MUNICIPAL STORMWATER MANAGEMENT PLAN

BOROUGH OF FANWOOD

UNION COUNTY, NEW JERSEY

JUNE 2005

KUPPER ASSOCIATES

TABLE OF CONTENTS

LIST OF TABLES

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

1.0 INTRODUCTION

1.1 New Stormwater Rules

The New Jersey Department of Environmental Protection ("NJDEP") has issued two sets of new stormwater rules that became effective on February 2, 2004. This is the first major update of NJDEP's stormwater rules since their initial adoption in1983.

The first set of new rules comprises the Phase II New Jersey Pollutant Discharge Elimination ("NJPDES") Stormwater Regulation Program Rules (N.J.A.C. 7:14A), which establish a regulatory program for existing stormwater discharges. The second set of new rules is the Stormwater Management Rules (N.J.A.C. 7:8), which set forth the required components of stormwater management plans and establish design and performance standards for "major" development. (A major development is one that disturbs one or more acres of land; or, increases impervious surface by one-quarter acre or more. A single family dwelling on a single lot would typically not be subject to the Rules.) Together, the two sets of rules establish a comprehensive framework for addressing water quality impacts associated with existing and future stormwater discharges.

For residential development, the design and performance standards established in the Rules became immediately effective for local approvals through the Residential Site Improvement Standards ("RSIS"). For non-residential development, the rules will not be applied at the local level until a municipal ordinance is passed adopting these standards. The rules will be immediately applied to a non-residential development if it requires any of four permits (stream encroachment, wetlands, CAFRA or waterfront development) under NJDEP's Land Use Regulation Program ("LURP").

1.2 Stormwater Permit

The Borough of Fanwood ("Borough" or "Fanwood") has been issued a NJPDES Tier A Municipal Stormwater Permit (Tier A Permit) under the new rules. The permit has an Effective Date of Permit Authorization (EDPA) of April 1, 2004. The Tier A permit sets forth Statewide Basic Requirements that must be implemented by the Borough to reduce nonpoint

source pollutant loads. The requirements are to be implemented in accordance with a timetable that extends out to 60 months from the EDPA. The Borough is required to develop a Municipal Stormwater Management Plan (MSWMP) within 12 months of the EDPA.

1.3 Stormwater Management Plan

This MSWMP documents Fanwood's strategy for addressing the impacts of stormwater runoff from new developments. The plan contains all of the required elements described in NJDEP's Stormwater Management Rules (N.J.A.C. 7:8). The plan addresses groundwater recharge, stormwater quantity, and stormwater quality impacts by incorporating stormwater design and performance standards for new major development (defined as projects that disturb one or more acre of land; or, increases impervious surface by one-quarter acre or more). These standards are intended to minimize the adverse impact of stormwater runoff on water quality and water quantity and the loss of groundwater recharge that provides baseflow in receiving water bodies. The plan describes long-term operation and maintenance measures for existing and future stormwater facilities.

The plan also addresses the review and update of existing ordinances, the Borough Master Plan, and other planning documents to allow for project designs that include low impact development techniques. Under the Municipal Land Use Law ("MLUL"), a municipal stormwater management plan is an integral part of any master plan prepared by the municipality pursuant to the MLUL. (Specifically, it is part of the utility service plan element of the master plan.)

The final component of this plan is a mitigation strategy for when a variance or exemption of the design and performance standards is sought. As part of the mitigation section of the stormwater plan, specific stormwater management measures are identified to lessen the impact of existing development.

2.0 GOALS

The goals of this MSWMP are to:

- reduce flood damage, including damage to life and property;
- minimize, to the extent practical, any increase in stormwater runoff from any new development;
- reduce soil erosion from any development or construction project;

- assure the adequacy of existing and proposed culverts and bridges, and other in-stream structures;
- maintain groundwater recharge;
- prevent, to the greatest extent feasible, an increase in nonpoint pollution;
- maintain the integrity of stream channels for their biological functions, as well as for drainage;
- minimize pollutants in stormwater runoff from new and existing development to restore, enhance, and maintain the chemical, physical, and biological integrity of the waters of the state, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, and other uses of water; and
- protect public safety through the proper design and operation of stormwater basins.

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

3.0 STORMWATER DISCUSSION

3.1 The Hydrologic Cycle

Land development can dramatically alter the hydrologic cycle of a site and, ultimately, an entire watershed. (See Figure C-1.) Prior to development, native vegetation can either directly intercept precipitation or draw that portion that has infiltrated into the ground and return it to the atmosphere through evapotranspiration.

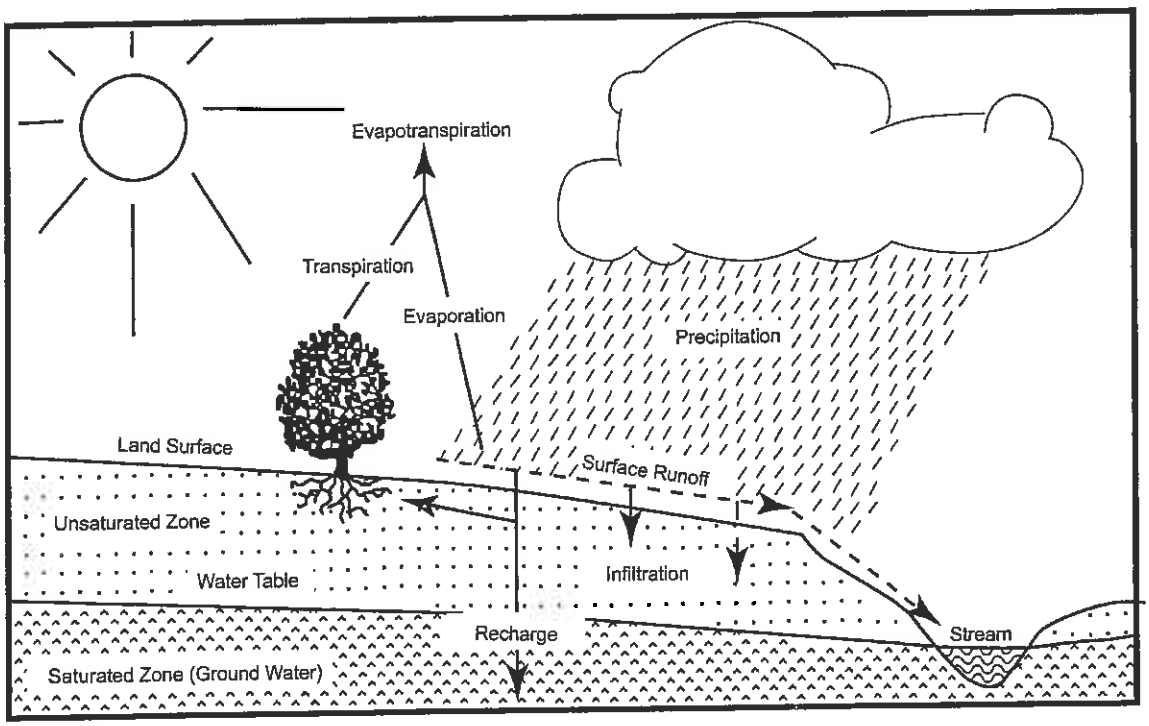
Development can remove this beneficial vegetation and replace it with lawn or impervious cover, reducing the site's evapotranspiration and infiltration rates. Clearing and grading a site can remove depressions that store rainfall. Construction activities may also compact the soil and diminish its infiltration ability, resulting in increased volumes and rates of stormwater runoff from the site.

Impervious areas that are connected to each other through gutters, channels, and storm sewers can transport runoff more quickly than natural areas. This shortening of the transport or travel time quickens the rainfall-runoff response of the drainage area, causing

flow in downstream waterways to peak faster and higher than natural conditions. These increases can cause or aggravate downstream flooding and erosion problems and increase the quantity of sediment in the channel. Filtration of runoff and removal of pollutants by surface and channel vegetation is eliminated by storm sewers that discharge runoff directly into a stream.

Increases in impervious area can also decrease opportunities for infiltration, which, in turn, reduces stream base flow and groundwater recharge. Reduced base flows and increased peak flows produce greater fluctuations between normal and storm flow rates, which can increase channel erosion. Reduced base flows can also negatively impact the hydrology of adjacent wetlands and the health of biological communities that depend on base flows. Finally, erosion and sedimentation can destroy habitat from which some species cannot adapt.

Figure C-1: Groundwater Recharge in the Hydrologic Cycle



Source: New Jersey Geological Survey Report GSR-32.

3.2 Water Quality

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

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

4.0 BACKGROUND

4.1 Borough Characteristics and Demographics

The Borough encompasses a 1.29 square mile area in Union County, New Jersey. The Borough is a stable, established, suburban community with an older housing stock. In recent years, the Borough has been under minimal development pressure due to the relatively stable population over the past decade and the lack of available land for new development.

The population of the Borough decreased from 7,767 in 1980 to 7,115 in 1990, and then increased slightly to 7,174 in 2000. Twenty-four new privately owned housing units were authorized by building permit for the four-year period from 2000 to 2004. Accordingly, recent changes in the landscape have not had a significant increase on stormwater runoff volumes and pollutant loads to the waterways of the adjoining downstream municipalities.

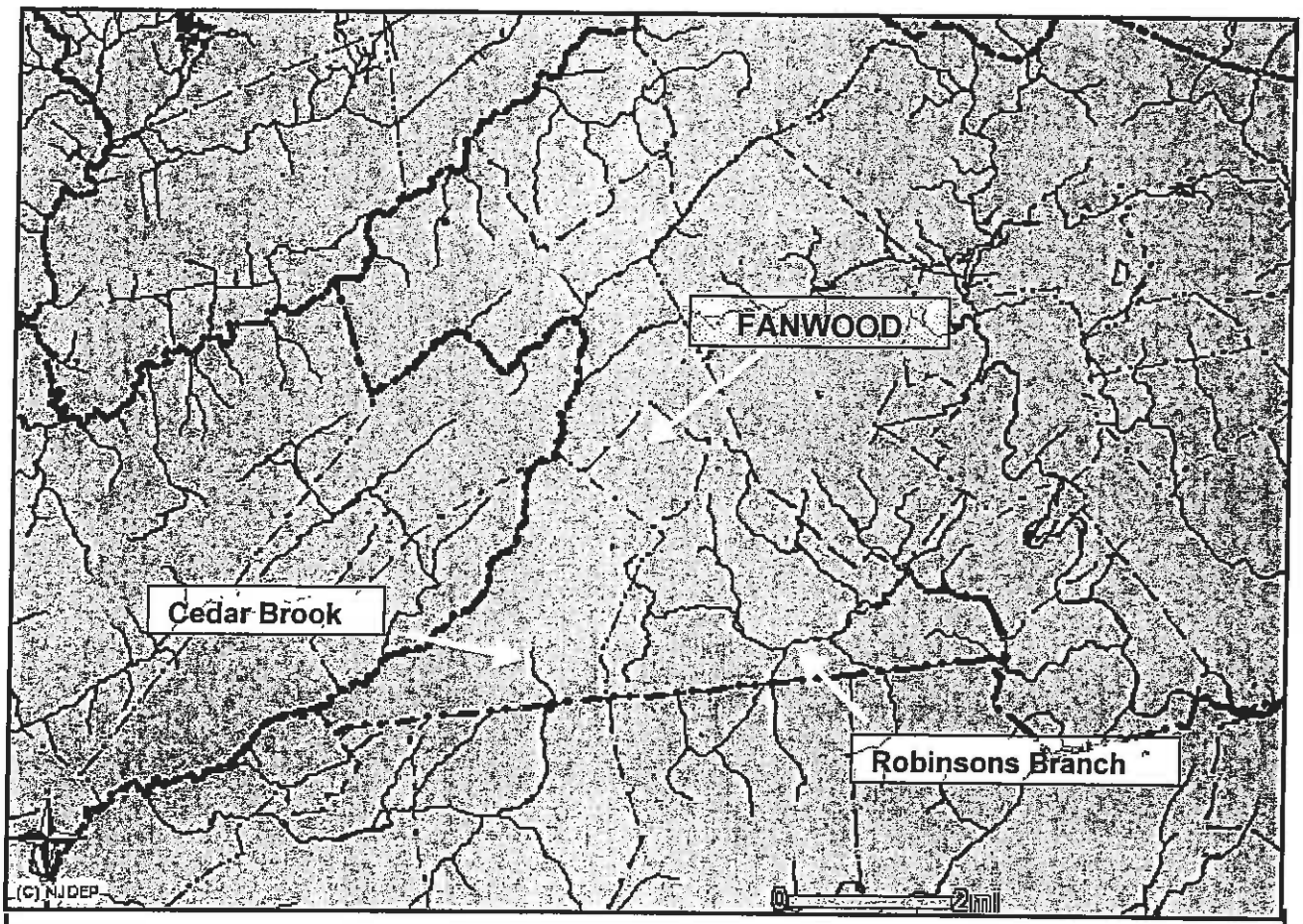
Future building activity will be limited to infill development, redevelopment and the demolition/replacement or expansion of existing homes. Figure C-2 illustrates the downstream waterways in the adjoining municipalities. Figure C-3 depicts the Borough boundary on the USGS quadrangle maps.

4.2 Existing Drainage Patterns

The Borough is situated on a low ridgeline that separates the Raritan River Basin to the northwest from the Rahway River Basin to the southeast. Flows from the northwestern portion of Fanwood are transported to Cedar Brook in Plainfield, which then flow into the Bound Brook. Bound Brook combines with Green Brook and enters the Raritan River along the boundary of the Boroughs of Bound Brook and Middlesex. Flows from the southern part of Fanwood are tributary to the Robinson's Branch of the Rahway River. The Rahway River then flows into the Arthur Kill near Linden. Fanwood receives no flows from adjacent communities, with the exception of the New Jersey Transit railroad bed where some flow enters from Scotch Plains.

The Borough is divided into nine sub-watershed (or sub-drainage basin) areas. Most of the runoff flows through the Borough's storm water piping systems, which discharge to storm drains in Scotch Plains or Plainfield. There are few remaining streams or open waters in the Borough.

Figure C-2: Borough of Fanwood and Its Downstream Waterways



Legend:

- Municipalities
- Counties
- Streams
- Water Bodies
- New Jersey

BOROUGH OF FANWOOD

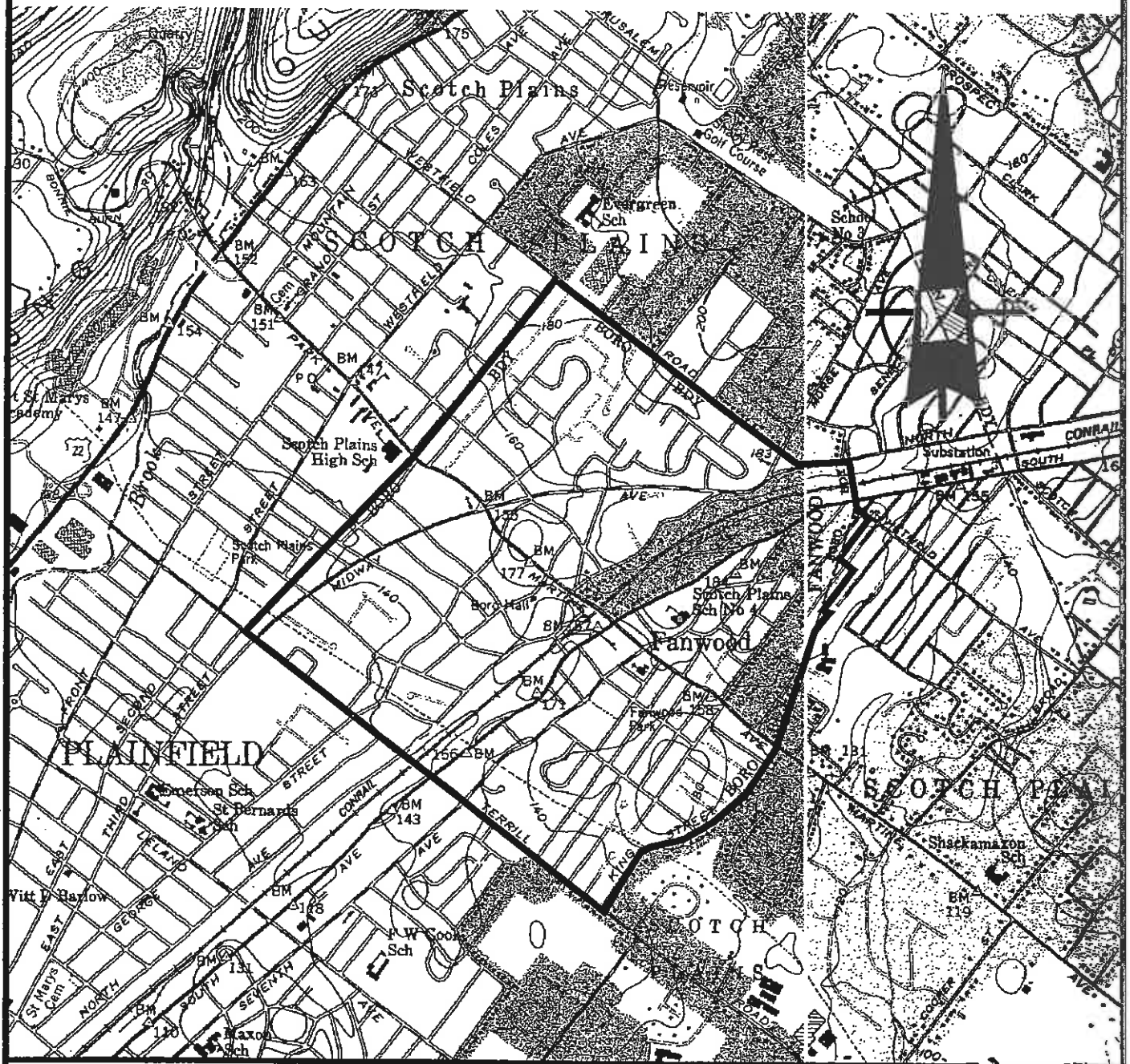
AND ITS DOWNSTREAM WATERWAYS

SOURCE: NJDEP iMAP

KUPPER ASSOCIATES

DATE: 03/05

FIGURE C-2



BOROUGH OF FANWOOD
BOUNDARY ON
USGS QUADRANGLE

SOURCE: CHATHAM AND ROSELLE QUADS

KUPPER ASSOCIATES

DATE: 3/05

FIGURE C-3

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4.3 Biomonitoring

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

The two major rivers to the northwest and south of the Borough are the Raritan River, and the Rahway River. Both are moderately impaired. The Bound Brook and Green Brook, which flow to these major rivers, are also moderately impaired based on AMNET data. No data was available at the time of the search for the Cedar Brook and the Robinson's Branch.

4.4 Total Maximum Daily Loads

In addition to the AMNET data, the NJDEP and other regulatory agencies collect water quality chemical data on the streams in the state. These data show that the instream total phosphorus concentrations and fecal coliform concentrations of the Raritan River and Rahway River frequently exceed the state's criteria. This means that these rivers are impaired waterways and the NJDEP is required to develop a Total Maximum Daily Load (TMDL) for these pollutants for each waterway.

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

The New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d)) (Integrated List) is required by the federal Clean Water Act to be prepared

biennially and is a valuable source of water quality information. This combined report presents the extent to which New Jersey waters are attaining water quality standards, and identifies waters that are impaired. Sublist 5 of the Integrated List constitutes the list of waters impaired or threatened by pollutants, for which one or more TMDLs are needed.

4.5 Localized Flooding

In addition to water quality problems, the Borough has exhibited localized flooding. Areas subject to flooding are shown on the Borough's Flood Area Map," which is attached as Figure C-4. The Borough is currently not covered by a FEMA map.

The areas delineated on the Flood Area Map are not "floodplains" in the classic sense, i.e., areas inundated by a watercourse that overflows its banks. Rather, they primarily represent neighborhoods where poor grading and/or inadequate storm sewers cause localized flooding. The map has been compiled through years of observation.

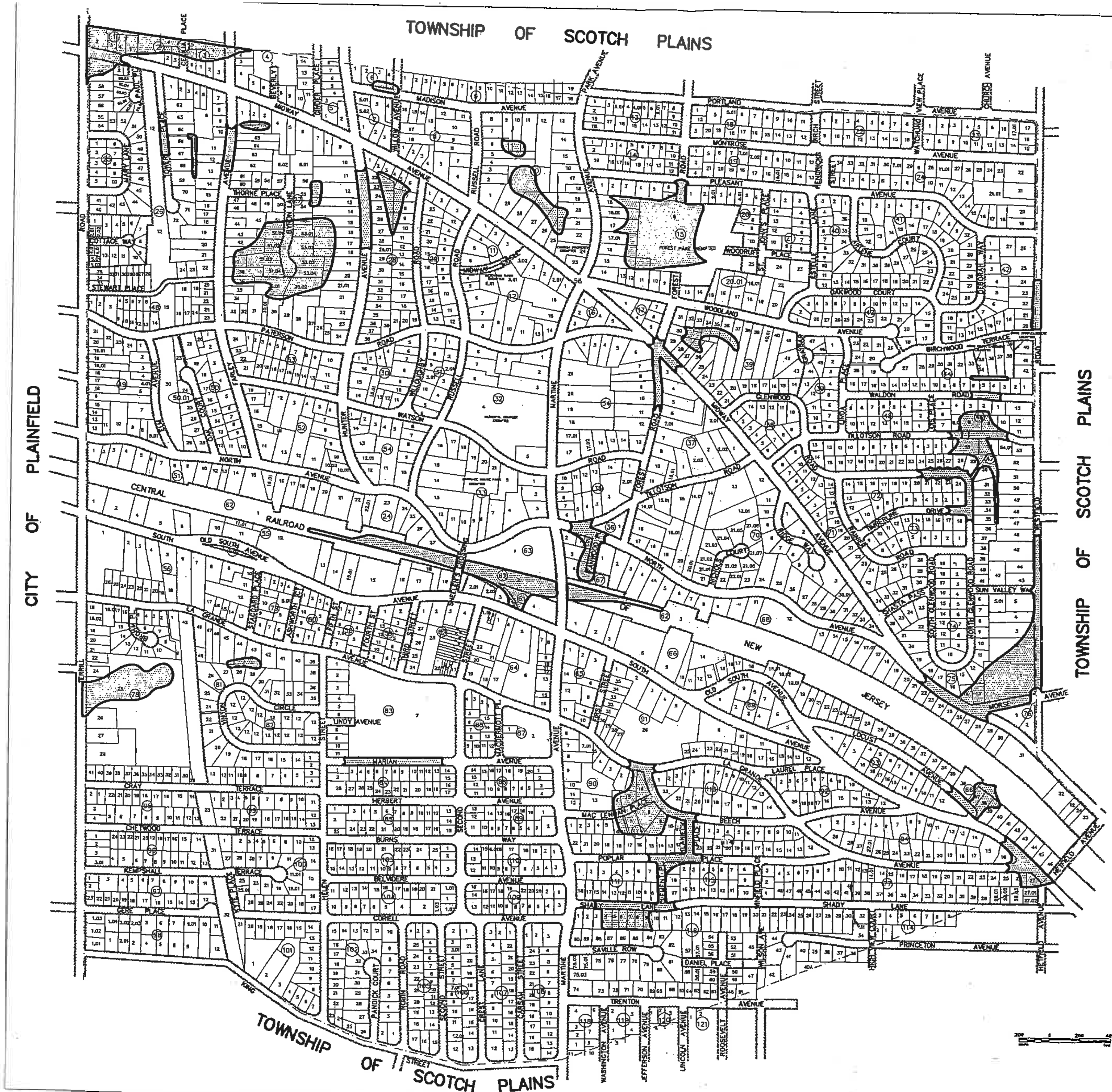
There are several areas of backyard flooding. These areas flood because they are low lying pockets that have no overland relief and/or there are insufficient stormwater collection points (inlets) for the runoff to drain to. Other areas within the Borough flood frequently because the existing stormwater piping system has insufficient capacity to transport all the water from a major storm event that is greater than a five-year storm, thereby causing a backwater effect and flooding upstream. In some cases, the insufficient capacity relates to receiving systems in the adjacent communities of Plainfield and Scotch Plains.

Much of the stormwater collection system was designed many years ago for much different hydrologic conditions (i.e., less impervious area) than presently exist in the Borough. As the imperviousness increased in the Borough, the peak and volumes of stormwater flows also increased. The increased amount of water resulted in pockets of flooded areas.

4.6 Recharge

The high imperviousness of the Borough has likely decreased groundwater recharge to some extent, although the Soil Survey of Union County, New Jersey ("Soil Survey") indicates that recharge in most of the Borough is poor.

The Soil Survey divides Union County into groups of associated soils called general soil map units. Each map unit defines with a soil profile extending from the surface to a



LEGEND

- FLOOD HAZARD AREA
- (74) BLOCK NUMBER
- 7 TAX MAP LOT NUMBER

FIGURE C-4

FLOOD AREA MAP

BASED ON "FLOOD AREA MAP" PREPARED BY RICHARD O. LUSTER ON OCT. 5, 1076 FOR THE AUGUST 2, 1973, "DORIA" AND DATA OF NEW PIPING SYSTEMS THAT REDUCED FLOOD AREAS

BOROUGH OF FANWOOD
UNION COUNTY, NEW JERSEY
APRIL 2004

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depth of approximately five feet. There are seven map units found in Fanwood (excluding a strip of highly disturbed "Urban Land" along Route 28 between Terrill and Martine that cannot be classified further without detailed field investigation). The units are shown on Figure C-5. Some of the properties associated with each unit are shown on Table C-1.

Moderately well drained Birdsboro soils (BhpB) are found in a small, narrow strip in the northwest corner of the Borough. The remaining six map units all exhibit a seasonable high groundwater table and either a slow or very slow infiltration rate when thoroughly wet. The predominant map unit, BovB, has a typical permeability of between 0.06 and 0.2 inches per hour at a depth of three to five feet.

Based on the foregoing, it is not clear how development in Fanwood has impacted base flows in neighboring streams during dry weather periods. Lower base flows can have a negative impact on in-stream habitat during the summer months. Groundwater recharge values for each soil type are shown in Figure C-6. Wellhead protection areas, also required as part of the MSWMP, are shown in Figure C-7.

SOILS LEGEND

BhpB	BIRDSBORO – URBAN LAND COMPLEX, 0 TO 8 PERCENT SLOPES
BohC	BOONTON GRAVELY LOAM, 8 TO 15 PERCENT SLOPES
BovB	BOONTON – URBAN LAND COMPLEX, 0 TO 8 PERCENT SLOPES
HokA	HALEDON LOAM, 0 TO 3 PERCENT SLOPES
HotB	HALEDON – URBAN LAND COMPLEX – HASBROUCK COMPLEX, 0 TO 8 PERCENT SLOPES
HctA	HASBROUCK SILT LOAM, 0 TO 3 PERCENT SLOPES
RasA	RARITAN – URBAN LAND COMPLEX – PASSAIC COMPLEX 0 TO 3 PERCENT SLOPES
UR	URBAN LAND

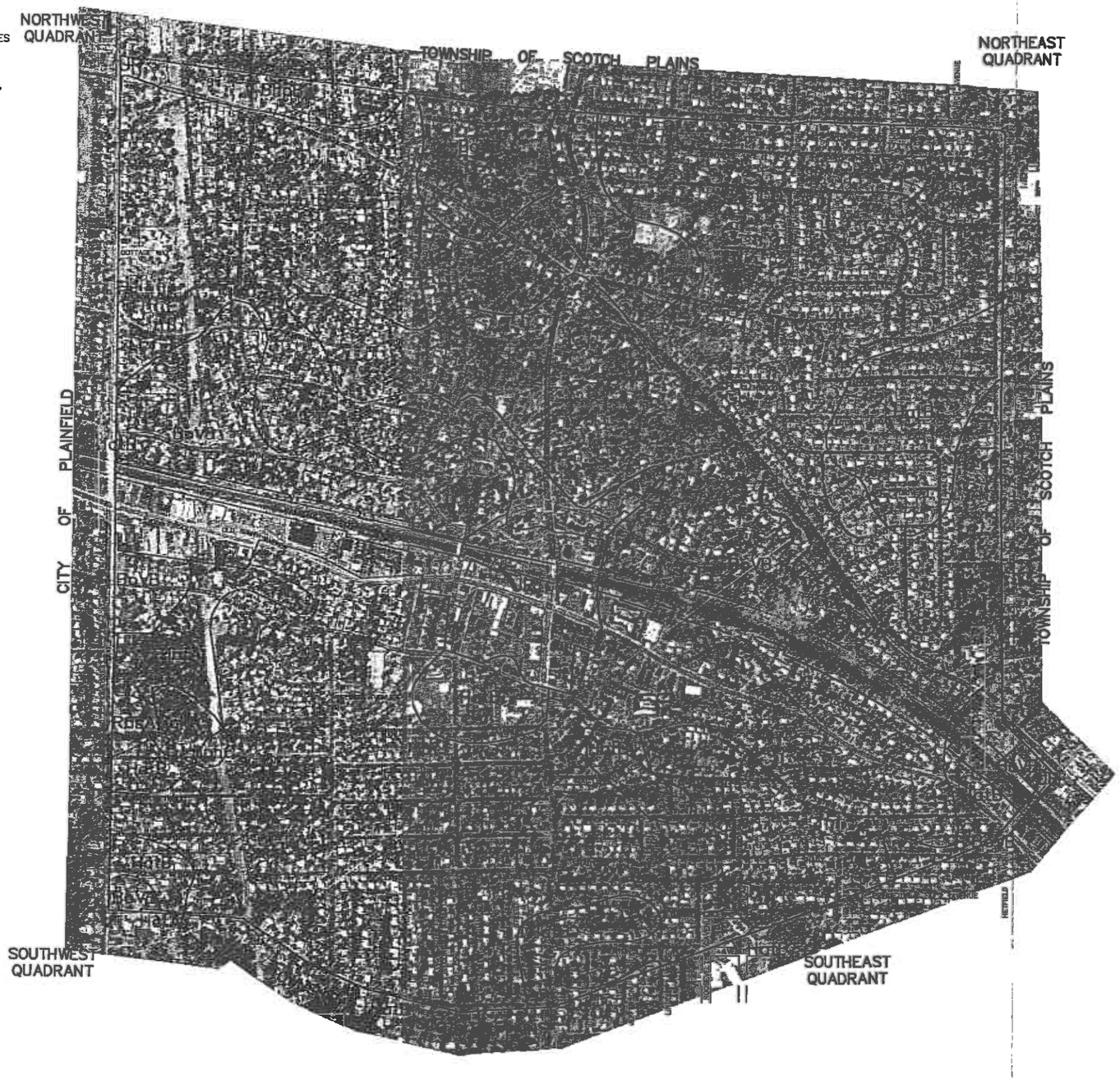

FIGURE C-5

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TAB:
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NO.	DATE	DESCRIPTION	CHKD.	APPRD.
		REVISIONS		

DESIGNED:
DRAWN: P.J.M.
OFFICE CHECKED: V.M.N.

0 400 800
SCALE IN FEET
1" = 400'

KUPPER ASSOCIATES
N.J. CERTIFICATE OF AUTHORIZATION #24GA2795660
15 STELTON ROAD, PISCATAWAY, N.J. 08855-0036
732-752-5600

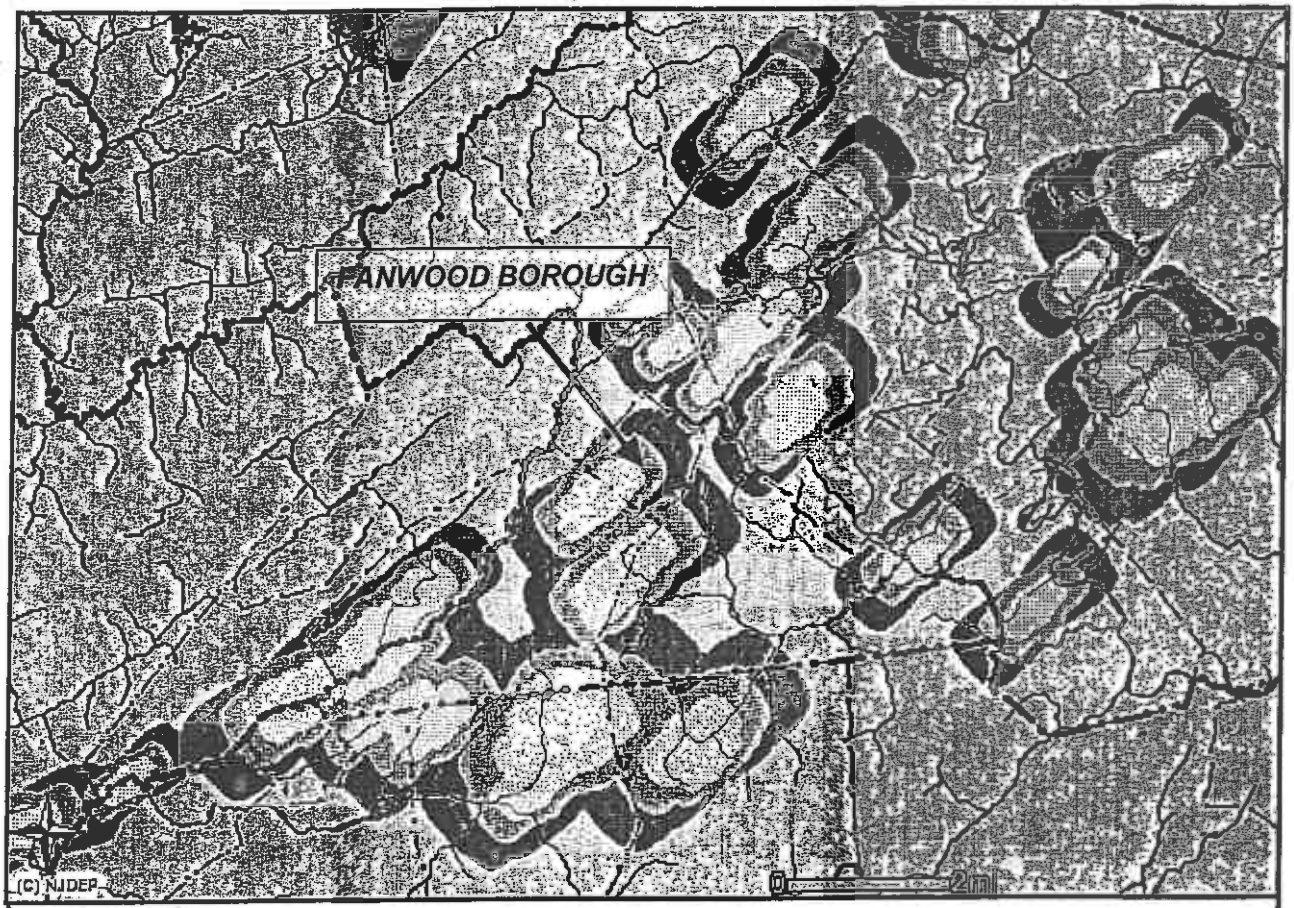
BOROUGH OF FANWOOD
SOILS MAP

BOROUGH OF FANWOOD UNION COUNTY
SCALE: 1" = 400 N.J. DATE: 3/2005

1 OF 1

275082 CONTRACT NO.

Figure C-7: Borough of Fanwood Boundary on USGS Quadrangles



Legend:

- Municipalities
- Counties
- Streams
- Water Bodies
- Well Head Protection Areas
- Tier 1: 2-Year
- Tier 2: 5-Year
- Tier 3: 12-Year
- New Jersey

BOROUGH OF FANWOOD

WELLHEAD PROTECTION AREAS

SOURCE: NJDEP iMAP

KUPPER ASSOCIATES

DATE: 03/05

FIGURE C-7

5.0 DESIGN AND PERFORMANCE STANDARDS

Chapter 255 of the Fanwood Code covers Stormwater Control and Floodplain Regulations. The regulations are quite complex, but can briefly be summarized as follows:

The primary requirement of Article II of Chapter 255 is that no land area shall be developed by any person in a manner that increases the volume and/or rate of stormwater runoff occurring at the area over what occurs there under existing conditions. Article II makes no mention of thresholds, waivers or exemptions. *Any* land area to be developed shall be through on-site water detention and/or ground absorption systems.

Article III of Chapter 255 deals with uses in the floodplain, which is delineated on the Borough's "Flood Area Map". No building or structure within the floodplain may be altered or expanded until a conditional use permit has been granted by the Planning Board. The permit may include requirements for construction of stormwater detention facilities as well as other flood control/flood proofing measures.

The Borough will amend its existing stormwater control and floodplain regulations to reflect the design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8-5 to minimize the adverse impact of stormwater runoff on water quality and water quantity and loss of groundwater recharge in receiving water bodies. The design and performance standards will include the language for maintenance of stormwater management measures consistent with the stormwater management rules at N.J.A.C. 7:8-5.8 Maintenance Requirements, and language for safety standards consistent with N.J.A.C. 7:8-6 Safety Standards for Stormwater Management Basins.

The Borough will evaluate the model stormwater ordinance that has been published by NJDEP and adjust it as necessary to reflect local conditions. The ordinance will be submitted to the county for review and approval within 24 months of the EDPA.

During construction, the Borough Engineer and/or Building inspector will observe the construction of the project to ensure that the stormwater management measures are constructed and function as designed.

6.0 PLAN CONSISTENCY

A portion (0.38 square miles) of the Borough is within the Robinson's Branch Watershed. A committee has been formed to prepare a Regional Stormwater Management Plan (RSMP) for the Robinson's Branch Watershed. The committee is presently preparing a characterization and assessment of the watershed; developing models to simulate flooding and water quality; conducting a public education and outreach program; and beginning a rain garden program. Based on this initial work, the committee will develop specific water quality, quantity and recharge objectives; identify measures and performance standards to achieve these objectives; and develop an implementation plan. When the RSMP is formally adopted into the Areawide Water Quality Management Plan, the Borough will incorporate applicable requirements of the RSMP into its Municipal Stormwater Management Plan.

The Borough's Municipal Stormwater Management Plan is consistent with the Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21. Under N.J.A.C. 5:21-1.5, the RSIS rules are the maximum that may be required in connection with residential development. The municipality will utilize the most current update of the RSIS in the stormwater management review of residential areas. This Municipal Stormwater Management Plan will be updated to be consistent with any future updates to the RSIS.

The Borough's updated Stormwater Management Ordinance will require all new development and redevelopment plans to comply with New Jersey's Soil Erosion and Sediment Control Standards. During construction, the Borough Engineer and/or Building Inspector will observe on-site soil erosion and sediment control measures and report any inconsistencies to the local Soil Conservation District.

7.0 NONSTRUCTURAL STORMWATER MANAGEMENT STRATEGIES

The Borough has reviewed its Master Plan and Ordinances, and has developed a list of the sections in the Borough land use and zoning ordinances that are to be modified to incorporate the nonstructural stormwater management strategies required by the new Stormwater Rules.

The following are the ordinances identified for revision. Once the ordinance texts are completed, they will be submitted to the county review agency for review and approval within

24 months of the EDPA. A copy will be sent to the Department of Environmental Protection at the time of submission.

Chapter 184 of the Borough Code, entitled Land Use, was reviewed with regard to incorporating nonstructural stormwater management strategies. Several changes will be made to Article XI of this Chapter, entitled "Design Guidelines, Standards and Construction Specifications" to incorporate these strategies.

Section 184-96: *Curbs* requires that streets, parking areas, loading areas, driveways for non-residential and multi-family residential developments, and other paved areas shall be bounded by standard granite block curb. This section was amended to allow for curb cuts or flush curbs with curb stops to allow vegetated swales to be used for stormwater conveyance and to allow the disconnection of impervious areas.

Section 184-98: *Driveway aprons* will be amended to address driveways. The language of this section will be amended to encourage the use of pervious paving materials to minimize stormwater runoff and promote groundwater recharge.

Section 184-99F: *Stormwater management and flood protection* requires all roof drains to be piped to either drywells, if the soil percolation rate meets design requirements, or existing storm drains, if they are located adjacent to the property, as required by the Borough Engineer. The language of this section will be amended to encourage the use of natural vegetation swales.

Section 184-100A: *Street trees* require that street trees shall be placed on both sides of the street within the right-of-way and spaced not more than 50 feet apart. In addition to Section 184,100A, the Borough has a Preservation and Removal of Trees Ordinance (Section 184-106) that restricts and otherwise controls the removal of mature trees throughout the Borough. 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 be amended to require the identification of forested areas, and provide additional protection of forested areas from disturbance.

Section 184-104.D: Buffers. A buffer in the form of landscaping, fences, berms and/or walls shall be provided by the developer of any non-residential use which abuts a residentially zoned property, and by the developer of any multi-family residential use, community residence or shelter which is regulated as a conditional use which abuts a property located in a single-family or two-family residential zone. The landscape requirements for these buffer areas in the existing section do not recommend the use of native vegetation. The language of this section will be amended to encourage the use of native vegetation, which requires less fertilization and watering than non-native species. Additionally, 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. This section currently requires the preservation of natural wood tracts and limits land disturbance for new construction.

Article XII of the Borough Code is entitled "Zone District Regulations." The Borough has 2 types of residential districts. Each district has a 35 percent maximum percent impervious surface allocation. District R-150 has a minimum lot size of 15,000 square feet for detached single-family homes and District R-75 has a minimum lot size of 7,500 square feet for single-family homes. The Borough has 8 types of non-residential districts. Each of these districts has a maximum percent impervious surface allocation, ranging from 52 percent for the TAH District to 90 percent for the GC District. Although each zone has a maximum allowable percent impervious surface, the Borough Code will be amended to remind developers that satisfying the percent impervious requirements does not relieve them of responsibility for complying with the Design and Performance Standards for Stormwater Management Measures contained in Chapter 255 – Stormwater Control and Floodplain Regulations. The Borough is evaluating the maximum allowable impervious cover for each

zone to determine whether a reduction in impervious cover is appropriate. The Borough will also be re-evaluating its definition of "impervious". Also, if a developer is given a variance to exceed the maximum allowable percent imperviousness, the developer must mitigate the impact of the additional impervious surfaces. This mitigation effort must address water quality, flooding, and groundwater recharge as described in Chapter 255. A detailed description of how to develop a mitigation plan is included in this Municipal Stormwater Management Plan.

8.0 LAND USE/BUILD-OUT ANALYSIS

A land use analysis was performed for the Borough as part of the Master Plan.

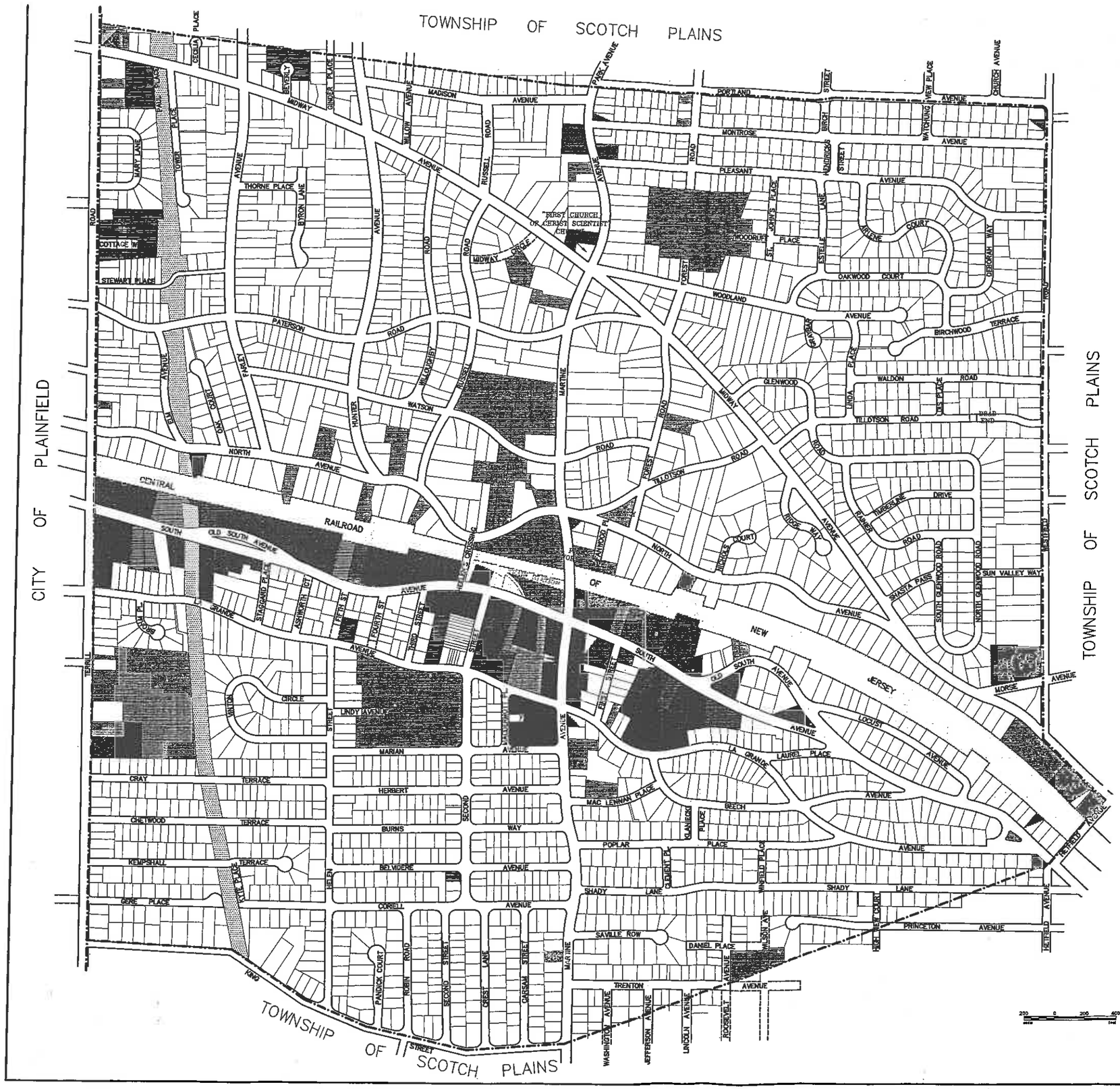
Figure C-8 shows the land uses within the Borough of Fanwood based on that analysis. This map is based upon a field survey undertaken in March 1985, which was updated in November 1987, modified during February 1988 and updated in August 1996 in accordance with directives received from the Borough. Table C-2 indicates the acreage in each eleven (11) categories of land use and the percentage of the Borough's total land area occupied by each use based on the mapping effort.

The mapping shows that there are approximately 3.88 acres of vacant land constituting one-half of one percent (0.5%) of the Borough's land area, distributed in small parcels throughout the Borough. A more recent mapping was developed in December 2004 during a re-examination of the Master Plan (See Figure C-8a). It demonstrates that the land uses are essentially the same. Calculations based on Figure C-8a show a vacant land area of 2.86 acres. Therefore, there has been a decrease in vacant land within the Borough.

Municipalities, which contain one square mile or more of vacant or agricultural lands, must conduct a build-out analysis. The Borough is composed of 0.004 square miles of vacant land. Therefore, a build-out analysis is not required by the regulations for this Municipal Stormwater Management Plan.

9.0 MITIGATION PLANS

This mitigation plan is provided for a proposed development that clearly demonstrates that on-site compliance is not practical and has been granted a variance or exemption from the stormwater management design and performance standards. Presented is a hierarchy of options.



SINGLE FAMILY RESIDENTIAL

TWO OR MORE FAMILY RESIDENTIAL

BUSINESS (RETAIL, SERVICE, COMMERCIAL)

OFFICE

MANUFACTURING/ INDUSTRIAL

PUBLIC/RECREATIONAL

QUASI-PUBLIC

VACANT

UTILITIES

ASSISTED LIVING

RAILROAD

EXISTING LAND USE MAP
BOROUGH OF FANWOOD
UNION COUNTY, NEW JERSEY
SEPTEMBER 1998

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FIGURE C-8

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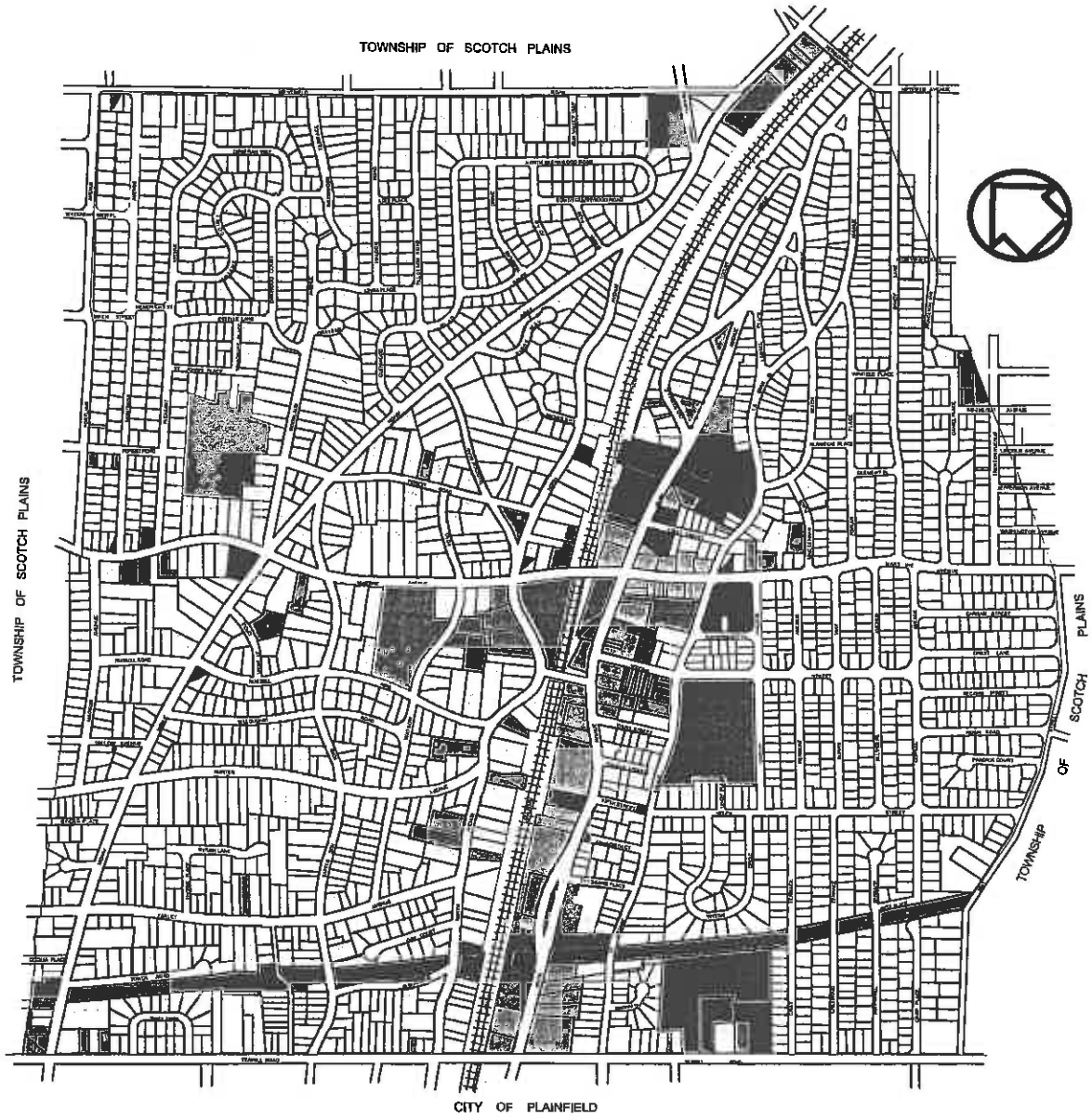
FIGURE C-8A



Land Use Map

Borough of Fanwood

LEGEND

Color	Use
	Single Family
	2 to 4 Family
	5 or more Family
	Business/Office
	Commerical
	Industrial
	Utilities
	Open Space/Parks
	Quasi Public
	Public
	Vacant

Prepared By: Borough of Fanwood Planning Board July, 2004

Mitigation Project Criteria

9.1 Option 1 – Mitigation Project

Wherever practical, the mitigation project must be implemented in the same drainage area as the proposed development. The project must provide additional groundwater recharge benefits, or protection from stormwater runoff quality and quantity from previously developed property that does not currently meet the design and performance standards outlined in the Municipal Stormwater Management Plan. The developer must ensure the long-term maintenance of the project, including the maintenance requirements under Chapters 8 and 9 of the NJDEP Stormwater BMP Manual.

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

- *Groundwater Recharge*
  - Replace the existing impervious paths and/or asphalt areas at LaGrande Park with pavers.
  - Replace the existing impervious paths and/or asphalt areas at Forest Park with pavers.
- *Water Quality*
  - Retrofit the Municipal Complex to provide the removal of 80 percent of total suspended solids from the parking lot runoff.
  - Retrofit the existing parking area at the North Side Train Station to provide the removal of 80 percent of total suspended solids. Due to site constraints, the retrofit BMP must be installed underground and cannot reduce the existing number of parking spaces.
  - Replace existing storm inlets on Borough Streets with new inlets meeting the design standard of the Tier A permit.

- *Water Quantity*

  - Install stormwater management measures at the Department of Public Works Complex to reduce the peak flow discharged to the NJ Transit property.

9.2 Option 2 – Contribution

The municipality may allow a developer to provide funding or partial funding to the municipality for an environmental enhancement project that has been identified in a Municipal Stormwater Management Plan, or towards the development of a Regional Stormwater Management Plan. The funding must be equal to or greater than the cost to implement the mitigation outlined above, including costs associated with purchasing the property or easement for mitigation, and the cost associated with the long-term maintenance requirements of the mitigation measure.

Table C-1: Borough of Fanwood
Soil Types

SOIL TYPE	AREA (S.F.)		(S.F.)	(ACRES)
BhpB	455977			
		TOTAL BhpB	455977	10
BohC	40627			
		TOTAL BohC	40627	1
BovB	60114			
BovB	254584			
BovB	1886552			
BovB	7			
BovB	788767			
BovB	70223			
BovB	21558827			
		TOTAL BovB	24619074	565
HakA	171783			
		TOTAL HakA	171783	4
HatB	215703			
HatB	147973			
HatB	1249			
HatB	472956			
HatB	2821			
HatB	254302			
HatB	4684			
HatB	5899004			
HatB	403771			
HatB	1155452			
HatB	525302			
		TOTAL HatB	9083217	209
HctA	4678			
HctA	576095			
		TOTAL HctA	580773	13
RasA	114852			
		TOTAL RasA	114852	3
UR	20495			
UR	2091021			
UR	47938			
		TOTAL UR	2159454	50
TOTAL	37225757		37225757	855

BhpB - Birdsboro - Urban Land Complex, 0 to 8 Percent Slopes
BohC - Boonton Gravelly Loam, 8 to 15 Percent Slopes
BovB - Boonton Urban Land Complex, 0 to 8 Percent Slopes
HakA - Haledon Loam, 0 to 3 Percent Slopes
HatB - Haledon - Urban Land - Hasbrouck Complex, 0 to 8 Percent Slopes
HctA - Hasbrouck Silt Loam, 0 to 3 Percent Slopes
RasA - Raritan - Urban Land - Passaic Complex, 0 to 3 Percent Slopes
UR - Urban Land

Notes:
Soil types are from NJDEP GIS soils coverage of Union County. The county coverage was clipped at the municipal boundary.
The source of the municipal boundary is based on road mapping of the borough, as such this boundary is approximate.

TABLE C-2

EXISTING LAND USE DISTRIBUTION IN THE BOROUGH OF FANWOOD

LAND USE CATEGORY	*AREA OF LAND (Acres)*	*PERCENTAGE OF BOROUGH*
Single-family residential	547.70	66.3
Multi-family	9.89	1.2
Commercial	22.19	2.7
Industrial	6.74	0.8
Office	5.30	0.6
Public	40.85	5.0
Quasi-public	8.95	1.1
Vacant	3.88	0.5
Utility easement	14.00	1.7
Railroad right-of-way	26.80	3.2
Streets	139.30	16.9
TOTAL	*825.60 acres*	*100.0%*

SOURCE: *Field Survey, March 1985;*
Revised November 1987;
Modified February 1988;
Modified March 1996.

Figure C-6: Groundwater Recharge Areas in the Borough of Fanwood

SOIL TYPE	Description	Annual Recharge (in)
BhpB	Birdsboro - Urban Land Complex, 0 to 8 Percent Slopes	10.4
BohC	Boonton Gravelly Loam, 8 to 15 Percent Slopes	8.9
BovB	Boonton Urban Land Complex, 0 to 8 Percent Slopes	8.9
HakA	Haledon Loam, 0 to 3 Percent Slopes	8.7
HatB	Haledon - Urban Land - Hasbrouck Complex, 0 to 8 Percent Slopes	8.7
HctA	Hasbrouck Silt Loam, 0 to 3 Percent Slopes	0.0
RasA	Raritan - Urban Land - Passaic Complex, 0 to 3 Percent Slopes	8.9
UR	Urban Land	0.0

Note:

Annual Recharge Values are from New Jersey Groundwater Recharge Spreadsheet (NJGRS).