needed, as to the exact location of the boundaries of the areas of special flood hazard. The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation to the Zoning Board of Adjustment.

This section is inconsistent with State regulations. Therefore, this section should be amended to state: “in areas where there appears to be a conflict between a mapped boundary and actual field conditions, the flood elevation shall be established by a New Jersey Licensed Land Surveyor based on the Flood Insurance Rate Map (FIRM) flood elevations.”

#### **7.5 SECTION 150-47 PLANNED DEVELOPMENT**

This section provided a residential cluster development option to preserve land for public purposes. This option minimizes the disturbance of large tracts of land which is a key nonstructural stormwater management strategy. Additionally, this cluster option is an excellent tool for reducing impervious roads and driveways. This Planned Development option is in compliance with NJDEP recommendations.

The use of buffers is discussed throughout this section. This language should be amended to promote the use of native vegetation, which requires less fertilization and watering than non-native ornamental plants, to the maximum extent practicable. Additionally, applicants should be encouraged to utilize mulch or stone on paths in the open space area, where practical, to decrease the impervious area.

#### **7.6 SECTION 150-50: MINOR SITE PLAN AND PRELIMINARY MAJOR SITE PLAN DETAILS**

Section 150-50A (9) requires that the location of the following natural features be depicted on a topographic map: existing contours at two-foot intervals, up to ten (10) feet beyond property line; proposed grading and contours; wooded areas; trees (where six (6) inches or greater in diameter measured two (2) feet above ground level for the area to be disturbed); floodplain zone; ponds, streams and drainage ditches; and any other geographical features. Language should be added to this section to include wetlands, steep slopes, historic sites, and other significant existing features.

#### **7.7 SECTION 150-55: MINOR SUBDIVISION SKETCH PLAT**

This section details the sketch plat requirements. In addition to the items already required, language should be added to this section require depiction of wetlands.

## **7.8 SECTION 150-56: MAJOR SUBDIVISIONS**

Section 150-56B (1) (e) states that a soil erosion and sediment control plan be submitted as part of the preliminary plat submission. This section states “Said soil erosion and sediment control plan shall be prepared by a licensed New Jersey professional engineer in accordance with the Standards and Specifications for Soil Erosion and Sediment Control of the United States Department of Agriculture Soil Conservation District.” The previous sentence should be revised to state “The soil erosion and sediment control plan shall be prepared by a licensed New Jersey Professional engineer in accordance with the Standards and Specifications for Soil Erosion and Sediment Control in New Jersey.” Additionally, the following sentences should be added: “During construction, Township inspectors shall perform periodic inspection of on-site soil erosion and sediment control measures and report any inconsistencies to the local Soil Conservation District.”; and “Soil disturbances of one (1) acre or larger require a Request for Authorization (RFA) for New Jersey Pollutant Discharge Elimination System (NJPEDS) General Permit No. NJG0088323 (N.J.A.C. 7:14A-11 Appendix B) Stormwater Discharge associated with Construction Activity.”

Section 150-56B (2) details the preliminary plat requirements. In additions to the items already required, language should be added to this section to require depiction of wetlands.

## **7.9 SECTION 150-57: IMPROVEMENTS**

### **Section 150-57B(3): Storm Drains and Culverts**

This section states that where storm drains or culverts are required on site or off site, all streets shall be provided with sufficient catch basins, storm sewer, culverts, water detention basins and other drainage appurtenances for the proper drainage of the area in the light of existing and future conditions. This section should also allow the use of vegetated open channel conveyance instead of the standard curb and gutter design where practical. One design option is for vegetated channels that convey smaller storm events, and provide an overflow into a storm sewer for larger storm events.

### **Section 150-57B(9): Shade Trees**

This section states that the removal of existing trees shall not be permitted in any subdivision except in the location of structures or unless it can be shown that grading or construction requires removal. The municipal agency may compel the subdivider or developer, at his sole expense, to retain a qualified forester or certified tree surgeon to report to the agency as to what measures are necessary to preserve existing trees. This section is in compliance with the NJDEP recommendations.

## **7.10 SECTION 150-58: DESIGN STANDARDS**

Item E of this Section, Public Use and Service Areas, states that natural features, such as trees, brooks, hilltops and vies, shall be preserved whenever possible in designing any subdivision containing such features. This section should be amended to expand trees to forested areas, to ensure that leaf litter and other beneficial aspects of the forest are maintained in addition to the trees.

## **7.11 NEW ORDINANCES**

### **Stormwater Control Ordinance**

The Stormwater Control Ordinance, provided in Appendix 2, should be inserted into this section in its entirety.

### **Minimization of Turf Grass Lawn Areas**

In order to minimize turf grass lawn areas, a new ordinance should be established to discourage the enlargement of existing turf lawn areas without proper justification.

### **Parking Areas**

A new ordinance should be adopted to encourage the use of multi-level parking structures rather than surface lots in non-residential zones.

### **Sidewalks**

Currently, concrete is the only currently acceptable construction material for sidewalks. Pervious paving materials should be allowed where practical.

### **Unconnected Impervious Areas**

Disconnection of impervious areas can occur in both low density development and high density commercial development, provided sufficient vegetated area is available to accept dispersed stormwater flows. Areas for disconnection include parking lot or cul-de-sac islands, lawn areas and other vegetated areas.

Applicant should be required to disconnect impervious surfaces, where practical, to promote pollutant removal and groundwater recharge.

### **Soil Erosion and Sediment Control Plan**

A soil Erosion and Sediment Control Plan, certified by the local Soil Conservation District, should be required for any disturbance exceeding 5,000 square feet.

## **8.0 LAND USE / BUILD OUT ANALYSIS**

There is less than one square mile of developable land in the Township; therefore, a “build-out) analysis is not required.

Figure 7 illustrates the existing land use in the Township based on 1995/97 GIS information from NJDEP. As shown, a majority of the Township is comprised of residential areas. Commercial and industrial uses are interspersed throughout the Township.

The Zoning Map currently utilized by the Borough is shown in Figure 9.

Wetlands and floodplains are located throughout the Township. These lands are constrained by regulatory development restrictions. Figure 10 illustrates the constrained lands within the Borough.

Small development projects not meeting the definition of “major development must comply with existing ordinances.

## **9.0 MITIGATION PLAN**

### **9.1 MITIGATION PROJECT CRITERIA**

This mitigation plan is provided for a proposed development or redevelopment projects that seek a variance or exemption from the Township Stormwater Management Plan or the Rules. Approval of the option to utilize a mitigation plan and choice of mitigation plan shall be under the sole discretion of the Township agency providing review, i.e. Board of Adjustment, Planning Board, Township Council and the Township Engineer.

Any relief from this MSWMP or the Rules via a mitigation plan option shall utilize an option to provide equal or greater, quantifiable benefit than the specific relief being sought. For example, if a relief for stormwater quality is sought for a particular project, the necessary amount of stormwater quality improvements shall be accomplished via the mitigation plan. Calculations shall be provided indicating the parameter of relief being sought along with equal or greater benefit via the mitigation plan option. These calculations shall be reviewed and approved by the Township Engineer prior to being reviewed by the appropriate reviewing authority.

In general, the mitigation project must be implemented in the same drainage area as the proposed development. The applicant must ensure the long-term maintenance of the project, including the maintenance requirements under Chapters 8 and 9 of the NJDEP Stormwater BMP Manual.

If a suitable site cannot be located in the same drainage area as the proposed development, a mitigation project may be selected that is not within the same drainage area but does provide an equal relief.

As a third option, in the case of mitigation plan options that do not address the variance or relief sought, the applicant may create a new mitigation option or provide a cash contribution to the Township of Woodbridge which will be used by the Township for Township-wide drainage improvements and stormwater management improvement planning. The amount of the contribution shall be based on the relief being sought, the applicant's opinion on the cost impacts to meet this Plan and the Rules, and the discretion of the Township agency providing review, i.e. Board of Adjustment, Planning Board, Township Council and the Township Engineer.

The applicant can select one of the following projects listed to compensate for the deficit from the performance standards resulting from the proposed project. More detailed information on the projects can be obtained from the Township Engineer. A current list of mitigation projects shall be maintained by the Township Engineer. Listed below are specific projects that may be used to address the mitigation requirement.

## **9.2 STORMWATER QUANTITY AND FLOODING**

- Increase the size of the culvert which carries the South Branch of the Rahway River near the Home Depot.
- Perform drainage system improvements to alleviate flooding on Wall Avenue in the Fords Section of the Township.
- Perform stream cleaning in specific stream areas as directed by the Township Engineer and/or Department of Public Works.
- Perform stormwater system improvements to increase the capacity of the stormwater drainage systems in areas as directed by the Township Engineer and/or Department of Public Works.

## **9.3 STORMWATER QUALITY**

- Retrofit specific streets or commercial locations to provide new, Type “B” water quality inlet casting compliant with the new Rules.
- Perform general cleaning of debris and garbage in stream and channel areas as directed by the Township Engineer and/or Department of Public Works.
- Provide stormwater quality relief via a mechanical treatment device and/or low impact development technique in areas prone to stormwater quality impacts.

No mitigation options relative to groundwater recharge are available at this time.

## Woodbridge Township Vicinity Map

Map of the Township and its waterways

# USGS Topographic Map

## Woodbridge Township Groundwater Recharge Areas Map

## Woodbridge Township Wellhead Protection Areas

## Woodbridge Township Existing Land Use Map

Woodbridge Township Hydrologic Units (HUC-14s)

## Woodbridge Township Zoning Map

Woodbridge Township Constrained Land Map

## APPENDIX 1: NONSTRUCTURAL STORMWATER MANAGEMENT STRATEGIES

The design of any development that disturbs at least one (1) acre of land or increases impervious surface by at least ¼ acre must incorporate nonstructural stormwater management strategies to the maximum extent practicable. Such a development is defined in the Rules as a “major development.” To achieve the *Rules* design and performance standards, Subchapter 5 of the *Rules* requires the maximum practical use of the following nine (9) nonstructural strategies at all major developments.

1. Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss.
2. Minimize impervious surfaces and break up or disconnect the flow or runoff over impervious surfaces.
3. Maximize the protection of natural drainage features and vegetation.
4. Minimize the decrease in the pre-construction “time of concentration.”
5. Minimize land disturbance including clearing and grading.
6. Minimize soil compaction.
7. Provide low maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides.
8. Provide vegetated open-channel conveyance systems that discharge into and through stable vegetated areas.
9. Provide preventative source controls.

## APPENDIX 2: STORMWATER CONTROL ORDINANCE

### Section 1: Scope and Purpose

#### A. Policy Statement

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

#### B. Purpose

It is the purpose of this ordinance to establish proper 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:
  - a) Non-residential major developments; and
  - b) Aspects of residential major developments that are not preempted by the Residential Site Improvement Standards at N.J.A.C. 5:21.
2. This ordinance shall also be applicable to all major developments under by the Township.

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

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

## **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, Township, 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, The township, or political subdivision of this state subject to municipal jurisdiction pursuant to the Municipal Land Use Law, N.J.S.A. 40:55D-1 et seq.

“Pollutant” means any dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, refuse, oil, grease, sewage sludge, munitions, chemical wastes, biological materials, medical wastes, radioactive substance ( except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 20111), 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 water or surface waters of State, or to a domestic treatment works. “Pollutant” includes both hazardous & non-hazardous pollutants.

“Recharge” means the amount of water from precipitation that infiltrates into the ground as 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, ice 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 basing may either be normally dry (that is, a detention basin or infiltration basing), 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 New Jersey Urban Enterprises Zoned Acts, N.J.S.A. 53:27H-60 et. Seq.

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

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

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

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

### **Section 3: General Standards**

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

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

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

- A. The development shall incorporate a maintenance plan for the stormwater management measures incorporated into the design of a major development in accordance with Section 10.
- B. Stormwater management measures shall avoid adverse impacts of concentrated flow on habitat for threatened and endangered species as documented in the Department's 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 Section 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 home 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 Section 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. Provided 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) squares 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. Example of ground surfaces include surfaces of roads (including bridges), driveways, parking areas, bikeways, plazas, sidewalks, lawns, fields, open channels, and stormwater basin floor.

- 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 basing hood ) that is designed, at a minimum, to prevent delivery of all solid and floatable material 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©, 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 Section 4.F and 4.G shall be dedicated to a government agency, subjected to a conservation restriction filed with the appropriate County Clerk's office, or subject to an approved equivalent restriction that ensures that measure or an equivalent stormwater management measure approved by the reviewing agency is maintained in perpetuity.

5. Guidance for nonstructural stormwater management strategies is available in the New Jersey Stormwater Best Management Practices Manual. The BMP Manual may be obtained from the address identified in Section 7, or found on the Department's website at [www.njstormwater.org](http://www.njstormwater.org).

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

1. This subsection contains minimum design and performance standards to control erosion, encourage and control infiltration and groundwater recharge, and control stormwater runoff quantity impacts of major development.
  - a. The minimum design and performance standards for erosion control are those established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq. and implementing rules.
  - b. The minimum design and performance standards for groundwater recharge are as follows:
    - (1) The design engineer shall, using the assumptions and factors for stormwater runoff and groundwater recharge calculation 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 materials(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 product; 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 hazards areas, stormwater runoff quantity analysis in accordance with (1), (2) and (3) above shall only be applied if the increase 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. The Soil Conservation District will accept these plans for review and consideration pursuant to the Agricultural Projects and Miscellaneous Non-Tillage Agricultural Disturbances of the New Jersey Soil Conservation District's Chapter 251, P.L. 1975 Administrative Policy and Procedures Manual and determine the applicability of these provisions to the agricultural development application, and then recommend the appropriate action.

#### 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 b 80

percent of the anticipated load from the developed sit, expressed as an annual average. Stormwater management measures shall only be required for water quality control if an additional ¼ 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 NJDES 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.

| <b>Time (Minutes)</b> | <b>Cumulative Rainfall (inches)</b> | <b>Time (Minutes)</b> | <b>Cumulative Rainfall (inches)</b> |
|-----------------------|-------------------------------------|-----------------------|-------------------------------------|
| 0                     | 0.0000                              | 65                    | 0.8917                              |
| 5                     | 0.0083                              | 70                    | 0.9917                              |
| 10                    | 0.0166                              | 75                    | 1.0500                              |
| 15                    | 0.0250                              | 80                    | 1.0840                              |
| 20                    | 0.0500                              | 85                    | 1.1170                              |
| 25                    | 0.0750                              | 90                    | 1.1500                              |
| 30                    | 0.1000                              | 95                    | 1.1750                              |
| 35                    | 0.1330                              | 100                   | 1.2000                              |
| 40                    | 0.1660                              | 105                   | 1.2250                              |
| 45                    | 0.2000                              | 110                   | 1.2334                              |
| 50                    | 0.2583                              | 115                   | 1.2417                              |
| 55                    | 0.3583                              | 120                   | 1.2500                              |
| 60                    | 0.6250                              |                       |                                     |

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

$$R = A + B - (A \times B) / 100$$

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

| Best Management Practice       | TSS Percent Removal Rate |
|--------------------------------|--------------------------|
| Bioretention Systems           | 90                       |
| Constructed Stormwater Wetland | 90                       |
| Infiltration Structure         | 40-60                    |
| Extended Detention Basin       | 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 nutrient 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 Section 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 are. These areas shall be established for the protection of water quality, aesthetic value, 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 reduce 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 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 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 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 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 structure, 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 surface separately to accurately compute the rates and volume of stormwater runoff from the site. To calculate runoff from unconnected impervious cover, urban impervious area modifications as described in the NRCS Technical Release 55 – Urban Hydrology for Small Watersheds and other methods may be employed.

5. If the invert of the outlet structure of a stormwater management measure is below the flood hazard design flood elevation as defined at N.J.A.C. 7:13, the design engineer shall take into account the effects of tailwater in the design of structural stormwater management measures.

B. Groundwater recharge may be calculated in accordance with the following:

1. The New Jersey Geological Survey Report GSR-32. A Method for Evaluating Ground-Water Recharge Areas in New Jersey, incorporated herein by reference as amended and supplemented. Information regarding the methodology is available from the New Jersey Stormwater Best Management Practices Manual; at <http://www.state.nj.us/dep/njgs/>; or at New Jersey Geological Survey, 29 Arctic Parkway, P.O. Box 427 Trenton, New Jersey 08625-0427; (609) 984-6587.

## Section 6: Standards for Structural Stormwater Management Measures

A. Standards for structural stormwater management measures are as follows:

1. Structural stormwater management measures shall be designed to take into account the existing site conditions, including, for example, environmentally critical areas, wetlands; flood-prone areas; slopes; depth to seasonal high water table; soil type, permeability and texture; drainage area and drainage patterns; and the presence of solution-prone carbonate rocks (limestone).
2. Structural stormwater management measures shall be designed to minimize maintenance, facilitate maintenance and repairs, and ensure proper functioning. Trash racks shall be installed at the intake to the outlet structure as appropriate, and shall have parallel bars with one-inch (1") spacing between the bars to the elevation of the water quality design storm. For elevations higher than the water quality design storm, the parallel bars at the outlet structure shall be spaced no greater than one-third (1/3) the width of the 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 to the Applicant: 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 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

Depicted is an elevational view.

(Insert Graph)

## **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 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 Section 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 a 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 measure (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 Township 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 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 Practice Manual. If the maintenance plan identifies a person other than the developer (for example, a public agency or homeowner's 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 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 Section 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 government agency.
  10. In the event that the stormwater management facility becomes a danger to public safety or public health, or if it is in need of maintenance or repair, the municipality shall so notify the responsible person in writing. Upon receipt of that notice, the responsible person shall have fourteen (14) days to effect maintenance and repair of the facility in a manner that is approved by the municipal engineer or his designee. The municipality, in its discretion, may extend the time allowed for effecting maintenance and repair for good cause. If the responsible person fails or refuses to perform such maintenance and repair, the municipality or County may immediately proceed to do so and shall bill the cost thereof to the responsible person.
  11. A two year maintenance guarantee in accordance with N.J.S.A. 40-55D-53 shall be posted for the maintenance of the stormwater facilities.
  12. 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.)
- C. 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 judge 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.