CITY OF HACKENSACK
STORMWATER MANAGEMENT PLAN

Prepared for:

City of Hackensack

Prepared by:

MALCOLM PIRNIE, INC.
17-17 Route 208 North
Fair Lawn, New Jersey 07410

May 1, 2005

Project Number 2976039

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1.0 INTRODUCTION

This document presents the Stormwater Management Plan (SWMP) for the City of Hackensack (the City). The SWMP is required by the N.J.A.C 7:14A-25 Municipal Stormwater Regulations and has been created in accordance with N.J.A.C. 7:8, Stormwater Management Rules. The SWMP addresses groundwater recharge, stormwater quantity, and stormwater quality by implementing the General Permit requirements referred to as the statewide basic requirements (SBRs).

The goals of the Stormwater Management Rules N.J.A.C. 7:8-2.2 are stated below and incorporated into this SWMP. The Stormwater Management Rules are directed toward "new development" and provide the foundation to develop municipal stormwater management plans. New development is defined as any development that disturbs more than one acre of land or adds ¼ of an acre of impervious cover. The City must prepare and implement a Stormwater Pollution Prevention Plan (SPPP) that requires the preparation and adoption of a municipal stormwater management plan along with a stormwater control ordinance, and the incorporation of a local public education program. The SPPP also addresses the improper disposal of waste, illicit connection elimination and MS4 outfall pipe mapping, implementation of solids and floatable controls, proper maintenance yard operation and employee training. The City's SPPP planning forms are provided in Appendix A.

1.1 STORMWATER MANAGEMENT PLAN GOALS

The SWMP is a course of action for the City to reduce nonpoint sources of water pollution by developing a comprehensive and dynamic SWMP. The City's SWMP is a series of strategies, designed in accordance with governmental agencies and laws, intended to reduce the amount of stormwater pollutants which enter local waterways. The goals of the City and SWMP, along with a plan on how they will be met, are as follows:

- ***Reduce flood damage***: this goal will be met by implementing the measures addressed in Section 4 through either non-structural or structural Best Management Practices, BMPs, (i.e. stormwater management measures) for achieving stormwater runoff quantity control.

- *Minimize stormwater runoff from new developments*: this goal will be met by implementing the measures addressed in Section 4 through either non-structural or structural BMPs (i.e. stormwater management measures) for achieving stormwater runoff quantity control.

- *Reduce soil erosion from any developments or construction projects*: this goal will be met by requiring implementation of stormwater management measures described in Section 4.2 and 4.4 such that they satisfy the requirements of the Soil Erosion and Sediment Control Act, N.J.S.A 4:24-39 et seq. and implementing rules.

- *Assure adequately designed culverts, bridges, and other in-stream structures*: this goal will be met by adhering to the design and performance standards for Structural Best Management Practices presented in Section 4.4 of the plan.

- *Maintain groundwater recharge*: this goal will be met by implementing the measures addressed in Section 4 through either non-structural or structural Best Management Practices (i.e. stormwater management measures) for meeting groundwater recharge requirements.

- *Preventing increases of Non Point Source (NPS) pollution*: this goal will be met by addressing the goal related to minimizing stormwater runoff pollutants described in Section 3 and 4.

- *Maintain the biological integrity of streams and drainage channels*: this goal will be met by selecting the BMP's that are allocated a 'high' to 'medium' rating in Table 4.2: BMP's Applicable to Various Land Uses, Stormwater Management Goals and Other Factors for meeting the groundwater recharge enhancement and runoff quality improvement goals.

- *Minimizing stormwater runoff pollutants from new and existing developments*: this goal will be met by implementing the measures addressed in Section 4.2 through either non-structural or structural Best Management Practices (i.e. stormwater management measures) for achieving stormwater runoff quality control.

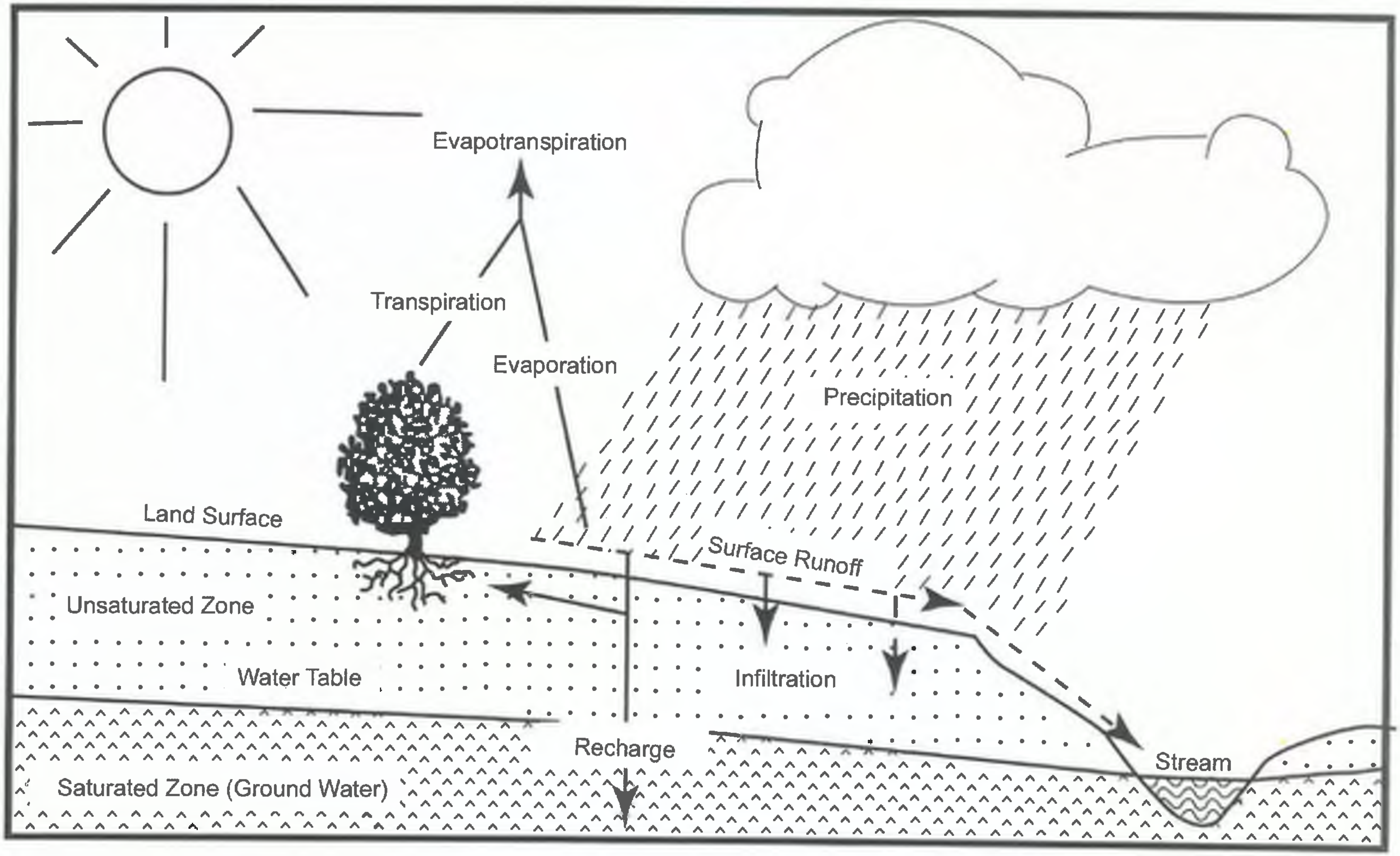
- *Protecting public safety through proper design and operation of stormwater management facilities*: this goal will be met by requiring adherence to the design and performance standards discussed in Section 4.2 and requiring adoption of comprehensive safety measures, described in Section 3.3.3 and an operation and maintenance plan that meets the requirements described in Section 3.3.2.

To achieve these goals, this SWMP outlines specific stormwater design and performance standards for new development and preventive maintenance strategies to ensure the effectiveness of the stormwater management facilities. Safety standards for the stormwater infrastructure will be implemented to protect public safety.

1.2 STORMWATER DISCUSSION

Stormwater pollution is generated when rain or wash travels over impervious surfaces such as pavement and building rooftops, and accumulates pollutants such as oil and grease, chemicals, nutrients, metals, and bacteria as it travels across land. The stormwater and pollutants then enter the storm drain system and are disposed of directly into our waterways. Pollutants include metals, suspended solids, hydrocarbons, pathogens and nutrients. Currently, stormwater is not generally pretreated prior to discharge in any way.

As illustrated in Figure 1-1 (Hydrologic Cycle), the hydrologic cycle consists of inflows, outflows, and storage. Prior to urban development, stormwater was filtered through the land surface and returned to the aquifer, or returned to the atmosphere through evapotranspiration or discharged from an aquifer to a stream. The percolation of water into the ground is an inflow to the aquifer. If the inflows to the aquifer are less than the outflows, the amount of water stored in the aquifer decreases. Increased urban development has increased impervious surfaces resulting in decreased groundwater recharge and increase in the volume and rate of stormwater runoff into our waterways. The increased flow into waterways causes flooding, erosion, habitat destruction, and decreased water quality.



Source: New Jersey Geological Survey Report GSR-32.

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STORMWATER MANAGEMENT PLAN
CITY OF HACKENSACK
HACKENSACK, NEW JERSEY
HYDROLOGIC CYCLE

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FIGURE 1-1

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2.0 BACKGROUND

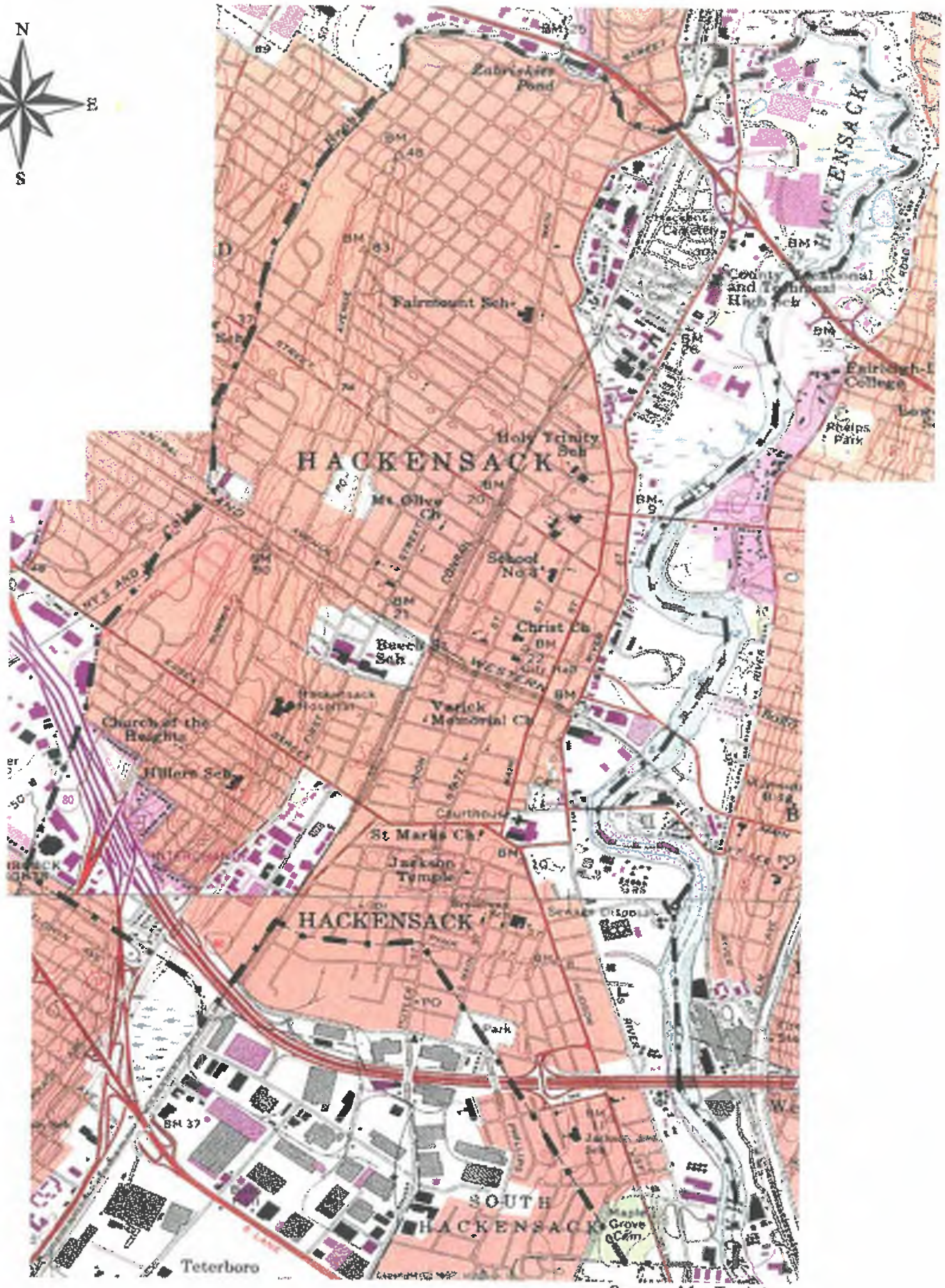
2.1 MUNICIPAL INFORMATION

The City of Hackensack (the City) is 2770 acres (4 square miles) located in northern New Jersey in Bergen County (Figure 2-1). Its geographic boundaries consist of the Hackensack River to the east, the Van Saun Mill Brook to the north, Coles Brook along the northwest border and two small waterways (an un-coded tributary and the West Riser Ditch) located along the southern border. Political boundaries include River Edge to the north, South Hackensack and Little Ferry along the southern border. Maywood and Lodi make up the western border, and Teaneck, Bogota and Ridgefield Park are located to the east of the City.

The City's stormwater system discharges untreated stormwater into the bordering waterways. Figure 2-2 shows the Hackensack storm drain catch basins and conduits. The City also has a combined wastewater and stormwater drainage system as shown on Figure 2-2. The combined sewer areas are regulated by a separate permit for combined sewer overflow (CSO) since the CSOs are recognized as point source discharges. There are two CSO drainage areas in the City which are identified as Anderson and Court Street. The Court Street drainage area consists of 449 acres and the Anderson Street drainage area consists of 434 acres which covers approximately 32% of the City's drainage area. Although the CSO facilities are regulated under a separate NJDEP General permit, the CSO drainage areas are included in the SWMP for completeness since they discharge untreated stormwater, including wastewater, to the waterways. There are no septic systems or public well systems within the City of Hackensack. United Water provides operation of the City's Water distribution system. There are no NJDEP Brownfields in the City. The City is within the boundaries of Planning Area 1.

2.1.1 Watershed Areas, Subwatershed Areas, Wetlands and Waterways

The City is located within two Watershed Management Areas (WMAs) identified as WMA4 and WMA5, which consists of the Lower Passaic and Saddle River watershed, and the Hackensack, Hudson, and Pascack River watershed, respectively. The WMAs are made up of subwatersheds



Source: MapTech Inc.

United States Geological Survey (USGS) Map:
Hackensack Quad: Year Created 1955 photo revised 1981
Weehawken Quad: Year Created 1967 photo revised 1981
City Boundary

MALCOLM PIRNIE	STORMWATER MANAGEMENT PLAN CITY OF HACKENSACK HACKENSACK, NEW JERSEY SITE LOCATION MAP	MALCOLM PIRNIE, INC. FIGURE 2-1 MAY 1, 2005

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STORMWATER MANAGEMENT PLAN
CITY OF HACKENSACK
HACKENSACK, NEW JERSEY
CSO AND STORMWATER SUBDRAINAGE AREA AND SEWER SYSTEMS

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FIGURE 2-2

MAY 1, 2005

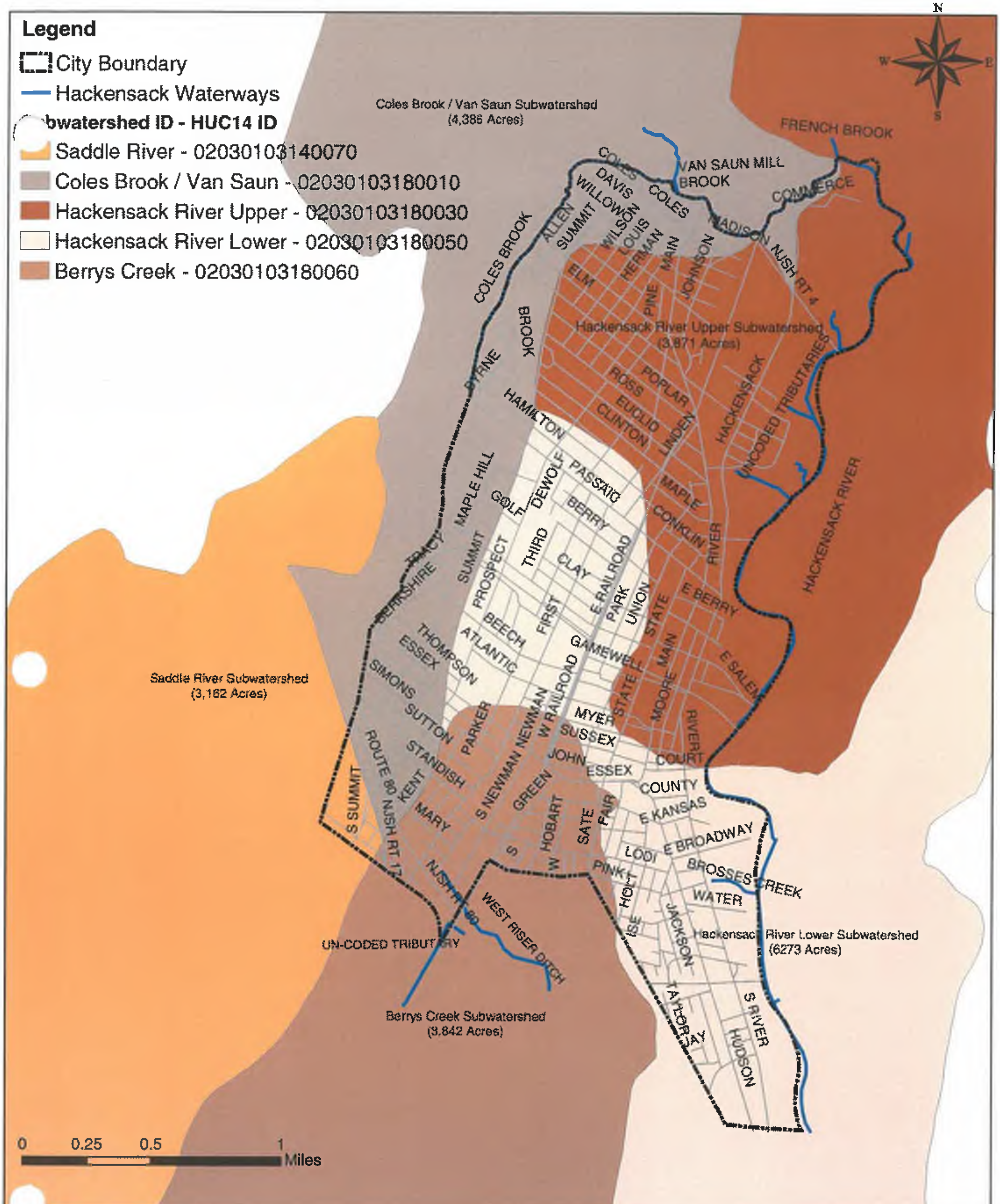
which are defined in the "HUC System," which is the national hydrologic unit code (HUC) system used by the United States Geological Survey. The NJDEP also utilizes the HUC system as a way to identify individual subwatershed areas. This plan examines the subwatersheds defined by 14-digit Hydrologic Unit Codes (HUC14). The HUC14s within the City are listed below. Figure 2-3 and Table 2-1 shows the HUC14 drainage areas within the City.

Table 2-1:
Subwatersheds (HUC14) in the City of Hackensack

Subwatershed	HUC14	WMA	SWMP Report Id
Saddle River (below Lodi gage)	02030103140070	04	Saddle River
Berry's Creek (above Paterson Ave)	02030103180060	05	Berry's Creek
Hackensack River (Bellmans Ck to Ft Lee Rd)	02030103180050	05	Hackensack River Lower
Coles Brook / Van Saun Mill Brook	02030103180010	05	Coles Brook / Van Saun
Hackensack River (Ft Lee Rd to Oradell gage)	02030103180030	05	Hackensack River Upper

State wetland areas identified within the City consist of deciduous wooded wetlands and herbaceous wetlands and are shown on Figure 2-4. "Freshwater wetland" or "wetland" means an area that is inundated or saturated by surface water or groundwater 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; provided, however, that the Department, in designating a wetland, shall use the three-parameter approach (that is, hydrology, soils and vegetation) enumerated in the 1989 Federal Manual as defined in this section. These include tidally influenced wetlands which have not been included on a promulgated map pursuant to the Wetlands Act of 1970, N.J.S.A. 13:9A-1 et seq. The wetland areas are protected by Freshwater Wetlands Protection Act Rules N.J.A.C 7:7A.

The establishment of Total Maximum Daily Load (TMDLs) represents the assimilative or carrying capacity of a receiving water taking into consideration, point and nonpoint sources of pollution, natural background, and surface water withdrawals. Waste Load Allocations (WLA) are developed to identify contributors and the allowable quantities of pollutants that can be discharged to surface waters without exceeding the waterbody's TMDL. Each WLA is intended to prevent adverse surface water quality impacts by setting load reduction goals for specific pollutants.



STORMWATER MANAGEMENT PLAN
CITY OF HACKENSACK
HACKENSACK, NEW JERSEY
SUBWATERSHEDS (HUC 14)

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FIGURE 2-3

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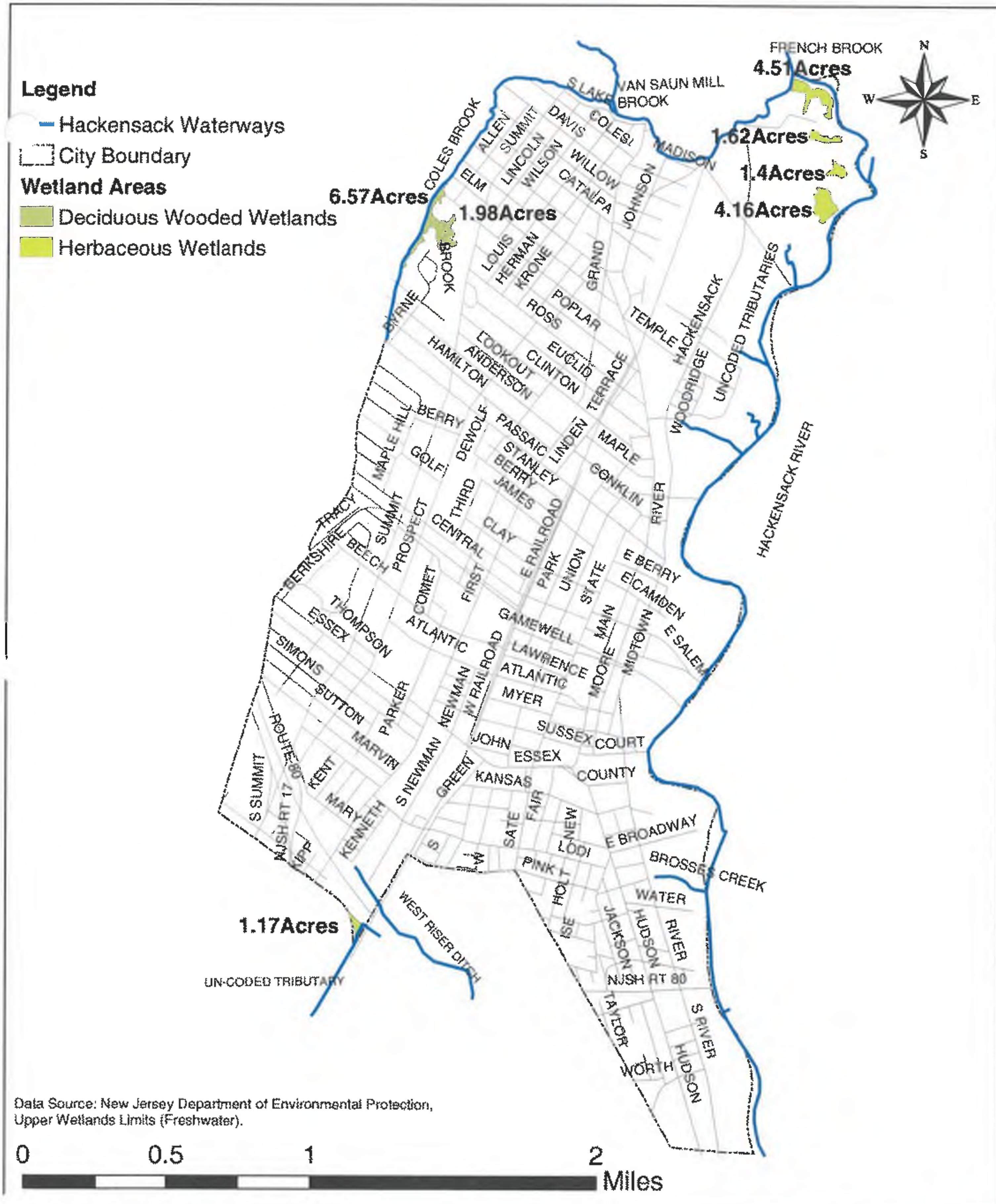

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STORMWATER MANAGEMENT PLAN
CITY OF HACKENSACK
HACKENSACK, NEW JERSEY
WETLANDS AND WATERWAYS

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FIGURE 2-4

MAY 1, 2005

The DEP has designated a special level of protection for a number of waterways in New Jersey. This protection is known as Category One (C1). Category One waters typically provide drinking water, habitat for Endangered and Threatened species, and popular recreational and/or commercial species, such as trout or shellfish. The Surface Water Quality Standards (N.J.A.C. 7:9B) define Category One waters as follows:

> "Category one waters" means those waters designated in the tables in N.J.A.C. 7:9B-1.15(c) through (h), 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). These waters may include, but are not limited to:
>
> 1. Waters originating wholly within Federal, interstate, State, county, or municipal parks, forests, fish and wildlife lands, and other special holdings that have not been designated as FW1 at N.J.A.C. 7:9B-1.15(h) Table 6;
> 2. Waters classified at N.J.A.C. 7:9B-1.15(c) through (g) as FW2 trout production waters and their tributaries;
> 3. Surface waters classified in this subchapter as FW2 trout maintenance or FW2
> 4. Nontrout that are upstream of waters classified in this subchapter as FW2 trout production;
> 5. Shellfish waters of exceptional resource value; or
> 6. Other waters and their tributaries that flow through, or border, Federal, State, county, or municipal parks, forests, fish and wildlife lands, and other special holdings.

According to rules for C1 waterbodies, a 300 ft. buffer is mandatory to prevent degradation to water quality. A buffer is also required on certain tributaries to C1 classified waterbodies. No waterbodies in the City of Hackensack have been designated as C1 Waterbodies.

The following waterways have been identified in the City of Hackensack and are shown on Figure 2-4.

- The Hackensack River is 32 miles long, and rises in Rockland County, New York and flows south through the Meadowlands to Newark Bay. The lower Hackensack is heavily industrialized and economically tied to the ports on Newark Bay and to the industrial development on the nearby Passaic River. The river's upper course is dammed to form three reservoirs that supply water to Rockland County, New York and Bergen County in New Jersey. The Hackensack River is a C1 waterbody from the new York/New Jersey border to Oradell Dam, located north of Hackensack. C1 restrictions do not apply to the reach of the Hackensack River located in Hackensack. The River makes up the eastern border of the City. The City is also located with two of the subwatersheds identified by HUC14 02030103180050 and 02030103180030. A TMDL for Nickel (Ni) has been established by the Environmental Protection Agency (EPA). The Hackensack River has a water quality code of SE1 (Saline Estuary) south of the Oradell Dam and near the City Hackensack and SE2 south of Little Ferry.

- The Van Saun Mill Brook and Coles Brook (HUC 14 02030103180010) is located in a residential area along the northwest border of the City. A TMDL for Fecal Coliform has been established by the EPA for Coles Brook.

- West Riser Ditch and an Un-Coded Tributary are located in the southern area of the City. They are adjacent to NJ Route 80 in an industrial/urban area of the City.

2.1.2 Population

Hackensack is the seat of Bergen County in northeastern New Jersey. The population of Hackensack is approximately 43,000. However, the daytime population more than triples as people come to the county seat daily for various commercial, professional, or personal needs. The Hackensack University Medical Center alone is the largest employer in Bergen County with more than 7,000 employees. The City currently has proposals for two development projects under consideration. These two proposed developments are the Royal Plaza with 273 units and the Excelsior with 203 units. These projects are currently under review by the City. Table 2-2 contains population and housing unit data.

Table 2-2:
Housing Units and Population in the City of Hackensack*

Year	Housing Units	Population	Percent Growth (Population)
1980	16,304	36,039	
1990	17,705	37,049	2.8%
2000	18,945	42,677	15.2%
2010 (projected)	Not Available	44,480	4.2%
2020 (projected)	Not Available	46,040	3.5%

Source: 1980, 1990 and 2000 data from U. S. Census and Bergen County Data Book Projected from New Jersey Transportation Planning Authority

2.1.3 Groundwater Recharge Areas

Groundwater recharge (GWR) is defined by the NJDEP as the water that infiltrates the ground and reaches the water table regardless of the underlying geology. GWR supports aquifer recharge, stream baseflow and wetlands. The GWR was calculated by the NJDEP and NJ Geologic Survey (NJGS). The GWR for the City is shown on Figure 2-5. The City has significant amounts of impervious surface with relatively little groundwater recharge capability. Groundwater recharge in the City was calculated based on GIS data provided by the NJDEP and NJGS Report GSR-32. The groundwater recharge rates in the City range from 0 to 13 inches/year. The average GWR over the City is 5.12 inches/year. Approximately 62 percent of the City's surface area is impervious (0.00 inches/year). Groundwater Recharge rates in Bergen County range from 10 to 20 (medium to maximum) inches per year. So Hackensack's GWR of 5.19 inches per year, is low compared to others in Bergen County so groundwater recharge in Hackensack is a lower priority in Bergen County.

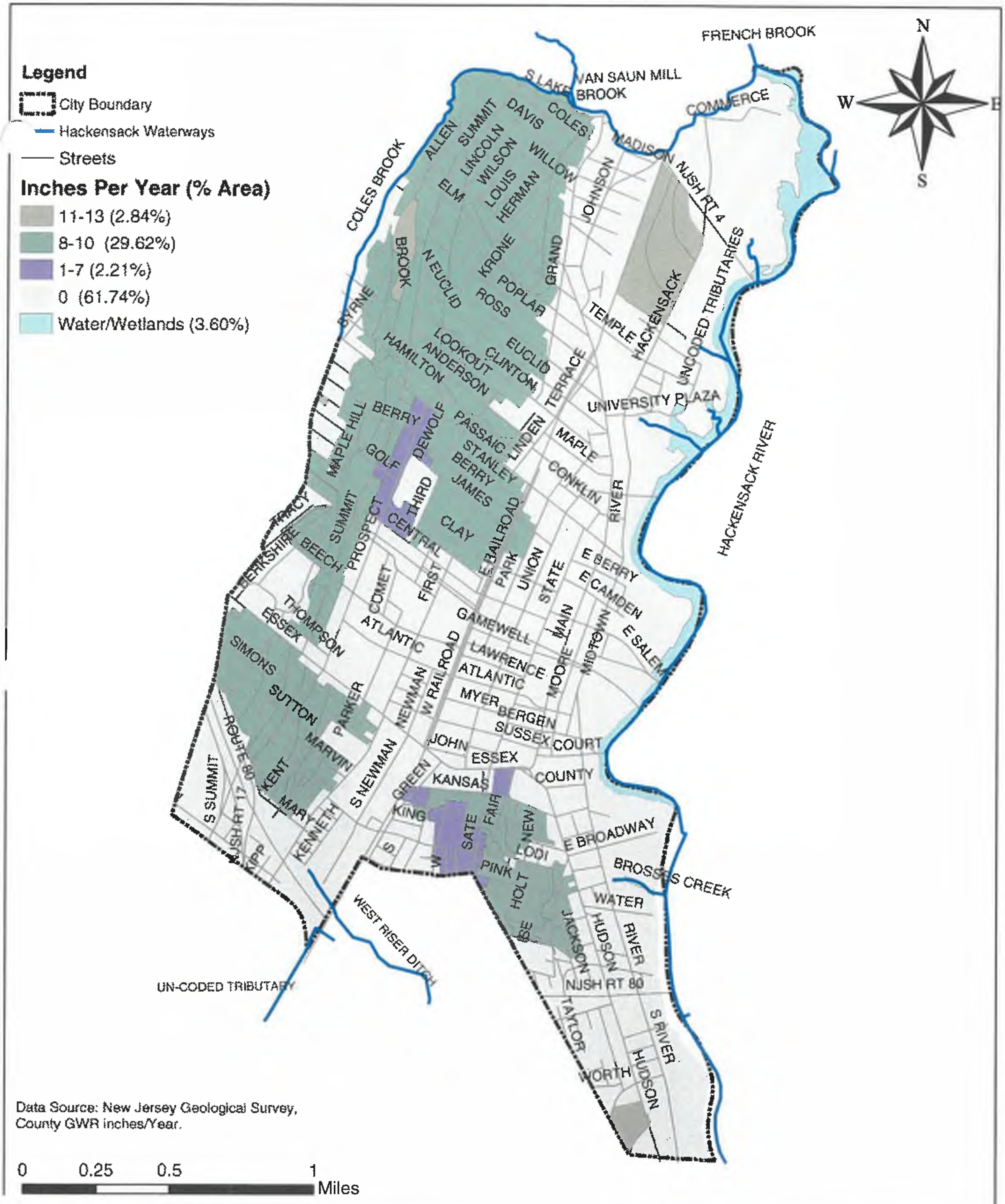
According to the Rules, a "major development" project, which is one that disturbs at least 1 acre of land or creates at least 0.25 acres of new or additional impervious surface, must include nonstructural and/or structural stormwater management measures that prevent the loss of groundwater recharge at the project site. Urban redevelopment and certain linear development projects are exempt from the groundwater recharge requirements. The Stormwater Management Rules require that a proposed major land development comply with one of the following two groundwater recharge requirements:

- Requirement 1: That 100 percent of the site's average annual pre-developed groundwater recharge volume be maintained after development; or
- Requirement 2: That 100 percent of the difference between the site's pre- and post-development 2-Year runoff volumes be infiltrated.

The best management practices (BMPs) are further discussed in Section 4.

2.1.4 Wellhead Protection Areas

A Wellhead Protection Area (WHPA) is a map area calculated around Public Community Water Supply (PCWS) and Non Public Community Water Supply (NPCWS) wells that delineate the horizontal extent of groundwater captured by a well pumping at a specific rate over a 2 (Tier 1), 5 (Tier 2), and 12 (Tier 3) year period of time. The WHPA delineations were conducted in response to the Safe Drinking Water Act Amendments of 1986 and 1996 as part of the Source Water Area



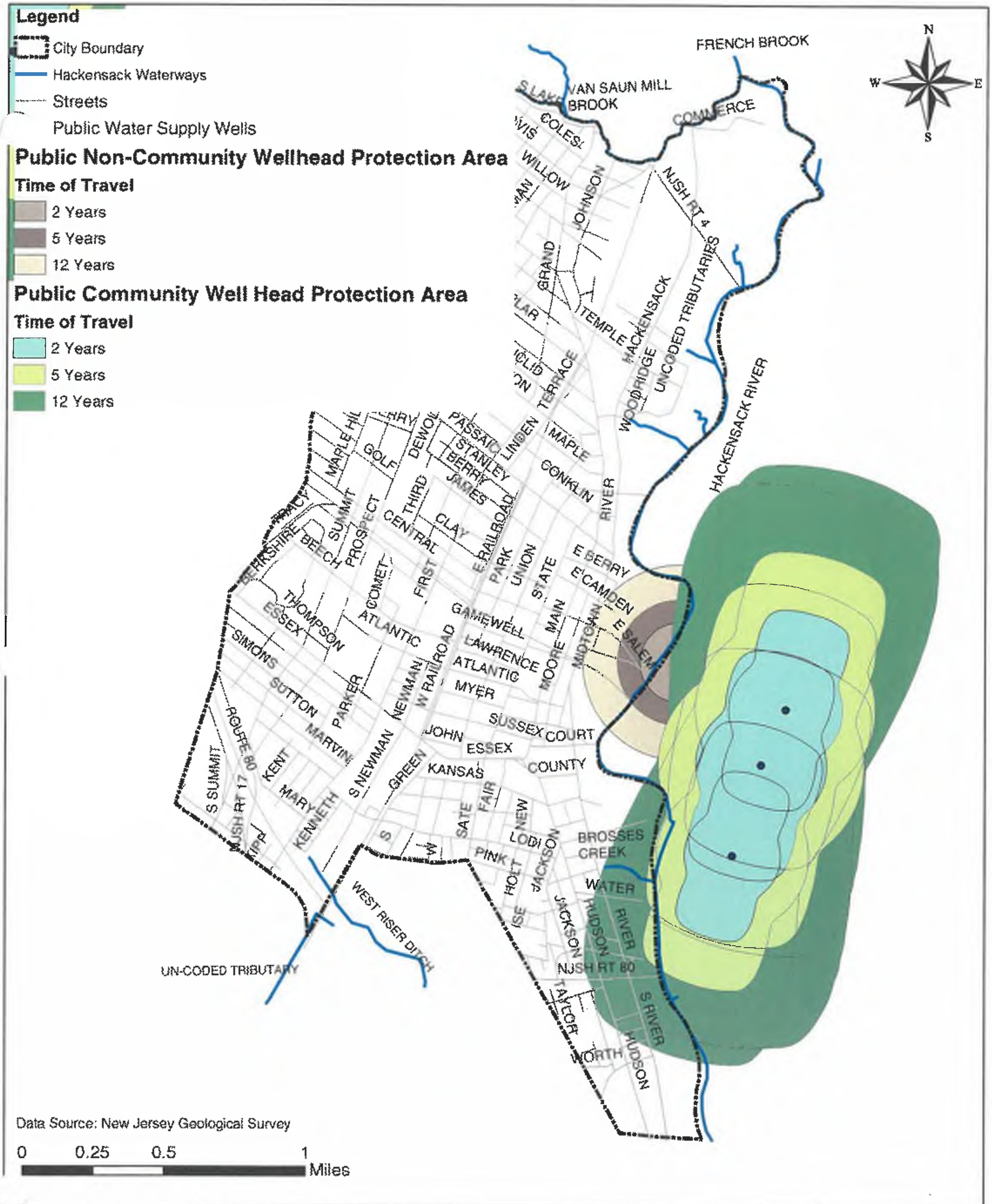
MALCOLM PIRNIE	STORMWATER MANAGEMENT PLAN CITY OF HACKENSACK HACKENSACK, NEW JERSEY GROUNDWATER RECHARGE AREAS	MALCOLM PIRNIE, INC. FIGURE 2-5 MAY 1, 2005

Protection (SWAP) Program. The delineation depicts the time of travel that a groundwater contaminant could be expected to reach a PCWS or NPCWS.

There are no PCWS located in the City. As shown on Figure 2-6, there are PCWS and NPCWS wells located east of the City in the Borough of Bogota. The WHPA's for these wells lie within the City. The development of zoning ordinances to control development within the WHPA may be established. The remediation of contaminated sites within the 2 and 5 year tier will be prioritized by the NJDEP. Contaminant source management also consists of land acquisition, conservation easements, and hazardous waste collection programs.

2.1.5 Flood Sensitive Areas in Hackensack's City Limits

Figure 2-2 shows six flood sensitive areas within the City which are shaded in cyan. In these areas, flooding occurs more frequently in the City due to extreme topography or mature river development conditions which makes flooding difficult to control in these areas. For example, the Newman, Green, and George storm sewers fall in this category because of the steep slopes (>15%) uphill of these sewers. Whenever there is a normal, frequent, short duration, and high intensity storm, a flash flood may occur in this area. Flooding along the waterfront is more likely due to the fact that the Hackensack River falls into the final stage of river development and the River can be classified as a "Mature" or "Old Age" river. This classification categorizes the river's stage of development by the level of natural river erosion that has occurred, rather than an indication of the actual age of the river. For example, the Colorado River is thousands of years old but it is still considered to be in the "Young" developmental stage because it is still, to this day, carving eroded banks to form the Grand Canyon. However, the "Mature" characteristics of the Hackensack River are important in order to understand the flood sensitive areas within the City along the river bank. Specifically, the Hackensack River, like most "Mature" rivers, has a wide, snake-like meandering pattern in its river bed, and in portions of the river north of Hackensack there are also "Ox Bow" lakes which are formed when the meandering becomes so extreme that the river changes course and jumps through or over the eroded away curved river bed rather than flowing around it in what use to be the river's normal path. These characteristics are classic signs that a river has eroded away a large portion of its river banks and created wider, flatter floodplains than other "Young or Middle Age" rivers. It is important to know that the Hackensack River is a "Mature" river since this



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STORMWATER MANAGEMENT PLAN
CITY OF HACKENSACK
HACKENSACK, NEW JERSEY
WELL HEAD PROTECTION AREAS

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FIGURE 2-6

MAY 1, 2005

characteristic is a primary natural cause of periodic flooding. In the areas where flatter floodplains are adjacent to the river, such as Hudson Street, River Road, and Foshini Park flood sensitive areas, there is naturally very low ground slope which is not able to drain precipitation away effectively in periodic heavy rainfalls.

If, in the judgment of the City's staff, a development is being proposed within a flood sensitive area then more significant stormwater controls and drainage systems would need to be considered. Their work should involve more careful design consideration to reduce impervious areas as much as possible and perhaps apply other stormwater controls.

2.2 EXISTING STORMWATER MANAGEMENT PROGRAM

The City has completed the Stormwater Pollution Prevention Plan Forms which are attached in Appendix B. The SPPP outlines how the City will prevent stormwater pollution from new and existing land areas. Bergen County has a Stormwater Management Program which is attached in Appendix C.

2.3 LAND USE / BUILD-OUT ANALYSIS

Land use effects groundwater and surface water quantity and quality. Pervious surfaces such as forested and wetland areas benefit water quality by absorbing water and filter out pollutants. Stormwater runoff increases over impervious surfaces and causes erosion and flooding. The following table shows the land use classifications for the City:

Table 2-3:
Land Use Classifications and Percent Impervious Surface Area

Land Use / Landcover	Total Acres	% Impervious
High / Medium Residential	673.42	53%
Low / Rural Residential	467.81	34%
Commercial	827.19	88%
Industrial	281.18	86%
Mixed Urban	156.77	12%
Forest, Water, Wetlands	306.69	7%
Barren / Agricultural	0.00	0 %

Figure 2-7 shows the relative distribution of the various land uses in the city. A detailed land use analysis was conducted within each subwatershed area of the City. The subwatershed areas are defined in section 2.0 and illustrated in Figure 2-1. The land use coverage in the City is based on the 1995/1997 land use / landcover (LU/LC) geographic information system (GIS) dataset from the NJDEP and shown on Figure 2-8. The land use data and impervious surface data was used in conjunction with the City's zoning ordinances to develop a full build out analysis as shown on Table 2-3.

The full build out analysis was conducted by subwatershed within the municipality. The full build out analysis presents the maximum acreage of land area available for development or redevelopment. The constrained and non-constrained areas are shown on Figure 2-9. To complete the full build out analysis the following information was determined:

- The City was divided into subwatersheds (HUC14).
- The total land area of each subwatershed within the City was determined.
- The LU/LC within each subwatershed area was calculated in acres.
- The total area of constrained lands within each subwatershed was calculated in acres.
- Constrained lands consist of wetlands, waterways, transportation, communications, and utility right of way areas.
- The City's zoning map (see following page) and ordnances were reviewed.

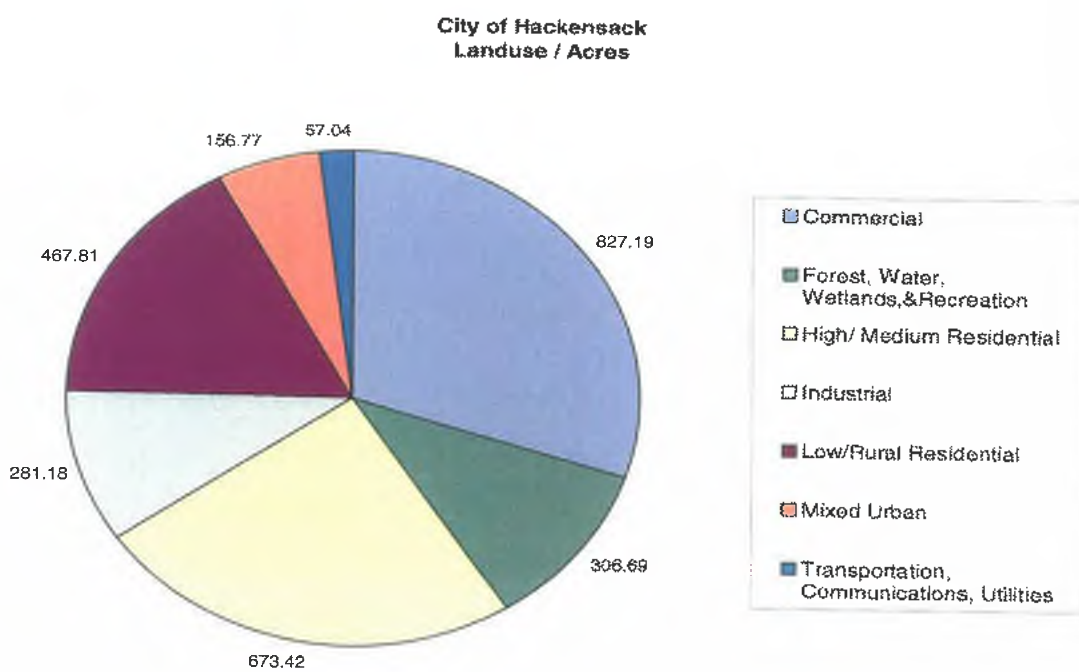
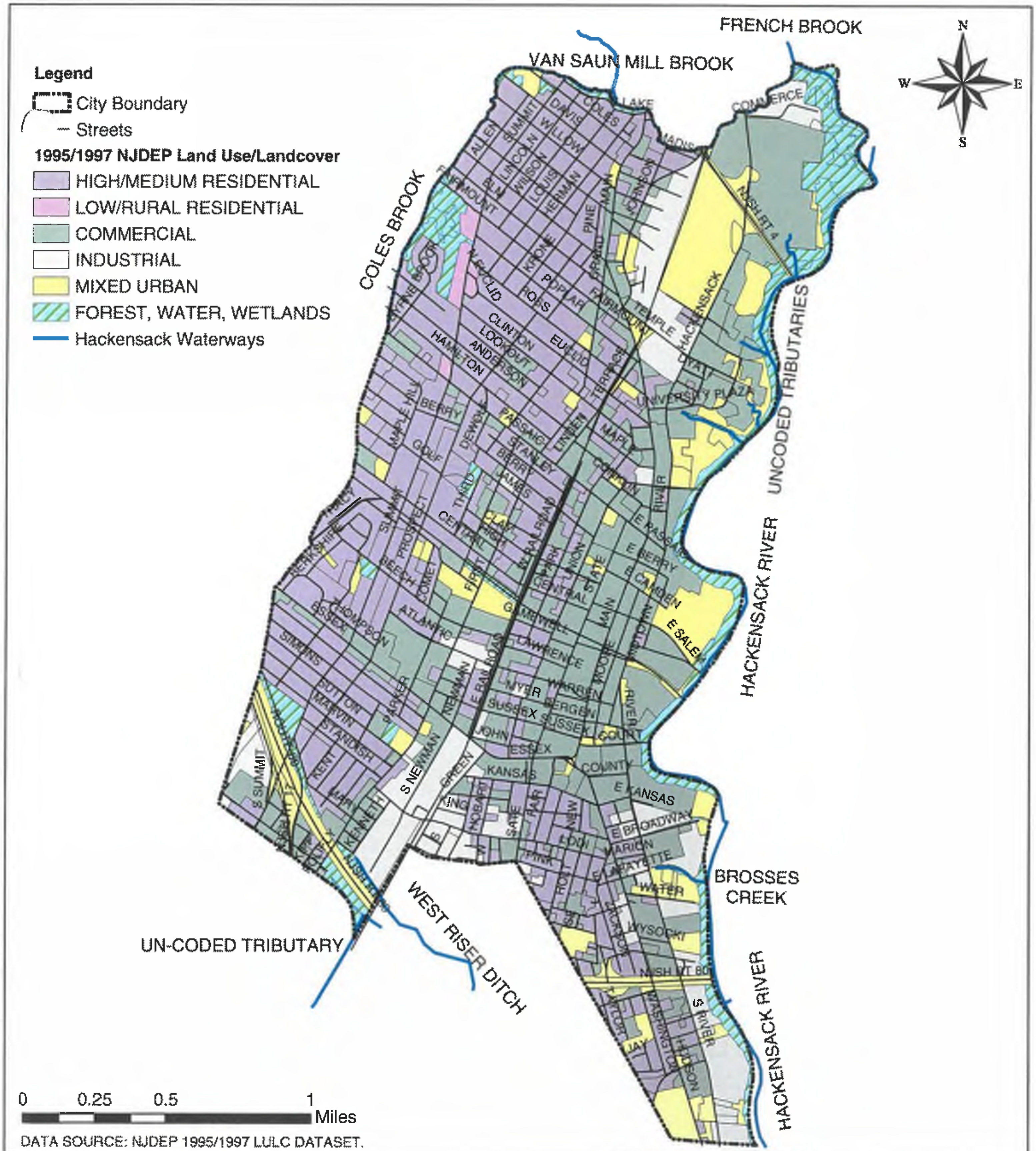


Figure 2-7: Distribution of Land Use / Landcover



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STORMWATER MANAGEMENT PLAN
CITY OF HACKENSACK
HACKENSACK, NEW JERSEY
LAND USE / LANDCOVER

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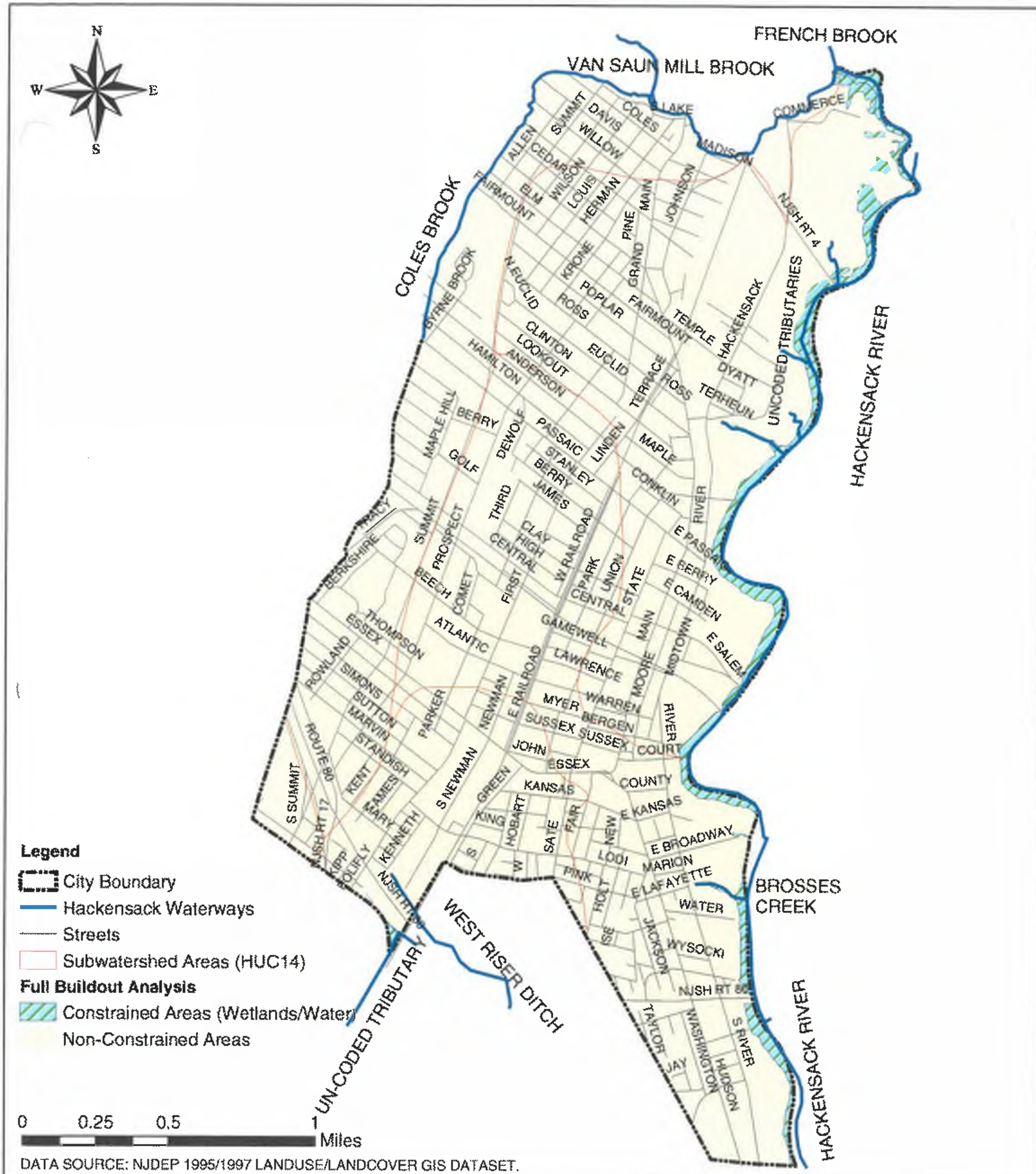
FIGURE 2-8

MAY 1, 2005



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STORMWATER MANAGEMENT PLAN
CITY OF HACKENSACK
HACKENSACK, NEW JERSEY
CONSTRAINED AND NON-CONSTRAINED AREAS

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FIGURE 2-9

MAY 1, 2005

The City has no barren or agricultural areas or otherwise known as vacant land, available for development. Figure 2-10 shows the distribution of landuse for the City. Commercial land use consists of 30% of the city's land use. Low density and medium/high density residential dwellings, makeup a combined 41% of the land use. According to the land use distribution within the city a full build out analysis was not required because there is less than 640 acres (1 square mile) of vacant, developable land. However, due to the variable rate of redevelopment in the City, a build out and analysis has also been included.

2.4 POLLUTANT LOADING SUMMARY

General area pollutant loading factor values were taken from the New Jersey Stormwater Best Management Practices Manual, as well as from current literature on those values not available from NJDEP. Values are summarized in Table 2-4. The land use for each subwatershed was taken from the 1995/97 LULC NJDEP GIS layer. Annual non point source (NPS) loads for each subwatershed were calculated using the following loading equation: *Load = LoadingCoefficients x Area*

Table 2-4:
Nonpoint Source Analysis: Area Pollutant Loading Factor per Land Use
(All Units in lbs./Acre/Year).

LU/LC	TP	TN	TSS	NH3-N	LEAD	ZINC	COPPER	CADMIUM	BOD	COD	NO2+NO3	Ni
High/ Medium Residential	1.4	15	140	0.65	0.2965	0.335	0.453	ns	25.6	152.6	1.7	0.0286
Low/Rural Residential	0.6	5	100	0.02	0.217	0.172	0.19	ns	ns	ns	0.1	0.0286
Commercial	2.1	22	200	1.9	0.955	0.873	0.784	0.002	42.1	662.6	3.1	0.0286
Industrial	1.5	16	200	0.2	1.409	1.598	0.93	0.003	31.4	ns	1.3	0.0286
Mixed Urban	1	10	120	1.75	3.215	1.743	1.529	0.0025	67.2	184.8	3.55	0.0286
Agriculture	1.3	10	300	ns	0.071	0.089	0.027	ns	15.45	ns	ns	0.0286
Forest, Water, Wetlands	0.1	3	40	ns	0.009	0.018	0.027	ns	9.2	2	0.3	0.0286
Barren Land	0.5	5	60	ns	ns	0.002	ns	ns	3.1	ns	ns	0.0286

The loading coefficients per land use are in pounds per acre per year (lbs/acre/yr). The loading equation provides an approximation for annual NPS loads on a subwatershed basis per land use. This allows for the comparison of loading between subwatershed areas and provides a method to prioritize areas for restoration and/or preservation.


CITY OF HACKENSACK
PREPARED FOR THE HACKENSACK PLANNING BOARD
BY: MURPHY & KREN PLANNING ASSOCIATES, INC.
ONE HALF MILE
R-1 ONE FAMILY RES.
R-1A ONE FAMILY RES.
R-2 ONE & TWO FAMILY RES.
R-2A ONE & TWO FAMILY RES. & GARDEN APARTMENTS
R-3A MEDIUM DENSITY MULTI-FAM. RES.
R-3B MEDIUM DENSITY MULTI-FAM. RES. & OFFICES
R-3 HIGH DENSITY MULTI-FAMILY RES.
B-1 NEIGHBORHOOD BUS.
B-2 CBD BUSINESS
B-3 GENERAL BUSINESS
M-1 MANUFACTURING
M-2 MANUFACTURING
UN UNIVERSITY-OFFICE
BOUNDARY OF P.O. OVERLAY DISTRICT
LIMITS OF FIRE ZONE

ZONING MAP

The stormwater management measures used to reduce the average annual TSS and nutrient loads can be non-structural and/or structural. To achieve the reduction requirements, they must be designed to treat the stormwater runoff generated by various design storms variable rate rainfall event. Nonstructural and structural stormwater management measures, also known as Best Management Practices (BMPs), are presented in Chapter 3.0 and 4.0. T he Full-Build Out Analysis and Annual Pollutant Loads at Full Build Out are shown on Tables 2-5 and 2-6 respectively.

2.5 STORM SEWER FLOW DIRECTION

Figure 2-11 shows the direction of flow for known storm sewers based upon current mapping (1977) and other catch basins located in the field in 2003 and 2004. Sewer maps which will be prepared in 2005 will include any modifications that may be discovered in the 2005 field investigations as required to prepare the maps. Figure 2-11 will be modified in accordance with these findings.

Table 2-5
Full Buildout Analysis

Subwatershed ID Land Use / Landcover Classification	HUC 14	Land Area (Sq. Feet)	Acres	Existing Impervious Areas (Acres)	Existing Impervious Areas (%)	Constrained Land (Acres)	Developable / Redevelopable Area (Acres)
Saddle River (Subtotal by Subwatershed)	02030103140070	1606140.34	36.87	33.64	91.24%	0.00	36.87
High/ Medium Residential		200398.77	4.60	3.68	80.01%	0.00	4.60
Low/Rural Residential		0.00	0.00	0.00	0.00%	0.00	0.00
Commercial		677802.92	15.56	14.69	94.39%	0.00	15.56
Industrial		637206.26	14.63	14.06	96.13%	0.00	14.63
Mixed Urban		90732.38	2.08	0.00	0.00%	0.00	2.08
Forest, Water, Wetlands		0.00	0.00	0.00	0.00%	0.00	0.00
Berrys Creek (Subtotal by Subwatershed)	02030103180060	13376233.09	307.07	225.06	73.29%	2.57	304.51
High/ Medium Residential		4012846.35	92.12	46.26	50.22%	0.00	92.12
Low/Rural Residential		0.00	0.00	0.00	0.00%	0.00	0.00
Commercial		3821491.47	87.73	76.60	87.31%	0.00	87.73
Industrial		4142744.52	95.10	88.84	93.41%	0.00	95.10
Mixed Urban		625699.12	14.36	12.38	86.21%	0.00	14.36
Forest, Water, Wetlands		773451.26	17.76	0.98	5.51%	2.57	15.19
Hackensack River Lower (Subtotal by Subwatershed)	02030103180050	38360180.29	880.63	525.52	59.68%	25.31	855.32
High/ Medium Residential		16577125.10	380.56	194.28	51.05%	0.00	380.56
Low/Rural Residential		307.75	0.01	0.00	28.31%	0.00	0.01
Commercial		12154582.25	279.03	236.18	84.64%	0.00	279.03
Industrial		4015602.24	92.19	69.76	75.67%	0.00	92.19
Mixed Urban		2934262.25	67.36	20.32	30.16%	0.00	67.36
Forest, Water, Wetlands		2678298.56	61.49	4.99	8.12%	25.31	36.18
Coles Brook / Van Saun (Subtotal by Subwatershed)	02030103180010	22882602.08	525.31	223.61	42.57%	10.12	515.19
High/ Medium Residential		6690254.61	153.59	83.98	54.68%	0.00	153.59
Low/Rural Residential		10679574.99	245.17	82.94	33.83%	0.00	245.17
Commercial		1490741.94	34.22	29.62	86.55%	0.00	34.22
Industrial		300406.29	6.90	5.79	83.88%	0.00	6.90
Mixed Urban		1274525.34	29.26	17.46	59.67%	0.00	29.26
Forest, Water, Wetlands		2447096.51	56.18	3.83	6.82%	10.12	46.05
Hackensack River Upper (Subtotal by Subwatershed)	02030103180030	44441247.15	1020.23	570.55	55.92%	10.45	1009.78
High/ Medium Residential		1853566.53	42.55	29.72	69.83%	0.00	42.55
Low/Rural Residential		9698203.66	222.64	77.36	34.75%	0.00	222.64
Commercial		17887881.04	410.65	370.63	90.26%	0.00	410.65
Industrial		3152246.59	72.37	64.21	88.72%	0.00	72.37
Mixed Urban		4388656.72	100.75	17.14	17.01%	0.00	100.75
Forest, Water, Wetlands		7460690.56	171.27	11.50	6.71%	10.45	160.82
TOTAL DEVELOPABLE AREA OF HACKENSACK CSO AND STORM SEWER DRAINAGE AREA=							2721.66
TOTAL DEVELOPABLE CSO SEWER DRAINAGE AREA OF HACKENSACK =							883.00
TOTAL DEVELOPABLE STORM SEWER DRAINAGE AREA OF HACKENSACK =							1838.66
PERCENTAGE OF DEVELOPABLE LAND AREA THAT IS STORM WATER DRAINAGE=							68%

Notes:
Water and wetlands are constrained areas.

Table 2-6
Annual Pollutant Loads at Full Build-Out for each HUC 14

Subwatershed ID Land Use / Landcover Classification	HUC 14	Land Area (Sq. Feet)	Acres	TP lbs./Year	TN lbs./Year	TSS lbs./Year	NH3-N lbs./Year	LEAD lbs./Year	ZINC lbs./Year	COPPER lbs./Year	CADMIUM lbs./Year	BOD lbs./Year	COD lbs./Year	NO2+NO3 lbs./Year	Ni lbs./Year
Saddle River (Subtotal by Subwatershed)	**02030103140070**	**1606140.34**	**36.87**	**63.14**	**666.21**	**6931.69**	**39.13**	**43.53**	**42.13**	**31.07**	**0.08**	**1372.15**	**11397.12**	**82.47**	**1.05**
High/ Medium Residential		200398.77	4.60	6.44	69.01	644.07	2.99	1.36	1.54	2.08	NS	117.77	702.04	7.82	0.13
Low/Rural Residential		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NS	NS	NS	0.00	0.00
Commercial		677802.92	15.56	32.68	342.32	3112.03	29.56	14.86	13.58	12.20	0.03	655.08	10310.16	48.24	0.45
Industrial		637206.26	14.63	21.94	234.05	2925.64	2.93	20.61	23.38	13.60	0.04	459.33	NS	19.02	0.42
Mixed Urban		90732.38	2.08	2.08	20.83	249.95	3.65	6.70	3.63	3.18	0.01	139.97	384.92	7.39	0.06
Forest, Water, Wetlands		0.00	0.00	0.00	0.00	0.00	NS	0.00	0.00	0.00	NS	0.00	0.00	0.00	0.00
Berrys Creek (Subtotal by Subwatershed)	**02030103180060**	**13376233.09**	**307.07**	**485.17**	**5162.13**	**53477.87**	**293.77**	**333.78**	**307.73**	**241.53**	**0.53**	**11051.55**	**77310.68**	**655.27**	**9.16**
High/ Medium Residential		4012846.35	92.12	128.97	1381.83	12897.07	59.88	27.31	30.86	41.73	NS	2358.32	14057.80	156.61	2.63
Low/Rural Residential		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NS	NS	NS	0.00	0.00
Commercial		3821491.47	87.73	184.23	1930.04	17545.81	166.69	83.78	76.59	68.78	0.18	3693.39	58129.26	271.96	2.51
Industrial		4142744.52	95.10	142.66	1521.66	19020.79	19.02	134.00	151.98	88.45	0.29	2986.26	NS	123.64	2.72
Mixed Urban		625699.12	27.53	27.53	275.33	3303.97	48.18	88.52	47.99	42.10	0.07	1850.22	5088.11	97.74	0.79
Forest, Water, Wetlands		773451.26	17.76	1.78	53.27	710.24	NS	0.16	0.32	0.48	NS	163.35	35.51	5.33	0.51
Hackensack River Lower (Subtotal by Subwatershed)	**02030103180050**	**38360180.29**	**880.63**	**1347.66**	**14351.35**	**140119.73**	**943.81**	**781.38**	**666.76**	**607.73**	**1.05**	**30627.34**	**258694.61**	**1950.16**	**25.68**
High/ Medium Residential		16577125.10	380.56	532.78	5708.35	53277.97	247.36	112.84	127.49	172.39	NS	9742.26	58072.99	646.95	10.88
Low/Rural Residential		307.75	0.01	0.00	0.04	0.71	0.00	0.00	0.00	0.00	NS	NS	NS	0.00	0.00
Commercial		12154582.25	279.03	585.96	6138.65	55805.94	530.16	266.47	243.59	218.76	0.56	11747.15	184885.10	864.99	7.98
Industrial		4015602.24	92.19	138.28	1474.96	18437.04	18.44	129.89	147.31	85.73	0.28	2894.61	NS	119.84	2.64
Mixed Urban		2934262.25	84.49	84.49	844.89	10138.67	147.86	271.63	147.26	129.18	0.21	5677.66	15613.56	299.94	2.42
Forest, Water, Wetlands		2678298.56	61.49	6.15	184.46	2459.40	NS	0.55	1.11	1.66	NS	565.66	122.97	18.45	1.76
Coles Brook / Van Saun (Subtotal by Subwatershed)	**02030103180010**	**22882602.08**	**525.31**	**499.21**	**5054.00**	**62400.91**	**257.34**	**300.01**	**221.39**	**226.23**	**0.21**	**9416.17**	**55328.60**	**592.39**	**15.60**
High/ Medium Residential		6690254.61	153.59	215.02	2303.80	21502.11	99.83	45.54	51.45	69.57	NS	3931.81	23437.30	261.10	4.39
Low/Rural Residential		10679574.99	245.17	147.10	1225.84	24516.83	4.90	53.20	42.17	46.58	NS	NS	NS	24.52	7.01
Commercial		1490741.94	34.22	71.87	752.90	6844.52	65.02	32.68	29.88	26.83	0.07	1440.77	22675.89	106.09	0.98
Industrial		300406.29	6.90	10.34	110.34	1379.27	1.38	9.72	11.02	6.41	0.02	216.55	NS	8.97	0.20
Mixed Urban		1274525.34	49.26	49.26	492.59	5911.08	86.20	158.37	85.86	75.32	0.12	3310.20	9103.06	174.87	1.41
Forest, Water, Wetlands		2447096.51	56.18	5.62	168.53	2247.10	NS	0.51	1.01	1.52	NS	516.83	112.35	16.85	1.61
Hackensack River Upper (Subtotal by Subwatershed)	**02030103180030**	**44441247.15**	**1020.23**	**1286.61**	**13511.54**	**144324.58**	**1011.29**	**895.51**	**713.51**	**616.63**	**1.30**	**29309.50**	**298411.88**	**1887.29**	**29.31**
High/ Medium Residential		1853566.53	42.55	59.57	638.28	5957.26	27.66	12.62	14.25	19.28	NS	1089.33	6493.41	72.34	1.22
Low/Rural Residential		9698203.66	222.64	133.58	1113.20	22263.93	4.45	48.31	38.29	42.30	NS	NS	NS	22.26	6.37
Commercial		17887881.04	410.65	862.36	9034.25	82129.53	780.23	392.17	358.50	321.95	0.82	17288.27	272095.13	1273.01	11.74
Industrial		3152246.59	72.37	108.55	1157.85	14473.07	14.47	101.96	115.64	67.30	0.22	2272.27	NS	94.07	2.07
Mixed Urban		4388656.72	105.42	105.42	1054.16	12649.87	184.48	338.91	183.74	161.18	0.26	7083.93	19480.79	374.23	3.01
Forest, Water, Wetlands		7460690.56	171.27	17.13	513.82	6850.93	NS	1.54	3.08	4.62	NS	1575.71	342.55	51.38	4.90
TOTAL (LBS / YEAR)				**3681.79**	**38745.23**	**407254.78**	**2545.34**	**2354.22**	**1951.52**	**1723.20**	**3.17**	**81776.72**	**701142.90**	**5167.59**	**80.80**
PERCENTAGE OF DEVELOPABLE LAND AREA THAT IS STORM WATER DRAINAGE=			68%												
Annual Pollutant loads from Hackensack Stormwater Drainage=				**2487.29**	**26174.96**	**275127.42**	**1719.54**	**1590.43**	**1318.38**	**1164.14**	**2.14**	**55245.56**	**473668.19**	**3491.04**	**54.58**
Annual Pollutant loads from Hackensack CSO Drainage=				**1194.50**	**12570.28**	**132127.36**	**825.79**	**763.79**	**633.14**	**559.07**	**1.03**	**26531.16**	**227474.70**	**1676.54**	**26.21**
Annual Nickel loads from Hackensack Stormwater Drainage to Hackensack River=															**53.53**

Notes:

NS = No Standard

All Area/Loading Factors referenced in Table 2-3 of Chapter 2.0 are taken from a local study for watershed management area 5 in use to determine the pollutant loads above

Land Use/Landcover data was obtained from the 1995/1997 NJDEP LULC GIS dataset.

MALCOLM PIRNIE	STORMWATER MANAGEMENT PLAN CITY OF HACKENSACK HACKENSACK, NEW JERSEY STORM SEWER FLOW DIRECTIONS	MALCOLM PIRNIE, INC. FIGURE 2-11 MAY 1, 2005

3.0 DESIGN AND PERFORMANCE STANDARDS

3.1 GENERAL DISCUSSION

The City has adopted the design and performance standards for stormwater management measures presented in N.J.A.C 7:8-5. These standards are designed to minimize the adverse impacts of stormwater runoff on water quality, water quantity, and loss of groundwater recharge in receiving water bodies. The standards for these measures also address erosion control. This plan also incorporates a maintenance plan consistent with N.J.A.C. 7:8-5.8 for stormwater management measures and safety standards consistent with N.J.A.C. Safety Standards for Stormwater Management Basins. These standards and measures are adopted by the municipality by means of the Stormwater Management Ordinance presented in Appendix A.

To ensure compliance with these standards, City inspectors will observe the construction of future projects and make certain that the stormwater management measures are constructed and function as designed.

The plan emphasizes that to the maximum extent practicable, the major stormwater management standards must be met by incorporating nonstructural stormwater management strategies consistent with N.J.A.C. 7:8-5.3 and described in Section 4.2 of this plan. It is upon exhaustion of all possible nonstructural strategies that structural stormwater management measures must be considered to ensure compliance with the standards incorporated in this plan.

3.2 MAJOR GOALS

The major goals of stormwater management measures, structural or non-structural, are to control erosion, sedimentation, infiltration and groundwater recharge, and control stormwater runoff quality and quantity impacts of major development. These specific goals are as follows:

3.2.1 Erosion and Sedimentation Control

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. More specifically, erosion and sedimentation controls are regulated by the Soil Conservation Districts in each county which ensure compliance with *Standards for Soil Erosion and Sediment Control*, (July 1999).

3.2.2 Groundwater Recharge

The minimum design and performance standards for groundwater recharge are those established under N.J.A.C. 7:8-5.4. The design engineer for the developer is provided with a choice of two methods to ensure that loss of groundwater recharge is being mitigated. The engineer must either demonstrate that 100 percent of the average annual pre-construction recharge volume is being maintained, or that the increase of stormwater runoff volume due to construction for the two-year storm is infiltrated. It must be noted that groundwater recharge design and performance standards do not apply to projects in an "urban redevelopment area" or in areas that fall under the following categories:

- Industrial and commercial areas with solvent/petroleum related activity.
- Areas where hazardous/toxic materials may be present.
- Areas with high risks of toxic material spills (e.g. gas stations and vehicle maintenance facilities).
- Areas where stormwater runoff is exposed to industrial materials or machinery that could act as a pollutant source.

3.2.3 Stormwater Runoff Volume and Peak Abatement

The minimum design and performance standards for controlling stormwater runoff quantity impacts are those established under N.J.A.C. 7:8-5.4. Using the assumptions and factors for stormwater runoff calculations, the developer's design engineer must demonstrate one of the following:

- For stormwater leaving the site, post-construction runoff hydrographs for two, ten and 100-year storm (the design storms) events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events.

- There is no increase in peak runoff rates of stormwater leaving the site for the two, ten 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.

- The post-construction peak runoff rates for the two, ten and 100-year storm events are 50, 75, and 80 percent, respectively, of the pre-construction peak runoff rates.

The engineer must provide proof that these criteria can be met by using SWMM 5, XP-SWMM, TR-55 or the Rational Method model in order to provide adequate proof that these criteria can be met. If more than three pipes or conveyance reaches are necessary for the proposed developments, the TR-55 or Rational Methods may not be appropriate and are not recommended.

3.2.4 Reduction of Stormwater Runoff Pollutant Quantities

The minimum design and performance standards controlling stormwater runoff quantity impacts are those established under N.J.A.C. 7:8-5.5. Measures for stormwater quality control are only required for proposed developments that create an additional one-quarter acre of impervious surface. The stormwater management measures must be designed to remove 80% of the post-construction total suspended solids (TSS) load in stormwater runoff generated from the water quality design storm. The design storm is defined as 1.25 inches of rainfall in two hours with the hourly distribution shown in Table 3.1.

TABLE 3-1: Distribution of a 1.25-inch 2 hour Storm in New Jersey

Minutes	Rainfall Intensity (inches/hour)	Total Rainfall in 10 Minutes (inches)	Cumulative Rainfall (inches)
0	3		0
10	2.5	0.23	0.23
20	1.8	0.18	0.41
30	1.4	0.13	0.54
40	1.2	0.11	0.65
50	1.1	0.10	0.75
60	1	0.09	0.83
70	1	0.08	0.92
80	0.9	0.08	1.00
90	0.8	0.07	1.07
100	0.85	0.07	1.14
110	0.7	0.06	1.20
120	0.6	0.05	1.25

The engineer must use this distribution with one of the aforementioned models in order to provide adequate proof that the 80% TSS requirement can be met. If more that three pipes or conveyance reaches are necessary for the proposed development, the TR-55 or Rational Method may not be appropriate. Reduction of post-construction nutrient load, to the maximum extent feasible, from the runoff of a water quality design storm must also be accomplished by the stormwater management measures.

3.3 DEVELOPER REQUIREMENTS

Developers constructing new developments or retrofitting old developments must not only meet the stormwater management goals discussed in the previous sections, but also achieve four other requirements. Developers must comply with the Natural Heritage Program, create stormwater management maintenance plans for each stormwater management method or technology they use, institute safety requirements outlined in N.J.A.C. 7.8-6, and comply with total maximum daily load requirements.

3.3.1 Natural Heritage Program Compliance

In response to the New Jersey Department of Environmental Protection's Natural Heritage Program, developers required to institute stormwater management measures shall ensure that the best management practice selected avoids damage to habitats of threatened and endangered species, particularly the swamp pink (*Helonias bullata*) and the bog turtle (*Clemmys muhlnebergii*). Developers should submit a request for information regarding endangered species in the selected project site. The request consists of a short letter explaining the project, a USGS quad map delineating project site boundaries, and a completed data request form. The data request form is available on the NJDEP website at http://www.nj.gov/dep/parksandforests/natural/heritage/datareq.html. Additional information regarding the Natural Heritage Program is available at http://www.nj.gov/dep/parksandforests/natural/heritage/. It should be noted that average turn around time for a request is two weeks. A minimum charge of $20 (plus $20 per hour for each additional hour, billed in half hour increments) will be assessed for each request.

3.3.2 Stormwater Management Maintenance Plans

N.J.A.C. 7.8-5.8(a) requires each stormwater management measure to have a maintenance plan. The maintenance plan must contain the names, addresses, and telephone numbers of the persons responsible for maintenance practices. It must also contain specific preventative and corrective tasks, an inspection and task schedule, maintenance cost estimates, and logs of all maintenance activities performed. In addition to the required information, the maintenance plan should contain sources of tools and equipment required for maintenance, corrective responses for emergencies, safety plans for maintenance practices, a list of disposal and recycling sites, copies of warranties for measure components, and copies of relevant construction documents. The maintenance plan should also contain information on access to the site, personnel training, and impacts of the stormwater management measure's aesthetics on the surrounding area.

Upon completion of the maintenance plan, copies shall be provided to the stormwater management measure's owner and operator as well as the County, the designated stormwater review agency for the City. The title and date of the plan and the name, address, and telephone number of the party responsible for measure maintenance must be recorded on the deed to the property on which the measure is located. If requested, the person responsible for plan maintenance must furnish the plan and any associated logs or records to public entities with administrative, health, environmental or safety authority over the site. More information regarding stormwater measure maintenance is available in Chapter 8 of the *New Jersey Best Management Practices Manual*: Maintenance and Retrofit of Stormwater Management Measures.

3.3.3 Safety

N.J.A.C. 7.8-6.2 sets safety requirements for best management practices involving stormwater basins. Requirements are set for trash racks, overflow grates and escape provisions. These requirements apply to all best management practices involving basins, such as wet ponds and detention basins. All basins and ponds with open water shall be enclosed and secured from public access with a minimum 6-foot tall steel fence or other material approved for use by the City's building department. Variances and exemptions to the following safety requirements can only be granted if the reviewing agency finds that the variance or exemption will not be a threat to public safety.

3.3.3.1 Trash Racks

Trash racks, much like the grates over storm water catch basins, are designed to catch trash and debris and prevent clogging. Trash racks are to be installed at the intake to the outlet from the stormwater management basin. They are to have parallel bars spaced no farther than six inches apart and shall not negatively affect the flow of the outlet. Average flow through the trash rack should not exceed 2.5 ft/s over the course of a storm. Trash racks shall be constructed from rigid, durable, corrosion-resistant material capable of withstanding a load of 300 psi.

3.3.3.2 Overflow Grates

Overflow grates are designed to prevent obstruction of overflow structures. An overflow grate shall be secured to the outlet but shall also be removable. Open spaces in the grate shall be no greater than two inches across the smallest dimension. Like trash racks, overflow grates shall be constructed from rigid, durable, corrosion-resistant material capable of withstanding a load of 300 psi and/or H-20 loading if trucks will possibly drive over the grates.

3.3.3.3 Escape Provisions

Stormwater basins with outflows shall incorporate permanent ladders, steps, rungs or other escape methods into the basin's structure. Basins more than 2.5 feet deep must have safety ledges. These safety ledges shall consist of two steps, each four to six feet in width. The first step shall be 1.5 to 2 feet below the permanent water surface, and the second step shall be located 1 to 1.5 feet above the permanent water surface. Dams, embankments and berms used in stormwater basins shall not have a slope greater than 3:1 horizontal.

3.3.4 Total Maximum Daily Load (TMDL) and Waste Load Allocations (WLAs)

Developers should be aware of and comply with Waste Load Allocations. These quantities are determined based on the substance's sources, point and nonpoint. The sum of the waste load allocations is equal to the total maximum daily load or TMDL. TMDLs are developed for water bodies that cannot meet the surface water requirements after installation of effluent-based treatment measures. The TMDL establishes Waste Load Allocations (WLA).

The State of New Jersey has a four phase process for TMDLs. A proposed TMDL is considered 'proposed' when it is published for public review in the New Jersey Register as a proposed amendment to the appropriate water quality management plan. Next, public comments are incorporated and the TMDL is submitted to EPA Region 2 for a 30-day review period. The TMDL is 'established' during this phase. The third phase is approval of the amendment by EPA Region 2. The TMDL is considered 'adopted' after it has been approved by EPA Region 2 and adopted by NJDEP as a water quality management plan amendment. The process ends when the amendment's adoption notice is published in the New Jersey Register. Developers should consult the Plan Consistency chapter of this report for TMDLs in effect in the City of Hackensack. More information on TMDLs including a list of TMDLs in New Jersey can be found on the NJDEP's website at http://www.state.nj.us/dep/watershedmgt/tmdl.htm. Developers are required to remove pollutants to achieve the specified annual pollutant load for their proposed land area development, which is the WLA.

3.4 EXEMPTIONS AND WAIVERS

All developments disturbing more than one acre of land or creating more than one quarter of an acre of impervious surface are subject to the stormwater treatment standards outlined in N.J.A.C. 7.8-5.4 and 5.5, with specific exemptions for urban redevelopment areas, high pollutant loading and runoff from source material outlined in N.J.A.C. 7.8-5.4(a)2ii and 2iii. Waivers may be granted for developments in areas subject to tidal influence where non-tidal water surfaces do not exist. Three types of linear development projects are exempt from the groundwater recharge and the stormwater quality and quantity requirements set forth in N.J.A.C. 7.8-5.4 and 5.5:

1. Underground utility line construction projects (provided that disturbed areas are revegetated upon project completion);

2. Aboveground utility line construction projects (provided that pre-project conditions are maintained to the maximum extent possible); and

3. Public pedestrian access projects, such as sidewalks or trails that are less than 14 feet wide (provided the access is constructed from permeable material).

Waivers from strict compliance with N.J.A.C. 7.8-5.4 and 5.5 can be obtained for projects concerning the enlargement of an existing public roadway, enlargement of a public railroad or the construction or enlargement of a public pedestrian access if the following four criteria are met:

1. The waiver applicant shows public need for the project and it cannot be accomplished any other way;

2. The applicant completes an alternatives analysis showing that the use of nonstructural and structural stormwater management measures complies with N.J.A.C. 7.8-5.4 and 5.5 (i.e.; the major goals discussed in Section 3.2) to the maximum extent practicable;

3. The applicant shows that compliance with N.J.A.C. 7.8-5.4 and 5.5 would require existing structures currently in use to be condemned; and

4. The applicant does not own or have rights to areas that would allow for additional mitigation opportunities that are not achievable on-site. This item, however, is not applicable to the City's SWMP since mitigation is permitted under the criteria set in Chapter 6.0.

4.0 SPECIFIC BEST MANAGEMENT PRACTICES (BMPS)

4.1 LOW IMPACT DEVELOPMENT VERSUS STRUCTURAL BMPS

Effective low impact development includes the use of both nonstructural and structural stormwater management measures that are a subset of a larger group of practices and facilities known as Best Management Practices or BMPs. The BMPs utilized in low impact development, known as LID-BMPs, focus first on minimizing both the quantitative and qualitative changes to the pre-developed hydrology of a site through nonstructural practices and then providing treatment as necessary through a network of structural facilities distributed throughout the site. In doing so, low impact development places an emphasis on nonstructural stormwater management measures, seeking to maximize their use prior to utilizing structural BMPs.

Nonstructural BMPs used in low impact development seek to reduce stormwater runoff impacts through sound site planning and design. Nonstructural LID-BMPs include such practices as minimizing site disturbance, preserving important site features, reducing and disconnecting impervious cover, flattening slopes, utilizing native vegetation, minimizing turf grass lawns, and maintaining natural drainage features and characteristics. Structural BMPs used to control and treat runoff are also considered LID-BMPs if they perform these functions close to the source of runoff. As such, they are typically smaller than standard structural BMPs. Structural LID-BMPs 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.

4.2 LOW IMPACT DEVELOPMENT OR NONSTRUCTURAL BMPS

The City will review its ordinances and provide a list of the sections in the City land use and zoning ordinances that are to be modified to incorporate nonstructural stormwater management strategies. Once the ordinance texts are completed, they will be submitted to the County for review and approval. A copy will also be submitted to the

NJDEP. The specific ordinances that ***are being considered*** for adoption by the Planning Board and governing body are described in the following Sections (4.2.1 to 4.2.1.3).

4.2.1 Buffers

This ordinance would require buffer areas along all lot and street lines separating residential uses from arterial and collector streets, separating a nonresidential use from either a residential use or residential zoning district line, and along all street lines where loading and storage areas can be seen from the street. The landscape requirements for these buffer areas in the existing section will not recommend the use of native vegetation. The language of this section will require the use of native vegetation, which requires less fertilization and watering than non-native species. Language will be included to allow buffer areas to be used for stormwater management by disconnecting impervious surfaces and treating runoff from these impervious surfaces. The City should determine if this section will require preservation of natural wood and tracts and limit land disturbance for new construction.

4.2.2 Cluster Development

This ordinance would provide for a development option to preserve land for public and agricultural purposes, to prevent development on environmentally sensitive areas, and to aid in reducing the cost of providing streets, utilities and services in residential developments. The cluster option is a tool for reducing impervious roads and driveways. The option allows for smaller lots with smaller front and side yard setbacks than traditional development options. It also minimizes the disturbance of large tracts of land, which is a key nonstructural stormwater management strategy. The cluster option will require that a percentage of the total tract be preserved as common open space for residential area. The cluster option will not require that 25 percent of the green or common area be landscaped with trees and/or shrubs. This language will promote the use of native vegetation, which requires less fertilization and watering than non-native ornamental plants. Although the cluster option requires public concrete sidewalks to be installed along all streets, the option requires paths in open space to be mulched or stone to decrease the impervious area.

4.2.3 Vegetated Swale Curbs and Gutters

This ordinance would require that concrete curb and gutter, concrete curb, or Belgian block curb be installed along every street within and fronting on a development whenever possible. This section may allow for curb cuts or flush cuts with curb stops to allow vegetated swales to be used for stormwater conveyance and to allow the disconnection of impervious areas.

4.2.4 Use of Natural Swales for Drainage

The ordinance would require that all streets be provided with inlets and pipes where the same are necessary for proper drainage and it would encourage the use of natural vegetated swales instead of inlets and pipes.

4.2.5 Permeable Pavement Driveways and Access Ways

The ordinance would describe the procedure for construction of any new driveway or access way to any street and will promote the use of pervious paving materials to minimize stormwater runoff and promote groundwater recharge.

4.2.6 Preservation of Natural Features

This ordinance would require that natural features such as trees, brooks, swamps, hilltops, and views be preserved whenever possible, and that care be taken to preserve selected trees to enhance soil stability and landscaped treatment of the area. This section would allow developers 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.

4.2.7 Vegetation on Roofs

This ordinance would require that roofs or rooftops be lined with a vegetated cover, when feasible. The vegetated roof would be constructed to exceed standards for leaking and ultimately retain stormwater and aid in the reduction of stormwater runoff.

4.2.8 Restrictions on Nonconforming Uses, High Impervious Area Structures or Lots

This ordinance would not permit proposed additions to existing single family homes proposing additions that will exceed the maximum percent of impervious cover. The homeowner would be required to reduce or mitigate the impact of the additional impervious surfaces unless the stormwater management plan for the development provided for these increases in impervious surfaces. This mitigation effort must address water quality, flooding, and groundwater recharge.

4.2.9 Off-site and Off-tract Improvements

This ordinance would describe essential off-site and off-tract improvements. Language will be added to this section to require that any off-site and off-tract stormwater management and drainage improvements must conform to the design and performance standards described in this plan.

4.2.10 Off-street Parking and Loading

This ordinance would include details of off-street parking and loading requirements. All parking lots with more than 10 spaces and all loading areas will be required to have concrete or Belgian block curbing around the perimeter of the parking and loading areas. This ordinance would also require concrete or Belgian block curbing be installed around all landscaped areas within the parking lot or loading areas. It will also allow for flush curb with curb stop, or curbing with curb cuts to encourage developers to allow for the discharge of impervious areas into landscaped areas for stormwater management whenever possible. Language would also be added to allow for use of natural vegetated swales for the water quality design storm, with overflow for larger storm events into storm sewers. This ordinance would promote the usage of pervious paving in areas providing overflow parking, vertical parking structures, smaller parking stalls, and shared parking.

4.2.11 Shade Trees

The ordinance will encourage land owners and home owners to plant shade trees in their yards. In addition to this section, the City would have a Tree Preservation Ordinance that restricts and otherwise controls the removal of mature trees throughout the City. This ordinance recognizes that the preservation of mature trees and forested areas is a key strategy in the management of environmental resources, particularly watershed management, air quality, and ambient heating and cooling. These sections will set out a "critical footprint area" that extends beyond the driveway and building footprint where clearing of trees cannot occur. This will comply with minimizing land disturbance, which is a nonstructural stormwater management strategy. These ordinances would require the identification of forested areas, and that a percentage of forested areas are protected from disturbance.

4.2.12 Use of Narrow Streets

This type of ordinance will be considered to encourage the reduction of impervious surface in development. The ordinance would describe the requirements for streets in the City. The City has several street classifications, with various right-of-way widths. Street paving widths are a function of the number of units served, whether a street is curbed, whether on-street parking is permitted, whether the interior streets serve lots of two acres or larger, and whether on-site topographical constraints allow design flexibility. Depending on these factors, paving width for secondary local streets has a range from 20 to 32 feet. This ordinance would encourage developers to limit on-street parking to allow for narrower paved widths. This ordinance would also require that cul-de-sacs 35 foot turning radius be minimized to reduce impervious area. Normal radius cul-de-sacs with landscaped islands will be used as planted tree or pond areas or designed with flush curbs with a reinforced shoulder to accommodate larger equipment and emergency vehicles.

4.2.13 Steep Slopes

This ordinance would require terraced landscaping design (such as the retention walls near Third Street as shown on Figure 2-2) or other flow velocity reduction methods be used with steep slope areas. One option is to construct flumes designed in accordance with "Standard for Slope Protection Structures" of the *Standards for Soil Erosion and Sediment Control in New Jersey*, which would follow the philosophy of moving the "fast" flows off the steep slopes without erosion to an area where the stormwater can be managed more effectively.

4.3 STRUCTURAL BEST MANAGEMENT PRACTICES BMPs

These BMPs should only be considered when nonstructural BMPs do not meet the goals identified in Section 3.2. These structural BMPs are as follows:

4.3.1 Bioretention Basins

Bioretention systems filter stormwater runoff through vegetative layer planted on a soil layer and convey the water downstream by means of an underdrained sand layer below the soil bed. These systems are used to remove a wide range of pollutants including suspended solids, nutrients, metals, hydrocarbons, and bacteria. They are also capable of reducing peak runoff rates and increasing stormwater infiltration if design features related to providing additional storage, and hydraulics that raise the invert of lowest outlet above the maximum design storm water surface, are incorporated into the design.

Runoff from both residential and nonresidential developments, impervious areas and lawns can be handled by bioretention systems. They can be installed in lawns, median strips, parking lot islands, unused lot areas, and certain easements. Detailed information for designing bioretention systems is provided in Chapter 9.1 of the *New Jersey Stormwater Best Management Practices Manual.* Some of the critical design criteria are discussed below.

Bioretention basins must be designed with enough storage volume to treat the runoff volume generated by the stormwater quality design storm (as calculated from methods described in Chapter 5 of the *New Jersey Stormwater Best Management Practices Manual*) without overflow. The surface area should be large enough such that the maximum water depth during treatment is 12 inches in a basin and 18 inches in a swale. The hydraulics of the soil bed and the sand undersrain should be such that the entire volume of a stormwater quality design storm can be drained within 72 hours. This in turn requires adherence to the soil permeability criteria discussed later. In conducting field or laboratory testing to determine soil permeability, a safety factor of two shall be applied to account for temporal variations due to continued operation of the basin. The system must be designed with enough hydraulic capacity so as to safely convey stormwater to downstream drainage systems. Any stormwater management measures classified as dams under the NJDEP Dam Safety Standards stipulated by N.J.A.C. 7:20 must also meet the overflow requirements of these standards.

The applicability of using bioretention systems depends on a few important criteria. Because bioretention basins rely upon an underdrain system to rapidly convey runoff to downstream areas after filtration, a high Seasonal High Water Table (SHWT) can be detrimental to a bioretention basin's effectiveness. Bioretention basins are appropriate when the SHWT is at least 1 foot below the bottom of the bioretention basin's underdrain during non-drought conditions. Furthermore, if the system relies on infiltration through the soil layer underneath the system instead of an underdrain, soil permeability must be greater than 0.5 inches/hour to ensure proper functioning (based on design criteria for Infiltration Basins, another BMP described in Chapter 9.5 of the *New Jersey Stormwater Best Management Practices Manual*). Bioretention systems should not be planned in areas where removal of mature trees would be involved.

4.3.2 Constructed Stormwater Wetlands

Constructed stormwater wetlands use vegetation to maximize the removal of pollutants from runoff through settling, uptake, and filtration while providing a means for erosion and flood control. The wetlands are designed to temporarily store runoff in shallow pools that provide suitable conditions for growth of wetland plants. Constructed stormwater wetlands can also be used to reduce peak runoff rates if designed as a multi-function, multi-stage facility and owing to the vegetation, can provide wildlife habitat and aesthetic features to the development.

The wetlands consist of three zones: the permanent pool, marsh, and semi-wet zones. Depending on the presence and relative storage volume of the zones, these systems can be classified as pond wetland, marsh wetland, or extended detention wetland. Pond wetlands are more appropriate when higher pollutant removal efficiencies are required. They have also been demonstrated to be the most reliable in terms of overall performance compared to the other types. Detailed information for designing constructed stormwater wetlands is provided in Chapter 9.2 of the *New Jersey Stormwater Best Management Practices Manual.* Some of the critical design criteria are discussed below.

The total volume of the three zones must equal the design runoff volume. An exception can be made for systems designed as extended detention wetlands. The detention time requirements in the semi-wet zone of an extended detention wetland (above the normal standing water level) are identical to those for an extended detention basin. The requirements state that the detention time must be long enough such that a minimum of 10 percent of the runoff volume generated by the stormwater quality design storm remains in the basin 24 hours after the peak basin water surface and maximum runoff storage volume is achieved.

Constructed stormwater wetlands are appropriate when sufficient drainage area requirements, dry weather base flow, and soil permeability requirements are met. Depending on the type of constructed wetland, the minimum drainage area to a constructed stormwater wetland ranges from 10 acres i.e. 2 football fields, for extended detention, to 25 acres i.e. 5 football fields for pond/marsh wetlands. The reliability of pollutant removal tends to increase as the stormwater wetland to watershed ratio increases. Dry weather base flows are an important criteria for marsh wetlands where it is necessary to support emergent plants and minimize mosquito breeding. Since the marsh area is quite large in this type of wetland, the drainage area requirements are greater. The greater marsh area necessitates greater rates of normal inflow to generate the required flow velocities and volume changeover rates. Thus, the design engineer must conduct a water budget which demonstrates that there will be a continuous supply of water to sustain the constructed stormwater wetland. It must also be demonstrated that the dry periods will not exceed two months since periods of a longer duration have been shown to be detrimental to the plant community richness. The location of the bedrock relative to the surface is an important criteria for determining the appropriateness of constructed wetlands. The high excavation costs in cases where bedrock in close to the surface may make these systems infeasible. Due to the critical function served by the permanent pool that must be maintained in constructed stormwater wetlands, the soil at the wetland site must be sufficiently impermeable to prevent excessive seepage, otherwise construction of an impermeable liner or other soil modifications will be necessary. This stormwater management measure is best suited for medium-fine texture soils (such as loams and silt loams) as they are ideal for establishing vegetation, surface water retention, groundwater recharge, and capture of pollutants. Constructed stormwater wetlands are also constrained by available land area requirements due to the minimum setback requirements from the following structures:

- Property Line – 10 ft. Distance
- Private Well – 50 ft. Distance

4.3.3 Dry Wells

Dry wells may either be structural chambers or excavated pits filled with aggregate that are designed to serve as subsurface storage facilities receiving and temporarily storing stormwater runoff from roofs of structures. The stored runoff is held until it infiltrates into the surrounding soils.

The primary purpose of a dry well is to reduce the volume of stormwater runoff caused by roofs of buildings (which is a major component of the overall increased runoff volume from development sites) by providing storage capacity and promoting infiltration. Thus, it greatly facilitates groundwater recharge and can be used to meet the groundwater recharge requirements of the NJDEP Stormwater Management Rules. Dry wells are ideally suited for reducing the amount of stormwater quality design storm runoff volume that must be treated by other downstream stormwater management facilities, thereby indirectly enhancing water quality. Detailed information for designing dry wells is provided in Chapter 9.3 of the *New Jersey Stormwater Best Management Practices Manual*. A detailed discussion relating to the use of this measure to meet the groundwater recharge requirements of the NJDEP Stormwater Management rules is presented in Chapter 6 of the *New Jersey Stormwater Best Management Practices Manual*. Some of the critical design criteria are discussed below.

Dry wells must be designed with enough hydraulic capacity to treat the total runoff volume generated by the dry well's maximum design storm. This in turn is determined by the dry well's proposed use, whether it is intended to handle a groundwater recharge storm or a stormwater quality design storm. The design should ensure that the entire runoff volume from the maximum design storm will be drained within 72 hours. The bottom of a dry well must be at least 2 feet above the seasonal high water table or bedrock and be as level as possible to uniformly distribute runoff infiltration over the subgrade soils. Furthermore, construction of a dry well must be conducted without compacting the subgrade soils. This must achieved by equipment placed outside the dry well whenever possible.

The applicability of dry wells as a stormwater management measure is influenced by a variety of factors. Dry wells cannot be used to directly comply with the suspended solids and nutrient removal requirements mandated by the NJDEP Stormwater Management Rules under N.J.A.C. 7:8 as they are primarily designed for handling roof runoff, which has a relatively low level of expected pollutants. Consequently, dry wells are inappropriate for use in the following areas where high pollutant or sediment loading is anticipated as this entails the potential for groundwater contamination:

- Industrial and Commercial areas with solvent/petroleum related activity
- Areas with a probability of presence of hazardous/toxic materials
- Areas with high risks of toxic material spills (eg. gas stations and vehicle maintenance facilities)
- Areas where stormwater runoff is exposed to industrial materials or machinery that could be a source of pollutants.

Dry wells must not be used where their installation would create a significant risk for basement seepage or flooding, cause surficial flooding of groundwater, or interfere with the operation of subsurface sewage disposal systems and other subsurface structures.

Stemming from the fact that dry wells rely entirely upon infiltration, their use is applicable only when subgrade soils conform to the required permeability rates presented below:

Table 4-1
Design Permeability Rates Required for Dry Wells and Infiltration Basins

Maximum Design Storm	Minimum Design Permeability Rate (inches/hour)
Groundwater Recharge	0.2
Stormwater Quality	0.5

Dry wells are recommended only for storms smaller than or equal to stormwater quality design storm. Approval for the use of dry wells for larger storm events is contingent upon review of and the criteria for design, construction, and maintenance for such systems by all applicable reviewing agencies. If the dry well is used for storms greater than the Groundwater Recharge Storm, then this management measure can only be constructed in areas with Hydrologic Soil Group A and B Soils.

Group A soils are sand, loamy sand, or sandy loam soils which have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sand or gravel and have a high rate of water transmission (greater than 0.30 in/hr).

Group B soils are silt loam or loam soils have moderate infiltration rates when thoroughly wetted and consist chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission (0.15-0.30 in/hr).

Soil with the more impermeable clays should be avoided for use with this BMP.

Finally, drainage area requirements stipulate that the maximum drainage area to a dry well must be 1 acre.

4.3.4 Extended Detention Basins

Extended detention basins are designed for temporary storage of runoff. They are basins constructed through filling and/or excavation which detains runoff inflows and provides a conducive environment for settlement of pollutants before being conveyed downstream through an outlet structure. These systems are usually designed as multi-staged facilities wherein the higher stages of the basin attenuate peak rates of runoff from large storms, thereby providing flood and erosion control, while the lower stages store runoff from stormwater quality design storms for extended time periods to enhance pollutant removal through sedimentation.

This stormwater management measure is used for both stormwater quality and quantity management. The TSS removal that can be achieved through this measure is strongly dependent on the duration of detention time provided in the basin. They are suited for use at residential, commercial, and industrial development sites where significant increases in runoff from development is expected. Detailed information for designing Extended Detention Basins is provided in Chapter 9.4 of the *New Jersey Stormwater Best Management Practices Manual*. Some of the critical design criteria are discussed below.

Extended detention basins should be designed to treat the runoff volume generated by the water quality design storm (as calculated from methods described in Chapter 5 of the *New Jersey Stormwater Best Management Practices Manual*). The detention time in extended detention basins must long enough such that a minimum of 10 percent of the runoff volume generated by the stormwater quality design storm remains in the basin 24 hours after the peak basin water surface and maximum runoff storage volume is achieved. Any stormwater management measure classified as a dam under the NJDEP Dam Safety Standards stipulated by N.J.A.C. 7:20 must also meet the overflow requirements of these standards. Owing to sediment removal and its consequent accumulation over the course of operation of these basins, a loss of detention time volume must be accounted for in the design. This could be achieved by increasing the initial maximum storage volume for compensation of the inevitable loss later. To increase the degree of sedimentation, narrow basin configurations with length to width ratios from 2:1 to 3:1 should be designed. The designer must avoid reducing surface area of the basin since shallow basins with larger surface area will provide better pollutant removal efficiencies than smaller, deeper basins.

The depth to the seasonal high water table (SHWT) can be a limiting condition since interception of groundwater by the basin can result in a loss of storage volume, mosquito breeding, and difficulty maintaining the basin bottom. Extended detention basins are appropriate only when the SHWT is at least one foot below the lowest elevation in the basin. Soil conditions on the site should be such that it is neither relatively impermeable (USDA Hydrologic Soil Group "D"), leading to problems associated with standing water, nor very permeable (Group "A") sue to excessive seepage into groundwater and the ramifications of possible contamination. Furthermore, close proximity to bedrock could increase excavation costs associated with such systems, making them infeasible. Finally, in Karst landscapes, other alternatives to detention basins should be examined.

4.3.5 Infiltration Basins

Infiltration basins are facilities constructed with highly permeable soils and no structural outlet to discharge runoff in order to promote infiltration to the surrounding soils. They provide temporary storage of the stormwater runoff from a stormwater quality design storm though they can be combined with an extended detention basin to provide additional storage volume for larger storms thereby accomplishing stormwater quantity management as well. This stormwater management measure relies upon the infiltration of runoff though underlying soil as well as biological and chemical activity within the soil to achieve pollutant removal.

Infiltration basins are primarily used on development sites that must achieve pollutant removal as well as reduce peak rate and total runoff volume. They may also be used to meet the groundwater recharge requirements of the NJDEP Stormwater Management Rule. A detailed discussion relating to the use of this measure to meet the above mentioned rule is presented in Chapter 6 of the *New Jersey Stormwater Best Management Practices Manual*. Appropriate soil and drainage area conditions can permit the combination of an infiltration basin with a detention basin to provide runoff quantity control in the detention portion of the basin. This would involve raising the invert of the lowest stormwater quantity control outlet above the maximum stormwater quality design storm water surface. Detailed information for designing Infiltration Basins is provided in Chapter 9.5 of the *New Jersey Stormwater Best Management Practices Manual*. The most critical design criteria for these systems are identical to those for dry wells described earlier. In addition to those requirements, infiltration basins classified as dams under the NJDEP Dam Safety Standards stipulated by N.J.A.C. 7:20 must also meet the overflow requirements of these standards.

Similar to the limitations of other BMPs that rely on infiltration, such as Dry wells, infiltration basins are inappropriate for use in areas where high pollutant or sediment loading is anticipated as this entails the potential for groundwater contamination. Chapter 9.5 of *the New Jersey Stormwater Best Management Practices Manual* mentions specific land uses which preclude dry wells as an alternative. These are briefly summarized below:

- Industrial and commercial areas with solvent/petroleum related activity
- Areas with a probability of presence of hazardous/toxic materials
- Areas with high risks of toxic material spills (eg. gas stations and vehicle maintenance facilities)
- Areas where stormwater runoff is exposed to industrial materials or machinery that could be a source of pollutants.

Infiltration basins must not be used where their installation would create a significant risk for basement seepage or flooding, cause surficial flooding of groundwater, or interfere with the operation of subsurface sewage disposal systems and other subsurface structures.

As stated in Section 4.3.3, stemming from the fact that this measure relies largely upon infiltration, its use is applicable only when subgrade soils conform to the required permeability rates presented Table 4.1.

If the basins are used for storms greater than the Groundwater Recharge Storm, then this management measure can only be constructed in areas with Hydrologic Soil Group A and B Soils: sands, loamy sands, sandy loams, silt loams, or loam.

The feasibility of using infiltration basins as a stormwater control measure for attenuation of water quality problems is considerably influenced by the quality of runoff entering the basin. This makes it imperative to determine the pollutants expected to be present in the runoff and their possible impacts on groundwater quality. This analysis must be complimented by ascertaining whether the existing soil column below the infiltration basin are capable of attenuating the pollutants or let them pass through to the groundwater table. It has been shown that certain soils are only partially capable of treating bacteria and soluble forms of nitrogen, phosphorous, and other pollutants such as pesticides and road salts. In general, it is observed that soils that exhibit the highest permeability, thereby making them optimal candidates for infiltration basin design, also have the least ability to treat problematic pollutants. In these cases, the developers design engineer must consider pretreatment of soluble pollutants prior to entry into the infiltration basin. These pretreatment measures could include vegetative filters, bioretention systems (in which case the standard underdrain can be replaced by the infiltration basin), and certain sand filters. If enhancement of the treatment systems is not possible on the site, the native soil below the proposed basin should be augmented or replaced by soils with greater pollutant removal rates if there is any indication that groundwater quality might be compromised.

Other constraints that may limit the applicability of infiltration basins are proximity to geologic and ecologically sensitive areas in the vicinity of the site. Infiltrations basins should be avoided in areas containing foundations (to avoid seepage problems), near drinking water supply wells, and where surrounding slopes are greater than 10 percent. Finally, infiltration basins must be avoided if a minimum distance of 100 feet from adjacent drinking water supply wells cannot be ensured.

4.3.6 Manufactured Treatment Devices

Manufactured treatment devices (MTDs) are pre-fabricated stormwater treatment structures used to remove pollutants from stormwater runoff. These devices use one or more of a variety of treatment methods, including settling, filtration, and vegetative components. Manufactured treatment devices can only be used to treat stormwater if their pollutant removal rates are certified by the NJDEP Division of Science, Research and Technology. For this reason, the City is advising the developers that they will consider such devices as a water quality control measure but the developer/owner is responsible for ensuring that this water quality goal is met. MTDs are best suited to treat runoff from small areas with a high percentage of impervious cover (such as small parking lots and gas stations) where the stormwater runoff contains a large amount of sediment and hydrocarbons.

4.3.6.1 Vortechnics

The Vortechs © system manufactured by Vortechnics is one example of a manufactured treatment device that has been used in New Jersey. Stormwater enters a grit chamber where vortex separation removes large particles. From the grit chamber, the stormwater passes under a baffle wall, behind which floatables are trapped. The water is removed from the system as it passes through an orifice or weir in a flow control wall (depending on the water level in the system), and into the outflow. Vortechs © systems have been used in Harding Township, NJ and at the Continental Airport Terminal at Newark Liberty International Airport. Information on these two projects is presented in Appendix E.

4.3.6.2 CDS

The Inline Unit manufactured by CDS Technologies is another example of a manufactured treatment system. Like the Vortechs © system, the Inline Unit relies on vortexing to remove suspended solids. Solids enter the separation chamber where vortexing causes them to settle in the sump, where they remain until the unit is cleaned. The treated stormwater flows through a separation screen (which traps floatables) and under an oil baffle before it reenters the storm drain. CDS Technologies reports that the Inline Unit removes 80% of total suspended solids and 100% of floatables.

4.3.7 Pervious Paving Systems

Pervious paving systems are utilized to reduce runoff from areas that would ordinarily be paved with conventional pavement materials. There are three types of pervious paving systems: porous paving, use of permeable pavers with a storage bed, and use of permeable pavers without a storage bed. Porous paving consists of a layer of porous asphalt over a storage bed of broken stone. The use of permeable pavers is similar to that of porous pavement, where impervious concrete blocks are laid out in a pattern that allows water to infiltrate through spaces between pavers and into the storage bed. The use of either porous paving or permeable pavers results in a reduction in the volume of stormwater runoff and up to an 80% reduction in total suspended solids (TSS) content. These two systems allow runoff to infiltrate the surface and be stored in a storage layer until the water can infiltrate the subgrade soils. The third system, use of permeable pavers without a storage bed, functions similarly to the others, but with a much shorter retention time due to lack of a storage bed. This shorter retention time does not allow for significant TSS removal.

Pervious paving systems are not appropriate for use in areas where high pollutant or sediment loading is expected, as infiltration of these waters can lead to groundwater contamination. Standards for Pervious Paving Systems (Chapter 9.7 of the *New Jersey Stormwater Best Management Practices Manual*) contains a list of example areas in which pervious paving systems are not to be used. Pervious paving systems should not be used in areas where they may increase the risk of basement seepage or flooding, cause groundwater flooding, or interfere with subsurface structures such as septic systems.

Because porous pavement and permeable pavers with storage beds require permeable soils beneath the storage bed to properly function, they can only be used in areas with Hydrologic Soil Group A and B soils. Part 618.35(b) of the National Soil Survey Handbook defines Group A soils as those with low runoff potential. Group A soils have high infiltration rates even when wet, and are generally sands and gravels. Group B soils have moderate infiltration rates and are moderately fine to moderately coarse in texture.

Porous paving should not be used in areas that are sandy in adverse weather, as the sand will clog the surface pores. Care should also be taken when using pervious pavement in areas where salt is applied, as it may infiltrate the water table. The use of pervious paving systems should be limited to areas such as parking lots, sidewalks, emergency access lanes, single family residence driveways, and other areas not subject to high traffic or heavy vehicles. Porous paving systems should be vacuum-swept and hosed down a minimum of four times a year to remove particulate materials that may have become lodged in the surface. Permeable pavers should be maintained according to manufacturer's recommendations.

4.3.8 Sand Filters

A sand filter uses the processes of sedimentation, filtration and absorption to remove hydrocarbons, metals, floatables, bacteria and sediment from stormwater. Sand filters can be surface, subsurface or perimeter sand filters. All three types of sand filters typically consist of four sections: a forebay or sedimentation basin, a filtration basin, an underdrain and an overflow. Water enters the sedimentation basin, where floatables and heavy sediments leave the water column before entering the filtration basin. In the filtration basin, the stormwater runoff travels through a sand bed. The filtered runoff leaves the filter through an underdrain system and enters either a stormwater drainage system or surface waters. The overflow allows stormwater in excess of the volume of the pore space in the sand bed to leave the system without traveling through the sand bed or underdrain and immediately be discharged.

The sedimentation basin should be sized to accommodate one-half the design storm runoff volume. The sand bed should be sized to hold one-half of the design storm runoff volume. The sand bed's volume includes the sand, pore spaces in the sand, and the water above the sand bed surface that has not yet entered the bed itself. Sample schematics and general design criteria for the three types of sand filters are available in Chapter 9.9 of the *New Jersey Stormwater Management Practices Manual*, Standards for Sand Filters. Additional design criteria are available in 'Standards for Sand Filters', Chapter 40 of *Standards for Soil Erosion and Sediment Control in New Jersey.*

Sand filters are not recommended for use in areas where stormwater runoff contains large amounts of coarse sediment or organic material such as leaves. This sediment will quickly clog the filter and lead stormwater to bypass the filter bed and pass immediately to the overflow without treatment. If a sand filter must be used to treat this type of water, it should be paired with additional stormwater treatment technology that can act as pretreatment. Filter media must be periodically replaced to avoid clogging. Use of impermeable basin or chamber bottoms can prevent contaminated runoff from coming into contact with groundwater. Sand filters should not be used in areas where high concentrations of toxic pollutants are expected in the runoff.

Sand filters are effective at removing contaminants from large amounts of water with low concentrations of coarse particulates. They are intended to be used for water quality enhancement rather than increasing groundwater recharge or decreasing stormwater runoff volume. Sand filters are best suited to treat runoff from small impervious areas with a low sediment load, such as rooftops, parking lots, and urban areas with drainage areas up to five acres[1].

4.3.9 Vegetative Filters

Vegetative filters are areas designed to remove suspended solids and pollutants from stormwater runoff as it flows through a vegetated area. The total suspended solids removal efficiency of a vegetative strip depends on its length and the type of plants used in the strip. Information on calculating TSS removal efficiency is available in Chapter 9.10 of the *New Jersey Stormwater Best Management Practices Manual*, Standards for Vegetative Filters. Vegetative strips can treat drainage from pervious surfaces less than 150 feet in length and impervious surfaces less than 100 feet in length, and must be a minimum of 20 feet in length in both cases. Plants used in vegetative strips can range from native grasses to forest floor vegetation, but it must be dense and healthy. More information on plant selection for vegetative filters can be found in Chapter 7 of the *New Jersey Stormwater Best Management Practices Manual*, Landscaping. Additional design criteria are available in 'Standards for Vegetative Filter Strips', Chapter 41 of *Standards for Soil Erosion and Sediment Control in New Jersey.*

Vegetative filters are only effective where runoff can enter and leave the strip as a sheet of flow. To achieve this goal, vegetative filters must be mildly sloped with a uniform grade. Slopes of less than five percent are the most efficient, as steeper slopes require a longer treatment strip. The drainage area must also be uniformly graded to allow the flow to enter the strip as a sheet. Soil type plays a role in determining the slope of a vegetative strip. This information can be found in County Soil Surveys or through soil investigations.

The use of a vegetative strip as a stormwater treatment method works best in areas such as parking and residential lots. Vegetation must be trimmed regularly and inspected for density and diversity at least twice annually.

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[1] *Standards for Sediment Control in New Jersey*, July 1999.

4.3.10 Wet Ponds

Wet ponds, also known as retention basins, are intended to provide both permanent and temporary stormwater runoff storage. A wet pond treats stormwater through the processes of sedimentation and bacterial pollutant removal that occur during long-term storage of stormwater runoff. They are designed to hold a predetermined volume of stormwater for enough time to allow sufficient sedimentation and bacterial pollutant removal to occur to meet the 80 percent TSS removal goal. Techniques for calculating runoff volume are described in Chapter 5 of the *New Jersey Stormwater Best Management Practices Manual*: Computing Stormwater Runoff Rates and Volumes.

Wet ponds require sufficient dry weather or base flow to maintain a water depth of three to six feet in the permanent pool. Deeper pools allow thermal stratification and shallower pools allow algal blooms (much like those in swamps) and resuspension of sediment. The base or dry weather flow not only maintains the water level in the wet pond, but controls mosquito breeding and prevents stagnation. The incorporation of a fountain can also help control these problems. The use of aquatic vegetation in the pond's landscaping not only enhances the aesthetic value of the pond, but can limit algae growth and aid in regulation of the pond's water temperature.

Ponds must be designed with a length to width ratio of at least 1.5 to 1 to allow stormwater sufficient time for sedimentation and bacterial pollutant removal to occur. Soils in the site must be sufficiently impermeable to prevent seepage. If the soils are too permeable, an impermeable liner may be used. Wet ponds need a minimum drainage area of 20 acres and a permanent pool surface area of at least 0.25 acres. The drainage area should have a slope of less than 15 percent. Additional design criteria are available in 'Standards for Wet Ponds', Chapter 42 of *Standards for Soil Erosion and Sediment Control in New Jersey*.

Due to space requirements, wet ponds are not a good choice in urban areas. Wet Ponds should not be sited in natural ponds or wetlands. They are a good option for residential and commercial areas where the nutrient load in the stormwater runoff is expected to be high.

4.4 COMPARISON BMPS FOR VARIOUS LAND USES AND GOALS

Table 4-2 presents information concerning the structural and nonstructural BMPs discussed earlier in this chapter. The purpose of this table is to aid future developers in the process of selecting a BMP appropriate for use at their particular site. In the table, the HUC14s present in the City of Hackensack are divided into two groups: HUC14s regulated by the nickel TMDL and HUC14s unaffected by the nickel TMDL. The applicability of each BMP was determined based on its Section 4.2 or Section 4.4 description, and these results are presented in the first two sets of columns in the table.

In addition to presenting BMP applicability, Table 4-2 also rates the ability of each BMP to meet the stormwater management goals presented in N.J.A.C. 7.8-5.4 and 5.5, which are discussed in Section 3.2 of this report. The table also ranks BMPs by cost, design complexity and construction complexity relative to the other BMPs. This table does not take all possible BMPs into account, rather those discussed in this chapter. There are many types of BMPS which have not been discussed, as this municipal stormwater management plan is intended to act as a starting point rather than an absolute guide. Information regarding additional structural and low-impact BMPs is available from the EPA's website at http://www.epa.gov/owm/mtb/mtbfact.htm under the 'Storm Water' subheading.

4.5 BMPS IN SERIES

The total suspended solids (TSS) removal rates for individual BMPs and these rates are presented in Table 4-2. These are the official NJDEP-adopted removal rates stated in Table 4-1 of the *New Jersey Stormwater Best Management Practices Manual.* The Stormwater Management Rule requirement of 80 percent TSS reduction in the post construction runoff from a land development site that increases impervious surface by 0.25 acres or more can, however, also be met by arranging multiple BMPs in series if it is deemed that a single BMP by itself would be inadequate. The total removal rate of such a BMP treatment train is computed by applying the removal rate of the second BMP applied to the fraction of the TSS loading remaining after the runoff has been processed

Table 4-2

BMPs Applicable to the Various Land Uses, Stormwater Management Goals

Area (HUC-14 Numbers)	Upper and Lower Hackensack River and Coles Brook/Van Saun Mills Brook (HUC 02030103180010, 02030103180030, 02030103180050) -Nickel TMDL Regulated Waters					Saddle River and Berry's Creek (HUC 02030103180060 and 02030103140070)					A Rating of the BMPs Ability of Meeting the Five Stormwater Management Goals					Other Restriction and Factors				
Applicable Non-Structural Category BMPs (in Column) for the Landuses and other BMP factors (in Row to Left)	High/Medium Residential	Low/Rural Residential	Commercial	Industrial	Mixed Urban	High/Medium Residential	Low/Rural Residential	Commercial	Industrial	Mixed Urban	Effective BMP for Erosion and Sedimentation Control	Groundwater Recharge Enhancement	Runoff Quantity Reduction	Runoff Flow Peak Reduction	Runoff Water Quality Improvement	Cost Relative to other BMP in its Category	Minimum Drainage Area Requirements	Design Complexity	Construction Complexity	Structural BMP TSS Removal Rate
Buffers	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Medium	Medium	High	Medium	Medium	Low	NA	Low	Low	NA
Cluster Development	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Medium	High	High	Medium	Medium	Low	25% OF AREA	Medium	Medium	NA
Vegetated Swale Curbs and Gutters	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low	Medium	Medium	Low	Low	Low	NA	Low	Low	NA
Use of Natural Swales for Drainage	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Medium	Medium	Medium		Low	Low	NA	Medium	Medium	NA
Permeable Pavement Driveways and Accessways	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low	Medium	Medium	Medium	Low	Low	NA	Medium	Medium	NA
Preservation of Natural Features	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High	High	High	High	High	Low	NA	Low	Low	NA
Vegetation on Roofs	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes		Medium	Medium	Medium	Medium	Low	NA	Low	Low	NA
Restrictions on Nonconforming Uses, Structures or Lots	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Low				Low	NA	Medium	Medium	NA
Off-site and Off-tract Improvements	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Low				Low	NA	Medium	Medium	NA
Off-street Parking and Loading	No	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes		Low				Low	NA	Medium	Medium	NA
Shade Trees	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High	Medium	High	Medium	Medium	Low	NA	Low	Low	NA
Use of Narrow Streets	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low	Medium	Medium	Medium	Low	Low	NA	Medium	Medium	NA
Applicable Structural Category BMPs (in Column) for the Landuses and other BMP factors (in Row to Left)	High/Medium Residential	Low/Rural Residential	Commercial	Industrial	Mixed Urban	High/Medium Residential	Low/Rural Residential	Commercial	Industrial	Mixed Urban	Effective BMP for Erosion and Sedimentation Control	Groundwater Recharge Enhancement	Runoff Quantity Reduction	Runoff Flow Peak Reduction	Runoff Water Quality Improvement	Cost Relative to other BMP in its Category	Minimum Drainage Area Requirements	Design Complexity	Construction Complexity	Structural BMP TSS Removal Rate
Bioretention System	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Medium	Medium	Medium	Medium	Medium	Medium	NA	High	Medium	90%
Constructed Wetlands	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	High	High	High	High	High	High	10 TO 25 ACRES	High	High	90%
Dry Wells	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low	Medium	Low	Low	Low	Medium	NA	High	Medium	N/A
Extended Detention Basins	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	High	Medium	Low	High	Medium	Medium	10 TO 25 ACRES	High	High	40-60%
Infiltration Basins	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low	Medium	Low	Medium	Low	Low	NA	High	Medium	80%
Manufactured Treatment Devices	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	High	Low	Low	Low	High	Medium	NA	High	Medium	Device specific
Pervious Paving Systems	Yes	Yes	No	No	No	Yes	Yes	No	No	No	Low	Medium	Medium	Medium	Low	Medium	NA	High	Medium	0 without storage bed, 80% with storage bed
Sand Filters	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Low	Low	Low	Low	High	High	NA	High	High	80%
Vegetative Filters	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Medium	Medium	Medium	Low	Medium	Low	NA	High	Medium	60-80%, depending on plant type
Wet Ponds	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High	High	High	High	High	High	10 TO 25 ACRES	High	High	50-90%

by the first BMP. The equation to be used for calculating the total TSS removal rate for two BMPs in series is as follows:

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

where:

R = Total TSS Removal Rate

A = TSS removal rate of Upstream BMP

B = TSS removal rate of Downstream BMP

General guidelines for selecting the order of the individual BMPs in a series are presented in Chapter 4 of the New Jersey Stormwater Best Management Practices Manual. These are summarized below:

- BMPs should ideally be arranged upstream to downstream in ascending order of TSS and Nutrient removal rate.
- BMPs should be arranged from upstream to downstream so that the BMP with the greater ease of sediment removal is placed upstream.
- BMPs should be preliminarily arranged in accordance with their relative TSS removal rates. The arrangement should be subsequently refined by considering relative nutrient removal rates followed by considerations of ease of sediment removal.

5.0 PLAN CONSISTENCY

5.1 REGIONAL COMPLIANCE

As of the date on which this plan was submitted, The City of Hackensack is not within a Regional Stormwater Management Planning Area. This plan, therefore, does not need to be consistent with any regional stormwater management plans (RSWMPs). If any RSWMPs are developed in the future, this Municipal Stormwater Management Plan (MSWMP) will be updated in order to remain consistent. Bergen County is in the process of creating a new master plan that will include stormwater management planning information. This Municipal Stormwater Management Plan will be updated to be consistent with the master plan. Bergen County is also currently creating a County Stormwater Management Plan that should be complete in 2005. This MSWMP will be updated as necessary to be consistent with the County Stormwater Management Plan.

This plan is consistent with the Residential Site Improvement Standards (RSIS) outlined in N.J.A.C. 5.21. The City will use the most current RSIS in the stormwater management review process for future residential developments. This municipal storm water management plan will be updated in order to remain consistent with the RSIS.

5.2 TOTAL MAXIMUM DAILY LOAD: NICKEL AND FECAL COLIFORM

A total maximum daily load (TMDL) requirement for nickel was adopted in December 1999. This TMDL set the load allocation of nickel that can be discharged into the Hackensack River at 4.98 lbs/day. The stormwater waste load allocation (WLA) is 0.81 lbs/day. It should also be noted that a fecal coliform TMDL was established in March 2003 for Coles Brook. This plan is in compliance with these TMDLs and will be updated should the City of Hackensack institute additional ordinances or measures to comply with the TMDLs. Please refer to Appendix E for more information on the nickel and fecal coliform TMDLs.

A simple mathematical analysis supports the idea that new developments should not be permitted to discharge stormwater runoff containing nickel. As previously stated, the current stormwater waste load allocation (WLA) for nickel is 0.81 lbs Ni/day, or 295.85 lbs Ni/year. If this WLA is applied uniformly over the New Jersey portion of the Hackensack River Watershed, a fraction of the 295.85 lbs Ni/year should be allocated to the City of Hackensack. The City of Hackensack contains 2,733 acres of the 87,033-acre Hackensack River Watershed. Of these 2,733 acres, 883 acres (32%) are served by a CSO system and the remaining 1,850 acres are served by stormwater sewer systems. These 1,850 acres (68%) compose 2.1% of the total area of the New Jersey portion of the Hackensack River Watershed. Hackensack should be allocated 2.1%, or 6.2 lbs Ni/year, of the total 295.85 lbs Ni/year entering the Hackensack River. It should be noted that Watershed Management Area 5 is composed of the Hackensack River Watershed, the Hudson River Watershed, and the Pascack River Watershed (which is a tributary of the Hackensack River, and thus included in the Hackensack River Watershed for the purposes of this report).

The nickel concentrations calculated in the buildout analysis portion of this report are adjusted to account for fraction of the City's area served by CSOs. It can be estimated that Hackensack currently contributes 54.2 lbs Ni/year to the Hackensack River. Using this figure and the allocated 6.2 lbs Ni/year, developers will be required to reduce the nickel present in stormwater runoff by 88.5%, leaving virtually only a small amount of nickel in runoff treated using a best management practice. It should be noted that for the purposes of both the buildout and this analysis all types of land cover were assumed to contribute equally to the nickel content of stormwater runoff.

6.0 STORMWATER CONTROL AND MITIGATION PLANS FOR PROPOSED LAND DEVELOPMENT IN THE CITY

Each new development that occurs after April 1, 2006 will require the completion of an approved Stormwater Control Plan or a Stormwater Mitigation plan for the site that is being developed. Stormwater Control Plans are the normal method that will be used to implement stormwater controls that are consistent with the requirements stated in this Municipal Stormwater Management Plan at the site being proposed for development. Stormwater Mitigation Plans are an alternative to the Stormwater Control Plan that is offered by the City when constrained, restricted, or other unusual circumstances prevent the developer/owner from implementing stormwater controls at the actual site development location. Mitigation will only be acceptable to the City if unusual circumstances prevent the developer from meeting the requirements of this Municipal Stormwater Management Plan at the site development, or if it can be demonstrated that implementing a stormwater mitigation will result in a greater environmental benefit to the waterbody.

6.1 STORMWATER CONTROL PLAN REQUIREMENTS

Under normal circumstances when stormwater controls can be provided at the site, the site developer will be required to obtain an approved Stormwater Control Plan (SCP) for any site development planned after April 1, 2006. The SCP is required to provide stormwater BMPs that meet the requirements in Chapter 3.0 and/or 4.0 of this Municipal Stormwater Management Plan at the site that is being developed unless unusual circumstances prohibit application of any of these BMPs at the site. In this case, the developer will be required to mitigate in accordance with Section 6.2.

The contents of a Stormwater Control Plan that can be approved by the City must contain the following:

- A written letter of request describing the proposed development from the land owner or developer to the City Planning Department including the Site Address with corresponding Lot and Block number.

- An existing site plan at scale 1 inch = 50 feet shall be completed indicating all features, superstructures, substructures, utilities, waterbody boundaries, topography, and separate location map.

- A proposed development site plan shall be completed using the existing site plan as a base map and indicate all proposed contours and BMPs identifying how this site will be modified to meet the stormwater control requirements in this Municipal Stormwater Management Plan.

- An explanation of the type and number of stormwater BMPs and goals that will be implemented on the development site plan to comply the confirmed stormwater management goals must be furnished. The explanation must describe the size, design criteria, details, estimated pollutant removal rates, materials, and other characteristics of each BMP and how they will meet the goals and other requirements of this Municipal Stormwater Management Plan.

- Calculations and/or hydrologic model simulations that demonstrate that all of the hydrologic, groundwater recharge (if applicable), and treatment goals of this Municipal Stormwater Management Plan are met.

- A schedule for completion of a Stormwater Mitigation Plan for Site Address with Lot and Block number along with the proposed time period for design and construction.

Upon submittal of the Stormwater Control Plan, the City will review the SCP and issue a notice within 3 weeks stating that the Plan is "Approved", "Approved-as-Corrected", needs revisions by noting "Revise and Resubmit" or "Unacceptable". If the Plan is "Approved" or "Approved-as-Corrected" the developer may proceed with the development provided that all other City and State permits have been acquired as required by NJAC and that all of the minor corrections shown in the "Approved-as-Corrected" Plan are made. If the Plan is marked "Revise and Resubmit" then it has the potential to be approved or it is not completely unacceptable and may be resubmitted once the revisions and modifications are made but the developer is not permitted to proceed with the development until it is "Approved" or "Approved-as-Corrected". "Disapproved" Stormwater Control Plans will not be reviewed if resubmitted since they do not appear to present an acceptable plan to the City that will meet the Municipal Stormwater Control Plan.

6.2 STORMWATER MITIGATION PLAN REQUIREMENTS

In the event that the site developer cannot meet the requirements in Chapter 3.0 and/or 4.0 of the Stormwater Management Plan due to site constraints, insufficient area, or other justifiable reasons, the City will consider granting a variance on a case by case basis upon request for one of the following three forms of mitigation:

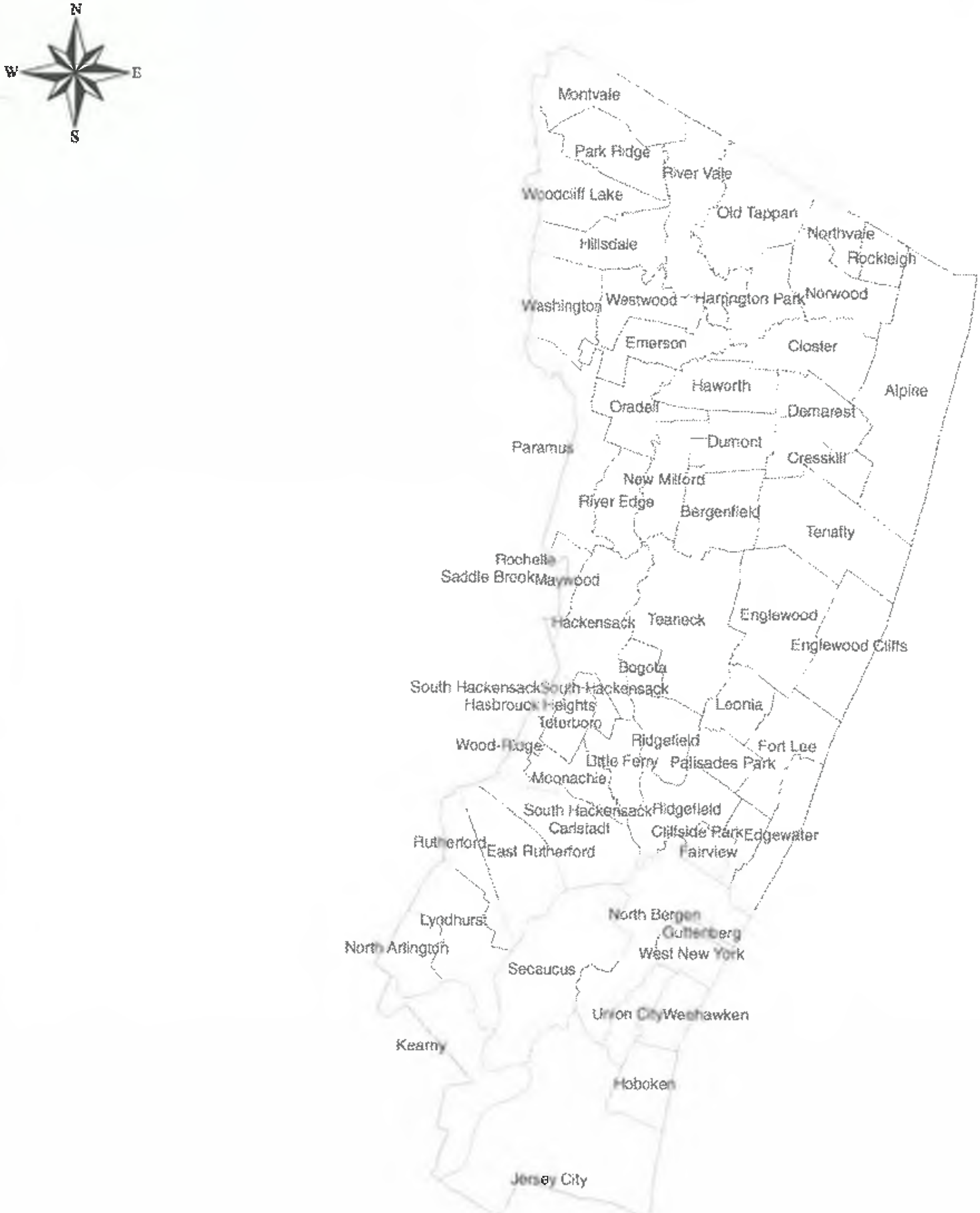
- Alternate Area Mitigation
- Pollutant Trading in WMA 5
- Mitigation Bank Contributions

Although the City is not currently engaged in any mitigation project, they are open to the concept when it is proven that few options for stormwater controls remain.

Mitigation will only be considered for approval by the City if the following requirements are met:

- A written letter of request for mitigation is formally submitted by the land owner or developer to the City Planning Department indicating Site Address with corresponding Lot and Block number.
- This request must state which of the three forms of mitigation is being proposed along with the reason(s) that justify why they cannot meet the storm water planning criteria on their specific site or why the proposed the proposed mitigation will be better for the environment.
- The request must clearly identify who the land owner and developer is that is requesting the mitigation and the request must be signed by both entities.
- The request must include a schedule for completion of a Stormwater Mitigation Plan along with Site Address with Lot and Block number and proposed time period for design and construction.
- The proposed method of mitigation must be within the boundaries of Watershed Management Area 5 where the boundaries and municipalities are identified in Figure 6-1.

Upon submittal of the request for mitigation, the City will review the request and issue a notice stating that the request to submit a mitigation plan is "Approved" or "Disapproved". If approved, the developer has approval to submit to the City a full



DATA SOURCE: NJDEP BUREAU OF GEOGRAPHIC INFORMATION SYSTEMS

MALCOLM PIRNIE	**STORMWATER MANAGEMENT PLAN** **CITY OF HACKENSACK** **HACKENSACK, NEW JERSEY** **WATERSHED MANAGEMENT AREA 5 MUNICIPALITIES**	MALCOLM PIRNIE, INC. FIGURE 6-1 MAY 1, 2005

Stormwater Mitigation Plan as described in their request. The City approval process will use the same submittal review method as required for a Stormwater Control Plan submittal. All Mitigation Plans are still required to demonstrate compliance with the MSWMP by implementation of one or more of the stormwater controls described in Chapters 3.0 and, if needed, Chapter 4.0. The specific mitigation conditions are described in more detail in the following sections.

6.2.1 Alternate Area Mitigation

This mitigation alternative is application of a Stormwater Control Plan at an alternate City and County location other than the developed site. For example, certain City owned sections of the river walk location approximately 30 feet in land of the river mean High Water Line along the Hackensack River may be available for implementing stormwater BMPs, such as filter strip or constructed strip wetlands, which may be able to act as a substitute equivalent to counter the stormwater impacts from the site being developed where stormwater BMPs cannot be implemented.

If a request for this form of mitigation is approved by the City, the developer would be required to complete a Stormwater Mitigation Plan which would include the similar submittal items as described in the Stormwater Control Plan above, including the following modifications and additional requirements:

- Calculations to quantify the difference in the stormwater impacts between the pre-existing site conditions and the developed site conditions of the proposed development.

- A site plan of the existing conditions at the proposed mitigation site and with the proposed stormwater BMPs.

- Calculations that show that the goals of the MSWMP can be met at the mitigation site that will offset the impacts at the developed site.

If the selected BMP is a Constructed Wetland for this mitigation plan, the area determined necessary to mitigate the stormwater impacts from the developed site must be 2 to 1 or double due to the risk of low survival associated with Constructed Wetlands. Mitigation of any kind cannot be allowed to encroach or impose other adverse impacts or threats on existing State or Federal Wetlands, Waters, Inter-tidal areas, or other sensitive environmental areas. The development or construction of Buffer Strips and/or Restored Wetlands within WMA 5 are recommended along the Hackensack River. Along the Hackensack River banks up to 30 feet inland of the Mean High Water Line are feasible zones for this type of stormwater control mitigation. Certain areas bordering the the Hackensack River below the Oradell Dam to the Meadowlands have also been identified by the Hackensack Riverkeeper as being a primary target area for this type of mitigation. Some more specific areas that have been identified by the Hackensack River Keeper which developers might consider for restoration of "Fringe Wetlands or Buffer Strips" include the following:

Hackensack County River Park
Foschini
Johnson
Bogota
Terhune
Andreas
Brett
The New Milford Woods
The Kenneth B. George
The county riparian corridor above Main Street

The developer shall be responsible for maintenance of the proposed "Strip Wetlands or Buffer Strips" for a period of five years in order to give the vegitation a chance to take hold and proliforate or he shall provide proof of a maintenance contract with a well known wetlands construction/maintenace contractor such as Marsh Resources or its equivalent." The developer would be required to post an account to ensure the completion of the restoration maintenance efforts.

6.2.2 Effluent Pollutant Trading in Watershed Management Area 5

This method of mitigation may only be applied where approved TMDLs have been established in Watershed Management Area 5 (WMA5) such as Nickel, Fecal Coliforms, etc. It is more likely to be feasible for large commercial developments or industries with multiple production facilities within WMA 5 where the pollutant trading can be offered between facilities. The developer is cautioned that this concept is a relatively new and developing area within EPA regulations and while the City will consider it as a possible option, the developer accepts that they will be responsible for obtaining all EPA and NJDEP approvals associated with it including all costs. Another possible trading option might be to install stormwater control BMPs in acceptable, existing, privately owned, large impervious areas. For example, if the developer is falling short of the runoff volume and peak abatement goals and needs a reduction in the amount of flow but there is not enough area to install pervious pavement or an infiltration well which could meet that requirement, they could be allowed to make a trade of an existing impervious surface elsewhere. The City will accept this option if the developer obtains approval letters from the land owner and regulatory agency that has jurisdiction whether that be the County, USEPA, Corps of Engineers, or NJDEP.

6.2.3 Mitigation Bank Contributions

This method of mitigation requires the purchase of buffer strips, wetlands or intertidal mitigation credits from known mitigation banks that have been accepted in the past for this purpose by the U.S. Army Corps of Engineers or the NJDEP Land Use Regulation Program (LURP). Again, the stormwater mitigation area required would have to be determined in a manner similar to the alternate area mitigation—through hydrologic calculations. The mitigation area offered must be twice the area required in order to account for vegetation that fails to survive within the mitigation area and must be within WMA-5.

The usual procedure is to enter into a contract with the entity who is the mitigation bank for the purchase of a specified acreage of wetlands, buffer strips, or inter-tidal areas for a set unit price determined by the mitigation banking entity. One such mitigation bank that has been used in the past for this purchase is Marsh Resource, Inc. Appendix E contains additional information which has been obtained from their web site at http://marshresources.twc.com/. The contract generally states that upon purchase, the mitigation bank will mobilize, construct, plant, maintain, and monitor the constructed wetlands, bufferstrip, or intertidal waterway in accordance with the requirements specified by the NJDEP and Corps of Engineers. The developer only needs to abide by the contract, pay the fee, and submit the required documentation to the appropriate regulatory agencies.

Upon submittal of the Stormwater Control Plan, the City will review the request and issue a notice stating that the mitigation plan is "Approved", "Approved-as-Corrected" (this means the city will not stop project, it is a conditional approval, however the developer must address City Engineer's comments by date certain), "Revise and Resubmit" or "Disapproved".

7.0 SCHEDULED MUNICIPAL STORMWATER MANAGEMENT PLAN UPDATES

The City's Municipal Stormwater Management Plan will be updated as required but at least every 5 years. During the initial stages of the MSWMP development the review, modification, and revision process is scheduled as follows:

- The first submittal of the Municipal Storm Water Management Plan and SPPP Forms to Bergen County and the NJDEP will be on April 1, 2005.
- By November 1, 2005, a draft of the proposed City Stormwater Management Ordinance will be submitted to the City for their review and comments.
- In eleven months, on March 1, 2006, a second update of the Municipal Stormwater Management Plan will be submitted to the City, County, and NJDEP and this will also be the last day for submittal of comments on the City's draft Stormwater Management Ordinance.
- Final revisions to the Stormwater Management Ordinance must be complete by March 15, 2006 in order to develop a resolution for the Council to adopt the Ordinance as final.
- The City's Final Stormwater Management Ordinance will be adopted by the City on April 1, 2006.

APPENDIX A

MODEL STORMWATER ORDINANCES

Section 1: Scope and Purpose

A. Policy Statement

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

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

B. Purpose

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

C. Applicability

1. This ordinance shall be applicable to all site plans and subdivisions for the following major developments that require preliminary or final site plan or subdivision review:

   a. Non-residential major developments; and

   b. Aspects of residential major developments that are not pre-empted by the Residential Site Improvement Standards at N.J.A.C. 5:21.

2. This ordinance shall also be applicable to all major developments undertaken by [*insert name of municipality*].

D. Compatibility with Other Permit and Ordinance Requirements

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

Section 2: Definitions

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

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

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

"Compaction" means the increase in soil bulk density.

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

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

A county planning agency; or

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

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

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

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

"Development" means the division of a parcel of land into two or more parcels, the construction, reconstruction, conversion, structural alteration, relocation or enlargement of any building or structure, any mining excavation or landfill, and any use or change in the use of any building or other structure, or land or extension of use of land, by any person, for which permission is required under the Municipal Land Use Law , N.J.S.A. 40:55D-1 et seq. In the case of development of agricultural lands, development means: any activity that requires a State permit; any activity reviewed by the County Agricultural Board (CAB) and the State Agricultural Development Committee (SADC), and municipal review of any activity not exempted by the Right to Farm Act , N.J.S.A 4:1C-1 et seq.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(1) Delineated on the State Plan Policy Map (SPPM) as the Metropolitan Planning Area (PA1), Designated Centers, Cores or Nodes;

(2) Designated as CAFRA Centers, Cores or Nodes;

(3) Designated as Urban Enterprise Zones; and

(4) Designated as Urban Coordinating Council Empowerment Neighborhoods.

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

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

Section 3: General Standards

A. Design and Performance Standards for Stormwater Management Measures

1. Stormwater management measures for major development shall be developed to meet the erosion control, groundwater recharge, stormwater runoff quantity, and stormwater runoff quality standards in Section 4. To the maximum extent practicable, these standards shall be met by incorporating nonstructural stormwater management strategies into the design. If these strategies alone are not sufficient to meet these standards, structural stormwater management measures necessary to meet these standards shall be incorporated into the design.

2. The standards in this ordinance apply only to new major development and are intended to minimize the impact of stormwater runoff on water quality and water quantity in receiving water bodies and maintain groundwater recharge. The standards do not apply to new major development to the extent that alternative design and performance standards are applicable under a regional stormwater management plan or Water Quality Management Plan adopted in accordance with Department rules.

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

Section 4: Stormwater Management Requirements for Major Development

A. The development shall incorporate a maintenance plan for the stormwater management measures incorporated into the design of a major development in accordance with Section 10.

B. Stormwater management measures shall avoid adverse impacts of concentrated flow on habitat for threatened and endangered species as documented in the Department' Landscape Project or Natural Heritage Database established under N.J.S.A. 13:1B-15.147 through 15.150, particularly *Helonias bullata* (swamp pink) and/or *Clemmys muhlnebergi* (bog turtle).

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

1. The construction of an underground utility line provided that the disturbed areas are revegetated upon completion;

2. The construction of an aboveground utility line provided that the existing conditions are maintained to the maximum extent practicable; and

3. The construction of a public pedestrian access, such as a sidewalk or trail with a maximum width of 14 feet, provided that the access is made of permeable material.

D. A waiver from strict compliance from the groundwater recharge, stormwater runoff quantity, and stormwater runoff quality requirements of Sections 4.F and 4.G may be obtained for the enlargement of an existing public roadway or railroad; or the construction or enlargement of a public pedestrian access, provided that the following conditions are met:

1. The applicant demonstrates that there is a public need for the project that cannot be accomplished by any other means;

2. The applicant demonstrates through an alternatives analysis, that through the use of nonstructural and structural stormwater management strategies and measures, the option selected complies with the requirements of Sections 4.F and 4.G to the maximum extent practicable;

3. The applicant demonstrates that, in order to meet the requirements of Sections 4.F and 4.G, existing structures currently in use, such as homes and buildings, would need to be condemned; and

4. The applicant demonstrates that it does not own or have other rights to areas, including the potential to obtain through condemnation lands not falling under D.3 above within the upstream drainage area of the receiving stream, that would provide additional opportunities to mitigate the requirements of Sections 4.F and 4.G that were not achievable on-site.

E. Nonstructural Stormwater Management Strategies

1. To the maximum extent practicable, the standards in Sections 4.F and 4.G shall be met by incorporating nonstructural stormwater management strategies set forth at Section 4.E into the design. The applicant shall identify the nonstructural measures incorporated into the design of the project. If the applicant contends that it is not feasible for engineering, environmental, or safety reasons to incorporate any nonstructural stormwater management measures identified in Paragraph 2 below into the design of a particular project, the applicant shall identify the strategy considered and provide a basis for the contention.

2. Nonstructural stormwater management strategies incorporated into site design shall:

   a. Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;

   b. Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces;

   c. Maximize the protection of natural drainage features and vegetation;

   d. Minimize the decrease in the "time of concentration" from pre-construction to post construction. "Time of concentration" is defined as the time it takes for runoff to travel from the hydraulically most distant point of the watershed to the point of interest within a watershed;

   e. Minimize land disturbance including clearing and grading;

   f. Minimize soil compaction;

   g. Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides;

   h. Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas;

   i. Provide other source controls to prevent or minimize the use or exposure of pollutants at the site, in order to prevent or minimize the release of those pollutants into stormwater runoff. Such source controls include, but are not limited to:

(1) Site design features that help to prevent accumulation of trash and debris in drainage systems, including features that satisfy Section 4.E.3. below;

(2) Site design features that help to prevent discharge of trash and debris from drainage systems;

(3) Site design features that help to prevent and/or contain spills or other harmful accumulations of pollutants at industrial or commercial developments; and

(4) When establishing vegetation after land disturbance, applying fertilizer in accordance with the requirements established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq., and implementing rules.

3. Site design features identified under Section 4.E.2.i.(2) above shall comply with the following standard to control passage of solid and floatable materials through storm drain inlets. For purposes of this paragraph, "solid and floatable materials" means sediment, debris, trash, and other floating, suspended, or settleable solids. For exemptions to this standard see Section 4.E.3.c below.

a. Design engineers shall use either of the following grates whenever they use a grate in pavement or another ground surface to collect stormwater from that surface into a storm drain or surface water body under that grate:

(1) The New Jersey Department of Transportation (NJDOT) bicycle safe grate, which is described in Chapter 2.4 of the NJDOT Bicycle Compatible Roadways and Bikeways Planning and Design Guidelines (April 1996); or

(2) A different grate, if each individual clear space in that grate has an area of no more than seven (7.0) square inches, or is no greater than 0.5 inches across the smallest dimension.

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

b. Whenever design engineers use a curb-opening inlet, the clear space in that curb opening (or each individual clear space, if the curb opening has two or more clear spaces) shall have an area of no more than seven (7.0) square inches, or be no greater than two (2.0) inches across the smallest dimension.

c. This standard does not apply:

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

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

(a) A rectangular space four and five-eighths inches long and one and one-half inches wide (this option does not apply for outfall netting facilities); or

(b) A bar screen having a bar spacing of 0.5 inches.

(3) Where flows are conveyed through a trash rack that has parallel bars with one-inch (1") spacing between the bars, to the elevation of the water quality design storm as specified in Section 4.G.1; or

(4) Where the New Jersey Department of Environmental Protection determines, pursuant to the New Jersey Register of Historic Places Rules at N.J.A.C. 7:4-7.2(c), that action to meet this standard is an undertaking that constitutes an encroachment or will damage or destroy the New Jersey Register listed historic property.

4. Any land area used as a nonstructural stormwater management measure to meet the performance standards in Sections 4.F and 4.G shall be dedicated to a government agency, subjected to a conservation restriction filed with the appropriate County Clerk's office, or subject to an approved equivalent restriction that ensures that measure or an equivalent stormwater management measure approved by the reviewing agency is maintained in perpetuity.

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

F. Erosion Control, Groundwater Recharge and Runoff Quantity Standards

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

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

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

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

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

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

(2) This groundwater recharge requirement does not apply to projects within the "urban redevelopment area," or to projects subject to (3) below.

(3) The following types of stormwater shall not be recharged:

(a) Stormwater from areas of high pollutant loading. High pollutant loading areas are areas in industrial and commercial developments where solvents and/or petroleum products are loaded/unloaded, stored, or applied, areas where pesticides are loaded/unloaded or stored; areas where hazardous materials are expected to be present in greater than "reportable quantities" as defined by the United States Environmental Protection Agency (EPA) at 40

CFR 302.4; areas where recharge would be inconsistent with Department approved remedial action work plan or landfill closure plan and areas with high risks for spills of toxic materials, such as gas stations and vehicle maintenance facilities; and

(b) Industrial stormwater exposed to "source material." "Source material" means any material(s) or machinery, located at an industrial facility, that is directly or indirectly related to process, manufacturing or other industrial activities, which could be a source of pollutants in any industrial stormwater discharge to groundwater. Source materials include, but are not limited to, raw materials; intermediate products; final products; waste materials; by-products; industrial machinery and fuels, and lubricants, solvents, and detergents that are related to process, manufacturing, or other industrial activities that are exposed to stormwater.

(4) The design engineer shall assess the hydraulic impact on the groundwater table and design the site so as to avoid adverse hydraulic impacts. Potential adverse hydraulic impacts include, but are not limited to, exacerbating a naturally or seasonally high water table so as to cause surficial ponding, flooding of basements, or interference with the proper operation of subsurface sewage disposal systems and other subsurface structures in the vicinity or downgradient of the groundwater recharge area.

c. In order to control stormwater runoff quantity impacts, the design engineer shall, using the assumptions and factors for stormwater runoff calculations at Section 5, complete one of the following:

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

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

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

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

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

G. Stormwater Runoff Quality Standards

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

Table 1: Water Quality Design Storm Distribution

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

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

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

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

   Where

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

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

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

Table 2: TSS Removal Rates for BMPs

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

4. If there is more than one onsite drainage area, the 80 percent TSS removal rate shall apply to each drainage area, unless the runoff from the subareas converge on site in which case the removal rate can be demonstrated through a calculation using a weighted average.

5. Stormwater management measures shall also be designed to reduce, to the maximum extent feasible, the post-construction nutrient load of the anticipated load from the developed site in stormwater runoff generated from the water quality design storm. In achieving reduction of nutrients to the maximum extent feasible, the design of the site shall include nonstructural strategies and structural

measures that optimize nutrient removal while still achieving the performance standards in Sections 4.F and 4.G.

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

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

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

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

      (1) A 300-foot special water resource protection area shall be provided on each side of the waterway, measured perpendicular to the waterway from the top of the bank outwards or from the centerline of the waterway where the bank is not defined, consisting of existing vegetation or vegetatioallowedto follownaturalsuccessionis provided.(2) Encroachment within the designated special water resource protection area under Subsection (1) above shall only be allowed where previous development or disturbance has occurred (for example, active agricultural use, parking area or maintained lawn area). The encroachment shall only be allowed where applicant demonstrates that the functional value and overall condition of the special water resource protection area will be maintained to the maximum extent practicable. In no case shall the remaining special water resource protection area be reduced to less than 150 feet as measured perpendicular to the top of bank of the waterway or centerline of the waterway where the bank is undefined. All encroachments proposed under this subparagraph shall be subject to review and approval by the Department.

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

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

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

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

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

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

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

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

d. A stream corridor protection plan may be developed by a regional stormwater management planning committee as an element of a regional stormwater management plan, or by a municipality through an adopted municipal stormwater management plan. If a stream corridor protection plan for a waterway subject to Section 4.G(8) has been approved by the Department of Environmental Protection, then the provisions of the plan shall be the applicable special water resource protection area requirements for that waterway. A stream corridor protection plan for a waterway subject to G.8 shall maintain or enhance the current functional value and overall condition of the special water resource protection area as defined in G.8.a.(1) above. In no case shall a stream corridor protection plan allow the reduction of the Special Water Resource Protection Area to less than 150 feet as measured perpendicular to the waterway subject to this subsection.

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

Section 5: Calculation of Stormwater Runoff and Groundwater Recharge

A. Stormwater runoff shall be calculated in accordance with the following:

1. The design engineer shall calculate runoff using one of the following methods:

a. The USDA Natural Resources Conservation Service (NRCS) methodology, including the NRCS Runoff Equation and Dimensionless Unit Hydrograph, as described in the NRCS National Engineering Handbook Section 4 – Hydrology and Technical Release 55 – Urban Hydrology for Small Watersheds; or

b. The Rational Method for peak flow and the Modified Rational Method for hydrograph computations.

2. For the purpose of calculating runoff coefficients and groundwater recharge, there is a presumption that the pre-construction condition of a site or portion thereof is a wooded land use with good hydrologic condition. The term "runoff coefficient" applies to both the NRCS methodology at Section 5.A.1.a and the Rational and Modified Rational Methods at Section 5.A.1.b. A runoff coefficient or a groundwater recharge land cover for an existing condition may be used on all or a portion of the site if the design engineer verifies that the hydrologic condition has existed on the site or portion of the site for at least five years without interruption prior to the time of application. If more than one land cover have existed on the site during the five years immediately prior to the time of application, the land cover with the lowest runoff potential shall be used for the computations. In addition, there is the presumption that the site is in good hydrologic condition (if the land use type is pasture, lawn, or park), with good cover (if the land use type is woods), or with good hydrologic condition and conservation treatment (if the land use type is cultivation).

3. In computing pre-construction stormwater runoff, the design engineer shall account for all significant land features and structures, such as ponds, wetlands, depressions, hedgerows, or culverts, that may reduce pre-construction stormwater runoff rates and volumes.

4. In computing stormwater runoff from all design storms, the design engineer shall consider the relative stormwater runoff rates and/or volumes of pervious and impervious surfaces separately to accurately compute the rates and volume of stormwater runoff from the site. To calculate runoff from unconnected impervious cover, urban impervious area modifications as described in the NRCS Technical Release 55 – Urban Hydrology for Small Watersheds and other methods may be employed.

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

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

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

Section 6: Standards for Structural Stormwater Management Measures

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

1. Structural stormwater management measures shall be designed to take into account the existing site conditions, including, for example, environmentally critical areas, wetlands; flood-prone areas; slopes; depth to seasonal high water table; soil type, permeability and texture; drainage area and drainage patterns; and the presence of solution-prone carbonate rocks (limestone).

2. Structural stormwater management measures shall be designed to minimize maintenance, facilitate maintenance and repairs, and ensure proper functioning. Trash racks shall be installed at the intake to the outlet structure as appropriate, and shall have parallel bars with one-inch (1") spacing between the bars to the elevation of the water quality design storm. For elevations higher than the water quality design storm, the parallel bars at the outlet structure shall be spaced no greater than one-third (1/3) the width of the diameter of the orifice or one-third (1/3) the width of the weir, with a minimum spacing between bars of one-inch and a maximum spacing between bars of six inches. In addition, the design of trash racks must comply with the requirements of Section 8.D.

3. Structural stormwater management measures shall be designed, constructed, and installed to be strong, durable, and corrosion resistant. Measures that are consistent with the relevant portions of the Residential Site Improvement Standards at N.J.A.C. 5:21-7.3, 7.4, and 7.5 shall be deemed to meet this requirement.

4. At the intake to the outlet from the stormwater management basin, the orifice size shall be a minimum of two and one-half inches in diameter.

5. Stormwater management basins shall be designed to meet the minimum safety standards for stormwater management basins at Section 8.

B. Stormwater management measure guidelines are available in the New Jersey Stormwater Best Management Practices Manual. Other stormwater management measures may be utilized provided the design engineer demonstrates that the proposed measure and its design will accomplish the required water quantity, groundwater recharge and water quality design and performance standards established by Section 4 of this ordinance.

C. Manufactured treatment devices may be used to meet the requirements of Section 4 this ordinance, provided the pollutant removal rates are verified by the New Jersey Corporation for Advanced Technology and certified by the Department.

Section 7: Sources for Technical Guidance

A. Technical guidance for stormwater management measures can be found in the documents listed at 1 and 2 below, which are available from Maps and Publications, New Jersey Department of Environmental Protection, 428 East State Street, P.O. Box 420, Trenton, New Jersey, 08625; telephone (609) 777-1038.

1. Guidelines for stormwater management measures are contained in the New Jersey Stormwater Best Management Practices Manual, as amended. Information is provided on stormwater management measures such as: bioretention systems, constructed stormwater wetlands, dry wells, extended detention basins, infiltration structures, manufactured treatment devices, pervious paving, sand filters, vegetative filter strips, and wet ponds.

2. The New Jersey Department of Environmental Protection Stormwater Management Facilities Maintenance Manual, as amended.

B. Additional technical guidance for stormwater management measures can be obtained from the following:

1. The "Standards for Soil Erosion and Sediment Control in New Jersey" promulgated by the State Soil Conservation Committee and incorporated into N.J.A.C. 2:90. Copies of these standards may be obtained by contacting the State Soil Conservation Committee or any of the Soil Conservation Districts listed in N.J.A.C. 2:90-1.3(a)4. The location, address, and telephone number of each Soil Conservation District may be obtained from the State Soil Conservation Committee, P.O. Box 330, Trenton, New Jersey 08625; (609) 292-5540;

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

3. The Soil Conservation Districts listed in N.J.A.C. 2:90-1.3(a)4. The location, address, and telephone number of each Soil Conservation District may be obtained from the State Soil Conservation Committee, P.O. Box 330, Trenton, New Jersey, 08625, (609) 292-5540.

Section 8: Safety Standards for Stormwater Management Basins

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

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

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

1. A trash rack is a device designed to catch trash and debris and prevent the clogging of outlet structures. Trash racks shall be installed at the intake to the outlet from the stormwater management basin to ensure proper functioning of the basin outlets in accordance with the following:

   a. The trash rack shall have parallel bars, with no greater than six inch spacing between the bars.

   b. The trash rack shall be designed so as not to adversely affect the hydraulic performance of the outlet pipe or structure.

   c. The average velocity of flow through a clean trash rack is not to exceed 2.5 feet per second under the full range of stage and discharge. Velocity is to be computed on the basis of the net area of opening through the rack.

   d. The trash rack shall be constructed and installed to be rigid, durable, and corrosion resistant, and shall be designed to withstand a perpendicular live loading of 300 lbs/ft sq.

2. An overflow grate is designed to prevent obstruction of the overflow structure. If an outlet structure has an overflow grate, such grate shall meet the following requirements:

   a. The overflow grate shall be secured to the outlet structure but removable for emergencies and maintenance.

   b. The overflow grate spacing shall be no less than two inches across the smallest dimension.

   c. The overflow grate shall be constructed and installed to be rigid, durable, and corrosion resistant, and shall be designed to withstand a perpendicular live loading of 300 lbs./ft sq.

3. For purposes of this paragraph 3, escape provisions means the permanent installation of ladders, steps, rungs, or other features that provide easily accessible means of egress from stormwater management basins. Stormwater management basins shall include escape provisions as follows:

   a. If a stormwater management basin has an outlet structure, escape provisions shall be incorporated in or on the structure. With the prior approval of the reviewing agency identified in Section 8.C a free-standing outlet structure may be exempted from this requirement.

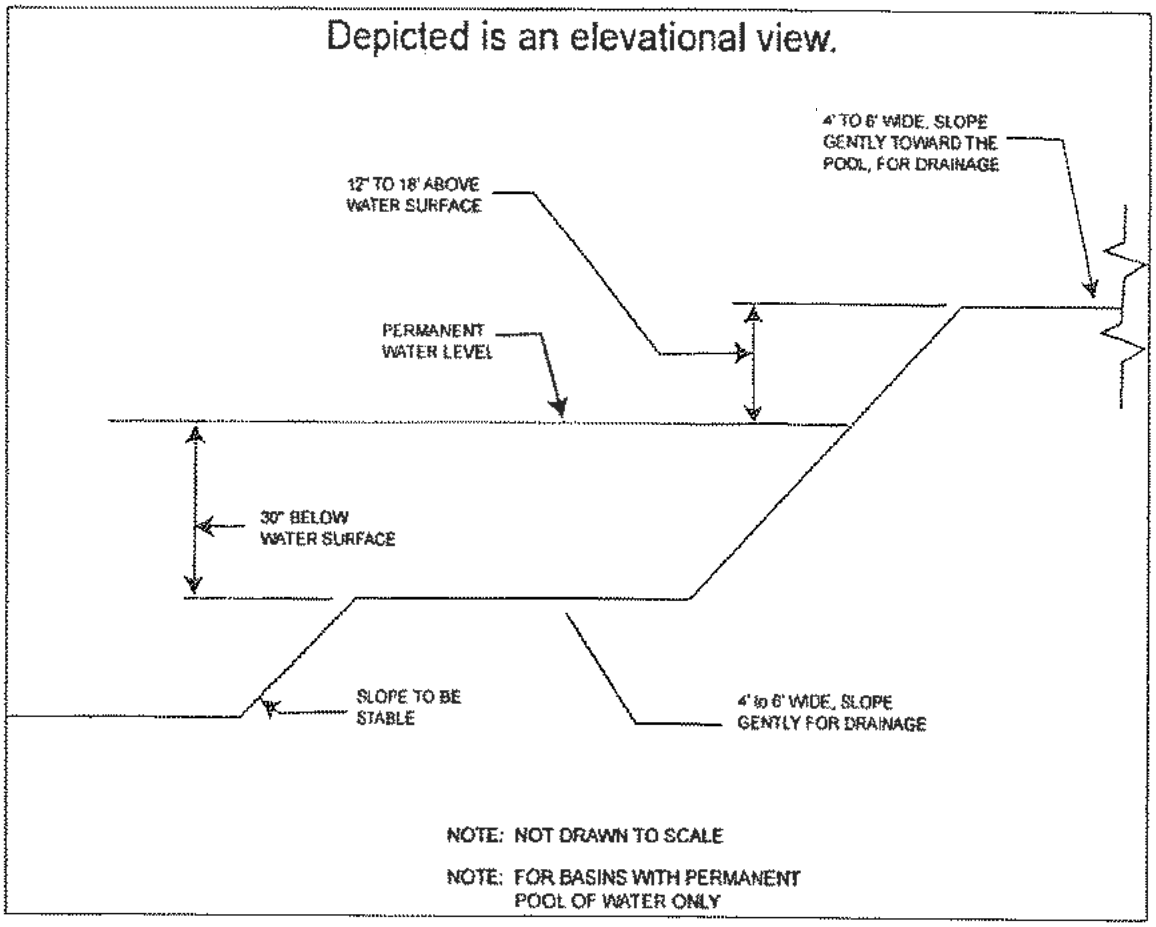
   b. Safety ledges shall be constructed on the slopes of all new stormwater management basins having a permanent pool of water deeper than two and one-half feet. Such safety ledges shall be comprised of two steps. Each step shall be four to six feet in width. One step shall be located approximately two and one-half feet below the permanent water surface, and the second step shall be located one to one and one-half feet above the permanent water surface. See Section 8.D for an illustration of safety ledges in a stormwater management basin.

c. In new stormwater management basins, the maximum interior slope for an earthen dam, embankment, or berm shall not be steeper than 3 horizontal to 1 vertical.

C. Variance or Exemption from Safety Standards

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

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



Section 9: Requirements for a Site Development Stormwater Plan

A. Submission of Site Development Stormwater Plan

1. Whenever an applicant seeks municipal approval of a development subject to this ordinance, the applicant shall submit all of the required components of the Checklist for the Site Development Stormwater Plan at Section 9.C below as part of the submission of the applicant's application for subdivision or site plan approval.

2. The applicant shall demonstrate that the project meets the standards set forth in this ordinance.

3. The applicant shall submit [*specify number*] copies of the materials listed in the checklist for site development stormwater plans in accordance with Section 9.C of this ordinance.

B. Site Development Stormwater Plan Approval

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

C. Checklist Requirements

The following information shall be required:

1. Topographic Base Map

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

2. Environmental Site Analysis

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

3. Project Description and Site Plan(s)

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

4. Land Use Planning and Source Control Plan

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

5. Stormwater Management Facilities Map

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

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

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

6. Calculations

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

   b. When the proposed stormwater management control measures (e.g., infiltration basins) depends on the hydrologic properties of soils, then a soils report shall be submitted. The soils report shall be based on onsite boring logs or soil pit profiles. The number and location of required soil borings or soil pits shall be determined based on what is needed to determine the suitability and distribution of soils present at the location of the control measure.

7. Maintenance and Repair Plan

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

8. Waiver from Submission Requirements

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

Section 10: Maintenance and Repair

A. Applicability

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

B. General Maintenance

1. The design engineer shall prepare a maintenance plan for the stormwater management measures incorporated into the design of a major development.

2. The maintenance plan shall contain specific preventative maintenance tasks and schedules; cost estimates, including estimated cost of sediment, debris, or trash removal; and the name, address, and telephone number of the person or persons responsible for preventative and corrective maintenance (including replacement). Maintenance guidelines for stormwater management measures are available in the New Jersey Stormwater Best Management Practices Manual. If the maintenance plan identifies a person other than the developer (for example, a public agency or homeowners' association) as having the responsibility for maintenance, the plan shall include documentation of such person's agreement to assume this responsibility, or of the developer's obligation to dedicate a stormwater management facility to such person under an applicable ordinance or regulation.

3. Responsibility for maintenance shall not be assigned or transferred to the owner or tenant of an individual property in a residential development or project, unless such owner or tenant owns or leases the entire residential development or project.

4. If the person responsible for maintenance identified under Section 10.B.2 above is not a public agency, the maintenance plan and any future revisions based on Section 10.B.7 below shall be recorded upon the deed of record for each property on which the maintenance described in the maintenance plan must be undertaken.

5. Preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measure, including repairs or replacement to the structure; removal of sediment, debris, or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; and repair or replacement of nonvegetated linings.

6. The person responsible for maintenance identified under Section 10.B.2 above shall maintain a detailed log of all preventative and corrective maintenance for the structural stormwater management measures incorporated into the design of the development, including a record of all inspections and copies of all maintenance-related work orders.

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

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

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

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

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

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

Section 11: Penalties

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

Section 12: Effective Date

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

Section 13: Severability

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

APPENDIX B

THE STORMWATER POLLUTION PREVENTION PLAN (SPPP) FORMS

FOR THE CITY OF HACKENSACK

MALCOLM PIRNIE

STORMWATER POLLUTION PREVENTION PLAN

CITY OF HACKENSACK
65 Central Avenue
Hackensack, NJ 07601

NJPDES No. NJG0154504
PI ID No. 224173

APRIL 1, 2005

Malcolm Pirnie, Inc.
17-17 Route 208 North – 2nd Floor
Fair Lawn, NJ 07410

Tier A Municipal Stormwater Regulation Program

Stormwater Pollution Prevention Team Members

Number of team members may vary.

Completed by: Jesse V. D'Amore
Title: Superintendent of Public Works
Date: February 10, 2005
Municipality: City of Hackensack
County: Bergen County
NJPDES #: NJG0154504
PI ID #: 224173

Stormwater Program Coordinator: Jesse V. D'Amore
Title: Superintendent of Public Works
Office Phone #: 201-646-3959
Emergency Phone #: 201-376-9715

Public Notice Coordinator: Debra Heck
Title: City Clerk
Office Phone #: 201-646-3940
Emergency Phone #: 201-646-3901

Post-Construction Stormwater Management Coordinator: Joseph C. Mellone
Title: Land Use Administrator
Office Phone #: 201-646-3914
Emergency Phone #: 201-832-9153

Local Public Education Coordinator: Albert H. Dib
Title: Information Specialist
Office Phone #: 201-646-3908
Emergency Phone #: 201-646-3901

Ordinance Coordinator: Peter J. Capone
Title: City Manager
Office Phone #: 201-646-3900
Emergency Phone #: 201-646-3901

Public Works Coordinator: Jesse V. D'Amore
Title: Superintendent of Public Works
Office Phone #: 201-646-3959
Emergency Phone #: 201-376-9715

Employee Training Coordinator: Jesse V. D'Amore
Title: Superintendent of Public Works
Office Phone #: 201-646-3959
Emergency Phone #: 201-376-9715

Other: Norm Levin
Title: Constable
Office Phone #: 201-646-3902
Emergency Phone #: 201-646-3901

SPPP Form 2 - Public Notice

Municipality Information	
Municipality: City of Hackensack	County: Bergen
NJPDES # : NJG0154504	PI ID #:224173
Team Member/Title: Debra Heck, City Clerk	
Effective Date of Permit Authorization (EDPA): 4/1/04	
Date of Completion: Ongoing	Date of most recent update: 2/10/05

Briefly outline the principal ways in which you comply with applicable State and local public notice requirements when providing for public participation in the development and implementation of your stormwater program.

The City of Hackensack (the City) complies with all applicable State and local public notice requirements for meetings where public notice is required. Specifically, the City complies with the following Open Public Metings Act statute:

1) N.J.S.A. 10:4-6 et seq

The City complies with all applicable State and local requirements with respect to the public notice requirements for passage of ordinances. Specifically, the City complies with the following statute:

2) N.J.S.A. 40:49-1 et sq.

The City complies with all applicable State and local public notice requirements with respect to municipal actions where public notice is required. Specifically, the City complies with the following Municipal Land Use Law:

3) N.J.S.A. 40:55D-1 et seq.

The City will certify annually that all applicable State and local public notice requirements were followed.

SPPP Form 3 – New Development and Redevelopment Program

Municipality Information

Municipality: *City of Hackensack* County: *Bergen*

NJPDES # : NJG*0154504* PI ID #: *224173*

Team Member/Title: *Joseph Mellone, Land Use Administrator*

Effective Date of Permit Authorization (EDPA): *4/1/04*

Date of Completion: *Ongoing* Date of most recent update: *3/21/05*

Describe in general terms your post-construction stormwater management in new development and redevelopment program (post-construction program), and how it complies with the Tier A Permit minimum standard. This description must address compliance with the Residential Site Improvement Standards for stormwater management; ensuring adequate long-term operation and maintenance of BMPs (including BMPs on property that you own or operate); design of storm drain inlets (including inlets that you install); and preparation, adoption, approval, and implementation of a municipal stormwater management plan and municipal stormwater control ordinance(s). Attach additional pages as necessary. Some additional specific information (mainly about that plan and ordinance(s)) will be provided in your annual reports.

To control stormwater from new development and redevelopment projects throughout the City, we will undertake the following:

The City currently, and will continue to ensure that all new residential development and redevelopment projects that are subject to the Residential Site Improvement Standards for stormwater management (including the NJDEP Stormwater Management Rules, N.J.A.C. 7:8) are in compliance with those standards. Our planning and zoning boards ensure such compliance prior to issuing preliminary or final subdivision or site plan approvals under the Municipal Land Use Law.

Since the effective date of permit authorization (4/1/04), the City has not constructed any new development or redevelopment projects on City owned property. Should the City decide to construct a project before the municipal stormwater control ordinance takes effect, we will ensure adequate long-term operation and maintenance of best management practices (BMPs) for that project by requiring a project maintenance plan similar to the maintenance plan described in our draft ordinance, and by requiring and funding the implementation of that plan. We currently require all storm drain inlets in the separated stormwater and sanitary sewer drainage areas that we install to comply with the design standard in Attachment C of our permit. Once the ordinance takes effect, we will ensure such operation and maintenance for any new development or redevelopment projects on our property by complying with the maintenance requirements in the ordinance. In addition, any storm drain inlets we install for such projects will comply with the ordinance's standard for such inlets.

Our City engineer has reviewed the Sample Municipal Stormwater Management Plan and our City Attorney has reviewed the Model Stormwater Control Ordinance in the NJ Stormwater BMP Manual and are in the process of drafting a municipal stormwater management plan and municipal stormwater control ordinance

SPPP Form 3 – New Development and Redevelopment Program – *cont'd*

similar to that sample and model. Subsequent to completion, the plan and ordinance will be adopted by the City planning board and Council, respectively, by the deadlines specified in the permit, and will be submitted to Bergen County for approval.

Once approved, the ordinance will control stormwater from non-residential development and redevelopment projects. Where it is necessary to implement the municipal stormwater management plan, the approved ordinance will also control aspects of residential development and redevelopment projects that are not subject to the Residential Site Improvement Standards.

For any BMP that is installed in order to comply with the requirements of our post-construction program, the City will ensure adequate long-term operation as well as preventative and corrective maintenance (including replacement) of BMPs. For BMPs on private property that the City does not own or operate, the City intends to adopt and enforce a provision in the municipal stormwater control ordinance that requires the private entity to perform the operation and maintenance, with penalties if the private entity does not comply.

The City will also enforce, through the municipal stormwater control ordinance, compliance with the design standard in Attachment C of our permit to control passage of solid and floatable materials through storm drain inlets.

SPPP Form 4- Local Public Education Program

Municipality Information	
	Municipality: *City of Hackensack* County *Bergen*
	NJPDES # : *0154504* PI ID #: *224173*
	Team Member/Title: *Albert H. Dib, Information Specialist*
	Effective Date of Permit Authorization (EDPA): *4/1/04*
	Date of Completion: *Ongoing* Date of most recent update: *3/10/05*

Local Public Education Program

Describe your Local Public Education Program. Be specific on how you will distribute your educational information, and how you will conduct your annual event. Attach additional pages with the date(s) of your annual mailing and the date and location of your annual event.

The City anticipates utilizing three different venues for the distribution of educational information. These venues include:

1. *the local newspaper the "County Seat",*
2. *The City's Website, and*
3. *an Annual Event.*

Local Newspaper - "County Seat":

The City will publish the NJDEP brochure in its entirety in the local newspaper, the "County Seat". The "County Seat" is distributed to all residents and businesses within the City twice a month. The City plans to publish the brochure in the newspaper twice a year; once in the month of June and once in the month of December. A copy of the "County Seat" is provided as Attachment 1.

Website:

The City will also publish the NJDEP brochure on its website quarterly during the months of March, June, September, and December. The brochure will be on the website for a two week period during each month, beginning June 2005.

Annual Event:

As the annual 4th of July event is well attended each year by the residents and community and business groups throughout the City, it is envisioned that this event will serve as our Annual Stormwater Event. For this event, which is held at Foschini Park, the City will work with its Environmental Commission to set up a "Stormwater Awareness" table and distribute the NJDEP brochure and other items such as pencils, jar openers,coloring pages, etc. with related stormwater best management practice topis identified. The City will be soliciting participation from its commercial establishments to offset a portion of the costs associated with this effort. The City has also solicited participation from the High School Environmental Club and Hackensack Riverkeeper, Inc.

SPPP Form 5 – Storm Drain Inlet Labeling

Municipality Information	
	Municipality: *City of Hackensack* County *Bergen*
	NJPDES # : *0154504* PI ID #: *224173*
	Team Member/Title: *Jesse V. D'Amore, Superintendent of Public Works*
	Effective Date of Permit Authorization (EDPA): *4/1/04*
	Date of Completion: *Ongoing* Date of most recent update: *3/10/05*

Storm Drain Inlet Labeling

Describe your storm drain inlet labeling program, including your labeling schedule, the details of your long-term maintenance plan, and plans on coordinating with watershed groups or other volunteer organizations.

The City has elected to utilize storm drain markers to label approximately 500 storm drian inlets. The City purchased 500 markers on August 30, 2004 from Almetek. The markers are blue and silver in color with "No Dumping - Drains to River", a fish logo and inlet number imprinted. They are made of stainless steal material and are anticipated to be durable. They are installed by glueing the marker, using a special bond adhesive, to the top of the storm drain inlet frame. A copy of the marker is provided in Attachment 2.

These markers will be installed by Department of Public Works (DPT) staff, being the City is instituting a storm drain inlet numbering program concurrently with its inlet labeling program and tracking the program stauts using its Geographic Information System (GIS). It is envisioned that 250 storm drain inlets will be labeled on or before March 31, 2007 and the remaining 250 storm drain inlets labeled on or before March 31, 2009. For this effort, the DPW has segregated the City into two sectors, the south sector and north sector. Attachment 3 provides a map illustrating the two sectors.

During street sweeping and catch basin cleaning activities, the City will be checking the markers to ensure that they have not been damaged or removed. Should a marker be so damaged that it is illegible, it will be replaced.

SPPP Form 6 – MS4 Outfall Pipe Mapping

Municipality Information

Municipality: *City of Hackensack* County *Bergen*

NJPDES # : *0154504* PI ID #: *224173*

Team Member/Title: *Jesse V. D'Amore, Superintendent of Public Works*

Effective Date of Permit Authorization (EDPA): *4/1/05*

Date of Completion: *Ongoing* Date of most recent update: *3/22/05*

Explain how you will prepare your map (include its type and scale, and the schedule for the mapping process). Who will prepare your map (e.g., municipal employees, a consultant, etc.)?

The City has existing sewer maps which will be used as a basis to prepare the MS4 Outfall Maps. The City has performed extensive work to locate catch basins and manhole by a handheld GPS system. Currently, the City has a GIS system that can produce a map of the entire separated sanitary, storm and combined sewer systems. This existing GIS map has the two combined sewer subdrainage areas, Anderson and Court, deliniated which represents approximately 33% of the entire sewer system service area; where the remaining 67% are served by separate storm and sanitary systems. The separated storm sewer areas exist around the combined sewer drainage areas, on the periphery.

The City will prepare individual maps of each of the approximate 18 subdrainage areas, with separate storm sewer drainage systems. The Mapping process will be completed as follows:

1) preliminary maps will be prepared based on existing GIS and historical sewer maps,

2) field investigations will be performed to identify the location of each outfall not previously identified through other City initiatives,

3) outfalls final discharge location will be located by handheld GPS,

4) each stormwater subdrainage area will be labeled and its associated isolated sewer system will be identified on the maps by the street name on wich the outfall is located and each storm sewer subdrainage area will be assigned a number (i.e. SSDA1, SSDA2, etc.), and

5) map scales will be 1 inch = 200 feet or less, and show the drainage area, storm sewers, direction of flow, manholes, catch basins, outfall(s) and outfall(s) coordinate(s).

SPPP Form 7 – Illicit Connection Elimination Program

Municipality Information

Municipality: *City of Hackensack* County *Bergen*

NJPDES # :*0154504* PI ID #: *224173*

Team Member/Title: *Jesse V. D'Amore, Superintendent of Public Works*

Effective Date of Permit Authorization (EDPA): *4/1/05*

Date of Completion: *December 2006* Date of most recent update: *4/1/05*

Describe your Illicit Connection Elimination Program, and explain how you plan on responding to complaints and/or reports of illicit connections (e.g., hotlines, etc.). Attach additional pages as necessary.

We will conduct the initial physical inspection of all of our outfall pipes during the mapping process. We will use the NJDEP Illicit Connection Inspection form (SPPP8) to conduct these inspections, and each of these forms will be kept with our SPPP records. Outfall pipes that are found to have dry weather flow or evidence of an intermittent non-stormwater flow will be rechecked again to locate the illicit connection. We will utilize the procedure as described on the following page to identify the illicit connection. If we are able to locate the illicit connection and the connection is within the City's jurisdiction, we will issue a summons to the responsible individual for violation of the City's Illicit Connection Ordinance and require the connection to be eliminated immediately. If, after the investigation we are unable to locate the source of the illicit connection, we will submit the Closeout Investigation Form with our Annual Inspection and Recertification. Should the illicit connection be found to originate from another public entity, the City of Hackensack will report the illicit connection to the NJDEP.

SPPP Form 7 – Illicit Connection Elimination Program – *cont'd*

Illicit Connection Identification Procedure:

Upon completion of the MS4 Sewer and Outfall Maps, the maps will be used to determine 3 key sewer junctions where the selected Storm Sewer Subdrainage Areas (SSDA) can be further divided to isolate 3 subareas. Each of the 3 key junction and monitoring locations will be clearly marked on the MS4 Sewer and Outfall Maps. Three field inspections will be performed on different random days at each of the SSDA's 3 key sewer junctions where a team of trained engineers and scientist will check the following :

1. Each site will be physically observed and inspected 3 times on different days for debris, waste, and/or smells that are normal indications of the presence of surfactants. With field chemical tests, we will detect whether wastewater or sanitary wastewater is present during dry weather periods.

2. Each site will have its dry weather sewer waterflow tested, if present, for the presence of surfactants with field chemical tests. If surfactants are present at known high concentrations, it will be recorded as an indication grey wastewater is present during dry weather periods.

3. Each site will have its dry weather sewer water flow tested, if present, 3 times for the presence of ammonia with field chemical tests. If ammonia is present in concentrations normally associated with sewage, this will be an indication that sanitary wastewater is present during dry weather periods.

If a majority of the physical and chemical data indicates the presents of wastewater, it will warrant further investigation. The same procedure will be followed anytime an illegal report is report to the DPW.

SPPP Form 8 – Illicit Connection Records

Municipality Information

Municipality: *City of Hackensack* County *Bergen*

NJPDES # : *0154504* PI ID #: *224173*

Team Member/Title: *Jesse V. D'Amore*

Effective Date of Permit Authorization (EDPA): *4/1/04*

Date of Completion: *Ongoing* Date of most recent update: *3/22/05*

Prior to May 2, 2006

***Note:** Attach a copy of each illicit connection report form for outfalls found to have a dry weather flow.*

Total number of inspections performed this year? ____

Number of outfalls found to have a dry weather flow? ____

Number of outfalls found to have an illicit connection? ____

How many illicit connections were eliminated? ____

Of the illicit connections found, how many remain? ____

May 2, 2006 – May 1, 2007

***Note:** Attach a copy of each illicit connection report form for outfalls found to have a dry weather flow.*

Total number of inspections performed this year? ____

Number of outfalls found to have a dry weather flow? ____

Number of outfalls found to have an illicit connection? ____

How many illicit connections were eliminated? ____

Of the illicit connections found, how many remain? ____

May 2, 2007 – May 1, 2008

***Note:** Attach a copy of each illicit connection report form for outfalls found to have a dry weather flow.*

Total number of inspections performed this year? ____

Number of outfalls found to have a dry weather flow? ____

Number of outfalls found to have an illicit connection? ____

How many illicit connections were eliminated? ____

Of the illicit connections found, how many remain? ____

May 2, 2008 – May 1, 2009

***Note:** Attach a copy of each illicit connection report form for outfalls found to have a dry weather flow.*

Total number of inspections performed this year? ____

Number of outfalls found to have a dry weather flow? ____

Number of outfalls found to have an illicit connection? ____

How many illicit connections were eliminated? ____

Of the illicit connections found, how many remain? ____

SPPP Form 9 – Yard Waste Ordinance/Collection Program

Municipality Information

Municipality: *City of Hackensack* County *Bergen*

NJPDES # : *NJG0154504* PI ID #: *224173*

Team Member/Title: *Jesse V. D'Amore, Superintendent/Art Koster, Sanitation Coordinator*

Effective Date of Permit Authorization (EDPA): *April 1, 2*

Date of Completion: *Ongoing* Date of most recent update: *3/7/05*

Please describe your yard waste collection program. Be sure to include the collection schedule and how you will notify the residents and businesses of this schedule. Attach additional pages as necessary.

The City currently provides yard waste collection (grass, leaves, brush, etc.) from April 1st through September 30th. Collection is provided weekly by the City during this period. For collection of yard waste, the City is divided into two sectors: the south side which includes recycling routes 1 through 5 and the north side which includes recycling routes 6 through 10. Collection is provided weekly with the south side recycling collection every Monday and the north side receiving collection every Tuesday. Residents are required to place yard waste in brown bio-degradable bags or in open containers. No plastic bags are allowed. The schedule for collection and description of acceptable yard waste containers is published in the City's annual recycling calendar, on the City's website and in the local newspaper, the County Seat.

The City also currently provides weekly leaf collection during the months of October, November and December. Leaves are collected during this period if placed in piles at the curb. Collection is provided weekly during this period. The City is currently amending its ordinance requiring that yard waste be placed, at minimum, no closer than 10 feet from any storm sewer inlet and be placed at the curb or along the street no more than seven days prior to collection. The routes and associated collection schedule change annually. Therefore, the collection routes and schedule are published in the City's Fall newsletter, on the City's website and in the local newspaper, the County Seat. The City will also amend its publications to note the new yard waste placement requirements.

SPPP Form 10 - Ordinances

Municipality Information

Municipality: *City of Hackensack* County *Bergen*

NJPDES # : *0154504* PI ID #: *22417*

Team Member/Title: *Peter J. Capone, City Manager / Norm Levin, Constable*

Effective Date of Permit Authorization (EDPA): *4/1/04*

Date of Completion: *10/1/05* Date of most recent update: *2/10/05*

For each ordinance, give the date of adoption. If not adopted, explain the development status:

Pet Waste *May 9, 1977 (being amended to address all types of pets)*

Are information sheets regarding pet waste distributed with pet licenses? Y ( ) N ( )

Litter *March 15, 1999 (most recent amendment)*

Improper Waste Disposal *Currently being prepared for adoption.*

Wildlife Feeding *Currently being prepared for adoption.*

Yard Waste *May 3, 1999 (most recent amendment)*

Illicit Connections *August 17, 1987 (most recent amendment)*

How will these ordinances be enforced?

The City's Constable, Sanitary Inspector, Health Inspector, Property Maintenance Inspectors and City Police Officers have and will continue to enforce these ordinances. Currently, violators of ordinaces are issued a written warning upon the initial violation and a summons upon the citing of continued non-compliance. This violation process will continue to be implemented by the City.

The City's Department of Health will also distribute the "Pet Waste Pollutes Our Waters" brochure with all pet licenses issued. A copy of this brochure is provided as Attachment 4.

SPPP Form 11 – Storm Drain Inlet Retrofitting

Municipality Information

Municipality: City of Hackensack County Bergen

NJPDES #: NJG0154504 PI ID #: 224173

Team Member/Title: Jesse V. D'Amore, Superintendent/Tony Sadita, Assistant Superintendent

Effective Date of Permit Authorization (EDPA): 4/1/04

Date of Completion: Ongoing Date of most recent update: 3/16/05

What type of storm drain inlet design will generally be used for retrofitting?

See Attachment 6 for general storm drain inlet specifications to be utilized by the City.

Repaving, repairing, reconstruction or alteration project name	Projected start date	Start date	Date of completion	# of storm drain inlets	# of storm drains w/ hydraulic exemptions
Summit Avenue Drainage Project	*Completed*	*8/20/03*	*10/31/03*	*30*	*0*
Beach Street Repaving	*Completed*	*9/11/04*	*9/11/04*	*1*	
Lodi Street Repaving	*Completed*	*11/5/04*	*11/5/04*	*2*	

Are you claiming any alternative device exemptions or historic place exemptions for any of the above projects? Please explain:

The City is not claiming any alternative device exemptions or historic place exemptions for any of the projects noted above.

The City is replacing catchbasins with the drain inlets which meet the standard contained in Attachment C of the Stormwater Permit. Specifically, the City is installing drain inlets in accordance with the specifications contained in Attachment 5.

SPPP Form 12 – Street Sweeping and Road Erosion Control Maintenance

Municipality Information

Municipality: City of Hackensack County: Bergen

NJPDES # : NJG0154504 PI ID #: 224173

Team Member/Title: Jesse V. D'Amore, Superintendent of Public Works

Effective Date of Permit Authorization (EDPA): 4/1/04

Date of Completion: Ongoing Date of most recent update: 3/16/05

Street Sweeping

Please describe the street sweeping schedule that you will maintain.

(NOTE: Attach a street sweeping log containing the following information: date and area swept, # of miles swept and the total amount of materials collected.)

The City currently provides sweeping of all City owned curbed streets on a weekly basis.

A listing of the City's street sweeping routes are provided in Attachment 6.

Road Erosion Control Maintenance

Describe your Road Erosion Control Maintenance Program, including inspection schedules. A list of all sites of roadside erosion and the repair technique(s) you will be using for each site should be attached to this form.

(NOTE: Attach a road erosion control maintenance log containing the following information: location, repairs, date)

All of the City's owned roads are curbed. There are no shoulders, embankment, or ditches that are not adjacent to a curb.

SPPP Form 13 – Stormwater Facility Maintenance

Municipality Information

Municipality: City of Hackensack County: Bergen

NJPDES # : NJG0154504 PI ID #: 224173

Team Member/Title: Jesse V. D'Amore, Superintendent of Public Works

Effective Date of Permit Authorization (EDPA): *4/1/04*

Date of Completion: *Ongoing* Date of most recent update: *3/21/05*

Please describe your annual catch basin cleaning program and schedule. Attach a map/diagram or additional pages as necessary.

A map which provides the location of each stormwater catch basin in the City is provided in Attachment 3. Please note that the catch basins located in the unshaded area are those catch basins in the separated stormwater and sanitary sewer system drainage areas. The shaded areas are the combined sewered areas of the City. The City will inspect each catch basin in the separated stormwater collection system drainage area on an annual basis. Those catch basins observed with debris, will be cleaned and inspected for proper function. Should catch basin repair be necessary, it will be scheduled for maintenance. The annual catch basins cleaning program will begin in April 2005.

Please describe your stormwater facility maintenance program for cleaning and maintenance of all stormwater facilities operated by the municipality. Attach additional pages as necessary.

(NOTE: Attach a maintenance log containing information on any repairs/maintenance performed on stormwater facilities to ensure their proper function and operation.)

The City will implement a stormwater facility maintenance program to ensure that all stormwater facilities operated by the City function properly. The City operates the following types of stormwater facilities:

- *catch basins*
- *storm drains*
- *infiltration basins*

These stormwater facilities will be inspected annually to ensure that they are functioning properly. In high risk areas, preventative maintenance will be performed on all stormwater facilities to ensure that they do not begin to fail.

SPPP Form 14 - Outfall Pipe Stream Scouring Remediation

Municipality Information

Municipality: City of Hackensack County: Bergen

NJPDES #: NJG0154504 PI ID #: 224173

Team Member/Title: Jesse V. D'Amore, Superintendent of Public Works

Effective Date of Permit Authorization (EDPA): 4/1/04

Date of Completion: Ongoing Date of most recent update: 3/21/05

Describe your stormwater outfall pipe scouring detection, remediation and maintenance program to detect and control active, localized stream and stream bank scouring. Attach additional pages as necessary.
(NOTE: Attach a prioritized list of sites observed to have outfall pipe stream and stream bank scouring, date of anticipated repair, method of repair and date of completion.)

The City is implementing outfall pipe mapping and illicit connection programs as noted in SPPP Form 6 – MS4 Outfall Pipe Mapping and SPPP Form 7 – Illicit Connection Elimination Program. As noted on the forms, during the identification of the outfalls and illicit connection activities, the City will be also be checking for signs of scouring from outfall pipes operated by the City. Should scouring be evident, the City will place the outfall on the priority list and repair the area in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey (N.J.A.C. 2:90-1 (e.g., Conduit Outlet Protection 12-1). Those outfall areas in need of repair that do not require NJDEP permits may be done prior to other areas requiring a permit.

The City will use the form provided in Attachment 7 to identify all of the sites with outfall pipe stream scouring, the date repair is anticipated to be performed, the method of repair and the date the actual repair was completed. Subsequent to completion of the repair, the City will perform an annual inspection of the site to ensure that scouring has not resumed.

SPPP Form 15 – De-icing Material Storage

Municipality Information

Municipality: *City of Hackensack* County *Bergen*

NJPDES # : *NJG0154504* PI ID #: *224173*

Team Member/Title: *Jesse V. D'Amore, Superintendent of Public Works*

Effective Date of Permit Authorization (EDPA): *4/1/04*

Date of Completion: *Ongoing* Date of most recent update: *3/12/05*

De-icing Material Storage

Describe how you currently store your municipality's de-icing materials, and describe your inspection schedule for the storage area. If your current storage practices do not meet the de-icing material storage SBR describe your construction schedule and your seasonal tarping interim measures. If you plan on sharing a storage structure, please include its location, as well as a complete list of all concerned public entities. If you store sand outdoors, describe how it meets the minimum standard.

The City currently stores its de-icing material in a stockpile located on a site on Green Street. The City has already implemented the interim seasonal tarping procedure and will continue to do so until a permanent structure is built. The de-icing material is currently stored, tarped, outside and is inspected, at minimum, twice a week during winter months (October through April) to ensure that the tarp is secured. In addition, the City inspects for spilled salt at the conclusion of loading and unloading activities and cleans the staging area as required. All salt will be removed from the site prior to May 1st and not be stored outside again until October 15th.

The City has initiated the site selection for a permanent storage structure. As a result, the following tentative schedule is set for the final site selection and construction.

Site Selection..........................6/05

Site Design/Permitting.............10/05

Bidding of Contract.................2/06

Initiate Construction................5/06

Complete Construction...........10/06

A six-month buffer is provided in the tentative schedule for potential delays possibly due to bidding, securing permits or weather, etc. The permanent storage structure, however, is anticipated to be completed within 36 months of the effective date of permit authorization (EDPA) or April 1, 2007.

The City also stores sand for use as absorbant material at accident sites. This material is stored at Johnson Park, 50' back from stormsewer inlets, ditches and the Hackensack River.

SPPP Form 67 – Standard Operating Procedures

Municipality Information

Municipality: *City of Hackensack* County *Bergen*

NJPDES # : *NJG0154504* PI ID #: *224173*

Team Member/Title: *Jesse V. D'Amore, Superintendent of Public Works*

Effective Date of Permit Authorization (EDPA): *4/1/04*

Date of Completion: *Ongoing* Date of most recent update: *3/21/05*

BMP	Date SOP went into effect	Describe your inspection schedule
Fueling Operations (including the required practices listed in Attachment D of the permit)	*June 1994*	*Monthly inspections will be conducted to ensure that the standard operating procedures (SOP) are being met as detailed in Attachment 8.*
Vehicle Maintenance (including the required practices listed in Attachment D of the permit)	*June 1994*	*Monthly inspections will be conducted to ensure that the standard operating procedures (SOP) are being met as detailed in Attachment 9.*
Good Housekeeping Practices (including the required practices listed in Attachment D of the permit) **Attach inventory list required by Attachment D of the permit.**	*June 1994*	*Monthly inspections will be conducted to ensure that the standard operating procedures (SOP) are being met as detailed in Attachments 10 and 11.*

SPPP Form 17 – Employee Training

Municipality Information

Municipality: City of Hackensack County Bergen

NJPDES # : 0154504 PI ID #: 224173

Team Member/Title: Jesse V. D'Amore, Superintendent of Public Works

Effective Date of Permit Authorization (EDPA): 4/1/04

Date of Completion: Ongoing Date of most recent update: 3/21/05

Describe your employee training program. For each required topic, list the employees that will receive training on that topic, and the date the training will be held. Attach additional pages as necessary.

The courses and applicable attendees are noted below:

Waste Disposal Education: DPW employees, enforcement code officials, health department officials

Municipal Ordinances: DPW employees, code enforcement officials, City police, health department officials

Yard Waste Collection Program: DPW employees, code enforcement officials, City police

Illicit Connection Elimination and Outfall Pipe Mapping: Selected DPW employees (field training)

Street Sweeping Program: DPW employees - Sanitation & Recycling Divisions of DPW

Stormwater Facility Maintenance: DPW employees - Sewer Repair Division of DPW

Road Erosion Control: N/A

Outfall Pipe Stream Scouring Remediation: DPW employees

Maintenance Yard Operations: DPW employees

Construction Activity/Post-Construction Stormwaer Management in New Development and Redevelopment: Land Use Administrator

Unless otherwise noted, training of the above noted topics will either be provided in a classroom setting or through a computer generated training program. Training dates yet to be determined.

ATTACHMENT 1

THE COUNTY SEAT NEWSPAPER

School Board Candidates on Page 19

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Volume 2 Issue 16

Friday, April 15, 2005

'The County Seat' Art Show

BY GAIL VACHON

"The County Seat" newspaper sponsored a Historic Building Art Contest asking all local schools to participate. Ten schools were represented out of 12 and 85 pieces of art were hung at the Cultural Arts Center in Hackensack.

Prizes were given in the categories of painting and drawing for third and fourth-graders, and fifth and sixth-graders. Area chamber members and businesses donated prizes for this event. The donors are printed with the winners on page 20.

Over 200 people attended the event with area children, parents, art teachers, Board of Education members, candidates, area businesses and council members. The art contest was a great success bringing together the area towns and promoting the fine arts as an important element in our children's futures.

Photo Courtesy: Tanya Engeleit

Art show participants showing their artwork to family and friends.

Healthy Kids Day at YMCA

Photos Courtesy: Dahlia Greene

Healthy Kids Day at the YMCA included lessons on dental hygiene and eating right.

BY DAHLIA GREENE

In an effort to promote youth fitness, the YMCA on Main Street kicked off their ninth Healthy Kids Day Fair on April 2. Donated gifts from generous sponsors were raffled off at the end of the day while attendees were treated to free giveaways from community businesses such as McDonalds, who introduced their new fruit and walnut cup. Other participants included: United Water, Sgt.

See "Healthy Kids" on Page 12

Frank C. Zisa Sr. Receives Medals

Photo Courtesy: Kathleen Kane

Congressman Steven Rothman presented Frank C. Zisa Sr. seven medals to honor his distinguished service in the Army in WWII. Among the many medals were the coveted Bronze Star and the POW Medal. He spent 26 months in a Nazi war camp in Germany during the war. Congressman Rothman said "I am proud that I was able to help Frank obtain the recognition from his country that he so rightfully deserves. He put his life on the line for his fellow Americans."

Ice House Avalanche Peewee Hockey Team Wins U.S. Championship Title

BY TOM GARCIA

On Sun., April 3 the Ice House Avalanche Peewee AAA hockey team beat the Los Angeles Hockey Club to earn the title of 2004-2005 U.S. National Champions. With a decisive 8-2 victory in the final over the top-seeded LA Hockey Club, the Avalanche have capped their 2004-2005 season as the undisputed top 12-year-old hockey team in the United States. Although LA was still very much in the game with a 2-2 tie after the first period, the Ice House Avalanche took charge from then on, with three unanswered goals in both the second and third periods. The Avalanche delivered a remarkable team effort with a total of eight goals scored by seven different players (Charlie Orzetti, of Ridgewood, had two goals for the Avs). With the score at 5-2 in the third period, LA peppered the Avalanche with 12 shots on goal, but Avs goaltender Jonathan Drago, from Guttenberg, N.J., delivered a stellar shut-out period of hockey.

Shortly after the final buzzer amongst all the excitement of winning a national title, Avalanche Head Coach Glenn Carlough said, "I'm very proud of our organization and this group of young men. It's a great

See "Peewee Hockey" on Page 17

Hackensack City Council Elections

New Visions for Hackensack

Citizens for Change

Community and Recreation Team

New Visions for Hackensack
1. Joseph DeFalco, 2. Karen K. Sasso, 3. Jorge E. Meneses, 4. Marlin G. Townes and 5. Michael R. Melfi

Citizens for Change
6. Ted Dunn, 7. Emil Canestrino, 8. Calvin J. Coles Jr. 9. Jenny Marin and 10. Steve Martino

Community and Recreation Team
11. Frederick L. Jones and 13. Weona "Mercedez" Dean

12. Clodell Randolph (not pictured)

The County Seat

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We welcome the submission of manuscripts, photographs, art and poetry for editorial consideration.

Photographs will not be returned unless arrangements are made. All submissions must have your name, address, and telephone number on it or it will not be considered. All material supplied shall become the property of

The County Seat

The County Seat, L.L.C. assumes **no** financial responsibility for typographical errors in **advertisements** or errors made in **copy** made by the advertiser or by **his or** her authorized agent, but will **reprint that** portion of an ad in which the error occurs or the entire **advertisement** if it is our error. Advertisers must notify the editor **within** seven days of publication of any error.

Election Bias

Two elections are quickly approaching our area. The first is for school board on April 19 and the second is for Hackensack City Council on May 10.

Obviously, those elected to the school board will have the ability to guide our schools in a fiscally responsible way. The newly-elected members will have the unenviable task of creating the school budget in future years.

The Hackensack City Council election is just a few weeks later. All five council seats are open and 13 candidates will compete for them. The task of the council is also daunting and it is important for voters to choose carefully when voting for their new leaders.

There have been suggestions that "The County Seat" is only favoring certain candidates. This however, is not true. "The County Seat" is only able to print the news that we are informed of and are only able to help those willing to work with us. Our votes in any election do not and will not influence what we print in the newspaper.

Letters

Dear Editor,

It's time again for the annual blitz of grandparents at the polls to try to vote down school budgets. Why has the sense of civic duty among our elderly sunk to such a low level? Seniors fail to understand that paying property taxes to support public education is part of a pact between the generations which includes Social Security and Medicare. Seniors are receiving Social Security and Medicare benefits funded by today's wage earners, many of which are families using the public education system. Our modern democratic society is engineered so that the cost of each generation's financial needs is spread out among all age groups.

Most of today's grandparents received a free public education when they were a child. When they became parents, most again benefited from the system and received a free public education for their own children. Now, despite having benefited twice from this pact between the generations, most seniors don't want to pay property taxes to support public education. Where are all the voices of outrage against this ungodly selfishness? I understand that some seniors are on a fixed budget and property taxes make it difficult to make ends meet. They might not want to, but seniors can always take a reverse mortgage on their house and receive a nice chunk of cash every month.

Only 30 years ago, seniors were the most impoverished age group. Things have changed. According to the U.S. Census Bureau, people retiring now are the wealthiest of all age groups. I guess being the wealthiest age group somehow "entitles" them to discounts at restaurants and public events. Many seniors are sitting on three to six-hundred-thousand dollars worth of real estate, owned outright, yet they cry poverty while young families with children struggle with no hope of ever owning real estate. Which generation has the greater problem? Families with children are in need of major public policy changes to advance their housing, financial and educational needs, yet their plight goes unnoticed. Instead public policy discourse is focused on seniors ranting about property taxes and school budgets. It's quite sickening. Instead, here's a call to action. I'm calling upon all children to make a phone call to your grandparents, wherever they live, and ask them to vote "yes" to the school budget in their town. You probably don't call them enough anyway, and they'd love to hear your voice.

Sincerely,
Eric Martindale

Dear Editor,

The readers' letters praising Mayor Zisa (issue 14) clearly reflected limited personal experience, for I cannot forget the invisible barking dogs, the sidewalks filled with rubbish, the rubbish containers placed on the sidewalk one or two days before collection, the 6 a.m. and 7 a.m. bell reminders that religion exists, the abusive behavior of certain municipal employees.

Unless the new mayor tries and succeeds in changing the mentality and behavior of some municipal employees or replaces the existing ones, it will be the same taste under a new face.

Thanks mayor for the "freedom we have had to walk the streets of Hackensack free of homeless people", but not clean of garbage, thanks mayor for having created a safe town, but not a peaceful one, thanks mayor for having allowed members of your administration to intimidate those who dared to voice their rights and having called them mentally unbalanced and politically adversarial.

Sincerely,
Forios Padazopulos

2005 Mom of the Year Contest

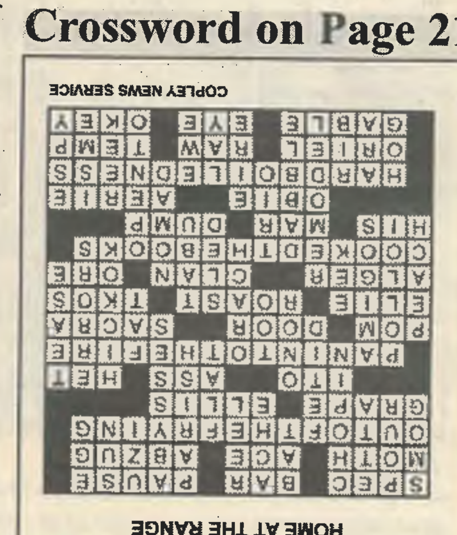
The Maywood Recreation Department is sponsoring the 2005 Mom of the Year Contest. Kindergarten youth and first-graders will submit a picture essay to express their thoughts and concepts. The second and third-graders will submit a picture essay and a 50-word written essay to express the content. The fourth and fifth-graders will submit a 100-word written essay expressing their thoughts. Picture essay entries – size dimension can only be as large as a standard oak tag poster board to express the content. All picture essays and written essays must have the following information printed on the back of the essay to be accepted:

First Name, Last Name
Home Address
Home Telephone No.
Name of School They Attend
Current Grade
E-mail Address to Contact (if available)

All Maywood 2005 Mom of the Year entries must be received by Borough Hall or the recreation department by Fri., April 29 – 4:30 p.m. to be eligible in the contest. The pictures essays will be evaluated by the clarity of thought, sincerity of feeling, and creativity and originality. The judging will be done by essay-type and age divisions. The winners will be announced in future "The County Seat" and "Our Town" articles and will be recognized at a mayor and council meeting.

For more information, you can contact Kimberly Jones at the recreation department by calling 201-368-1552 or e-mailing Maywoodrec99@aol.com.

Crossword on Page 21



Hackensack Streetscape Improvements

BY ANGELA MEYSTER

On April 5, Congressman Steve Rothman announced that he had reserved $72,750 in federal funding that would go towards the city of Hackensack Downtown Streetscape Renovation Project. The project was part of the section of the fiscal year 2005 Omnibus Appropriation Bill that funds the United States Department of Housing and Urban Development.

The money from the project will go towards improving customer and pedestrian access, attracting more visitors to the downtown commercial district, creating new sidewalks, upgrading street lighting, creating seating for pedestrians and changing the landscaping.

"The Downtown Streetscape Renovation Project will provide a critical boost to the city's ongoing efforts to attract visitors to three key commercial corridors that join at the County Court House and the Historic Green. The convergence of Essex Street, Hudson Street and Main Street constitutes the core of Hackensack's central business district, and these amenities will complement the civic improvement efforts of Mayor Zisa, the City Council and area businesses. This funding also saves Hackensack property taxpayers money by allowing federal money to replace local tax dollars that would have had to have been raised in order to pay for this capital project," said Rothman.

›uth Hackensack Volunteers Honored

ROBYN SCHOLZ

ife's most urgent question is: What are doing for others?"
Martin Luther King Jr.

any times in our lives we are touched people who give so effortlessly. In h Hackensack, there are many good le who lend themselves to just that. March 11, the volunteer organizations e township were recognized at a din- n their honor.

behalf of the South Hackensack com- ty, Mayor James Anzevino and township committee members reflected on the service provided by those on the fire department, ambulance corps, Board of Education, Board of Adjustment, Recreation Commission and Ladies Auxiliary.

At a special presentation, Staff Sgt. Walter Peterson was sworn in by Fire Commissioner Gary Brugger as first lieutenant to the South Hackensack Fire Department. Peterson recently returned from duty in Iraq and is currently fulfilling the remainder of his active duty in New York. Upon completion of his active duty, Peterson will be recognized at a formal township presentation for his service.

Raising Money for Leukemia at Nellie K. Parker

Photos Courtesy: Matt Hitscherich

Edward Malin and his mother, Sarah, joined Parker School's fight against leukemia.

MATT HITSCHERICH

ıukemia is a crippling cancer that orig- s in the main organs of the body used naking blood. With leukemia, abnor- and immature white blood cells are uced in the bone marrow and lymph m. The immature white blood cells called leukocytes. When these abnor- or immature white blood cells are pro- d in large amounts, the amount of nor- and healthy cells decreases.

is leads the body to become weaker more prone to disease and infection use the abnormal leukemic cells now to accumulate and lessen the produc- of oxygen-carrying red blood cells, l-clotting cells (platelets) and normal cytes. If left untreated, the cells can and will, eventually invade other of the body, such as the lymph nodes, n, liver, the brain and spinal cord.

though the cause of this cancer is own, we do know that there are many rent forms of leukemia and several but, none of which are completely tive or reliable. With this in mind the for leukemia is in great demand both e medical community and also with er patients who are desperately fight- o overcome this physical battle. To a cure however is a very challenging lifficult task, and the only way this can be achieved is through research. arch takes up valuable time and y, an all too real reality for a local stu- at Nellie K. Parker, Edward Malin.

lin is a pre-school student. He has a t and cheerful personality which accentuates his very "professional" arance. Malin wears a tie and shirt to l every day. He said that his collec- spans well to over 15 different ties, avorite being one with a dinosaur on also said he would like to be a prin- or a teacher some day, just like his ipal Mrs. Lillian Whitaker.

Malin's personality has definitely won him the hearts of many. One person whom Malin has touched is Ana Garcia, Nellie K. Parker school secretary. When she heard Malin's story, she decided to do something about it. So, on April 8, all of the teachers at Nellie K. Parker decided to buy t-shirts from the Leukemia and Lymphoma Society for $10 to help raise money to find a cure for leukemia. The school was able to raise over $500 for the society's cause. This message touches deeper to some faculty members, such as Assistant Principal Jack Giorgio, whose grandson Jack also suffers from leukemia.

Whitaker offered us a quote describing Malin. She said, "Edward is near and dear to our hearts, he is remarkable, always up and always peppy." Which only goes to show us how we can all make a difference in someone's life, no matter how big or how small, and how we can always try to make a difference in someone else's life.

200 Club Hosts Valor Awards

Photos Courtesy: Gail Vachon

Every year the 200 Club honors those in our area who have risked their lives or saved another. This year, many of these heroes came from our four towns.

BY GAIL VACHON

In 1985, J. Fletcher Creamer, along with John Rinaldi and several friends, started what is now one of the strongest 200 Clubs in the nation. At their 19th Annual Valor Awards and Student Scholarship Luncheon at the Glenpointe Marriott in Teaneck, the club paid tribute to 19 individuals who exemplified the attributes deserving of the honor of being called a hero. They also honored students who have demonstrated the qualities deserving of a scholarship to college.

Dana Marionotti presented an award to six deserving young women and men who will each receive $10,000 toward the college or university of their choice. From a field of over 70 applicants, the judges selected the final six. The recipients were: Beth Lutchen, of Leonia HS, Gary Donatello, of Pascack Valley HS, Timothy Nevins, of Ridgefield Park HS, Raquel Rivera, of Bergen County Academies, Normandy Villa, of Regis HS, and Kristen Parodi, of Immaculate Heart Academy, and a resident of Maywood.

The valor awards were presented to people who have risked their lives or saved a life. This year's recipients were Detective Daniel Lee, of the Bergen County Prosecutor's Office, Detective Moises Hernandez, of the New Jersey State Police, and firefighter John McMorrow, of the Hackensack Fire Department. McMorrow was recognized for his role in saving fellow firefighters in the March 4, 2004 fire on Clinton Place. During this fire, a fireball exploded and sent one fireman out of the building and upon realizing that other firemen were still in there, risked his own life to save the men in the building.

Both Detective Lee and Detective Hernandez were involved in an incident in South Hackensack in which Detective Kaiser, Police Officer Mea and Police Officer Maceri, of the South Hackensack Police Department, were involved. The South Hackensack policemen were honored with the Humanitarian Award for their role in preventing the loss of lives or serious bodily injury on Oct. 1, 2004. The incident involved fugitives who were both armed and dangerous and wanted for kidnapping and robbery.

The Meritorious Award is given to people who achieved a highly unusual accomplishment under adverse conditions. Police officer John Garland, of the Teaneck Police Department, was honored for his role in handling a fight involving knives in front of a bar in Teaneck. Police officers Richard Uram, Jeffrey Stewart, John Demko and firefighter Alan Tani, all from Garfield, were recognized for their role in a rescue on the Passaic River in May 2004. Detective Sgt. Timothy O'Donohue, of the Mahwah Police Department, was honored for his role in saving an elderly couple from a burning building. Detective Brian Lucas, of the Bergen County Prosecutor's Office, received his award for his role in an undercover drug operation in Maywood.

The John R. Rinaldi Special Recognition Award is not only a tribute to the man it was named for, but also an award that recognizes outstanding service which is the embodiment of Rinaldi's call to service. The first groups to receive this award were the Water Rescue Units from Oradell, Wallington and Lyndhurst for their role in recovery on the Passaic River in October 2004. The second recipient was firefighter Kenneth Smith, of Hillsdale, who, while on vacation in Orlando, saved a man who was having a heart attack. With his quick response and use of CPR, he was able to stabilize the man. The third award was given to Chaplain Beatrice Napier, of the Washington Township Ambulance Corp. She has dedicated over 30 years to service and has been honored by the Hackensack University Medical Center as an outstanding EMS.

A surprise award was given to Chief Joel Thornton, of the Hackensack Fire Department. Jack Terhune presented this award to the chief saying that, "He is the living embodiment of what John Rinaldi stood for. He demonstrates what outstanding service is all about."

A special award was also given to John Solari for his role in increasing the membership of the 200 Club.

The 200 Club averages $100,000 in grants to police, fire and EMS a year. They are committed to public service and recognize outstanding service by members of the community. The valor awards are a way for the club to recognize bravery and people who have gone beyond the call of duty.

Tapas: My Favorite Food Theme Get Together

BY PAT ROMERO

Whether you are planning a party for a birthday, retirement, anniversary, shower or just a casual gathering with friends, instead of thinking of a theme party, make the food the theme of the party. The theme could be sushi, fondue, seafood, pasta, soup or tapas. Food theme parties work best when set-up as an interactive buffet. If it's seafood, teach everyone how to shuck, have a platter of sardines in a variety of sauces, a bowl of peel and eat shrimp and a few bowls of creative seviche. If it's sushi, have the guests roll their own and think out of the box and go beyond seafood and veggies. Make rice rolls Latin-style with taco meat or chopped chicken fajitas or refried beans, or make Greek-style rice rolls with chopped feta, olives and tomato in a vinaigrette or, better yet, use gyro meat and tzaziki sauce. For dessert make sweet-style with rice rolled in a thin crepe and filled with chocolate, fruit, nuts or rice crispy and marshmallow rolled in fruit roll-ups; get creative and add your favorite dried fruit or Twizzlers. They are all great parties but my all time favorite is a tapas food theme party. They have been growing in popularity and I predict tapas will only become more and more popular over the next few decades. So get in on the wave, you have plenty to choose from because there are literally thousands of recipes, believe it or not. Each and every region of Spain has hundreds of their own specialty tapas.

So basically it becomes a tasting party and that is exactly what you should headline it as, "A Wine and Tapas Tasting Party". The time is right with all the wonderful wines that are coming out of Spain. If you haven't tried some of the inexpensive Riojos that have been around the past few years, do yourself a favor and buy a bottle. It is best if you set-up the party as a buffet – give the guests direction to start with, light seafood and veggies with lighter wines and continue into the creamier and heavier sauces and meats with the heartier wines. It truly is a delightful experience.

Tapas are basically little dishes or snacks originated in Seville, Spain served before lunch and dinner in bars and taverns. The first tapa was a slice of ham that was placed on top of a sherry glass to keep the flies out. The word tapa comes from "Tapar" which means to cover. The story goes that the saltiness of the ham, increased beverage sales. But let's face it, whether you call them tapas or appetizers you don't have to focus on Spain it can be an Italian appetizer party, Greek or French, with matching wines from respective countries.

When you set-up your tasting party, don't complicate the dishes. Feature a few wonderful dishes of protein such as a variety of seviche, pate, caviar, sausages, calamari, grilled sardines or octopus. Surround them with lots of sides such as roasted peppers, marinated olives, spiced nuts, cold cuts and cheeses, risotto croquettes and various tapenades with crostini. My favorites are patatas bravas and gambas al ajillo. Patatas bravas are boiled, peeled and cubed potatoes sautéed in olive oil until browned and crunchy, then salted. Serve them with spicy piquant sauce made with a teaspoon of cumin, three minced garlic cloves, chili or cayenne pepper to taste, 1.5 cups of tomato sauce or crushed tomatoes, four tablespoons of mayonnaise and one tablespoon white wine vinegar. The gambas al ajillo is prawns in garlic sauce. Use about a pound or 20 large, cleaned, veined and shelled shrimp sauté in olive oil with minced garlic, salt, pepper and chili pepper – all to your personal taste with ¼ - ½ cup of chopped flat parsley or cilantro (optional – juice of one or two lemons with ½ cup of your favorite white wine).

These small plates just might replace the traditional three course (appetizer, entrée and dessert) meal in restaurants soon. And why not, more and more restaurants are offering six, eight or 10-course meals of small portions matched with wines. People seem to like small tastes of a number of items than a big plate of one item and it gives the guest more control of how much they eat and spend. So whether you have a tapas party or just tapas-style appetizer buffet, I promise you it will be a hit.

Pat Romero is a certified hospitality educator and has been a hospitality consultant for years for a number of notable fine dining and most major full-service chain restaurants. She is presently completing her master's in hotel, restaurant and tourism at Fairleigh Dickinson University in Teaneck. She teaches at NYC Gibbs College and the NJ Restaurant Association, and has recently joined EQ International Perspectives as vice-president. Do not hesitate to contact her at PAT@EQip.ws.

Weekly Health Tip

by Alan Arnowitz, R. Ph.

No Honey For Infants

Ten percent of honey contains dormant *Clostridium botulinum* bacteria spores. When consumed, the spores can release a toxin that can cause botulism in infants under 12 months of age. According to the CDC, infants with botulism are lethargic, constipated, feed poorly, have poor muscle tone and a weak cry. The effects can range from mild illness to severe paralysis or sudden death. Many parents know not to give honey to their babies, but they sometimes overlook foods with honey in them. (Breads, cereals, crackers, etc.) Check with manufactures to see if these foods are safe.

Allergy Season Wreaking Havoc in Your Home?

BY THOMAS A. SELVAGGI, M.D.

Elm, maple, juniper and cedar pollen from the trees have been wreaking havoc on Bergen County tree allergy sufferers for the past three weeks with itchy, watery eyes, sore throats, runny noses, sneezing and even asthma. If you think you're off the hook this year because you have no symptoms, oak and ash trees will be pollinating in about two weeks. That will be followed by grass pollen in May and weed pollen in June.

Pollens, which are submicroscopic particles measuring approximately 10 microns, can nevertheless have a potent effect on the immune system of susceptible individuals. While it may seem that persons living in the rural areas are more likely to have a chance of developing allergies, the actual fact is that persons living in urban areas are twice as likely to develop allergies. This is because the pollen and other allergens have a lot of help from the particles in the air around metropolitan areas, most notably from diesel fumes. Diesel fumes have actually been shown in laboratory experiments to shift the body's immune system towards a more allergic expression.

This combination of pollen, pollution and genetic susceptibility combine to create misery and keep the allergist's phone ringing off the hook. There is a significant impact of allergies on a person's quality of life, including decreased ability to concentrate with an impact on work productivity. Some persons even develop the oral allergy syndrome in which the eating of apples, pears, peaches and plums causes itching in the mouth and throat. For a small number of these patients, eating these fruits may cause a much more severe allergic reaction.

The best way to diagnose allergies is to have a physician listen to your symptoms, examine you and to perform skin testing to see which pollens or allergens cause a response in your skin. Your physician may alternatively recommend blood work that may also be used to diagnose a particular allergy.

What can you do if you suffer from pollen allergies? Well, the most obvious intervention is simply to avoid the pollen. This is easier said than done, unless you are a hermit. You can start by keeping the pollen out of the house by closing your car and house windows (using your air conditioner if necessary), refraining from hanging clothes outside to dry, washing outdoor/indoor pets during days with high pollen counts and avoiding jogging, walking, biking, gardening and other outdoor activities between five and 10 o'clock in the morning when the pollen counts are the highest.

Medical treatments include nasal corticosteroid and antihistamine sprays, oral antihistamines and decongestants, eye drops and allergy shots. Nasal corticosteroids are usually the most effective treatments, but can be limited because of personal preference and the inability to treat the eyes. Many of the over-the-counter antihistamines cause drowsiness and wear off in less than 24 hours. There are several prescription antihistamines that get around these problems. Over the counter decongestants help nasal stuffiness but it is best to consult with your physician before using decongestants if you have any medical condition, particularly high blood pressure, problems urinating, thyroid disease, heart disease, insomnia or anxiety.

Allergy shots are an effective way to regulate the allergic immune response. Many experts are now recommending this course of therapy for all children with nasal and eye allergies as a way to prevent the development of allergic asthma. However, this course of therapy is only for the very motivated, as allergy shots require a significant amount of time. Usually, one needs to receive weekly shots once a week for just over ½ a year and then the shots are gradually spread to every three or four weeks. The usual duration of therapy is at least five years. Allergy shots can be very effective, working in about 80 percent of persons who regularly receive them. The down side is that they are not effective for a small number of persons and they can induce a severe allergic reaction.

So for all of you who suffer in silence or are told, "You better take care of that cold", there is hope for relief.

Dr. Selvaggi is a board certified allergist/immunologist by the American Board of Allergy and Immunology, a fellow of the American Academy of Allergy, Asthma and Immunology and the medical director of the Special Diagnostic Immunology Laboratory at Hackensack University Medical Center. He operates the Hackensack Allergy and Asthma Center at 211 Essex St., Suite 205 in Hackensack. For more information call 201-343-6673.

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For City Council

VOTE MAY 10th

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Kids Corner

Clothing Bin Benefits Scholarships

Photo Courtesy: Tanya Engeleit

The NASRO clothing bin sits outside of Hackensack Middle School. It is a seemingly ordinary bin but this clothing bin offers more than what meets the eye. In fact, by placing old clothing or textiles in this bin, you are helping give kids an education. The money collected from the clothing is actually turned into scholarship money. There are two scholarship companies which collect to help send the middle and high school students further in their studies. The bin has been in place for five years now and collections usually average over $1,200 a year, not bad for a few discarded clothing items.

Science Stars Shine at South Hackensack Science Fair

Photo Courtesy: Jeremy Brooks

The South Hackensack fair provided education in Science, Health and Safety.

BY JEREMY BROOKS

On March 23, the Memorial School in South Hackensack held its annual Science, Health, and Safety Fair. This year, the fair featured students from the seventh-grade life science class, eighth-grade physical science class, as well as two sixth-grade projects representing the future of the science program at Memorial School. After a day of presenting and demonstrating to their peers and science students from Hackensack High School, the students showcased their projects for their families and the community.

Visitors who braved the snowy weather were treated to a diversity of science experiments, all in bright display and great detail. With a walk around the gymnasium, there was anything from the dissection of a pig's heart, to candy crystals, pigeons and snakes and a flashy display of the human nervous system. Congratulations to all participants for their hard work and success at the science fair.

The seventh-grade winners were: honorable mention: Danielle Gautier for "DNA Structure - The Parts and Uses of it", third place: Brittany Yannetti and Samantha Sommer for "Bird Days", second place: Jenna Frasier for "Colorful Creations", first place: Denise Ramirez and Katherine Loor for "You've Got Nerve".

The eighth-grade winners were: honorable mention: Simona Gucciardi and Alexis Jennings for "Picture This", third place: Nicole Guintu for "Sweet Foods", first place: Michael Cascone and Ted Hyun for "The Mysteries of Astronomy".

The evening's success was also due to the special presentations from the police department, fire department and rescue squad. Memorial School's Family Life Program and D.A.R.E. Program were also represented. The Girl Scouts and Brownie Troops provided great refreshments. With everyone's help, the Science, Health and Safety Fair was a fun and educational experience for all.

Students Receive Honorable Mention

BY BARBARA PURCELL

Photo Courtesy: Tatyana Budanskaya

Midland students awarded honorable mention in this year's G.A.T.E. program.

Midland School proudly announced that Kaitlin Abrams, Samantha Sagun and Jansen Tiongko, eighth-grade students in Mrs. Purcell's G.A.T.E. Science Enrichment program, were awarded honorable mention status in this year's Toshiba/NSTA ExploraVision contest. ExploraVision awards program is a competition funded by Toshiba Corporation and administered by the National Science Teachers Association for all students in grades k-12 in the United States, Canada and U.S. territories.

This year, 13,597 students accepted the challenge of developing a project that required imagination, knowledge of science and technology applications, and vision of the future.

Abrams, Sagun, and Tiongko created D.A.R.C. (DNA computer applied to reprogram cancer cells), "bringing a cure to cancer into the light." Their innovative concept incorporates the technological advance, a DNA computer, created by Dr. Len Adleman, scientist and USC professor, and envisions programming this DNA computer with the genetic sequence that will reprogram a cancerous cell's DNA to its healthy configuration. The students conducted extensive research to learn the history, function and applications of this technology to curing cancer.

Midland School applauds the vision, creativity, dedication and scientific achievement of Abrams, Sagun and Tiongko.

Basketball Makes Dreams Come True

Photo Courtesy: Kevin O'Boyle

Members of the Hackensack/Maywood team with Edward Malin, of Hackensack.

BY TESSA FERNANDES

On Wed., March 30, the sixth annual Police Basketball Tournament to benefit the Make-A-Wish Foundation took place at Fairleigh Dickinson University. This event was a great success with the cooperation of many police departments and members of the foundation.

Some local policemen from Hackensack and an officer from Maywood participated in the tournament.

Last year, the Make-A-Wish Foundation sent Hackensack resident Edward Malin, who has leukemia, to Disney World. He is one of the many recipients of the Make-A-Wish Foundation.

A four out of five win was needed in order to enter the semifinals. Final results for the game were the Hackensack/Maywood team losing in the semifinals to Englewood by one point. In the end of the tournament, Hoboken was victorious.

In order to enter the tournament each police department must raise a certain amount of money. All proceeds go directly to the foundation.

Kids Corner

March's Kind Deeds at Memorial

Photo Courtesy: Ray Bauer

At Memorial School there are many true kind deeds taking place all the time. Pictured above are those children who were recognized and awarded by the P.T.O. Back row: Jeanmarie Rudloff, Illiriana Pocesta, Rochelle Penalosa, Marky Kate Kisi and Abigail DiGregorio. Front row: Vincent Lalumia, Matthew Golabek, Anthony Altamore and Danny Lane.

Do Something's Easter Food Baskets

Photo Courtesy: Tatyana Budanskaya

Front row: Caitlin Richards, Samantha Sagun, Jessica Scarpa, Meagan Edreich, Jamie Whitling and Heidi Pizzuto. Second row: Joseph Brito, John Monnachio, Christopher Goodlof, Frank Howard, Christine Zimmermann, principal, Geraldine Pierro, community coach and advisor, Frank Madden, Board of Education member, C. Lauren Schoen, superintendent, Brendan O'Donnell, Eric Verhasselt and David Krzewski.

BY JESSICA SCARPA

Do Something was once again busy at work this Easter season! Numerous Do Something members spent Mon., March 21 and Tues., March 22 making several bags for the less fortunate in the community. Monday night was spent organizing and arranging canned and boxed goods with seniors from Rochelle Park and Maywood, Mrs. Mosca, director at the Maywood/Rochelle Park Welfare Office, Mr. Madden, dedicated community member, as well as other volunteers. A third group of Do Something members, as well as Mrs. Pierro, community coach and advisor, and some officers helped out Tuesday morning when the assembly of the baskets occurred. Canned fruits, vegetables, turkeys, baked goodies and many other foods were put into these baskets to assure each family had a hearty meal for the Easter season.

The Character Education Program at Midland assisted in yet another successful fundraiser to help others in need throughout the community. A total of 33 baskets were made for families in both towns! Midland School never fails to lend a helping hand whenever it's needed.

Green Eggs and Ham at Hillers

Photo Courtesy: Michael Caez

Hillers' kindergarten teachers, Deborah Labrosse and Lisa Santangelo, prepared green eggs and ham as a culminating activity for the annual celebration of Read Across America. Dr. Seuss would indeed have approved of the fare.

Evening of Technology

Photo Courtesy: Michael Caez

Recently, the four STAR-W teachers, Jessica Luciano-Dow, Jennifer Jannucci, Dina Nasr and Kurt Schollin, hosted an Evening of Technology during which third and fourth-grade students helped their parents experience some of the technology that is available on a daily basis at Hillers. The STAR-W teachers not only explained how technology has enhanced classroom instruction, but actually presented mini-lessons using the Smart Board, laptop computers and a myriad software such as Knowledge Box. The parents got an opportunity to learn as their children are learning. In addition, tips on homework and an explanation of the state-mandated NJASK battery of tests were also on the agenda. It was well-attended and each parent walked away with a better understanding of the role of technology in today's education.

Hillers Kindergarten Assembly

Photo Courtesy: Michael Caez

The Hillers kindergarten students and their teachers prepared two school-wide assemblies honoring St. Patrick's Day, springtime and good ole Peter Cotton Tail and his egg baskets. Original sets, music and costumes added egg-citement to the festivities. It was an egg-celent presentation!

Money From Sky Befuddles Boy and Family

Photo Courtesy: Fox Searchlight

Brothers Damian (Alex Etel, left) and Anthony (Lewis McGibbon, right) examine the huge quantity of cash they find in the Fox Searchlight film, "Millions", directed by Danny Boyle.

BY DENNIS SEULING

"Millions" is a movie that plays on the themes of wish-fulfillment and greed, and celebrates the kind of imagination only a child can possess. Nine-year-old Anthony (Lewis McGibbon) and his seven-year-old brother Damian (Alex Etel) couldn't be more different. Anthony is down to earth, practical all the way. But Damian relies on imagination, fantasy and faith to make sense of his confusing world. Their story begins shortly after the death of their mother as they attempt to move on, guided by their caring father, Ronnie (James Nesbitt). After moving to a new home, Damian tapes together packing cartons and makes a tunnel-like house beside the railroad tracks that lie near his new development. Damian studies Catholic saints the way other boys his age might memorize statistics of major league baseball or professional soccer players. He knows their birth and death years, what they are patron saints of and, if martyred, the grisly details of their torture and demise. His head filled with these details, he has occasional encounters with assorted saints as we see the products of his imaginings.

Life changes dramatically when a satchel of money comes crashing through the roof of Damian's cardboard hideaway. Clearly, thinks Damian, it has come from God. He tells Anthony, who immediately makes plans to keep the money a secret, buy assorted electronic games and use the money to achieve enhanced status at school.

Damian, however, feels the money should be given away to the poor, and his attempts to do this draw unwanted attention from dad, the local police and a mysterious figure who claims to be the owner of the money.

Director Danny Boyle ("28 Days Later", "Trainspotting") has given "Millions" the quirky cinematic touches present in his earlier films, but takes on more complex subject matter this time around. Damian is the heart of the film and Alex Etel is exceptional at handling the film's emotional scenes, selling its lighter moments and providing a believable portrait of a highly imaginative child with an underlying sadness. It's risky for a director to entrust so much responsibility to a child, but here the casting of Etel pays off handsomely.

Lewis McGibbon's Anthony is the perfect counterpart to Damian. Cynical beyond his years, financially savvy and amusingly jaded by the machinations of an adult-run world, he is on hand to infuse doses of reality to Damian's flights of fantasy. Though Damian attempts to see things through his brother's eyes, he clings to the rosier reality provided by his imagination. These scenes are the movie's best. Director Boyle has elicited amazingly real, unaffected performances from both boys, who serve as cornerstones to the entire film.

Boyle's forte is the comic scene taking place in a familiar setting. There's a wonderful sequence involving a woman from a charity (Daisy Donovan) who visits Damian's school with a talking collection pail, which speaks to the children about the importance of thinking about those less fortunate than themselves. The animated receptacle maneuvers around the classroom as we see the scene from the point of view of the rolling plastic pail, kids scattering hither and yon, giggling.

Another scene features Anthony discussing the most profitable way of disposing of some of the cash in terms you'd expect to hear from a professor of economics, as his dad looks on in absolute bewilderment.

There are problems, however. After a wonderful beginning and first half, the movie starts to get into deep water as screenwriter Frank Cottrell and Boyce's script blends the fantasy elements with reality, merging them into a kind of wishful, fairytale world. This happens rather abruptly and alters the gentle tone of the movie into a didactic, even moralistic sermon. And if there's one thing a movie should not do overtly, it is to shout its message or wave a cause's banner. Sadly, this is what happens to "Millions", reducing a potentially excellent film to a merely flawed, good one.

Then there's the problem of that mysterious stranger, who has to be one of the most inept bad guys since the Cowardly Lion went to pieces after a little slap. His lugubrious, laid back manner suggests that this guy is on holiday rather than on a mission to retrieve stolen money. He is not nearly threatening enough and, as a result, lacks credibility in a film rich in solid characters. We never feel that the boys and their father are in serious peril.

Rated PG, "Millions" is an ambitious film you feel will be a unique winner. When it turns out to be less-than-anticipated, we've at least had the pleasure of seeing two young actors in their screen debuts rising above the material to turn in indelible performances.

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This article is for informational purposes only and not to be construed as legal or accounting advice. Please consult a professional.

John P. Cito is a certified divorce financial analyst with offices in Hackensack, N.J. and is a member of the Institute for Divorce Financial Analysts, the Financial Divorce Association and the Association of Divorce Financial Planners. He can be reached at 201-498-0072, 888-379-9569 or jcito@divorceplan.com.

For a copy of "40 Tips for Surviving Your Divorce", send $2 and a SASE to John P. Cito, CDFA 354 State St. Suite 204, Hackensack, N.J. 07601. Logon to www.divorceplan.com for a FREE copy of Divorce Magazine and a FREE electronic Divorce Newsletter.

Book Signing at Wellington Hall

Photo Courtesy: Nadine Blowe

Wellington Health Care Center hosted a book signing with author Patricia M. Kearns. Her book titled "Lessons in the Divine for Caregivers" was inspired by her mother for whom she was a caregiver. The event was attended by 150 invited guests from the outside community and family members of Wellington residents. Each guest received a complimentary copy of the book personally autographed by the author.

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Healthy Kids

Continued from Page 1

Williams from the Hackensack Police Department for D.A.R.E., Hackensack University Dentistry, Hackensack Riverkeeper and Family Chiropractic Center in Maywood. A "Reader's Digest" Book Fair was also held in conjunction with the event.

Parents who braved the rainy weather with their children are a testimony, according to the YMCA's Associate Executive Director Sue Kettren – parents are taking their children's health seriously. With juvenile obesity on the rise, it is imperative that parents and children are educated on the importance of being fit and eating right. Such education should start as early as three-years-old.

To highlight this year's theme, "Put play in your day", kids were introduced to mini-golf, basketball, mini-obstacle course, floor hockey and karate. The activities were geared to making them understand that getting fit could be fun. Free health screenings were also offered as part of the program.

YMCA Healthy Kid's Day is an annual national event that takes place every first Saturday of April. The Disney Channel, Kimberly Clark and Tropicana generously sponsored this year's event.

National Honor Society Inducts New Members

Photo Courtesy: Karen Sasso

Seven seniors and nine juniors were inducted into the E.T. Marlatt Chapter of the National Honor Society on March 31. The inductees were Jeanelle Javois, Sonia Perez, Matthew Sasso, Matthew Nowicki, Thomas Santoro, Terace Thomas, Ligia Villa, Ashley Budinic, Frank Chinga, Marc Guzman, Brittany Mei, Lisa Budinic, Ilana Galed, Sara Mammone, Paula Marie Pangilinan and Antonia Richards. Above, with the new honorees, are Tony Marseglia and Principal Joseph DeFalco.

HHS Juniors Nominated for Scholarships

BY NICOLE FERLISE

Hackensack High School juniors Fernanda Fajardo and Bradley Haymes have been nominated for the New Jersey Art Scholarship Competition. Their teachers nominated them because they were seen as some of the hardest working juniors in their art classes.

If chosen, Fajardo and Haymes will have the opportunity to attend a summer school program where they can share their talents with other artistically gifted students.

Haymes, a resident of Hackensack, said that he started taking art this year for the first time in several years. When he was informed of his nomination, Haymes was "happy and surprised." He has a myriad of works at home in styles ranging from abstract to architecture. Haymes said he uses some studies from real life but still strives for originality in his works. Haymes's favorite piece that he has completed is a picture of a big, blurry city. He first used colored pencils to create this piece of art then he put it into the computer and used PhotoShop on it. In the future, Haymes plans to pursue a career in architecture.

Fajardo said she was always interested in art. Although she is a junior, Fajardo is excelling in senior art classes. When asked how she felt about her nominations, Fajardo said, "just to be nominated means that we will probably get into some art colleges." Over the years, Fajardo has completed three sketch books and compiled a great portfolio. Although she likes all types of art, Fajardo especially likes including elements of Hispanic art, which she said includes the use of bright colors. "I like to keep it real, but at the same time make it different." She greatly admires the work of Colombian artist Boterto. After high school Fajardo plans to study either art or science. "Either way, I'm always going to draw," she said.

Fajardo and Haymes agreed that their teachers have been very helpful in fine tuning their art skills. Fajardo said that the teachers have helped her a lot by creating traits in her works that other students would notice and recognize as hers.

New UPS Store in Town

Photo Courtesy: Dahlia Greene

Thomas and Connie Desiderio officially opened their new UPS store at 130 W. Pleasant Ave. in Maywood.

BY DAHLIA GREENE

Thomas and Connie Desiderio realized that a full-service UPS store would benefit the residents of Maywood greatly. So on April 2, they officially opened the doors to their UPS store located at 130 West Pleasant Ave. On hand for the ribbon cutting were Maywood's Mayor Tom Richards and Councilman Dr. Tim Eustace.

In between homemade fruit punch and catered sandwiches, browsers managed to peruse the store's many services designed to make their life convenient. UPS is not just for shipping packages anymore, you can now have your mail delivered to the store through their mail. Need to send a greeting card? No problem. You can buy greeting cards from the store and mail it from there. Need notary service? They can help you with that too. You can also open a UPS house account through this location. However, the biggest convenience the store has to offer is their pack and ship program where they will pack and ship your packages for you. With UPS's reputation for on-time delivery and tracking system, you can be assured that your packages will arrive to their destination safely.

The Desiderios plan on donating 10 percent of the grand opening proceeds to Gilda's Club, a free, non-profit support community for anyone touched by cancer. Proving their commitment to community involvement.

For your convenience, the store is open Monday to Friday 8:30 a.m. - 6:30 p.m. and Saturdays from 8:30 a.m. - 4:30 p.m. They can be reached at 201-843-3009. Also look for their ad in "The County Seat".

Legal & Financial Services

A Doctor's Prescription for an Insurance Company That Won't Pay:
Hiring an Attorney at No Cost
A Case Study in Neurodiagnostic Medicine
Part 4 of a Continuing Series

BY ANTHONY L. ARGO JR., ESQ.

*The names have been changed in order to protect the patient's privacy

As I have indicated in prior articles, there exists a procedure whereby the medical practitioner may hire an attorney, at no cost, for the purpose of filing for arbitration of any auto-related medical bills, in order to compel payment. This procedure may be initiated by the medical practitioner, either to force payment for services provided or to mandate payment for previously unauthorized services. This article examines an actual case in point regarding a neurodiagnostic medicine.

John Jackson was involved in an automobile accident, which resulted in him treating with a chiropractor. The chiropractor referred the patient for an MRI, which revealed a small central disc protrusion in one area of the spine, and a minor annular disc bulge in another. Upon consultation with a neurologist, John complained of intermittent cervical pain and weakness in the left upper extremity, especially around the shoulder. He also complained of intermittent lumbar pain radiating down the leg.

Because of the persistent pain and findings consistent with multiple nerve root involvement, the neurologist thought that the patient may require more aggressive treatment. Before doing so, the neurologist knew that EMG/NCV testing would be necessary in order to better define the nerve root pathology. This would enable the doctor to make a more informed decision with regard to the treatment options, which could include epidural injections.

The problem was that the carrier denied authorization for these tests. Fortunately for the patient, the doctor performed the testing anyway, and based upon the findings, the doctor recommended a series of epidural injections. The bill for the doctor's services was submitted to my office for arbitration.

At the arbitration hearing, I relied exclusively on the doctor's records, without the need for the doctor at the hearing, and argued that the doctor hired by the insurance carrier failed to review all of the pertinent records. Most important, the initial examination was never reviewed.

The arbitrator ruled that based on all the evidence, the treating physician was in a better position to assess the patient, and issued an award compelling the carrier to pay the neurologist in full.

The neurologist was paid for all of the services she rendered, the patient received the benefit of proper medical care, in spite of the carrier's denial, and the attorney's fees and costs were paid by the insurance company.

In the context of neurodiagnostic medicine, I have personally handled several hundred cases over the past decade wherein I arbitrated neurologists' bills, and the neurologists were only involved to the point of providing copies of the patients' charts. The neurologists were not required at the hearings, and they simply awaited the results from the arbitrators. The total amount of time and involvement of the neurologists in the arbitration process was the time it took to copy the charts and to deposit the checks for the services that the carriers had previously refused to pay. When it came time for my fees to be paid, they came directly from the insurance carriers, by law.

Anthony L. Argo Jr., Esq., is a partner in the law firm of Zisa, Hitscherich & Argo, located in Hackensack, N.J.

Real Estate

Legal & Financial Services

Peewee Hockey Team

Photo Courtesy: Tom Garcia

Continued from Page 1

…eeling when it finally all comes together."

The Avalanche earned their way to the …ational tournament, which was held last …eek in Fairbanks, Alaska by winning the …SA Hockey Atlantic District title two weeks …go. There, they battled against the other top …1 USA District Champs and the hosting …laskan All Stars en route to the national title. …he Avalanche had only one loss during the …limination rounds, and had additional victo…es against other district champions from …Vashington, D.C., Dallas, Pittsburgh and …etroit. The Avalanche PeeWees also won the …tlantic Youth Hockey League during the …004-2005 season.

When asked his thoughts with regards to …he National PeeWee title, Ice House …valanche Hockey Director Dan May …esponded, "Coach Carlough has done a …reat job with this team and as the director …f the organization, I'm hoping that this is the first of many national championships. For the Avalanche to win a national championship in only our sixth year as a travel organization is pretty much unheard of."

The Ice House, established in 1997, is a state-of-the-art skating facility with four NHL specification ice surfaces. Ice House is located at 111 Midtown Bridge Approach in Hackensack. Ice House operated the Tri-State area's largest amateur youth hockey operations, including the Ice House Avalanche which is comprised of over 20 traveling all-star teams that compete at both the tier 1 and tier 2 levels of USA Hockey. In addition, the Ice House is nationally recognized for its figure skating school, which is home to the largest learn-to-skate program in the U.S., and a competitive program that includes 2002 Olympic Gold Medalists, Sarah Hughes, Elena Berezhnaja and Anton Sikharulidze. Look them up at www.icehousenj.com.

Signs of Spring at Parker

Photo Courtesy: Natalie Joy Comarato

Children in Mrs. Comarato's class showed off their reading and writing abilities with amazing creations on display.

BY NATALIE JOY COMARATO

Reading was in full "bloom" in Mrs. Comarato's second-grade classroom during Literacy Night at Parker School! The children's Signs of Spring theme transformed the classroom into a colorful, creative and unforgettable experience. The evening was filled with the joy of reading from a vast selection of wonderful literature.

Whether reading, "It's an Ant's Life" at the picnic table, complete with an actual ant farm, or sharing a "Froggy Tale" as the class tadpoles swam in their aquarium, countless visitors could be found with bright smiling faces and exciting books in their hands. Birds, butterflies, flowers, kites and sounds of nature filled the air, as parents and children of all ages became absorbed in various reading adventures.

Examples of the children's extraordinary writing talents also filled the brightly decorated bulletin boards. Spring poems, magical kite adventures and amazing ant colony creations were on display for everyone's reading pleasure. No matter the season, this night definitely proved, it's always the right time to "spring" into reading!

Fish Fry to Kick off Campaign

Photo Courtesy: Gail Vachon

BY GAIL VACHON

The Community & Recreation Team held a Fish Fry to meet and greet citizens in Hackensack and make them aware of their platform. Frederick L. Jones and Weona "Mercedez" Dean have joined forces to run for council in the May 10 election.

They feel that the city needs a community center and better parks and recreation for the residents including adding police on bicycles. They also would like to see more community involvement in the public meetings. They would be behind adding another judge to the Municipal Court. For more information on their platform call 201-487-4471.

Citizens for Change Kick off Campaign

Photo Courtesy: Citizens for Change

BY JENNIFER T. ZISA

The campaign kickoff for Citizens for Change was an incredible success. On April 2, the candidates each spoke to a crowd of about 200 people about their platform. The kickoff event took place at the Hasbrouck Heights Hilton and the turnout was unprecedented. The candidates said that they want to make the city better and have an open government in the community. If elected, they plan to have council meetings and the minutes to the meetings open to the public. For more information about Citizens for Change, visit their Web site at www.hackensacknj.info.

School Board Candidates

South Hackensack

Denise Gautier

Denise Gautier is running for a second term on the South Hackensack Board of Education. She is currently vice president and active on various committees.

She has resided in South Hackensack for over 40 years and is married to Frank and has a daughter Danielle.

She is a registered nurse employed by the Women's Health Care Group, located in Teaneck, N.J.

Her interest and goals are to continue to meet the high standards and expectations for all the students and faculty. She is also looking forward to being actively involved with all aspects of the Memorial School expansion project. "It has been my sincere pleasure of having the opportunity to serve on the Board of Education for the last three years and [I] am looking forward to helping provide another three productive and rewarding years."

Patricia Nasta

Patricia Nasta is running for her first term on the South Hackensack School Board. She and her husband, Michael, have lived in South Hackensack for 20 years. They have three children, two attend Memorial School and one attends Hackensack High School.

Nasta served as the PEO, Parent Educators Organization, as co-president for six years. She is currently a medical receptionist at a doctor's office and also teaches CCD at Immaculate Conception Parish.

"I've known and respected the members of the Board of Education for many years and am looking forward to having the opportunity to work with them."

Rochelle Park

Joe Borchard

My wife Christine and I moved onto Oak Street over two years ago. We were fortunate to buy our home from my parents who had previously owned the house for over 20 years. My father, who grew up in Rochelle Park, passed on to his family the benefits of being raised in a close-knit community. I wanted the same benefits for my family. Having Rochelle Park to call home, we started our family in January 2005, with the birth of our son Jake David.

I've been teaching in the Paterson public school system for over six years. I believe that it is important to be a life-long learner. As a result, since I graduated from the University of Scranton with a bachelor's of science, I went on to earn a master's in education from Saint Peter's College and I'm finishing a master's in administration and supervision from Caldwell College. My peers recognize my commitment to education and excellence, and have awarded me the 2004 Governor's Teacher Recognition Award. As part of my commitment to education, I'm a member of the Association of Supervision and Curriculum Development.

I want to be elected to the Board of Education because I want to be part of the education process at Midland School. It is important to give back to the community in order for a community to continue to grow. I feel that if elected to the Rochelle Park Board of Education, my educational background, thirst for academic excellence and love for our community would be an asset to our children's education.

Barbara Ann Gleeson Maurer

Barbara Ann Gleeson Maurer has been a resident of the township of Rochelle Park for the past 19 years. She is married with two children, a daughter in sixth-grade at Midland School No. 1 and a son who is a sophomore at Hackensack High School. Gleeson Maurer has served the past two years as Midland School's PTA president. She has been on the PTA Executive Board for four years and has been an active member of the PTA for 11 years. She is a member of the school's care committee and an assistant Girl Scout leader. When her son attended the Maywood Cooperative Nursery School, she served on the Board of Education to continue her dedication as a community advocate for all children assuring their rights to a quality education in a safe and healthy environment while being responsible to the taxpayers of Rochelle Park.

Hackensack

Daniel E. Kirsch

-Trustee and past president of the Hackensack Board of Education

-Vice president of the Hackensack Chamber of Commerce

-Practicing attorney, cited as "Distinguished Citizen" by the Hackensack Education Foundation

-Lifelong Hackensack resident

-Graduate of Hackensack High School, Harvard College and N.Y.U. Law School

-Married to Laura, three adult children all products of the Hackensack school system

Kirsch said, "My experience on the Board of Education has taught me this: we can improve our school system and be sensitive to our taxpayers at the same time. It is no coincidence that our school system is constantly honored as being among the most administratively elective at landing grants and scholarship funds for our students. It is the result of a hard working and dedicated Board of Education."

Francisco J. Rodriguez

-Trustee for the Hackensack Board of Education

-Partner in a New Jersey law firm

-Pro bono legal services for families of victims of the W.T.C. disaster

-Former member of the Hackensack Local Assistance Board

-Former member of the Hackensack Zoning Board of Adjustment

-Graduate, with honors, of Rutgers College and N.Y.U. Law School

-Married to his wife Lara

Rodriguez said, "My-family came to this country when I was 3-years-old. I didn't speak a word of English. I am a practicing attorney. We have a wonderful and diverse population in our community. I will make sure that every student gets the same opportunity for success that was given to me."

Carolyn D. Hayer

-Trustee for the Hackensack Board of Education

-Trustee of the Hackensack Education Foundation

-Significant P.T.A. participant and former president of Fairmount P.T.A.

-Regional office coordinator for Statewide Parent Advocacy Network

-Program coordinator for the Association for Retarded Citizens (ARC)

-Former member of the Hackensack Recreation Board

-Married to James with three children, two are currently attending the Hackensack school system

Hayer said, "I have committed my adult life to the service of our school system and our community. My three children have flourished in Hackensack schools. In the time I have served on the Board of Education, I have seen the challenges that the state has presented to local communities. To successfully meet these challenges, we must unite as one community. I will be in the forefront of that effort."

Barry Palmore

-Hackensack resident for 30 years

-Graduated from Hackensack High School

-Graduated from Virginia State University in Petersburg, Va., with a bachelor's of science in business administration

-Currently employed at Wachovia Bank as a financial center manager

-Member of the Masonic Lodge in Hackensack, N.J.

-Member of the Omega Psi Phi fraternity, Inc.

-Married with two children

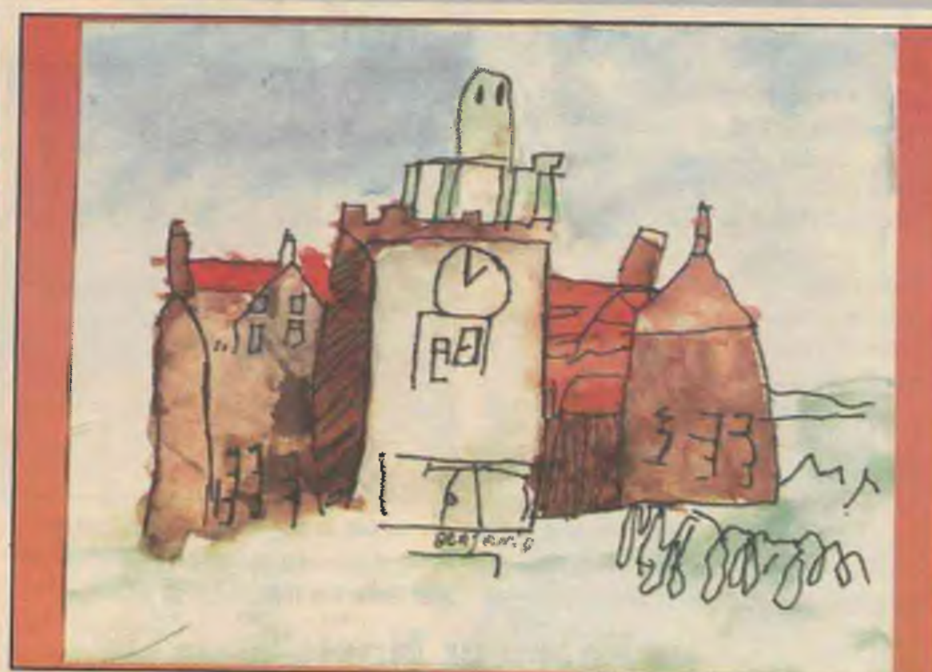
I welcome the opportunity and the challenge to participate as a member of the Hackensack Board of Education to help create positive changes in our school system.

As a board member, I will be an advocate for teachers as well as the children. Teachers are the people who we depend on to educate our children, so we as board members must be more attentive to the problems that they are facing in the classroom. Parents must be encouraged to participate more with their child's educational well-being. We must encourage our community to reach into the schools and support in whatever way they can. Administrators and board members must be willing to work harder to find real solutions to the problems we are experiencing in our school systems.

The County Seat's Art Show

First Place Winners

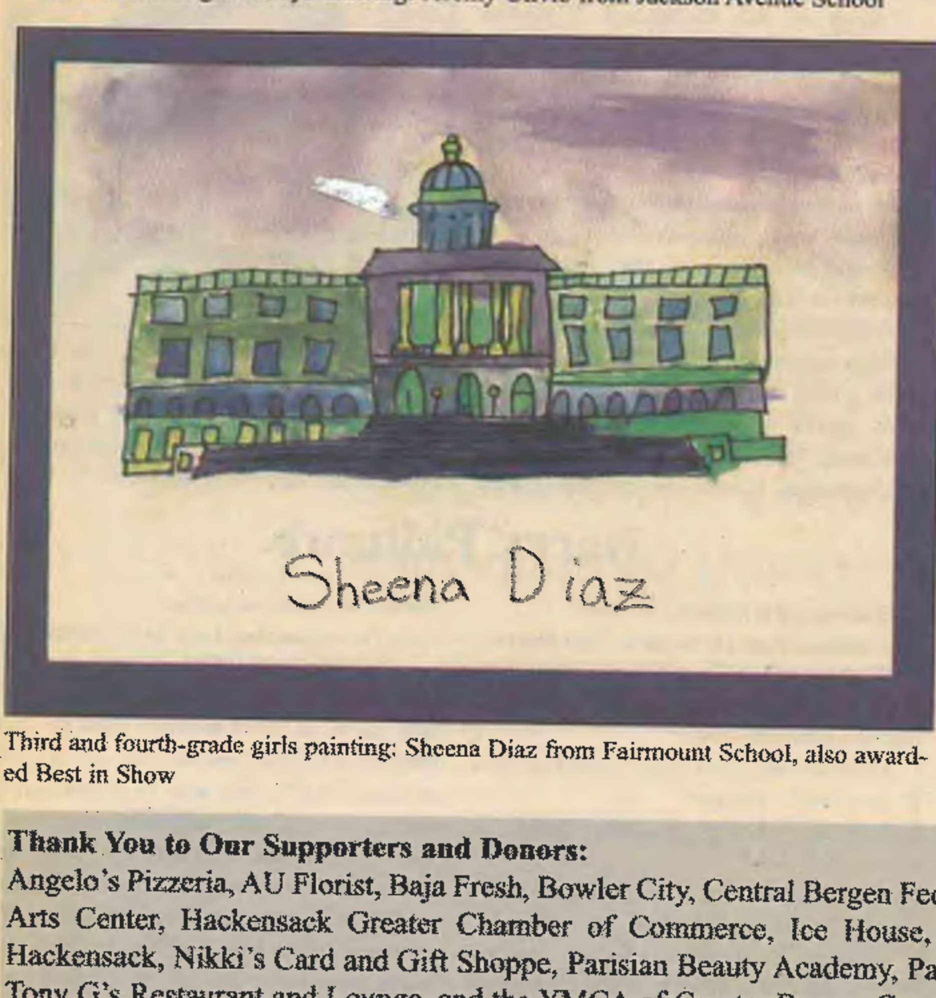
Third and fourth-grade girls drawing: Sasha Paulovich from Maywood Avenue School



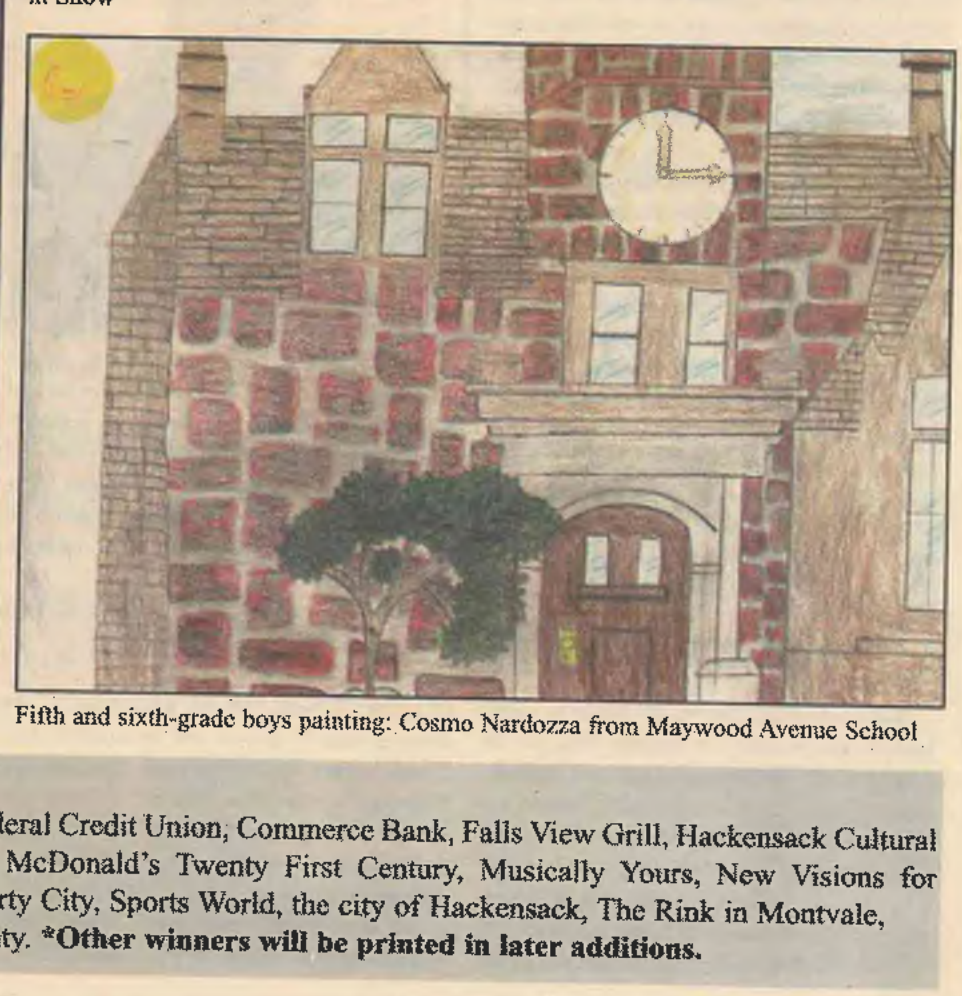
Third and fourth-grade boys painting: Benjamin Davis from Fairmount School

Third and fourth-grade boys drawing: Jeremy Olivio from Jackson Avenue School

Fifth and sixth-grade girls drawing: Susan Perls from 5ive/6ix School, also awarded Best in Show



Third and fourth-grade girls painting: Sheena Diaz from Fairmount School, also awarded Best in Show



Fifth and sixth-grade boys painting: Cosmo Nardozza from Maywood Avenue School

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'Tap Hatters'

Photo Courtesy: Mary Beth Walsh

"Tap Hatters" perform their routine while their master of ceremonies entertains the crowd with a song.

BY MARY BETH WALSH

On Fri., March 11 the senior citizen tenants of the Hackensack Housing Authority were entertained by the sensational senior dance troupe the "Tap Hatters". The "Tap Hatters" are a senior tap dancing group from the Northwest Senior Center in Midland Park, ranging in age from 60 to 86-years-old! They have been high kicking since 1992. All the seniors were bused to Keeling Manning Community Center and enjoyed light refreshments of coffee and Florence Pedi's homemade crumb cake. The "Tap Hatters" began their performance with the song "All That Jazz", from the musical "Chicago". They performed eight routines and did several costume changes. Between routines, the audience was entertained by the "Tap Hatter's" lead vocalist, who sang four songs, and their master of ceremonies, who was an excellent joke-teller. The show ran approximately one hour and in honor of St. Patrick's Day, the grand finale was a montage of Irish dance songs, each dancer had a solo spotlighting their talent. It was a wonderful show and the Housing Authority cannot wait for the ladies to come back and entertain them again.

United States National Award Winner

The United States Achievement Academy announced that Teja Carroll, of Hackensack, has been named a United States National Award winner in honor roll. This award is a prestigious honor very few students can ever hope to attain. Carroll, who attends Hackensack Middle School, was nominated for this national award by Heather Mecka, a teacher at the school. Carroll will appear in the United States Achievement Academy Official Yearbook, which is published nationally. Carroll is the daughter of Gerry and Julie Carroll, of Hackensack. The grandparents are Roy and Mary Cabibbo, of Maywood, and Claire Gibson, of Hackensack.

All-American Scholar

The United States Achievement Academy announced that Raven Crispino, of Hackensack, has been named an All-American Scholar.

The USAA has established the All-American Scholar Award program to offer deserved recognition to superior students who excel in the academic disciplines. The All-American Scholars must earn a 3.3 or higher, grade point average (GPA). Only scholars selected by a school instructor, counselor or other qualified sponsor are accepted. These scholars are also eligible for other awards given by the USAA.

Raven Crispino attends Immaculate Conception High School and was nominated for this national award by Mary Durante.

Crispino will appear in the All-American Scholar Yearbook, which is published nationally.

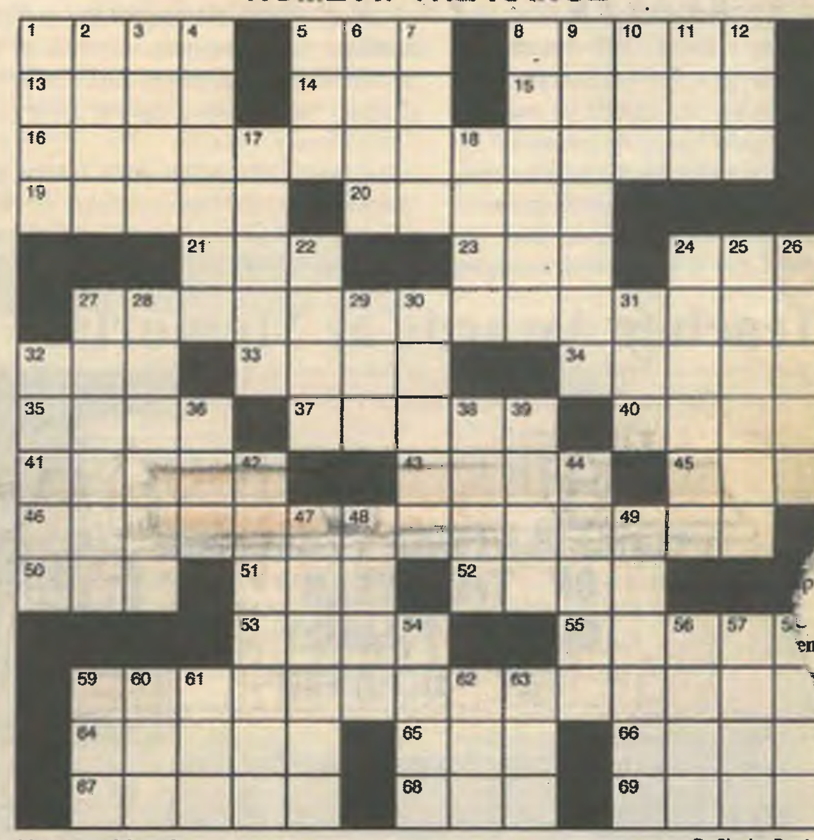
Crispino is the daughter of Toni Ann Crispino, also of Hackensack.

Photo Courtesy: The Crispino Family

Raven Crispino, of Hackensack.

Crossword Puzzle

HOME AT THE RANGE



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By Charles Preston

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15 Mod hatter Bella
16 With 27 Across, from bad to worse
19 Soda favorite
20 Island in New York Bay
21 How was ___ know?
23 Donkey
24 ___ up: indignant
27 See 16 Across
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33 Entry
34 Rota Romana ___
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37 Honor goodnaturedly
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43 Group with a common ancestor
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46 Duped the stockholders
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59 Dispassionate quality
64 Picture window
65 Disagreeably damp
66 Fill-in
67 House feature
68 Red or dead
69 ___-doke: all right

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3 Singer James
4 Minute Waltz composer
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7 Spool
8 Kind of priest
9 Infinite depths
10 Gun
11 Weather word
12 Head start?
17 Noisome
18 Off key
22 ___ about: of dates
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25 Bloopers
26 Pick on
27 Hoi ___
28 Friends: Sp.
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30 Spinachy plant
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36 Mouse shout
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42 Make over
44 Wanderer
47 Splash
48 Kingston group
49 ___ the public
54 Erin's homeland
56 Fume
57 Woe ___
58 Catch sight of
59 Monopolize
60 He's a Parseghian
61 Adam's cage
62 ___ of the land
63 Shepherd's charge

Answers on Page 2

Classifieds

Health

At Home Companions. Low cost non-medical homecare. Companions available for PT/FT and live-in. All the companions are carefully screened, speak English and drive. **Financial assistance available to veterans and their surviving spouses.** 201-525-0607.

TAHITAN NONI JUICE
For Info packet on Better Health and Healing please contact Linda A. Trulio RN 201-845-8813

Help Wanted

Hackensack Housing Authority as a Part-time bus driver. $12 per hour. Contact John Bellochio at 201-342-4280 ext 16.

Part-time receptionist, pleasant phone manner, computer literate, good customer relations. Afternoon/evening shifts. Send resume to: starlite642@yahoo.com or call 201-315-5157.

Part-time writer. Must be available nights and weekends. Hourly Compensation. Call Lauren at 201-488-5795.

Counter person to work in Deli/Bagel store. Hours 6am – 6pm part time or full time. 201-487-3378.

For Rent

Two Bedroom Apartment, near public transportation. Immediate Occupancy Available. $1,100 plus utilities. 201-342-1103.

New Apartments ready for rent in Hackensack. Garden style apartments ready May 1, Rochelle Park. For info call 201-525-1212.

Hackensack, One block from County Court House. Five offices plus large reception area. Call 201-342-1103.

Antiques Wanted

"Buying old paintings, frames, pottery. 201-487-3748, artpot@lycos.com.

Guitar Lessons

Guitar – Beginner/Intermediate tutoring – grades 4-6 Reasonable M. Catena 201-703-1570.

Cleaning Service

Portuguese Cleaning Service. 16 years experience. Call Maria at 201-991-1288.

Call 201-488-5795 to Submit Your Ad Today - Only $1 Per Word.

Amnesty International

Bergen County Academies Chapter

For the past three weeks, the student chapter of Amnesty International at the Bergen County Academies has undertaken a fundraising/awareness campaign concerning the Darfur Crisis. Students in the group have spent their lunchtimes manning an information table where green ribbons and "Save Darfur" wristbands could be purchased, along with facts about the crisis in Sudan. Monetary donations were also collected.

The effort to spread awareness about Darfur was extended by preparing an assembly for the students in the Bergen County Academies. The assembly featured a moving PowerPoint presentation consisting of striking images of Darfur refugees, as well as a word from Zahrah Masheeb and Amanda Alge, two representatives of the chapter.

This campaign hit home for many students at the Academies, especially those frustrated by international dismissal of the problem. The global community seems to have turned its back on the issue and, as a result, the public is severely uninformed about the crisis in Darfur. As President of the chapter, Leon Ratz said, "Our primary goal is to raise awareness... The more people know about this—the more people that are educated in regard to the genocide—the more people will be advised to take action."

The problem in the region of Darfur in western Sudan is arguably the most egregious display of calculated violence since the Rwandan genocide in 1994. Essentially an ethnic cleansing campaign, the situation in Darfur has received little international attention, despite its grave nature. An estimated 200,000 people have died and more than 1.6 million have been displaced from their homes, with another approximately 200,000 seeking refuge in the neighboring country of Chad.

The chapter of Amnesty International at Bergen County Academies hopes to give a voice to those suffering in Darfur. Since its inception in the spring of 2004, the BCA chapter of Amnesty International has been dedicated to raising awareness among students about humanitarian issues occurring across the globe. Past actions have included letter-writing campaigns for political prisoners of conscience, as well as an awareness campaign about a spree of sexual abuse and violence against women in Ciudad Juarez, Mexico.

For more information about Darfur and Amnesty International's "Save Darfur" campaign, please visit www.savedarfur.org or www.amnestyusa.org.

Teacher Awards at Memorial

Photo Courtesy: Ray Bauer

A district committee that involved parents, teachers, administrators, members of the Board of Education and the superintendent of schools met and selected this year's teacher award winners. Pictured is, Gloria Franco, the Memorial School recipient of the Governor's Teacher Recognition Award, and the recipient of the annual Board of Education Teacher of the Year, Patty Donovan.

Rochelle Park Hero

Photo Courtesy: Matt Hitscherich

Freeholder Tomas Padilla honors local citizen Morgan Bradley-Vilardi for her heroic life saving efforts with a plaque presented before her classmates at Midland School in Rochelle Park. Bradley-Vilardi is honored for her heroic actions when she noticed flames and smoke bellowing out of a neighbor's home. She then proceeded to inform her parents who phoned 911. In the end, Bradley-Vilardi is credited in saving the family who was unaware of the fire and proved herself as a local hero.

Beefsteak Dinner to Benefit Scholarships

Photo Courtesy: Gail Vachou

The Greater Hackensack Chamber of Commerce, along with the Hackensack Rotary and the Hackensack Lions Club, hosted a Beefsteak Dinner on April 7. The dinner helped to raise funds for these organizations for scholarships and other worthy causes. Over 100 people attended to support this effort and they were entertained by comedian Mike Eagan. Karen Sasso from Carvel won the 50/50 and donated a portion of her winnings back to the clubs.

Talent Show at Memorial School

Photo Courtesy: William DeFabiis

The Student Council of Memorial School in South Hackensack sponsored their 11th annual talent show for grades pre-kindergarten to grade three on April 1. There were more than 40 children participating in the show. The acts were varied and highlighted the many talents of our students. The audience of students, staff, parents and grandparents were all very appreciative of the performers.

Pennies for Patients at Fairmount School

Photo Courtesy: Joy Dorsey-Whiting

Fairmount students raised money to benefit the Leukemia and Lymphoma Society.

BY JOY DORSEY-WHITING

This year, Fairmount School students participated in a community service project entitled Pennies for Patients. This project, spearheaded by Linda Garafalo, a first-grade teacher, is an annual program of the Leukemia and Lymphoma Society. Pennies for Patients involves students and their families in a community of caring, raising funds to support the society's mission to cure leukemia, lymphoma, Hodgkin's disease and myeloma, and to improve the quality of life of patients and their families.

For an entire month, the children of Fairmount donated their pennies and spare change to this phenomenal cause. The children were truly motivated to collect the money and see the class totals grow on coin-mometer charts posted outside each classroom.

Fairmount School is proud to announce that $1,060 was collected. The top fundraising class was Mrs. Parke's fourth-grade class. Her class will receive a pizza party, compliments of Domino's Pizza, for their efforts. The class with the second highest total was Mrs. Albolino's kindergarten class. This class will be treated to an ice cream party. This was a lesson for all that proved that every penny counts!

Community Calendar

At the Libraries

JOHNSON LIBRARY, Gallery exhibit, "Hackensack, A Pictorial History" presented by Blue and Gold. Cases: "City Gallery Without Walls".

PRE-SCHOOL STORY HOURS ages 3 and up, Wed. 10 a.m. & 1:30 p.m., Thurs. 10 a.m., Sat. 10 a.m. Registration required.

MOTHER GOOSE TIME for child/caregiver, children under 3. Wed., Thurs., Sat. 11:15 a.m. Registration required. Call for dates.

BOOK BINGO April 29.

ARTS AND CRAFTS at 3:30 p.m., April 19 "Flower Pot Beadie". For ages 9 and up.

SPRING BREAK SPECIALS at 2:30 p.m., April 25 "Puzzle Day", April 26 "Earth Day Scavenger Hunt", April 27 Movie: "SpongeBob Squarepants", April 28 "Spring Critter Craft". Registration required.

SATURDAY FILMS at 2 p.m., April 16 "Ella Enchanted", April 23 "Shark Tale" & April 30 "Thunderbird".

For info on all programs call the Johnson Library at 201-343-4169.

MAYWOOD LIBRARY

COUPON BOOKFAIR sponsored by the F.O.L. and held at Walden Books in Paramus Park Mall from April 18 – May 7. Coupons for 10 percent & additional info call 201-843-6003 or 201-845-5149.

F.O.L. MEETING on April 27 at 7:30 p.m. in the Trinka Meeting Room.

At the Meadowlands

NOWHERE WITH NO AIR for ages 10 – 12 on April 17 at 1 p.m. Conduct experiments to learn the properties of air and do a little flying with a kite. $10 for 1 adult with child, $5 additional participant. $8 for members. Pre-registration required call 201-460-8300 or visit www.njmeadowlands.gov/ec.

EARTH DAY on April 23 from 10 a.m. – 2 p.m. for all ages. Celebrate the 35th anniversary with guided tours and dip-netting, build a bug with recycled materials and make note cards and origami figures with recycled paper. Free! Walk-ins welcome. For info call 201-460-8300 or visit www.njmeadowlands.gov/ec.

APRIL SHOWERS BRING MAY FLOWERS for ages 8 – 10 with adult on April 30 at 10 a.m. Plant your own flowers to take home and explore rain, rainbows and make a rain stick. $10 for 1 adult with child, $5 additional participant. $8 for members. Pre-registration required call 201-460-8300 or visit www.njmeadowlands.gov/ec.

Arts & Entertainment

April 15 PARAMUS

The George Stickel Festival of Moving Images held at BCC in the Student Center Movie Theatre at 8 p.m. For info call 201-493-3507 or 201-447-7200.

April 15 – 17 TEANECK

Murder on the Nile by Agatha Christie will be performed at FDU in the Russell Ratsch Experimental Theater at 8 p.m. and 2 p.m. on April 17. Tickets are $8 and $3/seniors. For ticket info call 201-692-7028.

April 15 – 17, 22 – 24 PARAMUS

"Present Laughter" a Noel Coward play will be performed at BCC in the Anna Maria Ciccone Theatre Fri. and Sat. at 8 p.m. and Sun. at 3 p.m. Tickets are $10, $5/students/seniors. For info call 201-447-7428.

April 23 HACKENSACK

Comedy Show starring Richard Belzer at Dinallo's Stony Hill Inn at 6:30 p.m. Tickets are $125 including dinner and show. For tickets call 201-342-4085.

April 29 PARAMUS

Just a Jersey Guy 2, More Altano Tales from the Heartland presented by Storyteller Brian Altano at BCC in the Anna Maria Ciccone Theatre at 7:30 p.m. For ticket info call 201-447-7428 or visit www.bergen.edu.

Business & Networking

April 16 TENAFLY

Murder Mystery Dinner and silent auction fundraiser sponsored by NJAWBO held at the Clinton Inn. Advance registration required. For info call 201-541-9702.

April 22 GARFIELD

Hispanic Business Council Scholarship Gala held at the Venetian from 6:30 – 11:30 p.m. For ticket info call 201-487-1770.

April 27 WASHINGTON TOWNSHIP

CIANJ Staff Recognition Luncheon featuring the Amazing Kreskin held at Seasons from 11:30 a.m. – 2 p.m. Tickets are $55/members & $70/non-members. For reservations call 201-368-2100.

May 3 SADDLE BROOK

Business Expo 2005 sponsored by the Greater Hackensack Chamber of Commerce held at the Holiday Inn & Conference Center from 5:30 – 8:30 p.m. Vendors may register by April 22 by contacting the Chamber at 201-489-3700 or download the registration from www.hackensackchamber.org.

Classes for All Ages

Throughout the Month ROCHELLE PARK

Dance Lessons every Mon. at American Legion Hall at 33 W. Passaic St. from 7 – 9 p.m. $2.50 per class. For info call 201-843-1326.

Throughout the Month ROCHELLE PARK

Dance Lessons every Tues. from 10:30 a.m. – 3:30 p.m. at the Knights of Columbus, 235 Rochelle Ave. Cost is $10/includes lunch. For info call Sal's "Twosdays" at 201-592-8535.

Throughout the Month HACKENSACK

Citizenship Classes at the Johnson Library, Mon. 10 – 11 a.m. If interested, please see Isaac Annan at the reference desk or call 201-343-4169 ext. 21.

English as a Second Language Weds. 9:30 – 10:30 a.m. For info call Corey Fauer at 201-343-4169 ext. 19.

April 16 PARAMUS

Open House for Children's "Summer in Motion" Program at BCC from 10 a.m. – noon in room 128 in the Technology Ed Center. For free info on the summer programs for children ages 7 – 14 in science and the arts call 201-447-7488.

April 16 RIDGEWOOD

YWCA In-person Registration starting at 8 a.m. for all programs running April 24 – June 18. For a free brochure call 201-444-5600 ext. 341 or visit www.ywcabergencounty.org.

Lectures & Information

April 16 PARAMUS

"Security and the Future" with Tom Ridge Former Secretary – Homeland Security at BCC Gymnasium at 7 p.m. Tickets are $15. For info call 201-447-7428.

April 17 HACKENSACK

S.A.F.E. Workshops for Teens and Parents offered by BC Executive Dennis McNerney, the Dept. of Human Services and the Junior Commission on the Status of Women held at the BC Administration Building from 10 a.m. – 3:30 p.m. For info call 201-836-1234.

April 19 PARAMUS

Maya Angelou, author, poet will speak at the Bergen Community College gymnasium at noon. Free and open to the public. For info call 201-447-7215 or visit www.bergen.edu.

April 20 HACKENSACK

"Laughter Meditation" with Ira Brandwein presented by Gilda's Club at 575 Main St. from 6:30 – 7:30 p.m. For info call 201-457-1670 or visit www.gildasclubnj.org.

April 21 PARAMUS

"The Nuremberg Trials" with Holocaust remembrance speaker, John Q. Barrett. Held at BCC Technology Ed Center at 11 a.m. For info call 201-447-7200 or visit www.bergen.edu.

April 22 HACKENSACK

Soccer Clinic for Hackensack Jr. Soccer Assoc. & Hackensack Royals' players & coaches from 6 – 7:30 p.m. at Johnson Park Field. Wear your team's uniform and bring a soccer ball. For more info contact Ralph Contini at 201-960-7131 or e-mail raccpa1021@aol.com.

April 23 ALLENDALE

Eco-Walk at the Celery Farm Natural Area hosted by the FYKE Nature Association and the Hackensack Riverkeeper. For directions and reservations call 201-968-0808 or e-mail hugh@hackensackriverkeeper.org.

April 24 FORT LEE

20th Annual Hooked on the Hudson at the Palisade Interstate Park hosted by the Hudson River Fisherman's Association from 10 a.m. – 2 p.m. For info visit www.hackensackriverkeeper.org.

April 25 PARAMUS

Mona Charen, syndicated columnist, will speak at BCC in the Technology Ed Center at 12:30 p.m. For info call 201-447-7215.

April 28 PARAMUS

Dr. Kenneth Silver, creative author and art historian will speak at BCC in room A-104 at 12:30 p.m. For info call 201-447-7215.

April 28 RAMSEY

Information Night on Tahitian Noni Juice held at the Tiffany Diner on Rt. 17 S. at 8 p.m. For info call 201-845-8813.

Organizations

First Monday of Every Month MAYWOOD

Maywood 4th of July Committee will hold their meetings at 7:30 p.m. at the American Legion Post 142, 135 East Passaic St. For info call 201-868-2449.

First Wednesday of Every Month BERGENFIELD

The Widow & Widowers Club of Northern Valley meets for dancing, refreshments and new friends at the VFW Hall, 321 S. Washington Ave., from 7:30 – 10:30 p.m. For info call 201-664-2195 or 201-384-3294.

Beginning in April HACKENSACK

Support Group for Women ages 21 – 65 who are functional survivors of abuse. For info call "Moving Beyond" at 201-996-0363.

April 17 ROCHELLE PARK

Pancake Breakfast held at the American Legion Post 170 at 33 W. Passaic St. from 8:30 – 11 a.m. Cost is $3. For info call 201-843-9683.

April 19 – 20 HACKENSACK

Open House for YMCA of Greater Bergen County for the summer camping program at 7:30 p.m. at 360 Main St. For info on all programs call 201-487-6600.

April 19 TEANECK

YWCA Rape Crisis Center holds a Survivors' Poetry Reading, "Recovering from Sexual Victimization" at FDU Student Union Building from 7 – 9 p.m. For more info call 201-487-2227.

April 19 HACKENSACK

Red Cross Blood Drive at 345 Union St. from 2 – 7 p.m. For info or appointments call 201-652-3210 ext. 3748.

April 21 – 22 HACKENSACK

Rummage Sale sponsored by the Second Reformed Church from 10 a.m. – 7 p.m. & Sat. 10 a.m. – noon. For info call 201-343-7550.

Religious

April 17, 24, 30 MAYWOOD

Reconstructionist Temple Beth Israel located at 34 W. Magnolia presents: April 15 Musical Shabbat. April 17 Pre-Passover workshop free for members, $15/per household for non-members at 11:30 a.m. April 24 Two Community seders at RTBI at 5:30 p.m. Either dinner is $40/adults, $20/children, $5/youngsters. For reservations call 201-567-4411. April 30 Yizkor services at 10 a.m. Call about Beit Midrash services and discussion. For info call 201-845-7500.

Schools

Throughout the Month USR

YWCA Rodie ChildCare Center Fall Registration accepting applications. For info on their all day kindergarten call 201-236-3126 or visit www.ywcabergencounty.org.

Special Events

April 15 MAYWOOD

Game Night at Zion Lutheran Church at 120 E. Pleasant Ave. from 7 – 10 p.m. All youth fifth-grade and up are welcome. For info call 201-646-0333.

April 15 HACKENSACK

Fairmount School 50s Sock Hop from 7 – 9 p.m. For info call 201-646-7890.

April 16 MAYWOOD

Maywood and Rochelle Park Opening Day of Softball held at Maywood Ave. School from 10:30 a.m. – 12:30 p.m. For info call 201-843-3863.

April 16 LYNDHURST

Canoe Trip at 10 a.m. at Mill Creek. For info on all NJMC boat tours call 201-460-4640.

April 17 HARRIMAN STATE PARK

YMCA Spring Hike at Harriman State Park at 8:45 a.m. Six-hour hike for adults and children. For info or directions call 201-487-6600.

April 17 BRANCH BROOK PARK

Essex County Bloomfest featuring Japanese cultural activities, arts, crafts, family fun under the newly bloomed cherry blossoms. Free from 11 a.m. – 5 p.m. For info call 973-268-3500 ext. 4.

April 17 MAYWOOD

Maywood Seniors Spring Luncheon sponsored by The Crossroads Community Church at the Senior/Recreation Building from 1 – 3 p.m. For info call 201-368-1522.

April 17 LEONIA

River Cleanup at Overpeck Park sponsored by the Hackensack Riverkeeper from 10 a.m. – 4 p.m. For info visit www.hackensackriverkeeper.org.

April 19 HACKENSACK

Celebrate Volunteers Recognition Event held at Bergen County Academies Auditorium. For reservations call 201-489-9454 or e-mail info@bergenvolunteers.org.

April 22 HACKENSACK

Earth Day Open House and Adirondack Pack Boat Raffle Drawing sponsored by the Hackensack Riverkeeper held at 231 Main St. from 2 – 6 p.m. For info visit www.hackensackriverkeeper.org.

April 23 BRANCH BROOK PARK

Essex County Cherry Blossom Bike Tour from 8 a.m. – 2 p.m. To sign up call 973-744-7252.

April 26 PARAMUS

Third Annual Cultural Arts Award Reception and "Person of the Year Award" presented by the Bergen Museum and held at Chakra. Cost is $50. For ticket info call 201-291-8848.

April 29 HACKENSACK

Softball Game for Tomorrow's Children Fund with Fairleigh Dickinson University playing Hackensack Target Store at 6 p.m. at FDU's Softball Field. Greg T with Z-100 will be on hand and Trikey Tray raffles, a 50/50, children's crafts and refreshments will be available. For more info call 201-692-2424.

April 30 LIBERTY STATE PARK

Walk for Liberty State Park from 10 a.m. – 1 p.m. For info visit www.folsp.org.

May 2 HAMBURG

Golf Outing sponsored by Central Bergen Credit Union to benefit the Rocco Montesano Scholarship Fund. Held at Wild Turkey with registration at 11:15 a.m. and tee-off at 1 p.m. Cost is $145. For info visit www.centralbergen.org.

Trips

April 26 HACKENSACK

"Red Hot Mamas" sponsored by AARP Chapter No. 418. For info call 201-288-1693.

ATTACHMENT 2

STORM DRAIN INLET MARKER


NO DUMPING
DRAINS TO RIVER

ATTACHMENT 3

STORM DRAIN INLET LABELING MAP

MALCOLM PIRNIE

City of Hackensack
Hackensack, New Jersey
Hackensack Stormwater and Combined Sewers

Malcolm Pirnie, Inc.

APRIL 28, 2005

ATTACHMENT 4

PET WASTE POLLUTES OUR WATERS BROCHURE

Pet Waste Pollutes Our Waters

What You Can Do To Help Protect Our Water

Clean and plentiful water is important to our families, our environment, our economy and our quality of life.

Did you know that animal waste from pets can pollute our waters? When left on the ground, pet waste is washed by rain and melting snow and ice into storm drains that carry it to our rivers, lakes, the ocean and drinking water.

Animal waste contains a high concentration of nutrients as well as bacteria and disease-causing microorganisms that can cause problems.

What you can do

Pet owners or anyone who takes your pet for walks must properly dispose of the waste by picking it up, wrapping it and either placing it in the trash or flushing it unwrapped down the toilet.

Your municipality is required to adopt and enforce local pet-waste laws. At a minimum, your community must require that pet owners or their keepers **immediately** and **properly** dispose of their pet's solid waste deposited on **any public or private property not owned or possessed by that person.** People with assistance animals such as Seeing Eye dogs are exempt.

Make sure you know what your municipality requires – and follow it.

Thank you for doing your part to keep New Jersey's waters clean.

For more information, please contact the following:

New Jersey Department of Environmental Protection
Division of Water Quality
Bureau of Nonpoint Pollution Control
Municipal Stormwater Regulation Program
(609) 633-7021

Visit www.njstormwater.org or www.nonpointsource.org

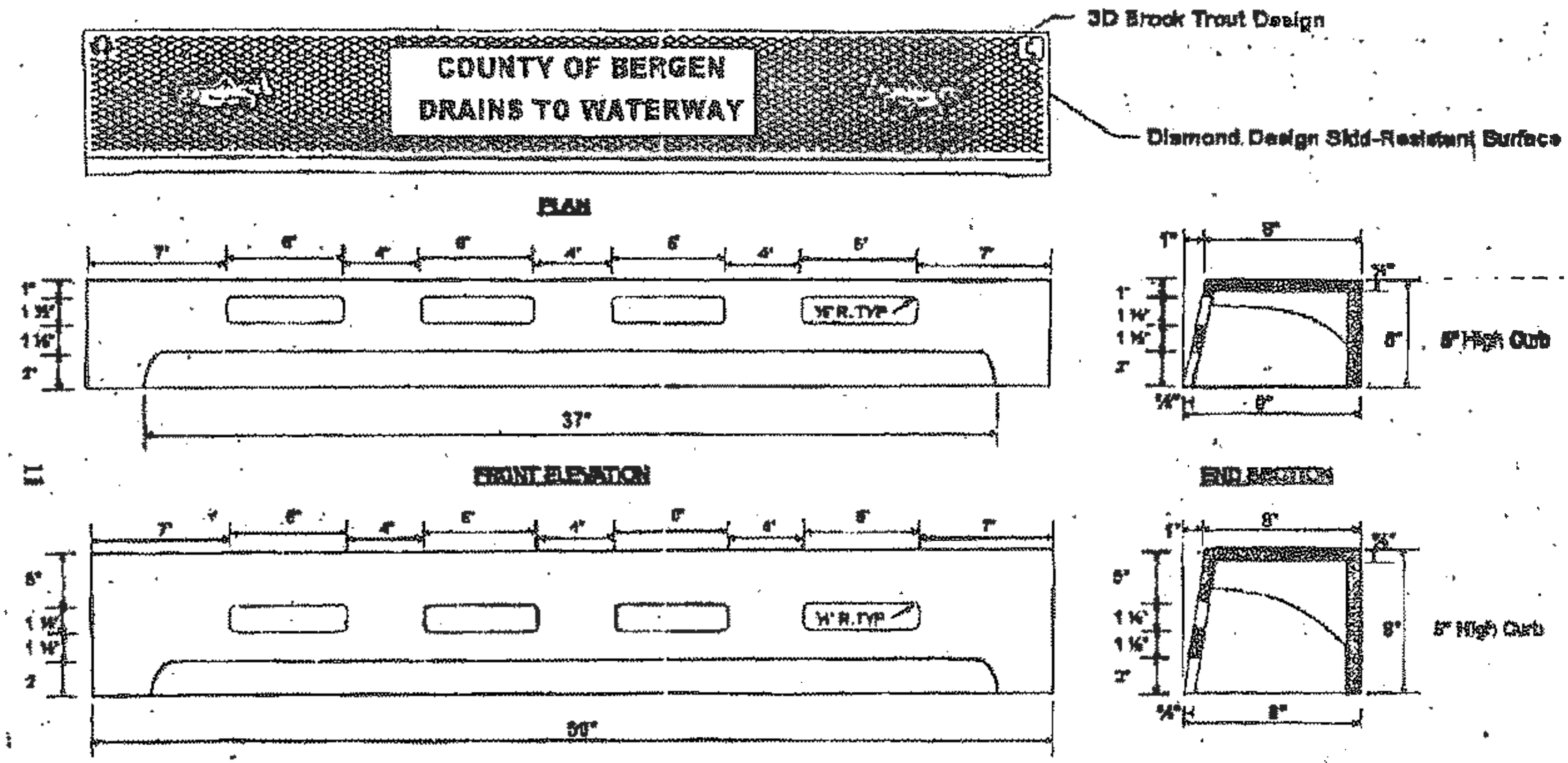
Additional information is also available at U. S. Environmental Protection Agency Web sites www.epa.gov/npdes/stormwater or www.epa.gov/nps

ATTACHMENT 5

SAMPLE STORM DRAIN INLET SPECIFICATIONS

2618-BC

Curb Piece
Type 'N-Eco-Bergen County'



NOTES:

1. MATERIAL: Gray Cast Iron ASTM A48-83, Class 30B;
2. In retrofit situations this curb piece (head) will fit existing CAMPBELL FOUNDRY CO. manufactured curb inlets for NJDOT Types B, B-1, B-2, D, D-1, and D-2;
3. Nameplate message can be modified to your specific needs within area shown;
4. Casting supplied without surface coating.

CAMPBELL FOUNDRY COMPANY
Harrison, N.J. 07029
Phone: 973-483-5480 FAX: 973-483-1843

06/09/2003	www.campbellfoundry.com	

Curb Piece type 'N-Eco-Bergen County'

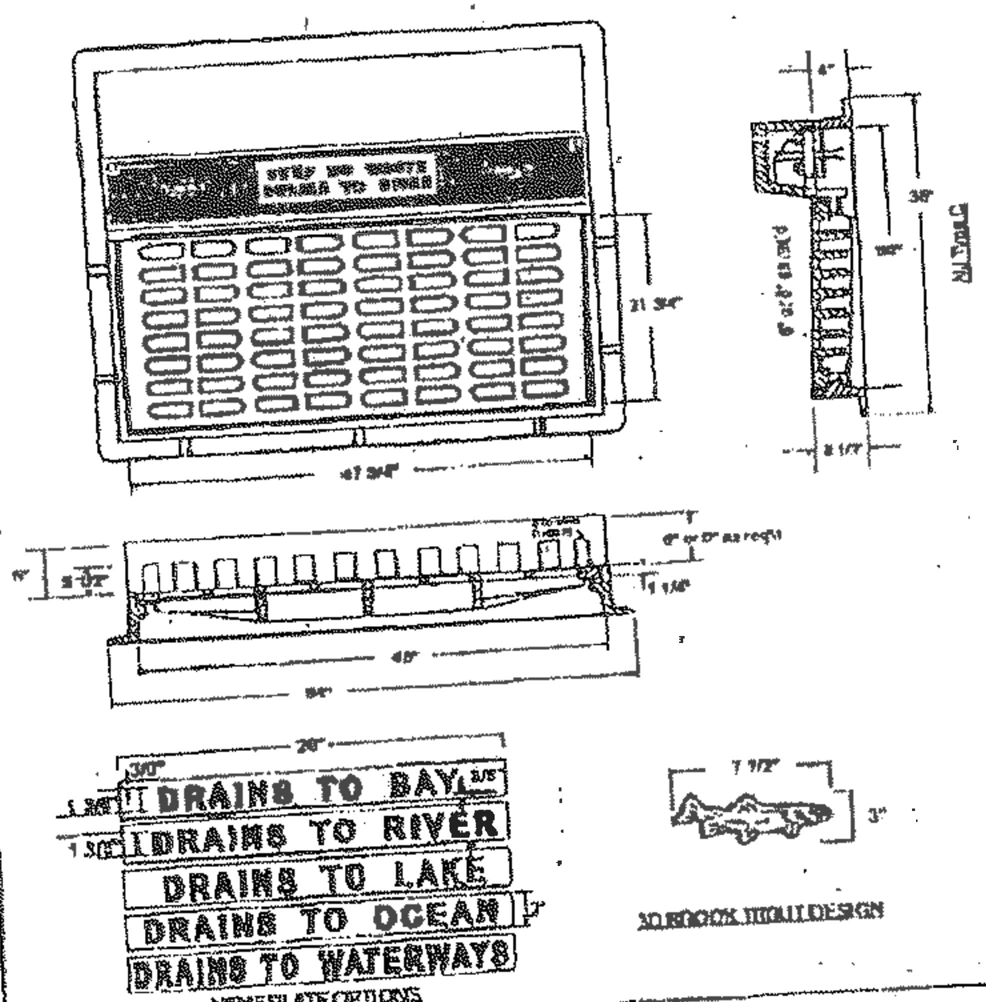
Pattern Number: 2618-BC

Att: John

3 pages

2618

Curb Inlet with Bicycle Safe Grate and type "J" - Eco Curb Piece

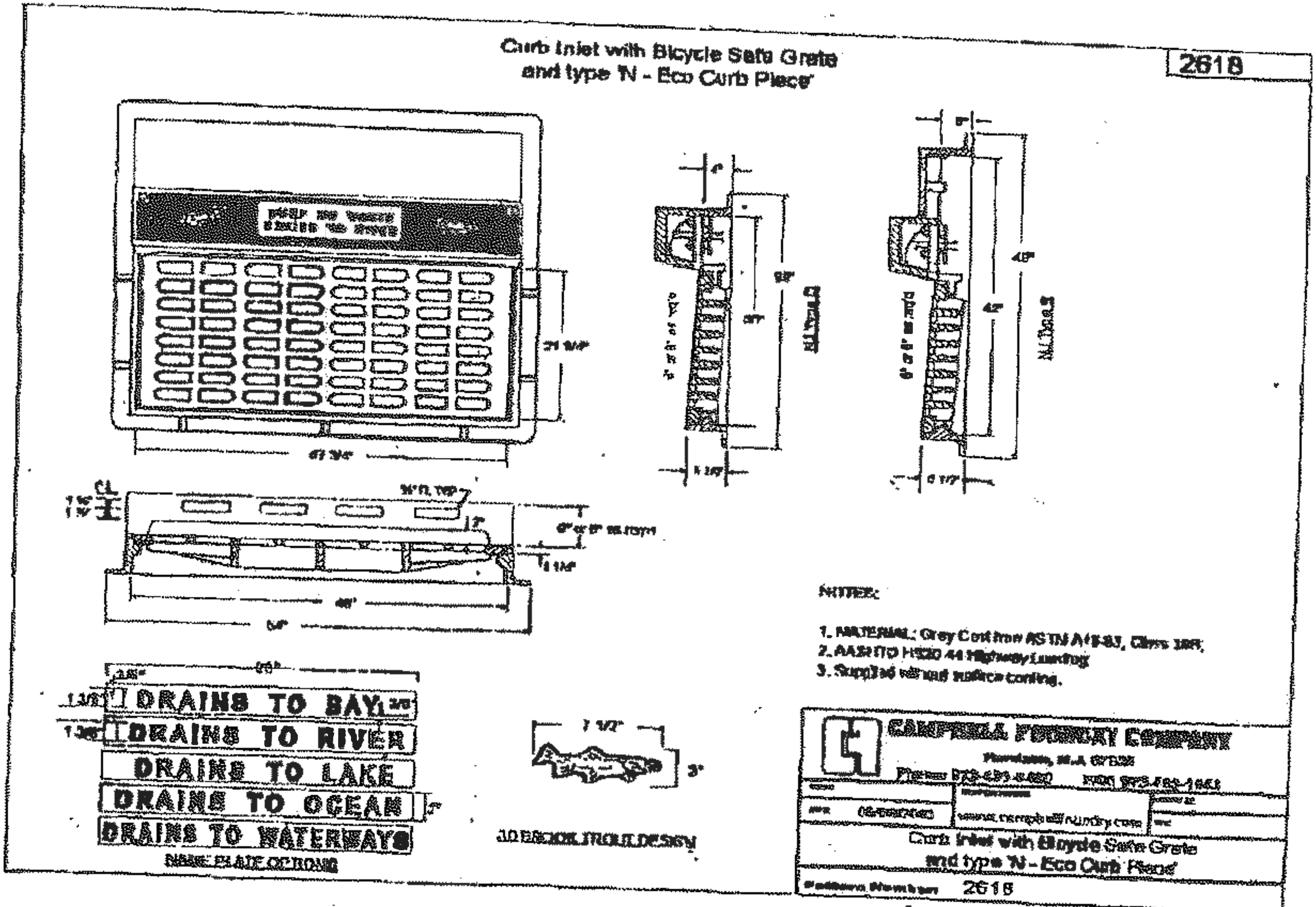


OR PLAIN

NOTES:

1. MATERIAL: Gray Cast Iron ASTM A48-83, Class 35B;
2. AASHTO HS20-44 Highway Loading;
3. Supplied without surface coating.

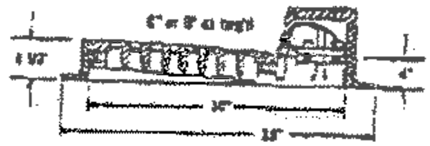
CAMPBELL FOUNDRY COMPANY
Harrison, N.J. 07029
Phone 973-483-5480 FAX 973-483-1843
www.campbellfoundry.com
09/08/2003
Curb Inlet with Bicycle Safe Grate and type "J" - Eco Curb Piece
Pattern Number 2618


Curb Inlet with Bicycle Safe Grate
and type 'N - Eco Curb Piece'
2618
NOTES:
1. MATERIAL: Grey Cast Iron ASTM A48-83, Class 35B;
2. AASHTO HS20-44 Highway Loading
3. Supplied without surface coating.
DRAINS TO BAY
DRAINS TO RIVER
DRAINS TO LAKE
DRAINS TO OCEAN
DRAINS TO WATERWAYS
NAME PLATE OPTIONS
10 BROOK TROUT DESIGN
7 1/2"
3"
CAMPBELL FOUNDRY COMPANY
www.campbellfoundry.com
Curb Inlet with Bicycle Safe Grate
and type 'N - Eco Curb Piece'
2618

CAMPBELL FOUNDRY COMPANY
Harrison, N.J. 07029
Phone: 973-483-5480 FAX: 973-483-1843
NY 212.732.3714 CT 203.288.7884

Easy Order Form

Step 1 Select Catch Basin Type.



TYPE D #2617 ☐

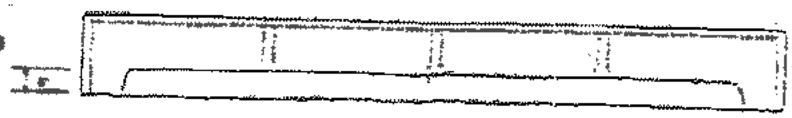
TYPE B #2848 ☐

Step 2 Select Curb Design.

TYPE N

☐

TYPE P



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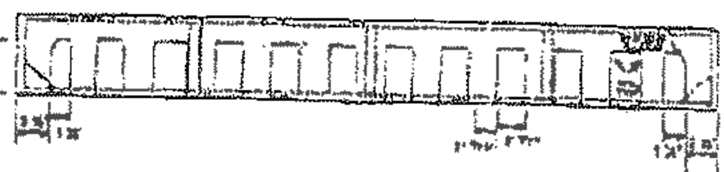
TYPE F

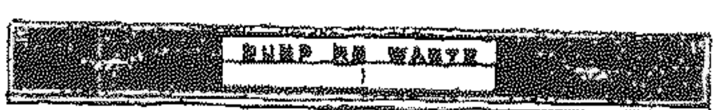


☐

Step 3 Select Curb Height.

8" ☐ 9" ☐

Step 4 Select Curb Markings.



DRAINS TO BAY ☐

DRAINS TO LAKE ☐

DRAINS TO OCEAN ☐

DRAINS TO RIVER ☐

DRAINS TO WATERWAYS ☐

ATTACHMENT 6

STREET SWEEPING SCHEDULE

NORTH ROUTE
Thursday 7am – 10am

Start at Pine St. and Spring Valley Ave. –

Pine St. <u>SOUTH</u> to Ross Ave.,
RIGHT on Ross Ave. to Prospect Avenue North,
RIGHT on Prospect Avenue North to Spring Valley Ave.,
RIGHT on Spring Valley Ave. to Pine St.,
LEFT on Pine St. to Catalpa Ave.,
RIGHT on Catalpa Ave. to Main St.,
LEFT on Main St. to Willow Ave.,
LEFT on Willow Ave. to Krone Pl.,
LEFT on Krone Pl. to Ross Ave.,
RIGHT on Ross Ave. to Herman St.,
RIGHT on Herman St. to South Lake Dr.,
LEFT on South Lake Dr. to Louis St.,
LEFT on Louis St. to Ross Ave.,
UTURN to Fairmount Ave.,
LEFT on Fairmount Ave. to Wilson St.,
RIGHT on Wilson St. to South Lake Dr.,
UTURN, Wilson St. <u>SOUTH</u> to Coles Ave.,
RIGHT on Coles Ave. to Lincoln St.,
RIGHT on Lincoln St. to End,
UTURN, Lincoln St. <u>SOUTH</u> to Elm Ave.,
RIGHT on Elm Ave. to Summit Ave.,
LEFT on Summit Ave. to Fairmount Ave.,
RIGHT on Fairmount Ave. to Allen St.,
RIGHT on Allen St. to Davis Ave.,
RIGHT on Davis Ave. to Summit Ave.,
LEFT on Summit Ave. to End.

NORTH ROUTE
Thursday 9am – 12 Noon

Start at Dead End Summit Ave. –

Summit Ave SOUTH to Passaic St.
RIGHT on Passaic St. to Byrne St.,
RIGHT on Byrne St. bear right to Brook St.,
Brook St. to Byrne St.,
Byrne St. SOUTH to Passaic St.,
LEFT on Passaic St. to Summit Ave.,
RIGHT on Summit Ave. to Central Ave.,
LEFT on Central Ave. to Third St.,
LEFT on Third St. to High St.,
RIGHT on High St. to Railroad Place,
LEFT on Railroad Pl. to Clay St.,
LEFT on Clay St. to First St.,
RIGHT on First St. to Berdan Pl.,
RIGHT on Berdan Pl. to W. Railroad Ave.,
UTURN, Berdan Pl. WEST to First St.,
LEFT on First St. to Clay St.,
RIGHT on Clay St. to Third St.,
RIGHT on Third St. to James St.,
RIGHT on James St. to W. Railroad Ave.,
LEFT on W. Railroad Ave. to Berry St.,
LEFT on Berry St. to DeWolf Pl.,
UTURN, Berry St. EAST to Haynes St.,
LEFT on Haynes St. to Stanley Pl.,
LEFT on Stanley Pl. to End,
UTURN, Stanley Pl. EAST to W. Railroad Ave.,
LEFT on W. Railroad Ave. to Passaic St.,
RIGHT on Passaic St. to Park St.,
LEFT on Park St. to Conklin Pl.,
RIGHT on Conklin Pl. to Union St.,
RIGHT on Union ST. to Berry St.,
RIGHT on Berry St. to E. Railroad Ave.,
LEFT on E. Railroad Ave. to Clay St.,
LEFT on Clay St. to State St.

SOUTH Thur. 7am-10am

Start Hudson St. and Broadway – Broadway WEST to Grove St.,
UTURN, Broadway to New St.,
LEFT on New St. to Campbell Ave.,
LEFT on Campbell Ave. to S. State St.,
LEFT on S. State St. to English St.,
RIGHT on English St. to Cleveland Street,
RIGHT on Cleveland St. to Lexington Ave.,
LEFT on Lexington Ave. to Green St.,
LEFT on Green St. to King St.,
LEFT on King St. to McKinley St.,
RIGHT on McKinley St. to Lodi St.,
RIGHT on Lodi St. to South St.,
LEFT on South St. to Jersey Pl.,
RIGHT on Jersey Pl. to Green St.,
RIGHT on Green St. to Lodi St.,
RIGHT on Lodi St. to Jackson Ave.,
UTURN, Lodi St. WEST to S. Main St.,
LEFT on S. Main St. to Troast St.,
RIGHT on Troast St. to S. State St.,
LEFT on S. State St. to Pink St.,
LEFT on Pink St. to Jackson Ave.,
RIGHT on Jackson Ave. to Lafayette Ave.,
LEFT on Lafayette Ave. to Hudson St.,
RIGHT on Hudson St. to Frederick St.,
RIGHT on Frederick St. to S. Main St.,
LEFT on S. Main St. to W. Franklin St.,
LEFT on W. Franklin St. to Old Hoboken Rd.,
RIGHT on Old Hoboken Rd. to Blauvelt Pl.,
LEFT on Blauvelt Pl. to Jackson Ave.,
LEFT on Jackson Ave. to Franklin St.,
RIGHT on Franklin St. to Hudson St.,
RIGHT on Hudson St. to E. Moonachie Rd.,
LEFT on E. Moonachie Rd. to River St.,

LEFT on River St. to Henry Pl.,
LEFT on Henry Pl. to Hudson St.,
RIGHT on Hudson St. to Pulaski Pl.,
RIGHT on Pulaski Pl. to River St.,
UTURN, Pulaski Pl. to Hudson St.,
RIGHT on Hudson St. to Shafer Pl.,
RIGHT on Shafer Pl. to River St.,
UTURN, Shafer Pl. to Hudson St.,
RIGHT on Hudson St. to E. Kennedy St.,
RIGHT on E. Kennedy St. to River St.,
LEFT on River St. to Bank St.,
LEFT on Bank St. to Hudson St.,
RIGHT on Hudson St. to Water St.,
RIGHT on Water St. to River St.,
UTURN, Water St. to Hudson St.,
RIGHT on Hudson St. to E. Lafayette
RIGHT on E. Lafayette St. to River St.,
UTURN, E. Lafayette to Hudson St.,
RIGHT on Hudson St. to Marion St.,
RIGHT on Marion St. to River St.,
UTURN, Marion St. to Hudson St.,
RIGHT on Hudson St. to E. Broadway,
RIGHT on E. Broadway to River St.,
LEFT on River St. to Van Wettering,
LEFT on Van Wettering to Hudson St.,
UTURN, Van Wettering to River St.,
LEFT on River St. to East Kansas St.,
LEFT on E. Kansas St. to Green St.,
RIGHT on Green St. to Essex St.,
RIGHT on Essex St. to Union St.,

SOUTH Thur. 9am-12 Noon

LEFT on Union St. to John St.,
LEFT on John St. to E. Railroad Ave.,
RIGHT on E. Railroad Ave. to Sussex St.,
RIGHT on Sussex St. to Union St.,
LEFT on Union St. to Ames St.,
LEFT on Ames St. to E. Railroad Ave.,
RIGHT on E. Railroad Ave. to Atlantic St.,
RIGHT on Atlantic St. to Union St.,
LEFT on Union St. to Lawrence St.,
LEFT on Lawrence St. to E. Railroad Ave.,
RIGHT on E. Railroad Ave. to Ricardo Pl.,
RIGHT on Ricardo Pl. to Park St.,
LEFT on Park St. to Gamewell St.,
RIGHT on Gamewell St. to Union St.,
UTURN, Gamewell St. to E. Railroad Ave.,
RIGHT on E. Railroad Ave. to Central Ave.,
RIGHT on Central Ave. to State St.,
RIGHT on State St. to Trinity Pl.,
RIGHT on Trinity Pl. to Union St.,
LEFT on Union St. to Lawrence St.,
LEFT on Lawrence St. to State St.,
RIGHT on State St. to Atlantic St.,
RIGHT on Atlantic St. to Union St.,
LEFT on Union St. to Ames St.,
LEFT on Ames St. to State St.,
RIGHT on State St. to Sussex St.,
RIGHT on Sussex St. to Union St.,
LEFT on Union St. to DeWitt Pl.,
LEFT on DeWitt Pl. to State St.,
RIGHT on State St. to Essex St.,
RIGHT on Essex St. to Polifly Rd.,
LEFT on Polifly Rd. to Kaplan Ave.,
RIGHT on Kaplan Ave. to Summit Ave.,

LEFT on Summit Ave. to Parker Ave.,
LEFT on Parker Ave. to Polifly Rd.,
UTURN, Parker Ave. to Longview Ave.,
LEFT on Longview Ave. to Simons Ave.,
RIGHT on Simons Ave. to Summit Ave.,
LEFT on Summit Ave. to Sutton Ave.,
LEFT on Sutton Ave. to Polifly Rd.,
RIGHT on Polifly Rd. to Marvin Ave.,
RIGHT on Marvin Ave. to Summit Ave.,
LEFT on Summit Ave. to Standish Ave.,
LEFT on Standish Ave. to Polifly Rd.,
RIGHT on Polifly Rd. to Lodi St.,
LEFT on Lodi St. to Railroad Tracks,
UTURN, Lodi St. West to Kenneth St.,
LEFT on Kenneth St. to Elleen Ter.,
RIGHT on Elleen Ter. to Polifly Rd.,
RIGHT on Polifly Rd. to Mary St.,
RIGHT on Mary St. to Kenneth St.,
LEFT on Kenneth St. to Daniel St.,
LEFT on Daniel St. to Polifly Rd.,
RIGHT on Polifly Rd. to Charles St.,
RIGHT on Charles St. to Kenneth St.,
LEFT on Kenneth St. to Lodi St.,
LEFT on Lodi St. to Polifly Rd.,
LEFT on Polifly Rd. to Mary St.,
RIGHT on Mary St., to Summit Ave.,
RIGHT on Summit Ave. to Marvin Ave.,
LEFT on Marvin Ave. to End,
UTURN, Marvin Ave. EAST to Rowland Ave.,
LEFT on Rowland Ave. to Sutton Ave.,
LEFT on Sutton Ave. to End,

UTURN, Sutton Ave. EAST to Summit Ave.,
LEFT on Summit Ave. to Simons Ave.,
LEFT on Simons Ave. to End,
UTURN, Simons Ave. to Rowland Ave.,
LEFT on Rowland Ave. to Parker Ave.,
LEFT on Parker Ave. to End,
UTURN, Parker Ave. EAST to Summit Ave.,
LEFT on Summit Ave. to Kaplan Ave.,
LEFT on Kaplan Ave. to End,
UTURN, Kaplan Ave to Rowland Ave.,
LEFT on Rowland Ave. to Essex St.,
LEFT on Essex St. to E. Arcadia Rd.,
RIGHT on Arcadia Rd. to Cambridge Ter.,
RIGHT on Cambridge Ter. to Thompson St.,
RIGHT on Thompson St. to Prospect Ave.,
LEFT on Prospect Ave. to Atlantic St.,
RIGHT on Atlantic St. to Newman St.,
RIGHT on Newman St. to Sussex St.,
RIGHT on Sussex St. to First St.,
RIGHT on First St. to Russell Pl.,
RIGHT on Russell Pl. to Newman St.,
LEFT on Newman St. to Lee Pl.,
LEFT on Lee Pl. to First St.,
RIGHT on First St. to Atlantic St.,
RIGHT on Atlantic St. to W. Railroad Ave.,
LEFT on W. railroad Ave. to Beech St.,
LEFT on Beech St. to End,
UTURN, Beech St. to Summit Ave.,
RIGHT on Summit Ave. to Coolidge Pl.,
LEFT on Coolidge Pl. to End,
UTURN, Coolidge Pl. to Summit Ave.,
LEFT on Summit Ave. to American Legion Dr.,
RIGHT on American Legion Dr. to First St.,

South Route
Tuesday 7am-10am

Start Essex and West End of Arcadia Road – Arcadia Road North to Berkshire,
LEFT on Berkshire to Beech Street,
LEFT on Beech St. to Dorchester Road,
RIGHT on Dorchester Rd. to Buckingham Dr.,
RIGHT on Buckingham Dr. to Winchester,
RIGHT on Winchester to Dorchester,
UTURN Winchester EAST to Buckingham Dr.,
RIGHT on Buckingham Dr. to Beech Street,
CROSS Beech St. to Cambridge Ter.,
FOLLOW Cambridge Ter. to Arcadia Rd.,
RIGHT on Arcadia Rd. to Berkshire Pl.,
UTURN Arcadia Rd. to Essex St.,
LEFT on Essex St. to Rowland Ave.,
RIGHT on Rowland Ave. to End,
UTURN, Rowland Ave. NORTH to Marvin Ave.,
RIGHT on Marvin Ave. to Summit Ave.,
RIGHT on Summit Ave. to Mary Street,
LEFT on Mary St. to S. Prospect Ave.,
LEFT on S. Prospect Ave. to American Legion Dr.,
RIGHT on American Legion Dr. to Overlook Ave.,
RIGHT on Overlook Ave. to Beech St.,
LEFT on Beech St. to Morningside Pl.,
LEFT on Morningside Pl. to American Legion Dr.,
UTURN, Morningside Pl. SOUTH to Hillside Pl.,
LEFT on Hillside Pl. to Second St.,
RIGHT on Second St. to Essex St.,
CROSS Essex St. to Parkway,
FOLLOW Parkway to Parker Ave.,
RIGHT on Parker Ave. to Longview Ave.,
LEFT on Longview Ave. to Marvin Ave.,
RIGHT on Marvin Ave. to S. Prospect Ave.,

LEFT on S. Prospect Ave. to Standish Ave.,
LEFT on Standish Ave. to Poor St.,
RIGHT on Poor St. to Mary St.,
LEFT on Mary St. to Kent St.,
LEFT on Kent St. to Standish Ave.,
RIGHT on Standish Ave. to Hopper St.,
RIGHT on Hopper St. to End,
UTURN, Hopper St. NORTH to Mary St.,
LEFT on Mary St. to Ames St.,
LEFT on Ames St. to Standish Ave.,
RIGHT on Standish Ave. to Polifly Rd.,
RIGHT on Polifly Rd. to E. Pleasantview Ave.,
RIGHT on E. Pleasantview Ave. to Kipp St.,
RIGHT on Kipp St. to End,
UTURN, Kipp St. SOUTH to E. Pleasantview Ave.,
RIGHT on E. Pleasantview Ave. to Clark St.,
RIGHT on Clark St. to Vincent,
LEFT on Vincent to End,
UTURN, Vincent to Clark,
RIGHT on Clark St. to E. Pleasantview Ave.,
LEFT on E. Pleasantview Ave. to Polifly Rd.,
LEFT on Polifly Rd. to Essex St.,
CROSS Essex St., CONTINUE on First St. to Central Ave.,
RIGHT on Central Ave. to W. Railroad Ave.,
RIGHT on W. Railroad Ave. to Essex St.,
RIGHT on Essex St. to Newman St.,
RIGHT on Newman St. to Atlantic St.,
UTURN, Newman St. SOUTH to Sussex St.,
RIGHT on Sussex St. to Lehigh St.,
LEFT on Lehigh St. to Essex St.,
LEFT on Essex ST. to S. Newman St.,
RIGHT on S. Newman St. to Lodi St.,
RIGHT on Lodi St. to Kenneth St.,

LEFT on Kenneth St. to End,
UTURN, Kenneth St. NORTH to Lodi St.,
RIGHT on Lodi St. to S. Newman St.,
RIGHT on S. Newman St. to End,
UTURN, S. Newman St. NORTH to Lodi St.,
RIGHT on Lodi St. to Green St.,
RIGHT on Green St. to Hackensack Border,
UTURN, Green St. NORTH to Essex ST.,
UTURN, Green St. SOUTH to Kansas St.,
LEFT on Kansas St. to McKinley St.,
RIGHT on McKinley St. to Lodi St.,
RIGHT on Lodi St. to South St.,
LEFT on South St. to End,
UTURN, South St. NORTH to Lodi St.,
RIGHT on Lodi St. to Liberty St.,
RIGHT on Liberty St. to End,
UTURN, Liberty St. NORTH to Lodi St.,
RIGHT on Lodi St. to Hobart St.,
RIGHT on Hobart St. to End,
UTURN, Hobart St. NORTH to Kansas St.,
RIGHT on Kansas St. to Cleveland St.,
RIGHT on Cleveland St. to English St.,
LEFT on English St. to S. State St.,
RIGHT on S. State St. to Lodi St.,
RIGHT on Lodi St. to West St.,
LEFT on West St. to Division Pl.,
LEFT on Division Pl. to Porter St.,
LEFT on Porter St. to Lodi St.,
RIGHT on Lodi St. to S. State St.,
RIGHT on S. State St to Michael St.,
LEFT on Michael St. to Bloom St.,

RIGHT on Bloom St. to End,
UTURN, Bloom St. to Pink St.,
RIGHT on Pink St. to S. Main St.,
LEFT on S. Main St. to Lodi St.,
LEFT on Lodi St. to Briscolina,
LEFT on Briscolina to Troast St.,
RIGHT on Troast St. to Van Olst St.,
RIGHT on Van Olst St. to Lodi St.,
LEFT on Lodi St. to Fair St.,
RIGHT on Fair St. to Essex St.,
LEFT on Essex St. to State St.,
RIGHT on State St. to Central Ave.,
LEFT on Central Ave. to Union St.,
LEFT on Union St. to Essex St.,
LEFT on Essex St. to S. State St.,
RIGHT on S. State St. to Kansas St.,
LEFT on Kansas St. to Grove St.

Tuesday 7-9 am

Start Club Way and Maple Hill Drive – Club Way west to Esplanade, Left on Esplanade to Central Ave., Left on Central Ave to Maple Hill Drive, Left on Maple Hill Dr. to Golf Place, UTURN, Right on Heath Place to Esplanade, Right on Esplanade to Blanchard Ter., Right on Blanchard to Maple Hill Dr., Right on Maple Hill Dr. to Golf Place, Left on Golf Place to Prospect, Left on Prospect to Berry Street, Left on Berry Street to Maple Hill Dr., Left on Maple Hill Dr. to Blanchard, UTURN, Left on Crestwood to Esplanade, Right on Esplanade to Colonial Ter., Right on Colonial Ter. To Maple Hill Drive, Left on Maple Hill Dr. to Esplanade, Right on Esplanade to Passaic Street, Cross Passaic St. to Byrne St, Left on Hamilton Place to Maywood Border, UTURN, Hamilton Place East to Vanderbeck, Left on Vanderbeck to Anderson St, Right on Anderson to Linden, UTURN, Anderson St. to West Anderson to Maywood Border, UTURN, Left on Byrne to W. Lookout, Left on W. Lookout to Maywood Border, UTURN, W. Lookout to Cull-De-Sac back to Byrne, Left on Byrne to W. Anderson, Left on W. Anderson to Summit, Left on Summit to Lookout Ave, Right on Lookout Ave to Clarendon, Left on Clarendon to Clinton Pl., Right on Clinton to Grand Ave. Grand Ave. North to Main St. Right on Main St. to Johnson Ave. Left on Johnson to Lawton, Right on Lawton to Burlews, Right on Burlews to end, UTURN to North end of Burlews, UTURN to Lawton, Right on Lawton to Johnson, Right on Johnson to Voorhis Pl., Left og Voorhis Pl. to Main, Right on Main to Voorhis Lane, Right on Voorhis Lane to Johnson, Right on Johnson to Voorhis Place, UTURN to Voorhis Lane, Right on Voorhis Lane to End, UTURN to Johnson Ave, Right on Johnson to Orchard, Right on Orchard to End, UTURN, Orchard to main, Right on Main to Oak, Right on Oak to end, UTURN, to Johnson Ave, Right on Johnson Ave. to Zabriskie St., Right on Zabriskie to end, UTURN, Zabriskie to Main St., Right on Main to Jefferson, Right on Jefferson to Johnson, Right on Johnson to Zabriskie, UTURN to Jefferson, Right on Jefferson to Kinderkamack Rd., Right on Kinderkamack Rd to Zabriskie UTURN to Jefferson, Right on Jefferson to End UTURN to Kinderkamack Rd, Right on Kinderkamack to Madison, Left on Madison to Johnson, Left on Johnson to Jefferson, UTURN to Route 4.

Tuesday 9-11Am

Route 4 and Johnson Ave to Jefferson St, Right on Jefferson to Main, Right on Main to South Lake Dr., Left on South Lake Dr., Left on South Lake Dr. to Wilson, Left on Wilson to Coles, Right on Coles to End, UTURN, Coles East to Main St., Right on Main to Davis Ave, Right on Davis to End, UTURN to Allen St., Right on Allen St. to Willow Ave, Right on Willow to End UTURN, Willow East to Main St. Right on Main to Catalpa, Right on Catalpa to end, UTURN to Allen, Right on Allen St to Cedar Ave., Left on Cedar to Krone Pl. Left on Krone to Catalpa, Right on Catalpa to Pine, Right on Pine to Martin Ter. Do Cul-de-sac Right in Pine to Spring Valley, Left on Spring Valley to Main, UTURN, Spring Valley Ave west to Maywood Border UTURN to Allen St. Right on Allen St. to Elm Ave, Right on Elm Ave to End UTURN, Elm Ave to East to Main St. Right on Main to Fairmount, Right on Fairmount to end UTURN to Summit Ave, Right on Summit to Poplar, Left on Poplar to Terrace Place, Left to Main St, Right on Main to Ross, Right on Ross to Linden, Left on Linden to Euclid, Left on Euclid to Main, Right on Main to Clinton Place, Right on Clinton Place to Summit Ave, Right on Summit to Euclid (South), Right on Euclid (South) bear left to Euclid (North) to Summit, UTURN, Euclid Ave East to Linden, Left on Linden to Ross, Left on Ross to Summit

NORTH ROUTE
Friday 7am – 10am

Start at Wilson St. and South Lake Dr. –

South Lake Dr. EAST to Main St.,
RIGHT on Main St. to Coles Ave.,
RIGHT on Coles Ave. WEST to End,
UTURN, Coles Ave. East to Allen St.,
RIGHT on Allen St. to Davis Ave.,
RIGHT on Davis Ave. to End,
UTURN, Davis Ave. EAST to Main St.,
RIGHT on Main St. to Willow Ave.,
RIGHT on Willow Ave. to End,
UTURN, Willow Ave. to Allen St.,
RIGHT on Allen St. to Catalpa Ave.,
RIGHT on Catalpa Ave. to End,
UTURN, Catalpa Ave. EAST to Main St.,
UTURN, Catalpa Ave. WEST to Pine St.,
LEFT on Pine St. to Martin Ter.,
RIGHT on Martin Ter. to End,
UTURN, Martin Ter. EAST to Pine St.,
LEFT on Pine St. to Catalpa Ave.,
LEFT on Catalpa Ave. to Krone Pl.,
LEFT on Krone Pl. to Cedar Ave.,
RIGHT on Cedar Ave. to End,
UTURN, Cedar Ave. EAST to Allen St.,
RIGHT on Allen St. to Spring Valley Ave.,
RIGHT on Spring Valley Ave. to Maywood Border,
UTURN, Spring Valley Ave. EAST to Main St.,
RIGHT on Main St. to Elm Ave.,
RIGHT on Elm Ave. to End.,
UTURN, Elm Ave. to Allen St.,
RIGHT on Allen St. to Fairmount Ave.,
RIGHT on Fairmount Ave. to End,
UTURN, Fairmount Ave. EAST to Main St.,
RIGHT on Main St. to Terrace Pl.,
RIGHT on Terrace Pl. to Poplar Ave.,

RIGHT on Poplar Ave. to Summit Ave.,
LEFT on Summit Ave. To Ross Ave.,
LEFT on Ross Ave. to Terrace Pl.
RIGHT on Terrace Pl. to Euclid Ave.,
RIGHT on Euclid Ave. to Euclid Ave. (South) & Summit Ave.,
UTURN, Euclid Ave. (South) EAST to Euclid Ave. (North) & Summit Ave.,
LEFT on Summit Ave. to Clinton Pl.,
LEFT on Clinton Pl. to Main St.,
LEFT on Main St. to Euclid Ave.,
LEFT on Euclid Ave. to Linden St.,
RIGHT on Linden St. to Ross Ave.,
RIGHT on Ross Ave. to Main St.,
LEFT on Main St. to Poplar Ave.,
LEFT on Poplar Ave. to Dead End,
UTURN, Poplar Ave. EAST to Main St.,
LEFT on Main St. to Johnson Ave.,
Johnson Ave. NORTH to Route 4,

NORTH ROUTE
Friday 9am – 12 Noon

Start at Johnson Ave. and Route 4. –

Johnson Ave. SOUTH to Jefferson St.,
UTURN, Johnson Ave. to Madison St.,
RIGHT on Madison St. to Kinderkamack Rd.,
RIGHT on Kinderkamack Rd. to Jefferson St.,
LEFT on Jefferson St. to End,
UTURN, Jefferson St. to Kinderkamack Rd.,
LEFT on Kinderkamack Rd. to Zabriskie St.,
UTURN, Kinderkamack Rd. to Jefferson St.,
LEFT on Jefferson St. to Main St.,
LEFT on Main St. to Zabriskie St.,
LEFT on Zabriskie St. to End,
UTURN, Zabriskie St. to Johnson Ave.,
LEFT on Johnson Ave. to Oak St.,
LEFT on Oak to End,
UTURN, Oak Street to Johnson Ave.,
LEFT on Johnson Ave. to Orchard St.,
UTURN, Johnson Ave. SOUTH to Oak St.,
LEFT on Oak St. to Main St.,
LEFT on Main St. to Orchard St.,
LEFT on Orchard St. to End,
UTURN, Orchard St. to Johnson Ave.,
LEFT on Johnson Ave. to Voorhis Lane,
LEFT on Voorhis Lane to End,
UTURN, Voorhis Lane to Johnson Ave.,
LEFT on Johnson to Voorhis Pl.,
UTURN, Johnson Ave. to Voorhis Lane,
LEFT on Voorhis Lane to Main St.,
LEFT on Main St. to Voorhis Pl.,

LEFT on Voorhis Pl. to Johnson Ave.,
RIGHT on Johnson Ave. to Lawton St.,
LEFT on Lawton St. to Burlews Ct.,
RIGHT on Burlews Ct. to End,
UTURN, Burlews Ct. NORTH to End,
UTURN, Burlews Ct. SOUTH to Lawton St.,
RIGHT on Lawton St. to Johnson Ave.,
LEFT on Johnson Ave. to main St.,
RIGHT on Main St. to Grand Ave.,
LEFT on Grand Ave. to Clinton Pl.,
RIGHT on Clinton pl. to Clarendon Pl.,
LEFT on Clarendon Pl. to Lookout Ave.,
RIGHT on Lookout Ave. to Summit Ave.,
LEFT on Summit Ave. to W. Anderson St.,
RIGHT on W. Anderson St. to Byrne St.,
RIGHT on Byrne St. to W. Lookout Ave.,
RIGHT on W. Lookout Ave. to End,
UTURN, W. Lookout Ave. WEST to Maywood Border,
UTURN, W. Lookout Ave. to Byrne St.,
RIGHT on Byrne St. to W. Anderson St.,
RIGHT on W. Anderson St. to Maywood Border,
UTURN, W. Anderson St. EAST to Linden St.,
UTURN, Anderson St. WEST to Vanderbeck Pl.,
LEFT on Vanderbeck Pl. to Hamilton Pl.,
RIGHT on Hamilton Pl. to End,
UTURN, Hamilton Pl. EAST to Byrne St.,
RIGHT on Byrne St. to Passaic St.,
CROSS Passaic St. to Esplanade,
FOLLOW Esplanade SOUTH to Maple Hill Dr.,
LEFT on Maple Hill Dr. to Colonial Ter.,
RIGHT on Colonial Ter. to Esplanade,

LEFT on Esplanade to Crestwood Ave.,
LEFT on Crestwood Ave to Maple Hill Dr.,
LEFT on Maple Hill Dr. to Colonial Ter.,
UTURN, Colonial Ter. to Berry St.,
LEFT on Berry St. to Prospect Ave.,
RIGHT on Prospect Ave. to Golf Pl.,
RIGHT on Golf Pl. to Maple Hill Dr.,
RIGHT on Maple Hill Dr. to Crestwood Ave.,
UTURN, Maple Hill Dr. to Blanchard Ter.,
RIGHT on Blanchard Ter. to Esplanade,
LEFT on Esplanade to Heath Pl.,
LEFT on Heath Pl. to Maple Hill Dr.,
LEFT on Maple Hill Dr. to Blanchard Ter.,
UTURN, Maple Hill Dr. to Central Ave.,
RIGHT on Central Ave. to Esplanade,
RIGHT on Esplanade to Club Way,
RIGHT on Club Way to Maple Hill Dr.,
RIGHT on Maple Hill Dr. to Central Ave.,
LEFT on Central Ave. to Summit Ave.,
LEFT on Summit Ave. to Passaic St.,
RIGHT on Passaic St. to Prospect Ave.,
LEFT on Prospect Ave. to Ross Ave.,
UTURN, Prospect Ave. SOUTH to Franklin Pl.,
LEFT on Franklin Pl. to Passaic St.,
LEFT on Passaic St. to DeWolf Pl.,
RIGHT on DeWolf Pl. to Berry St.,
LEFT on Berry St. to Haynes St.,
LEFT on Haynes St. to Passaic St.,
RIGHT on Passaic St. to Clarendon Pl.,
LEFT on Clarendon Pl., to Ross Ave.,
UTURN, Clarendon Pl. SOUTH to Passaic St.,

LEFT on Passaic St. to Second St.,
RIGHT on Second St. to James St.,
RIGHT on James St. to Third St.,
LEFT on Third St. to Central Ave.,
LEFT on Central Ave. to Second St.,
LEFT on Second St. to Passaic St.,
RIGHT on Passaic to Vanderbeck Pl.,
LEFT on Vanderbeck Pl. to End,
UTURN, Vanderbeck Pl., SOUTH to Passaic St.,
CROSS Passaic St. to First St.,
FOLLOW First St. SOUTH to Central Ave.,
LEFT on Central Ave. to W. Railroad Ave.,
LEFT on W. Railroad Ave. to Passaic St.,
LEFT on Passaic St. to Linden St.,
RIGHT on Linden St. to Clinton Pl.,
RIGHT on Clinton Pl. to Pangborn Pl.,
RIGHT on Pangborn Pl. to Maple Ave.,
RIGHT on Maple Ave. to End,
UTURN, Maple Ave. EAST to Pangborn Pl.,
RIGHT on Pangborn Pl. to Anderson St.,
RIGHT on Anderson St. to Park St.,
LEFT on Park St. to End,
UTURN, Park St. NORTH to Central Ave.,
RIGHT on Central Ave. to Union St.,
LEFT on Union St. to Anderson St.,
UTURN, Union St. SOUTH to Ward St.,
LEFT on Ward St. to S. State St.,
RIGHT on State St. to Central Ave.

NORTH ROUTE
Monday 7am – 10am

Start at the corner of Clay St. and State St.-

Clay St. WEST to E. Railroad Ave.,
RIGHT on E. Railroad Ave. to Berry St.,
RIGHT on Berry St. to Union St.,
LEFT on Union St. to Conklin Pl.,
LEFT on Conklin Pl. to Park St.,
RIGHT on Park St. to Anderson St.,
UTURN, Park St. SOUTH to Passaic St.,
RIGHT on Passaic St. to W. Railroad Ave.,
LEFT on W. Railroad Ave. to Stanley Pl.,
RIGHT on Stanley Pl. to END,
UTURN, Stanley Pl. to Haynes St.,
RIGHT on Haynes St. to Berry St.,
RIGHT on Berry St. to DeWolf Pl.,
UTURN, Berry St. EAST to W. Railroad Ave.,
RIGHT on W. Railroad Ave. to James St.,
RIGHT on James St. to Third St.,
LEFT on Third St. to Clay St.,
LEFT on Clay St. to First St.,
LEFT on First St. to Berdan Pl.,
RIGHT on Berdan Pl. to W. Railroad Ave.,
UTURN, Berdan Pl. to First St.,
LEFT on First St. to Clay St.,
LEFT on Clay St. to Railroad Pl.,
RIGHT on Railroad Pl. to High St.,
RIGHT on High St. to Third St.,
LEFT on Third ST. to Central Ave.,
RIGHT on Central Ave. to Summit Ave.

NORTH ROUTE
Monday 9am – 12 Noon

Start at the corner of Summit Ave. and Central Ave.-

Summit Ave NORTH to Passaic St.,
LEFT on Passaic St. to Byrne St.,
RIGHT on Byrne St. (Bearing Left) to Brook St.,
RIGHT on Brook St. to Byrne St.,
Byrne St. SOUTH to Passaic St.,
LEFT on Passaic St. to Summit Ave.,
LEFT on Summit Ave. to END,
UTURN, Summit Ave. SOUTH to Davis Ave.,
RIGHT on Davis Ave. to Allen St.,
LEFT on Allen St. to Fairmount Ave.,
LEFT on Fairmount Ave to Summit Ave.,
LEFT on Summit Ave. to Elm Ave.,
RIGHT on Elm Ave. to Lincoln St.,
LEFT on Lincoln St. to END,
UTURN, Lincoln St. SOUTH to Coles Ave.,
LEFT on Coles Ave. to Wilson St.,
LEFT on Wilson St. to South Lake Dr.,
UTURN, Wilson St. SOUTH to Fairmount Ave.,
LEFT on Fairmount Ave. to Louis St.,
RIGHT on Louis St. to Ross Ave.,
UTURN, Louis St. NORTH to South Lake Dr.,
RIGHT on South Lake Dr. to Herman St.,
RIGHT on Herman St. to Ross Ave.,
LEFT on Ross Ave. to Krone Pl.,
LEFT on Krone Pl. to Willow Ave.,
RIGHT on Willow Ave. To Main St.,
RIGHT on Main St. to Catalpa Ave.,
RIGHT on Catalpa Ave. to Pine St.,
LEFT on Pine St. to Spring Valley Ave.,
RIGHT on Spring Valley Ave. to Prospect Ave. North,
LEFT on Prospect Ave. North to Ross Ave.,
LEFT on Ross Ave. to Pine St.,
LEFT on Pine St. to Catalpa Ave.

NORTH ROUTE
Tuesday 7am – 10am

Start at the corner of State St. and Central Ave.-

State St. NORTH to Ward St.,
LEFT on Ward St. to Union St.,
RIGHT on Union St. to Anderson St.,
UTURN, Union St. SOUTH to Central Ave.,
RIGHT on Central Ave. to Park St.,
RIGHT on Park St. to Anderson St.,
RIGHT on Anderson St. to Pangborn Pl.,
LEFT on Pangborn Pl. to Maple Ave.,
LEFT on Maple Ave. to Dead End,
UTURN, Maple Ave. EAST to Pangborn Pl.,
LEFT on Pangborn Pl. to Clinton Pl.,
FOLLOW Clinton Pl. WEST to Linden St.,
LEFT on Linden St. to Passaic St.,
LEFT on Passaic St. to W. Railroad Ave.
RIGHT on W. Railroad Ave. to Central Ave.,
RIGHT on Central Ave. to Railroad Pl.,
RIGHT on Railroad Pl. to Clay St.,
UTURN, Railroad Pl. to Central Ave.,
RIGHT on Central Ave. to First St.,
RIGHT on First St. to Passaic St.,
CROSS Passaic St. to Vanderbeck Pl.,
FOLLOW Vanderbeck Pl. to Dead End,
UTURN, Vanderbeck Pl. SOUTH to Passaic St.,
RIGHT on Passaic St. to Second St.,
LEFT on Second St. to Central Ave.,
RIGHT on Central Ave. to Third St.,
RIGHT on Third St. to James St.,
RIGHT on James St. to Second St.,
LEFT on Second St. to Passaic St.,
LEFT on Passaic St. to Clarendon Pl.,

RIGHT on Clarendon Pl. to Ross Ave.,
UTURN, Clarendon Pl. to Passaic St.,
RIGHT on Passaic St. to Haynes St.,
LEFT on Haynes St. to Berry St.,
RIGHT on Berry St. to DeWolf Pl.,
RIGHT on DeWolf Pl. to Passaic St.,
LEFT on Passaic St. to Franklin Pl.,
RIGHT on Franklin Pl. to Prospect Ave.,
RIGHT on Prospect Ave. to Ross Ave.,
UTURN, Prospect Ave. SOUTH to Passaic St.,
RIGHT on Passaic St. to Summit Ave.,
LEFT on Summit Ave. to Central Ave.,
RIGHT on Central Ave. to Maple Hill Dr.,
RIGHT on Maple Hill Dr. to Club Way,
Club Way WEST to Esplanade
LEFT on Esplanade to Central Ave.,
LEFT on Central Ave. to Maple Hill Dr.,
LEFT on Maple Hill Dr. to Golf Pl.,
UTURN, Maple Hill Dr. to Heath Pl.,
RIGHT on Heath Pl. to Esplanade,
RIGHT on Esplanade to Blanchard Ter.,
RIGHT on Blanchard Ter. to Maple Hill Dr.,
RIGHT on Maple Hill Dr. to Golf Pl.,
LEFT on Golf Pl. to Prospect Ave.,
LEFT on Prospect Ave. to Berry St.,
LEFT on Berry St. to Maple Hill Dr.,
LEFT on Maple Hill Dr. to Blanchard Ter.,
UTURN, Maple Hill Dr. to Crestwood Ave.,
LEFT on Crestwood Ave to Esplanade,
RIGHT on Esplanade to Colonial Ter.,
RIGHT on Colonial Ter. to Maple Hill Dr.,

LEFT on Maple Hill Dr. to Esplanade,
RIGHT on Esplanade to Passaic St.,
CROSS Passaic St. to Byrne St,
LEFT on Hamilton Pl. to Maywood Border,
UTURN, Hamilton Pl. EAST to Vanderbeck Pl.,
LEFT on Vanderbeck Pl. to Anderson St.,
RIGHT on Anderson St. to Linden St.,
UTURN, Anderson St. WEST to Maywood Border,
UTURN, W. Anderson St. EAST to Byrne St.,
LEFT on Byrne St. to W. Lookout Ave.,
LEFT on W. Lookout Ave. to Maywood Border,
UTURN, W. Lookout to End,
UTURN, W. Lookout Ave to Byrne St.,
LEFT on Byrne St. to W. Anderson St.,
LEFT on W. Anderson St. to Summit Ave.,
LEFT on Summit Ave. to Lookout Ave.,
RIGHT on Lookout Ave. to Clarendon Pl.,
LEFT on Clarendon Pl. to Clinton Pl.,
RIGHT on Clinton Pl. to Grand Ave.,
LEFT on Grand Ave. to Main St.,
RIGHT on Main St. to Johnson Ave.,
LEFT on Johnson Ave. to Lawton St.,
RIGHT on Lawton St. to Burlews Ct.,
RIGHT on Burlews Ct. to End,
UTURN, Burlews Ct. NORTH to End,
UTURN, Burlews Ct. SOUTH to Lawton St.,
RIGHT on Lawton St. to Johnson Ave.,
RIGHT on Johnson Ave. to Voorhis Pl.,
LEFT on Voorhis Pl. to Main St.,
RIGHT on Main St. to Voorhis Lane,
RIGHT on Voorhis Lane to Johnson Ave.,

RIGHT on Johnson Ave. to Voorhis Pl.,
UTURN, Johnson Ave. NORTH to Voorhis Lane,
RIGHT on Voorhis Lane to End,
UTURN, Voorhis Lane WEST to Johnson Ave.,
RIGHT on Johnson Ave. to Orchard St.,
RIGHT on Orchard St to End,
UTURN, Orchard St. WEST to Main St.,
RIGHT on Main St. to Oak St.,
RIGHT on Oak St. to Johnson Ave.,
RIGHT on Johnson Ave. to Orchard St.,
UTURN, Johnson Ave. NORTH to Oak St.,
RIGHT on Oak St. to End,
UTURN, Oak St. WEST to Johnson Ave.,
RIGHT on Johnson Ave. to Zabriskie St.,
RIGHT on Zabriskie St. to End,
UTURN, Zabriskie St. WEST to Main St.,
RIGHT on Main St. to Jefferson St.,
RIGHT on Jefferson St. to Johnson Ave.,
RIGHT on Johnson Ave. to Zabriskie St.,
UTURN, Johnson Ave NORTH to Jefferson St.,
RIGHT on Jefferson St. to Kinderkamack Rd.,
RIGHT on Kinderkamack Rd. to Zabriskie St.,
UTURN, Kinderkamack Rd. NORTH to Jefferson St.,
RIGHT on Jefferson St. to End,
UTURN, Jefferson St. WEST to Kinderkamack Rd.,
RIGHT on Kinderkamack Rd to Madison St.,
LEFT on Madison St. to Johnson Ave.,
LEFT on Johnson Ave. to Jefferson St.,
UTURN, Johnson Ave. NORTH to Route 4

NORTH ROUTE
Tuesday 9am – 12 Noon

Start at Johnson Ave and Route 4 –

Johnson Ave. <u>SOUTH</u> to Jefferson St.,
RIGHT on Jefferson St. to Main St.,
RIGHT on Main St. to South Lake Dr.,
LEFT on South Lake Dr. to Wilson St.,
LEFT on Wilson St. to Coles Ave.,
RIGHT on Coles Ave. to End,
UTURN, Coles Ave. <u>EAST</u> to Main St.,
RIGHT on Main St. to Davis Ave.,
RIGHT on Davis Ave. to End,
UTURN, Davis <u>WEST</u> to Allen St.,
RIGHT on Allen St. to Willow Ave.,
RIGHT on Willow Ave. to End,
UTURN, Willow Ave. <u>EAST</u> to Main St.,
RIGHT on Main St. to Catalpa Ave.,
RIGHT on Catalpa Ave. to End,
UTURN, Catalpa Ave. <u>EAST</u> to Allen St.,
RIGHT on Allen St. to Cedar Ave.,
RIGHT on Cedar Ave. to End,
UTURN, Cedar Ave. <u>EAST</u> to Krone Pl.,
LEFT on Krone Pl. to Catalpa Ave.,
RIGHT on Catalpa Ave. to Pine St.,
RIGHT on Pine St. to Martin Ter.,
RIGHT on Martin Ter. to End,
UTURN, Martin Ter. <u>EAST</u> to Pine St.,
RIGHT on Pine St. to Spring Valley Ave.,
LEFT on Spring Valley Ave. to Main St.,
UTURN, Spring Valley Ave. <u>WEST</u> to Maywood Border,
UTURN, Spring Valley Ave. <u>EAST</u> to Allen St.,

RIGHT on Allen St. to Elm Ave.,
RIGHT on Elm Ave. to End,
UTURN, Elm Ave. EAST to Main St.,
RIGHT on Main St. to Fairmount Ave.,
RIGHT on Fairmount Ave. to End,
UTURN, Fairmount Ave. EAST to Summit Ave.,
RIGHT on Summit Ave. to Poplar Ave.,
LEFT on Poplar Ave. to Terrace Pl.,
LEFT on Terrace Pl. to Main St.,
RIGHT on Main St. to Ross Ave.,
RIGHT on Ross Ave. to Linden St.,
LEFT on Linden St. to Euclid Ave.,
LEFT on Euclid Ave. to Main St.,
RIGHT on Main St. to Clinton Pl.,
RIGHT on Clinton Pl. to Summit Ave.,
RIGHT on Summit Ave. to Euclid Ave. (South),
RIGHT on Euclid Ave. (South) bear left to Euclid Ave. (North)
UTURN, Euclid Ave. EAST to Linden St.,
LEFT on Linden St. to Ross Ave.,
LEFT on Ross Ave. to Summit Ave.

SOUTH Mon. 7am-10am

Start at First St. and American Legion Dr. – American Legion Dr. <u>WEST</u> to Summit Ave.,
LEFT on Summit Ave. to Coolidge Pl.,
RIGHT on Coolidge Pl. to End,
UTURN, Coolidge Pl. to Summit Ave.,
RIGHT on Summit Ave. to Beech St.,
RIGHT on Beech St. to end,
UTURN, Beech St. <u>EAST</u> to W. Railroad Ave.,
RIGHT on W. Railroad Ave. to Atlantic, St.,
RIGHT on Atlantic St. to First St.,
LEFT on First St. to Lee Pl.,
LEFT on Lee Pl., to Newman St.,
RIGHT on Newman St. to Russell Pl.,
RIGHT on Russell Pl. to First St.,
LEFT on First St. to Sussex St.,
LEFT on Sussex St. to W. Railroad Ave.,
UTURN, W. Railroad Ave. to Newman St.,
RIGHT on Newman St. to Atlantic St.,
LEFT on Atlantic St. to Prospect Ave.,
LEFT on Prospect Ave. to Thompson St.,
RIGHT on Thompson St. to Arcadia Rd.,
LEFT on Arcadia Rd. to Essex St.,
LEFT on Essex St. to Rowland Ave.,
RIGHT on Rowland Ave. to Kaplan Ave.,
RIGHT on Kaplan Ave. to End,
UTURN, Kaplan Ave. <u>EAST</u> to Summit Ave.,
RIGHT on Summit Ave. to Parker Ave.,
RIGHT on Parker Ave. to End,
UTURN, Parker Ave. <u>EAST</u> to Rowland Ave.,
RIGHT on Rowland Ave. to Simons Ave.,
RIGHT on Simons to End,
UTURN, Simons Ave. <u>EAST</u> to Summit Ave.,
RIGHT on Summit Ave. to Sutton Ave.,

RIGHT on Sutton Ave. to End,
UTURN, Sutton Ave. EAST to Rowland Ave.,
RIGHT on Rowland Ave. to Marvin Ave.,
RIGHT on Marvin Ave. to End,
UTURN, Marvin Ave. EAST to Summit Ave.,
RIGHT on Summit Ave. to Mary St.,
LEFT on Mary St. to Polifly Rd.,
RIGHT on Polifly Rd., to Elleen Ter.,
LEFT on Elleen Ter. to Kenneth St.,
LEFT on Kenneth St. to Mary St.,
LEFT on Mary St. to Polifly Rd.,
RIGHT on Polifly Rd. to Daniel St.,
RIGHT on Daniel St. to Kenneth St.,
LEFT on Kenneth St. to Charles St.,
LEFT on Charles St. to Polifly Rd.,
RIGHT on Polifly Rd., to Standish Ave.,
LEFT on Standish Ave. to Summit Ave.,
RIGHT on Summit Ave. to Marvin Ave.,
RIGHT on Marvin Ave. to Polifly Rd.,
LEFT on Polifly Rd. to Sutton Ave.,
LEFT on Sutton Ave. to Summit Ave.,
RIGHT on Summit Ave. to Simons Ave.,
RIGHT on Simons Ave. to Longview Ave.,
LEFT on Longview Ave. to Parker Ave.,
RIGHT on Parker Ave. to Polifly Rd.,
UTURN, Parker Ave. WEST to Summit Ave.,
RIGHT on Summit Ave. to Kaplan Ave.,
RIGHT on Kaplan Ave. to Polifly Rd.,
LEFT on Polifly Rd. to Essex St.,
RIGHT on Essex St. to John St.,
LEFT on John St. to Union St.,

LEFT on Union St. to Sussex St.,
LEFT on Sussex St. to E. Railroad Ave.,
RIGHT on E. Railroad Ave. to Ames St.,
RIGHT on Ames St. to Union St.,
LEFT on Union St. to Atlantic St.,
LEFT on Atlantic St. to E. Railroad Ave.,
RIGHT on E. Railroad Ave. to Lawrence St.,
RIGHT on Lawrence St. to Union St.,
LEFT on Union St. to Gamewell St.,
LEFT on Gamewell St. to E. Railroad Ave.,
UTURN, Gamewell Ave. to Park St.,
RIGHT on Park St. to Ricardo Pl.,
RIGHT on Ricardo Pl. to E. Railroad Ave.,
RIGHT on E. Railroad Ave., to Lawrence St.,
RIGHT on Lawrence St. to Union St.,
RIGHT on Union St. to Trinity Pl.,
LEFT on Trinity Pl. to State St.,
RIGHT on State St. to Lawrence St.,
RIGHT on Lawrence St. to Union St.,
LEFT on Union St. to Atlantic St.,
LEFT on Atlantic St. to State St.,
RIGHT on State St. to Ames St.,
RIGHT on Ames St. to Union St.,
LEFT on Union St. to Sussex St.,
LEFT on Sussex St. to State St.,
RIGHT on State St. to DeWitt Pl.,
RIGHT on DeWitt Pl. to Union St.,
LEFT on Union St. to Essex St.,

SOUTH Mon. 9am-12 Noon

Start Essex St. and Green St. – LEFT on Green St. to Kansas St.,
LEFT on Kansas St. to E. Kansas St. to River St.,
RIGHT on River St. to Van Wettering, RIGHT on Van Wettering to Hudson St.,
LEFT on Hudson St. to East Broadway
LEFT on East Broadway to River St.,
RIGHT on River St. to Marion St.,
RIGHT on Marion St. to Hudson St.,
LEFT on Hudson St. to E. Lafayette Ave.,
LEFT on E. Lafayette Ave. to River St.,
RIGHT on River St. to Water St.,
RIGHT on Water St. to Hudson St.,
LEFT on Hudson St. to Bank St.,
LEFT on Bank St. to River St.,
RIGHT on River St. to East Kennedy St.,
RIGHT on East Kennedy St. to Hudson St.,
LEFT on Hudson St. to Shafer Pl.,
LEFT on Shafer Pl. to River St.,
RIGHT on River St. to Pulaski Pl.,
RIGHT on Pulaski Pl. to Hudson St.,
LEFT on Hudson St. to Henry Pl.,
LEFT on Henry Pl. to River St.,
RIGHT on River St. to E. Moonachie Rd.,
RIGHT on E. Moonachie Rd. to Hudson St.,
RIGHT on Hudson St. to Franklin St.,
LEFT on Franklin St. to Jackson Ave.,
LEFT on Jackson Ave. to Blauvelt Pl.,
RIGHT on Blauvelt Pl. to Old Hoboken Rd.,
RIGHT on Old Hoboken Rd. to W. Franklin St.,
LEFT on W. Franklin St. to S. Main St.,
RIGHT on S. Main St. to Frederick St.,
RIGHT on Frederick St. to Hudson St.,
LEFT on Hudson St. to Lafayette St.,

LEFT on Lafayette St. to Jackson Ave.,
RIGHT on Jackson Ave. to Pink St.,
LEFT on Pink St. to S. State St.,
RIGHT on S. State St. to Troast St.,
RIGHT on Troast St. to S. Main St.,
LEFT on S. Main St. to Lodi St.,
RIGHT on Lodi St. to Jackson Ave.,
UTURN, Lodi St. to Green St.,
LEFT on Green St. to Jersey Pl.,
LEFT on Jersey Pl. to South St.,
LEFT on South St. to Lodi St.,
RIGHT on Lodi St. to McKinley St.,
LEFT on McKinley St. to King St.,
LEFT on King St. to Green St.,
RIGHT on Green St. to Lexington Ave.,
RIGHT on Lexington Ave. to Cleveland St.,
RIGHT on Cleveland St. to English St.,
LEFT on English St. to State St.,
LEFT on State St. to Campbell Ave.,
RIGHT on Campbell Ave. to New St.,
RIGHT on New St. to Broadway,
RIGHT on Broadway to Grove St.,
UTURN, Broadway EAST to Hudson St.,

SOUTH ROUTE
FRIDAY 7am-10am

START Washington Ave. and Vreeland Ave.,
Washington Ave. SOUTH to North St.,
RIGHT on North St. to Jackson Ave.,
RIGHT on Jackson Ave. to End,
UTURN, Jackson Ave. to Jay St.,
RIGHT on Jay St. cul-de-sac to Jackson Ave.,
RIGHT on Jackson Ave. to North St.,
RIGHT on North St. to Hackensack Border,
UTURN, North St. EAST to Washington Ave.,
RIGHT on Washington Ave. to Moonachie Rd.,
RIGHT on Moonachie Rd. to Hackensack Border,
UTURN, Moonachie Rd. NORTH to Hudson St.,
RIGHT on Hudson St. to Hackensack Border,
UTURN, Hudson St. NORTH to Henry St.,
RIGHT on Henry St. to Gardner Pl.,
RIGHT on Gardner Pl. to E. Moonachie Rd.,
RIGHT on E. Moonachie Rd. to Hudson St.,
RIGHT on Hudson St. to Vreeland Ave.,
LEFT on Vreeland Ave. to Taylor Ave.,
RIGHT on Taylor Ave. to End,
UTURN, Taylor Ave. SOUTH to Hackensack Border,
UTURN, Taylor Ave. NORTH to Vreeland Ave.,
RIGHT on Vreeland Ave. to Williams Ave.,
RIGHT on Williams Ave. to End,
UTURN, Williams Ave. NORTH to Vreeland Ave.,
RIGHT on Vreeland Ave. to Jackson Ave.,
RIGHT on Jackson Ave. to End,
UTURN, Jackson Ave. NORTH to Vreeland Ave.,
RIGHT on Vreeland Ave. to Hudson St.,
LEFT on Hudson St. to Marginal Rd.,
LEFT on Marginal Rd. to Washington Ave.,
RIGHT on Washington Ave. to Kennedy St.,
UTURN, Washington Ave. SOUTH to Marginal Rd.

RIGHT on Marginal Rd. to Kennedy St.,
UTURN, Marginal Rd. to Hudson St.,
LEFT on Hudson St. to Kennedy St.,
LEFT on Kennedy St. to Old Hoboken Rd.,
RIGHT on Old Hoboken Rd. to End,
UTURN, Old Hoboken Rd. SOUTH to Blauvelt Pl.,
LEFT on Blauvelt Pl. to Jackson Ave.,
RIGHT on Jackson Ave. to Kennedy St.,
UTURN, Jackson Ave. NORTH to Pink St.,
LEFT on Pink St. to Bonhomme,
LEFT on Bonhomme to End,
UTURN, Bonhomme to Lodi St.,
RIGHT on Lodi St. to Jackson Ave.,
RIGHT on Jackson Ave. to Washington Ave.,
LEFT on Washington Ave. to Kennedy St.,
RIGHT on Kennedy St. to End,
UTURN, Kennedy St. to Hudson St.,
LEFT on Hudson St. to Essex St.,
UTURN, Hudson St. to Broadway,
RIGHT on Broadway to Holt St.,
LEFT on Holt St. to Frederick St.,
LEFT on Frederick St. to Ise St.,
RIGHT on Ise St. to W. Franklin St.,
RIGHT on W. Franklin St. to S. Main St.,
RIGHT on S. Main St. to Broadway,
RIGHT on Broadway to New St.,
LEFT on New St. to Kansas St.,
LEFT on Kansas St. to Grove St.,
LEFT on Grove St. to Lodi St.,
UTURN, Grove St. NORTH to Kansas St.,

SOUTH ROUTE
FRIDAY 9am-12 Noon

START Kansas St. and Grove St.,
Kansas St. WEST to S. State St.,
RIGHT on S. State St. to Essex St.,
LEFT on Essex St. to Union St.,
RIGHT on Union St. to Central Ave.,
RIGHT on Central Ave. to State St.,
RIGHT on State St. to Essex St.,
LEFT on Essex St. to Fair St.,
RIGHT on Fair St. to Lodi St.,
LEFT on Lodi St. to Van Olst,
RIGHT on Van Olst to Troast St.,
LEFT on Troast St. to Briscolina,
LEFT on Briscolina to Lodi St.,
RIGHT on Lodi St. to S. Main St.,
RIGHT on S. Main St. to Pink St.,
RIGHT on Pink St. to Bloom St.,
LEFT on Bloom St. to End,
UTURN, Bloom St. to Michael St.,
LEFT on Michael St. to S. State St.,
RIGHT on S. State St. to Lodi St.,
LEFT on Lodi St. to Porter St.,
LEFT on Porter St. to Division St.,
RIGHT on Division St. to West St.,
RIGHT on West St. to Lodi St.,
RIGHT on Lodi St. to S. State St.,
LEFT on S. State St. to English St.,
LEFT on English St. to Cleveland St.,
RIGHT on Cleveland St. to Kansas St.,
LEFT on Kansas St. to Hobart St.,
LEFT on Hobart St. to End,
UTURN, Hobart St. NORTH to Lodi St.,
LEFT on Lodi St. to South St.,

LEFT on South St. to End,
UTURN, South St. to Lodi St.,
RIGHT on Lodi St. to McKinley St.,
LEFT on McKinley St. to Kansas St.,
LEFT on Kansas St. to Green St.,
RIGHT on Green St. to Essex St.,
UTURN, Green St. SOUTH to Hackensack Border,
UTURN, Green St. NORTH to Lodi St.,
LEFT on Lodi St. to S. Newman St.,
LEFT on S. Newman St. to End,
UTURN, S. Newman St. NORTH to Lodi St.,
LEFT on Lodi St. to Kenneth St.,
LEFT on Kenneth St. to End,
UTURN, Kenneth St. NORTH to Lodi St.,
RIGHT on Lodi St. to S. Newman St.,
LEFT on S. Newman St. to Essex St.,
LEFT on Essex St. to Lehigh St.,
RIGHT on Lehigh St. to Sussex St.,
RIGHT on Sussex St. to Newman St.,
LEFT on Newman St. to Atlantic St.,
UTURN, Newman St. SOUTH to Essex St.,
LEFT on Essex St. to E. Railroad Ave.,
LEFT on E. Railroad Ave. to Central Ave.,
LEFT on Central Ave. to First St.,
LEFT on First St. to E. Pleasantview Ave.,
RIGHT on E. Pleasantview Ave. to Kipp St.,
RIGHT on Kipp St. to End,
UTURN, Kipp St. SOUTH to E. Pleasantview Ave.,
RIGHT on E. Pleasantview Ave. to Clark St.,
RIGHT on Clark St. to Vincent St.,
LEFT on Vincent St. to End,
UTURN, Vincent St. to Clark St.,
RIGHT on Clark St. to E. Pleasantview Ave.,
LEFT on E. Pleasantview Ave. to Polifly Rd.,

LEFT on Polifly Rd. to Standish Ave.,
LEFT on Standish Ave. to Ames St.,
LEFT on Ames St. to Mary St.,
RIGHT on Mary St. to Hopper St.,
LEFT on Hopper St. to End,
UTURN, Hopper St. NORTH to Standish Ave.,
LEFT on Standish Ave. to Kent St.,
LEFT on Kent St. to Mary St.,
RIGHT on Mary St. to Poor St.,
RIGHT on Poor St. to Standish Ave.,
LEFT on Standish Ave. to S. Prospect Ave.,
RIGHT on S. Prospect Ave. to Marvin Ave.,
RIGHT on Marvin Ave. to Longview Ave.,
LEFT on Longview Ave. to Parker Ave.,
RIGHT on Parker Ave. to Parkway,
LEFT on Parker Ave. to Essex St.,
CROSS Essex St. CONTINUE on Second St. to Hillside Pl.,
FOLLOW Hillside Pl. to Morningside Pl.,
RIGHT on Morningside Pl. to American Legion Dr.,
UTURN, Morningside Pl. SOUTH to Beech St.,
RIGHT on Beech St. to Overlook Ave.,
RIGHT on Overlook Ave. to American Legion Dr.,
LEFT on American Legion Dr. to Prospect Ave.,
LEFT on Prospect Ave. ACROSS Essex St. to Mary St.,
UTURN, S. Prospect Ave. to Standish Ave.,
LEFT on Standish Ave. to Summit Ave.,
RIGHT on Summit Ave. to Marvin Ave.,
LEFT on Marvin Ave. to Rowland Ave.,
LEFT on Rowland Ave. to End,
UTURN, Rowland Ave. NORTH to Essex St.,
LEFT on Essex St. to E. Arcadia Rd.,
RIGHT on E. Arcadia Rd. to Berkshire Pl.,

UTURN, Arcadia Rd. to Cambridge Ter.,
LEFT on Cambridge Ter. to Beech St.,
CROSS Beech St. to Buckingham Dr.,
FOLLOW Buckingham Dr. to Dorchester Rd.,
LEFT on Dorchester Rd. to Winchester Pl.,
LEFT on Winchester Pl. to Buckingham Dr.,
UTURN, Winchester Pl. WEST to Dorchester Rd.,
LEFT on Dorchester Rd. to Beech St.,
LEFT on Beech St. to Berkshire Pl.,
RIGHT on Berkshire Pl. to Arcadia Rd.,
RIGHT on Arcadia Rd. to Essex St.,

SOUTH ROUTE
Tuesday 9am-12Noon

START Kansas St. and Grove St.,
Grove St. SOUTH to Lodi St.,
UTURN, Grove St. NORTH to Kansas St.,
RIGHT on Kansas St. to New St.,
RIGHT on New St. to Broadway,
RIGHT on Broadway to S. Main St.,
LEFT on S. Main St. to W. F ranklin St.
LEFT on W. Franklin St. to Ise St.,
LEFT on Ise St. to Frederick St.,
LEFT on Frederick St. to Holt St.,
RIGHT on Holt St. to Broadway,
RIGHT on Broadway to Hudson St.,
RIGHT on Hudson St. to Jackson Ave.,
RIGHT on Jackson Ave. to Lodi St.,
RIGHT on Lodi St. to Bonhomme St.,
LEFT on Bonhomme ST. to End,
UTURN, Bonhomme NORTH to Pink St.,
RIGHT on Pink St. to Jackson Ave.,
LEFT on Jackson Ave. to Lodi St.,
UTURN, Jackson Ave. SOUTH to Kennedy St.,
UTURN, Jackson Ave. NORTH to Blauvelt Pl.,
LEFT on Blauvelt Pl. to Old Hoboken Rd.,
RIGHT on Old Hoboken Rd. to Frederick St.,
UTURN, Old Hoboken Rd. SOUTH to Kennedy St.,
LEFT on Kennedy St. to Washington Ave.,
LEFT on Washington Ave. to Jackson Ave.,
RIGHT on Jackson Ave. to Hudson St.,
LEFT on Hudson St. to Essex St.,
UTURN, Hudson St. SOUTH to Marginal Rd.,
RIGHT on Marginal Rd. to Kennedy St.,
RIGHT on Kennedy St. to Washington Ave.,
RIGHT on Washington Ave. to Marginal Rd.,
LEFT on Marginal Rd. to Hudson St.,

RIGHT on Hudson ST. to Vreeland Ave.,
RIGHT on Vreeland Ave. to Taylor,
RIGHT on Taylor to End,
UTURN, Taylor Ave. SOUTH to S. Hackensack Border,
UTURN, Taylor Ave. NORTH to Vreeland Ave.,
RIGHT on Vreeland Ave. to Williams Ave.,
RIGHT on Williams Ave. to End,
UTURN, Williams Ave. NORTH to Vreeland Ave.,
RIGHT on Vreeland Ave. to Jackson Ave.,
RIGHT on Jackson Ave. to End,
UTURN, Jackson Ave. NORTH to Vreeland Ave.,
RIGHT on Vreeland Ave. to Hudson St.,
RIGHT on Hudson St. to Little Ferry Border
UTURN, Hudson St. NORTH to E. Moonachie Rd.,
RIGHT on E. Moonachie Rd. to Gardner Pl.,
LEFT on Gardner Pl. to Henry Pl.,
LEFT on Henry Pl. to Hudson St.,
LEFT on Hudson St. to Moonachie Rd.,
RIGHT on Moonachie Rd. to Little Ferry Border,
UTURN, Moonachie Rd. NORTH to Washington Ave.,
LEFT on Washington Ave. to North St.,
LEFT on North St. to Jackson Ave.,
RIGHT on Jackson Ave. to End,
UTURN, Jackson Ave. SOUTH to Jay St.,
CUL-DE-SAC around to Jackson Ave.,
RIGHT on Jackson Ave. to North St.,
RIGHT on North St. to Hackensack Border,
UTURN, North St. EAST to Washington Ave.,
LEFT on Washington Ave. to Vreeland Ave.,

ATTACHMENT 7

OUTFALL PIPE STREAM SCOURING REMEDIATION TRACKING FORM

SPPP Form 14 – Outfall Pipe Stream Scouring Remediation

Site Repair Reporting Form

Outfall Pipe Location:

____

Date Repair Anticipated:

____

Method of Repair:

____
____
____
____

Date Repair Completed:

____

Outfall Pipe Location:

____

Date Repair Anticipated:

____

Method of Repair:

____
____
____
____

Date Repair Completed:

____

ATTACHMENT 8

FUELING OPERATIONS SOP

CITY OF HACKENSACK

VEHICLE AND EQUIPMENT FUELING STANDARD OPERATING PROCEDURES

Fueling Operation Locations

- **120 East Broadway (DPW)**
- **Green Street (DPW Satellite)**
- **State Street (Fire Department)**

Introduction and Purpose

Vehicle and equipment fueling procedures and practices are designed to minimize contamination of surface and/or ground waters. Understanding the procedures for delivering fuel into vehicles, mobile fuel tanks and storage tanks is critical for this purpose. Safety is always the priority.

Scope

These procedures are to be implemented at all facilities with fueling operations.

Standards and Specifications

Vehicle and Equipment Fueling

- Shut off engine.
- Ensure that fuel is the proper type.
- Confirm that absorbent spill clean-up materials and spill kits are available in fueling areas and are disposed of properly after use.
- Nozzles used in vehicle and equipment fueling shall be equipped with an automatic shut-off to prevent overfill.
- Fuel tanks shall not be "topped off".
- Mobile fueling shall be minimized. Whenever practical, vehicles and equipment shall be transported to the designated fueling area in the maintenance yard.
- Clearly post in a prominent area of the facility, instructions for safe operation of fueling equipment, and appropriate contact information for the person(s) responsible for spill response.

Bulk Fueling

- Drip pans or absorbent pads shall be used under all hose and pipe connections and other leak-prone areas during bulk fueling.
- Block storm sewer inlets, or contain tank trucks used for bulk transfer, with temporary berms or temporary absorbent booms during the transfer process. If

temporary berms are being used instead of blocking the storm sewer inlets, all hose connection points associated with the transfer of fuel must be within the temporary berms during the loading/unloading of bulk fuels.

- Protect fueling areas with berms and/or dikes to prevent run-on, runoff, and to contain spills.
- A trained employee must always be present to supervise during bulk transfer.

Spill Response and Reporting

- Conduct cleanups of any fuel spills immediately after discovery.
- Uncontained spills are to be cleaned using dry cleaning methods only. Spills shall be cleaned up with a dry, absorbent material (e.g., kitty litter, sawdust, etc.) and absorbent materials shall be swept up.
- Collected waste is to be disposed of properly.
- Contact the City of Hackensack Spill Response Team at 201-646-3953.

Maintenance and Inspection

- Fueling areas and storage tanks shall be inspected monthly.
- Keep an ample supply of spill cleanup material on the site.
- Any equipment, tanks, pumps, piping and fueling dispensing equipment found to be leaking or in disrepair must be repaired or replaced immediately.
- The valve on the discharge pipe from the secondary containment area of the aboveground fuel storage tank in the DPW maintenance yard shall remain closed at all times. Visual inspections shall be performed before discharging stormwater through the valve to ensure that fuel in the tank has not come into contact with stormwater to be discharged.

ATTACHMENT 9

VEHICLE MAINTENANCE SOP

CITY OF HACKENSACK

VEHICLE MAINTENANCE
STANDARD OPERATING PROCEDURES

Introduction and Purpose

This standard operating procedure (SOP) contains the basic practices of vehicle maintenance to be implemented at all City of Hackensack (City) facilities conducting vehicle maintenance activities.

Scope

This SOP applies to all City facilities conducting vehicle maintenance activities.

Standards and Specifications

- Conduct vehicle maintenance operation only in designated areas.
- When possible, perform all vehicle and equipment maintenance at an indoor location with a paved floor.
- Always use drip pans.
- Absorbent spill clean-up materials shall be available in all maintenance areas and shall be disposed of properly after use.
- Maintenance areas shall be protected from stormwater run-on and runoff, and shall be located at least 50 feet downstream of any drainage facilities and watercourses.
- Use portable tents or construct a roofing-device over long-term maintenance areas and for projects that must be performed outdoors.
- Do not dump or dispose of oils, grease, fluids and lubricants onto the ground.
- Do not dump or dispose batteries, used oils, antifreeze and other toxic fluids into a storm drain or watercourse.
- Do not bury tires.
- Collect waste fluids in properly labeled containers and dispose of properly.

Spill Response and Reporting

- Provide spill containment dikes or secondary containment around stored oils and other fluid storage drum(s).
- Conduct cleanups of any fuel spills immediately after discovery.
- Spills are to be cleaned using dry cleaning methods only. Spills shall be cleaned up with a dry, absorbent material (e.g., kitty litter, sawdust, etc.) and the rest of the area is to be swept.
- Collected waste is to be disposed of properly.
- Contact the City of Hackensack Spill Response Team at 201-646-3953.

Maintenance and Inspection

- Periodically check for leaks and damaged equipment and make repairs as necessary.

ATTACHMENT 10

GOOD HOUSEKEEPING PRACTICES SOP

CITY OF HACKENSACK

GOOD HOUSEKEEPING
STANDARD OPERATING PROCEDURES

Introduction and Purpose

This standard operating procedure (SOP) contains the basic practices of good housekeeping to be implemented at maintenance yards including maintenance activities at ancillary operations in the City of Hackensack (City). The purpose of this SOP is to provide a set of guidelines for employees of the City for Good Housekeeping Practices at their maintenance facilities.

Scope

This SOP applies to all City facilities conducting maintenance activities.

Standards and Specifications

General

- All containers should be properly labeled and marked, and the labels must remain clean and visible.
- All containers must be kept in good condition and tightly closed when not in use.
- When practical, chemicals, fluids and supplies should be kept indoors.
- If containers are stored outside, they must be covered and placed on spill platforms.
- Keep storage areas clean and well organized.
- Spill kits and drip pans must be kept near any liquid transfer areas and protected from rainfall.
- Absorbent spill clean-up materials must be available in maintenance areas and shall be disposed of properly after use.
- Place trash, dirt and other debris in the dumpster.
- Collect waste fluids in properly labeled containers and dispose of them properly.
- Establish and maintain a recycling program by disposing papers, cans, bottles and trash in designated bins.

Salt and De-Icing Material Handling

- During loading and unloading of salt and de-icing materials, prevent and/or minimize spills. If salt or de-icing materials are spilled, remove the materials using dry cleaning methods. All collected materials shall be either reused or properly discarded.

- Sweeping should be conducted once a week to get rid of dirt and other debris. Sweeping should also be conducted immediately following loading/unloading activities, when practical.
- Minimize the tracking of materials from storage and loading/unloading areas.
- Minimize the distance that salt and de-icing materials are transported during loading/unloading activities.
- Any materials that are stored outside must be tarped when not actively being used.
- If interim seasonal tarping is being implemented, de-icing materials may be stored outdoors only between October 15th through April 30th.

Spill Response and Reporting

- Conduct clean-up of any spill(s) immediately after discovery.
- Spills are to be cleaned using dry cleaning methods only.
- Contact the City of Hackensack Spill Response Team at 201-646-3953.

Maintenance and Inspection

- Periodically check for leaks and damaged equipment and make repairs as necessary.
- Perform monthly inspections of all (indoor and outdoor if applicable) storage locations.

ATTACHMENT 11

MATERIALS INVENTORY LIST

APPENDIX C

THE BERGEN COUNTY STORMWATER MANAGEMENT PROGRAM

BERGEN COUNTY

STORM WATER MANAGEMENT PROGRAM

PERFORMANCE AND DESIGN STANDARDS

In accordance with the New Jersey County Planning Enabling statutes (N.J.S.A. 40:27-1 et seq.) wherein County Planning Boards are enabled to require adequate drainage facilities and easements in the review and approval of development applications affecting County facilities, the Bergen County Planning Board may require storm water management facilities in accordance with the following performance and design standards:

A. Storm Water Management

1. Procedures

   a. All applications for development of two (2) acres (gross area) or more including those of governmental agencies are required to submit data to the County Planning Board specifying the change in runoff due to the proposed improvements. (The additional area of improvements to County roads, or facilities required by the County Planning Board, shall be excluded from the calculations of both the gross area required and the change in runoff calculations).

   b. Those applications for development that propose one (1) acre or more of additional impervious surfaces are required to detail on the plans submitted storm water management facilities to retain/detain the additional storm water runoff being generated if downstream drainage has been determined to be inadequate to meet design standards. Residential roof areas not directly connected to storm water system shall be calculated at 60%.

   c. Any proposed development which does not have an adequate drainage outlet as determined by the County Engineer, and/or causes or increases existing flooding of a County road or adjacent land is required to submit plans indicating how these problems will be ameliorated.

   d. All applications for development (with the exception of major regional commercial centers) which drain directly to a tidal body (Hudson River, Hackensack River to Oradell Dam, Passaic River to Dundee Dam, Overpeck Creek to tide gates) or a controlled regional facility (i.e. Oradell and Woodcliff Lake Reservoirs, Lake Tappan, Darlington Lake and Overpeck Creek Lake) are exempt.

   e. Where the County engineer has determined that the receiving stream channel from a development site is adequate to handle the 100- year flood flows in bank or within the undeveloped, protected flood plain area without an adverse impact to downstream properties, on-site storm water management facilities will not be required. Flood plain areas are as defined by the N.J. Department of Environmental Protection.

   f. Where site constraints make on-site storm water management facilities clearly impractical for physical (steep slopes, rock conditions or aesthetics), public health (septic tanks), or economic reasons, (which shall be presented by the applicant and approved by the Planning Board) the County Planning Board shall require an in-lieu cash contribution, or a combination of facilities and cash contribution, toward the construction or maintenance of regional storm water management or drainage facilities located in the particular drainage basin in which the site is located. The cash contribution will be equal to the estimated cost of providing on-site storm water management facilities that would have otherwise been required. Said monies collected shall be held and disbursed from a trust fund to be established. Said disbursements shall be used only for storm water management purposes as specifically approved by the Board of Chosen Freeholders upon recommendation of the Bergen County Planning Board and/or the County Engineer.

g. County storm water management requirements shall be coordinated with existing municipal storm water management ordinances. Where pre-application meetings are held with the applicant the results of such meetings shall be forwarded to the appropriate municipal agencies.

2. Performance Standards

a. Additional storm water runoff produced as a result of the proposed development shall be retained or detained on-site, unless exempt for reason of section 1D, 1E, or 1F.

b. Flow velocities from the outlets of storm water management facilities shall be designed in such manner as to prevent scour, erosion and siltation in channels and spillways.[1]

c. Standards for Soil Erosion and Sediment Control in New Jersey [2] shall be adhered to and soil erosion and sediment control plans shall be certified where applicable by the Bergen County Soil Conservation District in accordance with P. L. 1979, Ch. 459.

d. The applicant shall post performance bonds to the municipality or county for the total cost of installation of the approved storm water management facilities based on estimates of construction quantities to be provided by the applicant.

e. The applicant shall post maintenance bonds for the upkeep of the approved storm water management facilities for a period of two years after the release of the performance bond. The maintenance bond shall be equal to 10% of the amount of the performance bond for storm water management facilities.

f. Maintenance of storm water management facilities, after the release of the maintenance bond, shall be the responsibility of the owners of property (excluding one and two family dwellings) on which the facility is located or the responsibility of a legally constituted home-owners (residents) association, if one exists for the development in question, or the responsibility of appropriate governmental unit assuming responsibility.

g. In instances where for reasons of public health and safety it would be appropriate for a governmental body to assume the responsibility of maintaining an approved storm water management basin, the following conditions should exist:

1. Adequate easements shall be provided around the storm water management basin as well as an access easement, for maintenance to the facility.

3. Design Standards

a. Storm water management facilities include, but are not limited to, drywells, swales, basins, porous pavement, open drainage pipes, rooftop storage or a combination of these or other methods.

b. All storm water retention or detention facilities shall be designed using the 25 year design storm.[3]

c. Runoff coefficients for developed and undeveloped conditions shall be used to determine increase in runoff to be stored.

d. Methodology for determining runoff shall conform to generally accepted engineering standards and practices. (e.g. SCS Runoff Equation, Runoff Curve Numbers and dimensionless unit hydrograph[4,5] or the Rational Formula and runoff coefficients as published in the Handbook of Applied Hydrology.[6])

e. Facilities shall be designed in such manner that the rate of discharge shall not exceed that which occurred under predevelopment conditions for the design storm.

f. Storm water retention/detention basins may be depressions in parking areas, excavated basins, basins created through use of curbs, stabilized earth berms or dikes, or any other form of grading which serves to temporarily impound and store water. The following standards apply to basins:

1. If routing study is required a short procedure may be used as described in SCS Technical Release #55 [5] or any other acceptable method.
2. If earth berms or dikes are used to create the impounding area, they shall be provided with an emergency spillway or outlet to pass the 100 year storm and be adequately stabilized and the slopes protected with vegetative cover, paving, or rip-rap to protect against failure or breaching.
3. Outlet pipes shall be at least 6 inches in diameter to facilitate cleaning.
4. Suitable linings shall be placed upstream and downstream of principal outlets to prevent scour and erosion.
5. Earthen Dam embankments shall have side slopes not steeper than 3:1. Emergency spillways must be adequately stabilized.
6. Basin bottoms should be designed to protect against residual water periods to prevent mosquito breeding.
7. Safety ledges shall be constructed when feasible on the side slopes steeper than 3:1 of all basins having a permanent pool of water. These ledges shall be at least 4 feet in width with one located 1-1½ feet above and the other located 2½-3 feet below the permanent water surface.
8. Fencing and/or vegetative screening may be erected around basins when desirable.

g. Ground absorption systems such as drywells, porous pavement or the like shall be used only where the infiltration rate of the receiving soil is acceptable as determined by percolation tests or soil borings, or as determined by the County Engineer.

h. Rooftop storage can be accomplished through temporary impoundment and storage of storm water on flat or slightly pitched building rooftops by use of drain outlets which restrict the storm water runoff from the roof surface. A design certification as to the ability of the structure to bear this weight must be presented by an appropriate licensed professional.

i. Drainage easements, where deemed necessary, will be required to assure the continuance of storm water management facilities. For subdivision applications, if the necessary drainage easements cannot be conveyed to a public body, a hardship will be deemed to exist and a cash contribution in-lieu of construction will be required, as outlined in Section A-1-f.

4. These standards shall be reviewed in approximately 6 months and periodically thereafter as determined after initial review by the Planning Board, the Board of Chosen Freeholders and a committee of representatives of appropriate professional associations to determine their effectiveness and equitability and a status report shall be given to the Board of Freeholders on the interest bearing trust fund accounts.

REFERENCES

1. Open Channel Hydraulics, Ven Te Chow, McGraw-Hill, 1959
2. Standards for Soil Erosion and Sediment Control in New Jersey. New Jersey State Soil Conservation Committee. September, 1974
3. Technical Paper Number 40 - Rainfall Frequency Atlas of the United States, U.S. Department of Commerce, Weather Bureau, 1961
4. National Engineering Handbook-Section 4 - Hydrology, U. S. Department of Agriculture, Soil Conservation Service, August 1972
5. Technical Release Number 55 - Urban Hydrology for Small Watersheds, U. S. Department of Agriculture, Soil Conservation Service, Engineering Division, January 1975
6. Handbook of Applied Hydrology, Ven Te Chow, Editor, McGraw-Hill, 1964

APPENDIX D

N.J.A.C. 7:8 "STORMWATER MANAGEMENT"

APPENDIX D

N.J.A.C. 7:8 "STORMWATER MANAGEMENT"

7:8-1.1 Scope and purpose

(a) This chapter establishes general requirements for stormwater management plans and stormwater control ordinances, as well as content requirements and procedures for the adoption and implementation of regional stormwater management plans and municipal stormwater management plans under the Municipal Land Use Law N.J.S.A. 40:55D-1 et seq.; the Water Quality Planning Act, N.J.S.A. 58:11A-1 et seq.: the Water Pollution Control Act, N.J.S.A. 58:10A-1 et seq.; and the Flood Hazard Area Control Act, N.J.S.A. 58:16A-50 et seq.; and implementing rules.

(b) This chapter establishes design and performance standards for stormwater management measures required by rules pursuant to the Flood Hazard Area Control Act, N.J.S.A. 58:16A-50 et seq.; the Coastal Area Facility Review Act, N.J.S.A. 13:19-1 et seq.; the Wetlands Act of 1970, N.J.S.A. 13:9A-1 et seq.; the Waterfront Development Law, N.J.S.A. 12:5-3; the Freshwater Wetlands Protection Act, N.J.S.A. 13:9B-1 et seq.; and the Dam Safety Act, N.J.S.A. 58:4-1 et seq.

(c) This chapter establishes safety standards for stormwater management basins pursuant to N.J.S.A. 40:55D-95.1.

7:8-1.2 Definitions

The following words and terms, when used in this chapter, shall have the following meanings unless the context clearly indicates otherwise.

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

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

"Compaction" means the increase in soil bulk density.

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

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

1. A county planning agency; or

2. A county water resources 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 Department of Environmental Protection.

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

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

"Development" means the division of a parcel of land into two or more parcels, the construction, reconstruction, conversion, structural alteration, relocation or enlargement of any building or structure, any mining excavation or landfill, and any use or change in the use of any building or other structure, or land or extension of use of land, for which permission is required under the Municipal Land Use Law, N.J.S.A. 40:55D-1 et seq.

In the case of development on agricultural land, development means: any activity that requires a State permit; any activity reviewed by the County Agricultural Boards (CAB) and the State Agricultural Development Committee (SADC), and municipal review of any activity not exempted by the Right to Farm Act, N.J.S.A. 4:1C-1 et seq.

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

"Environmentally constrained area" means the following areas where the physical alteration of the land is in some way restricted, either through regulation, easement, deed restriction or ownership such as: wetlands, floodplains, threatened and endangered species sites or designated habitats, and parks and preserves. Habitats of endangered or threatened species are identified using the Department's Landscape Project as approved by the Department's Endangered and Nongame Species Program.

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

Landscape Project as approved by the Department's Endangered and Nongame Species Program.

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

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

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

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

"Lead planning agency" means one or more public entities having stormwater management planning authority designated by the regional stormwater management planning committee pursuant to N.J.A.C. 7:8-3.2, that serves as the primary representative of the committee.

"Major development" means any "development" that provides for ultimately disturbing one or more acres of land or increasing impervious surface by one-quarter acre or more. Disturbance for the purpose of this rule is the placement of impervious surface or exposure and/or movement of soil or bedrock or clearing, cutting, or removing of vegetation. Projects undertaken by any government agency which otherwise meet the definition of "major development" but which do not require approval under the Municipal Land Use Law, N.J.S.A. 40:55D-1 et seq., are also considered "major development."

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

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

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

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

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

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

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

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

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

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

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

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

"Stormwater management planning agency" means a public body authorized by legislation to prepare stormwater management plans.

"Stormwater management planning area" means the geographic area for which a stormwater management planning agency is authorized to prepare stormwater management plans, or a specific portion of that area identified in a stormwater management plan prepared by that agency.

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

"Urban Redevelopment Area" is defined as previously developed portions of areas:
1. Delineated on the State Plan Policy Map (SPPM) as the Metropolitan Planning Area (PA1), Designated Centers, Cores or Nodes;
2. Designated as CAFRA Centers, Cores or Nodes;
3. Designated as Urban Enterprise Zones; and
4. Designated as Urban Coordinating Council Empowerment Neighborhoods.

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

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

7:8-1.3 Program information

Questions or submissions regarding this chapter should be directed to the Division of Watershed Management, New Jersey Department of Environmental Protection, P.O. Box 418, Trenton, New Jersey 08625.

7:8-1.4 Severability

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

7:8-1.5 Relationship to other regulatory programs

(a) Nothing in this chapter shall be construed as preventing the Department or other agencies or entities from imposing additional or more stringent stormwater management requirements necessary to implement the purposes of any enabling legislation including those measures necessary to achieve the Surface Water Quality Standards at N.J.A.C. 7:9B.

(b) If a stormwater management measure is used as a soil erosion or sediment control measure, the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq., shall also apply.

(c) These stormwater requirements are the Department's standards referenced by the stormwater management provisions of the Residential Site Improvement Standards at N.J.A.C 5:21-7.

7:8-1.6 Applicability to Major Development

(a) Except as provided in (b) below, all major development shall comply with the requirements of this chapter.

(b) The following major development shall be subject to the stormwater management requirements in effect on February 1, 2004, copies of which are available from the Department at the address specified in N.J.A.C. 7:8-1.3:

1. Major development which does not require any of the Department permits listed in (c) below and which has received one of the following approvals pursuant to the Municipal Land Use Law (N.J.S.A. 40:55D-1 et seq.) prior to February 2, 2004:

i. Preliminary or final site plan approval;

ii. Final municipal building or construction permit;

iii. Minor subdivision approval where no subsequent site plan approval is required;

iv. Final subdivision approval where no subsequent site plan approval is required; or

v. Preliminary subdivision approval where no subsequent site plan approval is required;

2. Major development which has received one of the approvals pursuant to the Municipal Land Use Law (N.J.S.A. 40:55D-1 et seq.) in (1) above prior to February 2, 2004 and has secured at least one of the applicable permits listed in (c) below from the Department by February 2, 2004, and provided that the permit included a stormwater management review component.

3. Major development undertaken by any government agency, which does not require approval under the Municipal Land Use Law, N.J.S.A. 40:55D-1 et seq., provided the project has secured at least one of the applicable Department permits listed in (c) below prior to February 2, 2004, and provided that the permit included a stormwater management review component.

(c) For the purposes of this section, the term "permit" shall include transition area waivers under the Freshwater Wetlands Protection Act. In order to qualify under (b)2 or 3 above, the major development must have obtained at least one Department permit granted under the following statutes and, provided that the permit included a stormwater management review component, prior to February 2, 2004:

1. Flood Hazard Area Control Act, N.J.S.A. 58-16A-50 et seq.;

2. Freshwater Wetlands Protection Act, N.J.S.A. 13:9B-1 et seq.;

3. Coastal Area Facility Review Act, N.J.S.A. 13:19-1 et seq.;

4. Waterfront and Harbor Facilities Act, N.J.S.A. 12:5-3;

(d) An exemption provided by (b) above shall expire with the expiration, termination or other loss of duration or effect of either of the qualifying local approval or Department permit, whichever comes first. The expiration of local approvals under (b)1 above shall be governed by local ordinance. In the event there are multiple qualifying Department permits under (c) above, the expiration date is governed by that permit which expires last provided that the permit is still in effect. Once the exemption expires, the major development shall be subject to all requirements of this chapter upon reapplication for that permit and all subsequent permits or local approval(s) under the Municipal Land Use Law.

(e) An exemption under (b) above is limited to the land area and the scope of the project addressed by the qualifying approval(s) and permit(s). Exemptions under this section shall be deemed void if revisions are made to the qualifying approval or permit in (b) above, including approvals under the Municipal Land Use Law, unless upon application, the Department determines that each revision would have a de minims impact on water resources. In making this determination, the Department shall consider the extent of any impacts on water resources resulting from the revision, including, but not limited to:

1) increases in stormwater generated;

2) increases in impervious surface;

3) increases in stormwater pollutant loading;

4) changes in land use;

5) new encroachments in special water resource protection areas; and,

6) changes in vegetative cover.

(f) In case of conflict with the Coastal Permit Program Rules at N.J.A.C. 7:7-4.4(a)4, the requirements of this chapter shall supersede.

SUBCHAPTER 2. GENERAL REQUIREMENTS FOR STORMWATER MANAGEMENT PLANNING

7:8-2.1 Scope

This subchapter provides general principles applicable to all stormwater management plans and stormwater control ordinances, including the goals of stormwater management planning, the process for identification of stormwater management planning agencies, and stormwater management plan requirements.

7:8-2.2 Goals of stormwater management planning

(a) All stormwater management plans and stormwater control ordinances shall be designed 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 in order 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 management basins.

7:8-2.3 Stormwater management planning agencies

(a) The following entities may be stormwater management planning agencies provided they are authorized under their enabling legislation to prepare stormwater management plans:

1. A municipality;
2. A county;
3. A county water resources agency or association;
4. A designated planning agency under N.J.A.C. 7:15;
5. A Soil Conservation District, in coordination with the State Soil Conservation Committee;
6. The Delaware River Basin Commission;
7. The Pinelands Commission;
8. The Delaware and Raritan Canal Commission;
9. The New Jersey Meadowlands Commission;
10. The Department; or
11. Other regional, State or interstate agencies.

7:8-2.4 Stormwater management plan requirements

(a) A stormwater management plan shall include structural and nonstructural stormwater management strategies necessary to meet the stormwater management goals of this chapter.

(b) A regional stormwater management plan shall comply with the requirements of this subchapter and N.J.A.C 7:8-3.

(c) A municipal stormwater management plan shall comply with the requirements of this subchapter and N.J.A.C 7:8-4.

(d) A stormwater management plan shall incorporate the safety standards for stormwater management basins at N.J.A.C. 7:8-6.

(e) In developing a stormwater management plan and identifying appropriate stormwater management measures thereunder, each stormwater management planning agency shall consider the physical characteristics and ecological resources of the stormwater management planning area.

(f) A stormwater management plan and any stormwater management ordinance shall be coordinated with any other stormwater management plans related to the same river basin or drainage area.

7:8-2.5 Exemptions

A municipality or other entity conducting stormwater management planning under this chapter may petition the Department at the address provided at N.J.A.C. 7:8-1.3 for an exemption to the requirements of this chapter by submitting documentation to demonstrate that, if granted, the exemption will not result in an increase in flood damage, water pollution, including threats to the biological integrity, or constitute a threat to the public safety.

SUBCHAPTER 3. REGIONAL STORMWATER MANAGEMENT PLANNING
7:8-3.1 Scope

(a) This subchapter describes stormwater management planning and implementation at the regional level, including plan elements; planning process; characterization; development of drainage area-specific objectives and standards; selection of stormwater management measures; strategy for implementing the measures and evaluating the effectiveness of the regional stormwater management plan; plan review, adoption, amendment or revision; and implementation and periodic evaluation of the plan.

(b) A regional stormwater management plan shall address stormwater-related water quality, ground water recharge and/or water quantity impacts of new and existing land uses in a regional stormwater management planning area. A regional stormwater management planning area shall consist of one or more continuous drainage areas. For example, a drainage area could be an area defined by a hydrologic unit code 14 (HUC14) as defined by the United States Geological Survey.

7:8-3.2 Regional stormwater management planning committee and lead planning agency

(a) A regional stormwater management planning committee (the committee) shall be established for the purposes of creating a regional stormwater management plan.

(b) A person or entity seeking to establish a regional stormwater management committee shall solicit participation from municipalities, interstate agencies, regional agencies, counties, designated planning agencies under N.J.A.C. 7:15, Soil Conservation

Districts, regional environmental commissions, Pinelands Commission, mosquito control and extermination commissions, public water supply and wastewater treatment utilities and agencies, lake associations, watershed associations, the watershed management planning area public advisory committee, environmental organizations, businesses, the Department and other appropriate State and Federal agencies and, members of the general public in the drainage area(s) to be addressed by the proposed plan. The solicitation for members of the general public to be part of the regional stormwater management planning committee can be performed through notices in local paper.

(c) The regional stormwater management planning committee shall designate a lead planning agency, which shall be recognized as the primary contact for the committee. The regional stormwater management planning committee, through the lead planning agency, shall:

1. Prepare the regional stormwater management plan;

2. Coordinate the regional stormwater management planning process with any applicable watershed management area planning process;

3. Provide opportunities for public participation throughout the regional stormwater management planning process; and

4. Perform other activities appropriate to facilitate the regional stormwater management planning process, including mediation, public information, providing technical assistance, and seeking and providing grants or other financial assistance, as available, to municipalities and/or local or regional agencies pursuant to N.J.S.A. 40:55D-99 or other applicable authority.

(d) A request for recognition as a regional stormwater management planning committee shall be submitted to the Department at the address listed in N.J.A.C. 7:8-1.3 by the lead planning agency, and include the following information:

1. A draft work plan and schedule for completing a regional stormwater management plan;

2. A copy of the mailing list used to solicit participation, including the entities identified in (b) above;

3. A copy of the letter of invitation to participate in the committee;

4. A copy of each response to the letter of invitation; and

5. In cases where no response from a public entity to the letter of invitation is

received within 60 days, the group shall send a follow-up request by certified mail, return receipt requested, and submit proof of such follow-up.

(e) The Department shall respond in writing within 45 days of the receipt of a complete request for recognition as a regional stormwater management planning committee. The Department shall either approve the application, request additional information or deny the request for recognition. Denials will include a justification for the decision.

The Department shall base approval or denial on the information submitted in the draft work plan and schedule for plan completion, completion of the requirements to involve and notify impacted parties, and whether there are other competing or overlapping requests for recognition for the same regional stormwater management planning area.

7:8-3.3 Regional stormwater management plan and elements

(a) A regional stormwater management plan shall incorporate, at a minimum, the following elements:

1. Identification of the lead planning agency and a description of the structure and members of the committee;

2. A statement of authority to develop and implement a stormwater management plan from public entities, as appropriate, represented on the regional stormwater management planning committee.

3. A characterization and assessment of the regional stormwater management planning area prepared in accordance with N.J.A.C. 7:8-3.4;

4. A statement of drainage area-specific water quality, groundwater recharge, and water quantity objectives established under N.J.A.C. 7:8-3.5;

5. The drainage area-specific stormwater-related water quality, groundwater recharge and water quantity design and performance standards established under N.J.A.C. 7:8-3.6;

6. The stormwater management measures selected in accordance with N.J.A.C. 7:8-3.7 and a summary of the rationale for the selection of each measure;

7. A description of the strategy for implementing the selected stormwater management measures for the regional stormwater management planning area and for evaluating the effectiveness of the regional stormwater management plan in accordance with N.J.A.C. 7:8-3.8, including a long-term monitoring program; and

8. To the extent elements of the plan do not represent the consensus of the committee, the plan shall identify and provide a discussion of the majority and minority positions.

(b) The regional stormwater management plan may also include:

1. Innovative stormwater measures and strategies such as nonpoint source pollutant trading, mitigation strategies, or special protection measures; and

2. A stream corridor protection plan to address protection of areas adjacent to waterbodies. For waterbodies subject to N.J.A.C. 7:8-5.5(h), the plan shall provide, at a minimum, protections equivalent to those provided at N.J.A.C. 7:8-5.5(h) and demonstrate that the functional value and overall condition of the special water resource protection area will be maintained or enhanced.

7:8-3.4 Characterization and assessment of the regional stormwater management planning area

(a) The regional stormwater management plan shall include a characterization and assessment that addresses the following components, unless the committee determines that a component is not appropriate for the regional stormwater management planning area and provides a rationale for not including the component:

1. Maps showing the following information. Maps developed on a Geographical Information System shall meet the Digital Data standards in N.J.A.C. 7:1D unless a rationale for a different format is provided.

i. The regional stormwater management planning area boundary;

ii. Existing land uses;

iii. Projected land uses assuming full development under existing zoning;

iv. Soil mapping units based on the detailed soil maps in County Soil Surveys published by the U.S. Department of Agriculture or, in areas for which County Soil Surveys are not available, on information obtained from Soil Conservation Districts;

v. Topography based on the U.S. Geological Survey Topographic Map, 7.5 minute quadrangle series, or other sources of information depicting topography in similar or greater detail;

vi. Water bodies based on detailed map sheets in County Soil Surveys published by the U.S. Department of Agriculture; the U.S. Geological Survey Topographic Map, 7.5 minute quadrangle series; or other sources of information depicting water bodies in similar or greater detail;

vii. Coastal wetlands based on maps prepared by the Department under the Wetlands Act of 1970, N.J.S.A. 13:9A-1 et seq., and freshwater wetlands based on maps prepared by the Department under the Freshwater Wetlands Protection Act, N.J.S.A. 13:9B-1 et seq.;

viii. Flood hazard areas based on delineations made by the Department under the Flood Hazard Area Control Act, N.J.S.A. 58:16A-50 et seq. For a water body for which the Department has not delineated the flood hazard area, a map of the flood hazard area prepared in accordance with N.J.A.C. 7:13 is acceptable;

ix. Groundwater recharge areas and well head protection areas based on maps prepared by the Department or ordinances of an affected municipality;

x. Environmentally constrained areas and environmentally critical areas;

xi. River areas designated under the New Jersey Wild and Scenic Rivers Act, N.J.S.A. 13:8-45 et seq., or the Federal Wild and Scenic Rivers Act, 16 U.S.C. §§1278 et seq.;

xii. For each waterbody in the regional stormwater management planning area, identification of the waterbody or waterbody segment, the drainage area, and the classification of the waterbody pursuant to N.J.A.C. 7:9B-1.15;

xiii. Each waterbody designated as a water quality limited surface water pursuant to N.J.A.C. 7:15-6;

xiv. Man-made stormwater conveyance, storage and discharge systems, including municipal separate storm sewer outfall pipes and the drainage areas as appropriate for these outfall structures; and

xv. Source water areas of potable public surface water supply intakes and public water supply reservoirs available on the Departments webpage at www.nj.gov/dep/swap/;

2. A map showing jurisdictional boundaries within the regional stormwater management planning area of municipal, county, and other agencies with responsibility for implementing stormwater management;

3. Identification of the physical characteristics of the regional stormwater management planning area pertinent to stormwater management, such as slopes, swales and impoundment areas as necessary for completing the analysis in N.J.A.C. 7:8-3.4(a)4;

4. A water quality, groundwater recharge and water quantity hydrologic and hydraulic model or analysis of the regional stormwater management planning area which addresses existing land uses and projected land uses assuming full development under existing zoning and taking into account permanently preserved lands;

5. An identification and evaluation of existing municipal, county, State, Federal, and other stormwater-related groundwater recharge, water quality and water quantity regulations and programs shall be conducted, including, where applicable, programs to develop total maximum daily loads (TMDLs) in accordance with N.J.A.C. 7:15-7; and

6. A summary of information that has been identified as useful for purposes of stormwater management planning but that is not available for technical, financial, or other reasons.

(b) The Department encourages the use of existing information to the extent that it is available to minimize the cost of data acquisition, such as information available on the Department's Geographical Information System web site (www.state.nj.us/dep/gis) or as developed through a watershed planning process.

(c) The characterization and assessment shall include information on locations and activities outside the regional stormwater management planning area that drain into the planning area (for example, stormwater originating in an adjacent drainage area that is transferred to the stormwater management planning area).

(d) Using the modeling or other information obtained under (a) through (c) above, the stormwater-related water quality impacts of existing land uses and projected land uses assuming full development under existing zoning shall be identified and ranked in accordance with the following process:

1. Inventory existing and potential stormwater-related pollutant sources and stormwater-related pollutants in the regional stormwater management planning area.

i. Stormwater-related pollutant sources include, for example, urban and suburban development, roads, storm sewers, agriculture, mining, and waterfront development.

ii. Stormwater-related pollutants include, for example, nutrients, pathogens, hydrocarbons, metals, pesticides, sediments, and suspended solids;

2. For surface water bodies and/or segments thereof and aquifers and/or portions thereof in the regional stormwater management planning area, identify and describe the existing or designated uses that are or may be adversely affected by stormwater-related pollutants, and to the extent feasible, identify the source(s) of the pollutant. The use of the report and list prepared by the Department to comply with Federal Clean Water Act, Section 303(d) and 305(b) (33 USC §§1313(d) and 1315(b)) and underlying data, including biological assessments, is encouraged; and

3. Identify and rank the most significant existing and potential stormwater-related pollutants and, for each pollutant, identify and rank the sources.

(e) Using the modeling or other information obtained under (a) through (c) above for stormwater-related water quantity impacts and stormwater-related groundwater recharge impacts of existing and projected land uses assuming full development under existing zoning, the most significant existing and potential stormwater-related water quantity problems, including flooding, erosion, mosquitoes, base-flow reduction, ground water depletion, and associated ecosystem impacts, shall be identified and described. The problems shall be ranked based on consideration of threat to public health, safety, and welfare as evidenced by history of or potential for flood damage; risk of loss of or damage to water supplies; and risk of damage to the biological integrity of water bodies.

7:8-3.5 Drainage area-specific water quality, groundwater recharge and water quantity objectives

(a) The regional stormwater management plan shall identify drainage area-specific water quality, groundwater recharge and water quantity objectives that are consistent with the goals of stormwater management planning at N.J.A.C. 7:8-2.3, and address each of the stormwater-related pollutant sources and pollutants ranked under N.J.A.C. 7:8-3.4(d) and the water quantity and groundwater recharge problems ranked under N.J.A.C. 7:8-3.4(e). The objectives shall address the elimination, reduction, or minimization of stormwater-related impacts associated with new and existing land uses. The objectives developed for the regional stormwater management plan may take into consideration environmental, social, and economic factors.

(b) Notwithstanding (a) above, the drainage area -specific objectives for major development shall provide, at a minimum, the protection that would be achieved through the application of N.J.A.C. 7:8-5, Design and Performance Standards for Stormwater Management Measures.

(c) If a TMDL has been established pursuant to N.J.A.C. 7:15 for a waterbody or waterbody segment in the regional stormwater management planning area, drainage area-specific objectives shall incorporate the loading reductions established in the TMDL for stormwater sources of pollution. In addition, if a waterbody or waterbody segment in the regional stormwater management planning area is on the Department's list prepared to comply with Federal Clean Water Act, Section 303(d) (33 USC §§1313(d)) for one or more designated uses by stormwater runoff, then drainage area objectives shall be included that address the pollutants or pollution for which the waterbody is threatened or impaired.

7:8-3.6 Drainage area-specific design and performance standards

(a) The regional stormwater management plan shall identify drainage area-specific design and performance standards in order to meet the drainage area-specific water quality, groundwater recharge and water quantity objectives identified under N.J.A.C. 7:8-3.5.

(b) Drainage area-specific design and performance standards may include performance standards for control of stormwater quantity, erosion, groundwater recharge and stormwater quality, as well as design standards for particular structural and nonstructural stormwater management strategies.

(c) The design and performance standards for stormwater management measures for major development described in N.J.A.C. 7:8-5 shall be incorporated into the regional stormwater management plan. Alternative drainage area-specific design and performance standards may be developed provided the alternative standard is at least as protective as would be achieved under N.J.A.C. 7:8-5 when considered on a regional stormwater management planning area basis.

(d) For structural stormwater management measures, drainage area-specific design and performance standards shall conform to the general standards at N.J.A.C. 7:8-5.7.

(e) Drainage area-specific design and performance standards do not have to be uniform throughout a drainage area provided the drainage area, when considered in its entirety, satisfies N.J.A.C. 7:8-5.

7:8-3.7 Selection of stormwater management measures

(a) The regional stormwater management plan shall identify stormwater management measures necessary to achieve the drainage area-specific water quality, groundwater recharge and water quantity objectives developed in accordance with N.J.A.C. 7:8-3.5, and design and performance standards developed in accordance with N.J.A.C. 7:8-3.6.

(b) Stormwater management measures in the following categories shall be considered and selected, as appropriate:

1. Stormwater management measures for new land uses;

2. Stormwater management measures for existing land uses, including, for example, retrofit measures for the modification of existing structural stormwater management measures or other structures affecting stormwater runoff; elimination of illicit or illegal discharges; prevention or minimization of the exposure of pollutants to stormwater; and control of floatables;

3. Stormwater management measures that enhance, protect, and/or preserve land or water areas possessing characteristics or features that provide for flood control, maintenance or improvement of water quality, or conservation of natural resources (for example, land use controls, local and regional open space plans and taxes, buffer zones, redirecting, recharging or minimizing stormwater discharges, pretreatment and/or end-of-pipe treatment); and

4. Public education programs that address stormwater quantity and quality.

(c) A written rationale shall be provided for each selected stormwater management measure, including an analysis of feasibility, benefits and costs, estimated percent pollutant load reduction and anticipated performance longevity;

(d) Each selected stormwater management measure shall include, as appropriate, a program for preventative and corrective maintenance, including a long-term implementation schedule and identification of the entity responsible for implementation and maintenance.

7:8-3.8 Strategy for implementing and evaluating effectiveness of stormwater management measures

(a) The regional stormwater management plan shall include a strategy for implementing the stormwater management measures. The lead planning agency or another entity designated by the committee shall be responsible for coordination and tracking of the implementation of the regional stormwater management plan, including the long-term monitoring program.

(b) The implementation strategy shall:

1. Identify agencies and/or entities necessary to implement the measures and conduct the long-term monitoring program;

2. Identify the respective measures and/or monitoring each agency and/or entity will implement and the enabling mechanisms by which the measures will be implemented, including, for example, new or amended municipal ordinances or interagency agreements;

3. Establish a schedule for the implementation of the measures based on priority, including specific milestones for all mechanisms identified under (b)2 above;

4. Provide an estimate of short term and long term implementation costs to be incurred; and

5. Identify existing and potential private, local, State, and Federal funding sources to implement the regional stormwater management plan.

(c) The implementation strategy shall include a long-term monitoring program that will provide information about land use, water quality, water quantity, groundwater resources and riparian and aquatic habitat condition, as appropriate. Information for the monitoring program may include data obtained through watershed management, local, county, State, interstate, and/or Federal monitoring programs, including volunteer monitoring programs.

(d) The implementation strategy shall include a procedure for evaluating and then updating as necessary, at least every five years, the effectiveness of the implemented measures in achieving the objectives and design and performance standards established in the regional stormwater management plan.

7:8-3.9 Regional stormwater management plan review, adoption, and amendment and/or revision

(a) Upon completion of a regional stormwater management plan, the lead planning agency shall submit the plan to the Department and, if applicable, to the designated water quality management planning agency as an amendment to the areawide water quality management plan(s) in accordance with the Water Quality Management Planning Rules at N.J.A.C. 7:15.

(b) In reviewing a regional stormwater management plan submitted under (a) above, the Department shall determine whether the plan conforms to the requirements of this chapter. The Department will disapprove, return for additional information or proceed with a proposed amendment in accordance with N.J.A.C. 7:15-3.4(g).

(c) Modifications to an adopted regional stormwater management plan shall be processed as an amendment or revision in accordance with N.J.A.C. 7:15-3.4(b)5 or 3.5(b)5, as applicable.

7:8-3.10 Implementation of adopted regional stormwater management plan

(a) Once the regional stormwater management plan has been adopted pursuant to N.J.A.C. 7:8-3.9, implementation responsibilities are as follows:

1. The Department will use the adopted regional stormwater management plan as the basis for reviewing the stormwater management aspects of projects or activities regulated pursuant to Coastal Permit Program rules, N.J.A.C. 7:7; the Freshwater Wetland Protection Act rules, N.J.A.C. 7:7A; the Coastal Zone Management rules, N.J.A.C. 7:7E; the Flood Hazard Area Control Act rules, N.J.A.C. 7:13; the New Jersey Pollutant Discharge Elimination System rules, N.J.A.C 7:14A; and the Dam Safety Standards, N.J.A.C. 7:20. The requirements of this chapter are considered to be the minimum stormwater standards. Additional requirements may be imposed as necessary under the respective programs.

2. Each municipality in the regional stormwater management planning area shall incorporate the applicable provisions of the regional stormwater management plan into a new or amended municipal stormwater management plan and ordinances.

3. In accordance with the Residential Site Improvement Standards at N.J.A.C. 5:21-7, if a stormwater management plan for the region has been approved by the Department, stormwater management systems must conform with that plan.

4. The Department shall not issue a permit for a project or activity that conflicts with an Areawide Water Quality Management Plan pursuant to N.J.A.C. 7:15-3.1.

SUBCHAPTER 4. MUNICIPAL STORMWATER MANAGEMENT PLANNING

7:8-4.1 Scope

This subchapter describes stormwater management planning and implementation at the municipal level, including plan elements, county review and technical assistance, the schedule for adoption of the plan and ordinances, and variance or exemption from design and performance standards for stormwater management measures.

7:8-4.2 Municipal stormwater management plan and elements

(a) A municipal stormwater management plan shall address stormwater-related water quality, groundwater recharge and water quantity impacts of major development, and may also address stormwater-related water quality, water quantity and groundwater recharge impacts of existing land uses. For purposes of this subchapter, major development is limited to projects that ultimately disturb one or more acres of land.

(b) A municipal stormwater management plan and stormwater control ordinance(s) shall conform with applicable regional stormwater management plan(s).

(c) A municipal stormwater management plan shall, at a minimum:

1. Describe how the municipal stormwater management plan will achieve the goals of stormwater management planning set forth at N.J.A.C. 7:8-2.3;

2. Include maps showing water bodies based on Soil Surveys published by the U.S. Department of Agriculture; the U.S. Geological Survey Topographic Map, 7.5 minute quadrangle series; or other sources of information depicting water bodies in similar or greater detail;

3. Map groundwater recharge areas and well head protection areas based on maps prepared by the Department under N.J.S.A. 58:11A-13 or a municipal ordinance;

4. Describe how the municipal stormwater management plan incorporates design and performance standards in N.J.A.C.7: 8-5 or alternative design and performance standards adopted as a part of a regional stormwater management plan or water quality management plan;

5. Describe how adequate long-term operation as well as preventative and corrective maintenance (including replacement) of the selected stormwater management measures will be ensured;

6. Describe how the plan will ensure compliance with Safety Standards for Stormwater Management Basins at N.J.A.C. 7:8-6;

7. Describe how the municipal stormwater management plan is coordinated with the appropriate Soil Conservation District and any other stormwater management plans, including any adopted regional stormwater management plan, prepared by any stormwater management planning agency related to the river basins or drainage areas to which the plans and/or ordinances apply;

8. Evaluate the extent to which the municipality's entire master plan (including the land use plan element), official map and development regulations (including the zoning ordinance) implement the principles expressed in N.J.A.C. 7:8-5.3(b). This evaluation shall also be included (with updating as appropriate) in the reexamination report adopted under N.J.S.A. 40:55D-89;

9. Include a map of the municipality showing:

i. Projected land uses assuming full development under existing zoning, and

ii. The hydrologic unit code 14 (HUC14) drainage areas as defined by the United States Geological Survey; and an estimate, for each HUC14 drainage area, of the total acreage in the municipality of impervious surface and associated future nonpoint source pollutant load assuming full build out of the projected land uses.

10. At the option of the municipality, document that it has a combined total of less than one square mile of vacant or agricultural lands rather than provide the information required in (c)8 and 9 above. Agricultural lands may be excluded if the development rights to these lands have been permanently purchased or restricted by covenant, easement or deed. Vacant or agricultural lands in environmentally constrained areas may be excluded if the documentation also includes an overlay map of these areas at the same scale as the map under (c)10i below.

i. Documentation shall include an existing land use map at an appropriate scale to display the land uses of each parcel within the municipality. Such a map shall display the following land uses: residential (which may be divided into single family, two-to-four family, and other multi-family), commercial, industrial, agricultural, parkland, other public uses, semipublic uses, and vacant land;

11. In order to grant a variance or exemption from the design and performance standards in N.J.A.C. 7:8-5, include a mitigation plan that identifies what measures are necessary to offset the deficit created by granting the variance or exemption. The mitigation plan shall ensure that mitigation is completed within the drainage area and for the performance standard for which the variance or exemption was granted;

12. Include a copy of the recommended implementing stormwater control ordinance(s) requiring stormwater management measures, and

13. The municipal stormwater management plan may also include a stream corridor protection plan to address protection of areas adjacent to waterbodies. For waterbodies subject to N.J.A.C. 7:8-5.5(h), the plan shall provide, at a minimum, protections equivalent to those provided at N.J.A.C. 7:8-5.5(h) and be approved by the Department.

7:8-4.3 Schedule for adoption of municipal stormwater management plan and ordinances

(a) A municipality shall adopt a municipal stormwater management plan as an integral part of its master plan and official map in accordance with the schedule in (a)1 or 2 below, whichever is sooner. The requirements in N.J.A.C. 7:8-4.2(c)8 and 9 are not operative until February 2, 2006.

1. By the deadline established in a New Jersey Pollutant Discharge Elimination System permit obtained by the municipality for a municipal separate storm sewer system under N.J.A.C. 7:14A; or

2. By the next reexamination of the master plan under N.J.S.A. 40:55D-89, if a grant for 90 percent of the costs for the preparation of the municipal stormwater management plan has been made available to a municipality by the Department;

(b) Within one year after the municipality adopts the municipal stormwater management plan, the municipality shall adopt stormwater control ordinance(s) to implement the adopted plan and shall submit the adopted municipal stormwater management plan and ordinance(s) to the county review agency for approval. The adopted municipal stormwater management plan and ordinance(s) shall not take effect without approval by the county review agency.

(c) The municipality shall amend the municipal stormwater management plan and stormwater control ordinance(s) as necessary and submit the amended plan and amended ordinance(s) to the county review agency for approval.

(d) The municipality shall reexamine the municipal stormwater management plan at each reexamination of the municipality's master plan in accordance with N.J.S.A. 40:55D-89.

(e) Within one year of the adoption of a regional stormwater management plan as an amendment to the Areawide Water Quality Management Plan, or an amendment thereto, each municipality within the regional stormwater management planning area shall amend their respective municipal stormwater management plans and stormwater control ordinance(s) to implement the regional stormwater management plan.

7:8-4.4 County review process

(a) A municipality shall submit a copy of the adopted stormwater management plan and stormwater control ordinance(s) to the county review agency and the Department.

(b) In reviewing the adopted municipal stormwater management plan and ordinance(s), the county review agency shall consider whether the plan and ordinance(s) conform with the requirements of this chapter.

(c) In accordance with N.J.S.A. 40:55D-97, it is the county review agency's responsibility to review and approve, conditionally approve (specifying the necessary amendments to the plan and ordinance(s)) or disapprove the adopted municipal stormwater management plan and ordinance(s) within 60 calendar days of receipt of the plan and ordinance(s). If the county review agency does not approve, conditionally approve, or disapprove the plan or ordinance(s) within 60 calendar days, the plan and ordinance(s) shall be deemed approved. The county review agency shall issue a written decision to the municipality, with a copy to the Department.

(d) A municipal stormwater management plan and ordinance(s) approved under (c) above shall take effect immediately. A municipal stormwater management plan and ordinance(s) conditionally approved under (c) above shall take effect upon adoption by the municipality of the amendments specified by the county review agency.

(e) Within 30 days of the effective date of the municipal stormwater management plan and ordinance(s) under (d) above, the municipality shall place the plan and ordinance(s) on its website and notify the Department, the Soil Conservation District and State Soil Conservation Committee, or:

1. Submit a copy of the approved municipal stormwater management plan and ordinance(s) to the Department; and

2. Provide notice of such approval to the Soil Conservation District and the State Soil Conservation Committee and, upon request, submit a copy of the approved plan and ordinance(s).

7:8-4.5 Reservation of rights

The Department reserves the right to review stormwater management plans and ordinances for compliance with this subchapter and make recommendations to correct any deficiencies.

7:8-4.6 Variance or exemption from the design and performance standards for stormwater management measures

A municipality may grant a variance or exemption from the design and performance standards for stormwater management measures set forth in its approved municipal stormwater management plan and stormwater control ordinance(s), provided the municipal plan includes a mitigation plan in accordance with N.J.A.C. 7:8-4.2(c)11 and the municipality submits a written report to the county review agency and the Department describing the variance or exemption and the required mitigation.

SUBCHAPTER 5 DESIGN AND PERFORMANCE STANDARDS FOR STORMWATER MANAGEMENT MEASURES

7:8-5.1 Scope

(a) This subchapter establishes design and performance standards for stormwater management measures for major development intended to minimize the adverse impact of stormwater runoff on water quality and water quantity and loss of groundwater recharge in receiving water bodies.

(b) The standards specified in this subchapter do not apply to major development if alternative design and performance standards that are at least as protective as would be achieved through this subchapter when considered on a regional stormwater management area basis are applicable under a regional stormwater management plan adopted in accordance with this chapter or a water quality management plan adopted in accordance with N.J.A.C. 7:15.

7:8-5.2 Stormwater management measures for major development

(a) Stormwater management measures for major development shall be developed to meet the erosion control, groundwater recharge, stormwater runoff quantity, and stormwater runoff quality standards at N.J.A.C. 7:8-5.4 and 5.5. To the maximum extent practicable, these standards shall be met by incorporating nonstructural stormwater management strategies at N.J.A.C. 7:8-5.3 into the design. If these measures alone are not sufficient to meet these standards, structural stormwater management measures at N.J.A.C. 7:8-5.7 necessary to meet these standards shall be incorporated into the design.

(b) The development shall incorporate a maintenance plan under N.J.A.C. 7:8-5.8 for the stormwater management measures.

(c) Stormwater management measures shall avoid adverse impacts of concentrated flow on habitat for threatened and endangered species as documented in the Department's Landscape Project or Natural Heritage Database established under N.J.S.A. 13:1B-15.147 through 15.150, particularly *Helonias bullata* (swamp pink) and/or *Clemmys muhlnebergi* (bog turtle).

(d) The following linear development projects are exempt from the groundwater recharge, stormwater runoff quantity, and stormwater runoff quality requirements at N.J.A.C. 7:8-5.4 and 5.5:

1. The construction of an underground utility line provided that the disturbed areas are revegetated upon completion;

2. The construction of an aboveground utility line provided that the existing conditions are maintained to the maximum extent practicable; and

3. The construction of a public pedestrian access, such as a sidewalk or trail with a maximum width of 14 feet, provided that the access is made of permeable material.

(e) A waiver from strict compliance from the groundwater recharge, stormwater runoff quantity, and stormwater runoff quality requirements at N.J.A.C. 7:8-5.4 and 5.5 may be obtained for the enlargement of an existing public roadway or railroad, or the construction or enlargement of a public pedestrian access, provided that the following conditions are met:

1. The applicant demonstrates that there is a public need for the project that cannot be accomplished by any other means;

2. The applicant demonstrates through an alternatives analysis, that through the use of nonstructural and structural stormwater management strategies and measures, the option selected complies with the requirements of N.J.A.C. 7:8-5.4 and 5.5 to the maximum extent practicable;

3. The applicant demonstrates that, in order to meet the requirements at N.J.A.C. 7:8-5.4 and 5.5 existing structures currently in use, such as homes and buildings would need to be condemned; and

4. The applicant demonstrates that it does not own or have other rights to areas, including the potential to obtain through condemnation lands not falling under (e)3 above within the upstream drainage area of the receiving stream, that would provide additional opportunities to mitigate for requirements of N.J.A.C. 7:8-5.4 and 5.5 that were not achievable on-site.

7:8-5.3 Nonstructural stormwater management strategies

(a) To the maximum extent practicable, the standards in N.J.A.C. 7:8-5.4 and 5.5 shall be met by incorporating nonstructural stormwater management strategies at N.J.A.C. 7:8-5.3 into the design. The persons submitting an application for review shall identify the nonstructural strategies 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 strategies identified in (b) below into the design of a particular project, the applicant shall identify the strategy and provide a basis for the contention.

(b) Nonstructural stormwater management strategies incorporated into site design shall:

1. Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;

2. Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces;

3. Maximize the protection of natural drainage features and vegetation;

4. Minimize the decrease in the "time of concentration" from pre-construction to post-construction. "Time of Concentration" is defined as the time it takes for runoff to travel from the hydraulically most distant point of the drainage area to the point of interest within a watershed;

5. Minimize land disturbance including clearing and grading;

6. Minimize soil compaction;

7. Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides;

8. Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas; and

9. Provide other source controls to prevent or minimize the use or exposure of pollutants at the site in order to prevent or minimize the release of those pollutants into stormwater runoff. These source controls include, but are not limited to:

i. Site design features that help to prevent accumulation of trash and debris in drainage systems;

ii. Site design features that help to prevent discharge of trash and debris from drainage systems;

iii. Site design features that help to prevent and/or contain spills or other harmful accumulations of pollutants at industrial or commercial developments; and

iv. 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.

(c) Any land area used as a non structural stormwater management measure to meet the performance standards in N.J.A.C. 7:8-5.4 and 5.5 shall be dedicated to a government agency, subjected to a conservation restriction filed with the County Clerk's office, or subject to Department approved or equivalent restriction that ensures that measure or an equivalent stormwater management measure approved by the reviewing agency is maintained in perpetuity.

(d) Guidance for nonstructural stormwater management strategies is available in the New Jersey Stormwater Best Management Practices Manual available from the Department through the address listed at N.J.A.C. 7:8-1.3.

7:8-5.4 Erosion control, groundwater recharge and runoff quantity standards

(a) This section contains minimum design and performance standards to control erosion, encourage and control infiltration and groundwater recharge, and control stormwater runoff quantity impacts of major development.

1. 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.

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

i. The design engineer shall, using the assumptions and factors for stormwater runoff and groundwater recharge calculations at N.J.A.C. 7:8-5.6, either:

(1) 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

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

ii. This groundwater recharge requirement does not apply to projects within the "urban redevelopment area," or to projects subject to iii below.

iii.The following types of stormwater shall not be recharged:

(1) Stormwater from areas of high pollutant loading. High pollutant loading areas are areas in industrial and commercial developments where solvents and/or petroleum products are loaded/unloaded, stored, or applied, areas where pesticides are loaded/unloaded or stored; areas where hazardous materials are expected to be present in greater than 'reportable quantities' as defined by the United States Environmental Protection Agency (EPA) at 40 CFR 302.4; areas where recharge would be inconsistent with Department approved remedial action work plan or landfill closure plan and areas with high risks for spills of toxic materials, such as gas stations and vehicle maintenance facilities; and

(2) Industrial stormwater exposed to "source material." "Source material" means any material(s) or machinery, located at an industrial facility, that is directly or indirectly related to process, manufacturing or other industrial activities, which could be a source of pollutants in any industrial stormwater discharge to groundwater. Source materials include, but are not limited to, raw materials; intermediate products; final products; waste materials; by-products; industrial machinery and fuels, and lubricants, solvents, and detergents that are related to process, manufacturing, or other industrial activities that are exposed to stormwater.

iv. The design engineer shall assess the hydraulic impact on the groundwater table and design the site so as to avoid adverse hydraulic impacts. Potential adverse hydraulic impacts include, but are not limited to, exacerbating a naturally or seasonally high water table so as to cause surficial ponding, flooding of basements, or interference with the proper operation of subsurface sewage disposal systems and other subsurface structures in the vicinity or downgradient of the groundwater recharge area.

3. In order to control stormwater runoff quantity impacts, the design engineer shall, using the assumptions and factors for stormwater runoff calculations at N.J.A.C. 7:8-5.6, complete one of the following:

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

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

iii.Design stormwater management measures so that the post-construction peak runoff rates for the two, 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; or

iv. In tidal flood hazard areas, stormwater runoff quantity analysis in accordance with i, ii, and iii above shall only be applied if the increased volume of stormwater runoff could increase flood damages below the point of discharge.

(b) Any application for a new agricultural development that meets the definition of major development at N.J.A.C. 7:8-1.2 shall be submitted to the Soil Conservation District for review and approval in accordance with the requirements of this section and any applicable Soil Conservation District guidelines for stormwater runoff quantity and erosion control. For purposes of this section, "agricultural development" means land uses normally associated with the production of food, fiber and livestock for sale. Such uses do not include the development of land for the processing or sale of food and the manufacture of agriculturally related products.

7:8-5.5 Stormwater runoff quality standards

Stormwater management measures shall be designed to reduce the post-construction load of total suspended solids (TSS) in stormwater runoff generated from the water quality design storm 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 one-quarter 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 Pollutant 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 below. The calculation of the volume of runoff may take into account the implementation of non-structural and structural stormwater management measures.

Table 1: Water Quality Design Storm Distribution

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

(b) 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 N.J.A.C. 7:8-1.3 or found on the Department's website at www.njstormwater.org. The BMP manual and other sources of technical guidance are listed in N.J.A.C. 7:8-5.9(a). 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. Where the Department is not 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 address at N.J.A.C. 7:8-1.3.

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

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

Where

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

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

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

Table 2: TSS Removal Rates for BMPs

Best Management Practice	TSS Percent Removal Rate
Bioretention Systems	90

Constructed Stormwater Wetland	90
Extended Detention Basin	40-60
Infiltration Structure	80
Manufactured Treatment Device	See N.J.A.C. 7:8-5.7(d)
Sand Filter	80
Vegetative Filter Strip	60-80
Wet Pond	50-90

(d) If there is more than one onsite drainage area, the 80 percent TSS removal rate shall apply to each drainage area, unless the runoff from the subareas converge on site in which case the removal rate can be demonstrated through a calculation using a weighted average.

(e) 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 N.J.A.C. 7:8-5.4 and 5.5.

(f) Additional information and examples are contained in the New Jersey Stormwater Best Management Practices Manual, which may be obtained from the address identified in N.J.A.C. 7:8-1.3.

(g) 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.

(h) 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 HUC 14 drainage. These areas shall be established for the protection of water quality, aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, and exceptional fisheries significance of those established Category One waters. These areas shall be designated and protected as follows:

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

i. 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 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.

ii. Encroachment within the designated special water resource protection area under (h)1i 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.

2. All stormwater shall be discharged outside of but may 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. (See N.J.A.C. 2:90-1.3).

3. 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., (see N.J.A.C. 2:90-1.3), 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:

i. Stabilization measures shall not be placed within 150 feet of the waterway;
ii. Stormwater associated with discharges allowed by this paragraph shall achieve a 95 percent TSS post construction removal rate;
iii. Temperature shall be addressed to ensure no impact on receiving waterway;
iv. 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;
v. A conceptual project design meeting shall be held with the appropriate Department staff and Soil Conservation District staff to identify necessary stabilization measures; and
vi. All encroachments proposed under this section shall be subject to review and approval by the Department.

4. 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 this subsection has been approved by the Department, 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 this subsection shall maintain or enhance the

current functional value and overall condition of the special water resource protection area as defined above in (h)1i. In no case shall a stream corridor protection plan allow reduction of the Special Water Resource Protection Area to less than 150 feet as measured perpendicular to the waterway subject to this subsection.

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

7:8-5.6 Calculation of stormwater runoff and groundwater recharge

(a) Stormwater runoff shall be calculated in accordance with the following:

1. The design engineer shall calculate runoff using one of the following methods:

i. The USDA Natural Resources Conservation Service (NRCS) methodology, including the NRCS Runoff Equation and Dimensionless Unit Hydrograph, as described in Section 4, National Engineering Handbook (NEH-4), dated July 2002, incorporated herein by reference as amended and supplemented. This methodology is additionally described in Technical Release 55 - Urban Hydrology for Small Watersheds (TR-55), dated June 1986, incorporated herein by reference as amended and supplemented. Information regarding the methodology is available from the Natural Resources Conservation Service website at http://www.wcc.nrcs.usda.gov/water/quality/common/neh630/4content.html or at Natural Resources Conservation Service, 220 Davidson Avenue, Somerset, New Jersey 08873; (732) 537-6040; or

ii. The Rational Method for peak flow and the Modified Rational Method for hydrograph computations. The rational and modified rational methods are described in "Appendix A-9 Modified Rational Method" in the Standards for Soil Erosion and Sediment Control in New Jersey, July 1999. This document is available from the State Soil Conservation Committee or any of the Soil Conservation Districts listed at N.J.A.C. 2:90-1.3(a)4. The location, address, and telephone number or each Soil Conservation District is available from the State Soil Conservation Committee, P.O. Box 330, Trenton, NJ 08625, 609-292-5540.

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 N.J.A.C. 7:8-5.6(a)1i and the Rational and Modified Rational Methods at N.J.A.C. 7:8-5.6(a)1i. A runoff coefficient or a groundwater recharge land cover for an existing condition may be used on all or a portion of the site if the design engineer verifies that the hydrologic condition has existed on the site or portion of the site for at least five years without interruption prior to the time of application. If more than

one land cover have existed on the site during the five years immediately prior to the time of application, the land cover with the lowest runoff potential shall be used for the computations. In addition, there is the presumption that the site is in good hydrologic condition (if the land use type is pasture, lawn, or park), with good cover (if the land use type is woods), or with good hydrologic condition and conservation treatment (if the land use type is cultivation.)

3. In computing pre-construction stormwater runoff, the design engineer shall account for all significant land features and structures, such as ponds, wetlands, depressions, hedgerows, or culverts, that may reduce pre-construction stormwater runoff rates and volumes.

4. In computing stormwater runoff from all design storms, the design engineer shall consider the relative stormwater runoff rates and/or volumes of pervious and impervious surfaces separately to accurately compute the rates and volume of stormwater runoff from the site. To calculate runoff from unconnected impervious cover, urban impervious area modifications as described in the NRCS Technical Release-55, Urban Hydrology for Small Watersheds or other methods may be employed.

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

(b) Groundwater recharge may be calculated in accordance with the following:

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

7:8-5.7 Standards for structural stormwater management measures

(a) Standards for structural stormwater management measures are as follows:

1. Structural stormwater management measures shall be designed to take into account the existing site conditions, including, for example, environmentally critical areas; wetlands; flood-prone areas; slopes; depth to seasonal high water table; soil type, permeability and texture; drainage area and drainage patterns; and the presence of solution-prone carbonate rocks (limestone).

2. Structural stormwater management measures shall be designed to minimize maintenance, facilitate maintenance and repairs, and ensure proper functioning. Trash racks shall be installed at the intake to the outlet structure as appropriate. The parallel bars at the outlet structure shall be spaced no greater than one-third the width of the diameter of the orifice or one-third the width of the weir, with a minimum spacing between bars of one-inch and a maximum spacing between bars of six inches. For outlets with a width or diameter less than three inches, the parallel bars shall be spaced one inch apart. In addition, the design of trash racks must comply with the requirements of N.J.A.C. 7:8-6.2(a).

3. Structural stormwater management measures shall be designed, constructed, and installed to be strong, durable, and corrosion resistant. Measures that are consistent with the relevant portions of the Residential Site Improvement Standards at N.J.A.C. 5:21-7.3, 7.4 and 7.5 shall be deemed to meet this requirement.

4. At the intake to the outlet from the stormwater management basin, the orifice size shall be a minimum of two and one-half inches in diameter.

5. Stormwater management basins shall be designed to meet the minimum safety standards for stormwater management basins at N.J.A.C. 7:8-6.

(b) Stormwater management measure guidelines are available in the New Jersey Stormwater Best Management Practices Manual. Other stormwater management measures may be utilized provided the design engineer demonstrates that the proposed measure and its design will accomplish the required water quantity, ground water recharge and water quality design and performance standards established by this subchapter.

(c) Manufactured treatment devices may be used to meet the requirements of this subchapter, provided the pollutant removal rates are verified by the New Jersey Corporation for Advanced Technology and certified by the Department.

7:8-5.8 Maintenance requirements

(a) The design engineer shall prepare a maintenance plan for the stormwater management measures incorporated into the design of a major development.

(b) The maintenance plan shall contain specific preventative maintenance tasks and schedules; cost estimates, including estimated cost of sediment, debris, or trash removal; and the name, address, and telephone number of the person or persons responsible for preventative and corrective maintenance (including replacement). Maintenance guidelines for stormwater management measures are available in the New Jersey Stormwater Best Management Practices Manual. If the maintenance plan identifies a person other than the developer (for example, a public agency or homeowners' association) as having the responsibility for maintenance, the plan shall include documentation of such person's agreement to assume this responsibility, or of the developer's obligation to dedicate a stormwater management facility to such person under an applicable ordinance or regulation.

(c)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.

(d) If the person responsible for maintenance identified under (b) above is not a public agency, the maintenance plan and any future revisions based on (h) below shall be recorded upon the deed of record for each property on which the maintenance described in the maintenance plan must be undertaken.

(e) Preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measure, including repairs or replacement to the structure; removal of sediment, debris, or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; and repair or replacement of nonvegetated linings.

(f) The person responsible for maintenance identified under (b) 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.

(g) The person responsible for maintenance identified under (b) above shall evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed.

(h) The person responsible for maintenance identified under (b) 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 (f) and (g) above.

(i) 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.

7:8-5.9 Sources for technical guidance

(a) Technical guidance for stormwater management measures can be found in the documents listed at (a)1 and 2 below, which are available from Maps and Publications, Department of Environmental Protection, 428 East State Street, P.O. Box 420, Trenton, New Jersey, 08625; telephone (609) 777-1038.

1. Guidelines for stormwater management measures are contained in the New Jersey Stormwater Best Management Practices Manual, 2002 as amended. Information is provided on stormwater management measures such as:

i. Bioretention systems;
ii. Constructed stormwater wetlands;
iii. Dry wells;
iv. Extended detention basins;
v. Infiltration structures;
vi. Manufactured treatment devices;
vii. Pervious paving;
viii. Sand filters;
ix. Vegetative filter strip, and
x. Wet pond.

2. The New Jersey Department of Environmental Protection Stormwater Management Facilities Maintenance Manual, as amended.

(b) Additional technical guidance for stormwater management measures can be obtained from the following:

1. The "Standards for Soil Erosion and Sediment Control in New Jersey" promulgated by the State Soil Conservation Committee and incorporated into N.J.A.C. 2:90. Copies of these standards may be obtained by contacting the State Soil Conservation Committee or any of the Soil Conservation Districts listed in N.J.A.C. 2:90-1.3(a)4. The location, address, and telephone number of each Soil Conservation District may be obtained from the State Soil Conservation Committee, P.O. Box 330, Trenton, New Jersey 08625, 609-292-5540;

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

3. The Soil Conservation Districts listed in N.J.A.C. 2:90-1.3(a)4. The location, address, and telephone number of each Soil Conservation District may be obtained from the State Soil Conservation Committee, P.O. Box 330, Trenton, New Jersey 08625, 609-292-5540.

SUBCHAPTER 6. SAFETY STANDARDS FOR STORMWATER MANAGEMENT BASINS

7:8-6.1 Scope

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

(b) The provisions of this subchapter are not intended to preempt more stringent municipal or county safety requirements for new or existing stormwater management basins. Municipal and county stormwater management plans and ordinances may, pursuant to their authority, require existing stormwater management basins to be retrofitted to meet one or more of the safety standards in N.J.A.C. 7:8-6.2(a), (b) and (c)1 for trash racks, overflow grates, and escape provisions at outlet structures.

7:8-6.2 Requirements for trash racks, overflow grates and escape provisions

(a) 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:

1. The trash rack shall have parallel bars, with no greater than six-inch spacing between the bars;

2. The trash rack shall be designed so as not to adversely affect the hydraulic performance of the outlet pipe or structure;

3. 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; and

4. The trash rack shall be constructed of rigid, durable, and corrosion resistant material and designed to withstand a perpendicular live loading of 300 lbs./ft sq.

(b) An overflow grate is designed to prevent obstruction of the overflow structure. If an outlet structure has an overflow grate, the grate shall comply with the following requirements:

1. The overflow grate shall be secured to the outlet structure but removable for emergencies and maintenance;

2. The overflow grate spacing shall be no greater than two inches across the smallest dimension; and

3. The overflow grate shall be constructed of rigid, durable, and corrosion resistant material and designed to withstand a perpendicular live loading of 300 lbs./ft sq.

(c) Stormwater management basins shall include escape provisions as follows:

1. If a stormwater management basin has an outlet structure, escape provisions shall be incorporated in or on the structure. Escape provisions include the installation of permanent ladders, steps, rungs, or other features that provide easily accessible means of egress from stormwater management basins. With the prior approval of the reviewing agency pursuant to N.J.A.C. 7:8-6.3(a), a free-standing outlet structure may be exempted from this requirement;

2. 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. Safety ledges shall be comprised of two steps. Each step shall be four to six feet in width. One step shall be located approximately two and one-half feet below the permanent water surface, and the second step shall be located one to one and one-half feet above the permanent water surface. See N.J.A.C. 7:8-6 Appendix A for an illustration of safety ledges in a stormwater management basin; and

3. In new stormwater management basins, the maximum interior slope for an earthen dam, embankment, or berm shall not be steeper than three horizontal to one vertical.

7:8-6.3 Variance or exemption from safety standards

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.

Appendix A: Illustration of safety ledges in a new stormwater management basin. Depicted is an elevational view.

CHAPTER 13
FLOOD HAZARD AREA CONTROL

SUBCHAPTER 2. PROJECT STANDARDS

7:13-2.8 Stormwater management

If a project or activity meets the definition of "major development" at N.J.A.C. 7:8-1.2, then the project or activity shall comply with the Stormwater Management rules at N.J.A.C. 7:8.

CHAPTER 15
WATER QUALITY MANAGEMENT PLANNING

SUBCHAPTER 3. PLAN ASSESSMENT, AMENDMENT AND ADOPTION

7:15-3.4 Water quality management plan amendment procedures

(a) (No change.)

(b) Procedures for amendment of the Statewide WQM Plan are as follows:

1. Water quality related provisions in present and future rules adopted by the Department shall be considered to be part of the Statewide WQM Plan. Such provisions may not be adopted, amended, or repealed through the WQM plan amendment process under (b) 6 below.

2. Priority systems, intended use plans and project priority lists for wastewater facilities that are developed by the Department and accepted by the United States Environmental Protection Agency (USEPA) pursuant to USEPA regulations, or that otherwise are developed by the Department under N.J.A.C. 7:22, shall be considered to be part of the Statewide WQM Plan. Such priority systems and project priority lists shall be adopted or revised in accordance with USEPA regulations and N.J.A.C. 7:22, as appropriate, and shall not be adopted or revised through the WQM plan amendment process under (b) 6 below.

3. Statewide Sludge Management Plans, District Sludge Management Plans and sludge management rules that are promulgated or approved by the Department pursuant to N.J.S.A. 13:1E-1 et seq. shall be considered to be part of the Statewide WQM Plan. Such plans and rules shall be promulgated, revised, updated or approved in accordance with N.J.S.A. 13:1E-1 et seq., and shall not be promulgated, revised, updated, or approved through the WQM plan amendment process under (b) 6 below.

4. Lists of water quality limited segments, lists of segments where TMDLs will be developed, and project priority lists for TMDL development which are developed by the Department under N.J.A.C. 7:15-6 shall be adopted as amendments to the Statewide WQM Plan. TMDLs developed in accordance with N.J.A.C. 7:15-7 shall be adopted as amendments to the relevant Areawide WQM Plan(s). However, such lists, and TMDLs shall be adopted or revised in accordance with N.J.A.C. 7:15-6 or 7:15-7, as appropriate, and shall not be adopted or revised through the WQM plan amendment process under (b) 6 below. The Department may also publish a draft amendment as an Interested Party Review document or as a pre-proposal prior to formal proposal of the amendment.

5. A regional stormwater management plan prepared in accordance with N.J.A.C. 7:8-3 shall be submitted only by a lead planning agency as a proposed amendment to the applicable areawide WQM plan. In addition, the following changes to an adopted

regional stormwater management plan shall be processed as amendments to applicable areawide WQM Plans under this section:

i. The addition, deletion or modification to any of the drainage area-specific water quality, ground water recharge or water quantity objectives identified under N.J.A.C. 7:8-3.5;

ii. The addition, deletion or modification to any drainage area-specific design or performance standard developed under N.J.A.C. 7:8-3.6;

iii. Any modification to a regional stormwater management plan that the Department or designated planning agency determines is likely to have a significant environmental, social, or economic impact; or

iv. Any modification that the applicant requests be processed as an amendment.

6. Components of the Statewide WQM Plan other than (b)1 through 5 above may be amended by using the procedure specified in (g) below, except that the Commissioner shall render the final decision identified in (g)9 below.

(c)-(f) (No change.)

(g) Except as provided in (h) below, the Department procedure for amendment of areawide WQM plans is as follows:

1. – 2. (No change.)

3. The Department shall notify the applicant and the applicable designated planning agency, if any, in writing of its decision under (g)2 above. If the Department's decision is to proceed further with the amendment request under (g)2iii above, then this notification shall include the public notice that shall be given for the proposed amendment. If the proposed amendment is a regional stormwater management plan, the Department shall also notify the Department of Community Affairs and the Department of Agriculture. The applicant shall request written statements of consent under (g)4 below, and shall give public notice by publication in a newspaper of general circulation at the applicant's expense. The Department shall maintain a list identifying the newspaper that shall be used for this purpose in each planning area. The public notice shall also be published in the New Jersey Register. In cases where such Department decisions include a requirement for a non-adversarial public hearing, the public notice shall provide at least 30 days notice of the hearing.

4.-11. (No change.)

(h)-(l) (No change.)

7:15-3.5 Water quality management plan review, revision, and certification

(a) (No change.)

(b) The Department and the designated planning agencies shall prepare revisions to Statewide and areawide WQM Plans under this section whenever such revisions are necessary to:

1. - 2. (No change.)

3. Revise schedules for submission of wastewater management plans under N.J.AC. 7:15-5.23(g);

4. Provide for the following substantive changes in Statewide and areawide WQM plans where the Department determines no significant individual or cumulative impacts will occur to environmentally sensitive areas or other natural resources (such as water supplies) due to the proposed revision (individually or in combination with past revisions in the area), that the changes are consistent with N.J.AC. 7:15-3.6 and 3.7, and that certain directly affected municipal and county agencies and other interests as identified by the Department have been provided an opportunity to review and comment on the proposed revision:

i. - iv. (No change.)

v. Expansion of a future sewer service area to contiguous lots, where the expansion involves less than 100 acres, contributes less than 8,000 gallons per day of additional wastewater flow, and does not create a significantly new pattern of sewered development such that a significant potential or incentive is created for additional revisions or amendments to open new areas to sewered development; or

5. Provide for any modification in an adopted regional stormwater management plan that does not require an amendment under N.J.A.C. 7:15-3.4(b)5.

(c) - (f) (No change.)

CHAPTER 20
DAM SAFETY STANDARDS

SUBCHAPTER 1. APPLICATION PROCEDURE; DESIGN CRITERIA FOR DAM CONSTRUCTION; DAM INSPECTION PROCEDURE

7:20-1.3 Permit-by-rule

(a) All dams must be designed, constructed, operated, maintained or removed in compliance with the rules in this subchapter except as set forth below:

1. Owners and operators of Class IV dams (see N.J.A.C. 7:20-1.8), Dam classification) are not required to file documents with nor obtain a permit from the Department, but must meet the following requirements, in addition to those set forth elsewhere in this subchapter:

i. (No change.)

ii. All necessary local approvals must be obtained;
iii. A New Jersey licensed professional engineer must design the Class IV Dam to meet all technical requirements of this subchapter; and

iv. If the Class IV dam is designed or constructed for stormwater management purposes, the dam shall comply with the Stormwater Management Rules at N.J.A.C. 7:8.

2. (No change.)

(c) (No change.)

APPENDIX F

FEMA FLOODPLAIN MAPS

APPENDIX E

EPA BMP FACT SHEETS AND

MANUFACTURERS' STORMWATER TREATMENT DEVICES

United States Environmental Protection Agency | Office of Water Washington, D.C. | EPA 832-F-99-007 September 1999

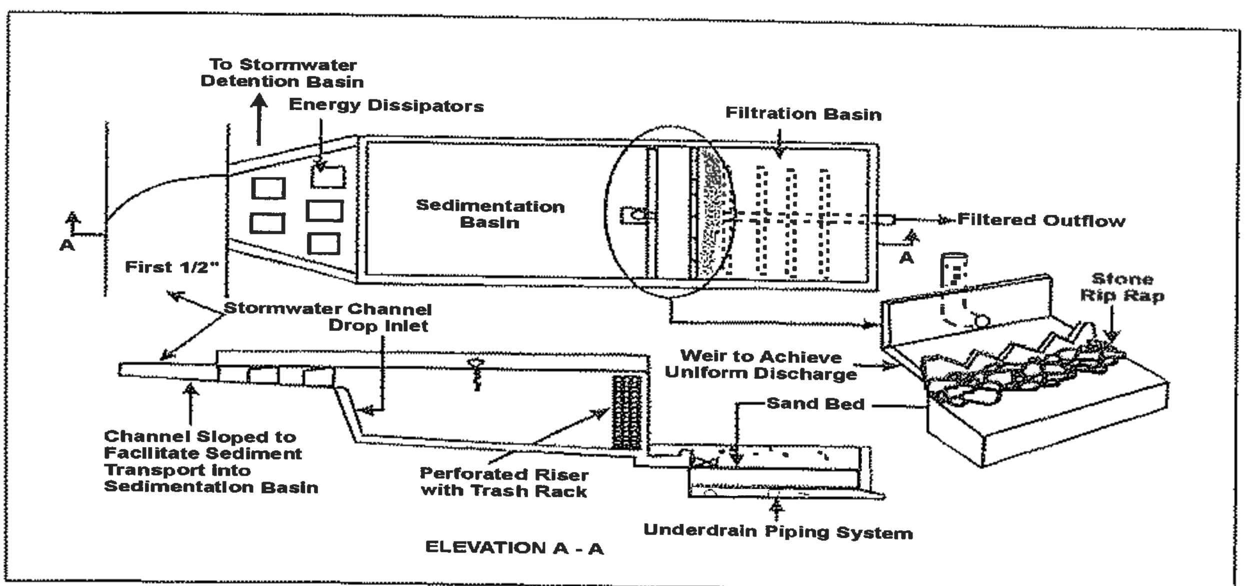
Storm Water Technology Fact Sheet Sand Filters

DESCRIPTION

Sand filters have proven effective in removing several common pollutants from storm water runoff. Sand filters generally control storm water quality, providing very limited flow rate control.

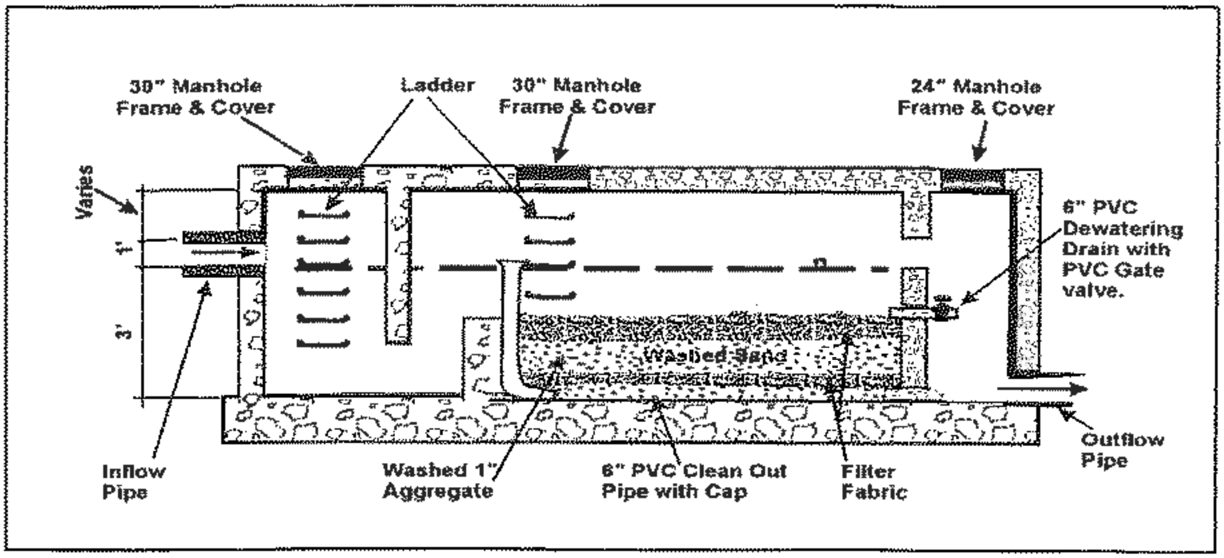
A typical sand filter system consists of two or three chambers or basins. The first is the sedimentation chamber, which removes floatables and heavy sediments. The second is the filtration chamber, which removes additional pollutants by filtering the runoff through a sand bed. The third is the discharge chamber. The treated filtrate normally is then discharged through an underdrain system either to a storm drainage system or directly to surface waters. Sand filters take up little space and can be used on highly developed sites and sites with steep slopes. They can be added to retrofit existing sites. Sand filters are able to achieve high removal efficiencies for sediment, biochemical oxygen demand (BOD), and fecal coliform bacteria. Total metal removal, however, is moderate, and nutrient removal is often low.

There are three main sand filter designs currently in common use: the Austin sand filter (Figure 1); the Washington, D.C., sand filter (Figure 2); and the



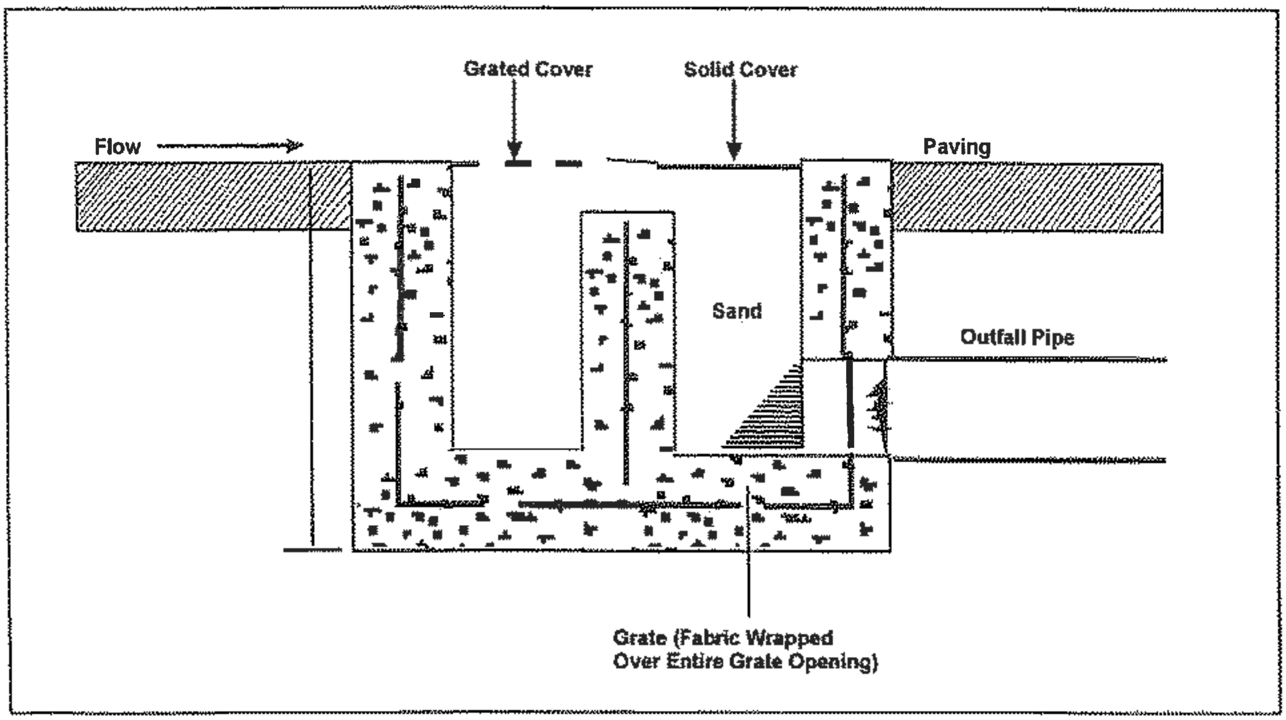
Source: Schueler, 1992.

FIGURE 1 TYPICAL AUSTIN SAND FILTER DESIGN



Source: Troung, 1989.

FIGURE 2 TYPICAL WASHINGTON, D.C. SAND FILTER DESIGN



Source: Shaver, 1991.

FIGURE 3 TYPICAL DELAWARE SAND FILTER DESIGN

Delaware sand filter (Figure 3). The primary differences among these designs are location (i.e., above or below ground), the drainage area served, their filter surface areas, their land requirements, and the quantity of runoff they treat.

Modifications that may improve sand filter design and performance are being tested. One modification is the addition of a peat layer in the filtration chamber. The addition of peat to the sand filter may increase microbial growth within the sand filter and improve metals and nutrient removal rates.

APPLICABILITY

Sand filters are intended primarily for water quality enhancement. In general, sand filters are preferred over infiltration practices, such as infiltration trenches, when contamination of groundwater with conventional pollutants - BOD, suspended solids, and fecal coliform - is of concern. This usually occurs in areas where underlying soils alone cannot treat runoff adequately - or ground water tables are high. In most cases, sand filters can be constructed with impermeable basin or chamber bottoms, which help to collect, treat, and release runoff to a storm drainage system or directly to surface water with no contact between contaminated runoff and groundwater.

The selection of a sand filter design depends largely on the drainage area's characteristics. For example, the Washington, D.C., and Delaware sand filter systems are well suited for highly impervious areas where land available for structural controls is limited, since both are installed underground. They are often used to treat runoff from parking lots, driveways, loading docks, service stations, garages, airport runways/taxiways, and storage yards. The Austin sand filtration system is more suited for large drainage areas that have both impervious and pervious surfaces. This system is located at grade and is often used at transportation facilities, in large parking areas, and in commercial developments.

In general, all three types of sand filters can be used as alternatives for water quality inlets. They are more frequently used to treat runoff contaminated with oil and grease from drainage areas with heavy vehicle usage. In regions where evaporation exceeds rainfall and a wet pond would be unlikely to maintain the required permanent pool, the Austin sand filtration system can be used.

ADVANTAGES AND DISADVANTAGES

Sand filters can be highly effective storm water best management practices (BMPs). All three types of sand filters achieve high removal rates for sediment, BOD, and fecal coliform bacteria. The filter media is periodically removed from the filter unit, thus also permanently removing trapped contaminants. Waste media from the filters does not appear to be toxic and is environmentally safe for landfill disposal. If they are designed with an impermeable basin liner, sand filters can also reduce the potential for groundwater contamination. Finally sand filters also generally require less land than other BMPs, such as ponds or wetlands.

The size and characteristics of the drainage area, as well as the pollutant loading, will greatly influence the effectiveness of the sand filter system. For example, sand filters may be of limited value in some applications because of they are designed to handle runoff from relatively small drainage areas and they have low nutrient removal and metal removal capabilities. In these cases, other BMPs, such as wet ponds, may be less costly and/or more effective. The system also requires routine maintenance to prevent sediment from clogging the filter. In some cases, filter media may need to be replaced 3 to 5 years. Lastly, sand filters generally do not control storm water flow, and consequently, they do not prevent downstream stream bank and channel erosion.

Climatic conditions may also limit the filter's performance. For example, it is not yet known how well sand filters will operate in colder climates or in freezing conditions.

DESIGN CRITERIA

Typically the Austin sand filter system is designed to handle runoff from drainage areas up to 20 hectares (50 acres). The collected runoff is first diverted to the sedimentation basin, where heavy sediments and floatables are removed. There are two designs for the sedimentation basin: the full sedimentation system, as shown in Figure 1; and a partial sedimentation system, where only the initial flow is diverted. Both systems are located off-line and are designed to collect and treat the first 1.3 centimeters (0.5 inches) of runoff. The partial system has the capacity to hold only a portion (at least 20 percent) of the first flush volume in the sedimentation basin, whereas the full system captures and holds the entire flow volume.

Equations used to determine the sedimentation basin surface areas (As) in square and meters acres are shown in Table 1.

TABLE 1 SURFACE AREA EQUATION FOR AUSTIN SAND FILTER SYSTEM

Partial Sedimentation	Full Sedimentation
As=(AD)(H)/(1/Ds-1/10)	As=(AD)(H)/10
Af=(AD)(H)/10	Af=(AD)(H)/18

Note: Designed to collect and treat 0.5 inches of runoff.
Ds (feet)=depth of the sedimentation basin.
H (feet)=depth of rainfall, 0.042ft (0.5 in).
AD(acres)=impervious and pervious areas that provide contributing drainage.

Source: Galli, 1990.

Flow is conveyed from the sedimentation basin, through a perforated riser, a gabion wall, or a berm, to the filtration basin. The filtration basin consists of a 45-centimeter (18-inch) layer of sand particles 0.05 to 0.10 centimeters (0.02 to 0.04 inches) in diameter that may be underlain by a gravel layer. Equations used to determine the surface areas (Af) in acres are also shown in Table 1. The filtrate is discharged from the filtration basin through underdrain piping 10 to 15 centimeters (4 to 6 inches) in diameter with 1-centimeter (0.4 inch) perforations. Filter fabric is placed around the underdrain piping to prevent sand and other particulates from being discharged.

Typically, the Washington, D.C., sand filter system is designed to handle runoff from completely impervious drainage areas of 0.4 hectares (1 acre) or less. The system, as shown in Figure 2, consists of three underground chambers: a sedimentation chamber, a filtration chamber, and a discharge chamber. The sand filter system is designed to accept the first 1.3 centimeters (0.5 inches) of runoff. Coarse sediments and floatables are removed from the runoff within the sedimentation chamber. Runoff is discharged from the sedimentation chamber through a submerged weir, into the filtration chamber, which consists of a combination of sand and gravel layers totaling 1 meter (3 feet) in depth with underdrain piping wrapped in filter fabric. The underdrain system collects the filtered water and discharges it to the third chamber, where the water is collected and discharged to a storm water channel or sewer system. An overflow weir is located between the second and third chambers to bypass excess flow. The Washington, D.C., sand filter is often constructed on-line, but can be constructed off-line. When the system is off-line, the overflow between the second and third chambers is not included.

The Delaware sand filter, shown in Figure 3, is similar to the Washington, D.C., sand filter in that both utilize underground concrete vaults. However, the Delaware sand filter has only two chambers: a sedimentation chamber and a filtration chamber. A 2.5-centimeter (1 inch) design storm was selected for sizing the sedimentation basin because it is representative of large storm events: in Delaware, 92 percent of all storms are less than 2.5 centimeters (1 inch) in depth. Runoff enters the sedimentation chamber through a grated cover and then overflows into the filtration chamber, which contains a sand layer 45 centimeters (18 inches) in depth. Gravel is not normally used in the filtration chamber although the filter can be modified to include it. Typical systems are designed to handle runoff from drainage areas of 2 hectares (5 acres) or less. A major advantage of the Delaware sand filter is its shallow structure depth of only 76 centimeters (30 inches), which reduces construction and maintenance costs.

Proper design and maintenance are also critical factors in maintaining the operating life of any filter system. The life of the filter media may be increased by a number of methods, including:

- Stabilizing the drainage area so that sediment loadings in the runoff are minimized.
- Providing adequate storm water detention times to enhance sedimentation and filtration.
- Inspecting and maintaining the sand filter frequently enough to ensure proper operation.

PERFORMANCE

Sand filters are currently in use in Delaware, Maryland, Florida, Texas, Virginia, and Washington, D.C. Studies on the systems' pollutant removal efficiencies are currently being performed in Washington, D.C., and Austin, TX. Additional evaluations are needed to evaluate alternative sand filter designs and media. Sand filters remove particulates in both the sedimentation and the filtration chambers. The City of Austin has estimated their systems' pollutant removal efficiencies based on preliminary findings of their storm water monitoring program (Austin, 1988). The estimates shown in Table 2 are average values for various sand filters serving drainage areas of several different sizes. As shown in Table 2, no removal of nitrate was observed. No other dissolved pollutants were monitored. Additional monitoring is currently being performed by the City of Austin to supplement the preliminary estimates.

TABLE 2 TYPICAL POLLUTANT REMOVAL EFFICIENCY

Pollutant	Percent Removal
Fecal Coliform	76
Biochemical Oxygen Demand (BOD)	70
Total Suspended Solids (TSS)	70
Total Organic Carbon (TOC)	48
Total Nitrogen (TN)	21
Total Kjeldahl Nitrogen (TKN)	46
Nitrate as Nitrogen (NO_3-N)	0
Total Phosphorus (TP)	33
Iron (Fe)	45
Lead (Pb)	45
Zinc (Zn)	45

Source: Galli, 1990

OPERATION AND MAINTENANCE

All filter system designs must provide adequate access to the filter for inspection and maintenance. The sand filters should be inspected after all storm events to verify that they are working as intended. Since the Washington, D.C., and Austin sand filter systems can be deep, they may be designated as confined spaces and require compliance with confined space entry safety procedures.

Typically, sand filters begin to experience clogging problems within 3 to 5 years (NVPDC, 1992). Accumulated trash, paper and debris should be removed from the sand filters every 6 months or as necessary to keep the filter clean. A record should be kept of the dewatering times for all sand filters to determine if maintenance is necessary. Corrective maintenance of the filtration chamber includes removal and replacement of the top layers of sand, gravel and/or filter fabric that has become clogged. The removed media may usually be disposed in a landfill. The City of Austin tests their waste media before disposal. Results thus far indicate that the waste media is not toxic and can be safely landfilled (Schueler, 1992). Sand filter systems may also require the periodic removal of vegetative growth.

COSTS

The construction cost for an Austin sand filtration system is approximately $18,500 (1997 dollars) for a 0.4 hectare- (1 acre-) drainage area. The cost per hectare decreases with increasing drainage area. The cost for precast Washington, D.C. sand filters, with drainage areas of less than 0.4 hectares (1 acre), ranges between $6,600 and $11,000 (1997 dollars). This is considerably less than the cost for the same size cast-in-place system. Costs for the Delaware sand filter are similar to that of the D.C. system, with the exception of the lower excavation costs due to the Delaware filters' shallowness.

Annual costs for maintaining sand filter systems average about 5 percent of the initial construction cost (Schueler, 1992). Media is replaced as needed. Currently the sand is being replaced in the D.C. filter systems about every 2 years. The cost to replace the gravel layer, filter fabric and top portion of the sand for D.C. sand filters is approximately

$1,700 (1997 dollars). Improvements in Washington, D.C.'s maintenance procedures may extend the life of the filter media and reduce the overall maintenance costs.

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OWM MTB
Excellence in compliance through optimal technical solutions
MUNICIPAL TECHNOLOGY BRANCH

Vortechs® System Project Profile

Continental Airport Terminal - Newark, NJ

Vortechnics®

A CONTECH Company

The combination of flexibility in design, easy installation, and ability to handle high flows made the Vortechs® System the obvious choice for stormwater treatment at the new Continental Airport Terminal.

In 1996 a group of scientists from NOAA (National Oceanic and Atmospheric Association) conducted a sediment toxicity survey of 22 estuaries in the United States. Newark Bay topped that list for concentrations of toxicity. The bay's proximity to high hubs of industry and transportation – including Newark Liberty International Airport – has meant that it has long been the receptacle of industrial waste, as well as high doses of non-point source pollution.

Above, the Vortechs® cast-in-place System during construction. Each of the roof slabs for the cast-in-place units include a steel cross beam to help meet the loading specifications.

When Continental Airlines opened its much awaited Global Gateway at Newark Liberty International Airport in late 2001, airline passengers reveled in the improved traffic flow, easier check-in and arrival procedures, increased gate capacity (by nearly 50 percent), and award-winning concessions featuring mall-style retailers and an international food court. But Terminal C, the centerpiece of the $1.4 billion expansion of Newark Liberty also included some cutting edge stormwater treatment technologies to help remove pollutants from the runoff of the airport's roadways, runways and airplane taxiways prior to discharge into Newark Bay. While few will ever see the technology, now buried beneath the tarmac of the airport's taxiways, the system demonstrates the effectiveness of applying stormwater treatment technology to an already congested area where competition for space is fierce.

Airports, in general, can potentially generate enormous amounts of polluted stormwater runoff. In addition to hydrocarbons such as oil and fuel from cars, trucks and planes, winter weather brings added sand and salt to the roadways. Expanding the terminal area for Continental's new Global Gateway included increasing the paved areas around the terminal to accommodate the new taxiways and roadways. Stormwater runoff volumes increase as a result of the additional impervious surfaces, and so does the resultant non-point source pollution.

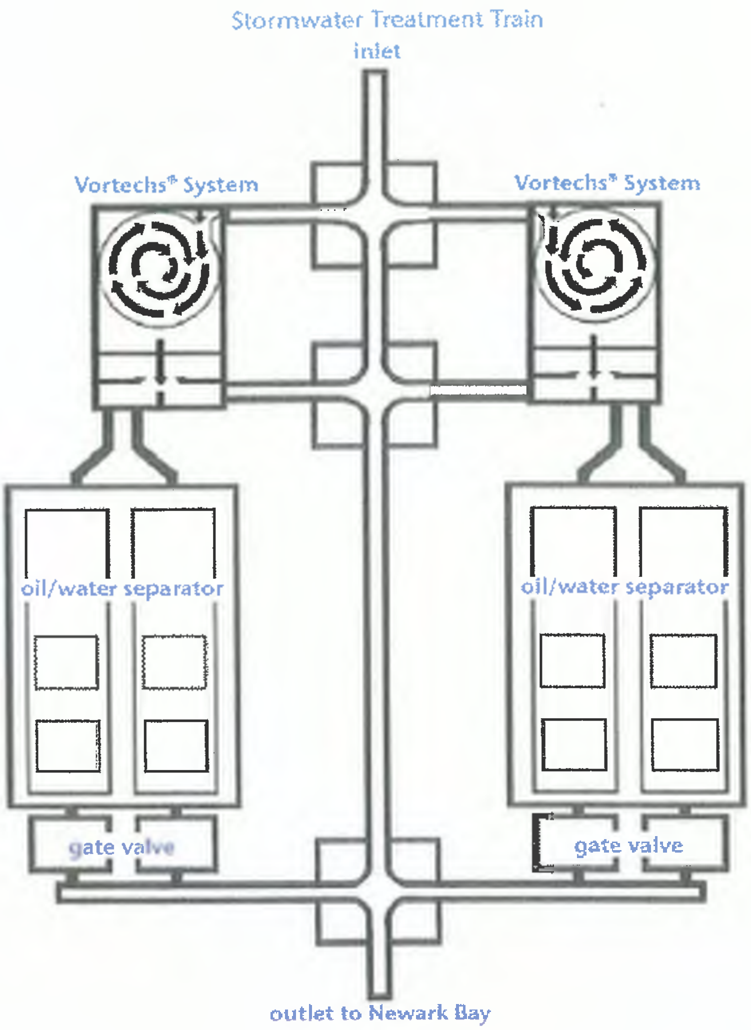
The completed Vortechs® System will be able to meet load bearing requirements for a 747 aircraft.

The expansion of the terminal triggered the need for stormwater permits under Phase I of NPDES, which required that runoff be treated to ensure that oil/hydrocarbon concentrations did not exceed 15 parts per million (ppm), and that solids be reduced through treatment down to the 50 micron particle level. Prior to the expansion, stormwater from the paved terminal and parking areas was directed to a peripheral ditch – nearly 60 feet wide – that led to a pump station that discharged the water directly into Newark Bay. Now, stormwater from the site is directed first to a stormwater treatment train that will remove solids such as sediment, debris and hydrocarbons such as oil and fuel, before being released into the ditch.

Due to the size of the treatment area, the storm flows from the paved areas around the terminal will be quite large, so runoff is conveyed via a 66-inch pipe that can handle flows of up to 80 cubic feet per second (cfs). The water hits a flow splitting device which routes the runoff to two separate treatment trains. Project engineers designed the treatment train to incorporate two cast-in-place Vortechs® Systems combined with four oil and water separators.

Stormwater runoff from the paved areas of Terminal C is directed first to a pair of Vortechs® Systems. Because the Vortechs® System can be cast-in-place, it was the most practical system to install to handle the large flows from the site. Each of the Vortechs® Systems are 18 feet wide by 30 feet long, and nine feet three inches deep. And because the units are buried under taxiways for the terminal, they had to be constructed to meet B-747-400 Aircraft loading requirements.

"It is somewhat uncommon for treatment equipment like this to be buried under pavement requiring the kind of load bearings necessary for a 747," said Francis Tighe, vice president of Vortechnics. "We designed each of the roof slabs for the cast-in-place units with a steel cross beam to help meet the loading specifications. And there are steel reinforced concrete columns in the baffle walls of the units for additional structural strength."



After treatment in the Vortechs® Systems, the stormwater enters one of four oil and water separators manufactured by Highland Tank to further remove oily contaminants from the stormwater. The tanks for the oil and water separators were specially constructed of three-eighths inch steel with one-half inch by six-inch reinforcement rings to ensure the tanks could withstand pressure from the burial depth and surface loading. The combination of Vortechs® Systems and the oil and water separators are designed to reduce oil concentrations to 10 ppm, which is five ppm less than dictated by the permit.

The two systems complement each other, with the Vortechs® Systems helping to optimize the coalescing capacity of the oil and water separators. The result is that water discharged from the units into the perimeter ditch is now free of most of the solids and debris carried from the roadway in stormwater, and oil is reduced to 10 parts per million. From the ditch, the cleaner treated water is then pumped into Newark Bay.

According to Henry Meyers, president of Anselmi and DeCicco, Inc. the general contractor for the job, the underground installation of the units happened while the airport was operational. This meant work had to stop any time a plane traveled near the excavation.

"We had to install these huge units into a hole that was 22 feet deep. The aircraft's wing came within 20 feet of the excavation site, and it wasn't feasible to just dig a big hole in the ground," he said. "The wheel loading for a Boeing 747 is very large, so we wanted to make sure that the taxiway was far away from any soil that could give way. Plus, we didn't want to have a big exposed hole in the ground and have the jet engines sucking debris from the hole.

"So we ended up using sheeted excavation to help maintain the integrity of the taxiways and keep the construction zone compact. By driving steel sheeting for excavation with internal bracing, we could keep the hole as small as possible."

Once installed, the stormwater treatment systems were covered by tarmac and are accessible for inspection and maintenance from grade. Vortechnics recommends quarterly inspections during the first year, followed by annual inspections and cleanout with a vacuum truck to remove accumulated sediment and debris as needed. The oil and water separators include a corrugated plate to trap solids and oil coalescing material to trap oil, both of which should be inspected every six months and power washed as needed.

Airport sites in general pose a variety of environmental challenges in terms of air and water pollution. The stormwater treatment systems in place at Continental's new Global Gateway at Newark Liberty Airport demonstrate how new stormwater treatment technologies can help control non-point source pollution and ensure cleaner water, even in highly industrialized areas.

Division of Watershed Management

Total Maximum Daily Loads

Description	Format	Size	Updated
TMDL Factsheet: What is a TMDL?	Adobe Pdf	236 KB	2003
TMDL Factsheet: Expedited Lake TMDLs	Adobe Pdf	272 KB	2003
TMDL Factsheet: Expedited Fecal Coliform TMDLs	Adobe Pdf	243 KB	2003

INTRODUCTION TO TMDLs

Total Maximum Daily Loads (TMDLs) represent the assimilative or carrying capacity of the receiving water taking into consideration point and nonpoint sources of pollution, natural background, and surface water withdrawals. A TMDL is developed as a mechanism for identifying all the contributors to surface water quality impacts and setting goals for load reductions for specific pollutants as necessary to meet surface water quality standards. TMDLs are required, under Section 303(d) of the federal Clean Water Act, to be developed for waterbodies that cannot meet surface water quality standards after the implementation of technology-based effluent limitations. TMDLs may also be established to help maintain or improve water quality in waters that are not impaired. A TMDL establishes Waste Load Allocations and Load Allocations for point and nonpoint sources, respectively. Regulations concerning TMDLs are contained in EPA's Water Quality Planning and Management Regulations (40 CFR 130). "A TMDL is established at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality." (40 CRF 130.7(c)). The federal TMDL rules have recently been revised but are not yet effective. Revisions to New Jersey's TMDL requirements have recently been proposed as part of the Water Quality Management Planning rules. Where TMDLs are required to address documented surface water quality impairment, allocations are made to the varying sources contributing to the water quality problem in order to reduce the total pollutant load received by the waterbody. Load reduction goals established through TMDLs are achieved through the issuance of wasteload allocations for points source discharges and load allocations for nonpoint source discharges. Since nonpoint source pollution, by definition, does not come from discrete, identifiable sources, load allocations would consist of the identification of categories of nonpoint sources that contribute to the parameters of concern. The load allocation would also include specific load reduction measures for those categories of sources, to be implemented through best management practices (BMPs) including local ordinances for stormwater management and nonpoint source pollution control, headwaters protection practices, or other mechanisms for addressing the priority issues of concern.

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STATEWIDE TMDL TIMELINE

The following is a timeline for establishing New Jersey's TMDLs under the MOA with EPA, categorized by water region and watershed/waterbody. The intermediate deadlines are milestones for TMDL development and are subject to refinement. The deadlines for establishing the TMDLs is also subject to change as further amendments to the MOA, as agreed by both NJDEP and EPA Region 2.

- New Jersey TMDL 2 yr. Development Timeline (June 2004)
- TMDL MOA with EPA Region 2 September 16, 2002
- Water Assessment Team website

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TMDL ISSUES

There will be a number of policy issues regarding Total Maximum Daily Load (TMDL) development that will need to be addressed during TMDL development including, but not limited to, the following:

- What are the critical environmental conditions to which the TMDL should be directed? For wet weather flows, will the TMDL modeling incorporate a stream design flow or a statistical analysis?
- Where a waterbody does not meet criteria, options for allocating wasteload allocations to individual point source inputs and load allocations for individual or aggregate nonpoint source inputs will need to be addressed. Allocations may be based on concentration, loading, reduction costs, and other factors. What role should net implementation costs play?
- Whether or not a waterbody exceeds standards, a series of model simulations reflecting a range of management options that will result in attainment of the ambient criteria will need to be run. Management options could include the use of Best Management Practices, the trading of pollutant loading allocations, or the use of water conservation measures to restore streamflow, among others. What scenarios should be depicted by model simulations?

- What implementation schedules are appropriate to ensure that results are achieved?

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THE PROCESSES OF TMDLs

A TMDL is considered "proposed" when NJDEP publishes the TMDL Report as a proposed Water Quality Management Plan Amendment in the New Jersey Register (NJR) for public review and comment. A TMDL is considered to be "established" when NJDEP finalizes the TMDL Report after considering comments received during the public comment period for the proposed plan amendment and formally submits it to EPA Region 2 for thirty (30)-day review and approval. The TMDL is considered "approved" when the NJDEP-established TMDL is approved by EPA Region 2. The TMDL is considered to be "adopted" when the EPA-approved TMDL is adopted by NJDEP as a water quality management plan amendment and the adoption notice is published in the NJR. The Department is in the process of adopting each of the approved TMDLs to the appropriate management plan and does not anticipate that there will be significant, if any change to TMDL implementation plans upon its adoption.

TMDL DOCUMENTS

Description
TMDL to Address Arsenic in the Wallkill River and the Papakating Creek Northwest Water Region

Proposed	Established	Approved	Adopted
July 2004			

Description
TMDL to Address Temperature in the Pequannock River Northeast Water Region

Proposed	Established	Approved	Adopted
June 2004			

Description
TMDL for Phosphorus to Address Greenwood Lake in the Northeast Water Region

Proposed	Established	Approved	Adopted
June 2004			

Description
TMDL for Total Phosphorus to Address Four Stream Segments and Two Lakes in Cooper River Watershed in Camden County Lower Delaware Water Region

Proposed	Established	Approved	Adopted
April 2004			

Description

TMDL to Address Phosphorus in the Clove Acres Lake and Papakating Creek Northwest Water Region

Proposed	**Established**	**Approved**	**Adopted**
April 2004			

Description

TMDL for Fecal Coliform to Address Three Streams in the Atlantic Water Region

Proposed	**Established**	**Approved**	**Adopted**
April 2004			

Description

TMDL for Fecal Coliform to Address 48 Streams in the Raritan Water Region

Proposed	**Established**	**Approved**	**Adopted**
April 2003			

Description

TMDL for Fecal Coliform to Address 27 Streams in the Lower Delaware Water Region

Proposed	**Established**	**Approved**	**Adopted**
April 2003			

Description

TMDL for Phosphorus to Address 9 Eutrophic Lakes in the Atlantic Coastal Water Region

Proposed	**Established**	**Approved**	**Adopted**
April 2003	June 2003		

Description

TMDL for Fecal Coliform to Address 28 Streams in the Northwest Water Region

Proposed	**Established**	**Approved**	**Adopted**
April 2003			

Description

TMDL for Phosphorus to Address 6 Eutrophic Lakes in the Raritan Water Region

Proposed	**Established**	**Approved**	**Adopted**
Jan. 2003	March 2003	Sept. 2003	

Description

TMDL for Phosphorus to Address 13 Eutrophic Lakes in the Lower Delaware Water Region

Proposed	Established	Approved	Adopted
April 2003	June 2003		

Description

TMDL for Fecal Coliform to Address 32 Streams in the Northeast Water Region

Proposed	Established	Approved	Adopted
Jan. 2003	March 2003		

Description

TMDL for Phosphorus To Address 3 Eutrophic Lakes in the Northeast Water Region

Proposed	Established	Approved	Adopted
Jan. 2003	March 2003	Sept. 2003	

Description

TMDL for Phosphorus To Address 4 Eutrophic Lakes in the Northwest Water Region

Proposed	Established	Approved	Adopted
Jan. 2003	March 2003	Sept. 2003	

Description

TMDL for Fecal Coliform To Address 31 Streams in the Atlantic Water Region

Proposed	Established	Approved	Adopted
April 2003			

Description

TMDL for Nickel in the Hackensack River

Proposed	Established	Approved	Adopted
			Dec. 1999

Description

TMDL for Fecal Coliform and an Interim Total Phosphorus Reduction Plan for the Whippany River Watershed

Proposed	Established	Approved	Adopted
			Dec. 1999

Description

TMDL for Phosphorus in the Lower Sylvan Lake

Proposed	Established	Approved	Adopted
			June 2000

Description

TMDL for Phosphorus in Strawbridge Lake

Proposed	Established	Approved	Adopted
			Sept. 2000

Description

Delaware River VO TMDL

Proposed	Established	Approved	Adopted
			Jan. 2000

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TMDL SEGMENTS

List of 25 new Fecal Coliform TMDL segments from throughout the state. Includes an aerial map as well as a topo map of each segment.

- 25 New Fecal Coliform TMDL Segments

OTHER RELATED LINKS

- New Jersey Environmental Digital Library
- EPA's Surf Your Watershed Page
- EPA TMDL Website

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Last Updated: March 29, 2005

DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATERSHED MANAGEMENT

ADOPTION OF THE AMENDMENT TO THE NORTHEAST WATER QUALITY MANAGEMENT PLAN TO ESTABLISH A TOTAL MAXIMUM DAILY LOAD FOR NICKEL IN THE HACKENSACK RIVER

Public Notice

Take notice that on April 27,2000, pursuant to the provisions of the New Jersey Water Quality Planning Act, N.J.S.A. 58:11A-1 et seq., and the Statewide Water Quality Management Planning Rules (N.J.A.C. 7:15-3.4), an amendment to the Northeast Water Quality Management Plan was adopted by the Department of Environmental Protection (Department). This amendment established a Total Maximum Daily Load (TMDL) for Nickel in the Hackensack River.

Total Maximum Daily Loads (TMDLs) represent the assimilative or carrying capacity of the receiving water taking into consideration point and nonpoint sources of pollution, as well as surface water withdrawals. A TMDL is developed as a mechanism for identifying all the contributors to surface water quality impacts and setting goals for load reductions for specific pollutants as necessary to meet surface water quality standards. TMDLs are required, under Section 303(d) of the federal Clean Water Act, to be developed for waterbodies that cannot meet water quality standards after the implementation of technology-based effluent limitations. TMDLs may also be established to help maintain or improve water quality in waters that are not impaired. A TMDL establishes waste load allocations and load allocations for point and nonpoint sources, respectively.

Regulations concerning TMDLs are contained in USEPA's Water Quality Planning and Management Regulations (40 CFR 130).

Where TMDLs are required to address documented surface water quality impairment, such changes are to be made to the varying sources contributing to the water quality problem in order to reduce the total pollutant load received by the waterbody. Load reduction goals established through TMDLs are achieved through the issuance of wasteload allocations (WLAs) for points source discharges, load allocations (LAs) for nonpoint source discharges, and a margin of safety. Since nonpoint source pollution, by definition, does not come from discrete, identifiable sources, load allocations would consist of the identification of categories of nonpoint sources that contribute to the parameters of concern. The load allocation would also include specific load reduction measures for those categories of sources, to be implemented through best management practices (BMPs) including local ordinances for stormwater management and nonpoint source pollution control, headwaters protection practices, or other mechanisms for addressing the priority issues of concern.

USEPA established a TMDL for Nickel in the Hackensack River effective December 27, 1999 pursuant to 40 CFR 130.7 (d), see volume 65 of the Federal Register, page 2398, dated January 14, 2000. Under N.J.A.C. 7:15-7(l), TMDLs established by USEPA are considered part of the appropriate areawide WQM plan.

Table 1. TMDL/WLAs/LAs for nickel in the Hackensack River.

Source:	Existing load (lbs/day)	WLA/LA (lbs/day)
Bergen County Utilities Authority [NJPDES Permit #NJ0020028]	11.3	2.2[1]
North Bergen Sewage Treatment Plant (STP) [NJPDES Permit #NJ0034339]	0.28	0.38[2]
Secaucus STP [NJPDES Permit #NJ0025038]	0.04	0.06[3]
Combined Sewage Overflows	0.10	0.10
Storm Water	0.81	0.81
ΣWLAs..................	....	3.55
Atmospheric................	1.06	1.06
Boundary (Background)	0.37	0.37[4]
TMDL....................	....	4.98

[1] The WLA of 2.2 lbs/day is established at an effluent concentration of 3.6 µg/l (total recoverable) and flow of 75 mgd. If the effluent flow is 109 mgd, the WLA is 3.3 lbs/day with an effluent concentration of 3.6 µg/l.

[2] Based on design flow of 10 mgd and means effluent concentration of 4.6 µg/l (total recoverable).

[3] Based on design flow of 10 mgd and mean effluent concentration of 1.5 µg/l (total recoverable).

[4] Calculated at the boundary condition of the Hackensack River upstream at the Oradell Dam.

Lance R. Miller
Director
Division of Watershed Management
Department of Environmental Protection

Date

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 & Middle Passaic, Whippany, and Rockaway Rivers)

Proposed:	January 21, 2003
Established:	March 28, 2003
Approved (by EPA Region 2):	
Adopted:	

New Jersey Department of Environmental Protection
Division of Watershed Management
P.O. Box 418
Trenton, New Jersey 08625-0418

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1.0 Executive Summary

In accordance with Section 305(b) of the Federal Clean Water Act (CWA), the State of New Jersey developed the *2002 Integrated List of Waterbodies*, addressing the overall water quality of the State's waters and identifying impaired waterbodies for which Total Maximum Daily Loads (TMDLs) may be necessary. The *2002 Integrated List of Waterbodies* identified several waterbodies in the Northeast Water Region as being impaired by pathogens, as indicated by the presence of fecal coliform concentrations in excess of standards. This report, developed by the New Jersey Department of Environmental Protection (NJDEP), establishes 32 TMDLs addressing fecal coliform loads to the waterbodies identified in Table 1.

Table 1 Fecal coliform-impaired stream segments in the Northeast Water Region, identified in Sublist 5 of the 2002 Integrated List of Waterbodies, for which fecal coliform TMDLs are being established.

TMDL Number	WMA	Station Name/Waterbody	Site ID	County(s)	River Miles
1	3	Macopin River at Macopin Reservoir	01382450	Passaic	1.8
2	3	Wanaque River at Highland Avenue	01387010	Passaic	1.5
3	3	Ramapo River Near Mahwah	01387500	Passaic and Bergen	17.7
4	4	Passaic R. below Pompton R. at Two Bridges	01389005	Passaic	1.83
5	4	Preakness Brook Near Little Falls	01389080	Passaic	8.9
6	4	Deepavaal Brook at Fairfield	01389138	Essex	6.3
7	4	Passaic River at Little Falls	01389500	Passaic and Essex	15.0
8	4	Peckman River at West Paterson	01389600	Passaic and Essex	7.7
9	4	Goffle Brook at Hawthorne	01389850	Passaic and Bergen	10.5
10	4	Diamond Brook at Fair Lawn	01389860	Passaic and Essex	2.5
11	4	WB Saddle River at Upper Saddle River	01390445	Bergen	2.4
12	4	Saddle River at Ridgewood	01390500	Bergen	24.0
13	4	Ramsey Brook at Allendale	01390900	Bergen	6.4
14	4	HoHoKus Brook at Mouth at Paramus	01391100	Bergen	6.2
15	4	Saddle River at Fairlawn	01391200	Bergen	5.0
16	4	Saddle River at Lodi	01391500	Bergen	3.8
17	5	Hackensack River at River Vale	01377000	Bergen	10.0
18	5	Musquapsink Brook at River Vale	01377499	Bergen	7.3
19	5	Pascack Brook at Westwood	01377500	Bergen	6.6
20	5	Tenakill Brook at Cedar Lane at Closter	01378387	Bergen	10.2
21	5	Coles Brook at Hackensack	01378560	Bergen	11.1
22	6	Black Brook at Madison	01378855	Morris	2.4
23	6	Passaic River near Millington	01379000	Morris and Somerset	5.2
24	6	Dead River near Millington	01379200	Somerset	21.9
25	6	Passaic River near Chatham	01379500	Somerset, Union, Essex, and Morris	25.2
26	6	Canoe Brook near Summit	01379530	Essex	17.6
27	6	Rockaway River at Longwood Valley	01379680	Sussex and Morris	11.6
28	6	Rockaway River at Blackwell Street	01379853	Morris	3.5
29	6	Beaver Brook at Rockaway	01380100	Morris	17.0
30	6	Stony Brook at Boonton	01380320	Morris	13.1
31	6	Rockaway River at Pine Brook	01381200	Morris	6.8

TMDL Number	WMA	Station Name/Waterbody	Site ID	County(s)	River Miles
32	6	Passaic River at Two Bridges	01382000	Morris and Essex	14.1
Total River Miles:					305.0

These thirty-two TMDLs will serve as management approaches or restoration plans aimed at identifying the sources of fecal coliform and for setting goals for fecal coliform load reductions in order to attain applicable surface water quality standards (SWQS).

As stated in N.J.A.C. 7:9B-1.14(c) of the New Jersey Surface Water Quality Standards, "Fecal coliform levels shall not exceed a geometric average of 200 CFU/100 ml nor should more than 10 percent of the total sample taken during any 30-day period exceed 400 CFU/100 ml in FW2 waters." Nonpoint and stormwater point sources are the primary contributor to FC loads in these streams and can include storm-driven loads transporting fecal coliform from sources such as geese, farms, and domestic pets to the receiving water. Nonpoint sources also include steady-inputs from sources such as failing sewage conveyance systems and failing or inappropriately located septic systems. Because the total point source contribution other than stormwater (i.e. Publicly-Owned Treatment Works, POTWs) is an insignificant fraction of a percent of the total load, these fecal coliform TMDLs will not impose any change in current practices for POTWs and will not result in changes to existing effluent limits.

Using ambient water quality data monitoring conducted during the water years 1994-2000, summer and all season geometric means were determined for each Category 5 listed segment. Given the two surface water quality criteria of 200 CFU/100 ml and 400 CFU/100 ml in FW2 waters, computations were necessary for both criteria and resulted in two values for percent reduction for each stream segment. The higher (more stringent) percent reduction value was selected as the TMDL and will be applied to nonpoint and stormwater sources as a whole or apportioned to categories of nonpoint and stormwater sources within the study area. The extent to which nonpoint and stormwater sources have been identified and the process by which they will become identified will vary by study area based on data availability, watershed size and complexity, and pollutant sources. Implementation plans for activities to be established in these watersheds are addressed in this report.

Each TMDL shall be proposed and adopted by the Department as an amendment to the appropriate area wide water quality management plan(s) in accordance with N.J.A.C. 7:15-3.4(g).

This TMDL Report is consistent with EPA's May 20, 2002 guidance document entitled: "Guidelines for Reviewing TMDLs under Existing Regulations issued in 1992," (Suftin, 2002) which describes the statutory and regulatory requirements for approvable TMDLs.

2.0 Introduction

Sublist 5 (also known as List 5 or, traditionally, the 303(d) List) of the State of New Jersey's proposed *2002 Integrated List of Waterbodies* identified several waterbodies in the Northeast Water Region as being impaired by pathogens, as evidenced by the presence of high fecal coliform concentrations. This report establishes 32 TMDLs, which address fecal coliform loads to the identified waterbodies. These TMDLs serve as management approaches or restoration plans aimed toward reducing loadings of fecal coliform from various sources in order to attain applicable surface water quality standards for the pathogen indication. Several of these waterbodies are listed in Sublist 5 for impairment cause by other pollutants. These TMDLs address only fecal coliform impairments. Separate TMDL evaluations will be developed to address the other pollutants of concern. The waterbodies will remain on Sublist 5 until such time as TMDL evaluations for all pollutants have been completed and approved by the United States Environmental Protection Agency (USEPA).

3.0 Background

3.1. 305(b) Report and 303(d) List

In accordance with Section 305(b) of the Federal Clean Water Act (CWA) (33 U.S.C. 1315(B)), the State of New Jersey is required to biennially prepare and submit to the United States Environmental Protection Agency (USEPA) a report addressing the overall water quality of the State's waters. This report is commonly referred to as the 305(b) Report or the Water Quality Inventory Report.

In accordance with Section 303(d) of the CWA, the State is also required to biennially prepare and submit to USEPA a report that identifies waters that do not meet or are not expected to meet surface water quality standards (SWQS) after implementation of technology-based effluent limitations or other required controls. This report is commonly referred to as the 303(d) List. The listed waterbodies are considered water quality-limited and require total maximum daily load (TMDLs) evaluations. For waterbodies identified on the 303(d) List, there are three possible scenarios that may result in a waterbody being removed from the 303(d) List:

> **Scenario 1:** A TMDL is established for the pollutant of concern;
> **Scenario 2:** A determination is made that the waterbody is meeting water quality standards (no TMDL is required); or
> **Scenario 3:** A determination is made that a TMDL is not the appropriate mechanism for achieving water quality standards and that other control actions will result in meeting standards

Where a TMDL is required (Scenario 1), it will: 1) specify the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards; and 2) allocate pollutant loadings among point and nonpoint pollutant sources.

Recent EPA guidance (Suftin, 2002) describes the statutory and regulatory requirements for approvable TMDLs, as well as additional information generally needed for USEPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations. The Department believes that this TMDL report, which includes thirty-two TMDLs, addresses the following items in the May 20, 2002 guideline document:

1. Identification of waterbody(ies), pollutant of concern, pollutant sources and priority ranking.
2. Description of applicable water quality standards and numeric water quality target(s).
3. Loading capacity - linking water quality and pollutant sources.
4. Load allocations.
5. Wasteload allocations.
6. Margin of safety.
7. Seasonal variation.
8. Reasonable assurances.
9. Monitoring plan to track TMDL effectiveness.
10. Implementation (USEPA is not required to and does not approve TMDL implementation plans).
11. Public Participation.
12. Submittal letter.

3.2. Integrated List of Waterbodies

In November 2001, USEPA issued guidance that encouraged states to integrate the 305(b) Report and the 303(d) List into one report. This integrated report assigns waterbodies to one of five categories. In general, Sublists 1 through 4 include waterbodies that are unimpaired, have limited assessment or data availability or have a range of designated use impairments, whereas Sublist 5 constitutes the traditional 303(d) List for waters impaired or threatened by a pollutant for which one or more TMDL evaluations are needed. Where more than one pollutant is associated with the impairment for a given waterbody, that waterbody will remain in Sublist 5 until one of the three possible delisting scenarios are completed. In the case of an Integrated List, however, the waterbody is not delisted but moved to one of the other categories.

Following USEPA's guidance, the Department chose to develop an Integrated Report for New Jersey. New Jersey's proposed *2002 Integrated List of Waterbodies* is based upon these five categories and identifies water quality limited surface waters in accordance with N.J.A.C. 7:15-6 and Section 303(d) of the CWA. These TMDLs address fecal coliform impairments, as listed on Sublist 5 of the State of New Jersey's proposed *2002 Integrated List of Waterbodies*.

3.3. Total Maximum Daily Loads (TMDLs)

A Total Maximum Daily Load (TMDL) represents the assimilative or carrying capacity of a waterbody, taking into consideration point and nonpoint sources of pollutants of concern, natural background and surface water withdrawals. A TMDL quantifies the amount of a pollutant a water body can assimilate without violating a state's water quality standards and allocates that load capacity to known point and nonpoint sources in the form of wasteload allocations (WLAs), load allocations (LAs), and a margin of safety. A TMDL is developed as a mechanism for identifying all the contributors to surface water quality impacts and setting goals for load reductions for pollutants of concern as necessary to meet the SWQS.

Once one of the three possible delisting scenarios, noted above, is completed, states have the option to remove the waterbody and specific pollutant of concern from Sublist 5 of the *2002 Integrated List of Waterbodies* or maintain the waterbody in Sublist 5 until SWQS are achieved. The State of New Jersey will be removing the waterbodies for fecal impairment from Sublist 5 once these TMDLs are approved by USEPA.

4.0 Pollutant of Concern and Area of Interest

The pollutant of concern for these TMDLs is pathogens, the presence of which is indicated by the elevated concentration of fecal coliform bacterial. Fecal coliform concentrations have been found to exceed New Jersey's Surface Water Quality Standards (SWQS) published at N.J.A.C. 7-9B et seq. As reported in the proposed *2002 Integrated List of Waterbodies*, the New Jersey Department of Environmental Protection (NJDEP) identified waterbodies as being impaired by fecal coliform. The Northeast Water Region listings for fecal coliform impairment are identified in Table 2. Also identified in Table 2 are the river miles and management response associated with each listed segment. All of these waterbodies have a high priority ranking, as described in the *2002 Integrated List of Waterbodies*.

Table 2 Abridged Sublist 5 of the 2002 Integrated List of Waterbodies, listed for fecal coliform impairment in the Northeast Water Region.

TMDL No.	WMA	Station Name/Waterbody	Site ID	River Miles	Management Response
1	3	Macopin River at Macopin Reservoir	1382450	**1.8**	establish TMDL
	3	Pequannock River at Macopin Intake Dam	1382500	**19.1**	none; Re-assessment shows non-impairment
	3	Wanaque River at Wanaque	1387000	**0.6**	water quality monitoring needed to identify if an impairment exists
2	3	Wanaque River at Highland Ave.	1387010	**1.5**	establish TMDL
3	3	Ramapo River near Mahwah	1387500	**17.7**	establish TMDL
4	4	Passaic River below Pompton River at Two Bridges	1389005	**1.8**	establish TMDL
5	4	Preakness Brook Near Little Falls	1389080	**8.9**	establish TMDL
6	4	Deepavaal Brook at Fairfield	1389138	**6.3**	establish TMDL
7	4	Passaic River at Little Falls	1389500	**15.0**	establish TMDL
8	4	Peckman River at West Paterson	1389600	**7.7**	establish TMDL
9	4	Goffle Brook at Hawthorne	1389850	**10.5**	establish TMDL
10	4	Diamond Brook at Fair Lawn	1389860	**2.5**	establish TMDL

TMDL No.	WMA	Station Name/Waterbody	Site ID	River Miles	Management Response
	4	Passaic River at Elmwood Park	1389880	13.8	CSO influence
11	4	WB Saddle River at Upper Saddle River	1390445	2.4	establish TMDL
12	4	Saddle River at Ridgewood	1390500	24.0	establish TMDL
13	4	Ramsey Brook at Allendale	1390900	6.4	establish TMDL
14	4	HoHoKus Brook at Mouth at Paramus	1391100	6.2	establish TMDL
15	4	Saddle River at Fairlawn	1391200	5.0	establish TMDL
16	4	Saddle River at Lodi	1391500	3.8	establish TMDL
17	5	Hackensack River at River Vale	1377000	10.0	establish TMDL
18	5	Musquapsink Brook at River Vale	1377499	7.3	establish TMDL
19	5	Pascack Brook at Westwood	1377500	6.6	establish TMDL
20	5	Tenakill Brook at Cedar Lane at Closter	1378387	10.2	establish TMDL
	5	Hackensack River at New Milford	1378500	1.1	water quality monitoring needed to identify if an impairment exists
21	5	Coles Brook at Hackensack	1378560	11.1	establish TMDL
22	6	Black Brook at Madison	1378855	2.4	establish TMDL
23	6	Passaic River near Millington	1379000	5.2	establish TMDL
24	6	Dead River Near Millington	1379200	21.1	establish TMDL
25	6	Passaic River near Chatham	1379500	25.2	establish TMDL
26	6	Canoe Brook near Summit	1379530	17.6	establish TMDL
27	6	Rockaway River at Longwood Valley	1379680	11.6	establish TMDL
28	6	Rockaway River at Blackwell Street	1379853	3.5	establish TMDL
29	6	Beaver Brook at Rockaway	1380100	17.0	establish TMDL
30	6	Stony Brook at Boonton	1380320	13.1	establish TMDL
31	6	Rockaway River at Pine Brook	1381200	6.8	establish TMDL
	6	Whippany River at Morristown	1381500	6.6	TMDL completed in 1999
	6	Whippany River near Pine Brook	1381800	6.6	TMDL completed in 1999
32	6	Passaic River at Two Bridges	1382000	14.1	establish TMDL

These thirty-two TMDLs will address 305 river miles or approximately 87% of the total river miles impaired by fecal coliform (352 total FC impaired river miles) in the northeast watershed region. Based on the detailed county hydrography stream coverage, 847 stream miles, or 47% of the stream segments in the northeast region (1800 total miles) are directly affected by the 32 TMDLs due to the fact that the implementation plans cover entire watersheds; not just impaired waterbody segments.

Table 2 identifies six segments for which TMDLs will not be developed at this time based on investigations following the *2002 Integrated List of Waterbodies* proposal. These segments, which are identified as requiring a management response other than "establish TMDL," are discussed in Appendix A along with the listing Sublist to which they will be moved.

These include: #01382500, Pequannock River at Macopin Intake Dam, #01387000, Wanaque River at Wanaque, #01378500, Hackensack River at New Milford, #01381500, Whippany

River at Morristown, #01381800, Whippany River near Pine Brook, and #01389880, Passaic River at Elmwood Park. For each of these segments an explanation of the management response is provided in Appendix A.

4.1. Description of the Northeast Water Region and Sublist 5 Waterbodies

4.1.1. Watershed Management Area 3

Watershed Management Area 3 (WMA 3) includes watersheds that receive water from the Highlands portion of New Jersey. The Pequannock, Wanaque and Ramapo Rivers all flow into the Pompton River. The Pompton River is, in turn, a major tributary to the Upper Passaic River. WMA 3 contains some of the State's major water supply reservoir systems including the Wanaque Reservoir, the largest surface water reservoir in New Jersey. There are four watersheds in WMA 3: Pompton, Ramapo, Pequannock and Wanaque River Watersheds. WMA 3 lies mostly in Passaic County but also includes parts of Bergen, Morris, and Sussex Counties.

The **Pequannock River Watershed** is 30 miles long and has a drainage area of 90 square miles. The headwaters are in Sussex County and the Pequannock River flows east, delineating the Morris/Passaic County boundary line. The Pequannock River joins the Wanaque River and flows to the Pompton River in Wayne Township. Some of the major impoundments within this watershed are Kikeout Reservoir, Lake Kinnelon Reservoir, Clinton Reservoir, Canistear Reservoir, Oak Ridge Reservoir, and Echo Lake Reservoir. The great majority of the land within this watershed is forested and protected for water supply purposes and parklands.

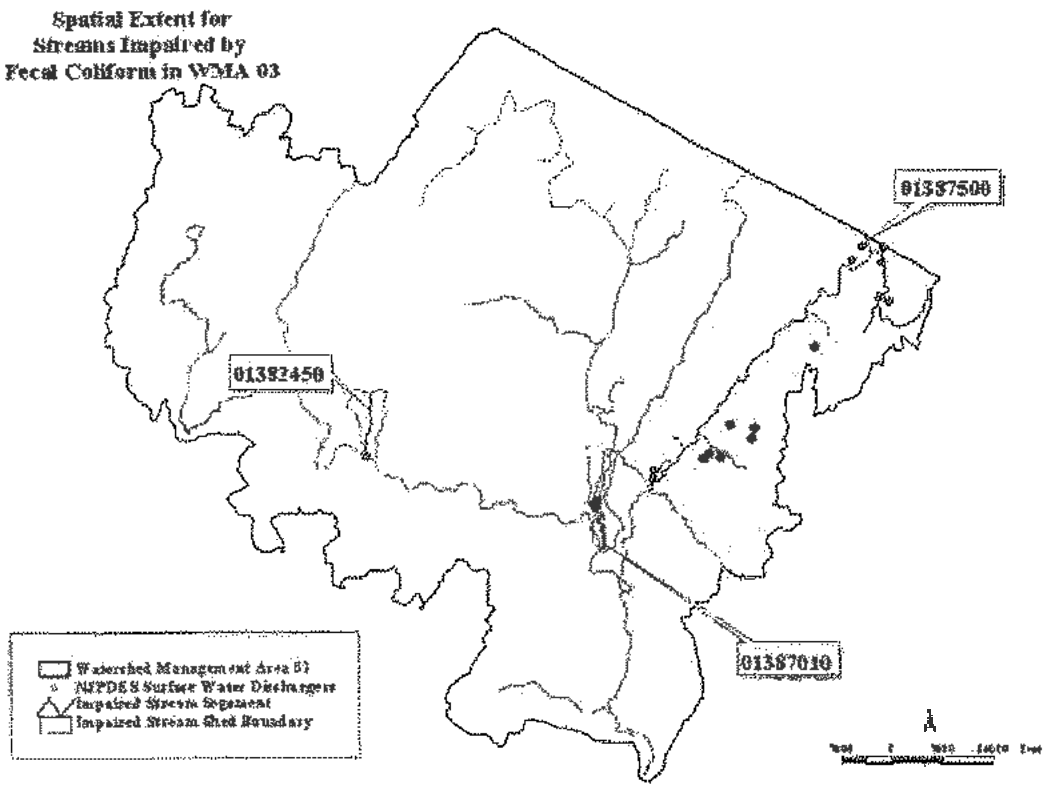
The **Ramapo River and Pompton River Watersheds** comprise a drainage area of about 160 square miles; 110 square miles of which are in New York State. The Ramapo River flows from New York into Bergen County and enters the Pequannock River to form the Pompton River in Wayne Township. The Ramapo River is 15 miles long on the New Jersey side. The Pompton River, a tributary to the Passaic River, is 7 miles long. Some of the major impoundments within this watershed include Point View Reservoir #1, Pompton Lakes, and Pines Lake. Over one-half of this watershed is undeveloped; however, new development is extensive in many areas.

The **Wanaque River Watershed** has a total drainage area of 108 square miles. The headwaters of the river lie within New York State as a minor tributary to Greenwood Lake (located half in New Jersey and half in New York). The New Jersey portion lies in West Milford, Passaic County. The Wanaque River joins up with the Pequannock River in Riverdale Township. The Wanaque River is 27 miles in length. Some of the major impoundments and lakes with this watershed are the Wanaque Reservoir, Greenwood Lake, Arcadia Lake and Lake Inez. Most of the land in this watershed is undeveloped, consisting of vacant lands, reservoirs, parks and farms.

Sublist 5 Waterbodies in WMA 3

Three river segments of the thirty-two impaired segments addressed in this report, the Macopin River (#01382450), Wanaque River (#01387010), and Ramapo River (#01387500) are located in WMA 3. The spatial extent of each segment is identified in Figure 1. River miles, watershed sizes and land use\land cover by percent area associated with each segment are listed in Table 3.

Figure 1 **Spatial extent of Sublist 5 segments for which TMDLs are being developed in WMA 3**



Segment #01382450, the Macopin River at Macopin Reservoir, has a watershed area of approximately 1.1 mi^2. Water quality from stations #01382410 and #01382450 were used in assessing the status and spatial extent of bacterial contamination. The length of the impaired stream segment is approximately 1.8 miles and is located on the Macopin River upstream of the confluence of the Macopin and the Pequannock Rivers. A total of 1.9 stream miles (based on county hydrologic stream coverage) are located within its watershed and will be included in the implementation plan.

Table 3 **River miles, Watershed size, and Anderson Landuse classification for three Sublist 5 segments, listed for fecal coliform, in WMA 3.**

	Segment ID		
	1382450	**1387010**	**1387500**
Sublist 5 impaired river miles (miles)	1.8	1.5	17.7
Total river miles within watershed and included in the implementation plan (miles)	1.9	4.0	87.8
Watershed size (acres)	711	708	26084
Landuse/Landcover			
Agriculture	0.00%	0.00%	0.43%
Barren Land	0.15%	0.17%	0.78%
Forest	89.74%	29.65%	51.20%
Urban	4.11%	55.19%	37.64%
Water	1.97%	4.71%	3.05%
Wetlands	4.04%	10.29%	6.89%

Segment #01387010, the Wanaque River at Highland Avenue at Wanaque, is located on the Wanaque River from the inlet of the Wanaque River at Inez Lake to the confluence of the Wanaque and Pequannock Rivers. Water quality from stations #01387014 and #01387041 were used in assessing the spatial extent of bacterial contamination. The stream segment length is approximately 1.5 miles with a watershed area of approximately 708 acres or 1.1 mi^2.

Segment #01387500, the Ramapo River near Mahwah, is located on the Ramapo River between the NJ-NY borders to the inlet at Pompton Lake. Water quality from station #01387500 was used to assess the spatial extent of bacterial contamination. The impaired stream segment length is approximately 17.7 miles. A total of 87.8 stream miles are located within its watershed and will be included in the implementation plan. The total drainage area for this segment is approximately 26084 acres or 40.8 mi^2.

4.1.2. Watershed Management Area 4

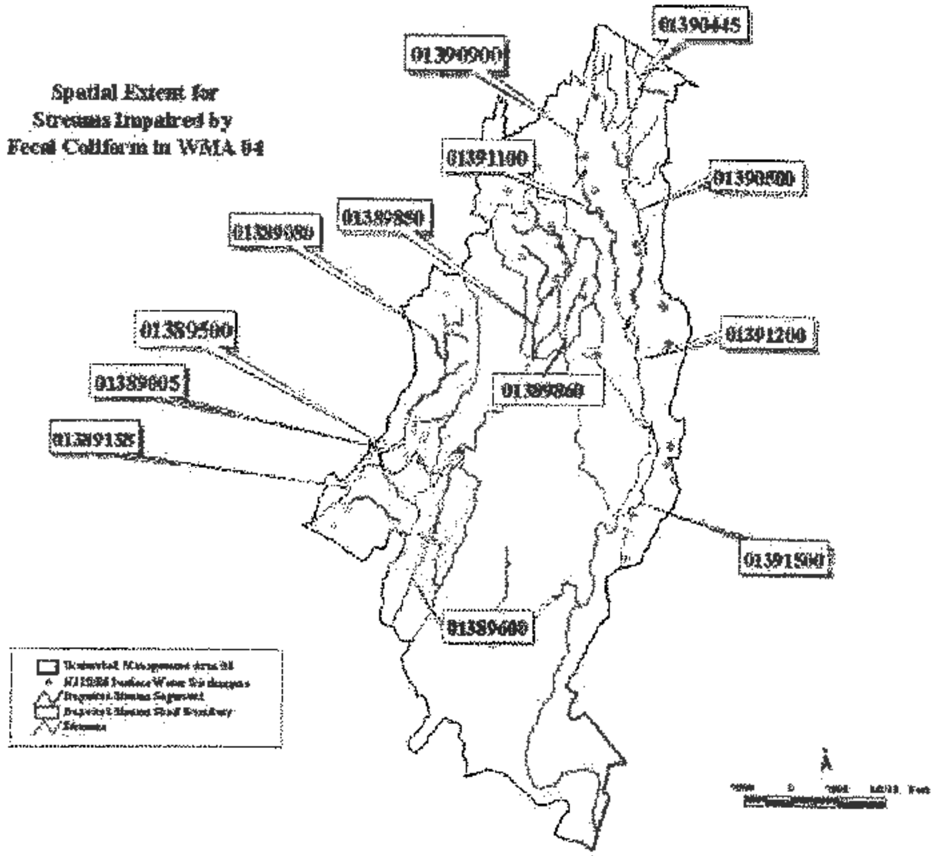
Watershed Management Area 4 (WMA 4) includes the Lower Passaic River (from the Pompton River confluence downstream to the Newark Bay) and its tributaries, including the Saddle River. The WMA 4 drainage area is approximately 180 square miles and lies within portions of Passaic, Essex, Hudson, Morris and Bergen Counties.

Two watersheds comprise WMA 4: the Lower Passaic River Watershed and Saddle River River Watershed. The **Lower Passaic River Watershed** originates from the confluence of the Pompton River downstream to the Newark Bay. This 33-mile section meanders through Bergen, Hudson, Passaic, and Essex Counties and includes a number of falls, culminating with the Great Falls at Paterson. This watershed has a drainage area of approximately 129 square miles. The major tributaries to this section of the Passaic River are the Saddle River, Preakness Brook, Second River, and Third River. The Saddle River is one of the larger tributaries to the Lower Passaic River. The **Saddle River Watershed** has a drainage area of approximately 51 square miles. Land in this watershed is extensively developed and contains many older cities and industrial centers including Newark, Paterson, Clifton, and East Orange.

Sublist 5 Waterbodies inWMA 4

Thirteen of the thirty-two TMDLs in the Northeast region are located in WMA 4. Included are several segments of the Saddle River (#01390500, #01391200 and #01391500), West Branch of the Saddle River (#01390445), Ramsey Brook (#01390900), Hohokus Brook (#01391100), the Passaic River (#01389005 and #01389500), Preakness Brook (#01389080), Deepavaal Brook (#01389138), Diamond Brook (#01389860), Goffle Brook (#01389850), and the Peckman River (#01389600). Several of these stream segments are geographically located in close proximity, thus, when these segments were found to contain similar levels of bacteria contamination (geometric means value), water quality data from these segments were grouped when calculating the TMDL. The spatial extent of each segment is identified in Figure 2. River miles, watershed sizes and land use\land cover by percent area associated with each segment are listed in Table 4.

Figure 2 Spatial extent of Sublist 5 segments for which TMDLs are being developed in WMA 4



Given the proximity and similarity in impairment of several stations in the Saddle River watershed, six segments were grouped for the purposes of this report. These segments include: the West Branch Saddle River at Upper Saddle River (#01390445), Saddle River at Ridgewood (#01390500), Ramsey Brook at Allendale (#01390900), Hohokus Brook at Paramus (#01391100), Saddle River at Fairlawn (#01391200), and the Saddle River at Lodi (#01391500). These stream segments extend from the New York-New Jersey border to the confluence of the Saddle and Passaic Rivers and is contained within a 32933 acres, or 51.5 mi^2, watershed. The combined six stream segments total a length of 45.7 miles. The implementation plan will address all of streams located in this watershed (97.3 miles). Stations #01390445, #01390470, #01390510, #01390518, #01390900, #01391100, #01391490, and #01391500 were used to assess the status and spatial extent of bacterial contamination.

Table 4 River miles, Watershed size, and Anderson Landuse classification for thirteen Sublist 5 segments, listed for fecal coliform, in WMA 4.

	Segment ID		
	1390445, 1390500, 1390900, 1391100, 1391200, 1391500	1389005,1389500, 1389080, 1389138,1389600	1389850,1389860
Sublist 5 impaired river miles (miles)	45.7	29.8	10.5
Total river miles within watershed and included in the implementation plan (miles)	97.3	56.1	13.3
Watershed size (acres)	32933	14450	7590
<u>Landuse/Landcover</u>			
Agriculture	0.51%	0.12%	0.07%
Barren Land	0.20%	0.79%	0.27%
Forest	10.59%	20.81%	7.96%
Urban	81.89%	69.81%	88.51%
Water	1.06%	1.59%	0.46%
Wetlands	5.75%	6.88%	2.74%

Five Sublist 5 segments, the Passaic River below Pompton River at Two Bridges (#01389005), Passaic River at Little Falls (#1389500), Preakness Brook near Little Falls (#1389080), Deepavaal Brook at Fairfield (#01389138) and Peckman River at West Paterson (#01389600) were grouped based on similarities in geography and bacterial concentrations. Water quality from stations #01389500, #01389080, #01389138, #01382000, and #01389600 were used to assess the status and spatial extent of bacterial contamination. The combined length of the impaired stream segments is approximately 29.8 miles. A total of 56.1 stream miles are located within its watershed and will be included in the implementation plan. The total drainage area for this segment is approximately 14450 acres, or 22.6 mi^2.

Stream segments #01389850 and #01389860 were also grouped in calculating the TMDL percent reduction. Segment #01389850, Goffle Brook at Hawthorne, consists of the entire length of Goffle Brook to the confluence of Goffle Brook with the Passaic River. Segment #01389860, Diamond Brook at Fair Lawn, consists of the entire length of Diamond Brook to the confluence of Diamond Brook with the Passaic River. Water quality from stations #01389850 and #01389860 were used in assessing the status and spatial extent of bacterial contamination for these segments. The length of the impaired #01389850 stream segment is approximately 10.5 miles in a watershed area of approximately 5658 acres or 8.8 mi^2. A total of 13.3 river miles are in the watershed and will be included in the implementation plan. The length of the impaired #01389860 stream segment is approximately 2.5 miles in a watershed area of approximately 1932 acres or 3.0 mi^2.

4.1.3. Watershed Management Area 5

Watershed Management Area 5 (WMA 5) includes parts of Hudson and Bergen Counties and has a watershed area of approximately 165 square miles. WMA 5 is comprised of three watersheds: Hackensack River Watershed, Hudson River Watershed and Pascack Brook Watershed. The Hackensack River originates in New York State and flows south to the Newark Bay. New Jersey's portion of the river is 31 miles long. The Hackensack River Watershed is approximately 85 square miles. Major tributaries include the Pascack Brook, Berry's Creek, Overpeck Creek, and Wolf Creek. The **Pascack Brook Watershed** has a drainage area of approximately 51 square miles.

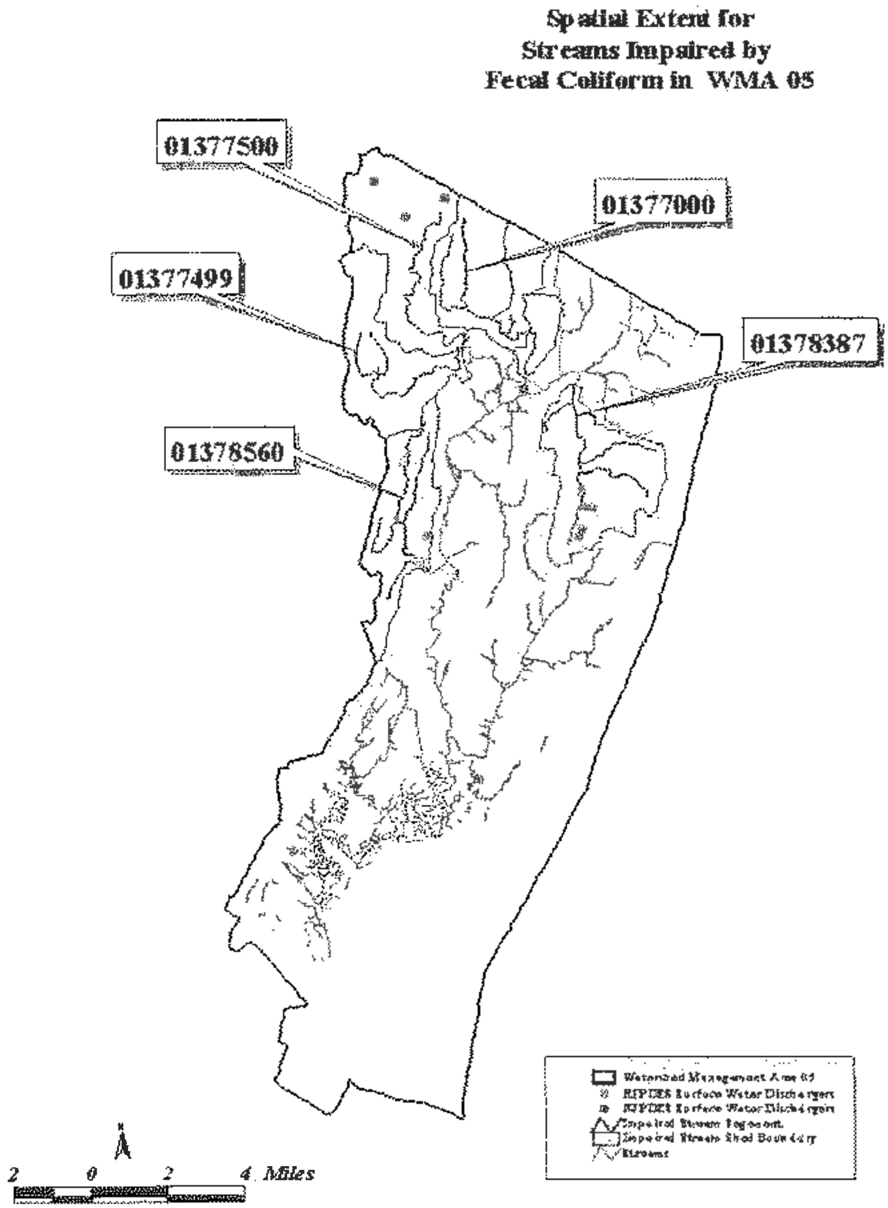
The New Jersey portion of the Hudson River is 315 miles long and begins in New York State at Lake Tear of the Clouds on the southwest side of Mount Marcy, New York's highest peak. The New Jersey portion of the **Hudson River Watershed** is approximately 29 square miles. The Hudson River forms the boundary between New Jersey and New York States.

Although WMA 5 is the most populated of all the WMAs, approximately 50% of the land is still undeveloped, with more than 30% residential development. The remaining developed land is commercial/industrial use. Much of the lower **Hackensack River Watershed** is tidal marsh known as the Hackensack Meadowlands. The Meadowlands are home to more than 700 plant and animal species including several rare and threatened species

Sublist 5 Waterbodies in WMA 5

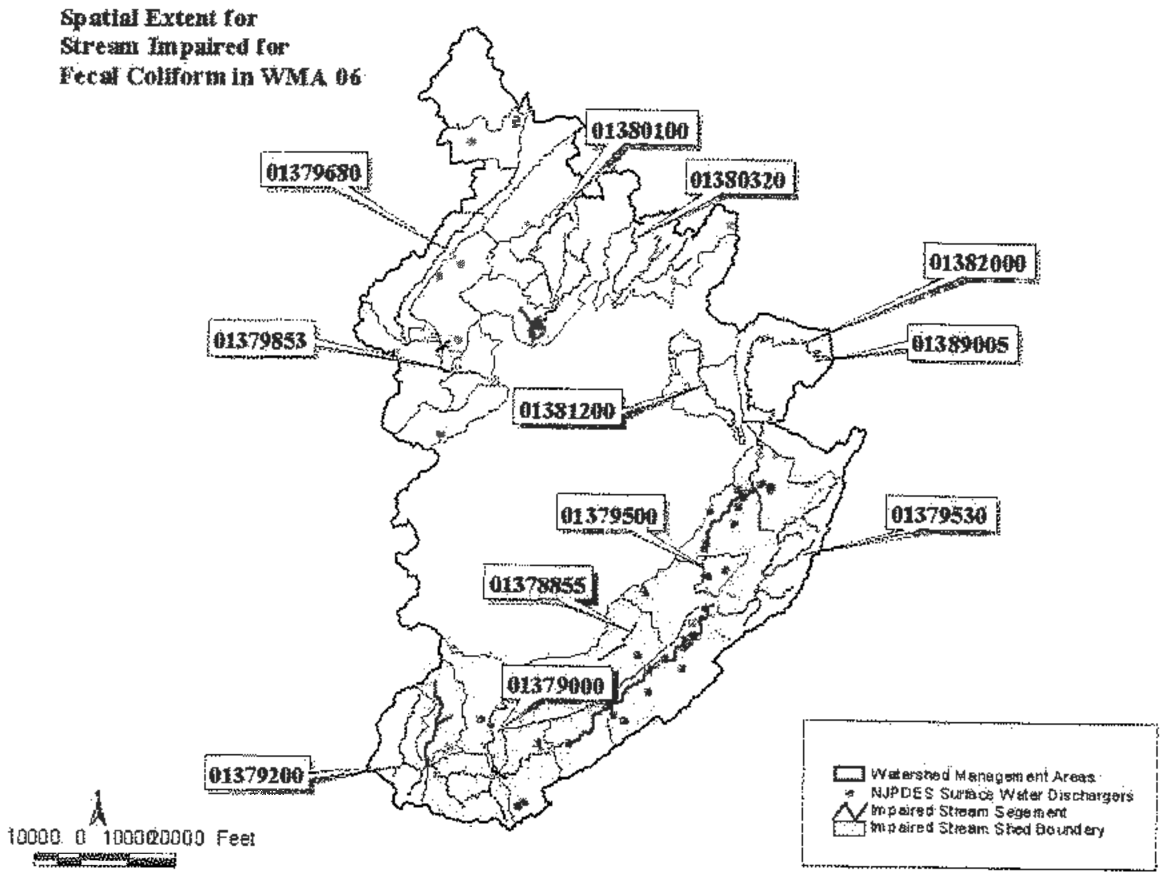
Five of the thirty-two TMDLs in this report are located in WMA 5. Included are segments in the Hackensack River (#01377000), Pascack Brook (#01377500), Musquapsink Brook (#01377499), Tenakill Brook (#01378387), and Coles Brook (#01378560). The spatial extent of each segment is identified in Figure 3. River miles, watershed size and land use\land cover by percent area associated with each segment are listed in Table 5.

Figure 3 Spatial extent of Sublist 5 segments for which TMDLs are being developed in WMA 5



Hackensack River at River Vale, (segment #01377000) flows across the New Jersey/New York State line in River Vale/Old Tappan and extends to the inlet of the Oradell Reservoir. Water quality from stations #01377000 and #01376970 (Hackensack River at Old Tappan) were used in assessing the status and spatial extent of bacterial contamination for this segment. The length of the impaired stream segment is approximately 10.0 miles in a

Figure 4 Spatial extent of Sublist 5 segments for which TMDLs are being developed in WMA 6



Five segments, the Black Brook at Madison (#01378855), Passaic River near Millington (#01379000), Dead River near Millington (#01379200), the Passaic River near Catham (#01379500), and Canoe Brook near Summit (#01379530), comprise a large portion of the Passaic River headwater region and were grouped based on geographical similarities and bacterial geometric mean concentrations. Water quality from stations #01378855, #01379000, #01379200, #001379500, and #01379530 were used to assess the status and spatial extent of bacterial contamination. The combined length of the impaired stream segments is approximately 71.0 miles. A total of 204.8 stream miles are located within its watershed and will be included in the implementation plan. The total drainage area for this segment is approximately 66,759 acres, or 104.3 mi^2.

Table 6 **River miles, Watershed size, and Anderson Landuse classification for eleven Sublist 5 segments, listed for fecal coliform, in WMA 6.**

	Segment ID					
	1378855,1379000, 1379200,1379500, 1379530	**1379680 1379853**	**1380100**	**1380320**	**1381200**	**1382000**
Sublist 5 impaired river miles (miles)	71.0	15.1	16.9	13.1	6.8	14.9
Total river miles within watershed and included in the implementation plan (miles)	204.8	105.8	43.0	25.0	18.4	53.0
Watershed size (acres)	66759	39246	14528	7864	4861	11019
Landuse/Landcover						
Agriculture	2.23%	0.36%	0.16%	2.00%	1.44%	0.52%
Barren Land	0.90%	1.23%	2.66%	0.36%	1.62%	0.51%
Forest	19.21%	55.51%	63.14%	62.92%	13.07%	11.83%
Urban	51.57%	27.70%	17.22%	21.24%	66.79%	42.42%
Water	1.45%	3.75%	7.08%	4.03%	2.14%	3.00%
Wetlands	24.65%	11.44%	9.74%	9.46%	14.94%	41.72%

Rockaway River at Longwood Valley, (#01379680), and Rockaway River at Blackwell St. (#01379853) were grouped based on similarities in geography and bacterial contamination. Water quality from stations #01379680, #01379700 and #01379853 were used in assessing the spatial extent of bacterial contamination for these segments. The combined length of the impaired stream segments is approximately 15.1 miles in a watershed area of approximately 39246 acres or 61.3 mi^2. A total of 105.8 river miles are located within the watershed and will be included in the implementation plan.

Beaver Brook at Rockaway, segment #01380100, consists of the entire Beaver Brook to the confluence of Beaver Brook and the Rockaway River. Water quality from station #01380100 was used to assess the status and spatial extent of bacterial contamination. The impaired stream segment length is approximately 16.9 miles. A total of 43.0 stream miles are located within its watershed and will be included in the implementation plan. The total drainage area for this segment is approximately 14528 acres or 22.7 mi^2.

Segment #01380320, Stony Brook at Boonton, consists of the entire Stony Brook to the confluence of Stony Brook and the Rockaway River. Water quality from station #01380100 was used to assess the status and spatial extent of bacterial contamination. The impaired stream segment length is approximately 13.1 miles. A total of 25.0 stream miles are located within its watershed and will be included in the implementation plan. The total drainage area for this segment is approximately 7864 acres or 12.3 mi^2.

Segment #01381200, Rockaway River at Pine Brook, is located on the downstream portion of the Rockaway River between the outlet of the Boonton Reservoir and the confluence of the watershed area of approximately 5912 acres or 9.2 mi^2, however a total of 20.3 river miles are located in the watershed and will be included in the implementation plan.

Table 5 River miles, Watershed size, and Anderson Landuse classification for five Sublist 5 segments, listed for fecal coliform, in WMA 5.

	Segment ID			
	1377000	1377499, 1377500	1378387	1378560
Sublist 5 impaired river miles (miles)	10.0	13.8	10.2	11.1
Total river miles within watershed and included in the implementation plan (miles)	20.3	33.3	10.8	14.8
Watershed size (acres)	5902	10430	5626	4241
Landuse/Landcover				
Agriculture	0.07%	0.95%	0.17%	0.00%
Barren Land	0.42%	0.30%	0.13%	0.18%
Forest	13.85%	11.53%	11.32%	4.98%
Urban	65.52%	79.72%	84.43%	91.80%
Water	12.09%	2.31%	0.44%	0.19%
Wetlands	8.05%	5.18%	3.51%	2.84%

Pascack Brook at Westwood, segment #01377500, and Musquapsink Brook at River Vale segment #01377500, were also grouped based on similarities in geography and extent of bacterial contamination. Water quality from stations #01377499 and #01377500 were used in assessing the status and spatial extent of bacterial contamination for these segments. The combined length of the impaired stream segments is approximately 13.8 miles in a watershed area of approximately 10429 acres or 16.3 mi^2, however a total of 33.3 river miles are located within the watershed and will be included in the implementation plan.

Tenakill Brook at Cedar Lane at Closter, segment #01378387, consists of the entire length of Tenakill Brook upstream of USGS station #01378387. Water quality from this station #01378387 was used in assessing the status and spatial extent of bacterial contamination for this segment. The length of the impaired stream segment is approximately 10.2 miles in a watershed area of approximately 5625 acres or 8.8 mi^2. A total of 10.8 river miles are included in this watershed and will be included in the implementation plan

Coles Brook at Hackensack, segment #01378560, consists of the entire length of Coles Brook upstream of USGS station #01378560. Water quality from station #01378560 was used in assessing the status and spatial extent of bacterial contamination for this segment. The length of the impaired stream segment is approximately 11.1 miles in a watershed area of approximately 4240 acres or 6.6 mi^2. A total of 14.8 river miles are included in this watershed and will be included in the implementation plan.

4.1.4. Watershed Management Area 6

Watershed Management Area 6 (WMA 6) represents the area drained by waters from the upper reaches of the Passaic River Basin including the Passaic River from its headwaters in Morris County to the confluence of the Pompton River. Extensive suburban development and reliance upon ground water sources for water supply characterize WMA 6. WMA 6 lies in portions of Morris, Somerset, Sussex and Essex counties and includes the Upper & Middle Passaic River, Whippany River and Rockaway River Watersheds.

The **Upper Passaic River Watershed** is approximately 50 miles long and consists of a drainage area approximately 200 square miles in portions of Somerset, Morris, and Essex Counties. This section of the Passaic River is a significant source of drinking water for a much of northeastern New Jersey. Major tributaries to the Upper Passaic River include the Dead River, Rockaway River, Whippany River, and Black Brook. The Great Swamp National Wildlife Refuge is located within the Upper Passaic River Watershed. Approximately one-half of this watershed is undeveloped or vacant, with the remainder primarily residential and commercial; however, this watershed is facing significant development in the vacant areas. This watershed is subject to frequent flooding.

The **Middle Passaic River Watershed** includes Great Piece Meadows and Deepavaal Brook. The Great Piece Meadows is a freshwater wetland with a drainage area of approximately 12 square miles and is prone to flooding. Various owners privately own the Great Piece Meadows.

The **Rockaway River Watershed** has a drainage area of approximately 133 square miles and is approximately 37 miles long. The Rockaway River flows east to its confluence with the Whippany River at Pine Brook. Major tributaries include Stone Brook, Mill Brook, Beaver Brook, and Den Brook. The land use patterns in this area are complex and include vacant areas, parklands, residential development and industrial/commercial uses.

The **Whippany River Watershed** drains approximately 69 square miles and is located entirely within Morris County. The river is approximately 18 miles long and flows to the Passaic River. Two major tributaries are Black Brook and Troy Brook. The population is centered in Morristown, Parsippany-Troy Hills, Hanover Township and East Hanover Township.

Sublist 5 Waterbodies WMA 6

Eleven of the thirty-two TMDLs in this report are located in WMA 6. Included are segments in the Black Brook (#01378855), Dead River (#01379200), Passaic River (#01379000, #01379500, and #01382000), Rockaway River (#01379680, #01379853, and #01381200), Canoe Brook (#01379530), Beaver Brook (#01380100), and Stony Brook (#01380320). The spatial extent of each segment is identified in Figure 4. River miles, watershed size and land use\land cover by percent area associated with each segment are listed in Table 6.

Rockaway and the Whippany Rivers. Water quality from station #01381200 was used to assess the status and spatial extent of bacterial contamination. The impaired stream segment length is approximately 6.8 miles. A total of 18.4 stream miles are located within its watershed and will be included in the implementation plan. The total drainage area for this segment is approximately 4861 acres or 7.6 mi^2.

Segment #01382000, Passaic River at Two Bridges, is located on the Passaic River between the confluence of the Whippany and Passaic Rivers to the confluence of the Passaic and Pompton Rivers. Water quality from station #01382000 was used to assess the status and spatial extent of bacterial contamination. This segment was not grouped with other segments based on its relatively lower bacterial concentrations compared with those found in up and downstream on the Passaic River. The impaired stream segment length is approximately 14.9 miles in a drainage area of approximately 11019 acres or 17.2 mi^2. A total of 53.0 stream miles are located within its watershed and will be included in the implementation plan.

4.2. Data Sources

The Department's Geographic Information System (GIS) was used extensively to describe northeast watershed characteristics. In concert with USEPA's November 2001 listing guidance, the Department is using Reach File 3 (RF3) in the 2002 Integrated Report to represent rivers and streams. The following is general information regarding the data used to describe the watershed management area:

- Land use/Land cover information was taken from the 1995/1997 Land Use/Land cover Updated for New Jersey DEP, published 12/01/2000 by Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA), delineated by watershed management area.
- 2002 Assessed Rivers coverage, NJDEP, Watershed Assessment Group, unpublished coverage.
- County Boundaries: Published 11/01/1998 by the NJDEP, Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA), "NJDEP County Boundaries for the State of New Jersey." Online at: http://www.state.nj.us/dep/gis/digidownload/zips/statewide/stco.zip
- Detailed stream coverage (RF3) by County: Published 11/01/1998 by the NJDEP, Office of Information Resources Management (OIRM), Bureau of Geographic Information and Analysis (BGIA). "Hydrography of XXX County, New Jersey (1:24000)." Online at: http://www.state.nj.us/dep/gis/digidownload/zips/strm/
- NJDEP 14 Digit Hydrologic Unit Code delineations (DEPHUC14), published 4/5/2000 by Department of Environmental Protection (NJDEP), New Jersey Geological Survey (NJGS) Online at: http://www.state.nj.us/dep/gis/digidownload/zips/statewide/dephuc14.zip
- NJPDES Surface Water Discharges in New Jersey, (1:12,000), published 02/02/2002 by Division of Water Quality (DWQ), Bureau of Point Source Permitting - Region 1 (PSP-R1).

5.0 Applicable Water Quality Standards

5.1. New Jersey Surface Water Quality Standards for Fecal Coliform

As stated in N.J.A.C. 7:9B-1.14(c) of the New Jersey SWQS, the following are the criteria for freshwater fecal coliform:

> "Fecal coliform levels shall not exceed a geometric average of 200 CFU/100 ml nor should more than 10 percent of the total sample taken during any 30-day period exceed 400 CFU/100 ml in FW2 waters".

All of the waterbodies covered under these TMDLs have a FW1 or FW2 classification (NJAC 7:9B-1.12). The designated use, i.e. surface water uses, both existing and potential, that have been established by the Department for waters of the State, for all of the waterbodies in the Northeast Water Region is as stated below:

In all FW1 waters, the designated uses are:
1. Set aside for posterity to represent the natural aquatic environment and its associated biota;
2. Primary and secondary contact recreation;
3. Maintenance, migration and propagation of the natural and established aquatic biota; and
4. Any other reasonable uses.

In all FW2 waters, the designated uses are:
1. Maintenance, migration and propagation of the natural and established aquatic biota;
2. Primary and secondary contact recreation;
3. Industrial and agricultural water supply;
4. Public potable water supply after conventional filtration treatment (a series of processes including filtration, flocculation, coagulation and sedimentation, resulting in substantial particulate removal but no consistent removal of chemical constituents) and disinfection; and
5. Any other reasonable uses.

5.2. Pathogen Indicators in New Jersey's Surface Water Quality Standards (SWQS)

A subset of total coliform, fecal coliform, originates from the intestines of warm-blooded animals. Therefore, because they do not include organisms found naturally in soils, fecal coliform is preferred over total coliform as a pathogen indicator. In 1986, USEPA published a document entitled *"Implementation Guidance for Ambient Water Quality Criteria for Bacteria – 1986"* that contained their recommendations for water quality criteria for bacteria to protect bathers from gastrointestinal illness in recreational waters. The water quality criteria established levels of indicator bacteria *Escherichia coli* (*E. coli*) for fresh recreational water and enterococci for fresh and marine recreational waters in lieu of fecal coliforms. Historically, the New Jersey has listed water bodies for exceedances of the fecal coliform criteria.

Therefore, the Department is obligated to develop TMDLs for Sublist 5 water bodies based upon fecal coliform, at least until New Jersey has the transition to *E. coli* and enterococci in the Department's SWQS and until sufficient data have been collected to either develop a TMDL or to support a proposal to move the waterbodies to one of the other four categories.

6.0 Source Assessment

In order to evaluate and characterize fecal coliform loadings in the waterbodies of interest in these TMDLs, and thus propose proper management responses, source assessments are warranted. Source assessments include identifying the types of sources and their relative contributions to fecal coliform loadings, in both time and space variables.

6.1. Assessment of Point Sources other than Stormwater

Municipal point sources of fecal coliform for these TMDLs are listed in Appendix B. Municipal treatment plants are required to disinfect effluent prior to discharge and to meet surface water quality criteria for fecal coliform in their effluent. While there are some industrial treatment plants that also treat domestic wastewater, these facilities are few in number and are also required to disinfect effluent prior to discharge. In addition, New Jersey's Surface Water Quality Standards at N.J.A.C. 7:9B-1.5(c)4 reads "No mixing zones shall be permitted for indicators of bacterial quality including, but not limited to, fecal coliforms and enterococci". This mixing zone policy is applicable to both municipal and industrial treatment plants.

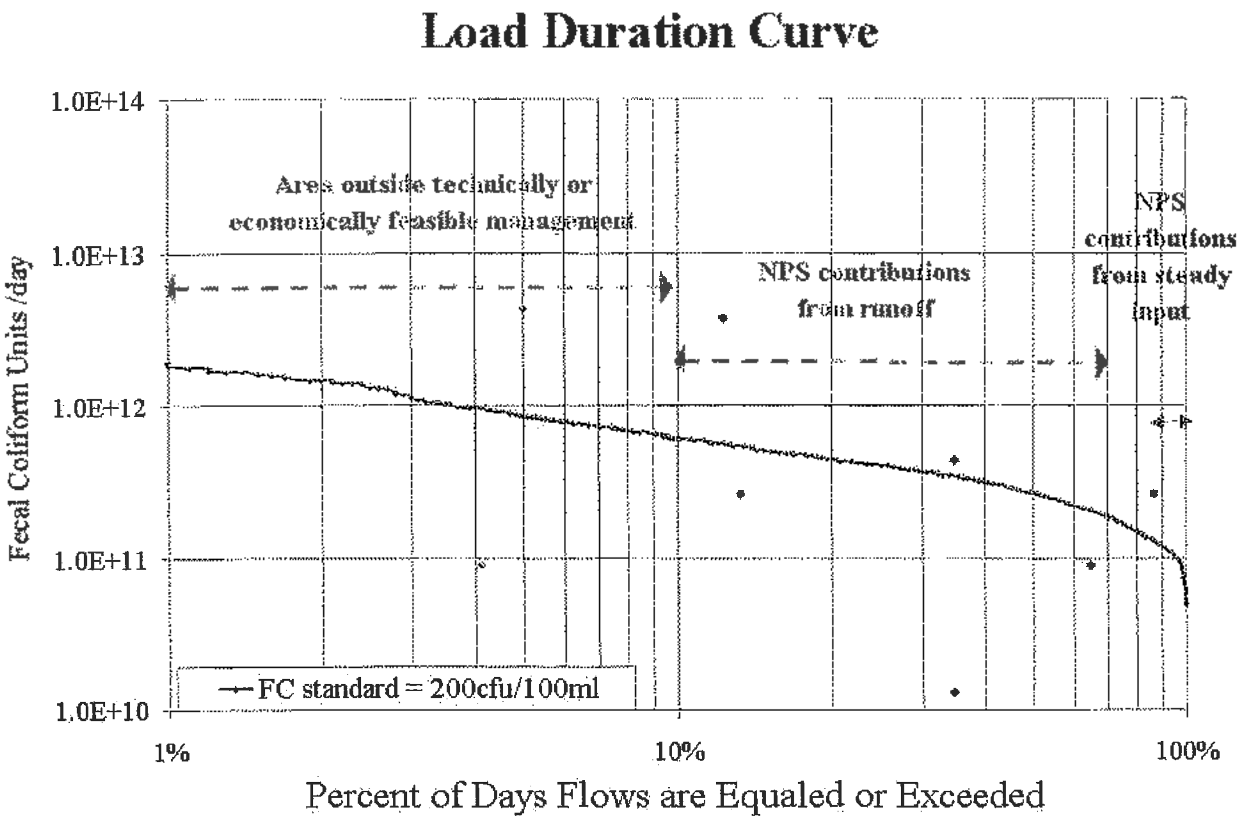
Since POTWs and industrial treatment plants routinely achieve essentially complete disinfection (less than 20 CFU/100ml), the requirement to disinfect is, in effect, more stringent than the fecal coliform effluent criteria. The percent of the total point source contribution is an insignificant fraction of the total load. Consequently, these fecal coliform TMDLs will not impose any change in current practices for POTWs and industrial treatment plants and will not result in changes to existing effluent limits. The methodology used in this report is inappropriate for use in areas affected by combined sewer overflows (CSOs) or in areas influenced by tidal action. Therefore, stream segments falling into these two categories will be excluded from the discussion of TMDLs in this report.

6.2. Assessment of Nonpoint and Stormwater Sources

Nonpoint and stormwater sources include storm-driven loads such as runoff from various land uses that transport fecal coliform from sources such as geese, farms, and domestic pets to the receiving water. Domestic pet waste, geese waste, as well as loading from storm water detention basins will be addressed by the Phase II MS4 program. Nonpoint sources also include steady-inputs from "illicit" sources such as failing sewage conveyance systems, sanitary sewer overflows (SSOs), and failing or inappropriately located septic systems. When "illicit" sources are identified, appropriate enforcement measures will be taken to eliminate them.

When streamflow gauge information is available, a load duration curve (LDC) is useful in identifying and differentiating between storm-driven and steady-input sources. As an example, Figure 5 represents a LDC using the 200 CFU/100 ml criterion.

Figure 5 Example Load Duration Curve (LDC)



The load duration curve method is based on comparison of the frequency of a given flow event with its associated water quality load. A LDC can be developed using the following steps:

1. Plot the Flow Duration Curve, Flow vs. % of days flow exceeded.
2. Translate the flow-duration curve into a LDC by multiplying the water quality standard, the flow and a conversion factor, the result of this multiplication is the maximum allowable load associated with each flow
3. Graph the LDC, maximum allowable load vs. percent of time flow is equaled or exceeded
4. Water quality samples are converted to loads (sample water quality data multiplied by daily flow on the date of sample).
5. Plot the measured loads on the LDC.

Values that plot below the LDC represent samples below the concentration threshold whereas values that plot above represent samples that exceed the concentration threshold. Loads that plot above the curve and in the region between 85 and 100 percent of days in which flow is exceeded indicate a steady-input source contribution. Loads that plot in the region between 10 and 70 percent suggest the presence of storm-driven source contributions. A combination of both storm-driven and steady-input sources occurs in the transition zone between 70 and 85 percent. Loads that plot above 99 percent or below 10 percent represent values occurring during either extreme low or high flows conditions and are thus considered to be outside the region of technically and economically feasible management. In this report, LDCs are used only for TMDL implementation and not in calculating TMDLs.

7.0 Water Quality Analysis

Relating pathogen sources to in-stream concentrations is distinguished from quantifying that relationship for other pollutants given the inherent variability in population size and dependence not only on physical factors such as temperature and soil characteristics, but also on less predictable factors such as re-growth media. Since fecal coliform loads and concentrations can vary many orders of magnitude over short distances and over time at a single location, dynamic model calibrations can be very difficult to calibrate. Options available to control non-point sources of fecal coliform typically include measures such as goose management strategies, pooper-scooper ordinances, and septic system maintenance. However, the effectiveness of these control measures is not easily measured. Given these considerations, detailed water quality modeling may not provide adequate insight or guidance toward the development of implementation plans for fecal coliform reductions.

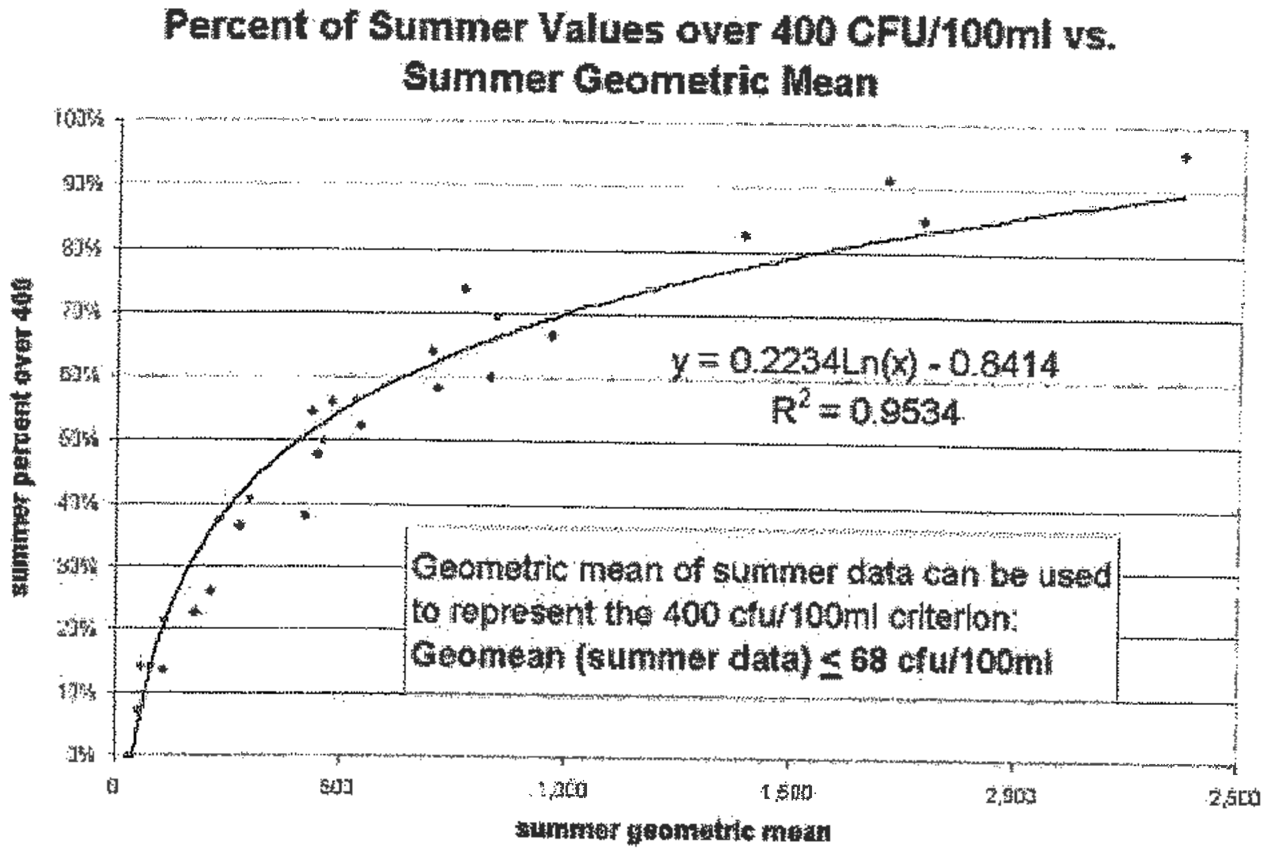
As described in EPA guidance, a TMDL identifies the loading capacity of a waterbody for a particular pollutant. EPA regulations define loading capacity as the greatest amount of loading that a waterbody can receive without violating water quality standards (40 C.F.R. 130.2). The loadings are required to be expressed as either mass-per-time, toxicity, or other appropriate measures (40 C.F.R. 130.2(i)). For these TMDLs, the load capacity is expressed as a concentration set to meet the state water quality standard. For bacteria, it is appropriate and justifiable to express the components of a TMDL as percent reduction based on concentration. The rationale for this approach is that:

- expressing a bacteria TMDL in terms of concentration provides a direct link between existing water quality and the numeric target;
- using concentration in a bacteria TMDL is more relevant and consistent with the water quality standards, which apply for a range of flow and environmental conditions; and
- follow-up monitoring will compare concentrations to water quality standards.

Given the two criteria of 200 CFU/100 ml and 400 CFU/100 ml in FW2 waters, computations were necessary for both criteria and resulted in two percent reduction values. The higher percent reduction value was applied in the TMDL so that both the 200 CFU/100 ml and 400 CFU/100 ml criteria were satisfied.

To satisfy the 200 CFU/100ml criteria, the geometric mean of all available data between water years 1994-2000 was compared to an adjusted target concentration. The adjusted target accounts for an explicit margin of safety and is equal to 200 minus the margin of safety. A calculation incorporating all available data is generally conservative since most samples are taken during the summer when fecal coliform is generally higher. A geometric mean of summer data was used to develop a percent reduction to satisfy the 400 CFU/100 ml criteria. A summer geometric mean can be used to represent the 400 criteria by regressing the percent over 400 CFU/100 ml against the geometric mean (Figure 6). Thus, each datapoint on Figure 6 represents all the data from one individual monitoring station. Sites with 20 or more summer data points were used to develop this regression, in order to make use of more significant values for percent exceedance. The resulting regression has an r-squared value of 0.9534. Solving for X when Y is equal to 10% yields a geometric mean threshold of 68 CFU/100ml. This means that, using summer data, a geometric mean of 68 can be used to represent the 400 CFU/100ml criterion. Since the geometric mean is a more reliable statistic than percentile when limited data are available, 68 CFU/100ml was used to represent the 400 CFU/100ml criterion for all sites. The inclusion of all data from summer months (May through September) to compare with the 30-day criterion is justified because summer represents the critical period when primary and secondary contact with water bodies is most prevalent. A more detailed justification for using summer data can be found in Section 7.1,"Seasonal Variation and Critical Conditions."

Figure 6 Percent of summer values over 400 CFU/100ml as a function of summer geometric mean values



$y = 0.2234Ln(x) - 0.8414$ Equation 1

$R^2 = 0.9534$

Geometric mean, and summer geometric mean, and percent reductions were determined at each location for both criteria using Equations 2 through 4. To satisfy the 200 CFU/100ml criteria, equations 2 and 3 were applied. Equations 2 and 4 were used in satisfying the 400 CFU/100ml criteria.

$$Geometric\ Mean\ for\ 200CFU\ criteria = \sqrt[n]{y_1 y_2 y_3 y_4 \dots y_n}$$ Equation 2

where:
y = sample measurement
n = total number of samples

$$200\ CFU\ criteria\ Percent\ Reduction = \frac{(Geometric\ mean - (200 - e))}{Geometric\ mean} \times 100\ \%$$ Equation 3

$$400\ CFU\ criteria\ PercentReduction = \frac{(SummerGeometric\ mean - (68 - e))}{SummerGeometric\ mean} \times 100\ \%$$ Equation 4

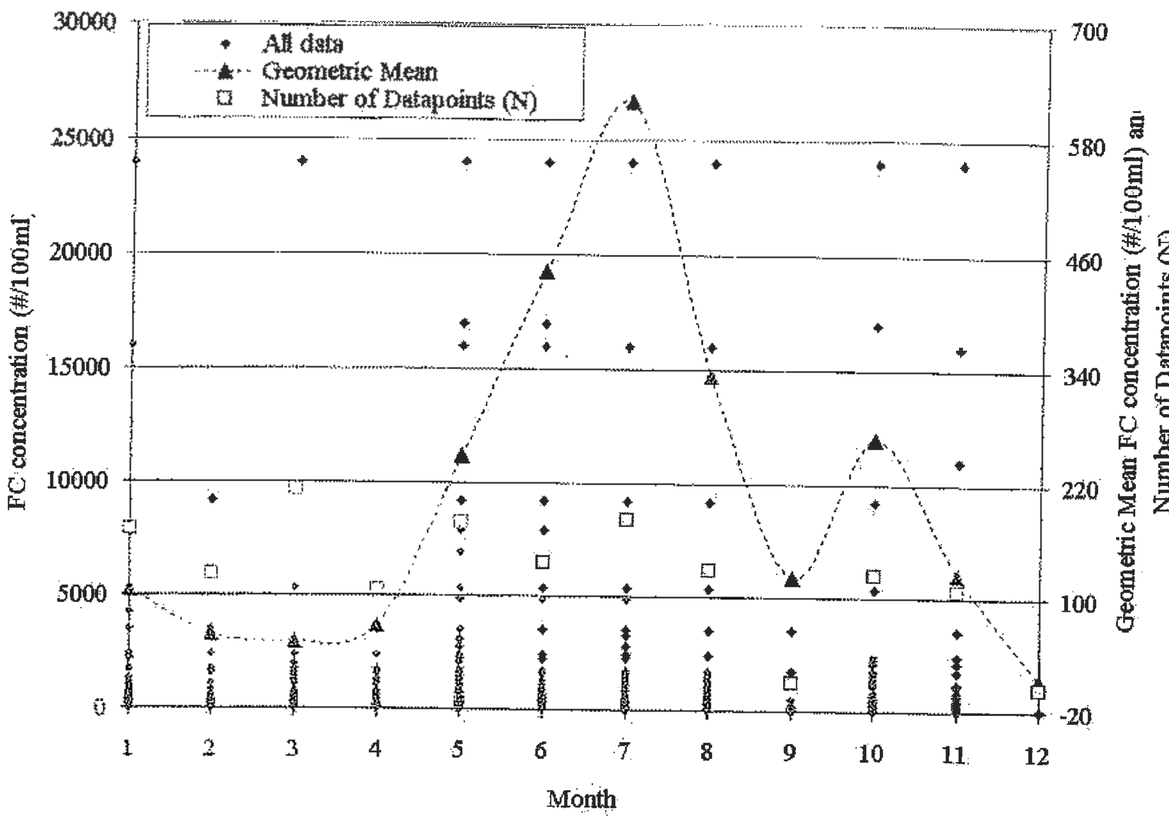
where:
e = (margin of safety)

This percent reduction can be applied to nonpoint and stormwater sources as a whole or be apportioned to categories of nonpoint and stormwater sources within the study area. The extent to which nonpoint and stormwater sources have been identified and the process by which they will become identified will vary by study area based on data availability, watershed size and complexity, and pollutant sources.

7.1. Seasonal Variation/Critical Conditions

These TMDLs will attain applicable surface water quality standards year round. The approach outlined in this paper is conservative given that in most cases fecal coliform data were collected during the summer months, a time when in-stream concentrations are typically the highest. This relationship is evidenced when calculating, on a monthly basis, the geometric mean of fecal coliform data collected statewide. Statewide fecal coliform geometric means during water years 1994-1997 were compared on a monthly basis and are shown in Figure 7. The 1994-1997 period was chosen for this analysis so that the significance of the number of individual datapoints for any given month was minimized. During the 1994-1997 period year-round sampling for fecal coliform was conducted by sampling four times throughout the year. Following 1997, the fecal coliform sampling protocol was changed to five samples during a 30-day period in the summer months. As evident in Figure 7, higher monthly geometric means are observed between May and September with the highest values occurring during mid-summer. This relationship is also evident when using the entire 1994-2002 dataset or datasets from individual water years. Given this relationship, summer is considered the critical period for violating fecal coliform SWQS and, as such, sampling during this period is considered adequate for meeting year round protections and designated uses.

Figure 7 **Statewide monthly fecal coliform geometric means during water years 1994-1997 using USGS/NJDEP data.**



7.2. Margin of Safety

A Margin of Safety (MOS) is provided to account for "lack of knowledge concerning the relationship between effluent limitations and water quality" (40 CFR 130.7(c)). For these TMDLs calculations, both an implicit and explicit Margin of Safety (MOS) are incorporated. Implicitly, a MOS is inherent in the estimates of current pollutant loadings, the targeted water quality goals (New Jersey's SWQS) and the allocations of loading. This was accomplished by taking conservative assumptions throughout the TMDL evaluation and development. Examples of some of the conservative assumptions include treating fecal coliform as a conservative substance, applying the fecal coliform criteria to stormwater sources, and applying the fecal coliform criteria to the stream during all weather conditions. Fecal coliforms decay in the environment (i.e. outside the fecal tract) relatively rapidly, yet this analysis assumes a linear relationship between fecal load and instream concentration. Furthermore, it is generally recognized that fecal contamination from stormwater poses much less risk of illness than fecal contamination from sewage or septic system effluent (Cabelli, 1989). Finally, much of the fecal coliform is flushed into the system during rainfall events and passes through the system in a short time. Primary and secondary recreation generally occur during dry periods.

An explicit MOS is provided by incorporating a confidence level multiplier associated with log-normal distributions in the calculation of the load reduction for both the 200 and 400 standards. Using this method, the 200 and 400 targets are reduced based on the number of data points and the variability within each data set. For these TMDLs, a confidence level of 90% was used in calculating the MOS. As a result, and as identified in Appendix C, the target value will be different for each stream segment or grouped segments. The explicit margin of safety is calculated using the following steps:

1- FC data (x) will transformed to Log form data (y),
2- the mean of the Log- transformed data (y) is determined, $\bar{y}$
3- Determine the standard deviation of the Log-transformed data, S_y using the following equation:

$$S_y = \sqrt{\frac{\sum_i (y_i - \bar{y})^2}{N-1}}$$

4- Determine the Geometric mean of the FC data (GM)
5- Determine the standard deviation of the mean (standard error of the mean), $s_{\bar{y}}$, using the following equation:

$$s_{\bar{y}} = \frac{s_y}{\sqrt{N}}$$

6- For the 200 standard ($x_{standard}$), $y_{standard}$ = Log(200)= 2.301, thus for a confidence level of 90%, the target value will be the lower confidence limit (n= -1.64), $y_{target} = y_{std} - n \cdot s_{\bar{y}}$, for example, the 200 criteria: y_{target} = 2.301- n* $s_{\bar{y}}$
7- The target value for x, $x_{target} = 10^{y\ target}$
8- The margin of safety (e) therefore will be e = $x_{standard}$ - x_{target}
9- Finally, the load reduction = $\frac{GM - x_{target}}{GM} \cdot 100\%$, for example the 200 criteria will be defined as: $\frac{(GM - (200 - e))}{GM} \cdot 100\%$

The 400 criteria would be defined as: $\frac{(GM - (68 - e))}{GM} \cdot 100\%$

8.0 TMDL Calculations

Because these TMDLs are calculated based on ambient water quality data, the allocations are provided in terms of percent reductions. In the same way, the loading capacity of each stream is expressed as a function of the current load:

$LC = (1 - PR) \times L_o$, where

LC = loading capacity for a particular stream;
PR = percent reduction as specified in Tables 7-10;

L_o = current load.

8.1. Wasteload Allocations and Load Allocations

For the reasons discussed previously, these TMDLs do not include WLAs for traditional point sources (POTWs, industrial, etc.). WLAs are hereby established for all NJPDES-regulated point sources (including NJPDES-regulated stormwater), while LAs are established for all stormwater sources that are not subject to NJPDES regulation, and for all nonpoint sources. Both WLAs and LAs are expressed as percentage reductions for particular stream segments.

Table 7 identifies the required percent reduction necessary for each stream segment or group of segments to meet the fecal coliform SWQS. The reductions reported in these tables include a margin of safety factor and represent the higher percent reduction (more stringent) required of the two criteria. Reductions that are required under each criteria are located in Appendix C. In all cases, the 400 CFU/100ml criteria was the more stringent of the two criteria, thus values reported in Table 7 were equal to the percent required to meet the 400 CFU/100ml criteria.

Table 7 TMDLs for fecal coliform-impaired stream segments in the Northeast Water Region as identified in Sublist 5 of the 2002 Integrated List of Waterbodies. The reductions reported in this table represent the higher, or more stringent, percent reduction required of the two fecal colifom criteria.

TMDL No.	WMA	Station Name/Waterbody	Sublist 5 Segment	Summer Geometric Mean CFU/100ml	MOS as a percent of the target conc.[1]	Percent Reduction (LA) without MOS	Percent Reduction (LA) with MOS	Wasteload Allocation (WLA) as a Percent Reduction, with MOS
1	3	Macopin River at Macopin Reservoir	01382450	59	46%	-16%	**37%**	**37%**
2	3	Wanaque River at Highland Avenue	01387010	208	53%	67%	**85%**	**85%**
3	3	Ramapo River near Mahwah	01387500	431	44%	84%	**91%**	**91%**

TMDL No.	WMA	Station Name/Waterbody	Sublist 5 Segment	Summer Geometric Mean CFU/100ml	MOS as a percent of the target conc.[1]	Percent Reduction (LA) without MOS	Percent Reduction (LA) with MOS	Wasteload Allocation (WLA) as a Percent Reduction, with MOS
4	4	West Branch Saddle River at Upper Saddle R.	01390445	1,144	30%	94%	**96%**	**96%**
5	4	Saddle River at Saddle River	01390500					
6	4	Saddle River at Ridgewood Ave at Ridgewood	01390900					
7	4	Hohokus Brook at Mouth at Paramus	01391100					
8	4	Saddle River at Rochelle Park	01391200					
9	4	Saddle River at Lodi	01391500					
10	4	Passaic R. below Pompton R. at Two Bridges	01389005	652	30%	90%	**93%**	**93%**
11	4	Passaic River at Little Falls	01389500					
12	4	Preakness Brook near Little Falls	01389080					
13	4	Peckman River at West Paterson	01389600					
14	4	Deepavaal Brook at Fairfield	01389138					
15	4	Diamond Brook at Fair Lawn	01389860	1,544	47%	96%	**98%**	**98%**
16	4	Goffle Brook at Hawthorne	01389850					
17	5	Hackensack River at River Vale	01377000	294	34%	77%	**85%**	**85%**
18	5	Musquapsink Brook at River Vale	01377499	709	54%	90%	**96%**	**96%**
19	5	Pascack Brook at Westwood	01377500					
20	5	Tenakill Brook at Cedar Lane at Closter	01378387	159	91%	57%	**96%**	**96%**
21	5	Coles Brook at Hackensack	01378560	1,093	68%	94%	**98%**	**98%**
22	6	Black Brook at Madison	01378855	1,370	29%	95%	**96%**	**96%**
23	6	Passaic River near Millington	01379000					
24	6	Dead River Near Millington	01379200					
25	6	Passaic River near Chatham	01379500					
26	6	Canoe Brook near Summit	01379530					
27	6	Rockaway River at Longwood Valley	01379680	373	54%	82%	**92%**	**92%**
28	6	Rockaway River at Blackwell Street	01379853					
29	6	Beaver Brook at Rockaway	01380100	362	43%	81%	**89%**	**89%**
30	6	Stony Brook at Boonton	01380320	214	32%	68%	**78%**	**78%**
31	6	Rockaway River at Pine Brook	01381200	571	28%	88%	**91%**	**91%**
32	6	Passaic River at Two Bridges	01382000	276	33%	75%	**83%**	**83%**

[1] MOS as a percent of target is equal to: $\frac{e}{200\ CFU/100\,ml}$ or $\frac{e}{68\ CFU/100\,ml}$ where "e" is defined as the MOS in Section 7.2

- Failing sewage conveyance systems
- Improper garbage storage and disposal

10.3. Management Strategies

Management measures are "economically achievable measures for the control of the addition of pollutants from existing and new categories and classes of nonpoint and stormwater sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint and stormwater source pollution control practices, technologies, processes, siting criteria, operating methods, or other alternatives" (USEPA, 1993). A combination of best management practices and direct remedies of illicit sources that are found through track-down monitoring will be used to implement these TMDLs.

10.3.1. Short-Term Management Strategies

Short-term management strategies include existing projects dubbed "Action Now" that are on the ground projects funded by the Department to address fecal and other NPS impairments to an impaired waterbody. These projects include stream bank restoration projects, ordinance development and catchbasin cleanouts. Funding sources include Clean Water Act 319(h) funds and State sources. Since 1998, 319(h) funds have provided approximately $3 million annually.Priority is given to funding projects that address TMDL implementation, development of stormwater management plans and projects that address impairment based on Sublist 5 listed waterbodies.

An example of such a project is a two-year project evaluating stormwater quality in a low-density residential area located in Hanover Township, Morris County. As part of the study, catch basin cleaning and public education and outreach were conducted. The outreach program targeted homeowners, landscapers and pet owners and was based on enhancing awareness and effecting behaviors that would reduce specific potential sources of NPS contaminants.

10.3.2. Long-Term Management Strategies

While short-term management measures will begin to reduce sources of fecal coliform in the Northeast Water Region, additional measures will be needed to verify and further reduce or eliminate these sources. Some of these measures may be implemented now, where resources are available and sources have already been identified as causing the fecal impairment. Both short-term and long-term management strategies that address fecal reduction related to these identified sources may be eligible for future Departmental funding.

Source Categories for Long-Term Management Strategies

1) Canada Geese

Geese are migratory birds that are protected by the Migratory Bird Treaty Act of 1918 and other Federal and State Laws. Resident Canada geese are those birds that do not migrate, but are protected by this and other legislation. The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS)-Wildlife Services program reports that the 1999 estimated population of non-migratory geese in New Jersey was 83,000. Geese and other pest waterfowl have been identified as one of several primary sources of pathogen loading to impaired water bodies in the Northeast Region. Geese may produce up to 1½ pounds of fecal matter a day.

Canada Goose Damage Management Plan

Because geese are free to move about and commonly graze and rest on large grassy areas associated with schools, parks, golf courses, corporate lawns and cemeteries, solutions are best developed and conducted at the community level through a community-based goose damage management program. USDA's Wildlife Services program recommends that a community prepare a written Canada Goose Damage Management Plan that may include the following actions:

- Initiate a fact-finding and Communication Plan
- Enact and Enforce a No Feeding Ordinance
- Conduct Goose Damage Control Activities such as Habitat Modification
- Review and Update Land Use Policies
- Reduce or Eliminate Goose Reproduction (permit required)
- Hunt Geese to Reinforce Nonlethal Actions (permit required)

Procedures such as handling nests and eggs, capturing and relocating birds, and the hunting of birds require a depredation permit from either the USDA APHIS Wildlife Services or U.S. Fish and Wildlife Services. Procedures requiring permits should be a last resort after a community has exhaustedthe other listed measures. The Department's draft guide *Management of Canada Geese in Suburban Areas, March 2001,* which may be found at www.state.nj.us/dep/watershedmgt under publications, provides extensive guidance on how to modify habitat to serve as a deterrent to geese as well as other prevention techniques such as education through signage and ordinances.

2) Stormwater Detention Basins and Impoundments

Stormwater detention basins may act as sources of fecal coliform due to the accumulation of geese and pet waste in basins. Under certain conditions, coliform will increase in numbers in basins. As a result, significant quantities of fecal coliform can be discharged during storm events.

Impoundments created by small dams across streams have been a measure commonly used for flood control by municipalities in New Jersey. In addition to flood control, the impoundments were often incorporated into public parks in order to provide recreational opportunities for residents. Many of the impoundments are surrounded by mowed turf areas, which in combination with open water serve as an ideal habitat for geese and an

8.2. Reserve Capacity

Reserve capacity is an optional means of reserving a portion of the loading capacity to allow for future growth. Reserve capacities are not included at this time. The loading capacity of each stream is expressed as a function of the current load (Section 8.0), and both WLAs and LAs are expressed as percentage reductions for particular stream segments (Section 8.1). Therefore, the percent reductions from current levels must be attained in consideration of any new sources that may accompany future development.

9.0 Follow - up Monitoring

The NJDEP's primary surface water quality monitoring unit is the Office of Water Monitoring Management. In association with the Water Resources Division of the U.S. Geological Survey, the NJDEP have cooperatively operated the Ambient Stream Monitoring Network (ASMN) in New Jersey since the 1970s. The ASMN currently includes approximately 115 stations that are routinely monitored on a quarterly basis. Bacteria monitoring, as part of the ASMN network, are conducted five times during a consecutive 30-day summer period each year. The data from this network has been used to assess the quality of freshwater streams and percent load reductions. Although other units also perform monitoring functions, the ASMN will remain a principal source of FC monitoring.

10.0 Implementation

When bacterial sources are easily identifiable, measures outlined in section 10.2, Source Categories and Best Management Practices (BMPs), will be applied to reduce bacterial loading to meet SWQ standards. When bacterial sources are not easily identifiable, load duration curves will be used in conjunction with bacterial source tracking, if necessary, to identify pathogen sources.

Much of the stormwater discharged to the surface waters in question is discharged through "small municipal separate storm sewer systems" (small MS4s) that are proposed to be regulated under the Department's proposed Phase II NJPDES stormwater rules for the Municipal Stormwater Regulation Program. Under those proposed rules and associated draft general permits, nearly all municipalities (and various county, State, and other agencies) in the Northeast Region will be required to implement various control measures that should substantially reduce bacteria loadings, including measures to eliminate "illicit connections" of domestic sewage and other waste to the small MS4, adopt and enforce a pet waste ordinance, prohibit feeding of unconfined wildlife on public property, clean catch basins, perform good housekeeping at maintenance yards, and provide related public education and employee training. The WLAs and LAs in Table 7 are not themselves "Additional Measures" under proposed N.J.A.C. 7:14A-25.6 or 25.8.

Sections 10.2 and 10.4 identify BMPs and monitoring measures that in some respects are in addition to the control measures required in these general permits. These BMPs and monitoring measures are also not "Additional Measures" under proposed N.J.A.C. 7:14A-25.6 or 25.8. However, the Department will seek to have these BMPs and monitoring measures implemented through means other than requirements in these general permits. Also, in the future, the Department may propose and adopt WQM plan amendments that identify one or more of these BMPs (or other BMPs) and monitoring measures as "Additional Measures" for some or all of the permittees under these general permits.

10.1. Load Duration Curve (LDC)

As explained in Section 6.2, a LDC can be a beneficial tool as a first step in identifying potential pathogen sources. LDCs for listed segments in the Northeast region are located in Appendix D. In each case, thirty (30) years of USGS gage flow data (water years 1970-2000), from the listed station, were used in generating the curve. When a recent 30-year period was not available at the listed station, an adjacent station was selected based on station correlation information in US Geological Survey Open File Report 81-1110 (USGS, 1982). When an adjacent station was used in the manner, flows were adjusted to the station of interest based on a ratio of watershed size. LDCs were not developed for stations in which a satisfactory correlation could not be found.

10.2. Source Categories and Best Management Practices

The TMDLs developed in this report were developed with the assistance of stakeholders in WMAs 3, 4, 5 and 6 as part of the Department's ongoing watershed management efforts. Through the creation of the watershed management planning process over the past several years, Public Advisory Committees (PACs) and Technical Advisory Committees (TACs) were created in all 20 WMAs. Whereas the PACs serve in an advisory capacity to the New Jersey Department of Environmental Protection, and examined and commented on a myriad of issues in the watersheds, the TACs were focused on the scientific, ecological, and engineering issues relevant to the mission of the PAC. The Department in collaboration with the Northeast TACs narrowed the scope of the primary sources of fecal contamination to the following:

Non-Human Sources of Fecal Coliform

- Canada geese
- Pet Waste
- Stormwater basins
- Direct stormwater discharges to waterbodies
- Farms, zoos and livestock

Human Sources of Fecal Coliform

- Malfunctioning or older improperly sized septic systems attraction for pet walking. Specific management measures to reduce fecal coliform inputs to these waterbodies include:

- Development of Stormwater Management Plan
- Establishment of Riparian Buffers and "no mow" zones
- No feed ordinances for all waterfowl and wildlife and signage
- Retrofit of detention/retention basins to achieve water quality control
- Conduct regularly scheduled stormwater basin cleanout and maintenance, storm sewer inlet cleanouts and street sweeping programs

3) Pet Waste

Specific management measures to reduce pet waste include:

- Adoption of pet waste disposal i.e. pooper scooper ordinances
- Signage in parks and other public recreation areas
- Provide plastic bags dispensers in public recreation areas

4) Agricultural

Agricultural activities are potential sources of fecal coliform. Possible contributors are direct contributions from livestock permitted to traverse streams and stream corridors, manure management from feeding operations, use of manure as a soil fertilizer/amendment. Implementation of conservation management plans and best management practices are the best means of controlling agricultural sources of fecal coliform. Several programs are available to assist farmers in the development and implementation of conservation management plans and best management practices.

Agricultural Conservation Programs

The Natural Resource Conservation Service is the primary source of assistance for landowners in the development of resource management pertaining to soil conservation, water quality improvement, wildlife habitat enhancement, and irrigation water management. The USDA Farm Services Agency performs most of the funding assistance. All agricultural technical assistance is coordinated through the locally led Soil Conservation Districts. There are a number of USDA farm programs currently addressing NPS pollution. A few of these include:

- **The Environmental Quality Incentive Program (EQIP)** is designed to provide technical, financial, and educational assistance to farmers/producers for conservation practices that address natural resource concerns, such as water quality. Practices under this program include integrated crop management, grazing land management, well sealing, erosion control systems, agri-chemical handling facilities, vegetative filter strips/riparian buffers, animal waste management facilities and irrigation systems.

- The **Conservation Reserve Program (CRP)** is designed to provide technical and financial assistance to farmers/producers to address the agricultural impacts on water quality and to maintain and improve wildlife habitat. CRP practices include the establishment of filter strips, riparian buffers and permanent wildlife habitats. This program provides the basis for the Conservation Reserve Enhancement Program (CREP).

- The **Wetland Reserve Program (WRP)** is designed to address the restoration of previously farmed wetlands. Easements are purchased for a 10-year, 30-year, or permanent duration.

- **Integrated Crop Management** is a best management practice designed to reduce the application of fertilizers and herbicides using soil samples and education to control nutrient and pesticide application to cropland.

- The **Farmland Preservation Program (FPP)** is designed to strengthen the agricultural industry and preserve important farmlands to enhance the economy and quality of life in the Garden State. Four different programs are available: The eight-year Program, where landowners voluntarily restrict non-agricultural development on their land for 8 years. In exchange, participants are eligible for cost-sharing grants for soil and water conservation projects, as well as other statutory benefits and protections. The Easement Purchase Program, where landowners sell the development rights on their land to the County Agriculture Development Board (CADB), non-profit organizations or directly to the State. Compensation for this sale is based upon the appraised value of the development rights on the land. The landowner retains ownership of the land and is eligible for cost-sharing grants for soil and water conservation projects and other benefits. The Fee Simple Program, where farms are acquired by the State Agriculture Development Committee (SADC, which is in but not of, the NJDA) based upon their fair market value and auction them off to private owners, after agricultural deed restrictions have been placed on the land. Lastly, there is the Easement Donation Program, where landowners donate their development easements to the SADC or the CADB. All of these programs have been in place since 1983.

- The **Soil & Water Conservation Cost-Sharing Program** is available to participants in a Farmland Preservation Program pursuant to the Agriculture Retention and Development Act. A Farmland Preservation Program (FPP) means any voluntary FPP or municipally approved FPP, the duration of which is at least 8 years, which has as its principal purpose as long term preservation of significant masses of reasonably contiguous agricultural land within agricultural development areas. The maintenance and support of increased agricultural production must be the first priority use of the land. Eligible practices include erosion control, animal waste control facilities, and water management practices. Cost sharing is provided for up to 50% of the cost to establish eligible practices.

- **The State Conservation Cost Share Program (CCSP)** is administered by the State Soil Conservation Committee and is integrated with the federal Environmental Quality Incentives Program (EQIP). It provides technical and financial assistance to producers for prevention and control of nonpoint sources of pollution. Cost sharing is provided for up to 75%, and in some cases 90% of the cost of installing approved conservation practices. Applications are approved based upon their environmental benefits and water quality enhancements.

- **Conservation Reserve Enhancement Program (CREP).** The New Jersey Departments of Environmental Protection and Agriculture, in partnership with the Farm Service Agency and Natural Resources Conservation Service, has recently submitted a proposal to the USDA to offer financial incentives for agricultural landowners to voluntarily implement conservation practices on agricultural lands. The NJ Conservation Reserve Enhancement Program (NJ CREP) will be part of the USDA's Conservation Reserve Program (CRP). The enrollment of farmland into CREP in New Jersey is expected to improve stream health through the installation of water quality conservation practices on New Jersey farmland. Following are some highlights of the New Jersey CREP proposal:

  - 30,000 acres of agricultural land are targeted for conservation, with 4,000 acres of agricultural land targeted for permanent conservation easement. Farmland enrolled but not permanently preserved will be under rental contract for 10-15 years
  - Conservation practices under the program are riparian buffers, filter strips, contour buffer strips, and grass waterways.
  - Water quality benefits of the program are expected to assist in achieving biologically healthy streams.
  - Permanent preservation of 4,000 acres of CREP lands will aid in reaching open space preservation goals.
  - The proposal is for a $100 million program representing a 3:1 Federal/State match, with New Jersey providing $23 million and USDA – Commodity Credit Corporation committing $77 million.

5) Stormwater Management

The Department has recently proposed Stormwater Management Rules and NJPDES Phase II Municipal Stormwater Regulation Rules that will establish standards and a regulatory program for stormwater management. Stormwater general permits issued by the Municipal Stormwater Regulation Program will address stormwater pollution

6) Malfunctioning and Older Improperly Sized Septic Systems; Illicit Connections of Domestic Sewage

Malfunctioning and older improperly sized septic systems contribute to fecal coliform loading in two ways: the system may fail hydraulically, where there is surface break out; or hydrogeologically, under conditions when soils are inadequate to filter pathogens. Specific management measures include the implementation of the NJPDES Municipal Stormwater Regulation Program, Sanitary Surveys, Septic System Management Programs and future sewer service area designations for service to domestic treatment works.

Sanitary surveys are conducted in an effort to evaluate the water quality of natural surface waters and identify those components that affect water quality, including geographic factors and pollution sources. The focus of the sanitary survey is to identify nonpoint and stormwater source contribution of fecal coliform within the watershed. It is accomplished by sampling for various types of fecal indicators (fecal coliform, enterococcus, fecal streptococcus, *E. coli* and coliphage) during wet and dry weather conditions. Where potential problems with septic systems are identified, as described below, a trackdown study may be warranted. This could lead to an analysis of alternatives to address any identified inadequacies, such as rehabilitation of septic systems or connection to a sewage treatment system, as appropriate.

10.4. Potential Sources of Fecal Impairment to Impaired Water Bodies

In an effort to locate pathogen sources to streams listed in this report, each stream segment was walked and potential sources noted based on the source categories listed in Section 10.2. The information gathered during those site visits is listed below by their respective WMA. The below are not considered to be a list of comprehensive sources, rather they will be used in conjunction with additional site visits, LDCs, and as appropriate, bacterial source tracking to identify actual pathogen sources.

10.4.1. Watershed Management Area 3

Macopin River at Macopin Reservoir (Site ID #01382450)

Potential sources noted within this watershed include detention basins at the upper end of Echo Lake, stables (Echo Lake Stables) located on east Echo Lake Road near Echo Lake above Macopin Gorge, and potential septic source located on Route 23 (City of Newark).

Wanaque River at Highland Avenue (Site ID #01387010)

Canada Geese were observed at a number of locations within this watershed. These areas include: the Wanaque Athletic Fields, Lake Inez, Lower Twin Lake (large geese population), and Skyland Lake. Possible problem stormwater detention basins were noted specifically at Pompton Lakes, Lake Inez and Skyland Lake. Potential failing septics noted at Dupont Village and Wanaque; these areas in the process of being sewered. . Possible pet sources observed at Lower Twin Lake and Skyland Lake.

Ramapo River near Mahwah (Site ID #01387500)

Potential sources in failing septic systems located in Oakland. Almost all Oakland is on septic systems, many failing and solid rock below ~3-feet. Stormwater outfalls present where Masonicus Brook and Mahwah Rivers converge. Canada geese observed at Ramapo College atlethic fields, and other recreational fields. Horse farms located across from Ramapo College. Crystal Lake (bathing beach) has been closed several times due to high fecal concentrations.

10.4.2. Watershed Management Area 4

Passaic River below Pompton River at Two Bridges (Site ID #01389005)

This entire segment is highly developed with many stormwater outfalls, however, much of this area was developed prior to the practice of constructing detention basins. This area may benefit from stormwater management retrofits. Sources upstream on the Pompton River at Packanack Lake (Site ID #01388600) include potential failing septic systems in the Hoffman Grove section of Wayne (110 homes potential); open manure storage observed on Black Oak Ridge Road and Cross Road. Canada Geese observed at Wayne Municipal Park (Sheffield Fields), Packanack Lake Country Club, Pompton Lakes crossroads at golf driving range, Old MacDonald Park, Pequannock Park (directly above testing site), and Kehum Park.

Preakness Brook near Little Falls (Site ID #01389080)

Potential sources include: animal agriculture from Van Pien Dairy Farm, pet sources from Tintle Park, wildlife and geese sources from Preakness Golf Course, High School on Valley Road, High Mountain Golf Course, Wetland area,

Deepavaal Brook at Fairfield (Site ID #01389138)

Geese were observed at Mountain Ridge Golf Course and Green Brook Country Club.

Passaic River at Little Falls (Site ID #01389500)

Geese observed at the Passaic County Golf Course on River Road and island middle of Passaic River. Potential human source from a significant homeless population. Several stormwater pipes observed to discharge directly to the river.

Peckman River at West Paterson (Site ID #01389600)

Geese and wildlife were observed in several areas including: town parks, reservoir lands, golf course, and Essex County park. Other potential sources included pet waste from residential areas located adjacent to the river and stormwater pipes discharging directly to river north of the golf course.

Goffle Brook at Hawthorne (Site ID #01389850)

Site visit confirmed over 200 geese, 150 ring-billed and laughing gulls, 75 ducks and 100 pigeons, and pets at Goffle Brook Park. Potential source includes failing septic systems in upper reach.

Diamond Brook at Fair Lawn (Site ID #01389860)

Geese, wildlife, pet wildlife observed at the Passaic County Park System. Geese observed at the Vander Plat Park fields. Garbage, including disposable diapers, observed behind Pathmark on Hemlock Ave. Geese observed at Fair Lawn Memorial Cemetery.

WB Saddle River at Upper Saddle River (Site ID #01390445)

Stormwater, Geese, and wildlife noted as potential sources.

Saddle River at Ridgewood (Site ID #01390500)

Potential septic system impact from homes located directly beside the river on Old Stone Church Road. Gulls, cormorants (16) and over 80 geese observed at Otto C. Pehle Section of Saddle River Park. Pets, wildlife observed throughout the watershed and potential impact from Wild Duck Pond Park.

Ramsey Brook at Allendale (Site ID #01390900)

Wildlife (geese, deer, foxes, and dogs) observed at Crestwood Park. Geese and other wildlife observed at Apple Ridge golf course, Ramsey Country Club golf course, Lake Street at Ramsey, and Napolekao Pond. Potentially failing septics in Mahwah.

HoHoKus Brook at the mouth of the Saddle River, Paramus (Site ID #01391100)

Potential failing septic systems in HoHoKus and Wyckoff. Geese observed or apparent at Whites' Pond, Saddle River Park, Glen Rock Section (50 geese observed), Dunkerhook Park, and Wild Duck Pond. Dog walking observed at Saddle River Park, Glen Rock Section and Dunkerhook Park. Poultry farm observed and appears to be an enclosed operation.

Saddle River at Fairlawn (Site ID #01391200)

Wildlife (150 geese, 75 seagulls, 25 doves) observed at Saddle River park, Wild Duck Pond area. No-feed signs posted (dog and waterfowl both), however, people observed still feeding waterfowl. At the Saddle River Park at Rochelle Park, no geese were observed but physical signs apparent and ducks appear to be fed. Geese observed at Bergen County Golf Courses and Ridgewood Country Club.

Saddle River at Lodi (Site ID #01391500)

Geese and pet walking observed at the Main St. Cemetery.

10.4.3. Watershed Management Area 5

Hackensack River at River Vale (Site ID #01377000)

Geese observed at Golf Course, Open Spaces, and County Park. Septic Systems in Old Tappan recently converted to sewers.

Musquapsink Brook at River Vale (Site ID #01377499)

Canada Geese observed at elementary school ballfields and nearby cemeteries. No septics are located in this area. Pumping from the Saddle River and discharging to the Musquapsink Brook represents a potential source of FC.

Pascack Brook at Westwood (Site ID #01377500)

No septics are located in this area. Potential sources included: Woodcliff Lake Reservoir, Corporate Parks in Montvale (source of geese droppings to Bear Brook which feeds into Pascack Brook), waste management transfer station, geese around the Woodcliff Lake, stormdrains discharge into Woodcliff Lake, and street sweeping materials from DPWs for Park Ridge, Hillsdale, and Westwood.

Tenakill Brook at Cedar Lane at Closter (Site ID #01378387)

Potential sources include: failing septics in Alpine, geese and waterfowl at Tenakill Middle School ballfields, Alpine Country Club, Tenafly Park, Demarest Nature Center, and Demarest Park/Duck Pond. The municipal park is located adjacent to Demarest Duck pond along Tenakill Brook and is subjected to geese and other waterfowl depositing droppings on turf areas within the park. Demarest Duck Pond is also the receiving body for stormwater outfalls that capture runoff from nearby roads, residential areas and commercial areas. Dredging of Demarest Duck Pond is slated for completion during 2003. Demarest Borough is committed to the shoreline restoration and nonpoint source improvement to the pond and park area and has sought additional funding to stabilize 1,600 linear feet of degraded shoreline around Demarest Duck Pond along Tenakill Brook with a 20 foot wide native vegetative buffer. The Environmental Commission has already implemented several small restoration projects along Tenakill Brook and is an active participant in the Department's Watershed process.

Coles Brook at Hackensack (Site ID #01378560)

No septics or agriculture are located in this watershed. Geese/Waterfowl, disposable diapers, and dog waste observed at Van Saun Park. Potential sources of pet waste include Oradell, River Edge, Paramus, and Emerson residential areas. Geese observed at the Emerson Golf Course, Paramus Middle School alongside Bkanky Brook (feeds into Coles Brook). Zoo observed, however, recently tied to sanitary sewer.

10.4.4. Watershed Management Area 6

Black Brook at Madison (Site ID #01378855)

The headwaters of this segment include the Fairmount Country Club where geese are a contributing factor. At Green Village Packing Company on Britten Road in Green Village, residents have reported that the company has, in recent years, dumped its animal wastes and scraps into local woods. Following complaints, the company has been shipping them out via truck. Recent complaints are that the trucks leak. Other potential sources include: Miele Kennel, Rolling Knolls Landfill, Britten Road, Chatham, and wildlife (deer and geese)

Passaic River Near Millington (Site ID #01379000)

This segment is directly adjacent to the Great Swamp Wildlife Refuge, thus wildlife are a potential source. Geese populations were observed at the following locations: AT&T Corporation grounds off Madisonville Road, Somerset County Environmental Education Center ponds, Southard Park, Basking Ridge Golf Course, northeast of the intersection of White Bridge Road and Carlton Road, at the Southwest corner of the intersection of White Bridge Road and Pleasant Plains Road, east of Pleasant Plains Road, north of White Bridge Road; east of the Passaic River, north of Stone House Road; and south of White Bridge Road, east of Pleasant Plains Road in Long Hill Township. The majority of this watershed contains urbanized landuse that has many detention basins, pets, and deer. Other potential sources include: Somerset County horse stables and horse trails through Lord Stirling Park and livestock populations at the southwest corner of the intersection of White Bridge Road and Carlton Road; east of the Passaic River, north of Stone House Road; and east of Pleasant Plains Road between White Bridge Road and Sherwood Lane.

Dead River Near Millington (Site ID #01379200)

Potential sources in this watershed include: Geese (New Jersey National Golf Course, Pleasant Valley road near King George Road where a large geese population of approximately 1000 was observed), pets, livestock and pastures present.

Passaic River Near Chatham (Site ID #01379500)

The following potential sources in this watershed include: geese (at Canoe Brook Country Club, Brook Lake Country Club and Cedar Ridge Country Club), wildlife, failing septics, pets, detention basins, and landfills (Bradley Loren Landfill, Florham Park Borough Waste Landfill, Vitto Marchetto Sanitary Landfill, Passaic Township Sanitary Landfill)

Canoe Brook Near Summit (Site ID #01379530)

Geese are suspected at Essex Fells Country Club, Crestmont Country Club, East Orange Golf Club and Summit Municipal Golf Course. Wildlife, especially deer, and pets are also thought to contribute a bacteria load.

Rockaway River at Longwood Valley (Site ID #01379680)

Wildlife and failing septics noted as potential sources.

Rockaway River at Blackwell Street (Site ID #01379853)

Potential sources include Hurd Park (goose population, no riparian buffer), and landfills.

Beaver Brook near Rockaway (Site ID #01380100)

This watershed contains several lake communites; many of which are on septic systems. Thus the potential for failing septics exist throughout the watershed. A portion of this watershed is designated as wildlife management area or reservoir protection area, thus, wildlife contribution is a potential. Geese observed at Rockaway Township recreational field located off of Old Beach Glen.

Stony Brook at Boonton (Site ID #01380320)

Canada geese observed at the picnic area of Pyramid Mountain Natural Historic Area, and at Rockaway Valley athletic fields off of Rockaway Valley Road, in Caterbury, and on Hill Road. Livestock operations are located off of Hill Road abutting a tributary to the impaired segment, near intersection of Kingsland and Rockaway Valley, and at intersection of Birchwood and Valley.

Rockaway River at Pine Brook (Site ID #01381200)

Potential sources include: Sharkey Landfill, Ecology Lake Club Sanitary Land Fill, Knoll East County Club Golf Course, wildlife, and geese.

Passaic River at Two Bridges (Site ID #01382000)

Wildlife and leaking septics noted as potential sources.

10.5. Pathogen Indicators and Bacterial Source Tracking

Advances in microbiology and molecular biology have produced several methodologies that discriminate among sources of fecal coliform and thus more accurately identify pathogen sources. The numbers of pathogenic microbes present in polluted waters are few and not readily isolated nor enumerated. Therefore, analyses related to the control of these pathogens must rely upon indicator microorganisms. The commonly used pathogen indicator organisms are the coliform groups of bacteria, which are characterized as gram-negative, rod-shaped bacteria. Coliform bacteria are suitable indicator organism because they are generally not found in unpolluted water, are easily identified and quantified, and are generally more numerous and more resistant than pathogenic bacteria (Thomann and Mueller, 1987).

Tests for fecal organisms are conducted at an elevated temperature (44.5°C), where the growth of bacteria of non-fecal origin is suppressed. While correlation between indicator organisms and diseases can vary greatly, as seen in several studies performed by the EPA and others, two indicator organisms *Esherichia coli* (*E. coli*) and enterococci species showed stronger correlation with incidence of disease than fecal coliform (USEPA, 2001). Recent advances have allowed for more accurate identification of pathogen sources. A few of these methods, including, molecular, biochemical, and chemical are briefly described in the following paragraph.

Molecular (genotype) methods are based on the unique genetic makeup of different strains, or subspecies, of fecal bacteria (Bowman et al, 2000). An example of this method includes "DNA fingerprinting" (i.e., a ribotype analysis which involves analyzing genomic DNA from fecal *E. coli* to distinguish human and non-human specific strains of *E. coli.*). Biochemical (phenotype) methods include those based on the effect of an organism's genes actively producing a biochemical substance (Graves et al., 2002; Goya et al 1987). An example of this method is multiple antibiotic resistance (MAR) testing of fecal *E. coli*. In MAR testing, *E. coli* are isolated from fecal samples and exposed to 10-15 different antibiotics. In theory, *E. coli* originating from wild animals should show resistance to a smaller number of antibiotics than *E. coli* originating from humans or pets. Given this general trend, MAR patterns or '"signatures" can be defined for each class of *E. coli* species. Chemical methods are based on finding chemical compounds associated with human wastewater, and useful in determining if the sources are human or non-human. Such methods measure the presence of optical brighteners, which are contained in all laundry detergents, and soap surfactants in the water column. Unlike the optical brightener method, the measurement of surfactants may allow for some quantification of the source.

BST methods have already been successfully employed at the NJDEP in the past decade. Since 1988, the Department's Bureau of Marine Water Monitoring has worked cooperatively with the University of North Carolina in developing and determining the application of RNA coliphage as a pathogen indicator. This research was funded through USEPA and Hudson River Foundation grants. These studies showed that the RNA coliphages are useful as an indicator of fecal contamination, particularly in chlorinated effluents and that they can be serotyped to distinguish human and animal fecal contamination. Through these studies, the Department has developed an extensive database of the presence of coliphages in defined contaminated areas (point human, non-point human, point animal, and non-point animal). More recently, MAR and DNA fingerprinting analyses of *E. coli* are underway in the Manasquan estuary to identify potential pathogen sources (Palladino and Tiedemann, 2002). These studies along with additional sampling within the watershed will be used to implement the necessary percent load reduction.

10.6. Reasonable Assurance

With the implementation of follow-up monitoring, source identification and source reduction, the Department is reasonably assured that New Jersey's Surface Water Quality Standards will be attained for fecal coliform. Activities directed in the watersheds to reduce fecal coliform loading shall include options, included but not limited to education projects that teach best management practices, approval of projects funded by CWA Section 319 Nonpoint Source (NPS) Grants, recommendations for municipal ordinances regarding feeding of wildlife and pooper-scooper laws, and stormwater control measures.

The fecal coliform reductions proposed in these TMDLs assume that existing NJPDES permitted municipal facilities will continue to meet New Jersey's Surface Water Quality Standard requirements for disinfection. Any future facility will be required to meet water quality standards for disinfection.

11.0 Public Participation

The Water Quality Management Planning Rules NJAC 7:15-7.2 require the Department to initiate a public process prior to the development of each TMDL and to allow public input to the Department on policy issues affecting the development of the TMDL. Accordingly the Department shall propose each TMDL as an amendment to the appropriate areawide water quality management plan. As part of the public participation process for the development and implementation of the TMDLs for fecal coliform in the Northeast Water Region, the NJDEPs, Division of Watershed Management, Northeast Bureau worked collaboratively with a series of stakeholder groups throughout New Jersey as part of the Department's ongoing watershed management efforts.

The Department's watershed management process was designed to be a comprehensive stakeholder driven process that is representative of members from each major stakeholder group (agricultural, business and industry, academia, county and municipal officials, commerce and industry, purveyors and dischargers, and environmental groups). As stated previously, through the creation of this watershed management planning process over the past several years Public Advisory Committees (PACs) and Technical Advisory Committees (TACs) were created in all 20 WMAs. Whereas the PACs serve in an advisory capacity to the Department, and examined and commented on a myriad of issues in the watersheds, the TACs were focused on scientific, ecological, and engineering issues relevant to the mission of the PAC.

The Northeast Bureau discussed with the WMA 3, WMA 4, WMA 5 and WMA 6 TAC members the Department's TMDL process through a series of presentations and discussions that culminated in the development of the 32 TMDLs for Streams Impaired by Fecal Coliform in the Northeast Water Region. The below paragraphs outline public involvement.

- Integrated Listing Methodology presentations were made by the Northeast Bureau within the DWM to the Northeast TACs throughout the month June; requesting that they review the Integrated List and submit comments to the Department by the September deadline. Presentations were made to WMA 5 TAC on June 18, 2002; WMA 6 TAC on June 20, 2002; WMA 3 TAC on June 21, 2002; and WMA 4 TAC on June 27, 2002.
- Expedited Fecal Coliform and Lake TMDL presentations were given at the September TAC meetings. The finalized Sublist 5 list was also disseminated. The TACs were briefed about the executed Memorandum of Agreement between the Department and EPA Region 2 with the imminent timeline. The TACs were asked to review sites and think about sources for discussion at the October TAC meetings at which time the Northeast Bureau would bring maps with municipalities and impaired stream segments and other features to facilitate the conversation.
- At the October TAC meetings (WMA 5: October 15, 2002; WMA 3 October 19, 2002; WMA 4 October 24, 2002 and WMA 6 October 28, 2002) TAC members were asked to identify based on their local knowledge potential sources of impairment. Draft copies of the Northeast Fecal TMDL report were distributed for informational purposes only. TAC members were advised that the formal comment period would be during the New Jersey Register Notice, but that the Department was interested in their input on policy issues affecting the development of the TMDL.
- At the November and December TAC meetings, the draft Fecal TMDL Report was distributed for informal comments prior to the NJR Notice.

Additional public participation and input was received through the NJ EcoComplex. The Department contracted with Rutgers NJ EcoComplex (NJEC) in July 2001. The role of NJEC is to provide comments on the Department's management strategies, including those related to the development of TMDL values. NJEC consists of a review panel of New Jersey University professors who provide a review of the technical approaches developed by the Department. The New Jersey Statewide Protocol for Developing Fecal TMDLs was presented to NJEC on August 7, 2002 and was subsequently reviewed and approved. The statewide approach was also presented the Passaic TMDL Workgroup in May 2002 for their input and approval. The New Jersey's Statewide Protocol for Developing Lake and Fecal TMDLs was presented by the Northeast Bureau at the SETAC Fall Workshop on September 13, 2002 and met with their approval.

11.1. AmeriCorps Participation

AmeriCorps is a national service initiative that was started in 1993 and is the domestic Peace Corps. The New Jersey Watershed Ambassadors Program is a community-oriented AmeriCorps environmental program designed to raise awareness about watershed issues in New Jersey. Through this program, AmeriCorps members are placed in watershed management areas across the state to serve their local communities. Watershed Ambassadors monitor the rivers of New Jersey through River Assessment Teams (RATs) and Biological Assessment Teams (BATs) volunteer monitoring programs.

Representatives from the Department in conjunction with the Watershed Ambassadors conducted RATs surveys on each of the impaired segments. These visual assessments were conducted from October to December 2002.

11.2. Public Participation Process

In accordance with N.J.A.C. 7:15-7.2(g), these TMDLs are hereby proposed by the Department as an amendment to the Northeast Water Quality Management Plan. N.J.A.C. 7:15-3.4(g)5 states that when the Department proposes to amend the areawide plan on its own initiative, the Department shall give public notice by publication in a newspaper of general circulation in the planning area, shall send copies of the public notice to the applicable designated planning agency, if any, and may hold a public hearing or request written statements of consent as if the Department were an applicant. The public notice shall also be published in the New Jersey Register.

Notice of these TMDLs was published January 21, 2003 pursuant to the above noted Administrative Code, in order to provide the public an opportunity to review the TMDLs and submit comments. The Department has determined that due to the level of interest in these TMDLs, a public hearing will be held. Public notice of the hearing, provided at least 30 days before the hearing, was published in the New Jersey Register and in two newspapers of general circulation and will be mailed to the applicable designated planning agency, if any, and to each party, if any, who was requested to issue written statement of consents for the amendment.

All comments received during the public notice period and at any public hearings will become part of the record for these TMDLs. All comments will be considered in the establishment of these TMDLs and the ultimate adoption of these TMDLs. When the Department takes final agency action to establish these TMDLs, the final decision and supporting documentation will be sent to U.S.E.P.A. Region 2 for review and approval pursuant to 303(d) of the Clean Water Act (33 U.S.C. 1313(d)) and 40 CFR 130.7.

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Appendix A: Explanation of stream segments in Sublist 5 of the *2002 Integrated List of Waterbodies* for which TMDLs will not be developed in this report.

Data to support removing River Segments from List 5 to List 1 for Fecal Coliform.

- Pequannock River at Macopin Intake Dam, Station #01382500

Re-assessments of data from station #01382500, the Pequannock River at Macopin Intake Dam, indicate that the water quality standards are met at this location. Measurements taken between 2/22/1994 and 7/17/00 at Station #01382500, show a geometric mean of 34 CFU/100 ml, and that 7.8% of values are over 400 CFU/100ml.

River segments to be moved from Sublist 5 to Sublist 3 for fecal coliform.

- Wanaque River at Wanaque, #01387000;
- Hackensack River at New Milford, #01378500

Two segments listed on Sublist 5, station #01387000, the Wanaque River at Wanaque (WMA 3), and station #01378500 the Hackensack River at New Milford (WMA 5), were included on Sublist 5 based on their listings on previous 303(d) lists with no recent data to assess their current attainment status. Therefore, TMDLs will not be developed for these locations until and unless recent data indicated violations of the surface water quality standards.

River segments to be moved from Sublist 5 to Sublist 4 for fecal coliform.

- Whippany River at Morristown, #01381500;
- Whippany River near Pine Brook, #01381800

Two segments, #01381500, the Whippany River at Morristown, and #01381800, the Whippany River near Pine Brook, were included as part of the Whippany River Watershed Fecal Coliform TMDL adopted on 4/16/2000 and published in the New Jersey Register on 6/5/2000. Upon adoption of this TMDL Report, the Department will remove these two waterbodies for fecal coliform from Sublist 5 to move them to Sublist 4 as identified in the below table.

Sublist 5 river segments listed for fecal coliform for which TMDLs will not be developed in this report.

- Passaic River at Elmwood Park, #01389880

The Passaic River at Elmwood Park, segment #01389880, is located in an area affected by combined sewer overflows (CSOs). CSOs are sewage systems that use a single pipe to transport both stormwater runoff from rainstorms and sewage from households, businesses and industries to sewage treatment plants. During dry weather, combined sewers send all wastewater to the STPs. During wet weather, stormwater quickly fills the combined sewers, which carry both sanitary sewage and runoff from streets, parking lots, and rooftops. The overflows carry bacteria from the untreated sewage as well as other pollutants in the stormwater. Additional potential FC sources were identified during a site visit on October 24, 2002 and include geese (at park on River Road across from High School), homeless populations, and dog pounds/shelters.

The methodology employed in this report is not appropriate for use in areas affected CSOs, thus, this stream segment will be addressed with a separate management approach.

List of Sublist 5 segments to be moved to Categories 1, 3 or 4 based upon reassessment of data, the need for current data, or the prior completion of a TMDL report.

WMA	Station Name/Waterbody	Site ID	New Sublist Listing	Explanation
03	Pequannock River at Macopin Intake Dam	01382500	Sublist 1	Re-assessment shows non-impairment
03	Wanaque River at Wanaque	01387000	Sublist 3	Updated monitoring needed
04	Passaic River at Elmwood Park	01389880	No change	CSO influence
05	Hackensack River at New Milford	01378500	Sublist 3	Updated monitoring needed
06	Whippany River at Morristown	01381500	Sublist 4	TMDL completed in 1999
06	Whippany River near Pine Brook	01381800	Sublist 4	TMDL completed in 1999

Appendix B: Municipal POTWs Located in the TMDLs' Project Areas

WMA	Station #	NJPDES	Facility Name	Discharge Type	Receiving waterbody
3	1387500	NJ0027774.001A	Oakland Boro - Oakwood Knolls	MMI	Ramapo River via storm sewer
3	1387500	NJ0080811.001A	Oakland Twp - Riverbend	MMI	Ramapo River
3	1387500	NJ0021253.001A	Ramapo BOE - Indian High	MMI	Pond Creek (Ramapo River)
3	1387500	NJ0053112.001A	Oakland Boro - Chapel Hill Estates	MMI	Ramapo River via pond and storm sewer
3	1387500	NJ0021342.001A	Oakland Boro Skyview-Highbrook STP	MMI	Caille Lk via unnamed tributary & storm sewer
3	1387500	NJ0021946.001A	US Army - Nike Base	MMI	Darlington Brook via unnamed tributary
3	1387500	NJ0030384.001A	Oakland BOE - Manito Ave	MMI	Caille Lake via unnamed tributary and storm sewer
3	1387500	NJ0030384.001V	Oakland BOE - Manito Ave	MMI	Caille Lake via unnamed tributary and storm sewer
4	1389600	NJ0025330.001A	Cedar Grove Twp STP	MMJ	Peckman River
4	1389600	NJ0024490.004A	Verona Twp	MMJ	Peckman River
4	1389600	NJ0021687.001A	Essex County Hospital	MMJ	Peckman River
4	1389080	NJ0028002.001A	Wayne Twp - Mountain View	MMJ	Singac Brook (Preakness)
4	1389080	NJ0021261.001A	NJDHS-NJ Development Center	MMI	Passaic River
6	1379200	NJ0022845.001A	Harrison Brook STP	MMJ	Dead River
6	1379500	NJ0020427.001A	Caldwell Boro STP	MMJ	Passaic River via unnamed tributary
6	1379500	NJ0024511.001A	Livingston Twp	MMJ	Passaic River
6	1379500	NJ0025518.001A	Florham Park SA	MMJ	Passaic River
6	1379500	NJ0024937.001A	Molitor Water Pollution	MMJ	Passaic River
6	1379500	NJ0021636.001A	New Providence Boro	MMJ	Passaic River
6	1379500	NJ0024937.002A	Molitor Water Pollution	MMJ	Passaic River
6	1379500	NJ0027961.001A	Berkeley Heights	MMJ	Passaic River
6	1379500	NJ0020427.SL3A	Caldwell Boro STP	MMJ	Sludge Application
6	1379500	NJ0020427.SL3B	Caldwell Boro STP	MMJ	Sludge Application
6	1379500	NJ0020427.SL3M	Caldwell Boro STP	MMJ	Sludge Application
6	1381200	NJ0022349.001A	Rockaway Valley SA	MMJ	Rockaway River
6	1381200	NJ0024970.001A	Parsippany-Troy Hills SA	MMJ	Whippany River
6	1378855	NJ0020290.001A	Chatham Township - Main	MMI	Black Brook
6	1379200	NJ0021083.001A	Veterans Adm Medical Center	MMI	Harrisons Brook via unnamed tributary
6	1379200	NJ0022497.001A	Warren Twp SA - Stage 4	MMI	Dead River
6	1379200	NJ0050369.001A	Warren Twp SA - Stage 5	MMI	Dead River
6	1379500	NJ0020281.001A	Chatham Hill STP	MMI	Passaic River
6	1379500	NJ0052256.001A	Chatham Township - Chatham Glen	MMI	Passaic River

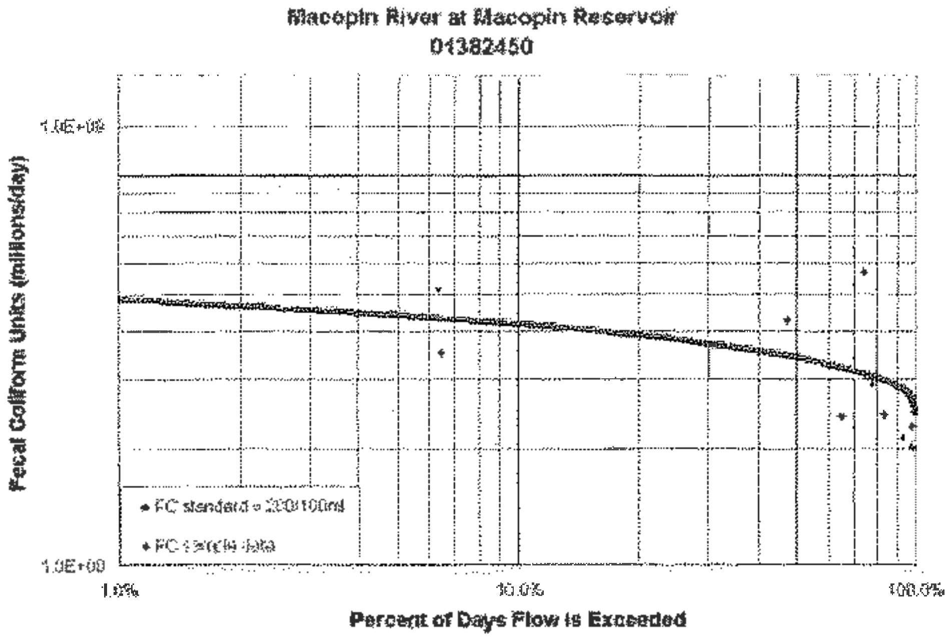
6	1379500	NJ0022489.001A	Warren Twp SA - Stage 1 & 2	MMI	Passaic River
6	1379500	NJ0024465.001A	Long Hill Twp STP - Stirling Hills	MMI	Passaic River
6	1379500	NJ0021938.001A	US Army - Nike Base	MMI	Passaic River
6	1380320	NJ0022276.001A	Stonybrook School	MMI	Untermeyer Lake via storm sewer
6	1379680	NJ0021091.001A	Jefferson Twp High - Middle School	MMI	Edison Brook
6	1379680	NJ0026867.001A	Jefferson Twp - White Rock	MMI	Mitt Pond (Russia Brook)
6	1379853	NJ0026603.001A	Randolph Twp BOE - High School	MMI	Mill Brook via unnamed tributary
6	1379853	NJ0032808.001A	Rockaway Townsquare Mall	MMI	Green Pond Brook

Appendix C: TMDL Calculations

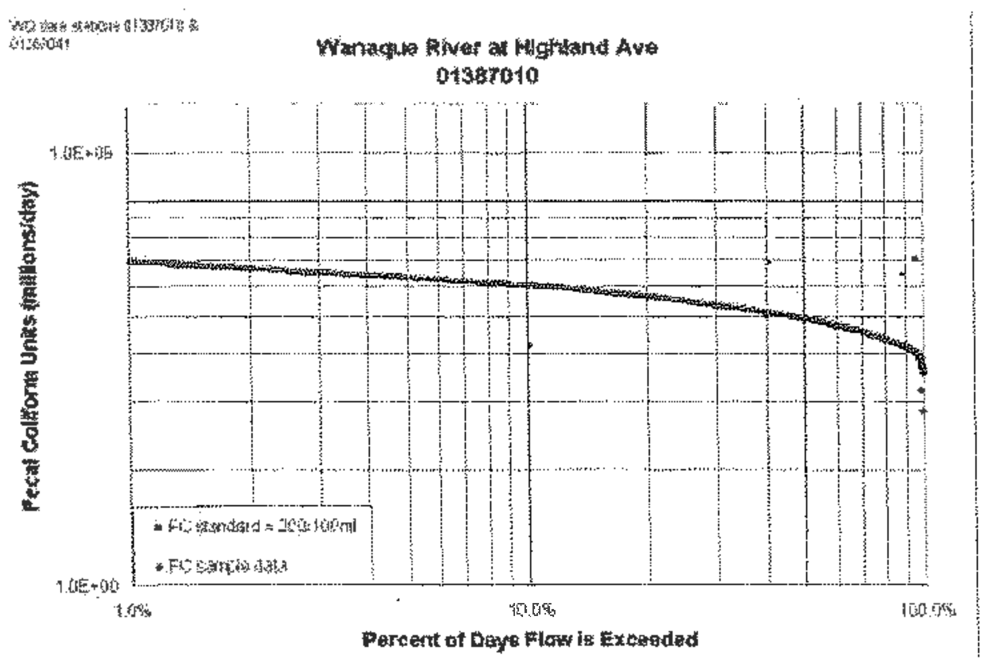
WMA	Station Names	303(d) Category 5 Segments	Water Quality Stations	Load Allocation (LA) and Margin of Safety (MOS) 200 FC/100ml Standard: Geometric mean CFU/100ml	200 FC/100ml Standard: MOS as a percent of the target concentration	200 FC/100ml Standard: Percent reduction without MOS	200 FC/100ml Standard: Percent reduction with MOS	400 FC/100ml Standard: Summer geometric mean CFU/100ml	400 FC/100ml Standard: MOS as a percent of the target concentration	400 FC/100ml Standard: Percent reduction without MOS	400 FC/100ml Standard: Percent reduction with MOS	Wasteload Allocation (WLA)
3	Macopin R at Echo Lake, Macopin R at Macopin Reservoir	01382450	01382410, 01382450	59	46%	-240%	-85%	59	46%	-16%	37%	37%
3	Wanaque R at Highland Avenue, Wanaque R at Pompton Lakes	01387010	01387010, 01387041	160	53%	-25%	42%	208	53%	67%	85%	85%
3	Ramapo R near Mahwah	01387500	01387500	291	44%	31%	61%	431	44%	84%	91%	91%
4	West Branch Saddle R at Upper Saddle River, Saddle R at Saddle River, Saddle R at Ridgewood Ave, Saddle R at Grove St., Ramsey Bk at Allendale, Hohokus Bk at Paramus, Saddle R at Rochelle Park, and Saddle R at Lodi	01390445, 01390500, 01390900, 01391100, 01391200, 01391500	01390445, 01390470, 01390510, 01390518, 01390900, 01391100, 01391490, 01391500	1,157	30%	83%	88%	1,144	30%	94%	96%	96%
4	Passaic R below Pompton R at Two Bridges, Passaic R at Little Falls, Preakness Bk, near Little Falls, Peckman R at W. Patterson, and Deepavaal Bk at Fairfield	01389005, 01389500, 01389080, 01389600, 01389138	01389500, 01389080, 01389600, 01389138	583	30%	66%	76%	652	30%	90%	93%	93%
4	Goffle Bk at Hawthorne, Diamond Bk at Fair Lawn	01389850, 01389860	01389850, 01389860	1,515	47%	87%	93%	1,544	47%	96%	98%	98%

WMA	Station Names	303(d) Category 5 Segments	Water Quality Stations	Load Allocation (LA) and Margin of Safety (MOS): 200 FC/100ml Standard				400 FC/100ml Standard				Wasteload Allocation (WLA)
				Geometric mean CFU/100ml	MOS as a percent of the target concentration	Percent reduction without MOS	Percent reduction with MOS	Summer geometric mean CFU/100ml	MOS as a percent of the target concentration	Percent reduction without MOS	Percent reduction with MOS	
5	Hackensack R. at Rivervale	01377000	01377000, 01376970	248	34%	19%	46%	294	34%	77%	85%	85%
5	Pascack Br at Westwood and Musquapsink Br at Rivervale	01377499, 01377500	01377499, 01377500	709	54%	72%	87%	709	54%	90%	96%	96%
5	Tenakill Br at Cedar Lane at Closter	01378387	01378387	159	91%	-26%	88%	159	91%	57%	96%	96%
5	Coles Br at Hackensack	01378560	01378560	1,093	68%	82%	94%	1,093	68%	94%	98%	98%
6	Black Brook at Madison, Passaic R nr Millington, Dead R nr Millington, Canoe Brook nr Summit, Passaic R nr Catham	01378855, 01379000, 01379200, 01379530, 01379500	01378855, 01379000, 01379200, 01379530, 01379500	675	29%	70%	79%	1,370	29%	95%	96%	96%
6	Rockaway R at Longwood Valley, Rockaway R at Berkshire Valley, Rockaway R at Blackwell St.	01379680, 01379853	01379680, 01379700, 01379853	253	54%	21%	64%	373	54%	82%	92%	92%
6	Beaver Brook at Rockaway	01380100	01380100	362	43%	45%	68%	362	43%	81%	89%	89%
6	Stony Brook at Boonton	01380320	01380320	214	32%	7%	37%	214	32%	68%	78%	78%
6	Rockaway R at Pine Brook	01381200	01381200	281	28%	29%	49%	571	28%	88%	91%	91%
6	Passaic R at Two Bridges	01382000	01382000	227	33%	12%	41%	276	33%	75%	83%	83%

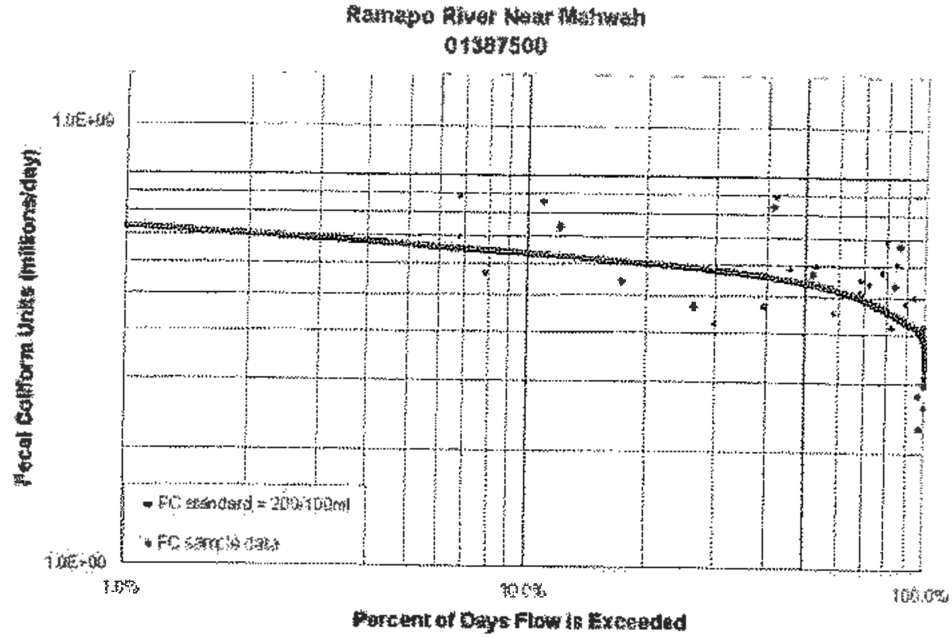
Appendix D: Load Duration Curves for each listed waterbody



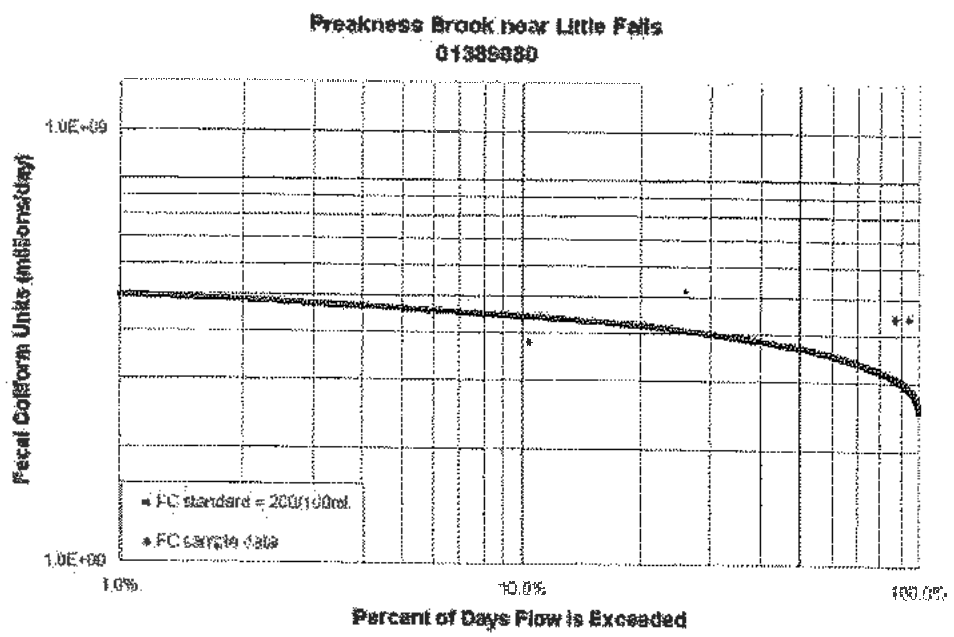
Load Duration Curve for Macopin River at Macopin Reservoir. Fecal coliform data from USGS station #01382450 during the period 10/1997 through 8/2000. Water years 1970-2000 from USGS station #01388500 (Pompton River at Pompton Plains NJ) were used in generating the FC standard curve.



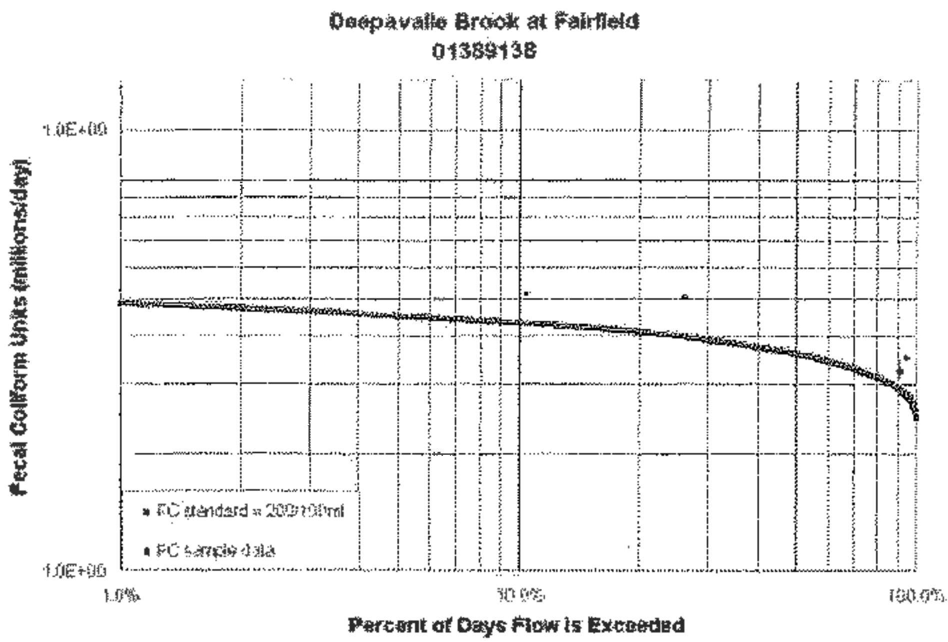
Load Duration Curve for Wanaque River at Highland Ave. Fecal coliform data from USGS station # 01387010 & 01387041 during the period 1/27/97 through 8/9/99. Water years 1970-2000 from USGS station # 01388500 (Pompton River at Pompton Plains NJ) were used in generating the FC standard curve.



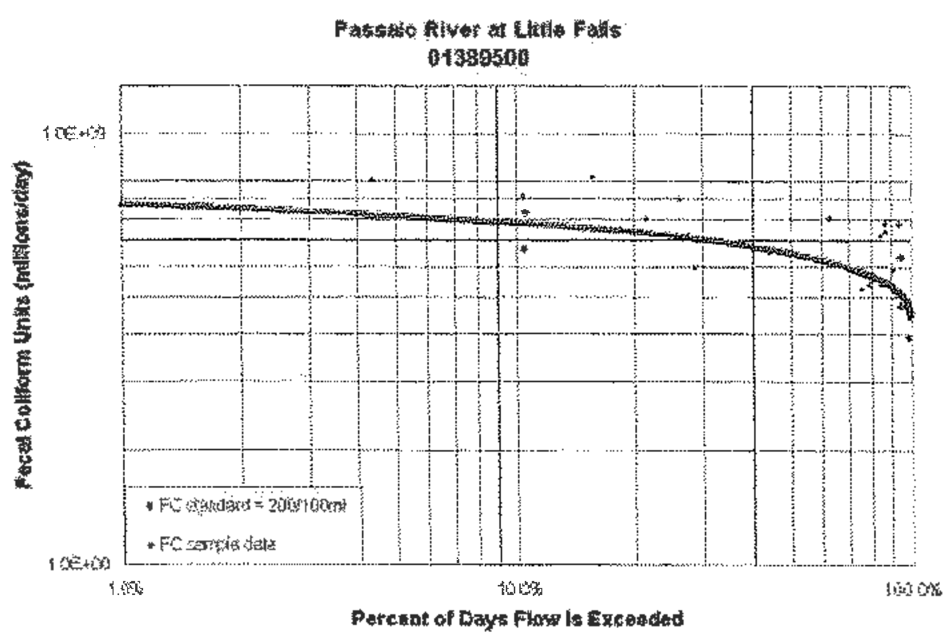
Load Duration Curve for Ramapo River Near Mahwah. Fecal coliform data from USGS station #01387500 during the period 2/24/94 8/3/00. Water years 1970-2000 from USGS station #01387500 (Ramapo River Near Mahwah) were used in generating the FC standard curve.



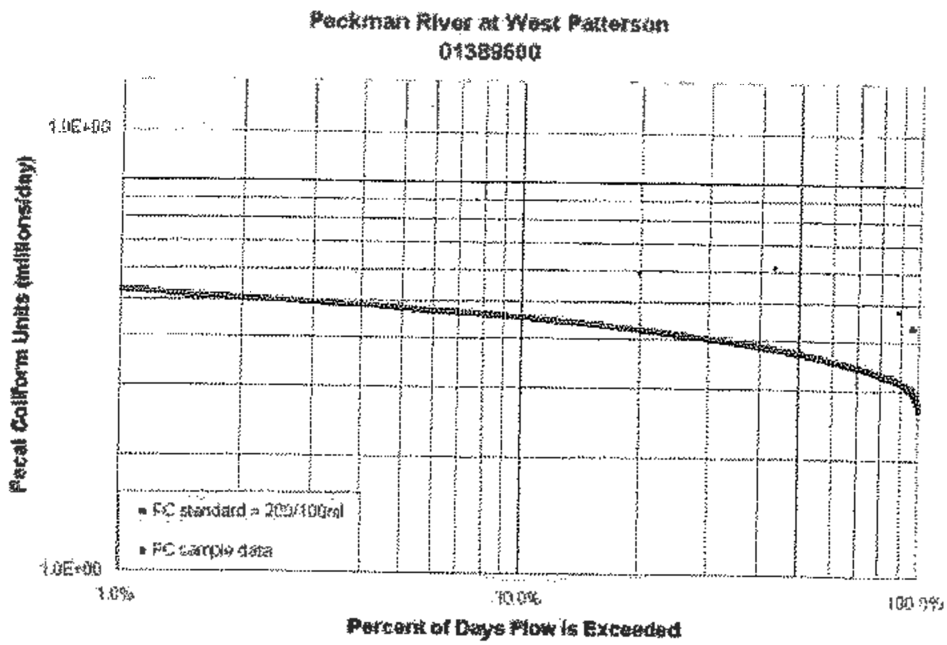
Load Duration Curve for Preakness Brook Near Little Falls. Fecal coliform data from USGS station #01389080 during the period 4/16/98 through 9/23/98. Water years 1970-2000 from USGS station #01389500 (Passaic River at Little Falls) were used in generating the FC standard curve.



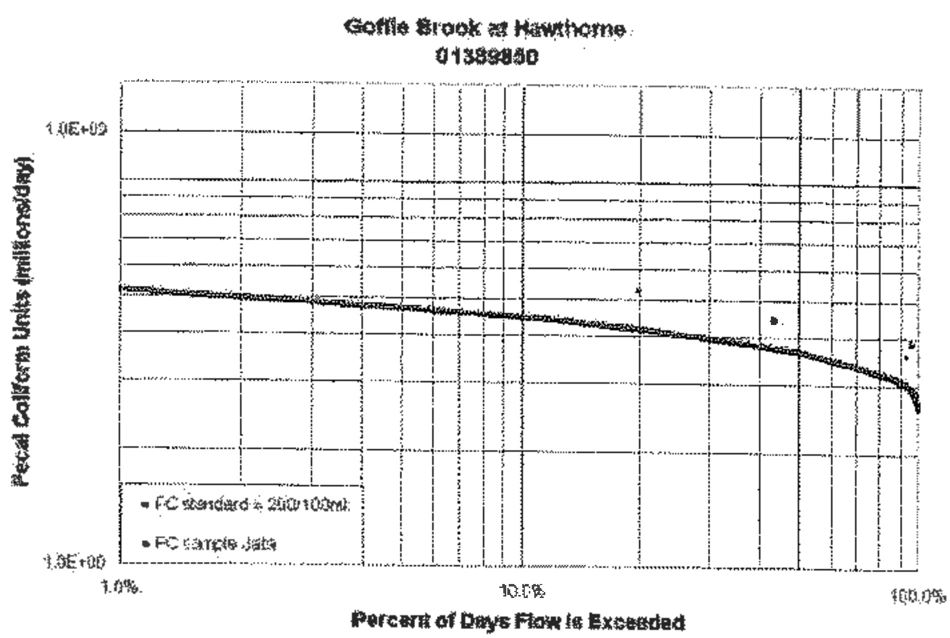
Load Duration Curve for Deepavalle Brook at Fairfield. Fecal coliform data from USGS station #01389138 during the period 4/16/98 through 9/23/98. Water years 1970-2000 from USGS station #01389500 (Passaic River at Little Falls) were used in generating the FC standard curve.



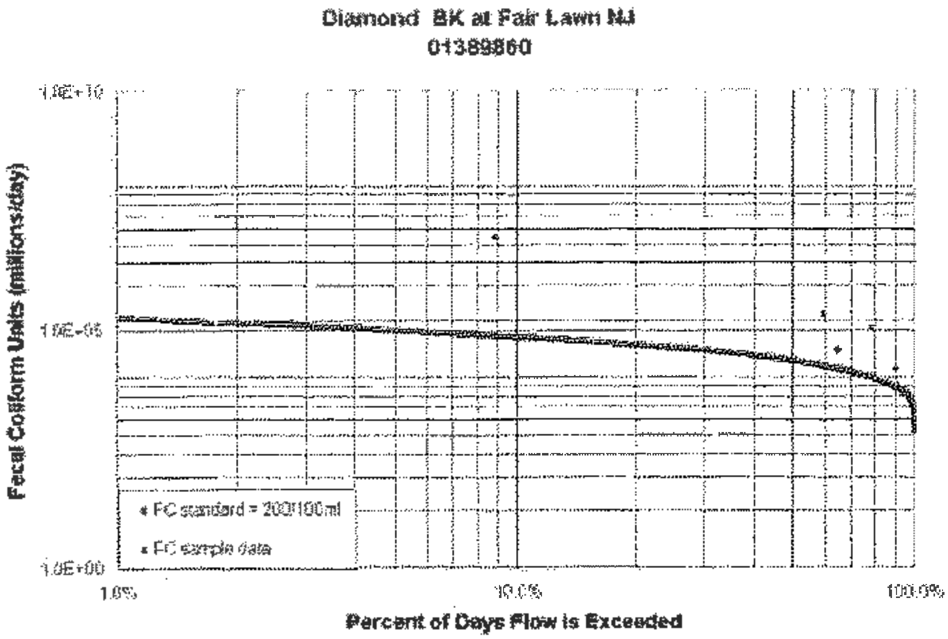
Load Duration Curve for Passaic River at Little Falls. Fecal coliform data from USGS station #01389500 during the period 2/18/94 through 9/23/98. Water years 1970-2000 from USGS station #01389500 (Passaic River at Little Falls) were used in generating the FC standard curve.



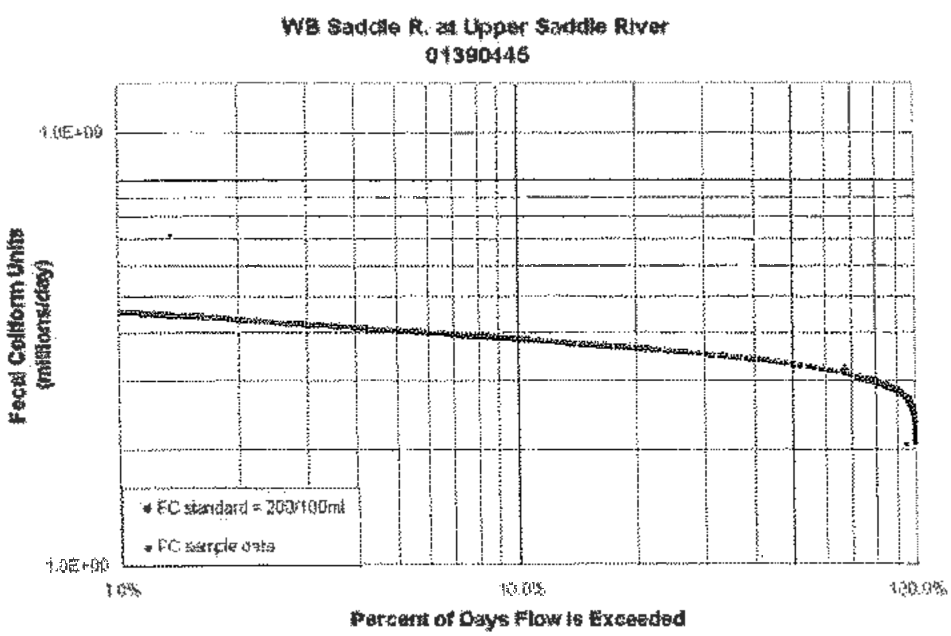
Load Duration Curve for Peckman River at West Patterson. Fecal coliform data from USGS station #01389600 during the period 4/23/98 through 9/24/98. Water years 1970-2000 from USGS station #01388500 (Pompton River at Pompton Plains NJ) were used in generating the FC standard curve.



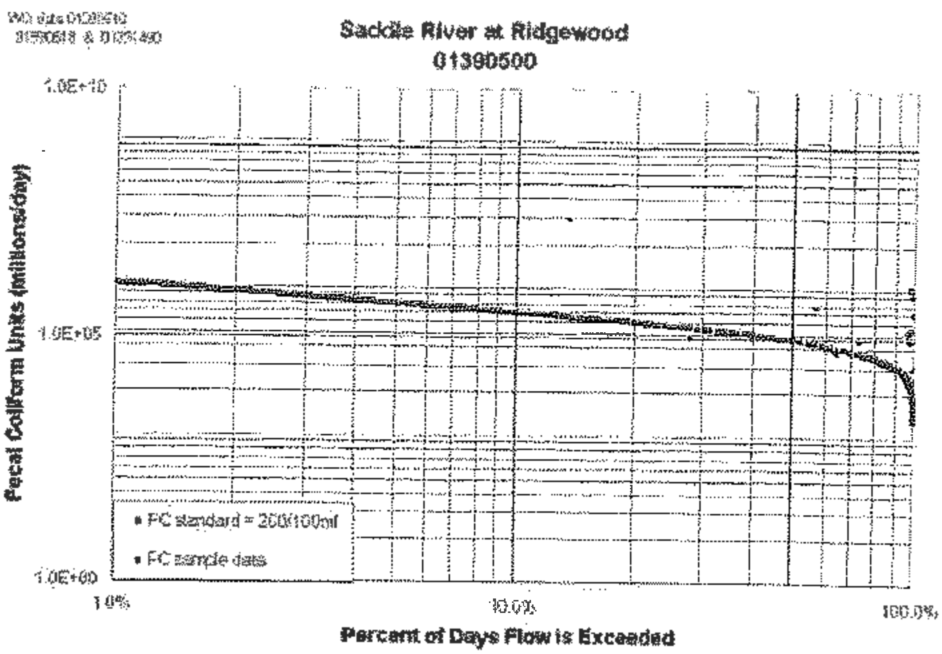
Load Duration Curve for Goffle Brook at Hawthorne. Fecal coliform data from USGS station #01389850 during the period 4/23/98 through 9/24/98. Water years 1970-2000 from USGS station #01388500 (Pompton River at Pompton Plains NJ) were used in generating the FC standard curve.



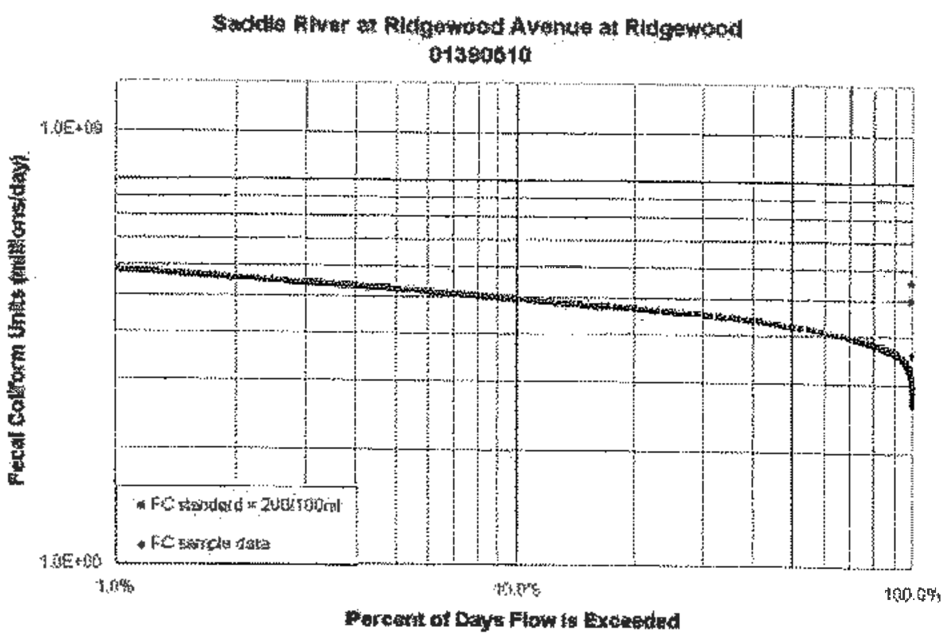
Load Duration Curve for Diamond Brook at Fair Lawn. Fecal coliform data from USGS station # 01389860 during the period 6/29/00-7/27/00. Water years 1970-2000 from USGS station # 01388500 (Pompton River at Pompton Plains NJ) were used in generating the FC standard curve



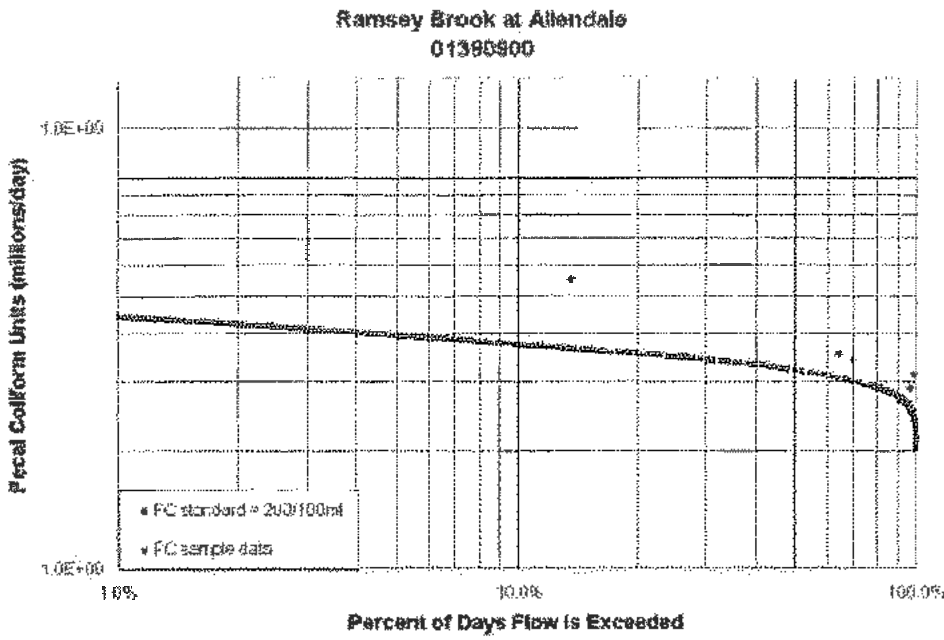
Load Duration Curve for WB Saddle R at Upper Saddle River. Fecal coliform data from USGS station #01390445 during the period 11/4/99 through 8/7/00. Water years 1970-2001 from USGS station #01390500 (Saddle River at Ridgewood) were used in generating the FC standard curve.



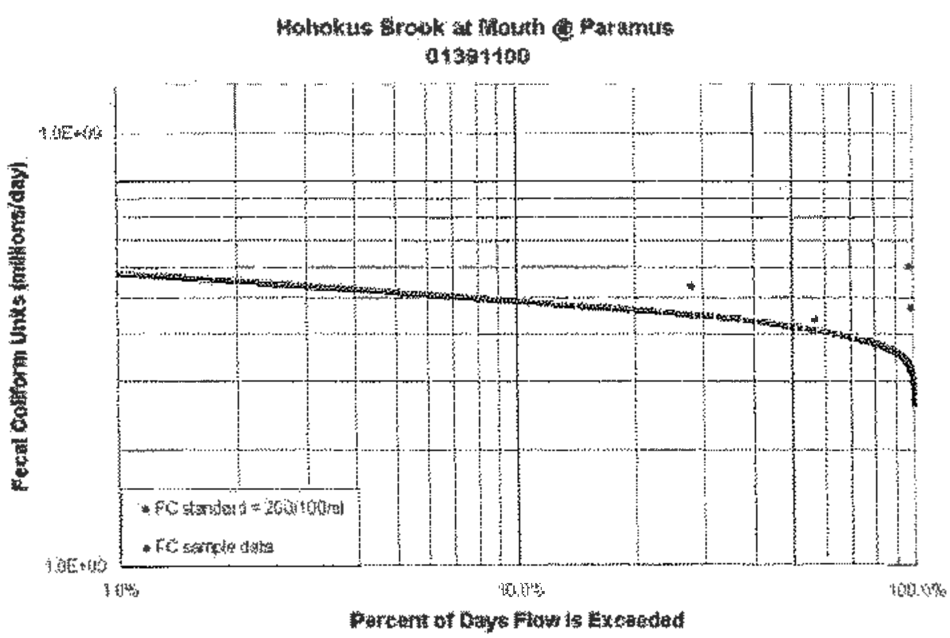
Load Duration Curve for the Saddle River at Ridgewood. Fecal coliform data from USGS stations #01390510, #01390518, and #01391490.during the period 11/6/97-8/9/99. Water years 1970-2001 from USGS station #01390500 (Saddle River at Ridgewood) were used in generating the FC standard curve.



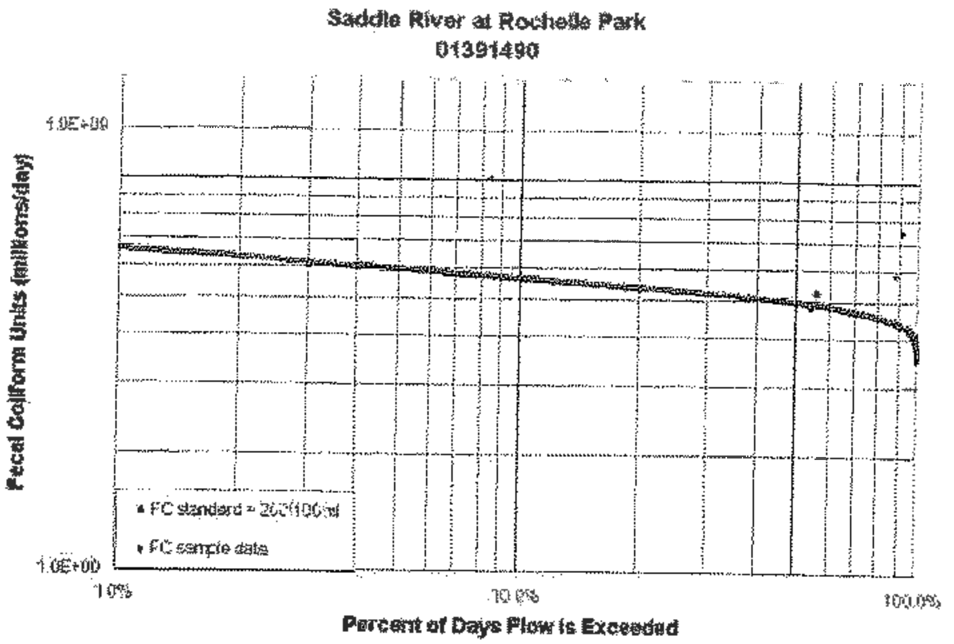
Load Duration Curve for Saddle River at Ridgewood Avenue at Ridgewood. Fecal coliform data from USGS station #01390510 during the period 7/13/99 through 8/9/99. Water years 1970-2001 from USGS station #01390500 (Saddle River at Ridgewood) were used in generating the FC standard curve.



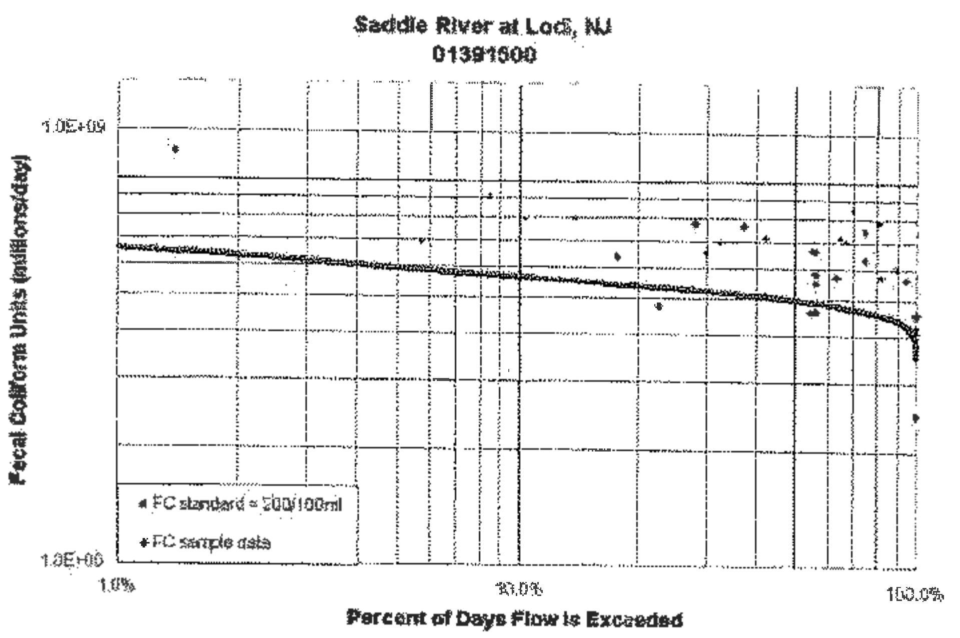
Load Duration Curve for Ramsey Brook at Allendale. Fecal coliform data from USGS station #01390900 during the period 11/6/97 through 9/1/98. Water years 1970-2000 from USGS station #01390500 (Saddle River at Ridgewood) were used in generating the FC standard curve.



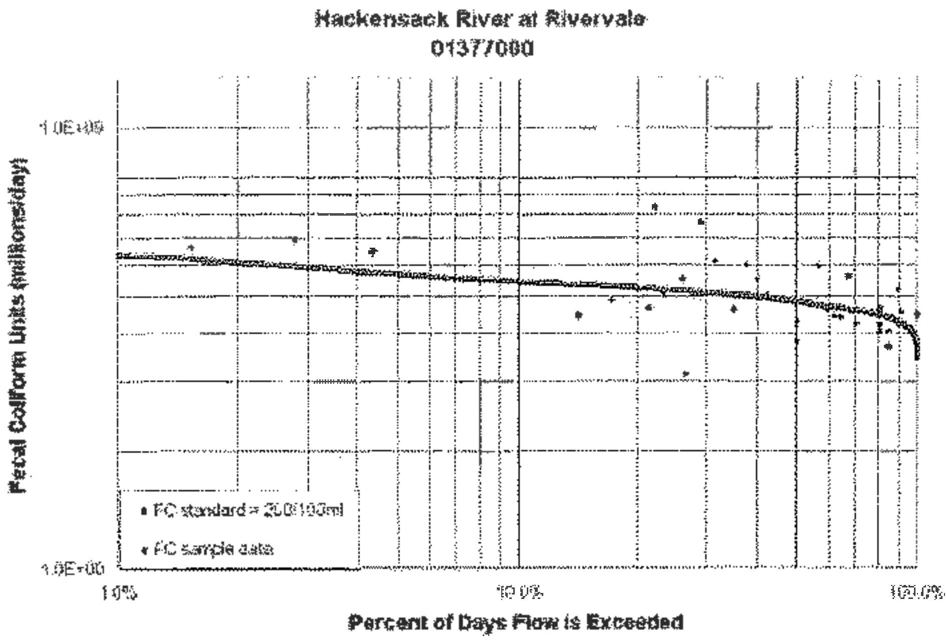
Load Duration Curve for Hohokus Brook at Mouth@ Paramus. Fecal coliform data from USGS station #01391100 during the period 4/23/98 through 9/24/98. Water years 1970-2000 from USGS station #01390500 (Saddle River at Ridgewood) were used in generating the FC standard curve.



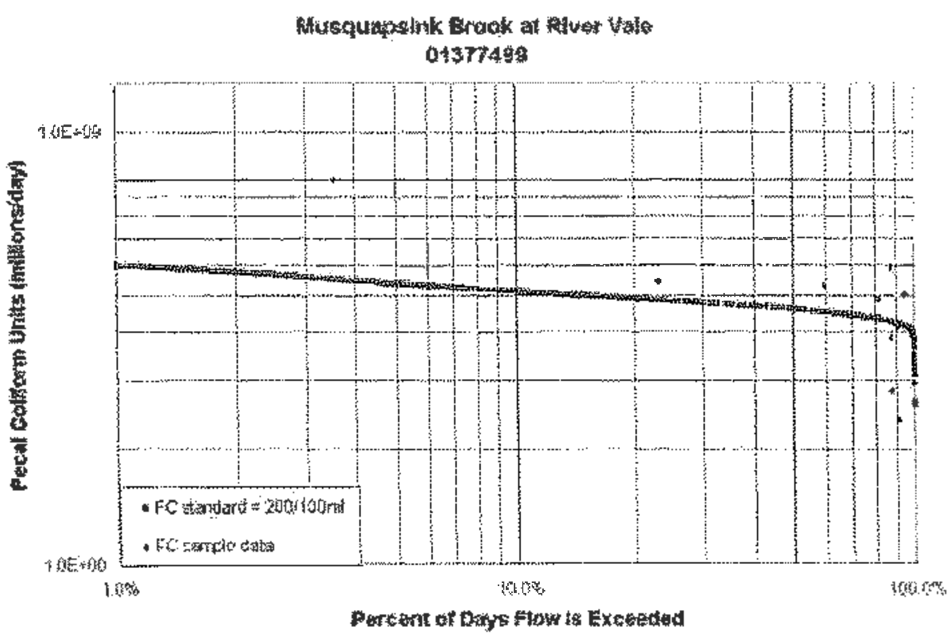
Load Duration Curve for the Saddle River at Rochelle Park. Fecal coliform data from USGS station #01391490 during the period 11/6/97 through 9/16/98. Water years 1970-2001 from USGS station #01391500 (Saddle River at Lodi) were used in generating the FC standard curve.



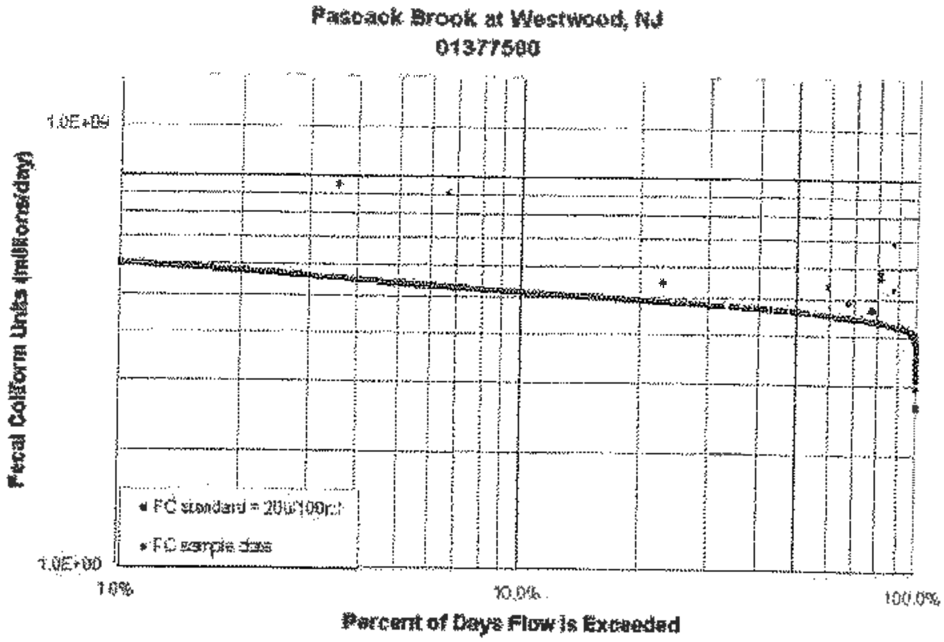
Load Duration Curve for the Saddle River at Lodi. Fecal coliform data from USGS station #01391500 during the period 2/22/94 through 9/13/00. Water years 1970-2000 from USGS station #01391500 (Saddle River at Lodi) were used in generating the FC standard curve.



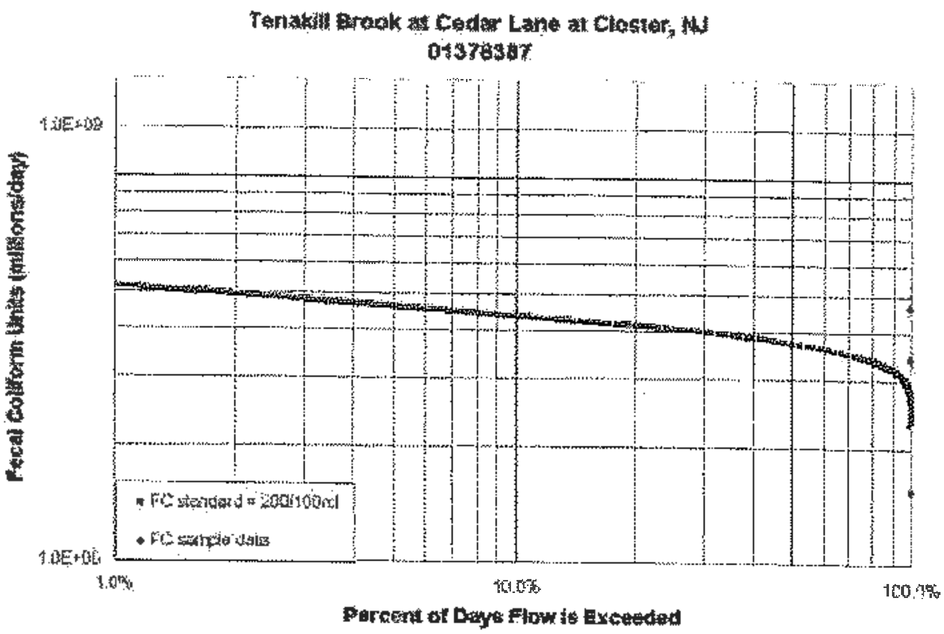
Load Duration Curve for the Hackensack River at River Vale. Fecal coliform data from USGS station #01377000 during the period 2/17/94 through 8/3/00. Water years 1970-2000 from USGS station #01377000 (Hackensack River at River Vale) were used in generating the FC standard curve.



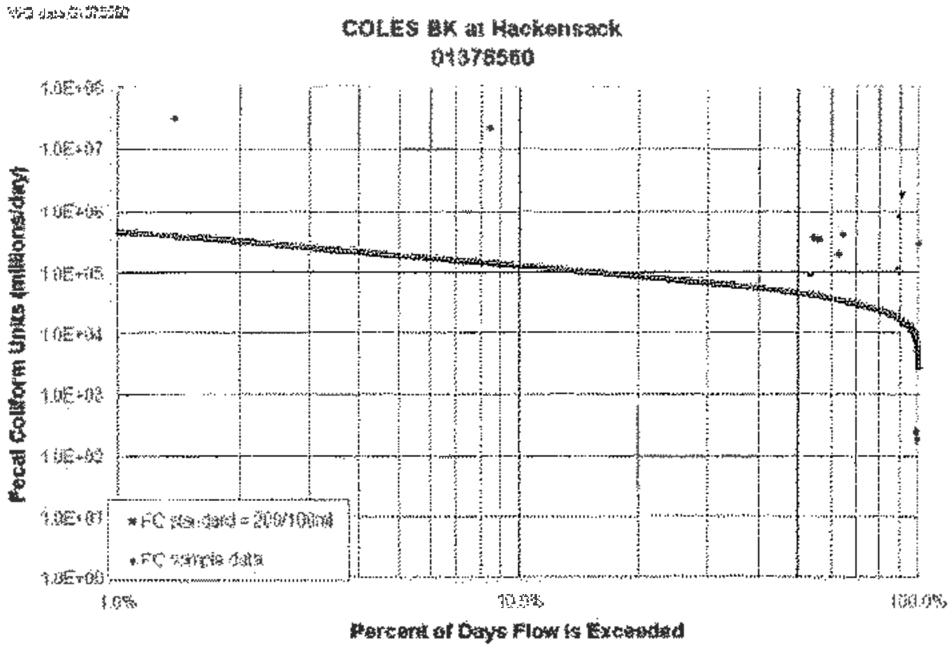
Load Duration Curve for the Musquapsink Brook at River Vale. Fecal coliform data from USGS station #01377499 during the period 7/13/99 through 9/7/00. Water years 1970-2000 from USGS station #01377499 (Musquapsink Brook at River Vale) were used in generating the FC standard curve.



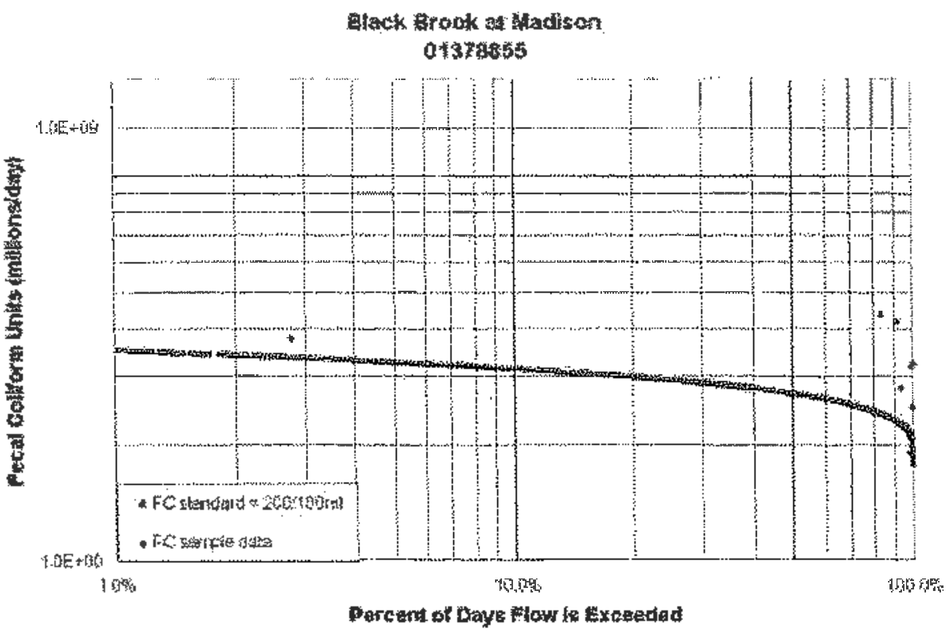
Load Duration Curve for the Pascack Brook at Westwood. Fecal coliform data from USGS station #01377500 during the period 6/1/98 through 9/6/98. Water years 1970-2000 from USGS station #01377500 (Pascack Brook at Westwood) were used in generating the FC standard curve.



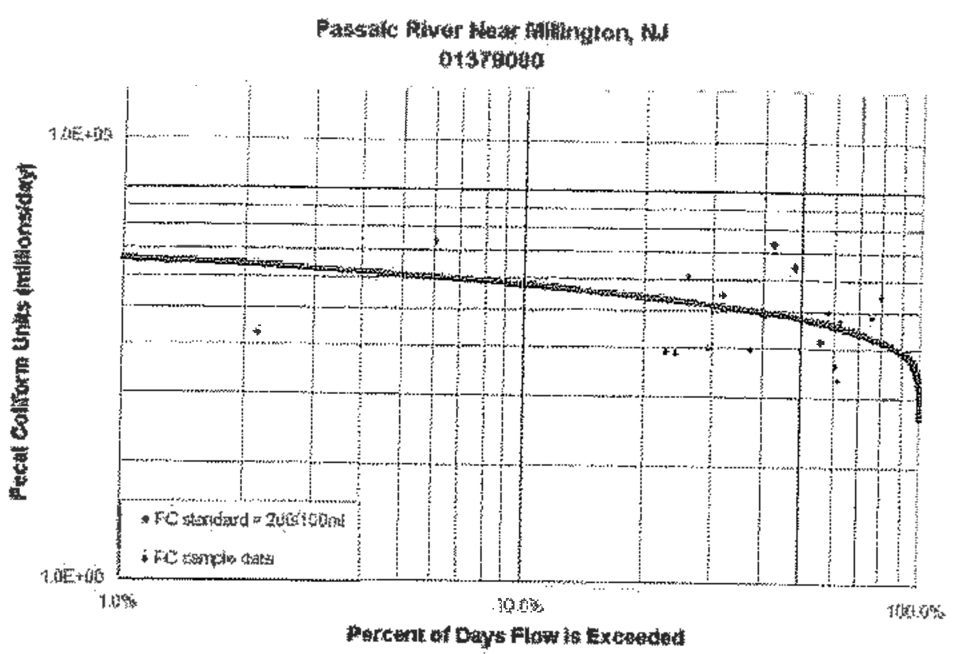
Load Duration Curve for the Tenakill Brook at Cedar Lane at Closter. Fecal coliform data from USGS station #01378387 during the period 7/13/99 through 8/9/99. Water years 1970-2001 from USGS station #01390500 (Saddle River at Ridgewood) were used in generating the FC standard curve.



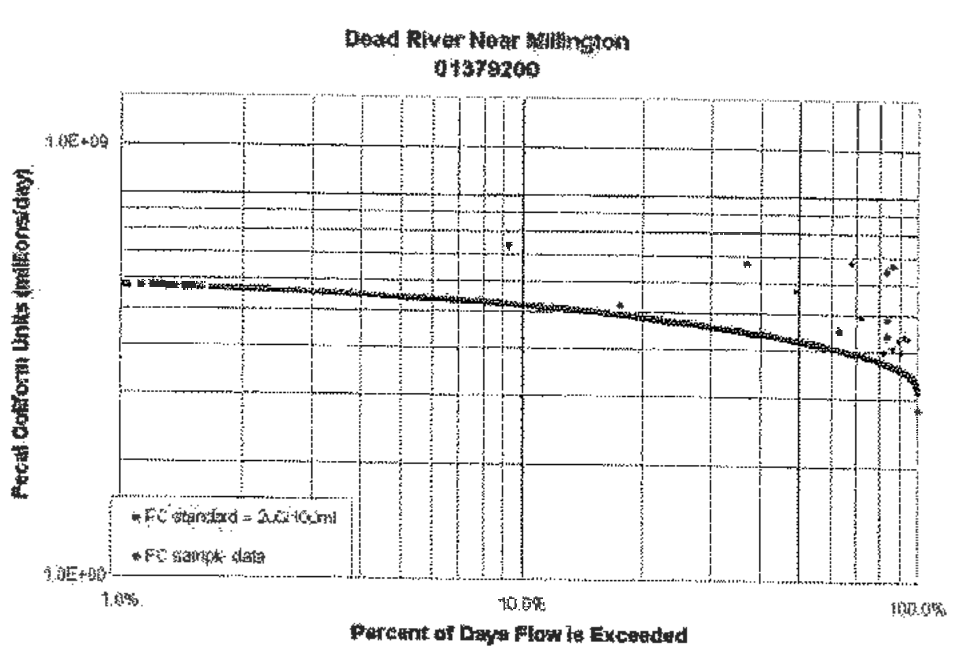
Load Duration Curve for Coles Brook at Hackensack. Fecal coliform data from USGS station # 01378387 during the period 11/5/97 through 8/23/00. Water years 1970-2001 from USGS station # 01391500 (Saddle River at Lodi) were used in generating the FC standard



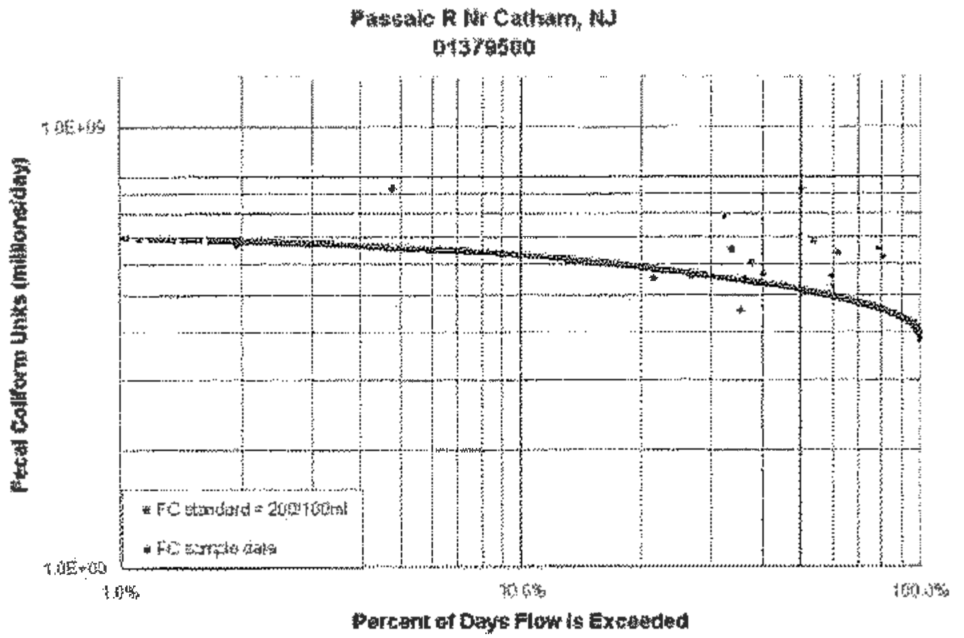
Load Duration Curve for the Black Brook at Madison. Fecal coliform data from USGS station #01378855 during the period 11/18/97 through 9/1/99. Water years 1970-2000 from USGS station #01380500 (Rockaway River above Reservoir at Boonton) were used in generating the FC standard curve.



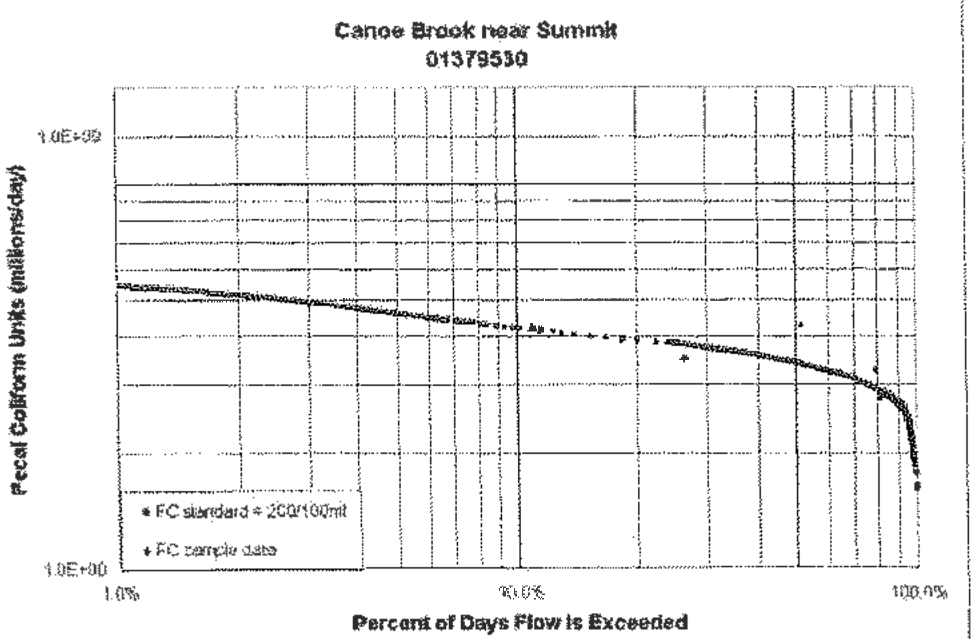
Load Duration Curve for the Passaic R Nr Millington. Fecal coliform data from USGS station #01379000 during the period 10/1997 through 8/2000. Water years 1970-2000 from USGS station #01379000 (Passaic R Nr Millington) were used in generating the FC standard curve.



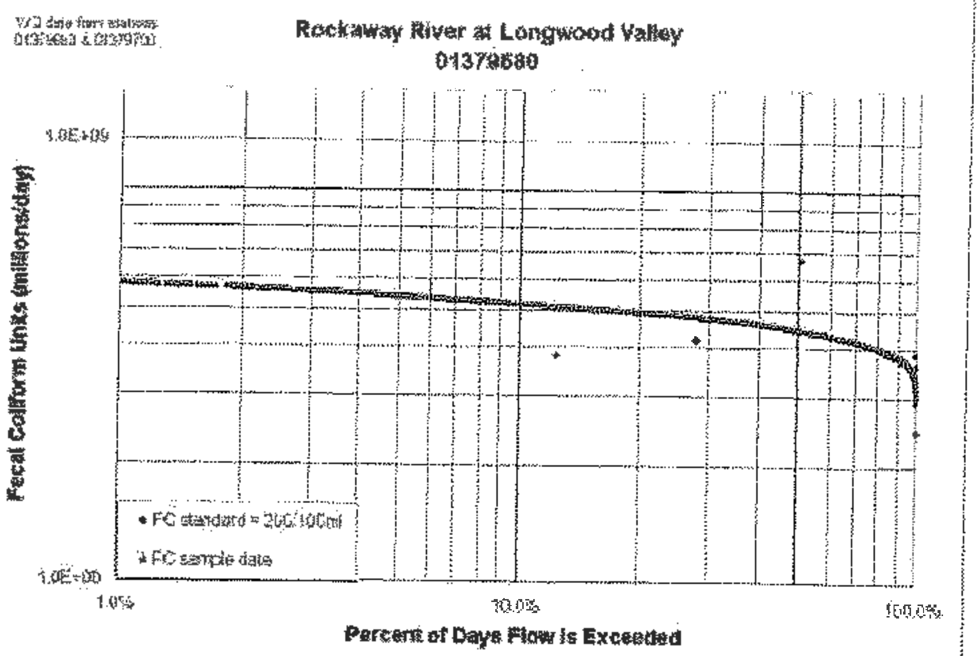
Load Duration Curve for the Dead River near Millington. Fecal coliform data from USGS station #01379200 during the period 10/1997 through 8/2000. Water years 1970-2000 from USGS station #01379500 (Passaic R Nr Catham) were used in generating the FC standard curve.



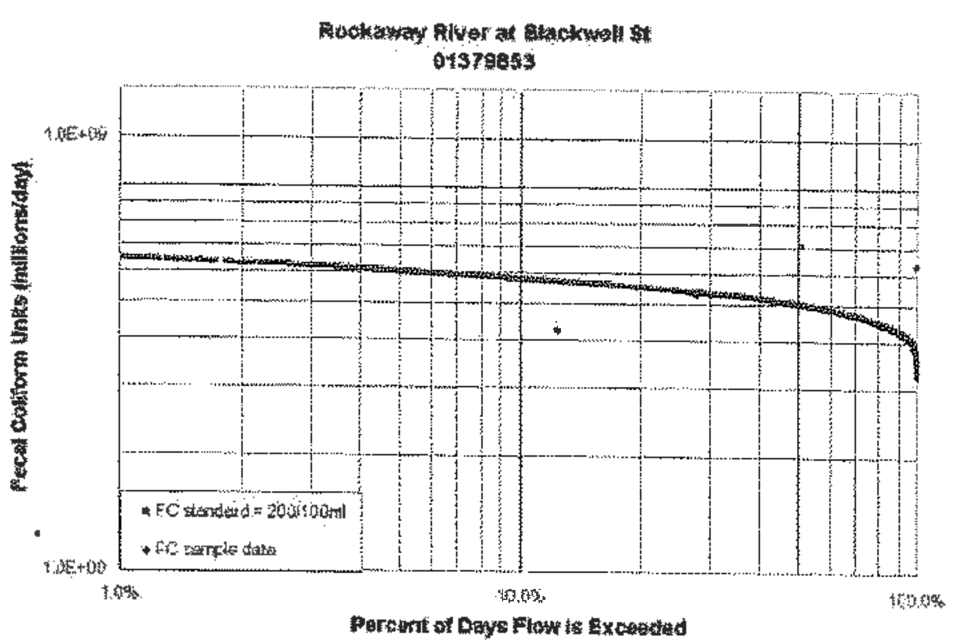
Load Duration Curve for the Passaic R Nr Catham. Fecal coliform data from USGS station #01379500 during the period 10/1997 through 8/2000. Water years 1970-2000 from USGS station #01379500 (Passaic R Nr Catham) were used in generating the FC standard curve.



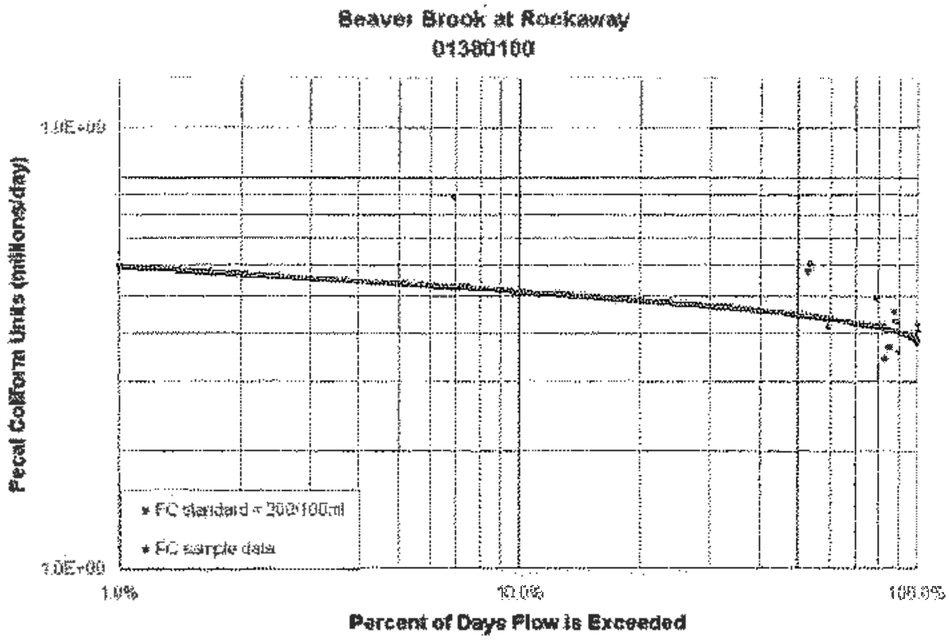
Load Duration Curve for Canoe Brook near Summit. Fecal coliform data from USGS station #01379530 during the period 10/1997 through 8/2000. Water years 1970-2000 from USGS station #01379530 (Canoe Brook near Summit) were used in generating the FC standard curve.



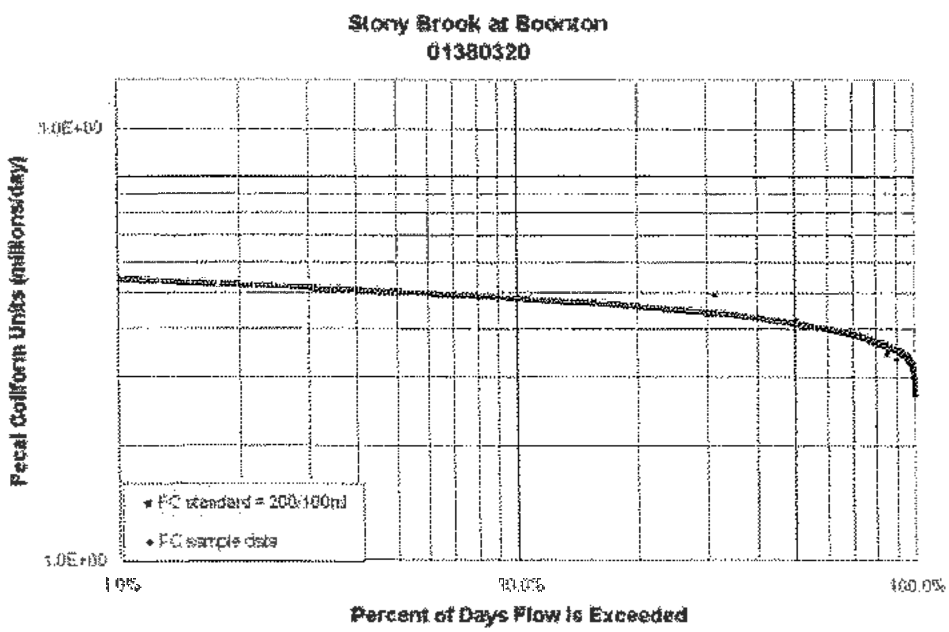
Load Duration Curve for Rockaway River at Longwood Valley. Fecal coliform data from USGS station # 01379680 & 01379700 during the period 1/27/97 through 9/2/99. Water years 1970-2000 from USGS station # 01380500 (Rockaway River above Reservoir at Boonton) were used in generating the FC standard curve.



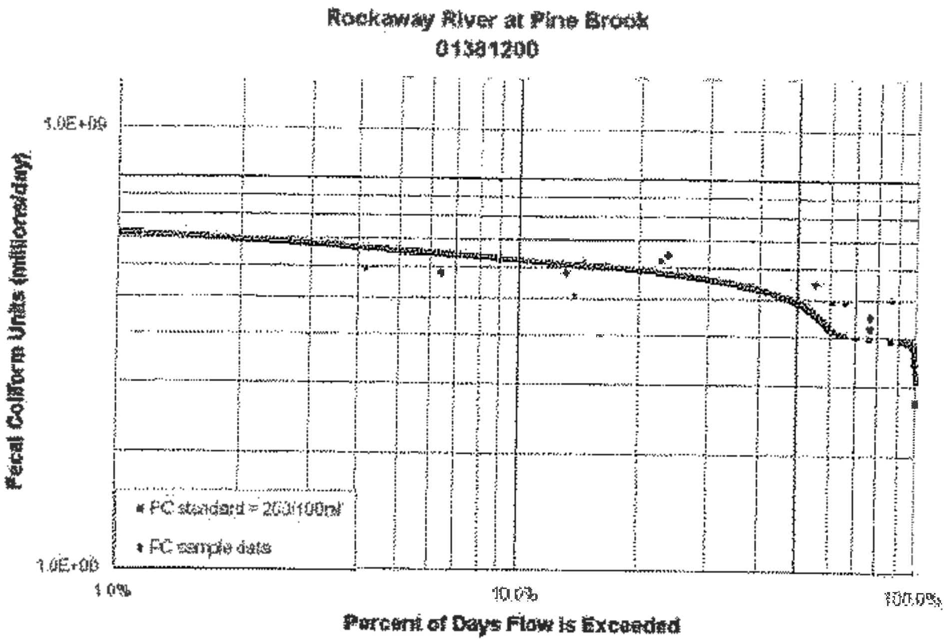
Load Duration Curve for Rockaway River at Blackwell St. Fecal coliform data from USGS station #01379853 during the period 4/15/98 through 9/22/98. Water years 1970-2000 from USGS station #01380500 (Rockaway River above Reservoir at Boonton) were used in generating the FC standard curve.



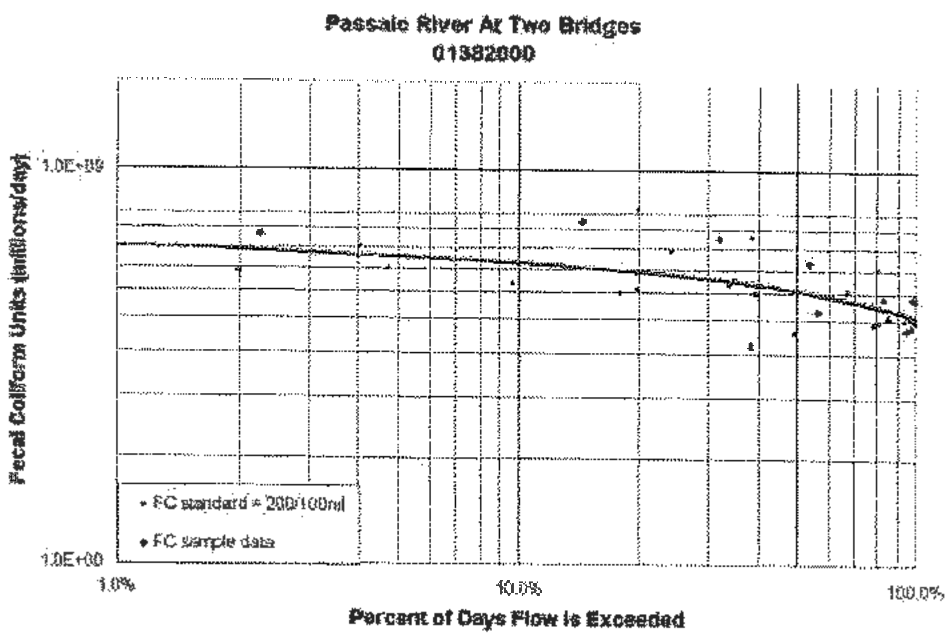
Load Duration Curve for the Beaver Brook At Rockaway. Fecal coliform data from USGS station #01380100 during the period 11/13/97 through 8/7/2000. Water years 1970-2000 from USGS station #01381500 (Whippany River at Morristown, NJ) were used in generating the FC standard curve.



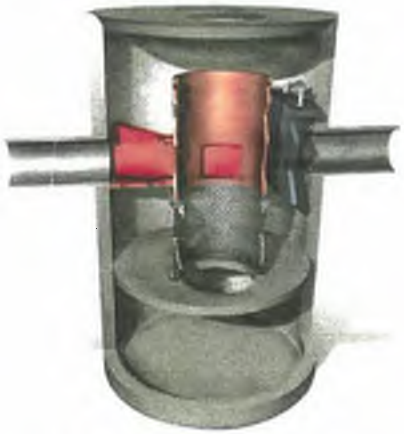
Load Duration Curve for Stony Brook at Boonton. Fecal coliform data from USGS station #01380320 during the period 12/13/99 through 9/7/00. Water years 1970-2000 from USGS station #01380500 (Rockaway River above Reservoir at Boonton) were used in generating the FC standard curve.



Load Duration Curve for the Rockaway R at Pine Brook. Fecal coliform data from USGS station #01381200 during the period 10/1997 through 8/2000. Water years 1970-2000 from USGS station #01381000 (Rockaway River below Reservoir at Boonton, NJ) were used in generating the FC standard curve.



Load Duration Curve for the Passaic River at Two Bridges. Fecal coliform data from USGS station #01382000 during the period 1/27/94 through 810/2000. Water years 1970-2000 from USGS station #01381900 (Passaic R at Pine Brook, NJ) were used in generating the FC standard curve.



INLINE UNIT

Polluted storm water runoff comes under control with the CDS Inline Unit. Placed on the main storm drain within one manhole, its unique configuration meets multiple engineering objectives by combining both treatment and bypass capabilities in one structure. By utilizing CDS' patented non-blocking screening technology, the Inline Unit ensures removal of both fine and suspended solids along with oil, grease, trash and debris.

Offering a remarkably small footprint, the Inline Unit can be incorporated into new development projects or retrofitted into existing storm water collection systems. The unit is totally underground, has no moving parts and requires no supporting infrastructure.

Process

Developed to complement CDS' offline storm water treatment systems, the Inline Unit also uses continuous deflective separation (CDS) technology.

1. A channeling weir collects the flow for entrance into the separation chamber.
2. Storm water enters the diversion chamber.
3. The natural vortex in the separation chamber separates suspended and fine sediments to the center of the chamber for eventual settling in the sump.
4. Because of the washing vortex, the patented separation screen will not become blocked and screened liquid passes through.
5. After flowing beneath the oil baffle, screened flow discharges from the unit.

Advantages

- One structure meets multiple engineering objectives.
- The sump is an important design feature of all CDS units. Sumps prevent scour because deposited material is not stored within the treatment flow path.
- Handles treatment flows greater than 20-cfs.
- Capable of bypassing flows in excess of 50-cfs.
- CDS can customize design for larger treatment and bypass flow events.
- The Inline Unit removes 80% of total suspending solids (TSS) as well as 100% of floatables and neutrally buoyant material, plus oil and grease.
- Due to its non-blocking screen and non-mechanical function, the Inline Unit is a low maintenance treatment option.

Maintenance

As a general rule, CDS recommends removing solids with a standard vactor truck once a year. Depending on each site's pollutant loading characteristics, more cleanouts may be necessary. Seasonal sump cleanout and annual inspection of the screen surface are typically the only requirements necessary to promote successful and efficient operation of the CDS Inline Unit.

Once the access hatch into the CDS unit is opened, the maintenance crew will remove the contents of the sump and separation chamber using a vactor truck as the best cleaning method.

The CDS screen and sump can then be visually inspected for any remaining debris. At this point the procedure is complete. There is no need for manned entry into the unit, which prevents any direct contact with captured materials.

CASE NO 01 STUDY

Nation's largest CDS unit trusted to treat 175-cfs of California highway runoff

In California, expected runoff from a six-mile stretch of Interstate 210 - an eight lane freeway bounding northern Los Angeles - was a major worry for the California Department of Transportation (Caltrans). The sunken concrete roadway runs through an area of many homes and space was tight for installation of storm water units. This did not favor installing runoff catch units that hold large volumes of water, in which pollutants separate over time. By contrast, the CDS technology was chosen for its ability to quickly and effectively separate pollutants and debris from storm water runoff. Five separate CDS units were installed for this project, including the nation's largest Offline Unit, built to filter a water quality runoff event of 175-cfs.

CDS screening technology prevents pollutants from California's I-210 from entering the Pacific Ocean.

Marsh Resources Inc. (MRI) is a wetland mitigation banking company whose goals include wise land use and environmental responsibility to promote the concept of sustainable development.

Home | Mitigation Banking | Mitigation Banks | Acreage Availability | Contact Us

Page last updated 08/14/00

MARSH RESOURCES INC.

Mitigation Banking

How does mitigation banking work?
Why use a mitigation bank?
Common mitigation banking misconceptions

On Nov. 28, 1995, U.S. Department of the Army Corps of Engineers in conjunction with the Environmental Protection Agency, the Department of Agriculture (Natural Resources Conservation Service), the Department of the Interior (Fish and Wildlife Service), and the Department of Commerce (National Oceanic and Atmospheric Administration) issued a document entitled "Federal Guidance for the Establishment, Use and Operation of Mitigation Banks." With the release of this guidance document, the concept and implementation of wetland mitigation banking has become a reality. Use of mitigation banks is fully embraced by permitting and resource agencies. In some cases, use of a mitigation bank is the preferred alternative to satisfying a permit condition.

The federal guidance document defines mitigation banking as "the restoration, creation, enhancement and, in exceptional circumstances, preservation of wetland, and/or other aquatic resources expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources."

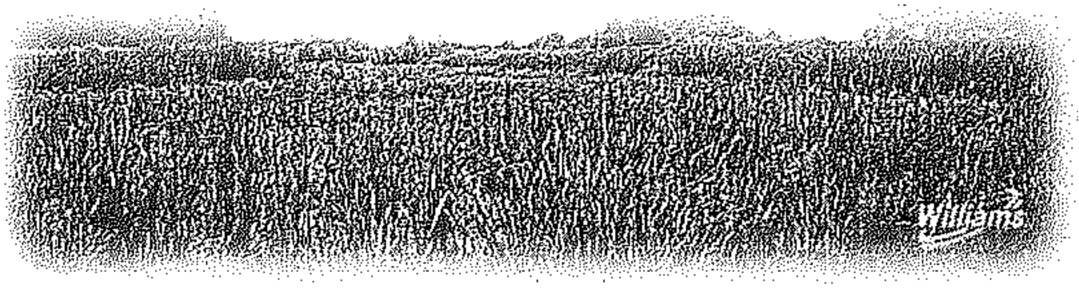
Although mitigation banks are an accepted and sometimes preferred mitigation method, the adherence to the CWA Section 404(b)(1) sequencing guidelines is required. A project must first avoid then minimize impacts to aquatic resources including wetlands. If impacts are considered unavoidable, mitigation is often required.

Although on-site mitigation is still preferred, the federal guidance documents states, "In general, use of a mitigation bank to compensate for minor aquatic resource impacts (e.g., numerous, small impacts ...) is preferable to on-site mitigation."

Page last updated 06/22/00

Mitigation Banking Acreage Availability Contact Us

MARSH RESOURCES INC.



Mitigation Banks

MARSH RESOURCES MEADOWLANDS MITIGATION BANK (Meadowlands) is a 206-acre site located within the Hackensack Meadowlands District in the Borough of Carlstadt, Bergen County, New Jersey and has a "service area" of the Hackensack River Drainage Basin and Newark Bay and the New Jersey Side of the Hudson River. The site is being converted from a degraded Phragmites (common reed) choked system to a more natural inter-tidal, salt marsh-estuarine, island/channel/mud flat ecosystem. Historically, the site was a complex wetland system which supported a diverse array of freshwater and estuarine plant and animal species. Over the last 100 years intense development and mosquito ditching led to a total degradation of the site. Phragmites, an invasive reed took over the site at the expense of all other plant species. This led to an overall loss of wetland functions and values as well as eliminating the site's beneficial and desirable wildlife habitat.

The bank has been created to restore a low value wetland area to its natural pristine state, thereby generating wetland mitigation credits. The amount and ratio of required mitigation when using the Meadowlands Bank will be determined on a case-by-case basis by the permitting agency. Marsh Resources Inc. (MRI) will assist in agency negotiations for use of the Meadowlands Bank as a part of the purchase price for mitigation acre-credits. The price for mitigation credit will be based on market demand and can be negotiated prior to, concurrent with, or after permit issuance. The price for mitigation credits will include land cost, design, bank permits, construction, maintenance, agency negotiations for use of the bank and all ongoing monitoring requirements. Mitigation acre-credits are currently available.

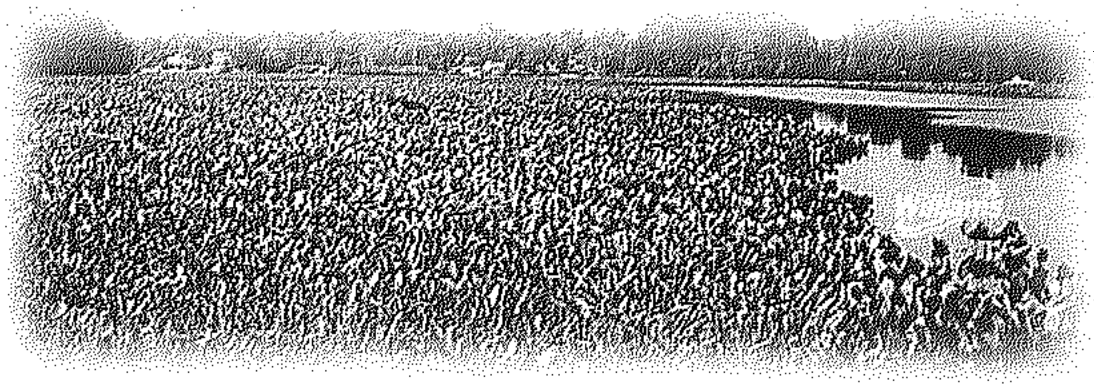
- **Meadowlands Update 6/22/00**

Home | Mitigation Banking | Mitigation Banks | Acreage Availability | Contact Us

Page last updated 07/19/00

Mitigation Banking Mitigation Banks Contact Us

MARSH RESOURCES INC.



Available Acreage

Wetland mitigation acreage is available in 1998 and there after. Mitigation ratios will be determined by the permitting agency during the permit process. Ratios may be determined by the Indicator Value Assessment (IVA) methodology or current method of impact assessment. MRI will assist in agency coordination if the bank is to be used to satisfy a mitigation requirement. Mitigation acreage prices will be dependent on current market demands. Although mitigation acre - credits are currently available there is a limited supply and it may be years before more are on the market.

The service area for the Meadowlands Bank includes the Hackensack River Drainage Basin and Newark Bay as mapped on the New Jersey Department of Environmental Protection's Drainage Basin Map of New Jersey dated 1972.

For more information or to check on credit availability you can call us at (713) 215-2427, e-mail at Daniel.L.Merz@williams.com, or fill in the contact box.

Home | Mitigation Banking | Mitigation Banks | Acreage Availability | Contact Us

Page last updated 06/24/03

APPENDIX F

FEMA FLOODPLAIN MAPS

LISTING OF COMMUNITIES

COMMUNITY NAME	COMMUNITY NUMBER	LOCATED ON PANEL(S)	INITIAL IDENTIFICATION DATE	POST-FIRM DATE
ALLENDALE, BOROUGH OF	340019	0067,0069,0086,0088	MARCH 16, 1973	JULY 2, 1979
[1]ALPINE, BOROUGH OF	340581	0118,0202,0204,0206,0210,0212, 0220	N/A	N/A
BERGENFIELD, BOROUGH OF	340020	0184,0192,0211	JANUARY 9, 1974	JUNE 1, 1977
BOGOTA, BOROUGH OF	340021	0193,0194,0256,0257	MAY 31, 1974	APRIL 1, 1982
CARLSTADT, BOROUGH OF	340022	0251,0252,0253,0254	SEPTEMBER 20, 1995	SEPTEMBER 20, 1995
[1]CLIFFSIDE PARK, BOROUGH OF	340582	0278,0286	N/A	N/A
CLOSTER, BOROUGH OF	340023	0182,0201,0202,0203,0204,0206	SEPTEMBER 6, 1974	APRIL 18, 1983
CRESSKILL, BOROUGH OF	340024	0203,0204,0210,0211,0212,0220	JULY 26, 1974	DECEMBER 1, 1981
DEMAREST, BOROUGH OF	340025	0203,0204,0210	MARCH 15, 1974	SEPTEMBER 30, 1981
DUMONT, BOROUGH OF	340026	0184,0192,0203,0211	MAY 28, 1976	NOVEMBER 18, 1977
EAST RUTHERFORD, BOROUGH OF	340028	0251,0253,0254	APRIL 12, 1974	DECEMBER 16, 1980
EDGEWATER, BOROUGH OF	340029	0276,0277,0278,0279,0286	AUGUST 2, 1974	APRIL 1, 1983
ELMWOOD PARK, BOROUGH OF	340500	0167,0169,0186,0188	JANUARY 4, 1974	NOVEMBER 15, 1979
EMERSON, BOROUGH OF	340030	0181,0182,0183,0184,0201	JUNE 15, 1973	SEPTEMBER 30, 1980
ENGLEWOOD, CITY OF	340031	0211,0212,0213,0214,0276,0277	OCTOBER 29, 1976	FEBRUARY 19, 1986
[1]ENGLEWOOD CLIFFS, BOROUGH OF	340580	0214,0220,0277	N/A	N/A
FAIR LAWN, BOROUGH OF	340033	0159,0167,0178,0179,0186,0187	DECEMBER 28, 1973	JULY 2, 1981
FAIRVIEW, BOROUGH OF	340034	0259,0267,0278,0286	JANUARY 25, 1974	AUGUST 2, 1982
[1]FORT LEE, BOROUGH OF	340035	0276,0277,0278	N/A	N/A
FRANKLIN LAKES, BOROUGH OF	340036	0062,0063,0064,0066,0068,0151, 0152	JULY 26, 1974	AUGUST 15, 1984
GARFIELD, CITY OF	340037	0169,0188,0189,0251	JUNE 29, 1973	APRIL 15, 1980
GLEN ROCK, BOROUGH OF	340038	0157,0159,0176,0178	JUNE 28, 1974	JULY 2, 1981
HACKENSACK, CITY OF	340039	0189,0191,0192,0193,0194,0252, 0256	JUNE 28, 1974	DECEMBER 1, 1982
HACKENSACK MEADOWLANDS DISTRICT	340570	0245,0252,0253,0254,0256,0257, 0258,0259,0261,0262,0263,0264, 0266,0267,0268,0307,0331,0332	OCTOBER 8, 1976	DECEMBER 15, 1982
HARRINGTON PARK, BOROUGH OF	340040	0113,0114,0201,0202	JUNE 28, 1974	APRIL 15, 1981
HASBROUCK HEIGHTS, BOROUGH OF	340041	0189,0252,0256	NOVEMBER 30, 1973	JUNE 30, 1976
HAWORTH, BOROUGH OF	340042	0182,0184,0201,0203	JANUARY 25, 1974	OCTOBER 15, 1981
HILLSDALE, BOROUGH OF	340043	0089,0093,0094,0181,0182	JANUARY 16, 1974	DECEMBER 15, 1981
HO-HO-KUS, BOROUGH OF	340044	0088,0089,0176,0177	JUNE 22, 1973	JUNE 1, 1977
LEONIA, BOROUGH OF	340045	0213,0257,0276	JULY 11, 1975	JULY 5, 1982
LITTLE FERRY, BOROUGH OF	340046	0256,0257,0258	DECEMBER 21, 1973	JUNE 15, 1982
LODI, BOROUGH OF	340047	0188,0189,0251,0252	JULY 27, 1973	FEBRUARY 15, 1978
LYNDHURST, TOWNSHIP OF	340048	0235,0245,0253,0261	JULY 26, 1974	JUNE 15, 1978
MAHWAH, TOWNSHIP OF	340049	0014[2],0051[2],0052[2],0053[2],0054, 0056,0057,0058,0059,0061,0062, 0066,0067,0068,0069,0076,0078	APRIL 5, 1974	NOVEMBER 3, 1982
MAYWOOD, BOROUGH OF	340050	0187,0189,0191,0193	AUGUST 15, 1977	AUGUST 15, 1977
MIDLAND PARK, BOROUGH OF	340051	0068,0069,0156,0157	JANUARY 23, 1974	SEPTEMBER 30, 1977
MONTVALE, BOROUGH OF	340052	0079,0083[2],0087,0091,0092	SEPTEMBER 6, 1974	JUNE 15, 1981
MOONACHIE, BOROUGH OF	340053	0256,0258	JUNE 28, 1974	MARCH 18, 1983
NEW MILFORD, BOROUGH OF	340054	0184,0191,0192	APRIL 1, 1977	APRIL 1, 1977
NORTH ARLINGTON, BOROUGH OF	340055	0245,0261,0263	MARCH 29, 1974	APRIL 3, 1978
NORTHVALE, BOROUGH OF	340056	0114,0202	AUGUST 31, 1973	JANUARY 20, 1982
NORWOOD, BOROUGH OF	340057	0113,0114,0201,0202,0206	JANUARY 16, 1974	APRIL 18, 1983
OAKLAND, BOROUGH OF	345309	0034[2],0042,0044,0053[2],0061,0062, 0063,0064,0132[2],0151	JUNE 30, 1970	JUNE 30, 1970
OLD TAPPAN, BOROUGH OF	340059	0094,0111,0113,0114,0182,0201	JUNE 22, 1973	APRIL 15, 1977
ORADELL, BOROUGH OF	340060	0181,0182,0183,0184	JUNE 15, 1973	MARCH 15, 1977
PALISADES PARK, BOROUGH OF	340061	0257,0259,0276,0278	DECEMBER 28, 1973	JUNE 1, 1982
PARAMUS, BOROUGH OF	340062	0176,0177,0178,0179,0181,0183, 0186,0187,0191	AUGUST 31, 1973	JUNE 1, 1984
PARK RIDGE, BOROUGH OF	340063	0087,0091,0092,0093,0094	JANUARY 18, 1974	MAY 5, 1981
RAMSEY, BOROUGH OF	340064	0058,0059,0066,0067,0078,0086	JANUARY 9, 1974	SEPTEMBER 2, 1981
RIDGEFIELD, BOROUGH OF	340065	0257,0259,0278	JUNE 15, 1973	MARCH 15, 1977
RIDGEFIELD PARK, VILLAGE OF	340066	0256,0257,0259	JUNE 28, 1974	OCTOBER 15, 1982
RIDGEWOOD, VILLAGE OF	340067	0069,0088,0157,0159,0176,0177, 0178	AUGUST 31, 1973	DECEMBER 15, 1983
RIVER EDGE, BOROUGH OF	340068	0183,0184,0191,0192	JUNE 18, 1976	FEBRUARY 1, 1984
RIVER VALE, TOWNSHIP OF	340069	0092,0094,0111,0113,0182,0201	APRIL 20, 1973	OCTOBER 15, 1981
ROCHELLE PARK, TOWNSHIP OF	340070	0187,0189	JUNE 22, 1973	MARCH 28, 1980
ROCKLEIGH, BOROUGH OF	340071	0114,0118,0202,0206	JANUARY 3, 1975	MAY 17, 1982
RUTHERFORD, BOROUGH OF	340072	0251,0253,0261	APRIL 12, 1974	JUNE 1, 1978
SADDLE BROOK, TOWNSHIP OF	340074	0186,0187,0188,0189	MARCH 8, 1974	APRIL 15, 1982
SADDLE RIVER, BOROUGH OF	340073	0086,0087,0088,0089	JANUARY 9, 1974	MAY 16, 1977
SOUTH HACKENSACK, TOWNSHIP OF	340515	0251,0256	JUNE 14, 1974	MARCH 2, 1983
TEANECK, TOWNSHIP OF	340075	0192,0193,0194,0211,0213,0257, 0276	JUNE 14, 1974	OCTOBER 16, 1984
TENAFLY, BOROUGH OF	340076	0204,0211,0212,0214,0220	DECEMBER 21, 1973	FEBRUARY 17, 1982
[1]TETERBORO, BOROUGH OF	340537	0252,0256	N/A	N/A
UPPER SADDLE RIVER, BOROUGH OF	340077	0078,0079,0086,0087	JANUARY 16, 1974	SEPTEMBER 15, 1977
WALDWICK, BOROUGH OF	340078	0069,0088	DECEMBER 28, 1973	MARCH 1, 1979
WALLINGTON, BOROUGH OF	340079	0251,0253	JUNE 14, 1974	JUNE 4, 1980
WASHINGTON, TOWNSHIP OF	340080	0089,0093,0177,0181,0183	NOVEMBER 5, 1976	NOVEMBER 19, 1980
WESTWOOD, BOROUGH OF	340081	0181,0182	MAY 11, 1973	FEBRUARY 4, 1981
WOODCLIFF LAKE, BOROUGH OF	340082	0087,0089,0091,0093,0094	FEBRUARY 22, 1974	SEPTEMBER 2, 1981
WOOD-RIDGE, BOROUGH OF	340083	0251,0252,0254	SEPTEMBER 7, 1973	AUGUST 11, 1978
WYCKOFF, TOWNSHIP OF	340084	0064,0068,0069,0152,0156,0157	JULY 13, 1973	AUGUST 1, 1977

[1]NONFLOOD-PRONE COMMUNITY
[2]PANEL NOT PRINTED

*PANEL NOT PRINTED - NO SPECIAL FLOOD HAZARD AREAS

MAP REPOSITORIES

(Maps available for reference only, not for distribution).

ALLENDALE, BOROUGH OF:
Allendale Borough Hall
500 W. Crescent Avenue
Allendale, New Jersey 07401

BERGENFIELD, BOROUGH OF:
Municipal Building
Building Department (Basement)
198 North Washington Avenue
Bergenfield, New Jersey 07621

BOGOTA, BOROUGH OF:
Municipal Building
375 Larch Avenue
Bogota, New Jersey 07603

CARLSTADT, BOROUGH OF:
Allendale Borough Hall
500 Madison Street
Carlstadt, New Jersey 07072-1597

CLOSTER, BOROUGH OF:
Municipal Building
295 Closter Dock Road
Closter, New Jersey 07624

CRESSKILL, BOROUGH OF:
Municipal Building
67 Union Avenue
Cresskill, New Jersey 07626

DEMAREST, BOROUGH OF:
Municipal Building
118 Serpentine Road
Demarest, New Jersey 07627

DUMONT, BOROUGH OF:
Municipal Building
50 Washington Avenue
Dumont, New Jersey 07628

EAST RUTHERFORD, BOROUGH OF:
Borough Hall
1 Everett Place
East Rutherford, New Jersey 07073

EDGEWATER, BOROUGH OF:
Borough Hall
916 River Road
Edgewater, New Jersey 07020-1296

ELMWOOD PARK, BOROUGH OF:
Municipal Building
182 Market Street
Elmwood Park, New Jersey 07407

EMERSON, BOROUGH OF:
Borough Hall, Building Department
Municipal Place
Emerson, New Jersey 07630

ENGLEWOOD, CITY OF:
Engineering Department
Ken Albert Associates
401 South Van Brunt Street, 2nd Floor
Englewood, New Jersey 07631

FAIR LAWN, BOROUGH OF:
Fair Lawn Municipal Building
8-01 Fair Lawn Avenue
Fair Lawn, New Jersey 07410

FAIRVIEW, BOROUGH OF:
Borough Hall
59 Anderson Avenue
Fairview, New Jersey 07022

FRANKLIN LAKES, BOROUGH OF:
Building Department
De Korte Drive
Franklin Lakes, New Jersey 07417

GARFIELD, CITY OF:
City Hall
111 Outwater Lane
Garfield, New Jersey 07026

GLEN ROCK, BOROUGH OF:
Glen Rock Municpal Building
Rock Road
Glen Rock, New Jersey 07452

HACKENSACK, CITY OF:
Hackensack City Office
65 Central Avenue
Hackensack, New Jersey 07601

HACKENSACK MEADOWLANDS DISTRICT:
HMDC Engineering Department
One De Korte Park Plaza
Lyndhurst, New Jersey 07071-3799

HARRINGTON PARK, BOROUGH OF:
Harrington Park Borough Hall
85 Harriot Avenue
Harrington Park, New Jersey 07640

HASBROUCK HEIGHTS, BOROUGH OF:
Borough Clerk's Office
248 Hamilton Avenue
Hasbrouck Heights, New Jersey 07604-1909

HAWORTH, BOROUGH OF:
Borough Hall
300 Haworth Avenue
Haworth, New Jersey 07641

HILLSDALE, BOROUGH OF:
Borough Hall
380 Hillsdale Avenue
Hillsdale, New Jersey 07642-2797

HO-HO-KUS, BOROUGH OF:
Ho-Ho-Kus Borough Hall
333 Warren Avenue
Ho-Ho-Kus, New Jersey 07423

LEONIA, BOROUGH OF:
Borough Hall
Administrator's Office / Building Department
312 Broad Avenue
Leonia, New Jersey 07605

LITTLE FERRY, BOROUGH OF:
Little Ferry Borough Hall
One Katherine Street
Little Ferry, New Jersey 07643-1800

LODI, BOROUGH OF:
Lodi Municipal Building
One Memorial Drive
Lodi, New Jersey 07644

LYNDHURST, TOWNSHIP OF:
Township Hall
Valley Brook Avenue
Lyndhurst, New Jersey 07071

MAHWAH, TOWNSHIP OF:
Mahwah Town Hall
300 B Route 17 South
Mahwah, New Jersey 07430

MAYWOOD, BOROUGH OF:
459 Maywood Avenue
Maywood, New Jersey 07607

MIDLAND PARK, BOROUGH OF:
Midland Park Borough Hall
280 Godwin Avenue
Midland Park, New Jersey 07342

MONTVALE, BOROUGH OF:
Montvale Borough Hall
One Memorial Drive
Montvale, New Jersey 07645

MOONACHIE, BOROUGH OF:
Moonachie Municipal Building
70 Moonachie Road
Moonachie, New Jersey 07074

NEW MILFORD, BOROUGH OF:
Borough Clerk's Office
930 River Road
New Milford, New Jersey 07646

NORTH ARLINGTON, BOROUGH OF:
North Arlington Borough Hall
214 Ridge Road
North Arlington, New Jersey 07031

NORTHVALE, BOROUGH OF:
Borough Hall
116 Paris Avenue
Northvale, New Jersey 07647-1414

NORWOOD, BOROUGH OF:
Borough Hall
455 Broadway
Norwood, New Jersey 07648-1219

OAKLAND, BOROUGH OF:
Borough Hall
Municipal Building
Oakland, New Jersey 07436

OLD TAPPAN, BOROUGH OF:
Old Tappan Borough Hall
227 Old Tappan Road
Old Tappan, New Jersey 07675

ORADELL, BOROUGH OF:
Borough Hall
355 Kindermack Road
Oradell, New Jersey 07649-2182

PALISADES PARK, BOROUGH OF:
Building Inspector's Office
275 Broad Avenue
Palisades Park, New Jersey 07650

PARAMUS, BOROUGH OF:
Engineer's Office-Borough Hall
Jockish Square
Paramus, New Jersey 07652

PARK RIDGE, BOROUGH OF:
Park Ridge Borough Hall
55 Park Avenue
Park Ridge, New Jersey 07656-1289

RAMSEY, BOROUGH OF:
Ramsey Borough Hall
Engineering Department
33 North Central Avenue
Ramsey, New Jersey 07446

RIDGEFIELD, BOROUGH OF:
Ridgefield Borough Clerk's Office
604 Broad Avenue
Ridgefield, New Jersey 07657

RIDGEFIELD PARK, VILLAGE OF:
Ridgefield Park Building Department
234 Main Street
Ridgefield Park, New Jersey 07660-2515

RIDGEWOOD, VILLAGE OF:
Ridgewood Department of Public Works
Engineering Division
131 North Maple Avenue
Ridgewood, New Jersey 07451

RIVER EDGE, BOROUGH OF:
River Edge Building Department
705 Kinderkamack Road
River Edge, New Jersey 07661-2499

RIVER VALE, TOWNSHIP OF:
River Vale Town Hall
406 Rivervale Road
River Vale, New Jersey 07675

ROCHELLE PARK, TOWNSHIP OF:
Rochelle Park Building Department
151 West Passaic Street
Rochelle Park, New Jersey 07662-3396

ROCKLEIGH, BOROUGH OF:
Rockleigh Borough Hall
26 Rockleigh Road
Rockleigh, New Jersey 07647-2706

RUTHERFORD, BOROUGH OF:
Rutherford Municipal Building
176 Park Avenue
Rutherford, New Jersey 07070

SADDLE BROOK, TOWNSHIP OF:
Saddle Brook Building Inspector's Office
540 Saddle River Road
Saddle Brook, New Jersey 07662-4899

SADDLE RIVER, BOROUGH OF:
Saddle River Municipal Building
100 East Allendale Road
Saddle River, New Jersey 07458

SOUTH HACKENSACK, TOWNSHIP OF:
South Hackensack Township Hall
227 Phillips Avenue
South Hackensack, New Jersey 07606-1600

TEANECK, TOWNSHIP OF:
Teaneck Township Engineer
Municipal Building
Teaneck, New Jersey 07666

TENAFLY, BOROUGH OF:
Tenafly Building Department
401 Tenafly Road
Tenafly, New Jersey 07670-2085

UPPER SADDLE RIVER, BOROUGH OF:
Upper Saddle River Borough Hall
376 West Saddle River Road
Upper Saddle River, New Jersey 07458-1621

WALDWICK, BOROUGH OF:
Waldwick Borough Clerk's Office
15 East Prospect Street
Waldwick, New Jersey 07463

WALLINGTON, BOROUGH OF:
Borough Clerk's Office
Wallington Municipal Building
24 Union Boulevard
Wallington, New Jersey 07057

WASHINGTON, TOWNSHIP OF:
Washington Town Clerk's Office
350 Hudson Avenue
Washington, New Jersey 07675-4799

WESTWOOD, BOROUGH OF:
Westwood Building Department
101 Washington Avenue
Westwood, New Jersey 07675-2294

WOODCLIFF LAKE, BOROUGH OF:
Woodcliff Lake Municipal Building
188 Pascack Road
Woodcliff Lake, New Jersey 07675-7999

WOOD-RIDGE, BOROUGH OF:
Wood-Ridge Borough Hall
Humboldt Street
Wood-Ridge, New Jersey 07075

WYCKOFF, TOWNSHIP OF:
Wyckoff Memorial Town Hall
Scott Plaza
Wyckoff, New Jersey 07481

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

BERGEN COUNTY, NEW JERSEY (ALL JURISDICTIONS)

(SEE LISTING OF COMMUNITIES TABLE

MAP INDEX

PANELS PRINTED:
42,44,54,56,57,58,59,61,62,63,64,66
67,68,69,76,78,79,86,87,88,89,91,92
93,94,111,113,114,118,151,152,156,157,159,167
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259,261,262,263,264,266,267,268,
276,277,278,279,286,307,331,332

MAP NUMBER
34003C0000

MAP REVISED:
DECEMBER 8, 1998

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas. The community map repository should be consulted for possible updated flood hazard information prior to use of this map for property purchase or construction purposes.

Coastal base flood elevations apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NVGD), and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of special flood hazard (100-year flood) include Zones A, AE, AH, AO, A99, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For community map revision history prior to countywide mapping, see section 6.0 of the Flood Insurance Study Report.

For adjoining map panels see separately printed *Map Index*.

DIGITAL DATA AVAILABILITY: Digital files containing the thematic floodplain information shown on these maps are published by the Federal Emergency Management Agency in DLG-3 Optional format on CD-ROM. Requests for data should include the full name of the community or county and the Flood Insurance Rate Map panel numbers covered by the request. Contact the Federal Emergency Management Agency, Flood Map Distribution Center, 6930 (A-F) San Tomas Road, Baltimore, Maryland 21227-6227.
Telephone 1-800-358-9616.

NOTE: The coordinate system used for the production of this Flood Insurance Rate Map (FIRM) is Universal Transverse Mercator (UTM), North American Datum of 1927 (NAD27), Clarke 1866 spheroid. Corner coordinates shown on the FIRM are in latitude and longitude referenced to the Transverse Mercator projection, NAD27. Differences in the datum and spheroid used in the production of FIRMs for adjacent counties may result in slight positional differences in map features at the county boundaries. These differences do not affect the accuracy of the information shown on the FIRM.

ATTENTION: Flood elevations on this map are referenced to the National Geodetic Vertical Datum of 1929. These flood elevations must be compared to structure and ground elevations referenced to the same datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, contact the National Geodetic Survey at the following address:

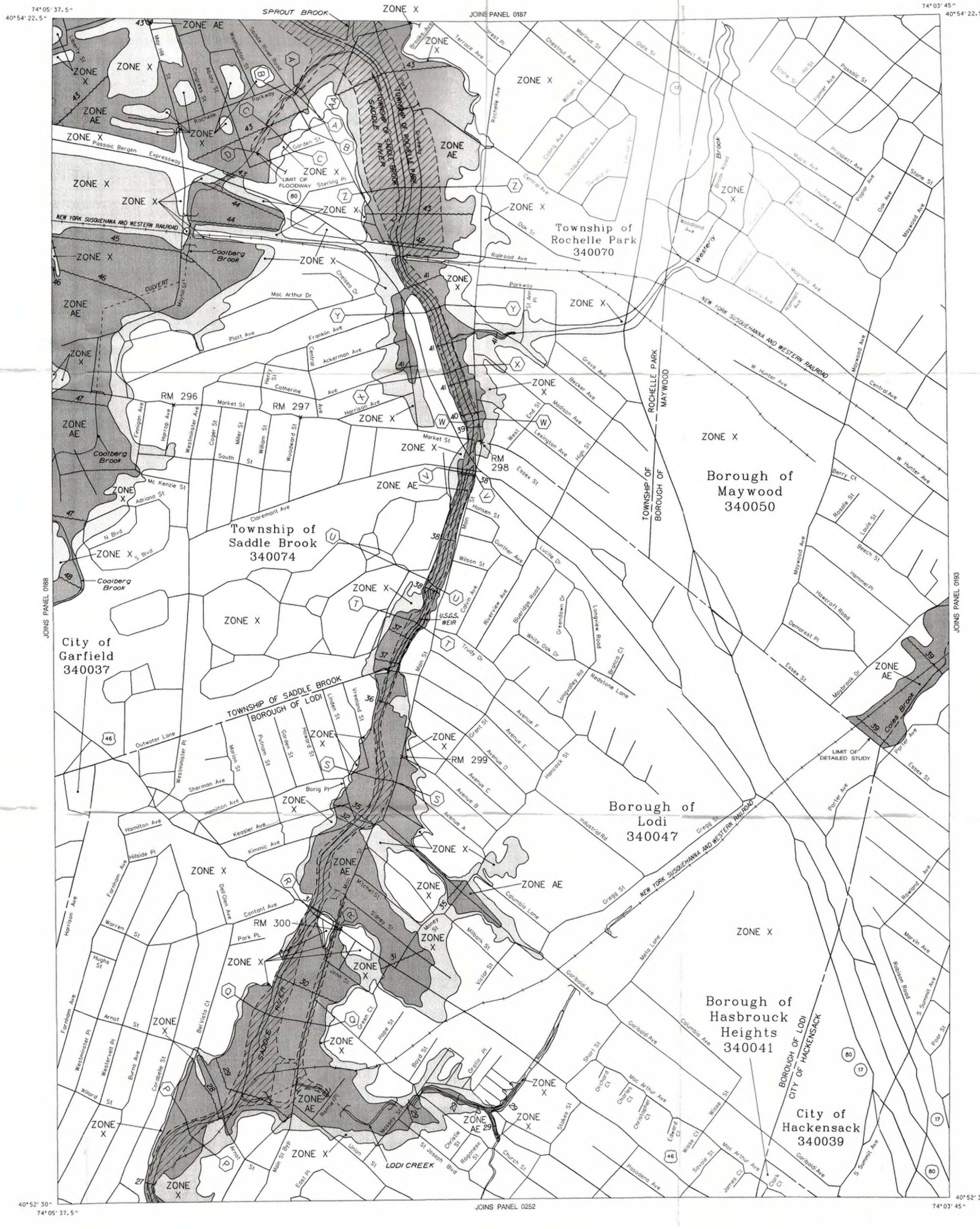
Vertical Network Branch, N/CG13
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

Base Map Source: 1:100,000 USGS Digital Line Graphs. Map users should be aware that this base map source causes road alignment distortions at and near road intersections. These alignment problems have been corrected in the vicinity of identified floodplains.

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION IN FT. (NGVD)[1]	DESCRIPTION OF LOCATION
RM 296	55.086	Saddle Brook, Bergen County, New Jersey. Standard New Jersey Geodetic and Coastal Survey disk, set in concrete, flush with ground, on southwest corner of Market Street and Harrop Avenue, approximately 12.90 feet south of edge of concrete pavement of Market Street and approximately 15 feet west of centerline of Harrop Avenue. Monument is approximately 67.12 feet north of southeast corner of stucco service station, approximately 35.20 feet east of cross cut in concrete base for gas pumps, and approximately 46.05 feet south of railroad spike in pole no. 60269-SRT.
RM 297	80.914	Saddle Brook, Bergen County, New Jersey. Standard New Jersey Geodetic and Coastal Survey disk, set in concrete, flush with ground on north side of Market Street, approximately 3.50 feet east of range of east side of sidewalk on west side of Woodward Street and approximately 6.30 feet north of north curb of Market Street. Monument is approximately 55.21 feet north of face of steel post in concrete base for wire fence on southwest corner of Market Street and Woodward Street, approximately 63.55 feet east of southeast corner of extreme west concrete fence post in front of house no. 141 Market Street and approximately 28.90 feet west of southwest corner of extreme concrete fence post in front of same house.
RM 298	39.74	Standard New Jersey Geodetic and Coastal Survey disk (Mon. 3828) in cast iron box on southeast corner Essex and Main Street.
RM 299	33.32	Standard New Jersey Geodetic and Coastal Survey disk (Mon. RV 3844) in sidewalk on southeast corner of Main Street and Avenue B.
RM 300	42.75	Standard New Jersey Geodetic and Coastal Survey disk (Mon. 3899) set flush with ground at northeast corner of U.S. Route 46 bridge over Main Street.

[1] National Geodetic Vertical Datum of 1929.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE A99	To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X	Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X	Areas determined to be outside 500-year floodplain.
ZONE D	Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS*

Identified 1983 | Identified 1990 | Otherwise Protected Areas

*Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

~~~~513~~~~ Base Flood Elevation Line; Elevation in Feet**

(A)———(A) Cross Section Line

(EL 987) Base Flood Elevation in Feet Where Uniform Within Zone**

RM7 x Elevation Reference Mark

●M1.5 River Mile

**Referenced to the National Geodetic Vertical Datum of 1929

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
SEPTEMBER 20, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

Refer to the FLOOD INSURANCE RATE MAP effective date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE
500 0 500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

BERGEN COUNTY, NEW JERSEY (ALL JURISDICTIONS)

PANEL 189 OF 332

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GARFIELD, CITY OF	340037	0189	F
HACKENSACK, CITY OF	340039	0189	F
HASBROUCK HEIGHTS, BOROUGH OF	340041	0189	F
LODI, BOROUGH OF	340047	0189	F
MAYWOOD, BOROUGH OF	340050	0189	F
ROCHELLE PARK, TOWNSHIP OF	340070	0189	F
SADDLE BROOK, TOWNSHIP OF	340074	0189	F

Notice to User: The MAP NUMBER shown below should be used when placing map orders; the COMMUNITY NUMBER shown above should be used on insurance applications for the subject community.

MAP NUMBER
34003C0189 F

EFFECTIVE DATE:
SEPTEMBER 20, 1995

Federal Emergency Management Agency
~~~~

NOTES TO USERS

is map is for use in administering the National Flood Insurance Program. It es not necessarily identify all areas subject to flooding, particularly from local ainage sources of small size, or all planimetric features outside Special ood Hazard Areas. The community map repository should be consulted for ssible updated flood hazard information prior to use of this map for property rchase or construction purposes.

astal base flood elevations apply only landward of 0.0 National Geodetic rtical Datum of 1929 (NGVD), and include the effects of wave action; these vations may also differ significantly from those developed by the National eather Service for hurricane evacuation planning.

eas of special flood hazard (100-year flood) include Zones A, AE, AH, AO, A99, and VE.

rtain areas not in Special Flood Hazard Areas may be protected by flood ntrol structures.

undaries of the floodways were computed at cross sections and interpolated tween cross sections. The floodways were based on hydraulic considerations h regard to requirements of the Federal Emergency Management Agency.

odway widths in some areas may be too narrow to show to scale. Floodway dths are provided in the Flood Insurance Study Report.

rporate limits shown are current as of the date of this map. The user should ntact appropriate community officials to determine if corporate limits have anged subsequent to the issuance of this map.

r community map revision history prior to countywide mapping, see section of the Flood Insurance Study Report.

r adjoining map panels see separately printed Map Index.

ITAL DATA AVAILABILITY: Digital files containing the thematic floodplain ormation shown on these maps are published by the Federal Emergency nagement Agency in DLG-3 Optional format on CD-ROM. Requests for data ould include the full name of the community or county and the Flood urance Rate Map panel numbers covered by the request. Contact the deral Emergency Management Agency, Flood Map Distribution Center, 6930 F) San Tomas Road, Baltimore, Maryland 21227-6227. lephone 1-800-358-9616.

TE: The coordinate system used for the production of this Flood Insurce Rate Map (FIRM) is Universal Transverse Mercator (UTM), North American tum of 1927 (NAD27), Clarke 1866 spheroid. Corner coordinates shown on FIRM are in latitude and longitude referenced to the Transverse Mercator ojection, NAD27. Differences in the datum and spheroid used in the oduction of FIRMs for adjacent counties may result in slight positional ferences in map features at the county boundaries. These differences not affect the accuracy of the information shown on the FIRM.

TENTION: Flood elevations on this map are referenced to the National odetic Vertical Datum of 1929. These flood elevations must be compared structure and ground elevations referenced to the same datum. For infortion regarding conversion between the National Geodetic Vertical Datum 1929 and the North American Vertical Datum of 1988, contact the tional Geodetic Survey at the following address:

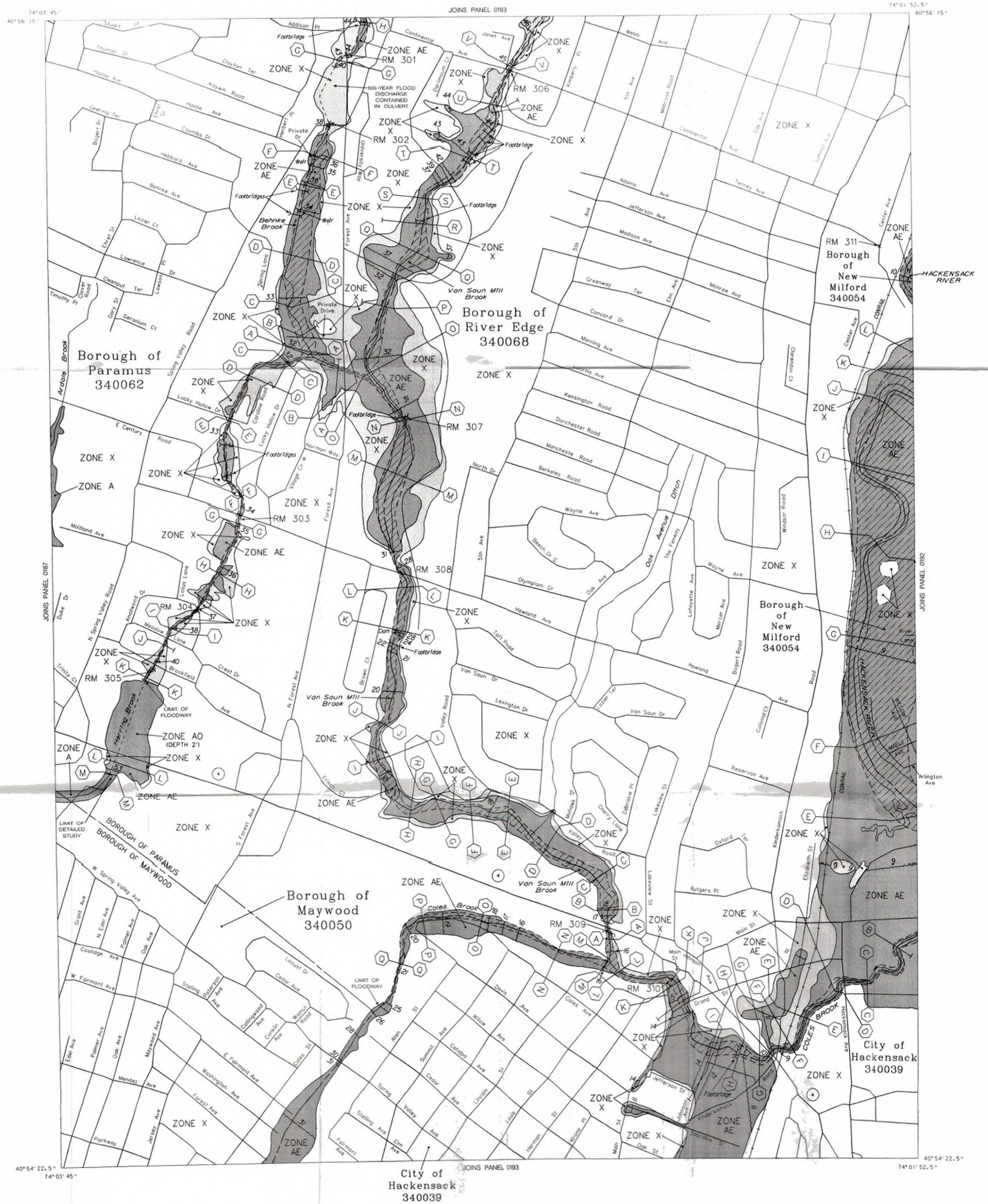
rtical Network Branch, N/CG13
tional Geodetic Survey, NOAA
ver Spring Metro Center 3
5 East-West Highway
ver Spring, Maryland 20910
01) 713-3191

se Map Source: 1:100,000 USGS Digital Line Graphs. Map users should be are that this base map source causes road alignment distortions at and near ad intersections. These alignment problems have been corrected in the vicinity identified floodplains.

ELEVATION REFERENCE MARKS

EFERENCE MARK	ELEVATION IN FT. (NGVD)[1]	DESCRIPTION OF LOCATION
RM 301	45.60	Cross cut in top of pilaster, at north end of upstream parapet of Forest Avenue bridge over Behnke Brook.
RM 302	41.65	Chiseled square cut in center of downstream headwall of Behnke Brook culvert under Spring Valley Road.
RM 303	41.21	Chiseled square cut in centerline of upstream parapet of Howland Avenue bridge over Herring Brook.
RM 304	39.22	Chiseled square cut in curb on downstream side of Knollwood Drive bridge over Herring Brook.
RM 305	40.17	Chiseled square cut in upstream curb of Brookfield Avenue bridge over Herring Brook.
RM 306	49.20	Chiseled square cut in found paint mark, at southeast corner of upstream parapet of Continental Avenue bridge over Van Saun Mill Brook.
RM 307	33.06	Chiseled square cut in south end of west abutment of footbridge over Van Saun Mill Brook, located at Picnic Area F in Van Saun Mill County Park.
RM 308	36.24	Cross cut in centerline of downstream parapet of Howland Avenue bridge over Van Saun Mill Brook.
RM 309	25.87	Metal plug stamped V-48 epoxied to top of downstream headwall of State Route 4 box culvert over Van Saun Mill Brook.
RM 310	15.555	Standard New Jersey Geodetic and Coastal Survey monel metal rivet No. 1413 set in top of upstream parapet at north end of Main Street bridge over Coles Brook.
RM 311	34.62	Standard U.S. Coastal and Geodetic Survey and SS disk stamped 825, set in concrete at east edge of west sidewalk along Center Avenue, located approximately 15 feet north of north curb of Tenney Avenue.

[1]National Geodetic Vertical Datum of 1929.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE A99	To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X	Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X	Areas determined to be outside 500-year floodplain.
ZONE D	Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS*

Identified 1983 | Identified 1990 | Otherwise Protected Areas

*Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

	Floodplain Boundary
	Floodway Boundary
	Zone D Boundary
	Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.
513	Base Flood Elevation Line; Elevation in Feet**
A — A	Cross Section Line
(EL 987)	Base Flood Elevation in Feet Where Uniform Within Zone**
RM7 x	Elevation Reference Mark
•M1.5	River Mile

**Referenced to the National Geodetic Vertical Datum of 1929

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
SEPTEMBER 20, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

Refer to the FLOOD INSURANCE RATE MAP effective date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE
500 0 500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

BERGEN COUNTY, NEW JERSEY (ALL JURISDICTIONS)

PANEL 191 OF 332

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HACKENSACK, CITY OF	340039	0191	F
MAYWOOD, BOROUGH OF	340050	0191	F
NEW MILFORD, BOROUGH OF	340054	0191	F
PARAMUS, BOROUGH OF	340062	0191	F
RIVER EDGE, BOROUGH OF	340068	0191	F

Notice to User: The MAP NUMBER shown below should be used when placing map orders; the COMMUNITY NUMBER shown above should be used on insurance applications for the subject community.

MAP NUMBER
34003C0191 F

EFFECTIVE DATE:
SEPTEMBER 20, 1995

Federal Emergency Management Agency

NOTES TO USERS

his map is for use in administering the National Flood Insurance Program; It oes not necessarily identify all areas subject to flooding, particularly from local rainage sources of small size, or all planimetric features outside Special lood Hazard Areas. The community map repository should be consulted for ossible updated flood hazard information prior to use of this map for property urchase or construction purposes.

oastal base flood elevations apply only landward of 0.0' National Geodetic ertical Datum of 1929 (NVGD), and include the effects of wave action; these levations may also differ significantly from those developed by the National Veather Service for hurricane evacuation planning.

reas of special flood hazard (100-year flood) include Zones A, AE, AH, AO, A99, , and VE.

ertain areas not in Special Flood Hazard Areas may be protected by flood ontrol structures.

oundaries of the floodways were computed at cross sections and interpolated etween cross sections. The floodways were based on hydraulic considerations ith regard to requirements of the Federal Emergency Management Agency.

loodway widths in some areas may be too narrow to show to scale. Floodway idths are provided in the Flood Insurance Study Report.

orporate limits shown are current as of the date of this map. The user should ontact appropriate community officials to determine if corporate limits have hanged subsequent to the issuance of this map.

or community map revision history prior to countywide mapping, see section .0 of the Flood Insurance Study Report.

or adjoining map panels see separately printed Map Index.

IGITAL DATA AVAILABILITY: Digital files containing the thematic floodplain nformation shown on these maps are published by the Federal Emergency anagement Agency in DLG-3 Optional format on CD-ROM. Requests for data hould include the full name of the community or county and the Flood nsurance Rate Map panel numbers covered by the request. Contact the ederal Emergency Management Agency, Flood Map Distribution Center, 6930 A-F) San Tomas Road, Baltimore, Maryland 21227-6227. elephone 1-800-358-9616.

OTE: The coordinate system used for the production of this Flood Insurance Rate Map (FIRM) is Universal Transverse Mercator (UTM), North American atum of 1927 (NAD27), Clarke 1866 spheroid. Corner coordinates shown on e FIRM are in latitude and longitude referenced to the Transverse Mercator rojection, NAD27. Differences in the datum and spheroid used in the roduction of FIRMs for adjacent counties may result in slight positional ifferences in map features at the county boundaries. These differences o not affect the accuracy of the information shown on the FIRM.

TTENTION: Flood elevations on this map are referenced to the National eodetic Vertical Datum of 1929. These flood elevations must be compared o structure and ground elevations referenced to the same datum. For information regarding conversion between the National Geodetic Vertical Datum f 1929 and the North American Vertical Datum of 1988, contact the ational Geodetic Survey at the following address:

ertical Network Branch, N/CG13
ational Geodetic Survey, NOAA
ilver Spring Metro Center 3
315 East-West Highway
ilver Spring, Maryland 20910
301) 713-3191

ase Map Source: 1:100,000 USGS Digital Line Graphs. Map users should be ware that this base map source causes road alignment distortions at and near oad intersections. These alignment problems have been corrected in the vicinity f identified floodplains.

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION IN FT. (NGVD)[1]	DESCRIPTION OF LOCATION
RM 312	42.48	Standard U.S. Coastal and Geodetic Survey and SS disk stamped 826 set in concrete at south edge of north sidewalk along River Edge Avenue, located approximately 80.45 feet east of utility pole 60002RE.
RM 313	12.00	Sanitary manhole rim intersection of Harvard Street and River Edge Avenue.
RM 314	7.07	Sanitary manhole rim, south end of Cornell Street.
RM 315	16.04	Sanitary manhole rim, intersection of River Lane and Maple Drive.
RM 316	11.02	Sanitary manhole rim, intersection of Roosevelt Avenue and Maple Avenue.
RM 317	17.162	Standard U.S. Coastal and Geodetic Survey disk, stamped 040, set in top of concrete wing wall at northwest corner of New Bridge Road bridge over Hackensack River.
RM 318	69.39	Sanitary manhole rim along West Clinton Avenue, approximately 320 feet west of intersection with South Queen Street.
RM 319	86.70	Sanitary manhole rim at intersection of Somers Avenue and South Queen Street.
RM 320	61.28	Sanitary manhole rim along Halberg Avenue, approximately 105 feet west of intersection with Valcourt Place.
RM 321	63.11	Sanitary manhole rim, at end of Ridge Court.
RM 322	34.14	Sanitary manhole rim, intersection of Boulevard and Floral Court.
RM 323	28.13	Sanitary manhole rim, intersection of Birchwood Road and Evergreen Court.
RM 324	29.82	Sanitary manhole rim, intersection of Vamel Drive and Warren Street.
RM 325	15.28	Sanitary manhole rim, intersection of New Bridge Road and Birchwood Road.
RM 326	9.70	Sanitary manhole rim, intersection of New Bridge Road and Rosse Avenue.
RM 327	45.30	Sanitary manhole rim at north end of Seargent Court.
RM 328	46.51	Sanitary manhole rim at intersection of Waters Street and Blauvelt Avenue.
RM 329	51.85	Sanitary manhole rim at southwest corner of Mods Lane.
RM 330	59.69	Sanitary manhole rim at intersection of Cleveland Street and North Demarest Avenue.
RM 331	66.17	Sanitary manhole rim at intersection of South Demarest Avenue and Van Houten Street.
RM 332	60.63	Sanitary manhole rim at intersection of Roosevelt Avenue and Anderson Avenue.
RM 333	70.20	Sanitary manhole rim along Woodbine Street, approximately 25 feet north of intersection with West Broad Avenue.
RM 334	69.08	Sanitary manhole rim at intersection of Greenwich Drive and north side of Greenwich Street.
RM 335	73.07	Sanitary manhole rim at intersection of New Bridge Road and Woodbine Street.

[1]National Geodetic Vertical Datum of 1929.

LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE A99	To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X	Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X	Areas determined to be outside 500-year floodplain.
ZONE D	Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS*

Identified 1983 — Identified 1990 — Otherwise Protected Areas

*Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 — Base Flood Elevation Line; Elevation in Feet**

A — A — Cross Section Line

(EL 987) — Base Flood Elevation in Feet Where Uniform Within Zone**

RM7x — Elevation Reference Mark

●M1.5 — River Mile

**Referenced to the National Geodetic Vertical Datum of 1929

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
SEPTEMBER 20, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

Refer to the FLOOD INSURANCE RATE MAP effective date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

N

APPROXIMATE SCALE

500 0 500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

BERGEN COUNTY,
NEW JERSEY
(ALL JURISDICTIONS)

PANEL 192 OF 332

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BERGENFIELD, BOROUGH OF	340020	0192	F
DUMONT, BOROUGH OF	340026	0192	F
HACKENSACK, CITY OF	340039	0192	F
NEW MILFORD, BOROUGH OF	340054	0192	F
RIVER EDGE, BOROUGH OF	340068	0192	F
TEANECK, TOWNSHIP OF	340075	0192	F

Notice to User: The MAP NUMBER shown below should be used when placing map orders; the COMMUNITY NUMBER shown above should be used on insurance applications for the subject community.

MAP NUMBER
34003C0192 F

EFFECTIVE DATE:
SEPTEMBER 20, 1995

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas. The community map repository should be consulted for possible updated flood hazard information prior to use of this map for property purchase or construction purposes.

Coastal base flood elevations apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NVGD), and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of special flood hazard (100-year flood) include Zones A, AE, AH, AO, A99, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For community map revision history prior to countywide mapping, see section 6.0 of the Flood Insurance Study Report.

For adjoining map panels see separately printed Map Index.

DIGITAL DATA AVAILABILITY: Digital files containing the thematic floodplain information shown on these maps are published by the Federal Emergency Management Agency in DLG-3 Optional format on CD-ROM. Requests for data should include the full name of the community or county and the Flood Insurance Rate Map panel numbers covered by the request. Contact the Federal Emergency Management Agency, Flood Map Distribution Center, 6930 (A-F) San Tomas Road, Baltimore, Maryland 21227-6227.
Telephone 1-800-358-9616.

NOTE: The coordinate system used for the production of this Flood Insurance Rate Map (FIRM) is Universal Transverse Mercator (UTM), North American Datum of 1927 (NAD27), Clarke 1866 spheroid. Corner coordinates shown on the FIRM are in latitude and longitude referenced to the Transverse Mercator projection, NAD27. Differences in the datum and spheroid used in the production of FIRMs for adjacent counties may result in slight positional differences in map features at the county boundaries. These differences do not affect the accuracy of the information shown on the FIRM.

ATTENTION: Flood elevations on this map are referenced to the National Geodetic Vertical Datum of 1929. These flood elevations must be compared to structure and ground elevations referenced to the same datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, contact the National Geodetic Survey at the following address:

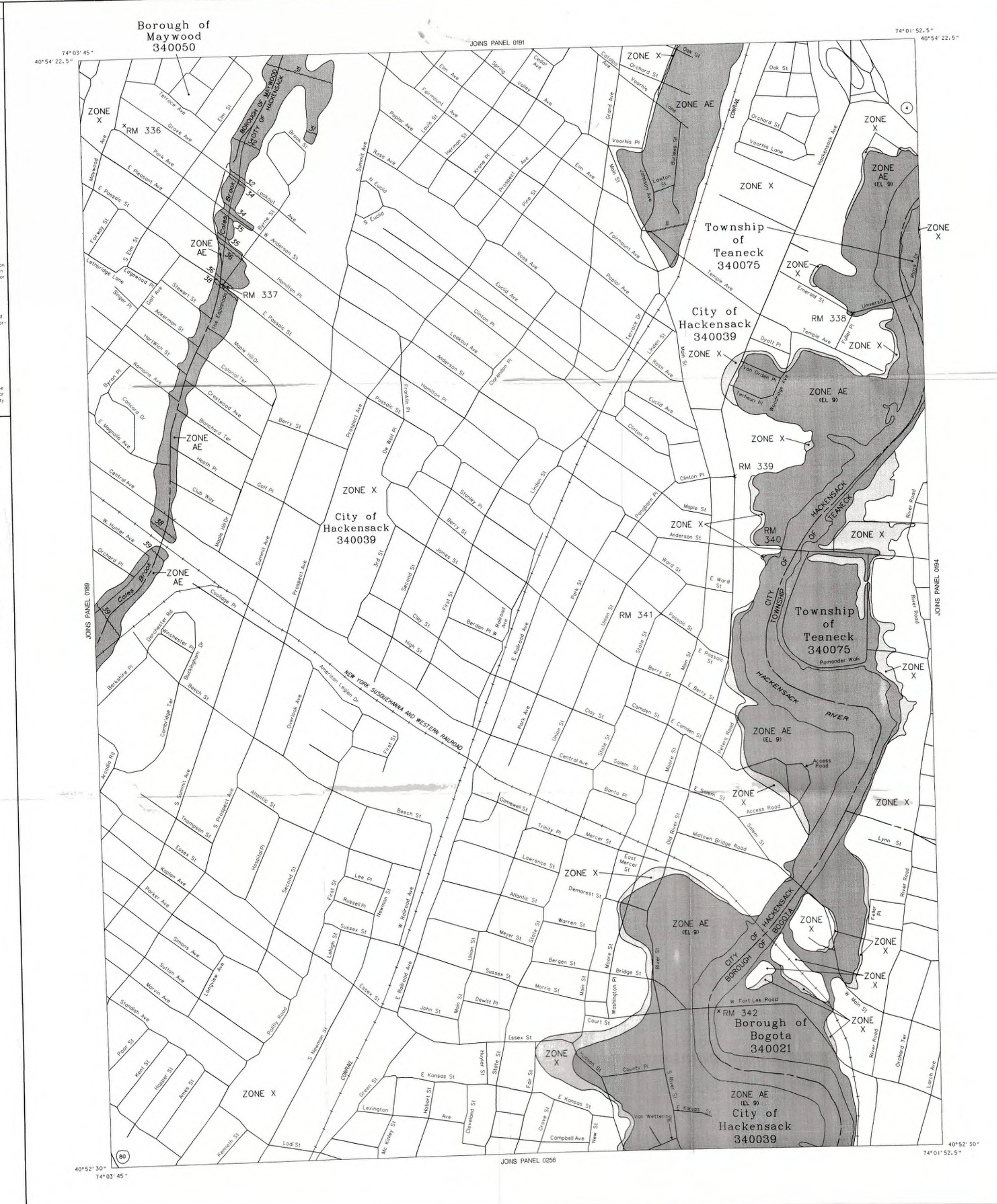
Vertical Network Branch, N/CG13
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

Base Map Source: 1:100,000 USGS Digital Line Graphs. Map users should be aware that this base map source causes road alignment distortions at and near road intersections. These alignment problems have been corrected in the vicinity of identified floodplains.

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION IN FT. (NGVD)[1]	DESCRIPTION OF LOCATION
RM 336	94.24	At borough hall on W. Anderson Street, approximately 39 feet northeast of centerline of W. Anderson Street, and approximately 3 feet southwest of monument erected in memory of World War dead. Standard disk, stamped 94.239 MAYWOOD 1933 and set in top of concrete post about flush with ground.
RM 337	36.77	Standard monel metal rivet on Passaic Street at north end of Esplanade Place, at Maywood-Hackensack city line, approximately 30 feet north of centerline of Passaic Street, in top of west end of concrete coping of culvert, and level with sidewalk.
RM 338	12.19	Top of fire hydrant at southeast corner of intersection of University Plaza Drive and Fuller Place.
RM 339	20.41	Top of operating nut of fire hydrant No. 24-242, set on east side of Hackensack Avenue at entrance to Johnson Park.
RM 340	13.34	Standard U.S. Coastal and Geodetic Survey triangulation station disk, stamped W. Anderson 2, set in sidewalk at northwest end of East Anderson Street bridge over Hackensack River.
RM 341	24.508	Standard New Jersey Geodetic and Coastal Survey disk, monument No. 6840, set on west corner of intersection of Passaic Street and State Street.
RM 342	9.6	End guardrail post at west end of downstream face of West Fort Lee Road.

[1]National Geodetic Vertical Datum of 1929.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE A99	To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X	Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X	Areas determined to be outside 500-year floodplain.
ZONE D	Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS*

Identified 1983 | Identified 1990 | Otherwise Protected Areas

*Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

	Floodplain Boundary
	Floodway Boundary
	Zone D Boundary
	Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.
513	Base Flood Elevation Line; Elevation in Feet**
A — A	Cross Section Line
(EL 987)	Base Flood Elevation in Feet Where Uniform Within Zone**
RM7 x	Elevation Reference Mark
•M1.5	River Mile

**Referenced to the National Geodetic Vertical Datum of 1929

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
SEPTEMBER 20, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

Refer to the FLOOD INSURANCE RATE MAP effective date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

N

APPROXIMATE SCALE

500 0 500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

**BERGEN COUNTY,
NEW JERSEY
(ALL JURISDICTIONS)**

PANEL 193 OF 332

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BOGOTA, BOROUGH OF	340021	0193	F
HACKENSACK, CITY OF	340039	0193	F
MAYWOOD, BOROUGH OF	340050	0193	F
TEANECK, TOWNSHIP OF	340075	0193	F

Notice to User: The MAP NUMBER shown below should be used when placing map orders; the COMMUNITY NUMBER shown above should be used on insurance applications for the subject community.

MAP NUMBER
34003C0193 F

EFFECTIVE DATE:
SEPTEMBER 20, 1995

Federal Emergency Management Agency

NOTES TO USERS

his map is for use in administering the National Flood Insurance Program; it oes not necessarily identify all areas subject to flooding, particularly from local rainage sources of small size, or all planimetric features outside Special lood Hazard Areas. The community map repository should be consulted for ossible updated flood hazard information prior to use of this map for property urchase or construction purposes.

oastal base flood elevations apply only landward of 0.0' National Geodetic ertical Datum of 1929 (NVGD), and include the effects of wave action; these levations may also differ significantly from those developed by the National 'eather Service for hurricane evacuation planning.

reas of special flood hazard (100-year flood) include Zones A, AE, AH, AO, A99, , and VE.

ertain areas not in Special Flood Hazard Areas may be protected by flood ontrol structures.

oundaries of the floodways were computed at cross sections and interpolated etween cross sections. The floodways were based on hydraulic considerations ith regard to requirements of the Federal Emergency Management Agency.

oodway widths in some areas may be too narrow to show to scale. Floodway idths are provided in the Flood Insurance Study Report.

orporate limits shown are current as of the date of this map. The user should ontact appropriate community officials to determine if corporate limits have hanged subsequent to the issuance of this map.

or community map revision history prior to countywide mapping, see section 0 of the Flood Insurance Study Report.

or adjoining map panels see separately printed Map Index.

IGITAL DATA AVAILABILITY: Digital files containing the thematic floodplain formation shown on these maps are published by the Federal Emergency anagement Agency in DLG-3 Optional format on CD-ROM. Requests for data hould include the full name of the community or county and the Flood surance Rate Map panel numbers covered by the request. Contact the ederal Emergency Management Agency, Flood Map Distribution Center, 6930 A-F) San Tomas Road, Baltimore, Maryland 21227-6227. elephone 1-800-358-9616.

OTE: The coordinate system used for the production of this Flood Insurance Rate Map (FIRM) is Universal Transverse Mercator (UTM), North American atum of 1927 (NAD27), Clarke 1866 spheroid. Corner coordinates shown on e FIRM are in latitude and longitude referenced to the Transverse Mercator rojection, NAD27. Differences in the datum and spheroid used in the roduction of FIRMs for adjacent counties may result in slight positional ifferences in map features at the county boundaries. These differences o not affect the accuracy of the information shown on the FIRM.

TTENTION: Flood elevations on this map are referenced to the National eodetic Vertical Datum of 1929. These flood elevations must be compared structure and ground elevations referenced to the same datum. For information regarding conversion between the National Geodetic Vertical Datum 1929 and the North American Vertical Datum of 1988, contact the ational Geodetic Survey at the following address:

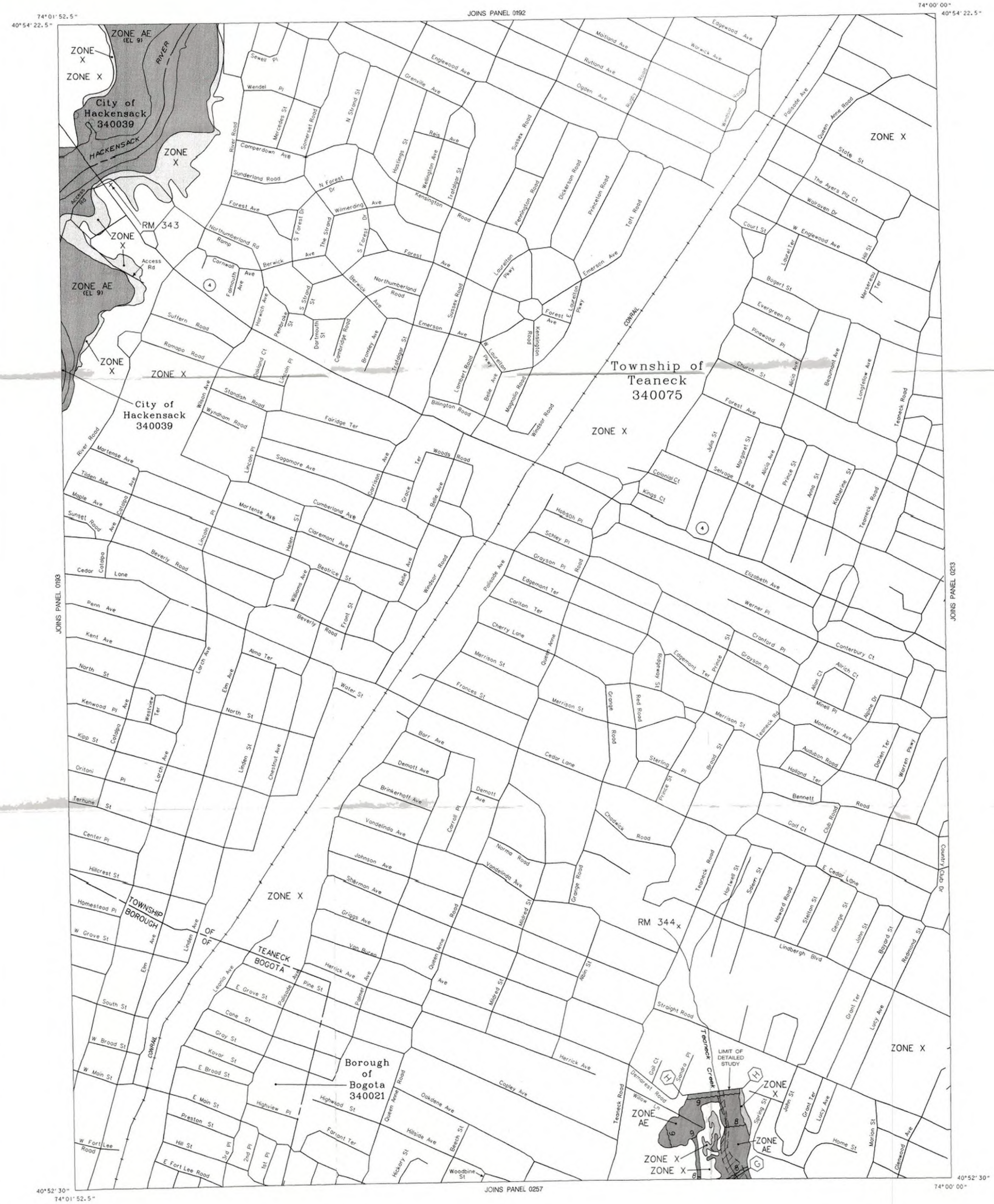
ertical Network Branch, N/CG13
ational Geodetic Survey, NOAA
lver Spring Metro Center 3
315 East-West Highway
lver Spring, Maryland 20910
01) 713-3191

ase Map Source: 1:100,000 USGS Digital Line Graphs. Map users should be ware that this base map source causes road alignment distortions at and near ad intersections. These alignment problems have been corrected in the vicinity identified floodplains.

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION IN FT. (NGVD)[1]	DESCRIPTION OF LOCATION
RM 343	39.231	Standard monel rivet, stamped 1411, set in base of northeast parapet, immediately southeast of southeast abutment of State Route 4 bridge over the Hackensack River, and approximately 1,050 feet northwest of intersection of River Road and State Route 4.
RM 344	33.991	Standard New Jersey Geodetic and Coastal Survey disk, stamped 6898, set in concrete approximately 5.8 feet north from north corner of catch basin at west curb of Teaneck Road approximately 800 feet northeast along Teaneck Road from intersection with Fycke Lane.

[1]National Geodetic Vertical Datum of 1929.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE A99	To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X — Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X — Areas determined to be outside 500-year floodplain.

ZONE D — Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS*

Identified 1983 — Identified 1990 — Otherwise Protected Areas

*Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 — Base Flood Elevation Line; Elevation in Feet**

A — A — Cross Section Line

(EL 987) — Base Flood Elevation in Feet Where Uniform Within Zone**

RM7 x — Elevation Reference Mark

• M1.5 — River Mile

**Referenced to the National Geodetic Vertical Datum of 1929

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
SEPTEMBER 20, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

Refer to the FLOOD INSURANCE RATE MAP effective date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE
500 0 500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

**BERGEN COUNTY,
NEW JERSEY
(ALL JURISDICTIONS)**

PANEL 194 OF 332

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BOGOTA, BOROUGH OF	340021	0194	F
HACKENSACK, CITY OF	340039	0194	F
TEANECK, TOWNSHIP OF	340075	0194	F

Notice to User: The MAP NUMBER shown below should be used when placing map orders; the COMMUNITY NUMBER shown above should be used on insurance applications for the subject community.

MAP NUMBER
34003C0194 F

EFFECTIVE DATE:
SEPTEMBER 20, 1995

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas. The community map repository should be consulted for possible updated flood hazard information prior to use of this map for property purchase or construction purposes.

Coastal base flood elevations apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NVGD), and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of special flood hazard (100-year flood) include Zones A, AE, AH, AO, A99, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For community map revision history prior to countywide mapping, see section 6.0 of the Flood Insurance Study Report.

For adjoining map panels see separately printed Map Index.

DIGITAL DATA AVAILABILITY: Digital files containing the thematic floodplain information shown on these maps are published by the Federal Emergency Management Agency in DLG-3 Optional format on CD-ROM. Requests for data should include the full name of the community or county and the Flood Insurance Rate Map panel numbers covered by the request. Contact the Federal Emergency Management Agency, Flood Map Distribution Center, 6930 (A-F) San Tomas Road, Baltimore, Maryland 21227-6227.
Telephone 1-800-358-9616.

NOTE: The coordinate system used for the production of this Flood Insurance Rate Map (FIRM) is Universal Transverse Mercator (UTM), North American Datum of 1927 (NAD27), Clarke 1866 spheroid. Corner coordinates shown on the FIRM are in latitude and longitude referenced to the Transverse Mercator projection, NAD27. Differences in the datum and spheroid used in the production of FIRMs for adjacent counties may result in slight positional differences in map features at the county boundaries. These differences do not affect the accuracy of the information shown on the FIRM.

ATTENTION: Flood elevations on this map are referenced to the National Geodetic Vertical Datum of 1929. These flood elevations must be compared to structure and ground elevations referenced to the same datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, contact the National Geodetic Survey at the following address:

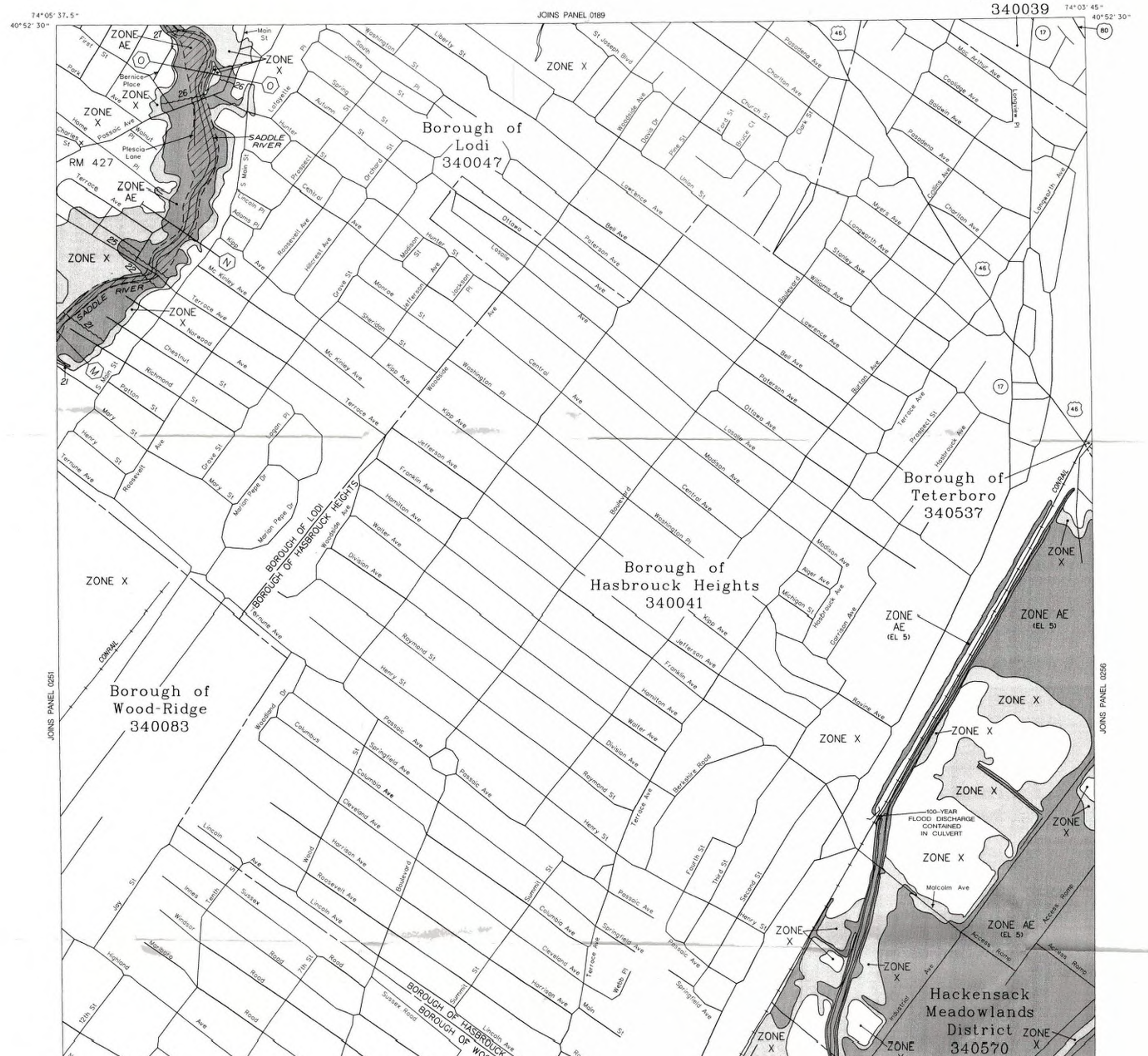
Vertical Network Branch, N/CG13
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

Base Map Source: 1:100,000 USGS Digital Line Graphs. Map users should be aware that this base map source causes road alignment distortions at and near road intersections. These alignment problems have been corrected in the vicinity of identified floodplains.

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION IN FT. (NGVD)[1]	DESCRIPTION OF LOCATION
RM 427	36.25	Standard New Jersey Geodetic Control Survey disk (Mon. 3825) in sidewalk on north corner of Passaic Avenue and Charles Street.

[1]National Geodetic Vertical Datum of 1929.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE A99	To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X	Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X	Areas determined to be outside 500-year floodplain.
ZONE D	Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS*

Identified 1983 — Identified 1990 — Otherwise Protected Areas

*Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

	Floodplain Boundary
	Floodway Boundary
	Zone D Boundary
	Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.
513	Base Flood Elevation Line; Elevation in Feet**
(A)—(A)	Cross Section Line
(EL 987)	Base Flood Elevation in Feet Where Uniform Within Zone**
RM7 x	Elevation Reference Mark
●M1.5	River Mile

**Referenced to the National Geodetic Vertical Datum of 1929

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
SEPTEMBER 20, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

Refer to the FLOOD INSURANCE RATE MAP effective date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE
500 0 500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

BERGEN COUNTY, NEW JERSEY (ALL JURISDICTIONS)

PANEL 252 OF 332

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CARLSTADT, BOROUGH OF	340022	0252	F
HACKENSACK, CITY OF	340039	0252	F
HACKENSACK MEADOWLANDS DISTRICT	340570	0252	F
HASBROUCK HEIGHTS, BOROUGH OF	340041	0252	F
LODI, BOROUGH OF	340047	0252	F
WOOD-RIDGE, BOROUGH OF	340083	0252	F

Notice to User: The MAP NUMBER shown below should be used when placing map orders; the COMMUNITY NUMBER shown above should be used on insurance applications for the subject community.

MAP NUMBER
34003C0252 F

EFFECTIVE DATE:
SEPTEMBER 20, 1995

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas. The community map repository should be consulted for possible updated flood hazard information prior to use of this map for property purchase or construction purposes.

Coastal base flood elevations apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NVGD), and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of special flood hazard (100-year flood) include Zones A, AE, AH, AO, A99, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For community map revision history prior to countywide mapping, see section 6.0 of the Flood Insurance Study Report.

For adjoining map panels see separately printed Map Index.

DIGITAL DATA AVAILABILITY: Digital files containing the thematic floodplain information shown on these maps are published by the Federal Emergency Management Agency in DLG-3 Optional format on CD-ROM. Requests for data should include the full name of the community or county and the Flood Insurance Rate Map panel numbers covered by the request. Contact the Federal Emergency Management Agency, Flood Map Distribution Center, 6930 (A-F) San Tomas Road, Baltimore, Maryland 21227-6227.
Telephone 1-800-358-9616.

NOTE: The coordinate system used for the production of this Flood Insurance Rate Map (FIRM) is Universal Transverse Mercator (UTM), North American Datum of 1927 (NAD27), Clarke 1866 spheroid. Corner coordinates shown on the FIRM are in latitude and longitude referenced to the Transverse Mercator projection, NAD27. Differences in the datum and spheroid used in the production of FIRMs for adjacent counties may result in slight positional differences in map features at the county boundaries. These differences do not affect the accuracy of the information shown on the FIRM.

ATTENTION: Flood elevations on this map are referenced to the National Geodetic Vertical Datum of 1929. These flood elevations must be compared to structure and ground elevations referenced to the same datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, contact the National Geodetic Survey at the following address:

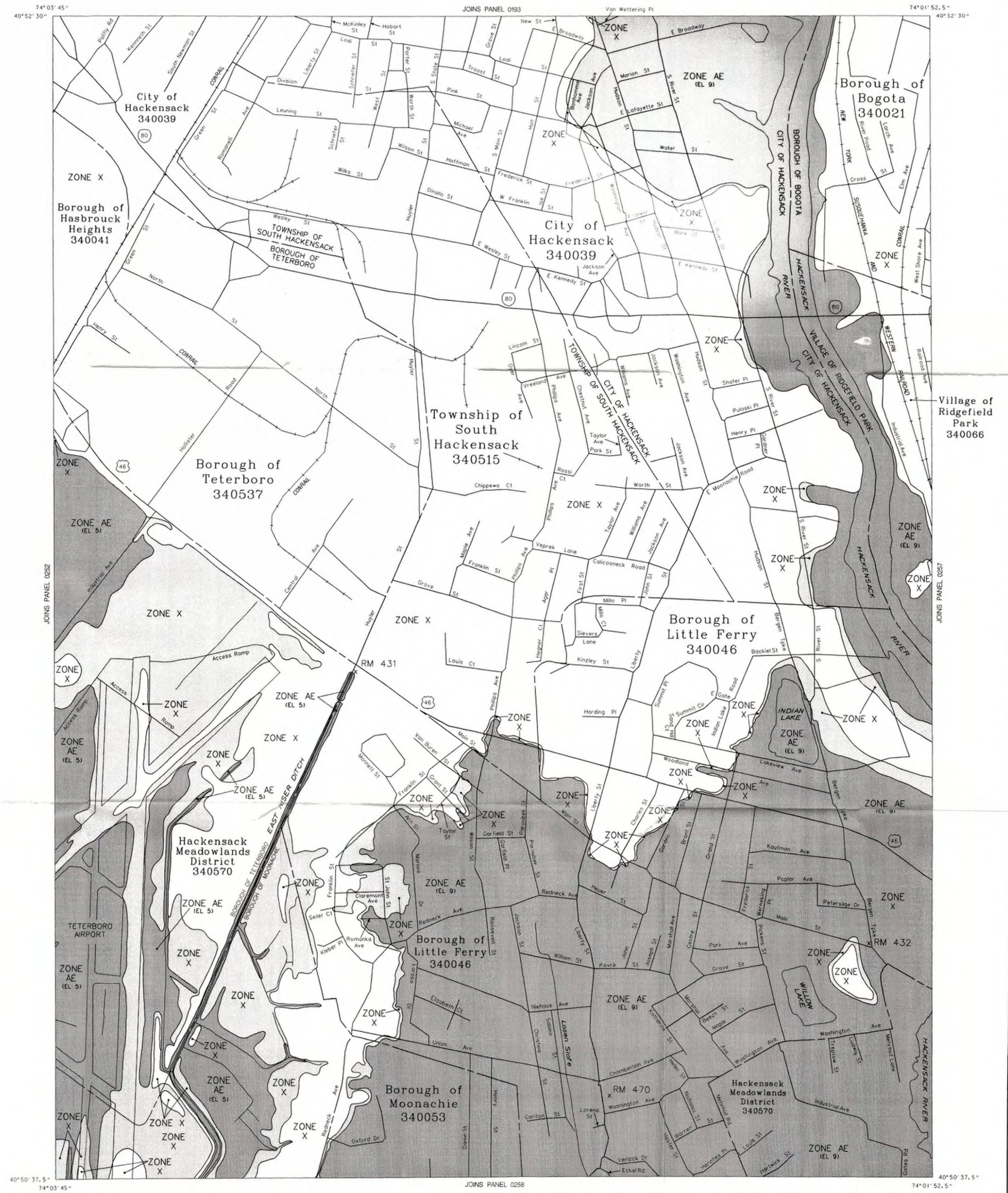
Vertical Network Branch, N/CG13
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

Base Map Source: 1:100,000 USGS Digital Line Graphs. Map users should be aware that this base map source causes road alignment distortions at and near road intersections. These alignment problems have been corrected in the vicinity of identified floodplains.

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION IN FT. (NGVD)[1]	DESCRIPTION OF LOCATION
RM 431	8.031	Standard U.S. Coastal and Geodetic Survey disk, stamped EA1, set in top of downstream headwall of East Riser Ditch culvert under U.S. Route 46.
RM 432	6.21	Standard New Jersey Geodetic and Coastal Survey monel rivet, No. 1228, set in south end of concrete sill at main entrance to building at northwest corner of intersection of Bergen Turnpike and Main Street.
RM 470	7.808	Standard U.S. Coastal and Geodetic Survey disk, stamped A62, set approximately 1.5 feet above ground in southwest corner of brick wall of St. Margareta R.C. school on east side of Liberty Street.

[1] National Geodetic Vertical Datum of 1929.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE A99	To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.
ZONE V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X	Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X	Areas determined to be outside 500-year floodplain.
ZONE D	Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS*

Identified 1983 | Identified 1990 | Otherwise Protected Areas

*Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

	Floodplain Boundary
	Floodway Boundary
	Zone D Boundary
	Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.
513	Base Flood Elevation Line; Elevation in Feet**
A — A	Cross Section Line
(EL 987)	Base Flood Elevation in Feet Where Uniform Within Zone**
$RM7_x$	Elevation Reference Mark
●M1.5	River Mile

**Referenced to the National Geodetic Vertical Datum of 1929

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
SEPTEMBER 20, 1995

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

Refer to the FLOOD INSURANCE RATE MAP effective date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE
500 0 500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

BERGEN COUNTY, NEW JERSEY (ALL JURISDICTIONS)

PANEL 256 OF 332

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BOGOTA, BOROUGH OF	340021	0256	F
HACKENSACK, CITY OF	340039	0256	F
HACKENSACK MEADOWLANDS DISTRICT	340570	0256	F
HASBROUCK HEIGHTS, BOROUGH OF	340041	0256	F
LITTLE FERRY, BOROUGH OF	340046	0256	F
MOONACHIE, BOROUGH OF	340053	0256	F
RIDGEFIELD PARK, VILLAGE OF	340066	0256	F
SOUTH HACKENSACK, TOWNSHIP OF	340515	0256	F

Notice to User: The MAP NUMBER shown below should be used when placing map orders; the COMMUNITY NUMBER shown above should be used on insurance applications for the subject community.

MAP NUMBER
34003C0256 F

EFFECTIVE DATE:
SEPTEMBER 20, 1995

Federal Emergency Management Agency