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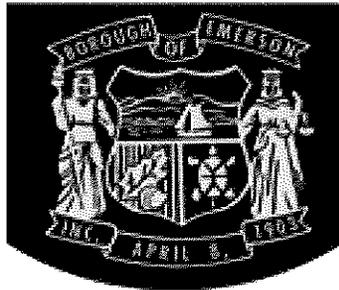
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BOROUGH OF EMERSON

STORMWATER MANAGEMENT

PLAN



PREPARED FOR:
BOROUGH OF EMERSON
MUNICIPAL PLACE
EMERSON, BERGEN COUNTY, NEW JERSEY

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Original: June 2005
Revised: June 2006
Revised: September, 2006

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SECTION 1.0

1.0 INTRODUCTION

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for the Borough of Emerson (Borough) 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, as contained within the ***Rules***, for new major development. Major development, as defined within the Approved Stormwater Control Ordinance in Appendix 1, is defined as any development that provides for ultimately disturbing one or more acres of land or creating more than ¼ acre of new impervious coverage. 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 adopted in 1978. ***Master Plan Reexamination Reports*** were adopted in 1978, 1984, 1992 and 1999. The Borough has budgeted for the preparation of a Master Plan Reexamination in 2006. To date, a planner has been hired. The Reexamination is expected to be completed in 2006.

The Borough of Emerson has significantly less than one square mile of vacant or agricultural land. Therefore, 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 Borough ***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.

SECTION 2.0

2.0 GOALS

2.1 STATEMENT OF GOALS

The goals of this MSWMP are to:

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

2.2 ACHIEVEMENT OF GOALS

To Borough plans to achieve these nine (9) goals in the following ways:

1. Flood damage will be reduced by using detention basins and by requiring new developments to follow the requirements of the ***Residential Site Improvement Standards (RSIS)*** and the Approved Stormwater Control Ordinance. Additionally, 19 acres of open space was preserved in the Borough; protecting that area from development will help to prevent increased flood damage by controlling development.
2. Stormwater runoff will be reduced by following the requirements of ***RSIS*** and the Approved Stormwater Control Ordinance.

3. Soil erosion from development and construction projects will be reduced through the Borough's Soil Movement Ordinance and coordination with the Bergen Soil Conservation District.
4. There is only one culvert in the Borough, which is located near the High School. The condition of this existing culvert is evaluated via periodic inspections by the Borough's Department of Public Works. The condition of any proposed culverts, bridges, and other in-stream structures will be monitored similarly.
5. Groundwater recharge is maintained through the use of detention basins.
6. The Borough established the following practices to prevent, to the greatest extent feasible, an increase in nonpoint pollution:
 - a. Storm drain labeling
 - b. Adoption of Litter, Improper Waste Disposal, Yard Waste and Illicit Connections Ordinances
 - c. Implementation of a Street Sweeping and Road Erosion Control Maintenance program
 - d. Annual catch basin cleaning program to maintain catch basin function and efficiency.

These practices are described in the Borough's Stormwater Pollution Prevention Plan (SPPP).

7. The Borough intends to maintain the integrity of stream channels for their biological functions, as well as for drainage, by performing stream desnagging when necessary and preventing erosion by following Soil Erosion and Sediment Control guidelines.
8. Minimization of pollutants in stormwater runoff will be accomplished through the various practices and programs established through the SPPP, some of which are listed in Item 6 of this section.
9. The Borough's SPPP established a Stormwater Facility Maintenance program to ensure that all of the Borough's stormwater facilities are inspected on an annual basis. Additionally, the SPPP established an annual catch basin cleaning program. These programs will help to protect public safety through the proper operation of catch basins and other stormwater facilities.

SECTION 3.0

3.0 STORMWATER DISCUSSION

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

Impervious areas that are connected to each other through gutters, channels, and storm sewers can transport runoff more quickly than natural areas. This shortening of the transport or travel time quickens the rainfall-runoff response of the drainage area, causing flow in downstream waterways to peak faster and higher than natural conditions. These increases can create new and aggravate existing downstream flooding and erosion problems and increase the quantity of sediment in the channel. Filtration of runoff and removal of pollutants by surface and channel vegetation is eliminated by storm sewers that discharge runoff directly into a stream. Increases in impervious area can also decrease opportunities for infiltration which, in turn, reduces stream base flow and groundwater recharge. Reduced base flows and increased peak flows produce greater fluctuations between normal and storm flow rates, which can increase channel erosion. Reduced base flows can also negatively impact the hydrology of adjacent wetlands and the health of biological communities that depend on base flows. Finally, erosion and sedimentation can destroy habitat from which some species cannot adapt.

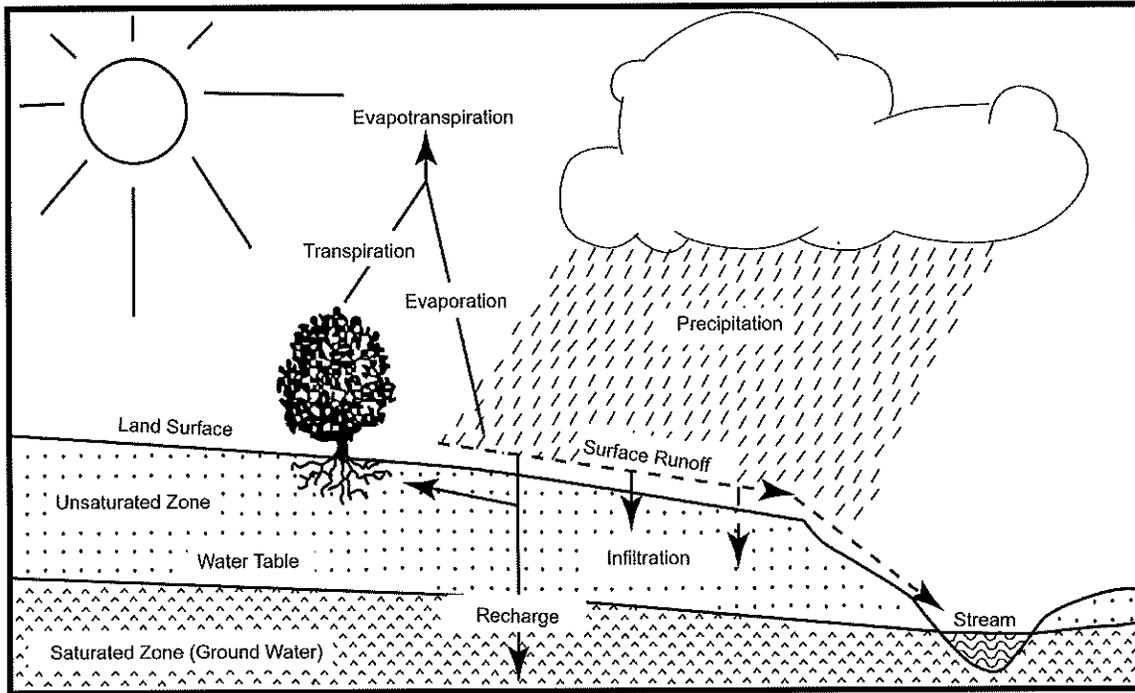


Figure 1: Groundwater Recharge in the Hydrologic Cycle

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

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

SECTION 4.0

4.0 BACKGROUND

4.1 BOROUGH CHARACTERISTICS

The Borough of Emerson comprises a 2.4 square mile area in Bergen County, New Jersey. Figure 3, USGS Topographic Map, depicts the Borough boundary on USGS quadrangle maps.

4.1.1 Population and Housing Trends

According to the **2003 Bergen County Data Book**, prepared by the Bergen County Department of Planning and Economic Development, the population of the Borough has fluctuated over the years.

Year	Population (persons)
1970	8,428
1980	7,793
1990	6,930
2000	7,197

However, while the population has fluctuated, the number of housing units has steadily increased over the years.

Year	Housing units
1970	2,135
1980	2,231
1990	2,257
2000	2,398

4.1.2 Land Use

The most recent document containing land use statistics is the **1999 Master Plan Reexamination Report**. The **1999 Master Plan Reexamination Report** indicates that 34.8% of Borough is comprised of low-density residential housing; 37.8% is medium-density residential housing; 7.4% is commercial; 0.9% is industrial; and 19.1% is planned commercial development. The specific area of vacant land in the Borough is not quantified in the **1999 Master Plan**.

In 2004, the Mayor and Council designated an area on Kinderkamack Road in downtown Emerson as being in need of redevelopment. While some major planning and design issues

remain to be decided, stormwater drainage will be a major consideration of this redevelopment project.

4.1.3 Water and Sewer Service

Water service throughout the entire Borough is provided by United Water New Jersey.

Sewer service throughout the entire Borough is provided by Bergen County Utilities Authority. According to the Borough, one septic system remains on a farm in the Borough. There is no plan to eliminate the septic system.

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).

Approximately 65% of the Borough is located in the Metropolitan Planning Area (PA-1). Approximately 32% of the Borough is located in the Environmentally Sensitive Planning Area (PA-5). The remainder of the Borough is comprised of the Oradell Reservoir.

4.1.5 Brownfields Sites and Known Contaminated 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 Borough. Additionally, the Borough has not identified any brownfields.

The *Known Contaminated Sites in New Jersey report (2005 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 nine (9) sites in the Borough with on-site sources of contamination and one (1) closed site with restrictions on the *Known Contaminated Sites report*.

4.1.6 Groundwater

According to the Borough Administrator, there is no existing groundwater assessment for the Borough.

4.2 WATERWAYS

The following watercourses are located in or immediately adjacent to the Borough:

- Emerson Brook
- Hackensack River
- Herring Brook
- Musquapsink Brook
- Oradell Reservoir
- Pascack Brook

The following ponds are also located in the Borough:

- Emerson Golf Club Pond
- Emerson Woods Pond
- Hackensack Golf Club Pond
- Shop Rite Pond

Figure 2, Borough and its Waterways, illustrates the waterways in the Borough.

4.2.1 Watershed Management Areas, HUC-14s and Category One Waters

The Borough of Emerson is located within the Hackensack, Hudson and Pascack Watershed Management Area (WMA #5). 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 three (3) HUC-14s within the Borough:

- 02030103170020 – Pascack Brook (below Westwood gage)
- 02030103170060 – Hackensack River (Oradell to Old Tappan gage)
- 02030103180010 – Coles Brook / Van Saun Mill Brook

Figure 7, Hydrologic Units (HUC-14s), illustrates the HUC-14s within the Borough.

Special water resource protection areas are those areas within 300 feet of Category One (C-1) waters and their immediate tributaries. C-1 waters are waters that receive special protection under the **Surface Water Quality Standards** because of their clarity, color, scenic setting or other characteristics of aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, or exceptional fisheries

resource(s). In addition, the special water resource protection area is required adjacent to those waters that drain to the C-1 water within the limits of the associated sub-watershed (HUC-14). The special water resource protection area is intended as a buffer between development and these special waters in order to protect both water quality and the attributes for which the waters have been designated. The NJDEP has determined that a buffer of 300 feet is necessary to achieve the intended goals. Three (3) watercourses within the Borough are categorized as Category One (C-1) by the NJDEP:

- Emerson Brook
- Hackensack River, including Oradell Reservoir and Emerson Woods Pond
- Pascack Brook

The following table summarizes the watercourse information:

TABLE 1: WATERCOURSE INFORMATION		
Name of Watercourse	HUC-14	Classification
Emerson Brook	02030103170060 Hackensack River (Oradell to Old Tappan gage)	FW2-NT (C-1)
Hackensack River	02030103170060 Hackensack River (Oradell to Old Tappan gage)	FW2-NT (C-1)
Herring Brook	02030103180010 Coles Brook / Van Saun Mill Brook	FW2-NT/SE1 (C-2)
Musquapsink Brook	02030103170020 Pascack Brook (above Westwood gage)	FW2-NT (C-2)
Oradell Reservoir	02030103170060 Hackensack River (Oradell to Old Tappan gage)	FW2-NT (C-1)
Pascack Brook	02030103170020 Pascack Brook (above Westwood gage)	FW2-NT (C-1)
Emerson Golf Club Pond	02030103180010 Coles Brook / Van Saun Mill Brook	NCA
Emerson Woods Pond	02030103170060 Hackensack River (Oradell to Old Tappan gage)	FW2-NT (C-1)

Hackensack Golf Club Pond	02030103170060 Hackensack River (Oradell to Old Tappan gage)	FW2-NT/SE1 (C-2)
Shop Rite Pond	02030103170060 Hackensack River (Oradell to Old Tappan gage)	NCA

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.

SE1 – 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.

C-1 (Category One) means those waters designated for purposes of implementing the antidegradation policies set forth at *N.J.A.C. 7:9B-1.5(d)* for protection from measurable changes in water quality characteristics because of their clarity, color, scenic setting, other characteristics of aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, or exceptional fisheries resource(s).

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

NCA – Emerson Golf Club Pond and Shop Rite Pond are not associated with any watercourses and therefore; no classification is available.

4.2.2 AMNET Data

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

There do not appear to be any AMNET testing sites in Emerson. Classifications for the Hackensack River, Pascack Brook, and Musquapsink Brook were available from nearby AMNET sites. The following are the watercourses with their AMNET testing location and classification:

- Hackensack River at Rivervale Road in Old Tappan/River Vale (Site ID AN0205) - Moderately Impaired
- Pascack Brook at Westwood Avenue in Westwood/River Vale (Site ID AN0207) – Non-Impaired

- Musquapsink Brook at Harrington Avenue in Westwood (Site ID AN0206) – Moderately Impaired

No data were available for the remaining waterways.

4.2.3 Integrated List Data and TMDLs

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 four (4) 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 Total Maximum Daily Load (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.

A TMDL is the amount of a pollutant that can be accepted by a waterbody without causing an exceedance of water quality standards or interfering with the ability to use a waterbody for one or more of its designated uses. The allowable load is allocated to the various sources of the pollutant, such as stormwater and wastewater discharges, which require 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:

- Hackensack River at New Milford (Site ID 01378500)
This section is on Sublist 5 for Phosphorus and Fecal Coliform
- Hackensack River at Old Tappan Road in Old Tappan (Site IDs AN0205 and 01376970)
This section is on Sublist 1 for Phosphorus, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Cadmium, Chromium, Copper, Lead, Nickel, Selenium and Zinc. It is on Sublist 3 for Fecal Coliform and Temperature. It is on Sublist 5 for Arsenic and benthic macroinvertebrates.
- Hackensack River in Rivervale (Site ID 01377000)
This section is on Sublist 1 for Phosphorus, Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids and Unionized Ammonia. It is on Sublist 3 for Cadmium, Selenium and Zinc. It is on Sublist 4 for Nickel and Fecal Coliform. It is on Sublist 5 for Arsenic, Chromium, Copper, Lead and Mercury.
- Musquapsink Brook at Harrington Avenue in Westwood, also referred to as Musquapsink Brook at River Vale (Site IDs AN0206 and 01377499)
This section is on Sublist 1 for Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids and Unionized Ammonia. It is on Sublist 3 for Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, and Zinc. It is on Sublist 4 for Fecal Coliform. It is on Sublist 5 for Phosphorus, Arsenic, and benthic macroinvertebrates.
- Oradell Reservoir
This section is on Sublist 5 for Mercury (fish).
- Pascack Brook at Westwood Avenue and Harrington Avenue in Westwood (Site IDs AN0207 and 01377500)
This section is on Sublist 1 for Temperature, pH, Dissolved Oxygen, Nitrate, Total Suspended Solids, Unionized Ammonia, Cadmium, Chromium, Copper, Lead, Nickel, Selenium, Silver, Zinc, and benthic macroinvertebrates. It is on Sublist 3 for Dissolved

Solids. It is on Sublist 4 for Fecal Coliform. It is on Sublist 5 for Phosphorus, Arsenic and Mercury.

The following table details TMDL information for the river segments listed on Sublist 5.

TABLE 2: TMDL INFORMATION			
Watercourse, Location and Site ID	Sublist # 5 Constituents	TMDL Information	TMDL Ref. \$
Hackensack River at New Milford 01378500	Phosphorus	A Phosphorus TMDL has not yet been developed for this segment because the segment is located at the outlet of a lake, and the NJDEP's current methodology for developing TMDLs at such a location is inappropriate. The NJDEP expects to develop an appropriate methodology in 2007.	1
	Fecal Coliform	According to TMDL document, water quality monitoring is needed to identify if an impairment exists. TMDLs will not be developed for this location until and unless recent data indicates violations of the <i>Surface Water Quality Standards</i> .	3
Hackensack River at Old Tappan Road in Old Tappan AN0205, 01376970	Arsenic	The NJDEP has not yet developed a methodology for developing Arsenic TMDLs	1
	Benthic Macroinvertebrates	The NJDEP has not yet developed a methodology for developing TMDLs for biological impairments	1
Hackensack River in Rivervale 01377000	Arsenic	The NJDEP has not yet developed a methodology for developing Arsenic TMDLs	1
	Chromium	The NJDEP has not yet developed a methodology for developing Chromium TMDLs	1
	Copper	TMDL Document established by the EPA on 1/24/1996	4*
	Lead	TMDL Document established by the EPA on 1/24/1996	4*
	Mercury	TMDL Document established by the EPA on 1/24/1996	4*
Musquapsink Brook at Harrington Avenue in Westwood/Musquapsink Brook at River Vale AN0206, 01377499	Phosphorus	TMDL Document approved by the EPA on 9/30/2005	2

Musquapsink Brook at Harrington Avenue in Westwood/Musquapsink Brook at River Vale AN0206, 01377499 cont.	Arsenic	The NJDEP has not yet developed a methodology for developing Arsenic TMDLs	1
	Benthic Macroinvertebrates	The NJDEP has not yet developed a methodology for developing TMDLs for biological impairments	1
Oradell Reservoir	Mercury	The NJDEP has not yet developed a methodology for developing Mercury TMDLs	1
Pascack Brook at Westwood AN0207, 01377500	Phosphorus	TMDL Document approved by the EPA on 9/30/2005	2
	Arsenic	The NJDEP has not yet developed a methodology for developing Arsenic TMDLs	1
	Mercury	The NJDEP has not yet developed a methodology for developing Mercury TMDLs	1

TMDL References:

1. Information obtained during a telephone conversation on April 27, 2006 with Ms. Kimberly Cenno, Supervising Environmental Analyst, NJDEP Division of Watershed Management.
2. Amendment to the Northeast Water Quality Management Plan, Total Maximum Daily Loads for Phosphorus to Address Three (3) Stream Segments in the Northeast Water Region, Watershed Management Area 5 (Hackensack and Pascack Watersheds), Proposed July 5, 2005, Established August 31, 2005, Prepared by the New Jersey Department of Environmental Protection Division of Watershed Management.
3. Amendment to the Northeast Water Quality Management Plan, Total Maximum Daily Loads for Fecal Coliform to Address 32 Streams in the Northeast Water Region, Watershed Management Area 3 (Pompton, Pequannock, Wanaque, and Ramapo Rivers), Watershed Management Area 4 (Lower Passaic and Saddle Rivers), Watershed Management Area 5 (Hackensack River, Hudson River, and Pascack Brook), Watershed Management Area 6 (Upper and Middle Passaic, Whippany, and Rockaway Rivers), Proposed January 21, 2003, Established March 28, 2003, Prepared by the New Jersey Department of Environmental Protection Division of Watershed Management.
4. Total Maximum Daily Loads for Copper, Mercury, Nickel and Lead in NY-NJ Harbor, Prepared by the U.S. Environmental Protection Agency, Region 2, in cooperation with

Department of Environmental Protection, under the New York-New Jersey Harbor Estuary Program, July 26, 1994.

- * Please note that TMDL document #4 is a document prepared by the USEPA. No TMDLs have been developed by the NJDEP for these metals.

In addition to the TMDL documents referenced above, a fecal coliform TMDL was approved by the USEPA in July 2003 for the Hackensack River at River Vale, Musquapsink Brook at River Vale, and Pascack Brook at Westwood. This document is entitled "Amendment to the Northeast Water Quality Management Plan, Total Maximum Daily Loads for Fecal Coliform to Address 32 Streams in the Northeast Water Region, Watershed Management Area 3 (Pompton, Pequannock, Wanaque, and Ramapo Rivers), Watershed Management Area 4 (Lower Passaic and Saddle Rivers), Watershed Management Area 5 (Hackensack River, Hudson River, and Pascack Brook), Watershed Management Area 6 (Upper and Middle Passaic, Whippany, and Rockaway Rivers), Proposed January 21, 2003, Established March 28, 2003, Prepared by the New Jersey Department of Environmental Protection Division of Watershed Management."

Additionally, on April 27, 2000, the NJDEP Division of Watershed Management adopted an amendment to the Northeast Water Quality Management Plan to establish a Total Maximum Daily Load for Nickel in the Hackensack River.

Copies of these TMDLs are available on the NJDEP and USEPA websites:

NJDEP: <http://www.nj.gov/dep/watershedmgt/tmdl.htm#chart>

USEPA: <http://www.epa.gov/owow/tmdl/>.

4.3 EXISTING AND FUTURE STORMWATER FACILITIES

The Borough operates the following stormwater facilities:

- Catch basins
- Storm drains
- Surface detention basins:
 - Fairways
 - Lake Hollow Estates

- Underground detention basins
 - Linden Avenue Estates

Additionally, one development application includes the construction of detention basins:

- Sanford Avenue

This development is not constructed.

In order to maintain existing stormwater facilities, the following practices were established and are described in the Borough's SPPP:

- Storm drain labeling
- Adoption of Litter, Improper Waste Disposal, Yard Waste and Illicit Connections Ordinances
- Implementation of a Street Sweeping and Road Erosion Control Maintenance program
- Annual catch basin cleaning program to maintain catch basin function and efficiency.

The Borough will ensure adequate long-term operation and maintenance of stormwater management measures by requiring a Maintenance Plan, as described in Section 10 of the Approved Stormwater Control Ordinance.

4.4 FLOODING ISSUES

The following areas of the Borough are known to experience flooding:

- Palisade Avenue
- Vivian Avenue
- Randolph Avenue
- Lincoln Boulevard

Since the Borough culverts are not mapped at this time, the Borough is unable to provide information regarding undersized culverts.

Please refer to Figure 4, Groundwater Recharge Areas.

4.5 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). One (1) mapped public community water supply well and its associated wellhead protection areas are located in the Borough of Emerson. Additionally, a wellhead protection area from a well situated outside the municipal border is located in the Borough.

Figure 5, Wellhead Protection Areas, depicts the well and wellhead protection areas in the Borough.

It should be noted that the County of Bergen adopted a Wellhead Protection Ordinance in 1998 which addresses public non-community water systems. A non-community water system is a public water system that pipes water for human consumption to at least 15 service connections used by individuals other than year-round residents for at least 60 days a year, or serves 25 or more people at least 60 days a year (e.g. schools or factories). According to the ***Bergen County Wellhead Protection Ordinance***, maps delineating the wellhead protection areas, prepared by the Bergen County Department of Health Services (BCDHS) and dated September 26, 1997, are on file and maintained by the BCDHS, Bergen County Clerk, and Borough Clerk's Office.

SECTION 5.0

5.0 DESIGN AND PERFORMANCE STANDARDS

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

In order to address impacts from existing development, the Borough has established and implemented various stormwater management controls and/or programs. These controls and programs were established and described in the SPPP. The controls and programs include:

- Local public education
- Illicit connection elimination
- Pet waste, Litter, Improper Waste Disposal, Wildlife Feeding, Yard Waste and Illicit Connections ordinances
- Storm Drain Inlet Retrofitting
- Annual catch basin cleaning
- Outfall pipe stream scouring remediation
- Implementation of Standard Operating Procedures for fueling operations, vehicle maintenance and housekeeping
- Employee Training

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

As stated previously in Section 4.3, the Borough intends to ensure adequate long-term operation and maintenance of stormwater management measures by requiring a Maintenance Plan as described in Section 10 of the Approved Stormwater Control Ordinance. The penalties

established by the Borough are detailed in Section 11 of the Approved Stormwater Control Ordinance.

SECTION 6.0

6.0 PLAN CONSISTENCY

6.1 BERGEN COUNTY

This MSWMP will be updated as necessary to be consistent with the County Stormwater Management Plan. If any additional Regional Storm Water Management Plans are developed in the future, this MSWMP will be updated to be consistent.

6.2 RESIDENTIAL SITE IMPROVEMENT STANDARDS (RSIS)

The Borough of Emerson currently utilizes the *Residential Site Improvement Standards (RSIS, 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*.

6.3 BERGEN SOIL CONSERVATION DISTRICT

The Borough Engineer and/or Construction Official are responsible for coordination with the Bergen Soil Conservation. According to the Borough Construction Official, the threshold review is any project larger than a two lot subdivision.

6.4 TOTAL MAXIMUM DAILY LOAD (TMDL) DOCUMENTS

As stated previously in Section 4.2, TMDLs have been developed for river segments in the vicinity of the Borough:

1. Hackensack River in Rivervale for copper, lead and mercury
Document entitled: "Total Maximum Daily Loads for Copper, Mercury, Nickel and Lead in NY-NJ Harbor, Prepared by the U.S. Environmental Protection Agency, Region 2, in cooperation with the New York State Department of Environmental Conservation and the New Jersey Department of Environmental Protection, under the New York-New Jersey Harbor Estuary Program, July 26, 1994."
2. Phosphorus TMDL for the Musquapsink Brook at Harrington Avenue in Westwood/Musquapsink Brook at River Vale and Pascack Brook at Westwood
Document entitled "Amendment to the Northeast Water Quality Management Plan, Total Maximum Daily Loads for Phosphorus to Address Three (3) Stream Segments in the

Northeast Water Region, Watershed Management Area 5 (Hackensack and Pascack Watersheds), Proposed July 5, 2005, Established August 31, 2005, Prepared by the New Jersey Department of Environmental Protection Division of Watershed Management.”

3. Fecal coliform TMDL for the Hackensack River at River Vale, Musquapsink Brook at River Vale, and Pascack Brook at Westwood.

Document entitled “Amendment to the Northeast Water Quality Management Plan, Total Maximum Daily Loads for Fecal Coliform to Address 32 Streams in the Northeast Water Region, Watershed Management Area 3 (Pompton, Pequannock, Wanaque, and Ramapo Rivers), Watershed Management Area 4 (Lower Passaic and Saddle Rivers), Watershed Management Area 5 (Hackensack River, Hudson River, and Pascack Brook), Watershed Management Area 6 (Upper and Middle Passaic, Whippany, and Rockaway Rivers), Proposed January 21, 2003, Established March 28, 2003, Prepared by the New Jersey Department of Environmental Protection Division of Watershed Management.”

4. Nickel TMDL for the Hackensack River

Document entitled “Adoption of the Amendment to the Northeast Water Quality Management Plan to establish a Total Maximum Daily Load for Nickel in the Hackensack River, Dated April 27, 2000.”

6.4.1 Implementation Strategies

This MSWMP must be consistent with the established TMDLs.

6.4.1.1 TMDL for Copper, Mercury, Nickel and Lead in the Hackensack River

The TMDL for copper, mercury, nickel and lead in the Hackensack River was specifically focused on municipal and industrial dischargers. According to the most recent available NJDEP GIS data, there are no surface water dischargers within the Borough. Therefore, the specific implementation strategies discussed in the TMDL document do not apply to the Borough.

6.4.1.2 TMDL for Phosphorus in the Musquapsink and Pascack Brooks

The TMDL for phosphorus in the Musquapsink Brook and Pascack Brook identified the following implementation strategies:

- Nonpoint source public education
- Cleaning catch basins
- Performing good housekeeping at maintenance yards
- Septic tank management to address failing systems (there is only one existing septic tank in the Borough)
- Waterfowl and pet waste disposal ordinances
- Goose management programs

The Borough has already established several of these strategies through their SPPP.

Additionally, the phosphorus TMDL requires that watersheds with a high percentage of urban land use adopt a low phosphorus fertilizer ordinance as part of the stormwater permitting program. Guidance, as well as a sample ordinance, is included in Appendix 3.

6.4.1.3 TMDL for Fecal Coliform in the Hackensack River, Musquapsink Brook and Pascack Brook

The TMDL for fecal coliform listed the following sources of fecal coliform:

- Non Human: Canada geese; pet waste; stormwater basins; direct stormwater discharges to waterbodies; and farms, zoos and livestock
- Human: Malfunctioning or older improperly sized septic systems; failing sewage conveyance systems; and improper garbage storage and disposal

The TMDL identified various short and long-term management strategies including stream bank restoration projects; goose management programs; establishment of riparian buffers; adoption of no feed ordinances for waterfowl and wildlife and pet waste ordinances; retrofit of detention/retention basins to achieve water quality control; conducting of regularly scheduled stormwater basin cleanouts and maintenance, storm sewer inlet cleanouts and street sweeping programs; adoption of SPPP and MSWMP; and elimination of malfunctioning and older improperly sized septic systems and illicit connections of domestic sewage.

The following potential sources of fecal impairment were specifically noted in the TMDL document:

- Hackensack River at River Vale: geese observed at Golf Course, Open Spaces and County Park
- Musquapsink Brook at River Vale: Canada geese observed at elementary school ballfields and nearby cemeteries
- Pascack Brook at Westwood: No sources were listed that are in the Borough of Emerson

It is unknown whether the specific areas listed in the TMDL are located in the Borough of Emerson; however, the Borough has already established several of the recommended strategies in their SPPP.

6.4.1.4 TMDL for Nickel in the Hackensack River

This TMDL recommends that load reduction measures be implemented through the use of Best Management Practices (BMPs) including local ordinances for stormwater management and nonpoint source pollution control. As is mentioned throughout this MSWMP, various ordinances and programs to control and reduce nonpoint source pollution control were established through the Borough's SPPP. Additionally, a Stormwater Control Ordinance has been adopted. The approved Stormwater Control Ordinance and the May 2, 2006 meeting agenda memorializing the adoption of the ordinance is included in Appendix 1.

6.4.2 Future TMDLs

The NJDEP has not yet developed a methodology for developing TMDLs for metals. The NJDEP expects to develop TMDLs for metals, especially arsenic and mercury, in the next few years. Currently, there is no schedule in place as to when the NJDEP will develop TMDLs for other metals, including copper, lead and chromium. If and/or when the NJDEP develops TMDLs for these metals or other constituents, this MSWMP will be updated to be consistent.

SECTION 7.0

7.0 NONSTRUCTURAL STORMWATER MANAGEMENT STRATEGIES

The Borough has reviewed the *Master Plan* and the *Borough Code*, and has provided a list of the sections in the Borough ordinances that are to be modified to incorporate nonstructural stormwater management strategies. These are the ordinances identified for revision. Once the ordinance texts are completed, they will be submitted to the county review agency for review and approval. A copy will be sent to the NJDEP at the time of submission.

Chapters 156 (Flood Damage Prevention), 236 (Site Plan Review), 244 (Soil Movement), 248 (Streets and Sidewalks), 266 (Tree Preservation and Woodlands Management), and 290 (Zoning) of the Borough Code were reviewed with regard to incorporating nonstructural stormwater management strategies. Several changes were made to these Chapters to incorporate these strategies.

7.1 CHAPTER 156: FLOOD DAMAGE PREVENTION

Section 156-13: Establishment of Development Permit

Section 156-13B details the information that is required for a development permit application. Since all flood plain and watercourse activities must comply with the NJDEP *Flood Hazard Area Control Act Rules (N.J.A.C. 7:13)*, this section should be amended to require that "proof of compliance with the *Flood Hazard Area Control Act Rules (N.J.A.C. 7:13)*" be provided as part of the development permit application.

Section 156-15D: Alteration of Watercourses

Section 156-15D discusses alteration of watercourses. The ordinance states that when alteration of a watercourse is proposed, the Borough Clerk shall:

- 1.) Notify adjacent communities and the state coordinating agency 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 the watercourse so that the flood carrying capacity is not diminished.

Section 156-15 is inconsistent with the NJDEP ***Flood Hazard Area Control Act Rules (N.J.A.C. 7:13)***. Therefore, this ordinance 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."

Additionally, the ordinance 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 156-15E: Interpretation of FIRM Boundaries

Section 156-15E states that the Borough Clerk shall also make interpretations where needed, as to the exact location of the boundaries of the areas of special flood hazard, for example, where there appears to be a conflict between a mapped boundary and actual field conditions. The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation.

This section is inconsistent with State regulations. Therefore, this ordinance 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."

7.2 CHAPTER 236: SITE PLAN REVIEW

Section 236-6: Application Procedure

Section 236-6B(3) requires that the location of the following natural features be depicted on the plan: contours; the location and width of any existing watercourses, marshes and wooded areas and isolated trees with a diameter of six inches or more when measured three feet above the base; and approximate boundaries of any areas subject to flooding or stormwater overflows.

Language should be added to this section to include wetlands, floodplains, steep slopes, historic sites, and other significant existing features.

Section 236-8: Design Standards

Section 236-8 states that the landscape shall be preserved in its natural state, insofar as practicable and where desirable, by minimizing tree and soil removal; and any grade changes shall be in keeping with the general appearance of neighboring developed areas. This section currently complies with the NJDEP's goal to preserve natural areas, which is a low impact development technique.

Section 236-8D details surface water drainage. This section states that stormwater shall be removed from all roofs, canopies and paved areas and carried away in paved swales or in an underground drainage system. This section should be amended to allow for the use of vegetated swales where practical.

Additionally, this section should be revised to include the new Stormwater Control Ordinance, included in Appendix 1, in its entirety.

7.3 CHAPTER 244: SOIL MOVEMENT

Chapter 244 addresses soil movement activities. Currently, the Chapter does not mention New Jersey's ***Soil Erosion and Sediment Control Standards***. Therefore, this Chapter should be amended to state that all soil activities must comply with New Jersey's ***Soil Erosion and Sediment Control Standards***. During construction, Borough inspectors shall perform periodic inspection of on-site soil erosion and sediment control measures and report any inconsistencies to the local Soil Conservation District.

7.4 CHAPTER 248: STREETS AND SIDEWALKS

Section 248-2 addresses concrete sidewalk construction specifications. It appears that concrete is the only currently acceptable construction material for sidewalks. This section should be amended to allow the use of pervious material where practical.

7.5 CHAPTER 266, ARTICLE II: TREE PRESERVATION AND WOODLANDS MANAGEMENT

Article II of Chapter 266 details Tree Preservation in the Borough. Section 266-14, Criteria for approval of management plan and/or removal, allows trees to be removed within 15 feet around the perimeter of any area to be occupied by a building, driveway, drainage field, septic tank, recreation area (tennis courts, swimming pools or similar facilities). This complies with NJDEP recommendations.

This section also states that there shall be no clear-cutting permitted on slopes of 10% or greater in grade or within major subdivisions where the existing lots will be on one acre or less. This section also complies with NJDEP recommendations.

However, this Article 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.

7.6 CHAPTER 290: ZONING

Section 290-17.2: MS-AHO Municipally Sponsored Affordable Housing Overlay

Section 290-17.2F details perimeter buffers in the MS-AHO zone. This section states that a minimum five-foot-wide setback from the lot perimeter shall be a landscaped buffer of preserved existing mature vegetation and, as necessary in sparsely wooded areas, new landscaping of evergreen shrubs or trees, or fencing, at least five feet high, or a combination of materials to create a reasonable visual screen. The perimeter buffer may be included within any required setback. This section also permits stormwater management basins to be included within the perimeter buffer. Therefore, this section complies with NJDEP recommendations.

Section 290-30B: Design Standards for Off-Street Parking Areas

Section 290-30B(1) indicates that each off-street parking space shall measure not less than 10 feet by 20 feet, exclusive of access drives and aisles, except that parallel curb parking spaces shall be eight feet by 23 feet. This section should be amended to allow for parking stalls 9 feet in width and 18 feet in length where practical. Additionally, there should be an option to allow reduced stall lengths with vehicle overhang into vegetated areas.

Section 290-30B(4) states that parking areas shall be landscaped to minimize nuisance characteristics to adjacent properties and for aesthetic reasons. They shall be drained and paved in accordance with good engineering and construction practices as required by the Planning Board and Borough specifications. 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 290-30E: Uses and Required Spaces

Section 290-30E provides guidance on minimum parking space requirements for general and professional offices. These requirements are generally based on gross floor area (GFA). 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 3 spaces per 1,000 square feet GFA. The parking ratios should be reduced to comply with the NJDEP's recommendation.

Additionally, Section 290-30E requires one (1) parking space per 200 feet of GFA for retail stores or service businesses. 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.

7.7 NEW ORDINANCES

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.

Minimum Driveway Widths for Residential Off-Street Parking

Zoning regulations should require a minimum driveway width of 9 feet for one lane and 18 feet for two lanes.

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. Additionally, shared parking, where practical, should be encouraged.

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.

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

Vegetated Open Channels

The use of vegetated channels, rather than the standard concrete curb and gutter configuration, can decrease flow velocity, and allow for stormwater filtration and re-infiltration.

Section 5.3(b)8 of the **Rules** indicates that nonstructural stormwater management strategies incorporated into site design shall provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas. The Borough has no existing ordinances regarding the use of vegetated open channels. Therefore, a new ordinance should be adopted to encourage 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.

Steep Slopes

The Borough should consider implementing a steep slope ordinance to further control development in areas characterized by steep slopes.

Stream Corridors

The Borough should consider the establishment of 'linear parks' or open spaces along stream corridors in the Borough. This concept of stream corridors is consistent with the State Development and Redevelopment Plan.

SECTION 8.0

8.0 LAND USE / BUILD OUT ANALYSIS

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

Figure 6, Existing Land Use, illustrates the existing land use in the Borough based on 1995/97 GIS information from NJDEP. Figure 8, Zoning Map of the Borough of Emerson, depicts the current zoning districts. Figure 9, Constrained Land, illustrates the constrained lands within the Borough.

9.0 MITIGATION PLAN

This mitigation plan is provided for a proposed development or redevelopment projects that seek a variance or exemption from the Borough 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 Borough agency providing review, i.e. Board of Adjustment, Planning Board, Borough Council and the Borough 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. The plan must identify the measures necessary to offset the deficit created with respect to the design and performance standard(s) that would result from the grant of a variance or exemption at a project site. The plan must also ensure that the mitigation is completed in the drainage area and for the performance standard(s) for which the variance or exemption was granted for a project. It should be noted that the standards for the Special Water Resource Protection Area (SWRPA) established under the Stormwater Management rules at N.J.A.C. 7:8-5.5(h) cannot be waived through the municipal mitigation plan.

The Borough has the option to identify a specific mitigation project that could be used by an applicant to offset the effect of a requested waiver/exemption or to address an existing stormwater problem, or choose to provide a process through which an applicant has the flexibility and responsibility to identify an appropriate mitigation project and a location to implement the mitigation project.

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

1. The project must be within the same area that would contribute to the receptor impacted by the project. If there are no specific sensitive receptors that would be impacted as the result of the grant of the waiver/exemption, then the location of the mitigation project can be located anywhere within the municipality, and should be selected to provide the most benefit relative to an existing stormwater problem in the same category (quality, quantity or recharge).

2. Legal authorization must be obtained to construct the project at the location selected. This includes the maintenance and any access needs for the project in the future.

3. The project should be close to the location of the original project, and if possible, be located upstream at a similar distance from the identified sensitive receptor. This distance should not be based on actual location, but on a similar hydraulic distance to the sensitive receptor. For example, if the project for which a waiver is obtained discharges to a tributary, but the closest location discharges to the main branch, it may be more beneficial to identify a location discharging to the same tributary.

4. For ease of administration, if sensitive receptors are addressed, it is preferable to have one location that addresses any and all of the performance standards waived, rather than one location for each performance standard.

5. It must be demonstrated that implementation of the mitigation project will result in no adverse impacts to other properties.

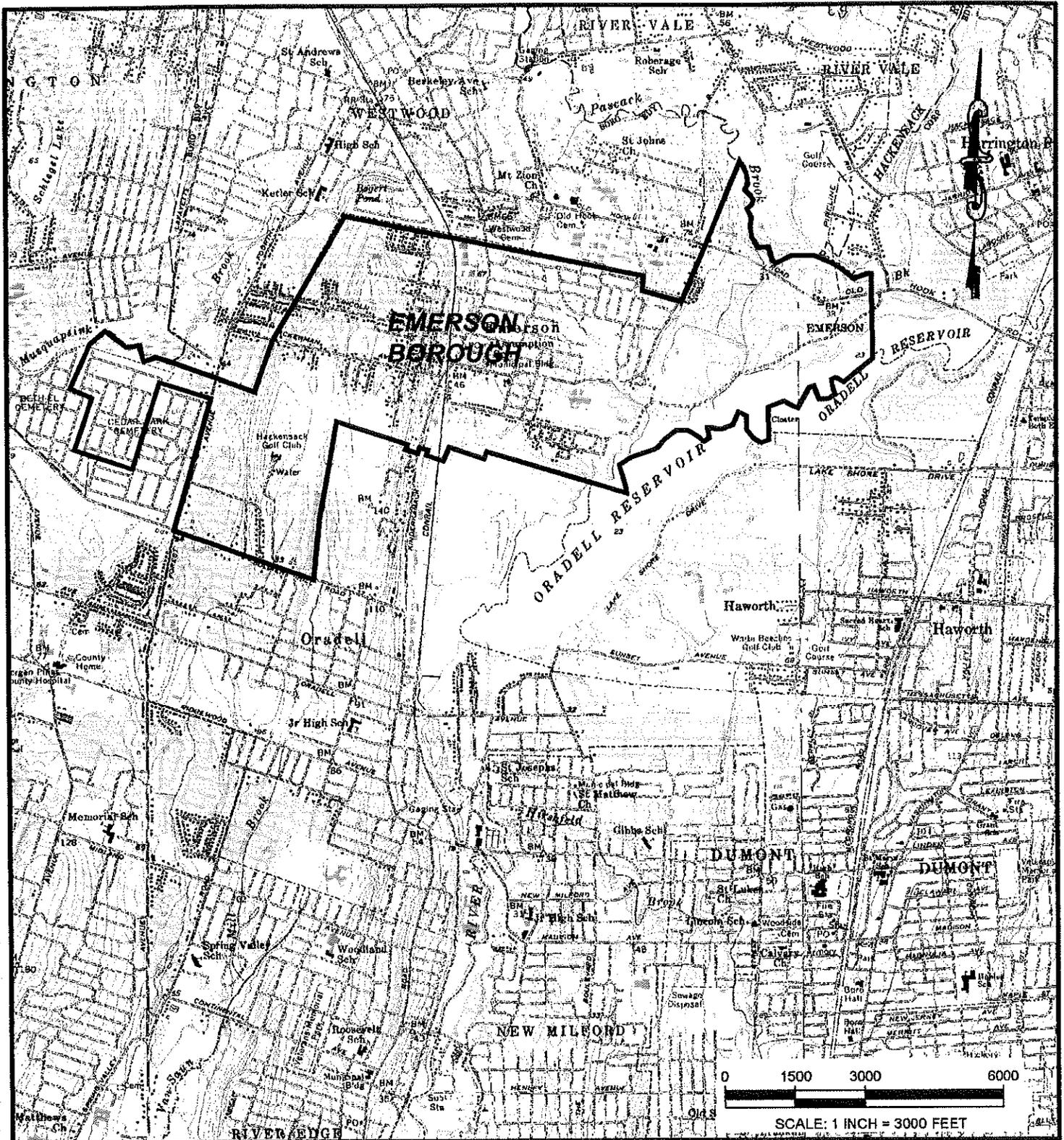
6. Mitigation projects that address stormwater runoff quantity can provide storage for proposed increases in runoff volume, as opposed to a direct peak flow reduction.

Note that work in regulated areas, such as floodplains and wetlands must be performed in accordance with applicable regulations such as the Flood Hazard Area Control Act Rules and the Freshwater Wetland Act Rules. Also, many areas of open space in New Jersey have received funding by the Department's Green Acres Program and many of those encumbered lands have restrictions placed on them as a result of that funding.

The Borough will allow developers to fund analyses to identify potential mitigation projects that could be used to address deficits in complying with each of the performance standards. However, the funding option shall only be allowed where the project requesting the waiver will have no measurable impact with respect to flooding, erosion, water quality degradation, etc. The funding option may also be appropriate in situations where the size of an individual project

requesting a waiver/exemption is small, or the degree of deficit in complying with the design and performance standard(s) is small. In such cases, the receipt of the financial contribution shall satisfy the mitigation obligation for the project.

FIGURES



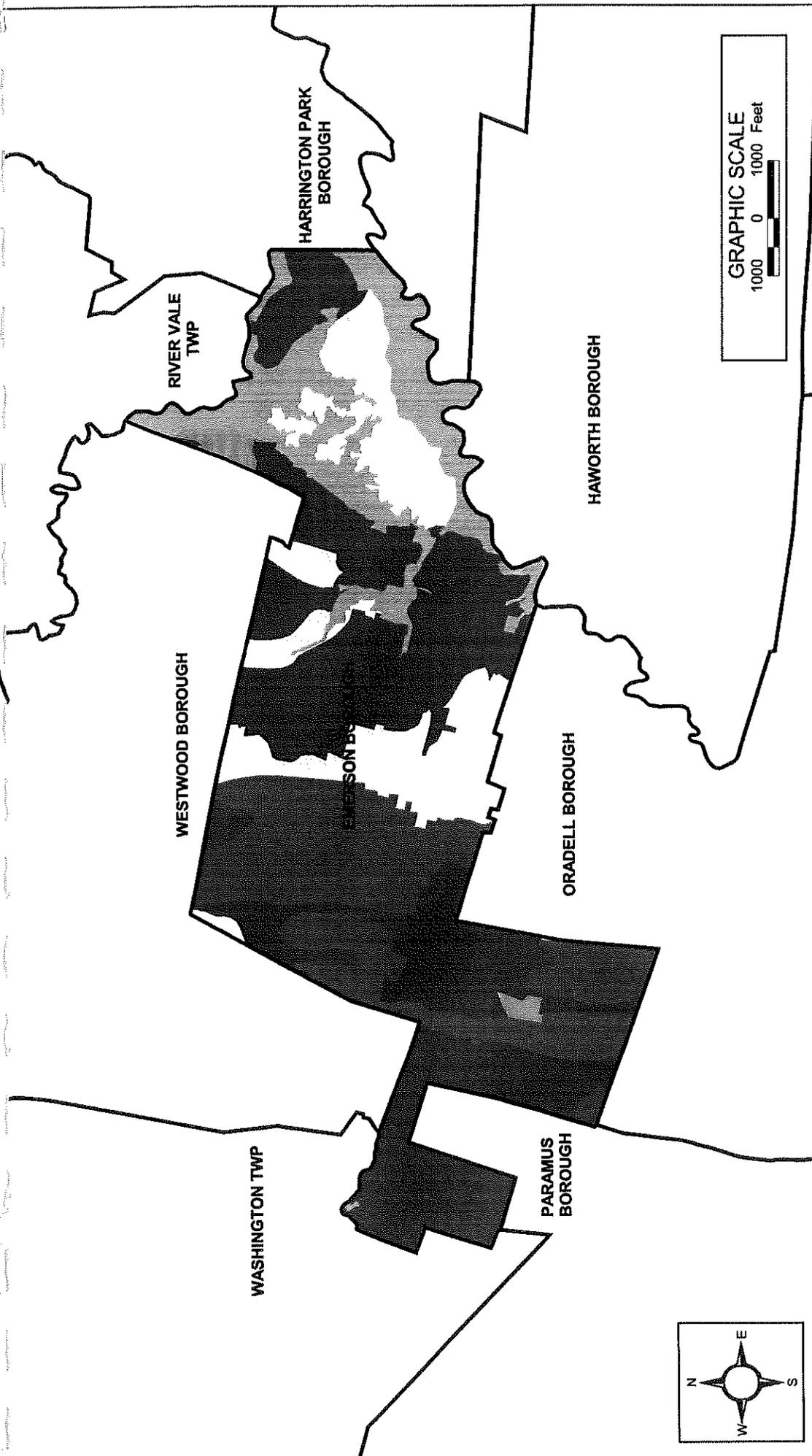
SOURCE: U.S.G.S. 7.5 MINUTE SERIES
 HACKENSACK (1955 REV. 1981) &
 YONKERS (1966 REV. 1979) QUADRANGLES
 NEW JERSEY

USGS TOPOGRAPHIC MAP

**BOROUGH OF EMERSON
 MUNICIPAL PLACE
 BERGEN COUNTY, NEW JERSEY**

PMK Group
 CONSULTING & ENVIRONMENTAL ENGINEERS
 65 Jackson Drive, Cranford, New Jersey 07016
 (908) 497-8900 * Fax: (908) 497-9134 * www.PMKgroup.com
 CERTIFICATE OF AUTHORIZATION #24CA28028000

DRAWN BY:	TS	DATE:	4/27/05
CHECKED BY:	DS	SCALE:	1" = 3000'
PROJECT NO:	051424-03		PLATE NO.
			3



GROUNDWATER RECHARGE AREAS

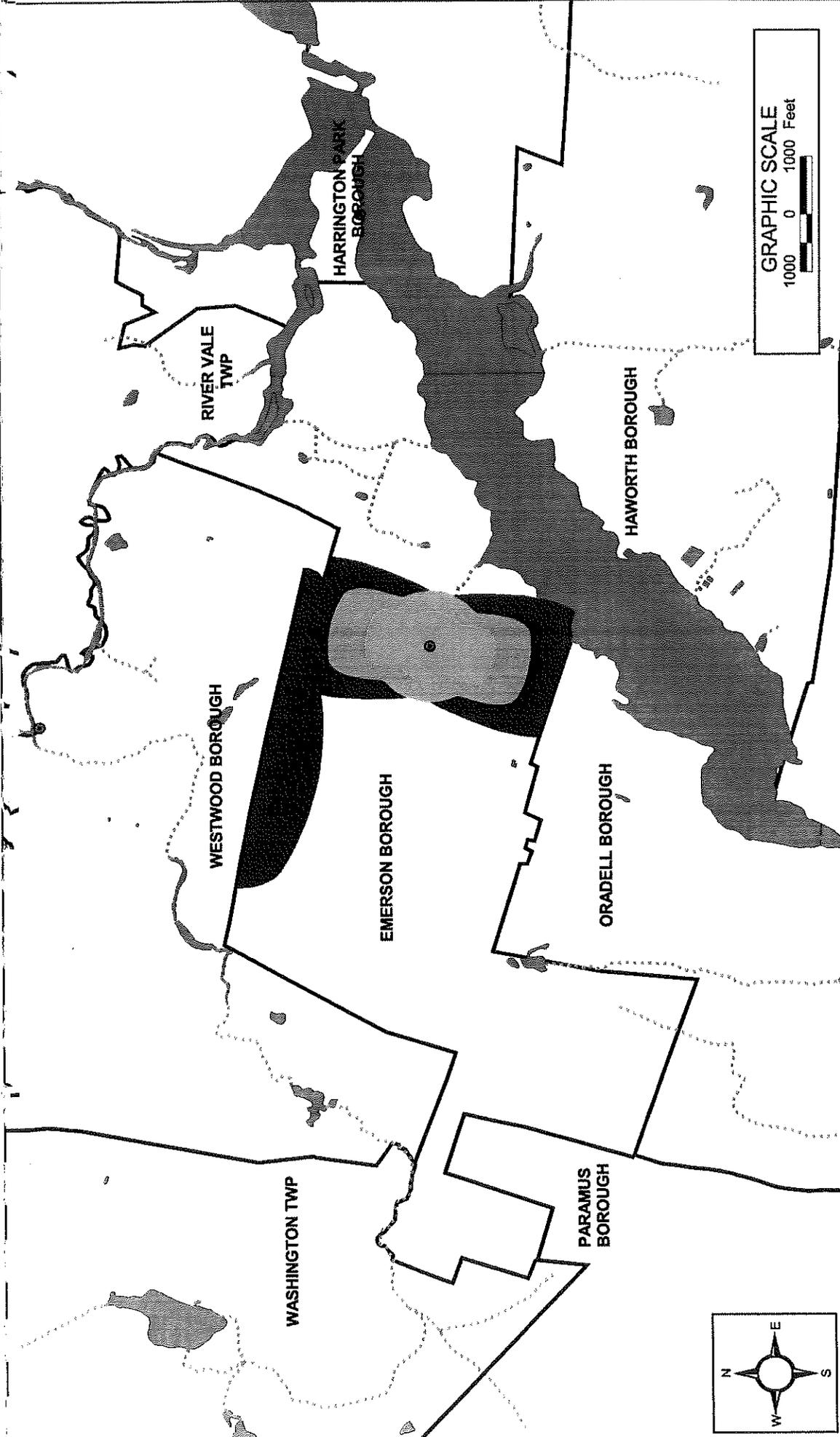
LEGEND

-  MUNICIPAL BOUNDARY
-  13 TO 17 IN/YR
-  8 TO 12 IN/YR
-  1 TO 7 IN/YR
-  0 IN/YR
-  WETLANDS & OPEN WATER

SOURCE:
NJDEP digital GIS data.

**BOROUGH OF EMERSON
MUNICIPAL PLACE
BERGEN COUNTY, NEW JERSEY**

 PMK Group CONSULTING & ENVIRONMENTAL ENGINEERS 65 Jackson Drive, Cranford, New Jersey 07016 (908) 497-8900 * Fax: (908) 497-8945 * www.pmkgroup.com CERTIFICATE OF AUTHORIZATION #24GA28028000	Drawn By: TS	Date: 4/27/05
	Checked By: DS	Scale: As Noted
Project No. 051424-03		Figure 4



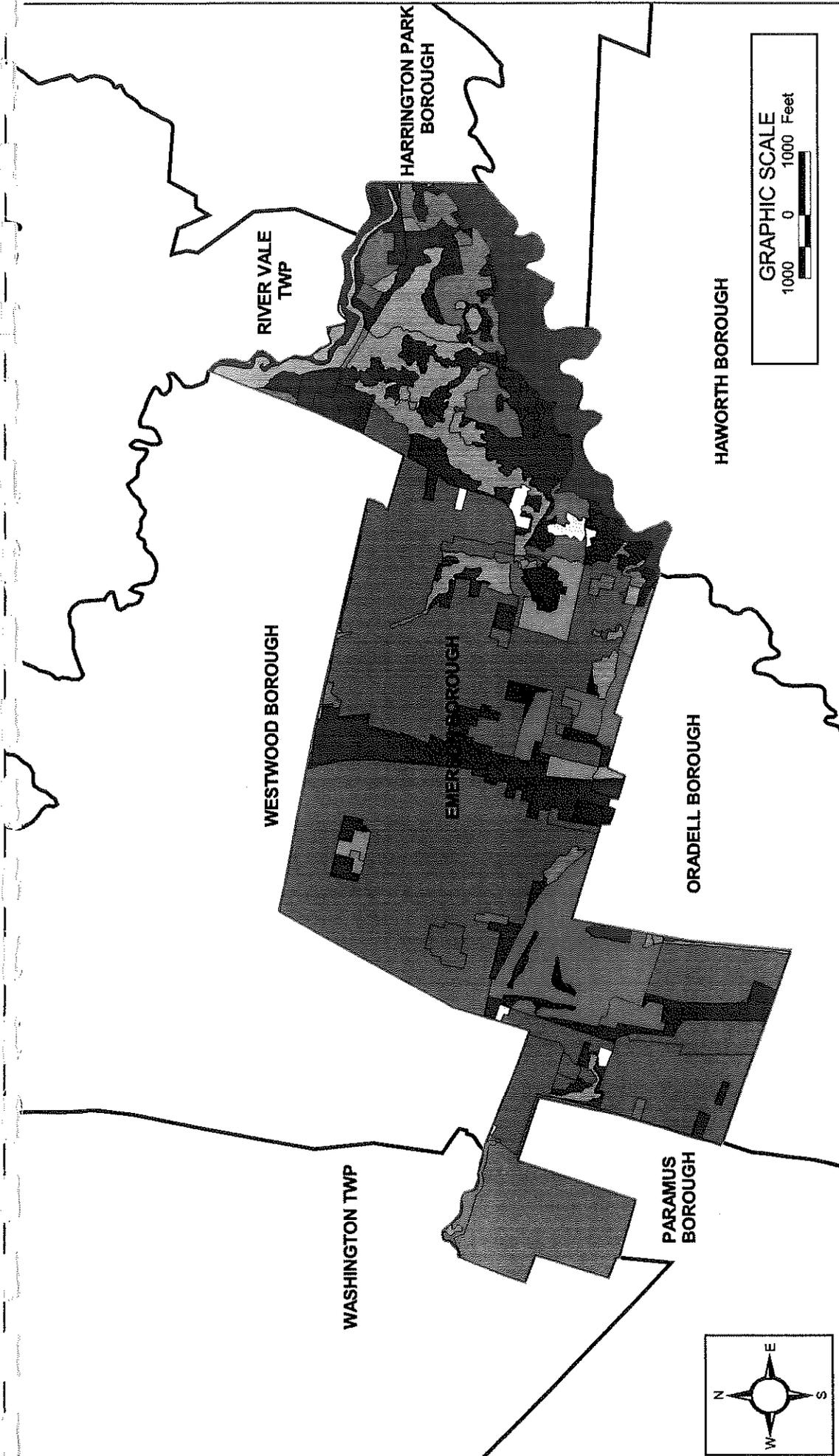
WELLHEAD PROTECTION AREAS

- LEGEND**
- MUNICIPALITY BOUNDARY
 - STREAM
 - LAKE
 - WELL LOCATION
 - TIER 1: TIME OF TRAVEL= 2 YEARS
 - TIER 2: TIME OF TRAVEL= 5 YEARS

SOURCE:

**BOROUGH OF EMERSON
MUNICIPAL PLACE
BERGEN COUNTY, NEW JERSEY**

<p>PMK Group CONSULTING & ENVIRONMENTAL ENGINEERS 65 Jackson Drive, Cranford, New Jersey 07016 (908) 497-8900 * Fax: (908) 497-8945 * www.pmkgroup.com</p>	Drawn	Date:
	By: TS	4/27/05
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By: DS	As Noted	
Project No.	Figure	



EXISTING LAND USE MAP

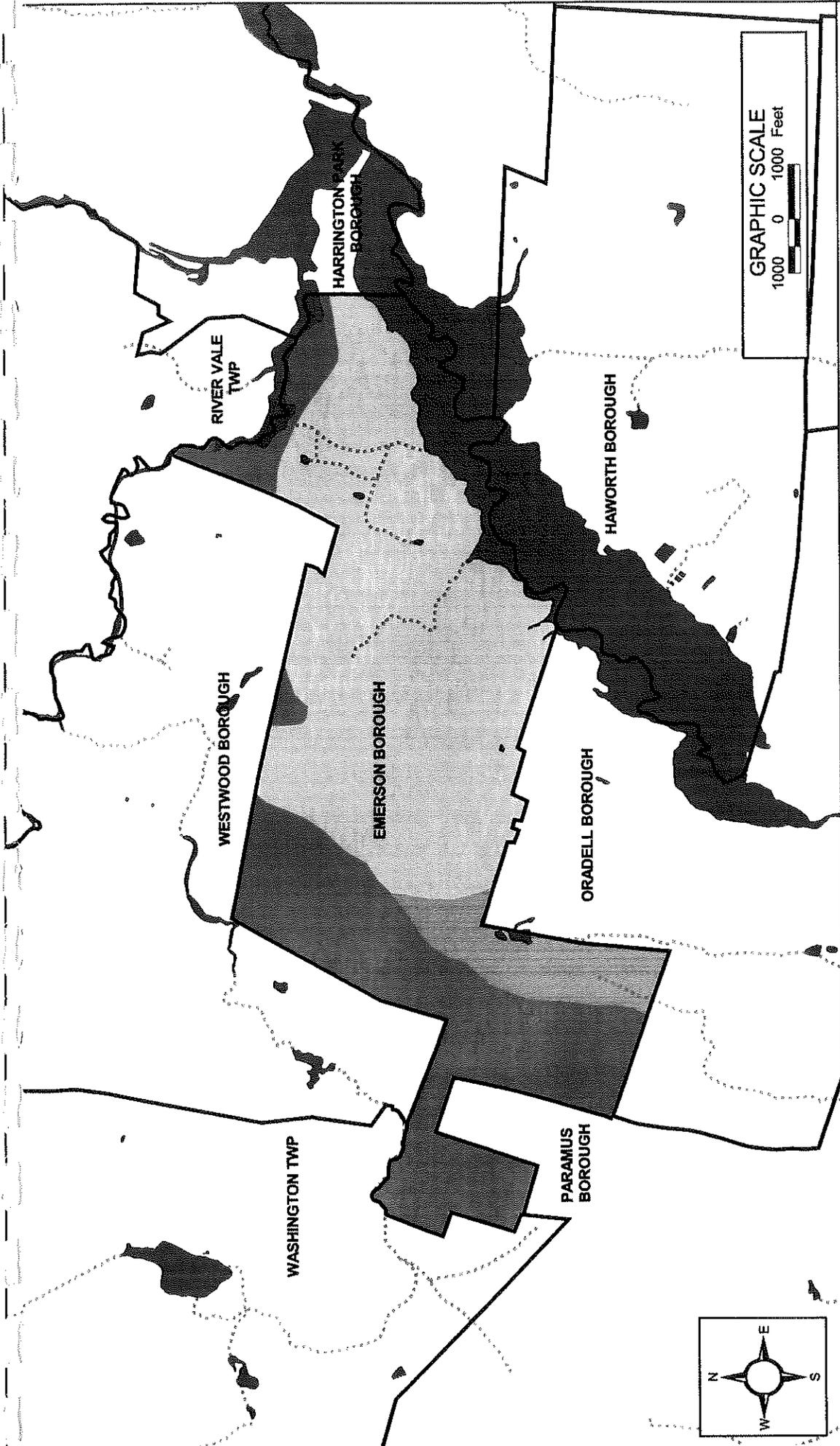
LEGEND

- AGRICULTURAL LAND
- ATHLETIC FIELDS (SCHOOLS)
- COMMERCIAL/SERVICES
- DECIDUOUS BRUSH/SHRUBLAND
- FORESTED AREAS
- OTHER URBAN OR BUILT-UP LAND
- RECREATIONAL LAND
- RESIDENTIAL, HIGH DENSITY, MULTIPLE DWELLING
- RESIDENTIAL, RURAL, SINGLE UNIT
- RESIDENTIAL, SINGLE UNIT, LOW DENSITY
- RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY
- TRANSITIONAL AREAS
- TRANSPORTATION/COMMUNICATIONS/UTILITIES
- WATERBODIES
- WETLAND AREAS

SOURCE:
NJDEP digital GIS data.

**BOROUGH OF EMERSON
MUNICIPAL PLACE
BERGEN COUNTY, NEW JERSEY**

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	Project No. 051424-03	Figure 6



HYDROLOGIC UNITS (HUC-14s)

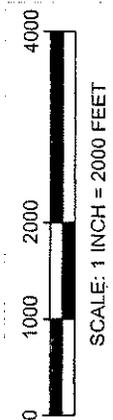
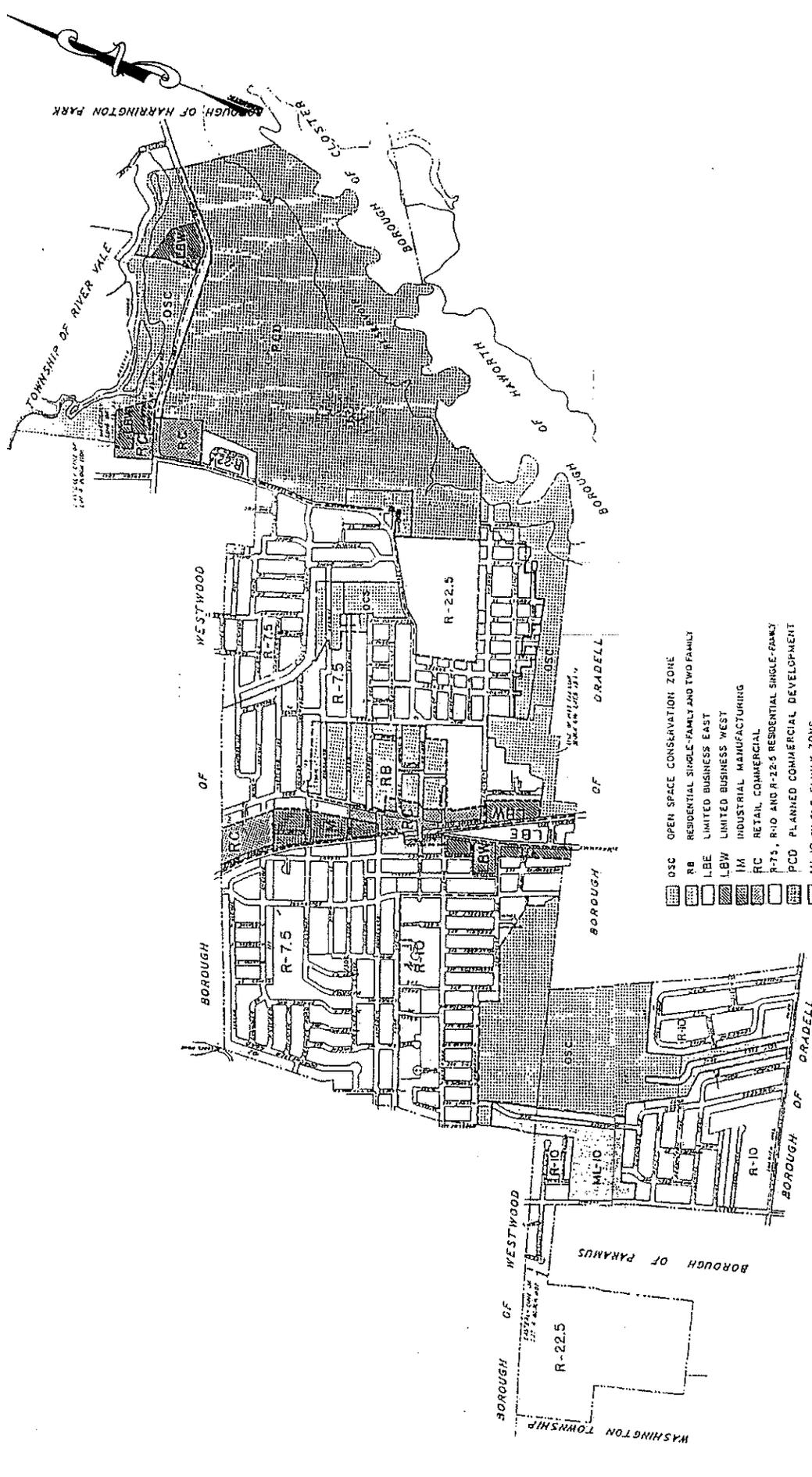
- LEGEND**
- MUNICIPAL BOUNDARY
 - LAKES
 - STREAMS
 - 02030103170020
 - 02030103170060
 - 02030103180010

SOURCE:
NJDEP digital GIS data.

**BOROUGH OF EMERSON
MUNICIPAL PLACE
BERGEN COUNTY, NEW JERSEY**

	Drawn By:	TS	Date:	4/27/05	
	Checked By:	DS	Scale:	As Noted	
CONSULTING & ENVIRONMENTAL ENGINEERS 65 Jackson Drive, Cranford, New Jersey 07016 (908) 497-8900 * Fax: (908) 497-8945 * www.pmkgroup.com			Project No.	051424-03	
				Figure	7

CERTIFICATE OF AUTHORIZATION #2JGA28028000

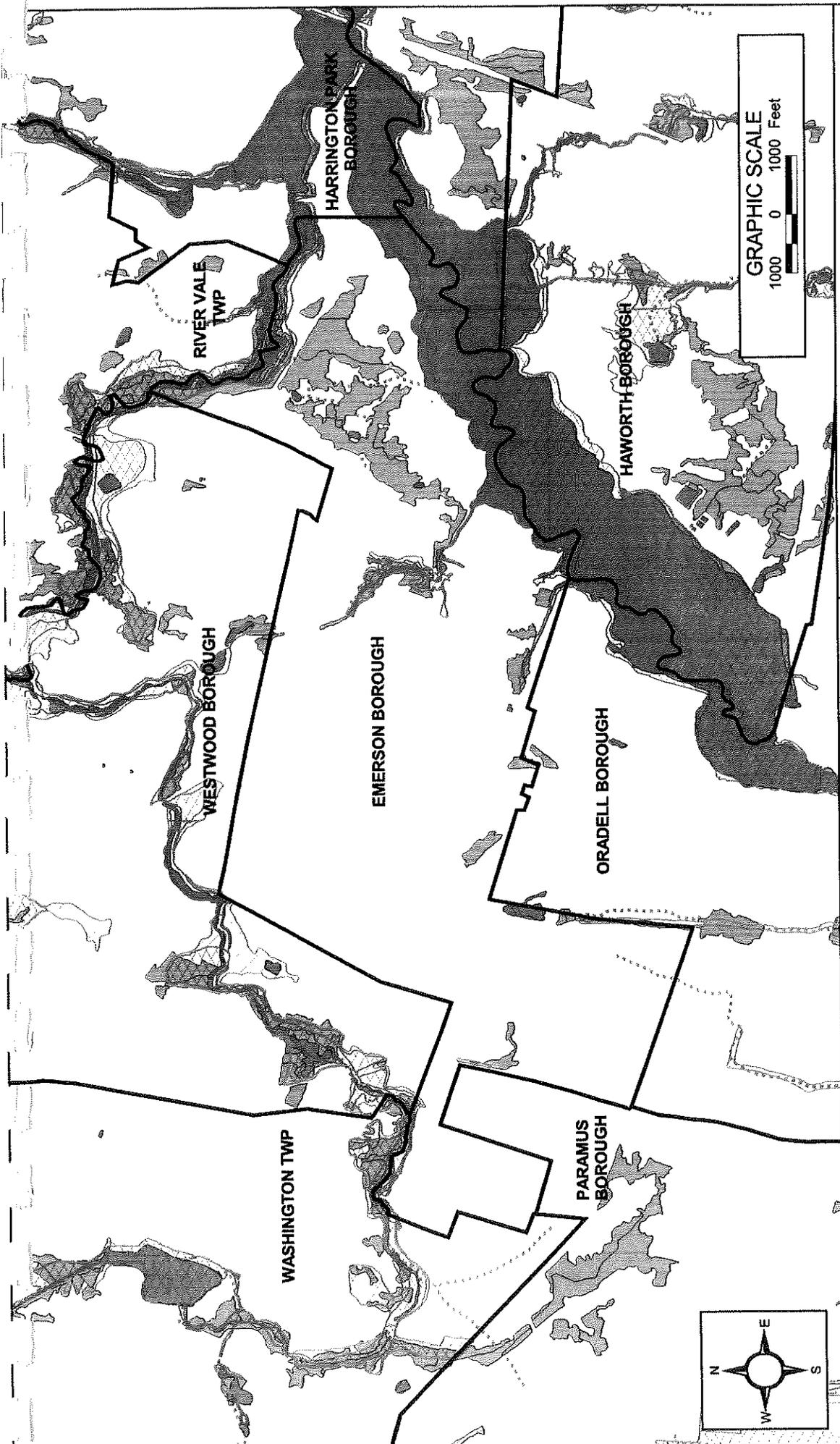


SOURCE: EMERSON BOROUGH ORDINANCE.

 PMK Group CONSULTING & ENVIRONMENTAL ENGINEERS	DATE	4/27/05
	DRAWN BY:	TS
65 Jackson Drive, Clarendon, New Jersey 07016 (908) 497-9134 * Fax: (908) 497-9134 * www.PMKgroup.com CERTIFICATE OF AUTHORIZATION #246A28028000	CHECKED BY:	DS
	PROJECT NO:	051424-03
	SCALE:	1" = 2000'
	PLATE NO.	8

ZONING MAP

BOROUGH OF EMERSON
 MUNICIPAL PLACE
 BERGEN COUNTY, NEW JERSEY



CONSTRAINED LAND

LEGEND

-  MUNICIPAL BOUNDARY
-  LAKES
-  STREAMS
-  100 -YEAR FLOOD PLAIN
-  500 -YEAR FLOOD PLAIN
-  WETLAND AREAS

SOURCE:
NJDEP digital GIS data.

**BOROUGH OF EMERSON
MUNICIPAL PLACE
BERGEN COUNTY, NEW JERSEY**



PMK Group
CONSULTING & ENVIRONMENTAL ENGINEERS
65 Jackson Drive, Cranford, New Jersey 07016
(908) 497-8900 * Fax: (908) 497-8945 * www.pmkgroup.com
CERTIFICATE OF AUTHORIZATION #24GA28028000

Drawn By:	TS	Date:	4/27/05
Checked By:	DS	Scale:	As Noted
Project No.	051424-03	Figure	9

APPENDIX 1

**APPROVED STORMWATER CONTROL ORDINANCE AND
MEETING AGENDA MEMORIALIZING ORDINANCE ADOPTION**

Borough of Emerson, Bergen County, New Jersey

ORDINANCE NO. 1304-06

NOTICE IS HEREBY GIVEN that the following ordinance was adopted on the second reading after a Public Hearing at the Regular Meeting of the Borough Council of the Borough of Emerson on the 2nd day of May 2006. A copy of Ordinance 1304-06 is on file in the Borough Clerk's Office in the Municipal Building, 1 Municipal Pl., Emerson, NJ 07630.

Storm water Control Ordinance

AN ORDINANCE TO ESTABLISH STORM WATER MANAGEMENT CONTROLS TO ENSURE PROPER STORM WATER MANAGEMENT IN CONJUNCTION WITH CURRENT STATE AND FEDERAL REGULATIONS

May 2, 2006

ATTEST: Carol Dray, RMC
Borough Clerk

Steve Setteducati
Mayor

Adopted
5/3/06

BOROUGH OF EMERSON

COUNTY OF BERGEN, NJ 07630

ORDINANCE NO. 1304-06

NOTICE IS HEREBY GIVEN that the following ordinance was adopted on the second reading after a Public Hearing at the Regular Meeting of the Borough Council of the Borough of Emerson on the 2nd day of May 2006. A copy of Ordinance 1304-06 is on file in the Borough Clerk's Office in the Municipal Building, 1 Municipal Pl., Emerson, NJ 07630.

Storm water Control Ordinance

AN ORDINANCE TO ESTABLISH STORM WATER MANAGEMENT CONTROLS TO ENSURE PROPER STORM WATER MANAGEMENT IN CONJUNCTION WITH CURRENT STATE AND FEDERAL REGULATIONS

May 2, 2006

ATTEST: Carol Dray, RMC
Borough Clerk

Steve Setteducati
Mayor

Ridgewood News - 1707016
Fee:\$24.44
May 5, 2006

Intro

BOROUGH OF EMERSON
COUNTY OF BERGEN, NJ 07630

ORDINANCE NO. 1304-06

NOTICE is hereby given that the following Ordinance was introduced and passed on first reading at the Regular meeting of the Borough Council of the Borough of Emerson on the 28th day of March 2006, and that said Ordinance will be further considered for final passage at the meeting of said Borough Council to be held on the 16th day of April 2006, at 8:00 p.m., or as soon thereafter as said matter can be heard at the Municipal Building, Linwood Avenue, Emerson, New Jersey, at which time and place all persons who may be interested therein shall be given an opportunity to be heard concerning same.

ORDINANCE NO. 1304-06

Storm water Control Ordinance

**No. 1304-06AN ORDINANCE TO ESTABLISH STORM WATER
MANAGEMENT CONTROLS TO ENSURE PROPER STORM WATER
MANAGEMENT IN CONJUNCTION WITH CURRENT STATE
AND FEDERAL REGULATIONS**

March 29, 2006

Carol Dray, RMC
Borough Clerk

Ridgewood News - 1672442
Fee: \$29.14
April 7, 2006

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11 APR 2006 10:00 AM

Borough of Emerson, Bergen County, New Jersey
Stormwater Control Ordinance

The Borough of Emerson hereby amends their Land Development Ordinance to include the following Stormwater Control Ordinance. The following shall govern for instances where this ordinance conflicts with the existing Land Development Ordinance.

Section 1 - Scope & 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 (Best Management Practices). Structural BMPs should be integrated with nonstructural stormwater management strategies and proper maintenance plans. Nonstructural strategies include both environmentally sensitive site design and source controls that prevent pollutants from being placed on the site or from being exposed to stormwater. Source control plans should be developed based upon physical site conditions and the origin, nature, and the anticipated quantity or amount of potential pollutants. Multiple stormwater management BMPs may be necessary to achieve the established performance standards for water quality, quantity, and groundwater recharge.

B. Purpose

It is the purpose of this ordinance to establish minimum stormwater management requirements and controls for Amajor development, as defined in Section 2 and to reduce the amount of non-point source pollution entering surface and ground water. Unmitigated storm waters from areas altered by development may pose public health and safety threats. This ordinance establishes the administrative mechanisms necessary for the Borough of Emerson to ensure proper storm water management. This ordinance is written to work in conjunction with current state and federal regulations. This ordinance guides development in a manner that is proactive and minimizes harmful impacts to natural resources. Specifically, this ordinance shall:

1. Reduce artificially induced flood damage to public health, life, and property;
2. Minimize increased stormwater runoff rates and volumes;
3. Minimize the deterioration of existing structures that would result from increased rates of stormwater runoff;
4. Induce water recharge into the ground wherever suitable infiltration, soil permeability and favorable geological conditions exist;
5. Prevent an increase in non-point source pollution
6. Maintain the integrity and stability of stream channels and buffers for their ecological functions, as well as for drainage, the conveyance of floodwater, and other purposes;
7. Control and minimize soil erosion and the transport of sediment;
8. Minimize public safety hazards at any stormwater detention facility constructed pursuant to subdivision or site plan approval;
9. Maintain adequate base flow and natural flow regimes in all streams and other surface water bodies to protect the aquatic ecosystem;
10. Protect all surface water resources from degradation; and
11. Protect ground water resources from degradation and diminution

C. Applicability:

1. This ordinance shall be applicable to all site plans and subdivisions for the following major

developments that require preliminary or final site plan or subdivision review:

- a. Non-residential major developments; and
 - b. Aspects of residential major developments that are not pre-empted by the Residential Site Improvement Standards at N.J.A.C. 5:21.
2. This ordinance shall also be applicable to all major developments undertaken by Borough of Emerson.

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.

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.

Best Management Practice (BMP) means structural device, measure, facility or activity that helps to achieve stormwater management control objectives at a designated site.

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.

Category 1 (C1) Waters means Waters of the State, including unnamed waterways that appear on Soil Survey and USGS Topographic Quadrangle within the same HUC 14 watershed, designated in NJAC 7:9B-1.15 (c) through (h) for purposes of implementing the anti-degradation policies set forth at NJAC 7:9B-1.5(d) for protection from measurable changes in water quality characteristics because of their clarity, color, scenic setting, other characteristics of aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, or exceptional fisheries resources (s).

Compaction means the increase in soil bulk density by subjecting soil to greater than normal loading.

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:

County Planning Agency; or

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.

Disturbance means any activity including the clearing, excavating, storing, grading, filling or transportation of soil or any other activity that causes soil to be exposed to the danger of erosion.

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

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 Departments Landscape Project as approved by the Departments Endangered and Non-Game 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.

Escape Provisions means the permanent installation of ladders, steps, rungs or other features that provide easily accessible means of egress from stormwater management basins.

Ground Water means a body of water below the surface of the land in a zone of saturation where the spaces between the soil or geological materials are fully saturated with water.

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 to a level below the normal root soil of plant species.

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 pr creates more than 1/4 acre of new impervious coverage.

Mitigation means an action by an Applicant providing compensation or offset actions for onsite stormwater management requirements where the Applicant has demonstrated the inability or impracticality of strict compliance with the stormwater management requirements set forth in N.J.A.C. 7:8 in an adopted regional stormwater management plan or in this local ordinance, and has received a waiver from strict compliance from the Borough of Emerson. Mitigation for the purposes of this ordinance includes both the mitigation plan detailing how the project's failure to strictly comply will be compensated, and the implementation of the approved mitigation plan.

Municipality means any City, Borough, Town, Township, or Village.

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

Nonstructural Stormwater Management Techniques@ means techniques that control or reduce stormwater runoff in the absence of stormwater structures (e.g., basins and pipe conveyances), such as minimizing site disturbance, preserving important site features including, but not limited to, natural vegetation, reducing and disconnecting impervious cover, minimizing slopes, utilizing native vegetation, minimizing turf grass lawns, increasing time of concentration and maintaining and enhancing natural drainage features and characteristics.

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

Permeable means a surface or land cover capable of transmitting or percolating a significant amount of precipitation into the underlying soils.

Person means any individual, corporation, company, partnership, firm, association, Borough of Emerson 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.

Plan means a document approved at the site design phase that outlines the measures and practices used to control stormwater runoff at the site.

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

Pollution means the man made or man induced alteration of the chemical, physical, biological and radiological integrity of water to the extent that the pollutant concentration or level violates either the Ground Water Quality Standards (N.J.A.C. 7:9-6) or the Surface Water Quality Standards (N.J.A.C. 7:9B) of New Jersey.

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

Review Agency (Municipal) means the municipal body or official that is responsible for the review of a major development project for compliance with the stormwater management requirements.

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

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

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

Soil and Floatable Materials means sediment, debris, trash and other floating, suspended or settle able solids.

Source Material means any material(s) or machinery, located at an industrial facility that is directly or indirectly related to process, manufacturing, or other industrial activities, that could be a source of pollutants in any industrial stormwater discharge to ground or surface water. Source materials include, but are not limited to, raw materials, intermediate products, final products, water 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.

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

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

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

Stormwater Runoff@ means water flow on the surface of the ground or in storm sewers, resulting from precipitation.

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

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

Stream Buffer means a strip of land located immediately adjacent to a stream channel consisting of natural, undisturbed vegetative cover, which serves as a transition area between uplands and riparian

lands. A stream buffer may encompass wetlands, may be contained with a flood plain or floodway or may extend beyond a wetland, floodplain or floodway boundary.

Structural Stormwater Techniques means a stormwater management measure that involves control of concentrated stormwater runoff or filtration such as stormwater basins, piped conveyance systems and manufactured stormwater devices and can include various types of basins, filters, surfaces and devices located on individual lots in a residential development or throughout a commercial, industrial or institutional development site in areas not typically suited for larger, centralized structural facilities.

Threatened and Endangered Species Endangered Species are those whose prospects for survival in New Jersey are in immediate danger because of a loss or change in habitat, over exploitation, predation, competition, disease, disturbance or contamination. Assistance is needed to prevent future extinction in New Jersey. Threatened Species are those who may become endangered if conditions surrounding them begin to or continue to deteriorate. Habitats of endangered or threatened species are those identified by the Department's Landscape Project as approved by the Department's Endangered and Non-Game Species Program.

Time of Concentration means the time it takes for stormwater runoff to travel from the hydraulically most distant point of the watershed to the point of interest within a watershed.

Transition Area means an area of protected upland adjacent to a freshwater wetland that minimizes adverse impacts on the wetland or serves as an integral component of the wetlands ecosystem. Also known as Buffer Area.

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

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

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

Urban Redevelopment Area is defined as previously developed portions of areas, including but not limited to the following:

- (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. 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 along with the predictable non-structural strategies.
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. Maintenance Plan:

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. Threatened and Endangered Species:

Stormwater management measures shall be implemented in order to avoid adverse impacts of concentrated flow on habitat(s) 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.

C. Exemptions:

The following linear development projects are exempt from the groundwater recharge, stormwater runoff quantity, and stormwater runoff quality requirements of Sections 4.F and 4.G:

1. The construction of an underground utility line provided that the disturbed areas are re-vegetated 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 such as, but not limited to, wood chips, unpacked gravel and porous pavement.

D. Waiver from Strict Compliance:

1. 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:
 - A. The Applicant demonstrates that there is a public need for the project that cannot be accomplished by any other means;
 - B. 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;
 - C. The Applicant demonstrates that, in order to meet the requirements of Sections 4.F and 4.G, existing structures currently in use, such as homes and buildings, would need to be condemned; and
 - D. 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.
2. A waiver from strict compliance from such projects can only be obtained if the Applicant agrees to undertake a suitable mitigation measure identified in the mitigation section of the Borough of Emerson's Stormwater Management Plan. In such cases, the Applicant must submit a mitigation plan detailing how the project's failure to strictly comply will be compensated. In cases where a waiver is granted, the Applicant should provide mitigation within the same watershed within which the subject project is proposed. If mitigation within the same watershed is not possible and/or practical, the Applicant shall contribute funding toward a regional stormwater control project or provide for equivalent treatment at an alternate location or other equivalent water quality benefit, in lieu of implementing the required stormwater control measures on their specific site. Said mitigation must be reviewed and agreed upon by the Borough of Emerson and Borough Engineer prior to commencement of mitigation work.

E. Nonstructural Stormwater Management Strategies:

1. To the maximum extent practicable, the standards in Sections 4.F and 4.G shall be met by incorporating nonstructural stormwater management strategies set forth at Section 4.E into the design. The applicant shall identify the nonstructural measures incorporated into the design of the project. If the applicant contends that it is not feasible for engineering, environmental, or safety reasons to incorporate any nonstructural stormwater management measures identified in Paragraph 2 below into the design of a particular project, the applicant shall identify the strategy considered and provide a basis for the contention. In both cases, the Applicant bears the burden of proving any impracticability.
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.
- e. Minimize land disturbance including clearing and grading;
- f. Minimize soil compaction;
- g. Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides;
- h. Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas;
- i. Provide other source controls to prevent or minimize the use or exposure of pollutants at the site, in order to prevent or minimize the release of those pollutants into stormwater runoff. Such source controls include, but are not limited to:

(1) Site design features that help to prevent accumulation of trash and debris in drainage systems, including features that satisfy Section 4.B.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) square inches, or is no greater than 0.5 inches across the smallest dimension.

Examples of grates subject to this standard include grates in grate inlets, the grate portion (non-curb-opening portion) of combination inlets, grates on storm sewer manholes, ditch grates, trench grates, and grates of spacer bars in slotted drains. Examples of ground surfaces

include surfaces of roads (including bridges), driveways, parking areas, bikeways, plazas, sidewalks, lawns, fields, open channels, and stormwater basin floors.

b. Whenever design engineers use a curb-opening inlet, the clear space in that curb opening (or each individual clear space, if the curb opening has two or more clear spaces) shall have an area of no more than seven (7) square inches, or be no greater than two (2) inches across the smallest dimension.

c. This standard does not apply:

(1) Where the review agency determines that this standard would cause inadequate hydraulic performance that could not practicably be overcome by using additional or larger storm drain inlets that meet these standards;

(2) Where flows from the water quality design storm as specified in Section 4.G.1 are conveyed through any device (e.g., end of pipe netting facility, manufactured treatment device, or a catch basin hood) that is designed, at a minimum, to prevent delivery of all solid and floatable materials that could not pass through one of the following:

- (a) A rectangular space four and five-eighths inches long and one and one-half inches wide (this option does not apply for outfall netting facilities); or
- (b) A bar screen having a bar spacing of 0.5 inches.
- (3) Where flows are conveyed through a trash rack that has parallel bars with one-inch (1") spacing between the bars, to the elevation of the water quality design storm as specified in Section 4.G.1; or
- (4) Where the New Jersey Department of Environmental Protection determines, pursuant to the New Jersey Register of Historic Places Rules at N.J.A.C. 7:4-7.2(c), that action to meet this standard is an undertaking that constitutes an encroachment or will damage or destroy the New Jersey Register listed historic property.

4. Any land area used as a nonstructural stormwater management measure to meet the performance standards in Sections 4.F and 4.G shall be:

- A. Dedicated to a government agency
- B. Subjected to a conservation restriction filed with the appropriate County Clerk's office, or
- C. Subject to an approved equivalent restriction that ensures that measure or an equivalent stormwater management measure approved by the reviewing agency is maintained in perpetuity.

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

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

1. This subsection contains minimum design and performance standards to control erosion, encourage and control infiltration and groundwater recharge, and control stormwater runoff quantity impacts of major development.

a. The minimum design and performance standards for erosion control are those established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq. and implementing rules.

b. The minimum design and performance standards for groundwater recharge are as follows:

(1) The Design Engineer shall, using the assumptions and factors for stormwater runoff and groundwater recharge calculations at Section 5, either:

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

(b) Demonstrate through hydrologic and hydraulic analysis that the increase of stormwater runoff volume from pre-construction to post-construction for the 2-year storm is infiltrated.

(2) This groundwater recharge requirement does not apply to projects within the Aurban 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 Areportable 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 Asource material. @

(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 down gradient of the groundwater recharge area.

c. Using the criteria for calculating stormwater runoff and groundwater recharge in Section 5, the Design Engineer shall comply with at least one (1) of the following standards:

(1) Demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the 2, 10, and 100-year storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events;

(2) Demonstrate through hydrologic and hydraulic analysis that there is no increase, as compared to the pre-construction condition, in the peak runoff rates of stormwater leaving the site for the 2, 10 and 100-year storm events and that the increased volume or change in timing of stormwater runoff will not increase flood damage at or downstream of the site. This analysis shall include the analysis of impacts of existing land uses and projected land uses assuming full development under existing zoning and land use ordinances in the drainage area;

(3) Design stormwater management measures so that the post-construction peak runoff rates for the 2, 10 and 100 year storm events are 50, 75 and 80 percent, respectively, of the pre-construction peak runoff rates. The percentages apply only to the post-construction stormwater runoff that is attributable to the portion of the site on which the proposed development or project is to be constructed. The percentages shall not be applied to post-construction stormwater runoff into tidal flood hazard areas if the increased volume of stormwater runoff will not increase flood damages below the point of discharge; or

(4) In tidal flood hazard areas, stormwater runoff quantity analysis in accordance with (1), (2) and

(3) Above shall only be applied if the increased volume of stormwater runoff could increase flood damages below the point of discharge.

2. Any application for a new agricultural development that meets the definition of major development at Section 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.

G. Stormwater Runoff Quality Standards:

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

Water quality calculations shall take into account the distribution of rain from the water quality design storm, as reflected in Table 1. The calculation of the volume of runoff may take into account the implementation of non-structural and structural stormwater management measures.

Table 1: Water Quality Design Storm Distribution			
Time (Minutes)	Cumulative Rainfall (Inches)	Time (Minutes)	Cumulative Rainfall (Inches)
0	0.0000	65	0.8917
5	0.00873	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	0.1333	100	1.2000
40	0.1660	105	1.2250
45	0.2000	110	1.2334
50	0.2583	115	1.2417
55	0.3583	120	1.2500
60	0.6250		

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

3. If more than one BMP in series is necessary to achieve the required 80 percent TSS reduction for a site, the applicant shall utilize the following formula to calculate TSS reduction:

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

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

A = the TSS percent removal rate (whole number) applicable to the first (upstream) BMP

B = the TSS percent removal rate (whole number) applicable to the second (downstream) BMP

In cases where three (3) or more BMP's are used in series, the Applicant shall calculate the TSS reduction for the two most upstream BMP's in the series using the above formula, then substitute the

result of that calculation in the formula for A when calculating the combined result with the next BMP in the series.

Best Management Practice	TSS% Removal Rate
Bio-Retention Systems	90
Constructed Stormwater Wetland	90
Extended Detention Basin	40-60
Infiltration Structure	80
Manufactured Treatment Device	See Section 5.C
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 sub-areas converge on site in which case the removal rate can be demonstrated through a calculation using a weighted average.

5. Stormwater management measures shall also be designed to reduce, to the maximum extent feasible, the post-construction nutrient load of the anticipated load from the developed site in stormwater runoff generated from the water quality design storm. In achieving reduction of nutrients to the maximum extent feasible, the design of the site shall include nonstructural strategies and structural measures that optimize nutrient removal while still achieving the performance standards in Sections 4.F and 4.G.

6. Additional information and examples are contained in the New Jersey Stormwater Best Management Practices Manual, which may be obtained from the address identified in Section 7.

7. In accordance with the definition of FW₁ at N.J.A.C. 7:9B-1.4, stormwater management measures shall be designed to prevent any increase in stormwater runoff to waters classified as FW₁.

8. Special water resource protection areas shall be established along all waters designated Category One at N.J.A.C. 7:9B, and perennial or intermittent streams that drain into or upstream of the Category One waters as shown on the USGS Quadrangle Maps or in the County Soil Surveys, within the associated HUC₁₄ drainage area. These areas shall be established for the protection of water quality, aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, and exceptional fisheries significance of those established Category One waters. These areas shall be designated and protected as follows:

a. The applicant shall preserve and maintain a special water resource protection area in accordance with one of the following:

(1) A 300-foot special water resource protection area shall be provided on each side of the waterway, measured perpendicular to the waterway from the top of the bank outwards or from the centerline of the waterway where the bank is not defined, consisting of existing vegetation or vegetation allowed to follow natural succession is provided.

(2) Encroachment within the designated special water resource protection area under Subsection (1) above shall only be allowed where previous development or disturbance has occurred (for example, active agricultural use, parking area or maintained lawn area). The encroachment shall only be allowed where applicant demonstrates that the functional value and overall condition of the special water resource protection area will be maintained to the maximum extent practicable. In no case shall the remaining special water resource protection area be reduced to less than 150 feet as measured perpendicular to the top of bank of the waterway or centerline of the waterway where the bank is undefined. All encroachments proposed under this subparagraph shall be subject to review and approval by the Department.

b. All stormwater shall be discharged outside of and flow through the special water resource protection area and shall comply with the Standard for Off-Site Stability in the Standards For Soil Erosion and Sediment Control in New Jersey, established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq.

c. If stormwater discharged outside of and flowing through the special water resource protection area cannot comply with the Standard For Off-Site Stability in the Standards for Soil Erosion and Sediment Control in New Jersey, established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq., then the stabilization measures in accordance with the requirements of the above standards may be placed within the special water resource protection area, provided that:

(1) Stabilization measures shall not be placed within 150 feet of the Category One waterway;

(2) Stormwater associated with discharges allowed by this section shall achieve a 95 percent TSS post construction removal rate;

(3) Temperature shall be addressed to ensure no impact on the receiving waterway;

(4) The encroachment shall only be allowed where the applicant demonstrates that the functional value and overall condition of the special water resource protection area will be maintained to the maximum extent practicable;

(5) A conceptual project design meeting shall be held with the appropriate Department staff and Soil Conservation District staff to identify necessary stabilization measures; and

(6) All encroachments proposed under this section shall be subject to review and approval by the Department.

d. A stream corridor protection plan may be developed by a Regional Stormwater Management Planning Committee as an element of a regional stormwater management plan or by a municipality through an adopted municipal stormwater management plan. If a stream corridor protection plan for a waterway subject to Section 4.G(8) has been approved by the Department of Environmental Protection, then the provisions of the plan shall be the applicable special water resource protection area requirements for that waterway. A stream corridor protection plan for a waterway subject to G.8 shall maintain or enhance the current functional value and overall condition of the special water resource protection area as defined in G.8.a.(1) above.

In no case shall a stream corridor protection plan allow the reduction of the Special Water Resource Protection Area to less than 150 feet as measured perpendicular to the waterway subject to this subsection.

e. Paragraph G.8 does not apply to the construction of one individual single family dwelling that is not part of a larger development on a lot receiving preliminary or final subdivision approval on or before February 2, 2004, provided that the construction begins on or before February 2, 2009.

Section 5: Calculation of Stormwater Runoff and Groundwater Recharge

A. Stormwater Runoff Calculations:

1. In complying with the design and performance standards in Section 4, the Design Engineer shall calculate stormwater runoff in accordance with 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 B Hydrology and Technical Release 55 B Urban Hydrology for Small Watersheds; or

b. The Rational Method for peak stormwater runoff rate calculations and the Modified Rational Method for stormwater runoff hydrograph calculations. Use of the Rational Method and Modified Rational Method are limited to drainage areas of 20 acres or less. Neither the Rational Method nor Modified Rational Method shall be used to calculate runoff volumes for ground water recharge or stormwater runoff infiltration purposes.

c. Alternative groundwater recharge calculation methods may be used upon approval by the Borough Engineer.

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 calculating pre-construction stormwater runoff, the Design Engineer shall account for all significant land features and structures, such as ponds, wetlands, depressions, hedgerows, or culverts, that may reduce pre-construction stormwater runoff rates and/or volumes.

4. In calculating stormwater runoff from all design storms, the Design Engineer shall consider the relative stormwater runoff rates and/or volumes of pervious and impervious surfaces separately to accurately compute the rates and volume of stormwater runoff from the site within the drainage area.

5. Calculation of stormwater runoff from unconnected impervious surfaces shall be based, as applicable, upon the Two-Step methodology as described in the Department's current Stormwater Best Management Practices Manual or the methodology as described in the NRCS Technical Release 55 B Urban Hydrology for Small Watersheds.

6. 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 tail water in the design of structural stormwater management measures.

B. Groundwater Recharge:

When selecting or calculating runoff coefficients the Design Engineer may calculate ground water recharge in accordance with 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. Structural Stormwater Management Measures:

1. Structural stormwater management measures shall be designed to take into account the existing site conditions which may cause the measure to fail, have an adverse affect on water quality or quantity, or cause harm or damage to persons or property, inking, but not limited to, environmentally critical areas, wetlands; flood prone areas, slopes; depth to seasonal high water table; soil type, permeability and texture; drainage area and drainage patterns; existing or former mines; significant land fillings; and the presence of solution-prone carbonate rocks (limestone).
2. Structural stormwater management measures shall be designed to minimize maintenance, facilitate maintenance and repairs, and ensure proper functioning. Trash racks shall be installed at the intake to the outlet structure as appropriate, and shall have parallel bars with one-inch (1") spacing between the bars to the elevation of the water quality design storm. For elevations higher than the water quality design storm, the parallel bars at the outlet structure shall be spaced no greater than one-third (1/3) the width of the diameter of the orifice or one-third (1/3) the width of the weir, with a minimum spacing between bars of one-inch and a maximum spacing between bars of six inches. In addition, the design of trash racks must comply with the requirements of Section 8.D.
3. Structural stormwater management measures shall be designed, constructed, and installed to be strong, durable, and corrosion resistant. Measures that are consistent with the relevant portions of the Residential Site Improvement Standards at N.J.A.C. 5:21-7.3, 7.4, and 7.5 shall be deemed to meet this requirement. The measures are to be sequenced in the site development process so that erosion control standards are met and so the measure is not compromised or impaired by construction runoff.
4. At the intake to the outlet from the stormwater management basin, the orifice size shall be minimum of two and one-half inches (2.5") in diameter.
5. Stormwater management basins shall be designed to meet the minimum safety standards for stormwater management basins at Section 8.
6. Where tail water will affect the hydraulic performance of a stormwater management measure, the Design Engineer shall include such effects in the design of said measure.

B. Guidelines for Stormwater Management Measures:

Stormwater Management measure guidelines are available in the New Jersey Best Management Practices Manual and other documents as described in Section 7. Other stormwater management measures may be utilized provided the Design Engineer demonstrates to the satisfaction of the review agency, in consultation with the Borough Engineer 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.

1. Manufactured treatment devices may be used to meet the requirements of Section 4 this ordinance, provided the pollutant removal rates are verified by the New Jersey Corporation for Advanced Technology and certified by the Department.
2. Non-verified manufactured treatment devices may also be used for purposes other than underground discharge of stormwater, where such devices provide a clear benefit to stormwater quality or flow control in a manner that facilitates improved nonstructural stormwater management controls on the site, or avoids the need for approval of offsite mitigation. The benefits of proposed non-verified manufactured treatment devices must be proved to the satisfaction of the review agency, in consultation with the Borough Engineer.
3. Manufactured treatment devices may be used only where the maintenance plan required by Section 10 ensures that the manufactured device will be properly maintained for its functional lifespan and will be replaced as needed with management measures that are at least as effective as the original manufactured treatment device working in accordance with manufacturer's specifications.

Section 7: Sources for Technical Guidance

A. Primary Technical Guidance:

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: bio-retention systems, constructed stormwater wetlands, dry wells, extended detention basins, infiltration structures, manufactured treatment devices, pervious paving, sand filters, vegetative filter strips, and wet ponds. This document is also available at www.njstormwater.org.
2. The New Jersey Department of Environmental Protection Stormwater Management Facilities Maintenance Manual, as amended.

B. Additional Technical Guidance:

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 or the Bergen County Soil Conservation District, 700 Kinderkamack Road, Suite 106, Oradell, NJ 07649; 201-261-4407.
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.

4. The United States Environmental Protection Agency, including the National Management Measures to Control Non-point Source Pollution from Urban Areas, available at the Web Site: <http://www.epa.gov/owow/nps/urbanmm/index.html>
5. Field guides of the United States Department of Agriculture, Natural Resources Conservation Environmental Protection, 428 East State Street, PO Box 420, Trenton, NJ 08625; (609) 777-1038.
6. Other similarly authoritative governmental or trade association sources acceptable to the Borough of Emerson

Section 8: Safety Standards for Stormwater Management Basins

A. General Scope:

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

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

1. A trash rack is a device designed to catch trash and debris and prevent the clogging of outlet structures. Trash racks shall be installed at the intake to the outlet from the stormwater management basin to ensure proper functioning of the basin outlets in accordance with the following:
 - a. The trash rack shall have parallel bars, with no greater than six inch spacing between the bars.
 - b. The trash rack shall be designed so as not to adversely affect the hydraulic performance of the outlet pipe or structure.
 - c. The average velocity of flow through a clean trash rack is not to exceed 2.5 feet per second under the full range of stage and discharge. Velocity is to be computed on the basis of the net area of opening through the rack.
 - d. The trash rack shall be constructed and installed to be rigid, durable, and corrosion resistant, and shall be designed to withstand a perpendicular live loading of 300 lbs/ft sq.
2. An overflow grate is intended to protect the opening in the top of a stormwater management Measure outlet structure It 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. Stormwater Management Basins shall include escape provisions as follows:
 - a. If a structural stormwater management measure has an outlet structure, escape provisions shall be incorporated in or on the structure. With the prior approval of the reviewing agency and/or the Borough Engineer 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 (2) steps. Each step shall be four to six feet in width. One step shall be located approximately two and one-half feet (2.5') below the permanent water surface, and the second step shall be located one to one and one-half feet (1'-1.5') 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 in accordance with N.J.A.C. 7:8-6(c) 3.

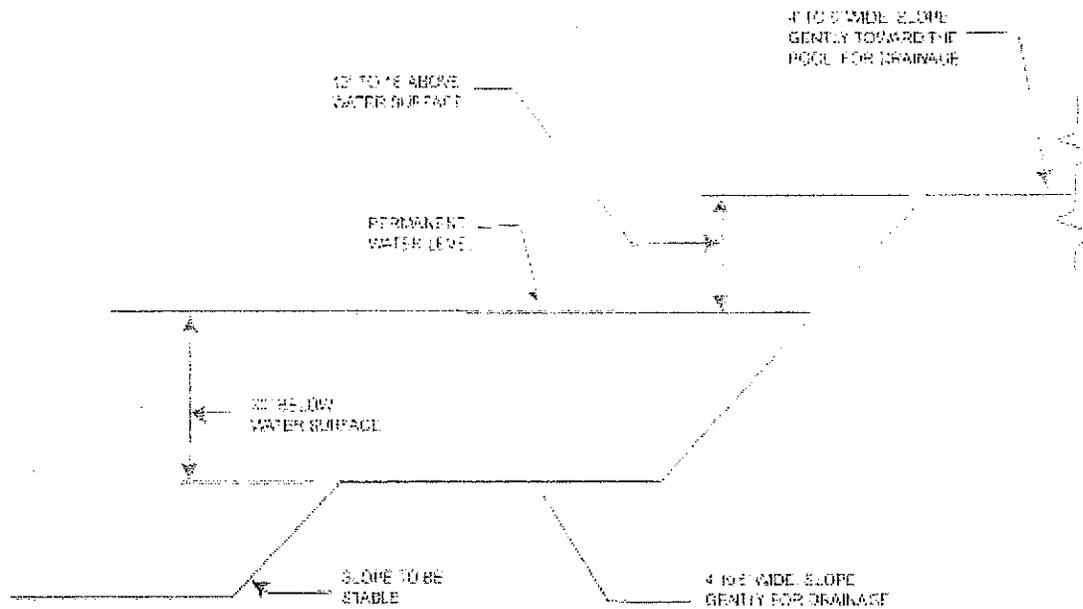
d. An emergency draw down method for detention basins is required where the permanent pool will be more than two and one half (2.5') feet deep. This draw down method must consider downstream or offsite stability at the outfall in accordance with the Standards for Soil Erosion and Sediment Control In New Jersey.

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.



NOTE: NOT DRAWN TO SCALE

NOTE: FOR BASINS WITH PERMANENT POOL OF WATER ONLY

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 through Submission Requirements that the project meets the Standards set forth in this ordinance.
3. The applicant shall submit to the reviewing agency, the required number of copies of materials listed in the checklist for site development stormwater plans in accordance with Section 9.C of this ordinance.

B. Site Development Stormwater Plan Approval

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

C. Checklist Requirements

The following information shall be required:

1. Existing Site Conditions Base Map, including topography and the following information:
 - A. 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' contour intervals.
 - B. The map as appropriate may indicate the following: existing surface water drainage, shorelines, steep slopes, soils, erodible soils, perennial or intermittent streams that drain into or upstream of the Category One waters, wetlands and flood plains along with their appropriate buffer strips, marshlands and other wetlands, pervious or vegetative surfaces, existing man-made structures, roads, bearing and distances of property lines, and significant natural and manmade features not otherwise shown.
2. Environmental Site Analysis

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

A map (or maps) at the scale of the topographical base map indicating the location of existing and proposed buildings, roads, parking areas, utilities, structural facilities for stormwater management and sediment control, and other permanent structures. The map(s) shall also clearly show areas where alterations occur in the natural terrain and cover, including lawns and other landscaping, and

seasonal high ground water elevations. A written description of the site plan and justification of proposed changes in natural conditions may also be provided.

4. Land Use Planning and Source Control Plan

This plan shall provide a demonstration of how the goals and standards of Sections 3 through 6 are being met. The focus of this plan shall be to describe how the site is being developed to meet the objective of controlling groundwater recharge, stormwater quality and stormwater quantity problems at the source by land management and source controls whenever possible. The Applicant should refer to the Borough of Emerson Stormwater Management Plan and the Borough of Emerson Stormwater Pollution Prevention Plan for additional requirements.

5. Stormwater Management Facilities Map

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

a. Total area to be paved or built upon, proposed surface contours, land area to be occupied by the stormwater management facilities and the type of vegetation thereon, and details of the proposed plan to control and dispose of stormwater.

b. Details of all stormwater management facility designs, during and after construction, including discharge provisions, discharge capacity for each outlet at different levels of detention and emergency spillway provisions with maximum discharge capacity of each spillway.

6. Calculations

a. Comprehensive hydrologic and hydraulic design calculations for the pre-development and post-development conditions for the design storms specified in Section 4 of this ordinance.

b. When the proposed stormwater management control measures (e.g., infiltration basins) depends on the hydrologic properties of soils, then a soils report shall be submitted. The soils report shall be based on onsite boring logs or soil pit profiles. The number and location of required soil borings or soil pits shall be determined based on what is needed to determine the suitability and distribution of soils present at the location of the control measure. The Borough of Emerson shall be notified of site investigation activities and given the opportunity to have a witness, either prior to approval or as a condition of approval, as appropriate for the specific type of measure. Subsequent to approval of the development, post-construction bulk soil density and infiltration testing shall be required for all infiltration measures that were used as justification for meeting the recharge standard, to ensure that they were properly constructed.

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

Section 10: Maintenance and Repair

A. Applicability

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

B. General Maintenance

1. The Design Engineer shall prepare a maintenance plan for the stormwater management measures incorporated into the design of a major development. This plan shall be separate from all other documents and designed for ongoing use by the site owner(s) or operator(s) in performing and documenting maintenance and repair, and by the Borough of Emerson in ensuring implementation of the maintenance plan. The final maintenance plan shall be updated and provided to the Borough of Emerson post-construction to include an evaluation based on the specifications of the initial maintenance plan and as-built conditions.
2. The maintenance plan shall contain specific preventative maintenance tasks and schedules; cost estimates, including estimated cost of sediment, debris, or trash removal; safety needs; identification of methods and disposal sites for materials removed during maintenance; maintenance requirements for created wetlands and other ecological systems; safety devices and systems; warranty and operational standards from the manufactures of any manufactured treatment devices; and the name, address, and telephone number of the person or persons responsible for preventative and corrective maintenance (including replacement) using maintenance guidelines for Stormwater Management measures from Section 7, the Borough of Emerson Municipal Stormwater Management Plan, Borough of Emerson Stormwater Pollution Prevention Plan, any relevant regional stormwater management plan and the maintenance guidelines for stormwater management measures as described in the New Jersey Stormwater Best Management Practices Manual. If the maintenance plan identifies a person other than the developer (for example, a public agency or homeowners= association) as having the responsibility for maintenance, the plan shall include documentation of such person=s agreement to assume this responsibility, or of the developer=s obligation to dedicate a stormwater management facility to such person under an applicable ordinance or regulation.
3. Responsibility for maintenance shall not be assigned or transferred to the owner or tenant of an individual property in a residential development or project, unless such owner or tenant owns or leases the entire residential development or project.
4. If the person responsible for maintenance identified under Section 10.B.2 above is not a public agency, the maintenance plan and any future revisions based on Section 10.B.7 below shall be recorded upon the deed of record for each property on which the maintenance described in the maintenance plan must be undertaken.
5. Preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measure, including repairs or replacement to the structure; removal of sediment, debris, or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; and repair or replacement of non-vegetated linings.
6. The person responsible for maintenance identified under Section 10.B.2 above shall maintain a detailed log of all preventative and corrective maintenance for the structural stormwater management measures incorporated into the design of the development, including a record of all inspections and copies of all maintenance-related work orders.

7. The person responsible for maintenance identified under Section 10.B.2 above shall evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed.

8. The person responsible for maintenance identified under Section 10.B.2 above shall retain and make available, upon request by any public entity with administrative, health, environmental, or safety authority over the site, the maintenance plan and the documentation required by Sections 10.B.6 and 10.B.7 above.

9. The requirements of Sections 10.B.3 and 10.B.4 do not apply to stormwater management facilities that are dedicated to and accepted by the municipality or another governmental agency of competent jurisdiction.

10. Authorized representatives of the Borough of Emerson, including but not limited to; the Borough Engineer, Superintendent of Public Works and Building Department Official may enter the site as needed in order to conduct onsite inspections as discussed in Section 10.D. The inspections shall be required to review and confirm that the information filed in the required reports as stated in Section 10B.6 are correct. Additional inspections and reviews may be made as deemed appropriate by the Borough of Emerson.

11. 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 affect 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, enforce penalties and/or liens as determined by the Borough of Emerson and described below.

C. Performance and Maintenance Guarantee

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.

D. Maintenance Access

The maintenance plan shall specifically provide a specific municipal right of access, which may include stormwater easements or covenants. The maintenance access shall be provided by the property owner(s) for access regarding facility inspections and maintenance as required. Easements and covenants shall be recorded with the Borough of Emerson prior to issuance of a permit.

E. Alteration of Maintenance Plan

Any alteration in maintenance responsibility or alterations to maintenance plans and agreements must be reviewed and approved by the Borough of Emerson Building Department Official or Board that reviewed the application under this ordinance in consultation with the Borough Engineer, Superintendent of Public Works and Building Department Official.

F. Recording of Information:

All maintenance information and alterations to maintenance agreements shall be recorded with the office of the Borough of Emerson Building Department Official as described in Section 10.B.8. Copies of the maintenance agreements and alterations to maintenance agreements shall be included in the Applicant=s stormwater management plans and documents. Recording of the maintenance agreements in accordance with this ordinance shall be the responsibility of the owner.

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:

A. Responsibility for Administration

The Superintendent of the Department of Public Works, Borough Engineer and Building Department Official shall administer, implement and enforce the provisions of this ordinance. Any powers granted or duties imposed upon the Superintendent of the Department of Public Works, Borough Engineer or Building Department Official may be delegated in writing to the person(s) or entities acting in the best interest of or in the employment of the Borough of Emerson.

B. Enforcement of Penalties and Liens

1. Should the applicant/owner fail to take the corrective actions, the Borough of Emerson shall then have the right to take the available appropriate remedies it deems necessary to correct the violations including fining the owner pursuant to Penalties for Violations of the Borough of Emerson Land Development Ordinance and to assert a lien on the subject property in an amount equal to the costs of remedial actions. The lien shall be enforced in the manner provided or authorized by law for the enforcement of common law liens on personal property. The lien shall be recorded with the Borough of Emerson and shall incur legal interest from the date of recording. The imposition of any penalty shall not exempt the offender from compliance with the provisions of this ordinance, including assessment of a lien on the property.

2. Whenever a structural BMP is not implemented, operated, and/or maintained in Accordance with the Stormwater Management Plan which has been approved in accordance with this ordinance. Any penalty invoked shall be in accordance with Penalties for Violations of the Borough of Emerson Land Development Ordinance.

Section 12: Effective Date

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

Section 13: Severability

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