STORMWATER MANAGEMENT PLAN

for the

BOROUGH OF BERGENFIELD
Bergen County, New Jersey

January 2005
Revision 1: March 2005
Revision 2: July 2006

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Table of Contents

List of Figures

I. Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for the Borough of Bergenfield to address stormwater-related impacts. The creation of this plan is required by N.J.A.C. 7:14A-25 Municipal Stormwater Regulations. This plan contains all of the required elements described in N.J.A.C. 7:8 Stormwater Management Rules. 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. 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 Borough, based upon existing zoning and land available for development, contains a total area of 159 acres additional space for new development, including the possible redevelopment of the one golf course located within the Borough. Therefore, a "build-out" analysis for developed conditions is not required. The Borough is fully serviced by the Bergen County Utilities Authority (B.C.U.A), providing sewage disposal, solid waste services, and treatment works. United Water Company supplies water to the entire Borough.

The plan 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. 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.

II. 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 nine goals, this plan outlines specific stormwater design and performance standards for new development and redevelopment. Each plan for development and redevelopment is thoroughly evaluated by the Land Use Boards and the Borough Engineer's office to insure that the development does not create any new adverse impacts on adjoining, downhill residences as a result of stormwater runoff. Furthermore, the development will be reviewed to determine the ability to address and reduce the intensity of any pre-existing stormwater related problem to adjoining property owners. All development is currently required to provide erosion control devices as a condition of the issuance of building permits. These devices are required to be installed in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey, and must be installed prior to any soil moving activity.

New culverts, bridges, and in-stream structures are required to be submitted to NJDEP for review and permits and, as such, are within the jurisdiction of the Department. The adequacy of existing culverts, bridges, and in-stream structures will need to be evaluated on a case-by-case basis. Through observations during intense storm conditions, capacity-related problems will be reported to the Borough Engineer's office for evaluation. Maintenance of identified problem areas is performed by Borough personnel and erosion-prone stream embankment areas will be protected to the extent permitted by the Department.

New development applications, that fall within the jurisdiction of NJAC 5:21 or NJAC 7:8, will be required to submit Stormwater Management reports, outlining the groundwater recharge requirements of the site in question. The plans shall incorporate those measures identified in the approved report. Groundwater recharge requirements will be required for all projects that are deemed to be "major developments", as defined by the Department (disturbance of more than one acre of land area or creation of more than ¼ acre of impervious area).

Nonpoint pollution will be controlled and, to the extent feasible, diminished with each new development and redevelopment project within the Borough. The on-site stormwater management requirements will mandate the reduction in the peak rate and/or volume of stormwater runoff as well as instituting water quality and groundwater recharge measures where applicable. Water quality and groundwater recharge for all sites shall be required to comply with the requirements of NJAC 5:21-7 and NJAC 7:8, which ever is applicable to that particular development. In addition, this Plan recommends that certain recommendations and goals offered in the most recent Master Plan (2003) should be revisited by the Governing Body. These recommendations are detailed later in this Plan. The creation of impervious areas is controlled under the current zoning ordinance of the Borough. Stormwater runoff from these areas is, and will continue to be, the priority when reviewing plans for new development and redevelopment, to insure compliance with the above noted NJAC stormwater control requirements.

Any new development and, in particular, new development in close proximity to a watercourse will be evaluated to ensure adequate protection of the watercourse and its overbank areas. There are no water courses within the Borough that are classified with a category one designation. Finally, at such time that TMDL's are established for the affected water course, the Borough will evaluate what, if anything, will need to be done to satisfy the established TMDL limits.

The Borough will minimize pollutants in stormwater runoff from new development and redevelopment by strictly adhering to the requirements of the above noted NJAC regulations. Adherence will be reviewed and evaluated through the land use approval process and further evaluated to verify compliance through on-site inspections during construction. This Plan also proposes stormwater management controls to minimize pollutants from existing developments. These controls are identified in the "Mitigation Plan" section of this Plan. The mitigation projects are all situated in areas of the Borough that were initially developed prior to the start of any stormwater management of water quantity, water quality, or groundwater recharge as a design feature. Redevelopment of these sites will be closely monitored to insure that each site that is redeveloped will contribute its small portion to reversing prior trends by addressing the quantity, quality, and recharge issues. The Borough has already begun retrofitting existing street catch basins with acceptable style grates and, where required, curb pieces to minimize solids and floatables from entering the watercourses.

Public safety will continue to be addressed through proper design of stormwater facilities. Stormwater management facilities are required to provide a safe means of entry in order to visually inspect and, when necessary, maintain the facilities. Security fencing shall be required along the perimeter of detention basins to prevent entry to anyone except authorized personnel performing normal or remedial maintenance at the facility. Control structures fitted with trash racks or choke pipes (orifices) will be monitored and cleaned after all intense rainfall events, to prevent clogging and/or abnormal build-up of stormwater.

III. Stormwater Discussion

Following is a brief description of the hydrologic cycle and how development affects the cycle.

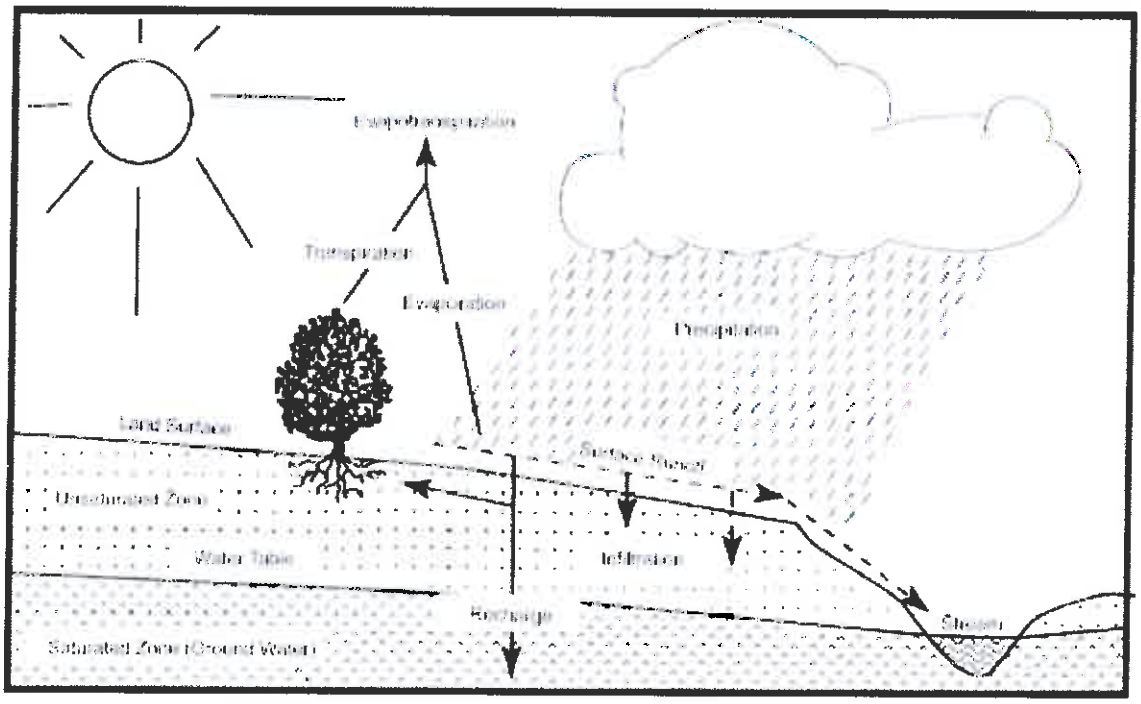
Land development can dramatically alter the hydrologic cycle (see Figure 1) of a site and, ultimately, an entire watershed. Prior to development, native vegetation can either directly intercept precipitation or draw that portion that has infiltrated into the ground and return it to the atmosphere through evapotranspiration. Development can remove this beneficial vegetation and replace it with lawn or impervious cover, reducing the site's evaportranspiration 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 areas, causing flow in downstream waterways to peak faster and higher than natural conditions. These increases can create new downstream flooding and aggravate existing overflowing 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 areas can also decrease opportunities for infiltration, which, in turn, reduce 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 to a degree that some species cannot adapt to it and result in the elimination of those species.

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.

Figure 1: Groundwater Recharge in the Hydrologic Cycle



Source: New Jersey Geological Survey Report GSR-32.

IV. Background

The Borough of Bergenfield encompasses a 2.92 square mile area in Bergen County, New Jersey and is located in eastern central Bergen County. It is bordered by the Borough of Demarest to the north, the Boroughs of Cresskill and Tenafly to the east, the City of Englewood and Township of Teaneck to the south and the Borough of New Milford to the west. The general map of the Borough is shown in Figure 2. The population of the Borough has moderately fluctuated from 25,568 in 1980, to 24,458 in 1990, and increased to 26,247 in 2000. The number of households has varied from 8,836 in 1980; to 8,799 in 1990; and 8,981 in 2000.

Recent developments within the Borough include a mixture of commercial development and single-family and multi-unit residential developments. NJDEP has prepared maps showing the growth in developed use areas for all municipalities. The map showing the Borough's growth from 1986 to 1995/97 can be accessed at http://www.state.nj.us/dep/gis/images/m4m/berco/bergenfield_tp.html A copy of this map is included under Appendix A of the plan. Based on this plan, the Borough's impervious area increased by a total of approximately 2.3 acres between 1986 and 1997. The growth locations are scattered throughout the Borough. The Borough follows the

RSIS regulations regarding Stormwater Management, therefore changes in the landscape have minimally increased stormwater runoff volumes to the waterways of the municipality. Figure 2 illustrates the general map of Bergenfield.

Hirschfeld Brook, Hirschfeld Brook Tributary, Metzlers Brook, French Brook, and Coopers Pond constitute the waterways in the Borough. Metzlers Brook originates in the Borough of Tenafly and flows southerly through the Borough into the City of Englewood. The Hirschfeld Brook Tributary originates in the Borough of Dumont and flows southwesterly into the Borough and connects with the Hirschfeld Brook. The Hirschfeld Brook originates in the Township of Teaneck and flows northerly through the Borough into the Borough of Dumont, and then westerly through the Borough of New Milford where it empties into the Hackensack River. French Brook originates in the southeast of the Borough and runs southerly, adjacent to the Borough's southwest boundary with New Milford. It continues to flow easterly in New Milford and discharges into Hackensack River. New Jersey has been divided into 20 Watershed Management Areas. All waterways in the Borough are located in the Northeast Region, Watershed Management Area (WMA 5). WMA 5 includes part of Bergen and Hudson Counties and has a drainage area of 165 square miles and contains the Hudson River Watershed, the Pascack Brook Watershed, and the Hackensack River Watershed. Figure 3 illustrates the waterways in the Borough. Figure 4 depicts the Borough boundary on the USGS quadrangle maps. It is noted that the Bergen County website does not include Hirschfeld Tributary in the north and Hirschfeld Brook south of Coopers Pond, and the NJDEP website does not show the section of French Brook within the Borough. These sections were added schematically to the respective Figures 2 and 3.

Category One Waters, also known as "C1 waters" are designated in New Jersey's rules for Surface Water Quality Standards (N.J.A.C. 7:9B-1.4), there are no designated C-1 waterways within the Borough of Bergenfield.

Sub-watersheds designated as HUC 14, are the smallest watersheds mapped by the NJDEP and the USGS, with each covering only approximately 3,000 acres. The USGS calls the watersheds Hydrologic Units. Each basic unit is a unique feature, and is given a unique Hydrologic Unit Code (HUC), which is 14 digits long. The HUC is hierarchical. Larger and larger watersheds can be defined using different portions of the 14 digit code to define the watershed boundaries. Portion of Bergenfield are located within three (3) HUC 14 areas, please refer to figure 8.

The New Jersey Department of Environmental Protection (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. As previously noted both the Metzlers Brook and Hirschfeld Brook are part of the Hackensack River Watershed.

There are no AMNET sites on the Hackensack River where it is met by either brook. In addition to the AMNET data, the NJDEP and other regulatory agencies, such as the US Environmental Protection Agency (USEPA) and the US Geological Survey (USGS), collect water quality chemical data on the streams in the state. Data for Hackensack River downstream of its confluence with Hirschfeld brook is collected at New Milford, Site ID 0137850, and show that the instream total phosphorus concentrations and fecal coliform concentrations of the Hackensack River frequently exceed the state's criteria. This means that the Hackensack River is an impaired waterways and the NJDEP is required to develop a Total Maximum Daily Load (TMDL) for these pollutants for this 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 waterbody for one or more of its designated uses. The allowable load is allocated to the various sources of the pollutant, such as stormwater and wastewater discharges, which require 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 Best Management Practice(s) (B.M.P.s).

Figure 2: General Map of the Borough of Bergenfield
Source: Bergen County GIS, http://gis.co.bergen.nj.us/website/viewer1/viewer.htm March 2005

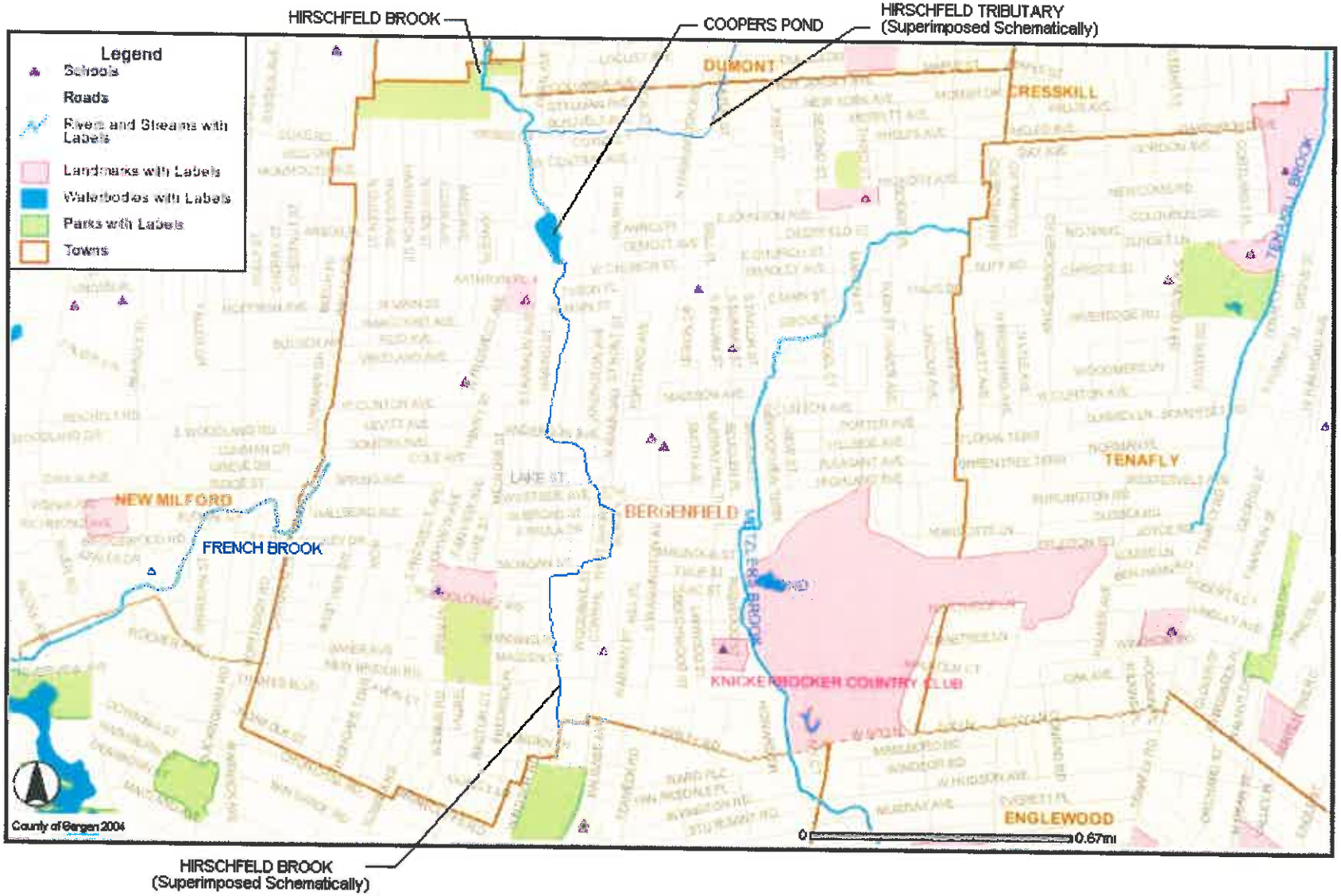
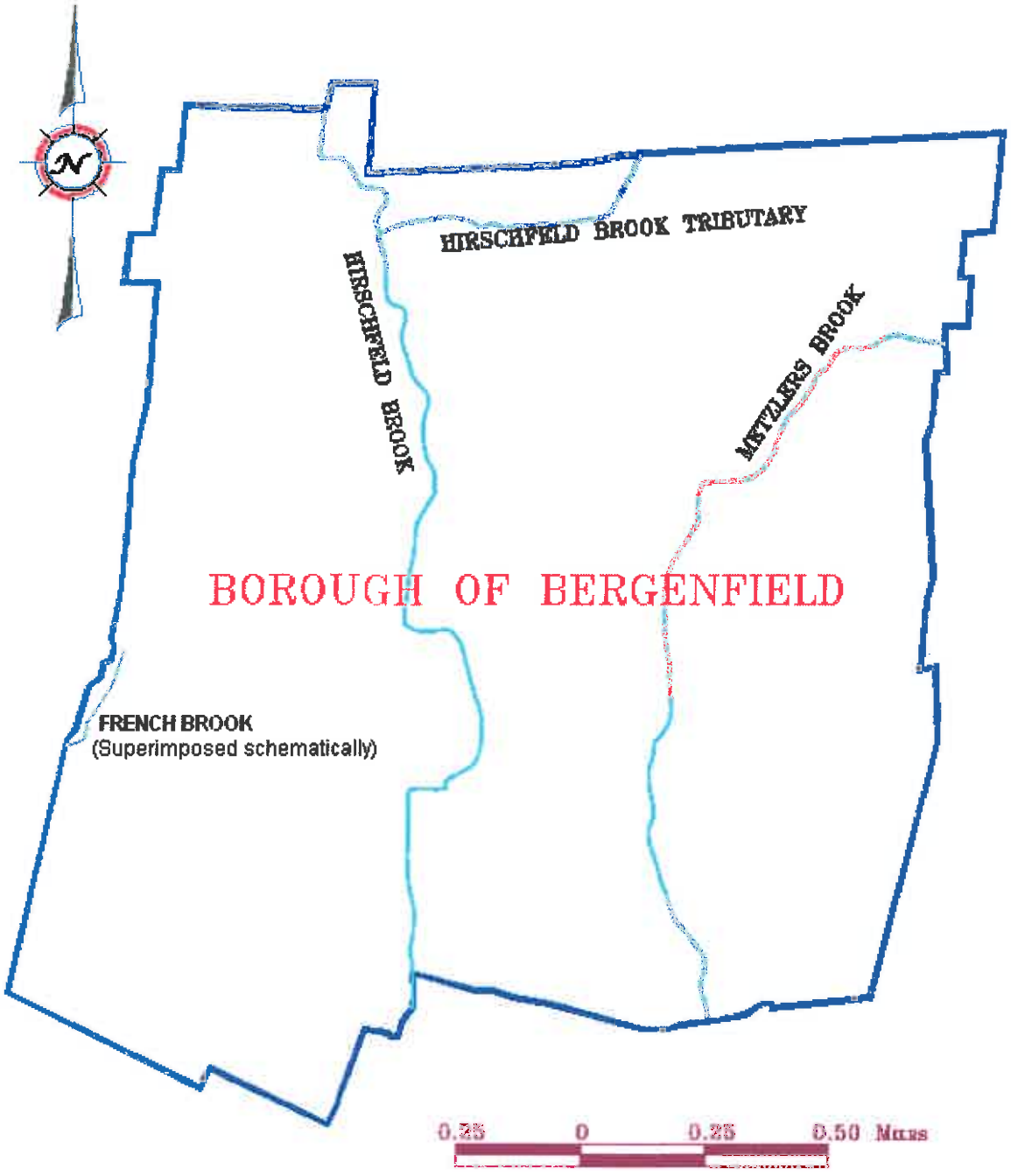
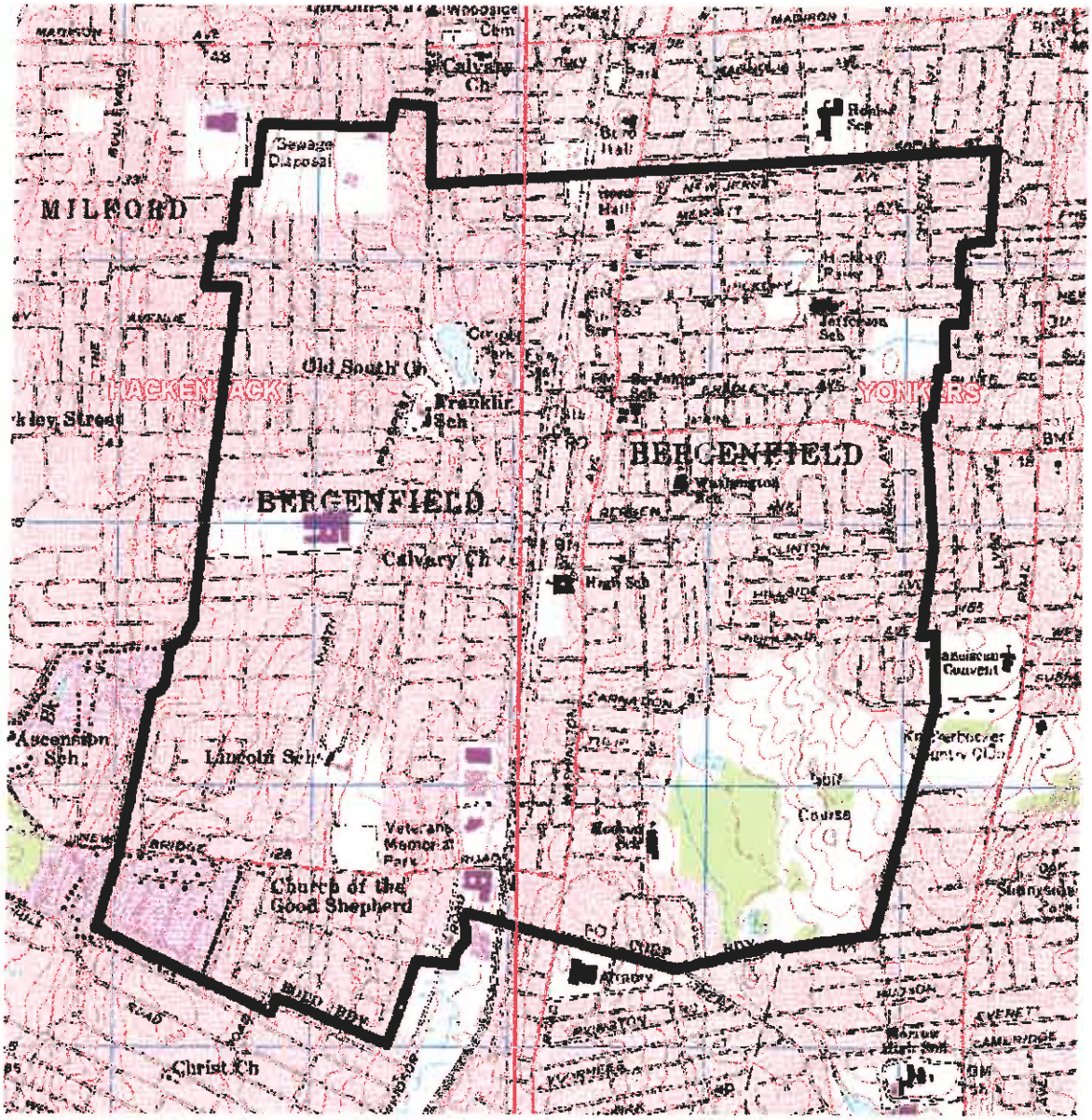


Figure 3: The Borough and Its Waterways – February 2005
Source: www.state.nj.us/dep/gis/newmapping.htm



Waterway	Category
Hirschfeld Brook and Tributary	FW2-NT/SE1
Metzlers Brook	FW2-NT/SE2
French Brook	FW2-NT/SE1

Figure 4: Borough Boundary on USGS Quadrangles



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. The Hackensack River at New Milford appears under Sublist 5 for phosphorus and fecal coliform. These are both listed under Appendix IB, with Fecal Coliform having a high priority ranking, and Phosphorus a medium priority ranking. In addition the phosphorus impairment is listed under Appendix IC. This list indicates TDML's that must be developed before 2006.

While this monitoring point is not located within Borough, the headwaters of this watercourse are situated with Borough, and therefore may be subject to TMDL's when establish by the state.

Low lying areas adjacent to Hirschfeld Brook, Hirschfeld Brook Tributary, Metzlers Brook, and French Brook experience flooding. The areas inundated by 100-year storm under existing conditions are shown on Flood Insurance Rate Maps (FIRM) (Panels 34003C0184F, 34003C0192F, and 34003C0211F), and have been attached at the end of this document to show the flood hazard areas congruent with the respective waterways. NJDEP has also delineated the floodway and Flood Hazard Area for these waterways. The NJDEP Flood Hazard Area is based on 100-year storm plus 25% under fully developed conditions flows. These areas as shown on maps entitled, "State of New Jersey, Department of Environmental Protection, Division of Water Resources, Bureau of Floodplain Management, Delineation of Floodway and Flood Hazard Area, Hirschfeld Brook, Dumont Borough, Bergenfield Borough, Bergen County, New Jersey, Plate #'s 6, 7, & 8" as prepared by Anderson-Nichols & Co., Inc., Boston, MA and dated March 1980; and "State of New Jersey, Department of Environmental Protection, Division of Water Resources, Bureau of Floodplain Management, Delineation of Floodway and Flood Hazard Area, Hirschfeld Brook Tributary, Dumont Borough, Bergenfield Borough, Bergen County, New Jersey, Plate #6" as prepared by Anderson-Nichols & Co., Inc., Boston, MA and dated March 1980. In general the inundation area by the 100-year storm on FIRM maps is limited to a narrow strip between approximately 25 feet to 300 feet adjacent to the waterways. The only exception is the southerly section of Hirschfeld Brook. The flood hazard area between Conrail Railroad and Greenwich Street extends to approximately 1200 feet, and stretches from Manning Place at south to Morgan Street in north. The flood hazard area furthermore expands to an approximate width of up to 800 feet covering the area bounded by S.Washington Avenue at east, Woodbine Street at west, Magnolia Street to south and Anderson Avenue to north. Excluding these low areas, the Borough has not experienced any significant flooding.

The New Jersey Municipal Land Use Law empowers and requires that local planning boards periodically re-examine and update their municipal Master Plan, and that they do so on a cycle not to exceed six years. Bergenfield's last Master Plan re-examination was completed in 1990, which means the update is past due. Bergenfield's last complete

Master Plan was prepared in 1966 and is obsolete by today's standards. Based on these facts, the Borough has authorized the preparation of a new Master Plan. Background studies have been initiated, and it is anticipated that the plan will be ready in 2005. Following is a partial list of elements that will be addressed in the new Master Plan:

1. Statutory requirements of the State
2. A new set of community Goals and Objectives
3. A new Land Use Plan Element that will incorporate all contemporary land use issues
4. A Community Profile Element that will report on the Township's demographics
5. A new Housing Plan Element that will help Bergenfield meet its affordable housing obligations
6. Community Design Element that will establish standards for design in public spaces, and establish a Borough vernacular
7. A Circulation Plan Element that will address vehicular, bicycle and pedestrian modes of travel
8. A Community Facilities Plan Element that will resolve the current space shortage, and provide for a wide breadth of facilities for all residents
9. A Parks and Recreation Plan Element that will find equitable solutions on the current shortcomings
10. A Conservation Element that will address the remaining natural resources in the Borough
11. A completed Green Acres Open Space and Recreation Plan
12. A Regional Context examination that will analyze Bergenfield's place in the surrounding region
13. Geographic Information Systems (GIS) mapping that will be employed to bring the Borough into the digital era

The Borough of Bergenfield has not conducted any groundwater assessments nor base flow stream assessments during dry weather periods. Lower base flows can have a negative impact on instream habitat during the summer months. A map of groundwater recharge areas is shown in Figure 5. Groundwater recharge is estimated using the NJGS methodology from the New Jersey Geological Survey Report; GSR-32, "A Method for Evaluation of Groundwater Recharge Areas in New Jersey." Land-use/Land-cover, soil and municipality-based climatic data were combined and used to produce an estimate of groundwater recharge in inches/year. As stated there are no existing groundwater assessments for the Borough.

A Well Head Protection Area (WHPA) in New Jersey is a map area calculated around a Public Community Water Supply (PCWS) well in New Jersey that delineates the horizontal extent of ground water captured by a well pumping at a specific rate over a two-, five-, and twelve-year period of time. The area of capture over two-, five-, and twelve-years is defined using line boundaries and polygon areas generated with GIS. WHPA delineations are conducted in response to the Safe Drinking Water Act Amendments of 1986 and 1996 as part of the Source Water Protection Program (SWPP).

Wellhead protection areas are shown in Figure 6. However, there are no such areas in the Borough and private wellhead location information is not available.

V. Design and Performance Standards

The Borough will adopt the design and performance standards for stormwater management measures as presented at 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 to receiving water bodies. The design and performance standards to be adopted by the Borough 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.

Groundwater recharge requirements will be implemented and will be a requirement for all new development and redevelopment projects that are within the jurisdiction of NJAC 5:21 (RSIS) or NJAC 7:8 (major development). It will be the applicant's responsibility to provide the necessary calculations to demonstrate (a) the groundwater recharge volume required for the development of the site, and (b) to adequately detail the structural and/or non-structural technique to provide the minimum recharge volume as determined in the calculations. A range of surface and subsurface techniques would be acceptable, subject only to satisfying the volume requirement as well as demonstrating adequate subsurface soil permeability.

In the Borough of Bergenfield, the general policy has been to relegate the primary maintenance responsibility for stormwater management features at larger developments (subdivisions) to the homeowner of the property on which the feature is situated. Since this procedure is prohibited by the Stormwater Rules, the policy will need to be reviewed and revised to an acceptable procedure. For developments, such as residential subdivisions, the approvals will need to include a provision to create a homeowners association or similar agreement. The association will then be responsible for the maintenance and upkeep of any on-site stormwater management improvements. This responsibility will be required to be noted on the deed and/or filed map for that particular development and shall also be a condition in the memorializing resolution and developer's agreement. Easements will be required to permit the Borough to access the feature and to perform any normal maintenance or remedial work in the event that the primary responsible party (association) fails to perform the required work. If, after notification, the responsible party does not perform the required work, the Borough DPW will address the situation and the association will be charged for the services.

For those features where the Borough has primary responsibility, the Borough personnel (DPW) will adhere to the operation and maintenance procedures found at NJAC 7:8-5.8. These procedures will include but are not limited to:

- Quarterly inspections for clogging and excessive debris buildup. Inspections

will also be performed after any intense rainfall (exceeding one inch in a twenty-four hour period).

- Grass surfaces to be properly maintained.

- Annual inspection of structural components for cracking, settlement, erosion, deterioration, etc.

The Municipal Stormwater Control Ordinance for the Borough of Bergenfield has been prepared and adopted, utilizing the Model Stormwater Control Ordinance for Municipalities, found in Appendix D of the New Jersey Stormwater Best Management Practices Manual. The Ordinance has been submitted to the County for review prior to adoption by the Governing Body and is included herein as Appendix A.

During construction, Borough inspectors, such as the Borough Engineer's office and/or the Construction Official, will observe the construction of new or redevelopment projects to ensure that the stormwater management measures are constructed and function as designed.

A. Achievement of Goals

1. Reduce flood damage, including damage to life and property

Chapter 161 of Borough's codes is entitled "Flood Damage Prevention". This chapter's purpose is to promote the public health, safety and general welfare and to minimize public and private losses due to flood conditions. Special flood areas are identified on Flood Insurance Rate Maps that are based on 100-year storms. Further reduction to flood damage is achieved by considering adding a new section to the above chapter. The new section shall require adherence to NJDEP regulations regarding floodplains and riparian buffer requirements. As noted above herein, Hirschfeld Brook and its tributary within the Borough of Bergenfield have been delineated by NJDEP, and flood hazard areas based on the Department's regulatory flood has been established for these waterways. By following the NJDEP requirements, the floodplain will cover larger areas, since as noted above herein the NJDEP regulatory flood is based on 100-year storm under full developed conditions which may also be represented by an increase of 25% to the 100-year flood flow under existing conditions. The NJDEP regulations further require that structures that span the flood plain and/or act as control structures for the watercourse, such as bridges, culverts or low dams, to be designed so that any increase in flood elevations, upstream or downstream, will not subject existing residential or commercial buildings to increased flood damages during this flood and more frequent floods.

2.Minimize, to the extent practical, any increase in stormwater runoff from any new development

The Borough currently follows RSIS regulations that do not allow increase in stormwater runoff in residential development. As indicated herein this plan, the Borough will adopt the NJDEP Stormwater Management Rules. These rules allow no increase in stormwater runoff from any major development that disturbs one or more acre of land, or increases the impervious surface by one-quarter acre or more. The applicant has to provide hydrologic and hydraulic calculations demonstrating one of the following:

- 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
- 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
- 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.

3. Reduce soil erosion from any development or construction project

This goal is achieved by adhering to the New Jersey's Soil Erosion and Sediment Control standards. Borough of Bergenfield Stormwater Management Ordinance shall require all new development and redevelopment plans to comply with New Jersey's Soil Erosion and Sediment Control Standards.

During construction, Borough inspectors will observe on-site erosion control measures and report any inconsistencies to the local Soil Conservation District. For those projects that are under their jurisdiction. Soil Conservation District personnel will inspect construction sites for compliance with the erosion control standards that exceed 5000 s.f. of disturbance, stand-alone single family lots are exempted.

4. Assure the adequacy of existing and proposed culverts and bridges, and other in-stream structures

The adequacy of existing and proposed culverts and bridges, and other in-stream structures is assured by adherence to NJAC 7:13 "Flood Hazard Area Control Act Rules". The NJDEP regulations under this chapter specify all the requirements needed to assure the adequacy of existing and new structures, without causing any adverse effects upstream or downstream, for the regulatory flood and more frequent ones. A permit from the NJDEP for any new bridge or modifications/alterations to existing ones as defined in NJAC 7:13, is required.

5. Maintain groundwater recharge

This goal is achieved by adopting the design and performance standards for Stormwater Management Measures as presented in N.J.A.C. 7:8-5. Subsections 7:8-5.4 "Erosion

Control, Groundwater Recharge and Runoff Quantity Standards", and 7:8-5.6 "Calculation of Stormwater Runoff and Groundwater Recharge" describe the specific standards and calculation technique to maintain the groundwater recharge. The soils within the Borough consist mainly of Dunellen (DuoB, DuoC, DuoD DuuB, DuuC) of Hydrologic Soil Group (HSG) "B" in the east and west, and urban land and Udorthents (UR, Udbu, Udb, Udh) of HSG "D" or undesignated soil group in the central part. There are also small areas of Boonton (BohC, BouB, BouC, BouD) of HSG "C" scattered in the east and west of the Borough, and Preakness (PrnA) of soil group "B/D" in the south east. Hydrologic soil group "B" meets the NJDEP minimum requirements of permeability rates for groundwater recharge and water quality storms. Hydrologic soil group "C", and urban land permeability needs to be verified by means of percolation test. Figure 7 illustrates the soils within the Borough.

6. Prevent, to the greatest extent feasible, an increase in nonpoint pollution

Nonpoint pollution is generally attributed to stormwater runoff from agricultural and residential areas. The Borough contains no agricultural land, and approximately 159 acres of land mainly in residential zoning, which subject to development of the Knickerbocker Golf Course, may be developed. The Borough follows RSIS regulations for residential development. By requiring residential developments to meet the RSIS standards regarding water quality, and by further adopting the design and performance standards for Stormwater Management Measures as presented in N.J.A.C. 7:8-5, Subsection 7:8-5.5 "Stormwater Runoff Quality Standards", which describes the stormwater management measures to achieve water quality and provides guidance to achieve the same for major developments, this goal shall be achieved.

7. Maintain the integrity of stream channels for their biological functions, as well as for drainage

This goal is achieved by adopting the design and performance standards for Stormwater Management Measures as presented in N.J.A.C. 7:8-5. Applying Goal 2 minimizes increase of runoff from major developments, thus maintaining the integrity and function of the stream channels for drainage. Applying Goals 6 and 7 will maintain the biological functions of the streams. This goal is achieved furthermore by adhering to NJAC 7:13 "Flood Hazard Area Control Act Rules" regarding the protection of vegetation areas adjacent to streams.

8. Minimize pollutants in stormwater runoff from new and existing development to restore, enhance, and maintain the chemical, physical, and biological integrity of the waters of the state, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, and other uses of water

This goal is achieved by adopting the design and performance standards for Stormwater Management Measures as presented in N.J.A.C. 7:8-5, Subsection 7:8-5.5 "Stormwater runoff quality standards". These standards 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 major development site. This

subsection includes the list of Best Management Practices, and the TSS Percent Removal Rate achieved from each practice.

9. Protect public safety through the proper design and operation of stormwater basins.

This goal is achieved by adopting the design and performance standards for Stormwater Management Measures as presented in N.J.A.C. 7:8-5, Subsection 7:8-5.8: "Maintenance Requirements", and Subsection 7:8-6 "Safety Standards for Stormwater Management Basins". The latter subchapter sets forth requirements to protect public safety through the proper design and operation of stormwater management basins. Major developments shall be required to provide a "Stormwater Management and Maintenance Plan" in which the responsible party for maintenance of the facility is identified and detailed schedules and procedures pursuant to NJAC 7:8-5.8 "Maintenance Requirements" are included therein. The existing facilities maintained by the Borough or privately, will continue to be maintained by same.

It is noted that nonstructural stormwater management strategies at N.J.A.C. 7:8-5.3 shall be incorporated into the design to achieve all the above listed goals. 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.

Figure 5: Groundwater Recharge Areas in the Borough – February 2005
Source: www.state.nj.us/dep/gis/newmapping.htm

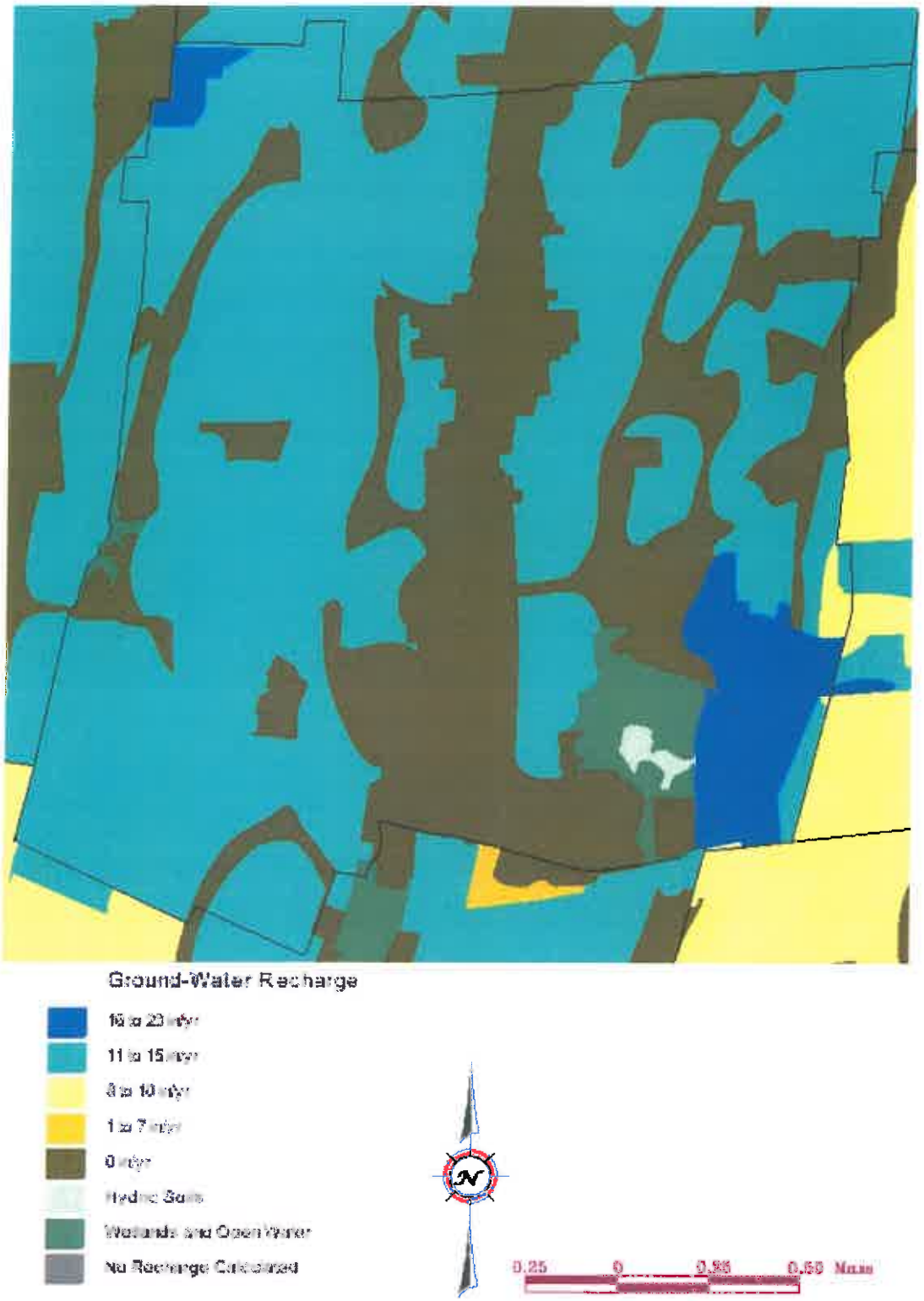
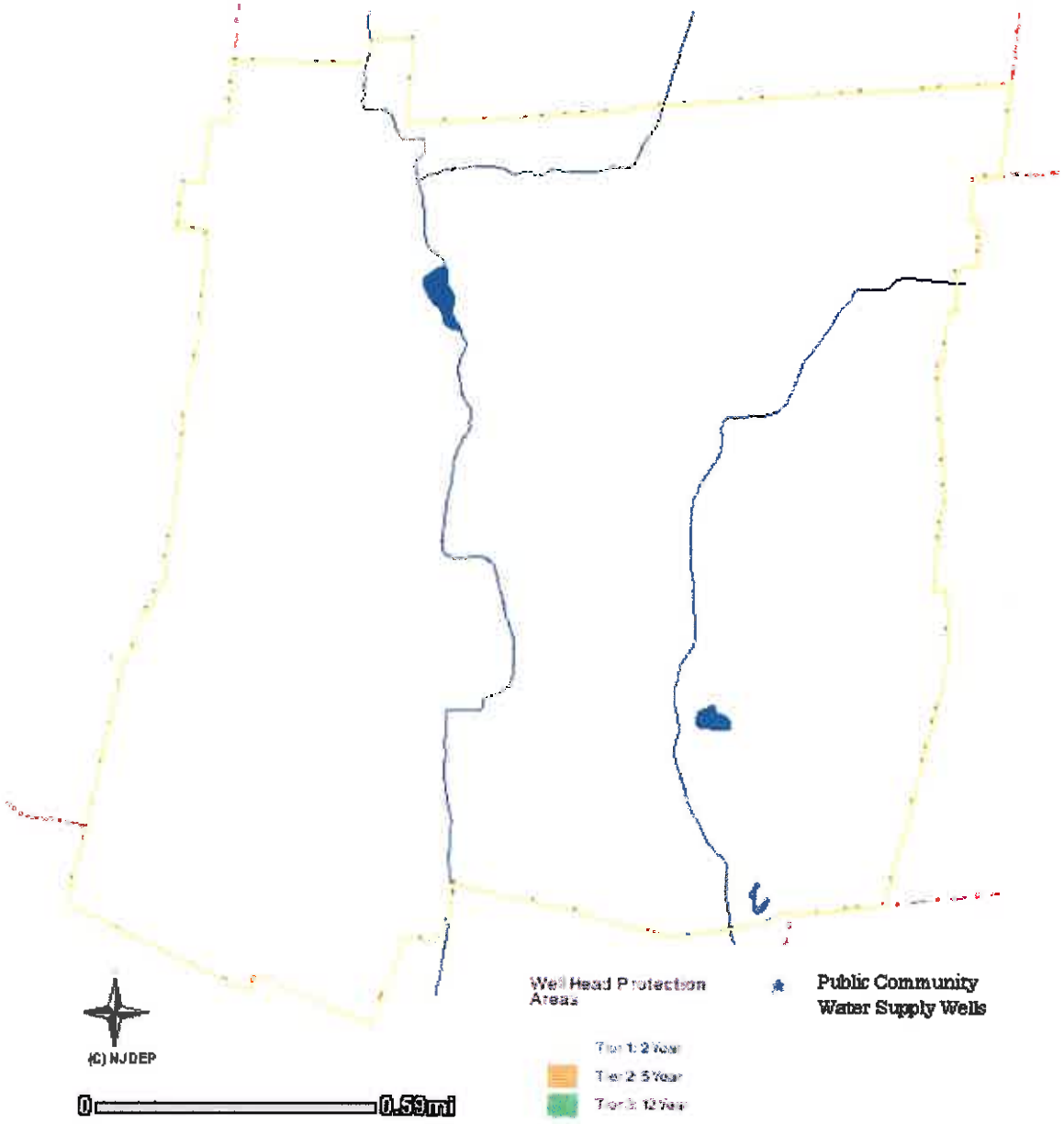
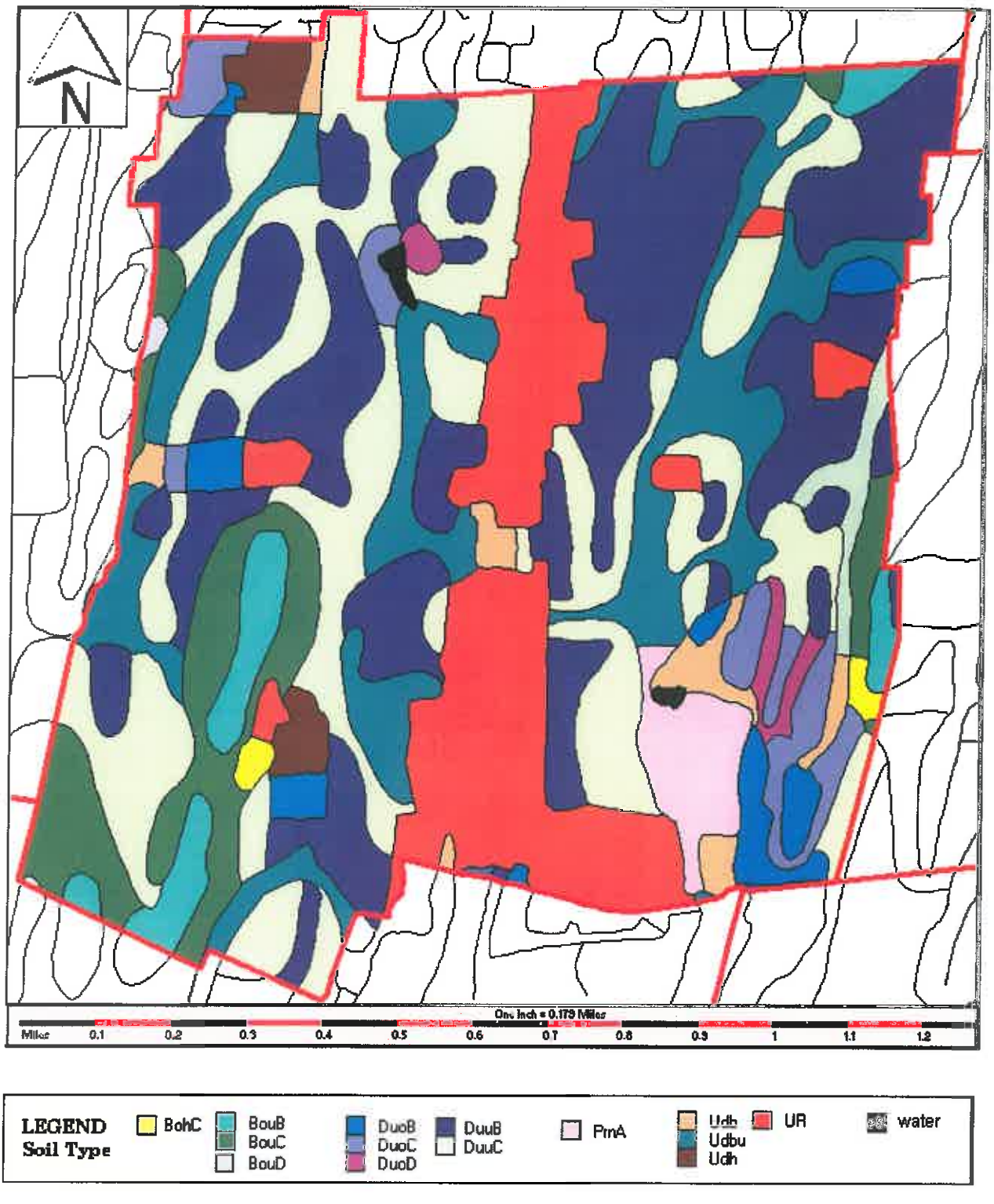


Figure 6: Wellhead Protection Areas located in the Borough – February 2005
Source: www.state.nj.us/dep/gis/newmapping.htm



Note: There are no Wellhead Protection Areas located in the Borough of Bergenfield

Figure 7: Borough of Bergenfield Soil Map –March 2005
Source: www.state.nj.us/dep/gis/newmapping.htm



VI. Plan Consistency

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

This Municipal Stormwater Management Plan is consistent with the Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21, adopted 1/6/1997, and revised 1/20/2004. These standards can be accessed at http://www.nj.gov/dca/codes/nj-rsis/sc7.shtml, and include regulations regarding water quantity and quality. The Borough of Bergenfield 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 Stormwater Management Ordinance shall require all new development and redevelopment plans to comply with New Jersey's Soil Erosion and Sediment Control Standards. All projects that disturb more than 5000 S.F. of area and are not exempted by the single family exclusion are required to secure Soil Conservation District Certification prior to start of construction and issuance of building permit. During construction, Borough inspectors will observe on-site soil erosion and sediment control measures and report any inconsistencies to the local Soil Conservation District. For project not under the purview of the Soil conservation District, Borough inspector(s) will enforce observance of on site soil erosion and sediment control measure.

VII. Nonstructural Stormwater Management Strategies

The Borough of Bergenfield will adopt Nonstructural Stormwater Management Strategies presented in NJAC 7:8-5.3(b) included under NJAC 7:8-5. To incorporate these strategies the Borough has reviewed the Master Plan and ordinances, and has provided a list of the sections of the Borough 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 review agency for review and approval within 24 months of the effective date of the Stormwater Management Rules. A copy will be sent to the Department of Environmental Protection at the time of submission.

Chapter 161 of the Borough Code, "Flood Damage Prevention", Chapter 186, "Land Development", and Chapter 273, "Streets and Sidewalks", were reviewed with regard to incorporating nonstructural stormwater management strategies and the stormwater management rules. Several changes will be made to these Chapters, to incorporate these strategies.

Chapter 161 - Flood Damage Prevention: This chapter will be amended to include adherence to NJDEP requirements. This chapter shall be consistent will all the NJDEP

regulations regarding floodplains and near-stream vegetation as stated under NJAC 7:13 "Flood Hazard Area Control Act Rules".

Section 186-42: Preservation of Natural Features: Minimum setbacks from the Borough water courses are provided. These requirements will be supplemented by reference to the Borough Storm Water Management Ordinance, which will be updated to include all requirements outlined in N.J.A.C. 7:8-5.

Section 186-44(E): Buffer strip requirements: discusses proper design of buffer strips required in the Borough. This section shall be amended to recommend the use of native vegetation, which requires less fertilization and watering than non-native species.

Section 186-46: General Landscaping Requirements: describes locations and materials to be used in areas that require landscaping in the Borough. This section will also be amended to include:

- Specific number of trees that are required to compensate the number of trees removed
- Recommendation for the use of native vegetation for landscaping
- Use of landscaped island in the center of a cul-de-sac to receive run-off at dead end streets, where feasible.

Section 186-47(C): Maximum Improved Lot Coverage: states that the lot coverage shall not exceed the percentage indicated for each zoning district designated. This section will be amended to remind builders that satisfying the percent impervious requirements does not relieve them of responsibility for complying with Stormwater Management Measures outlined in N.J.A.C. Chapter 21. 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 this report.

Section 186-58: Plantings: describes the Borough's landscaping requirements in Multi-Family/Garden Apartment/Townhouse Zone – language to be added to include the use of native vegetation as much as is feasible for new plantings.

Section 186-72, 73, 74 & 76: describe conditional use requirements for automobile service and repair establishments, hospitals and nursing homes, private schools, and hotels and motels – language will be added to include the use of native vegetation where feasible for landscape buffering.

Section 186-88: Definitions; Drainage Right-of-Way: This section will be amended to include reference to the Borough's Surface Water Management Ordinance, which will be updated and include all requirements outlined in NJAC 7:8-5.

Section 186-106B(15): describes information required for site plan application for proposed drainage and sanitary sewer lines. Language will be added to this section to refer to the Borough's Surface Water Management Ordinance, which will be updated and include all requirements outlined in NJAC 7:8-5.

Section 186-108(G, J, M): describes the standards and regulations required for review of site plans for stormwater drainage. Language will be added to this section to refer to the Borough's Surface Water Management Ordinance, which will be updated and include all requirements outlined in NJAC 7:8-5.

Section 186-118: Schedule B; Maximum Lot Coverage: The Borough will evaluate and assign a maximum improved lot coverage to Zoning Districts that do not currently have a maximum improved lot coverage value.

Section 273-50:Permanent Pavement describes paving materials and design characteristics. This section shall be amended to include the use of pervious paving materials to minimize stormwater runoff and promote groundwater recharge.

VIII. Land Use/Build-Out Analysis

Figure 8 illustrates the existing land use in the Borough based on 1995/97 GIS information from NJDEP. As shown in this figure, there are no agricultural or barren lands in the Borough.

A detailed land use analysis for the Borough was conducted. Based on this analysis, as shown in Figure 2, the general map of the Borough, Bergenfield contains a portion of the privately owned Knickerbocker Country Club. The property is zoned "40,000 sq. ft. residential, one-family dwelling zone" and is approximately 158 acres. One small vacant parcel, of approximately one (1) acre, exists on West Johnson Avenue. The maximum total area available for development from redeveloping the country club and the vacant parcel is approximately 159 acres. The new regulations specify that if a municipality has a combined total of less than one square mile of vacant or agricultural lands, the municipality is not required to provide a build-out analysis. Therefore, build-out calculations for impervious coverage are not required.

Figure 9 illustrates the HUC14s within the Borough. The Borough zoning map is shown in Figure 10. Figure 11 illustrates the constrained lands within the Borough.

Figure 8: Borough's Existing Land Use – February 2005
Source: www.state.nj.us/dep/gis/newmapping.htm

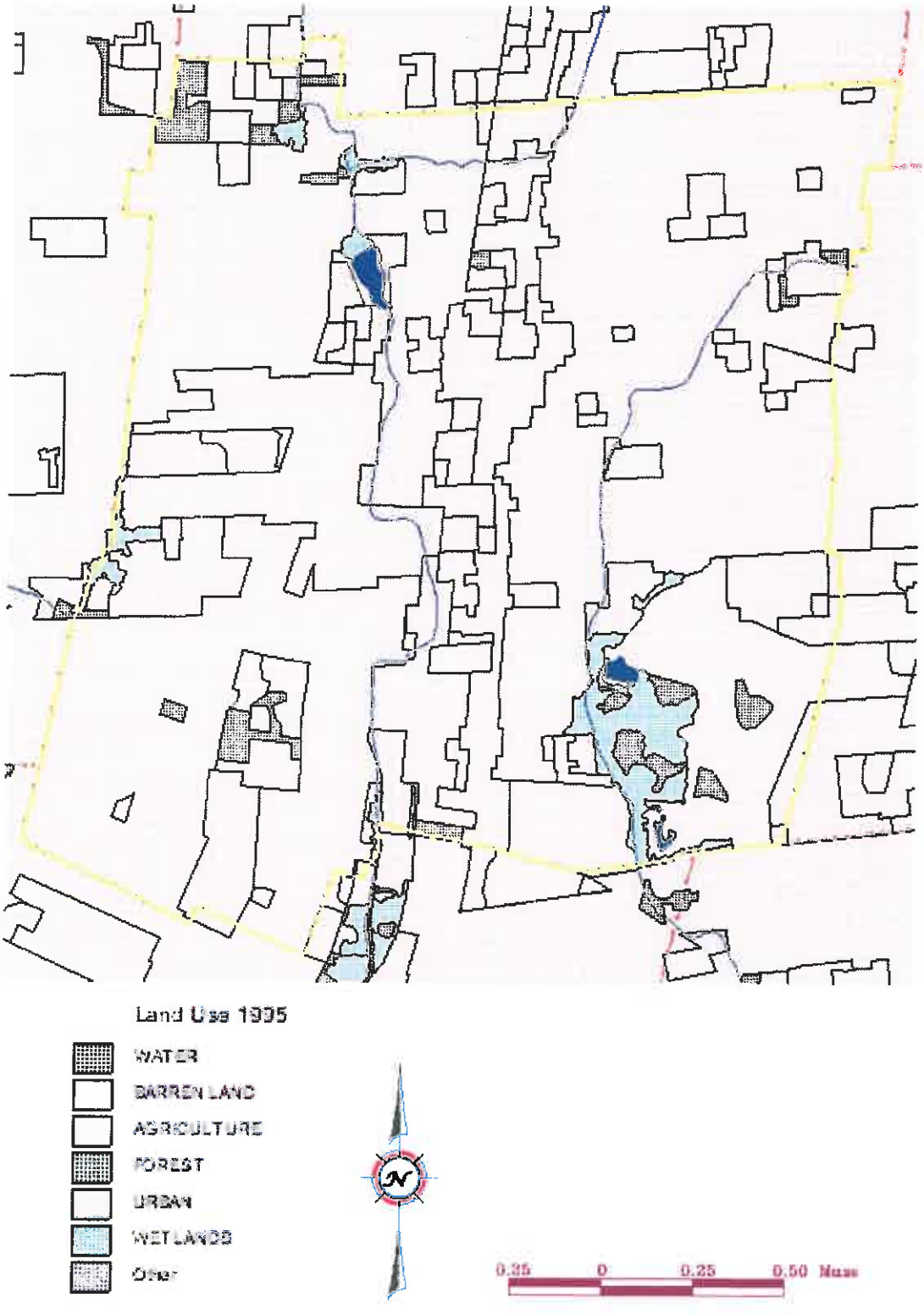
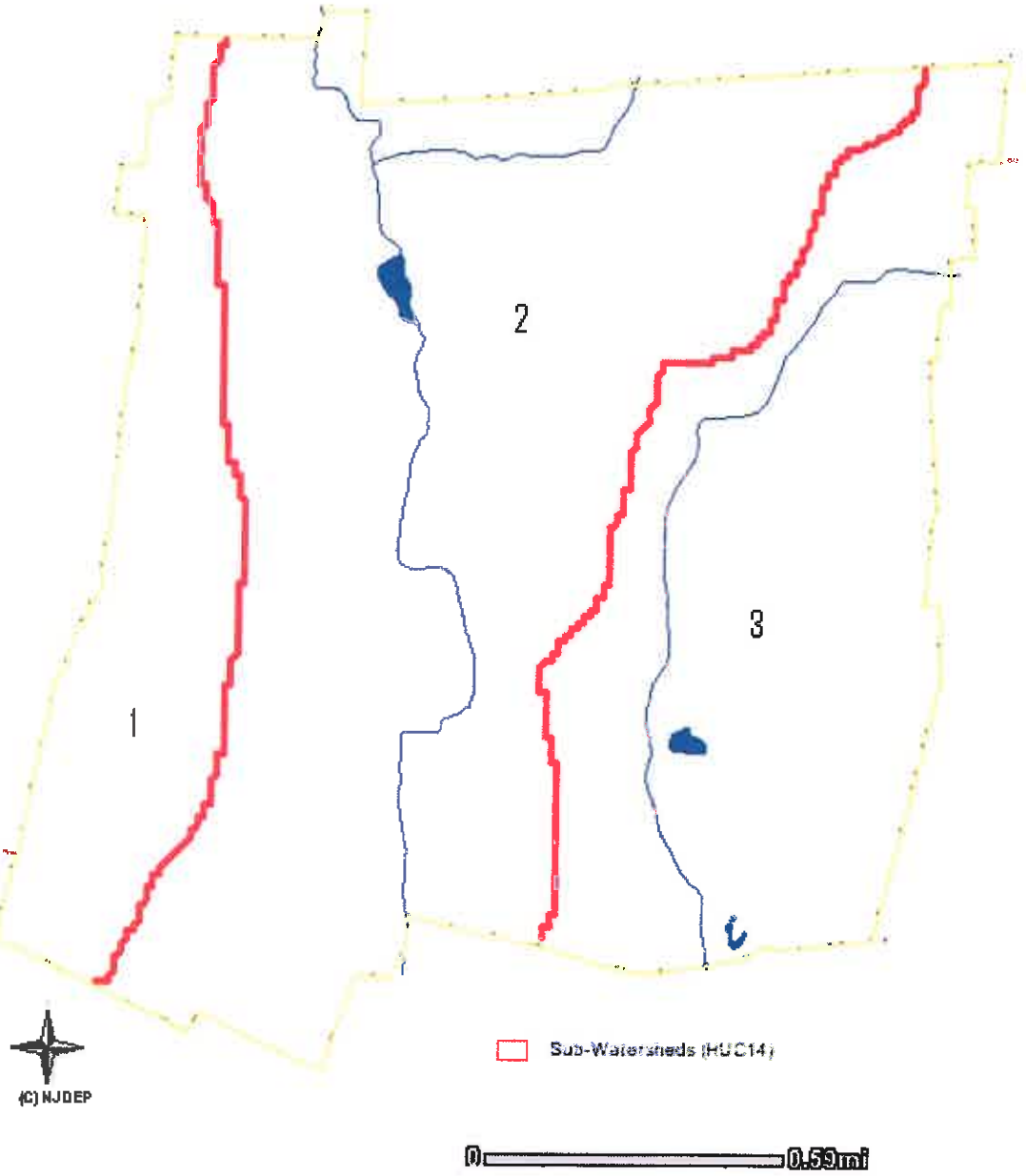


Figure 9: Hydrologic Units (HUC14s) within the Borough – February 2005
Source: www.state.nj.us/dep/gis/newmapping.htm



Area	Sub-Watershed Name	Sub-Watershed ID	Hydrologic Unit Code (14 digit)	Watershed Name	Watershed ID	Watershed Management Area	Management Area ID	Water Region	Water Region ID
1	Hackensack River (Ft. Lee Rd. to Oradell Gage)	05BB03	2030103180030	Hackensack River (Below Hirschfeld Brook)	05BB	Hackensack and Pascack	05	Northeast	1
2	Hirschfeld Brook	05BB02	2030103180020	Hackensack River (Below Hirschfeld Brook)	05BB	Hackensack and Pascack	05	Northeast	1
3	Overpeck Creek	05BB04	2030103180040	Hackensack River (Below Hirschfeld Brook)	05BB	Hackensack and Pascack	05	Northeast	1

Figure 10: Borough Zoning Map

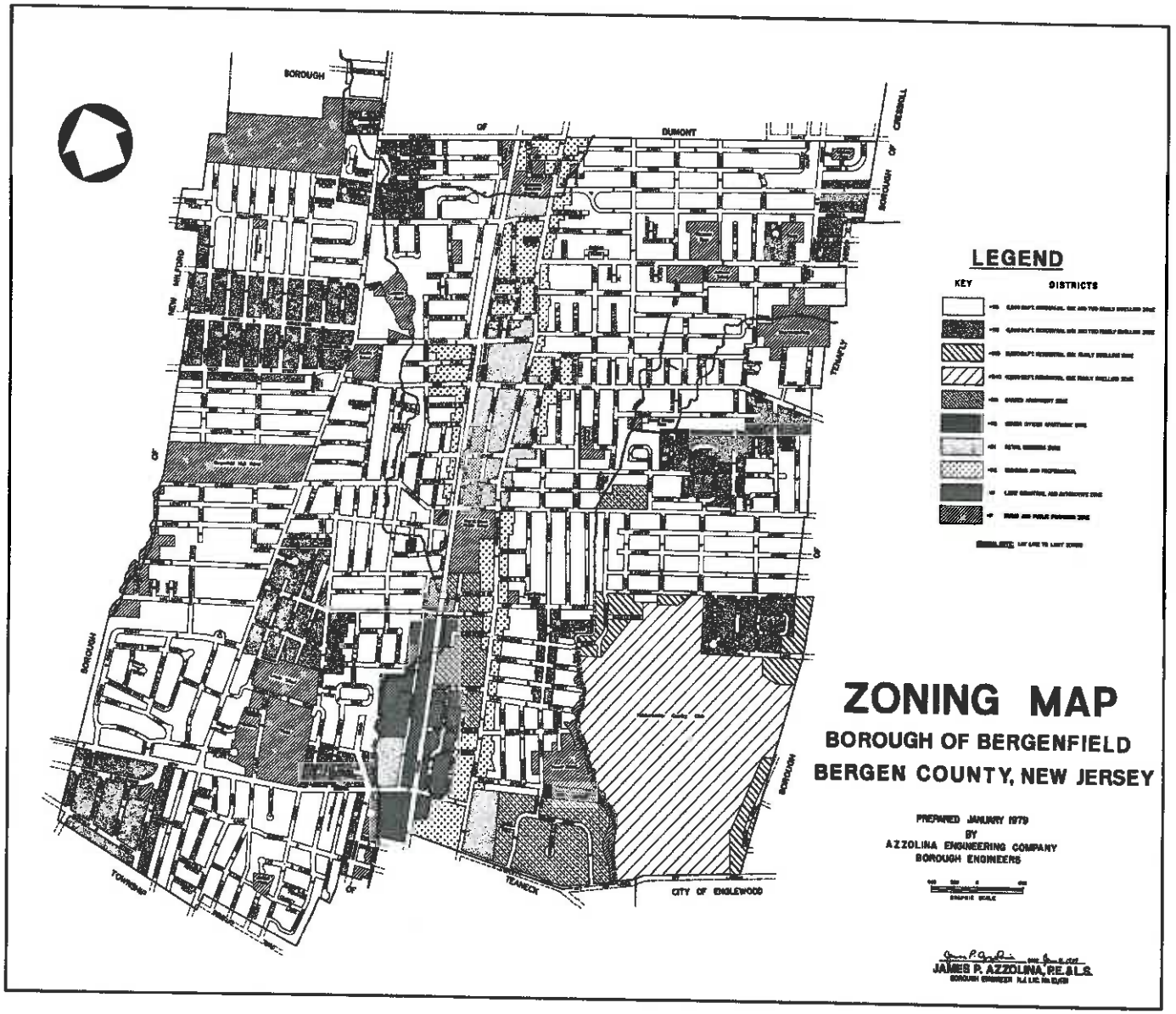
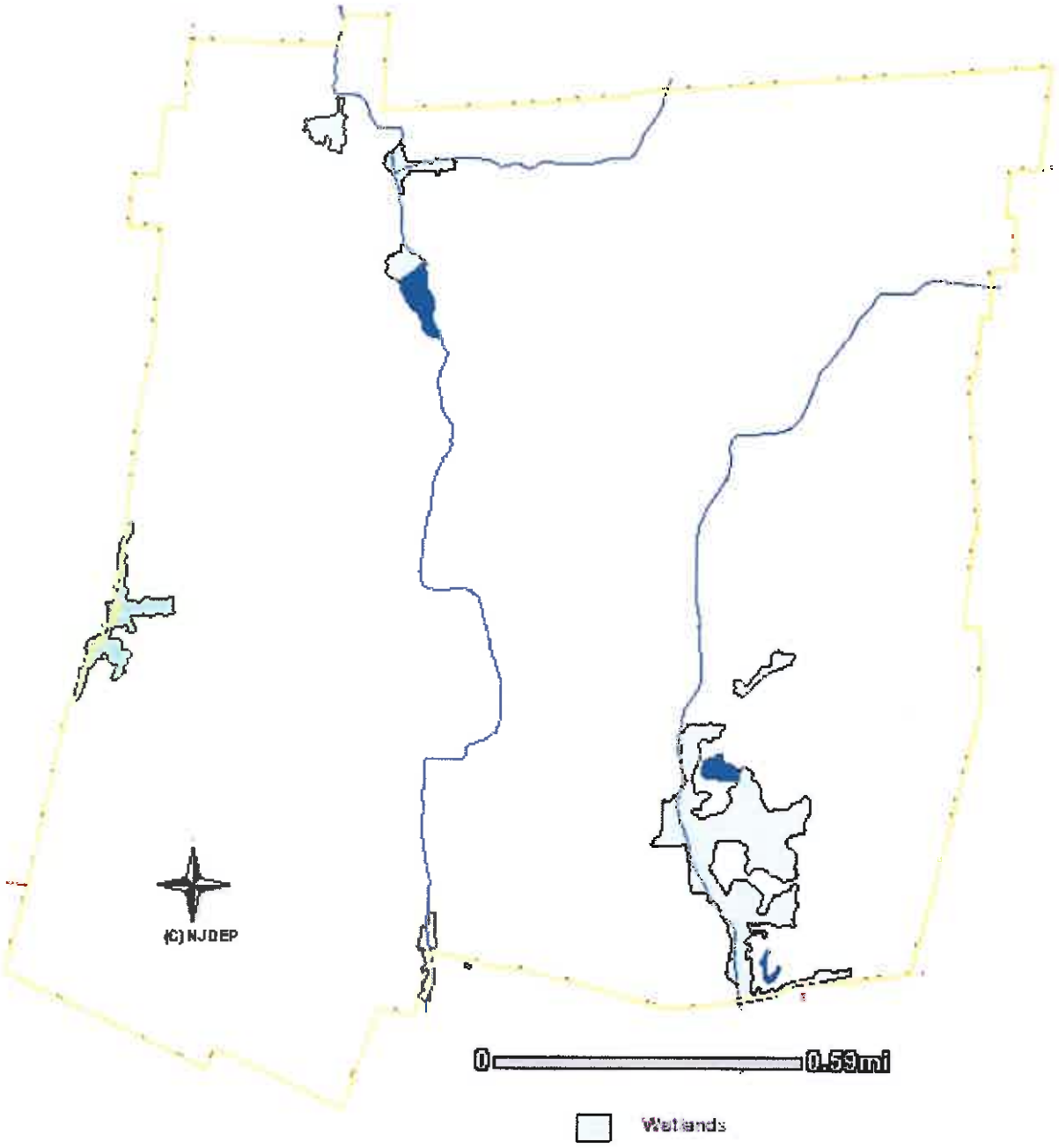


Figure 11: Wetlands and Water Land Uses in the Borough–Constrained Land
February 2005
Source: www.state.nj.us/dep/gis/newmapping.htm



IX. Mitigation Plans

In accordance with NJAC 7:8-4 a Mitigation plan is provided for proposed developments that are granted a municipal variance or exemption to the design and performance standards for stormwater runoff quality, stormwater runoff quantity, or ground water recharge establish under the stormwater management rules at NJAC 7:8-5.

A. Mitigation Project Criteria

1. The mitigation project shall be implemented in the same drainage area as the proposed development. The project must provide the additional groundwater recharge benefits, and/or protection from stormwater runoff quality and/or 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.
2. All applicants for a waiver from the design and performance standards for management of stormwater are to submit the following :

   a. Identification of the "sensitive receptor" and document the physical impossibility to meet all or part of the requirements for water quality, water quantity, or ground water recharge peculiar to the subject property.

   b. Documentation the extent of the defect from the stormwater management standards and how the mitigation plan offsets the defect.

   c. Documentation that approval of the project in mitigation plan would not result in a localized adverse impact or result in a compliance defect that can not be compensated by offsite mitigation.

   d. Documentation that a reduction in the size, scale, or layout of the project will not sufficiently reduce the size of defect from the stormwater standards.

   e. All design details, drawings, calculations and all other information necessary to evaluate the proposed mitigation project.

   f. A list of the persons responsible for the construction and maintenance of the mitigation facilities including documentation of the acceptance for said responsibility. The designation of an

individual single family homeowner as a responsible party is not permitted.

g. A maintenance plan for the mitigation project.

h. Provide all required local state and applicable permits necessary to install the mitigation facility.

i. Documentation that the construction of the mitigation project will coincide with the construction of the proposed project. No certificate of occupancy or final approval will be granted until the mitigation plan receives final approval.

3. Standards for the Special Water Resources protection area can not be waived.

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

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

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

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

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

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

   f. Mitigation projects that address stormwater runoff quantity can

provide storage for proposed increases in runoff volumes, as opposed to a direct peak flow reduction.

5. The municipality may allow a developer to provide funding or partial funding to the municipality towards the development of a Regional Stormwater Management Plan. . The Borough, may further allow this funding to be spent towards an overall study of stormwater management facilities, such as culvert capacity analyses, streambank stabilization, etc. The funding must be equal to or greater than the cost to implement the required 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.

B. Administrative Requirements

1. The Borough shall submit an annual report, as required by the NJPDES permit, to the NJDEP Division of watershed management (DWM) on the variances or exemptions from stormwater management standard issued.
2. The annual report is to include both projects reviewed by the municipality under Municipal Land Use law as well as the Borough's own projects that are unable to fully comply with design and performance standards.

X. Sources for Maps

The NJDEP I-Map Site, www.state.nj.us/dep/gis/depsplash.htm# was used for Figures 3, 5-9, and 11. The http://gis.co.bergen.nj.us/website/viewer1/viewer.htm, Bergen County website was used For Figure 2. Figure 4 is based on USGS Quadrangles as developed by the DeLorme TopoQuads computer program. The zoning map, Figure10, is based on a map entitled "Zoning Map, Borough of Bergenfield, Bergen County, New Jersey" as prepared by Azzolina Engineering Company. Figure 1 was copied from the Sample Stormwater Management Plan as prepared by the New Jersey Department of Environmental Protection.

Regarding the NJDEP site, it is noted that the existing stream layer on which the Category One Waters are based, is from an older data set developed by the US Geological Survey as part of the topographic map series. This layer does not include all water features that come under regulation, and those that are mapped may be displaced from the water features as visible on the digital imagery. The NJDEP will be correcting both of these problems in the near future, as all water features of the state will be re-mapped.

XI. Abbreviations

AMNET - Ambient Biomonitoring Network

BMP- Best Management Practices

C1 - Category One waters, designated for purposes of implementing the antidegradation policies set forth at N.J.A.C. 7:9B-1.5(d).

FW1 - Fresh waters as designated in N.J.A.C. 7:9B-1.15h.

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

HU- Hydrologic Unit Code

GIS - Geographic Information System

MSWMP-Municipal Stormwater Management Plan

NJDEP - The New Jersey Department of Environmental Protection

NJIS - New Jersey Impairment Score

NT- "Nontrout waters" means fresh waters that have not been designated in N.J.A.C. 7:9B-1.15(b) through (h) as trout production or trout maintenance.

RSIS - Residential Site Improvement Standards

RSWMP- Regional Stormwater Management Plan

PCWS - Public Community Water Supply

PURD - Planned Unit Residential Development

SE1 - Saline estuarine waters whose designated uses are listed in N.J.A.C. 7:9B-1.12(d).

SE2 - Saline estuarine waters whose designated uses are listed in N.J.A.C. 7:9B-1.12(e).

SWPP- Source Water Protection Program

SWMP- Stormwater Management Plan

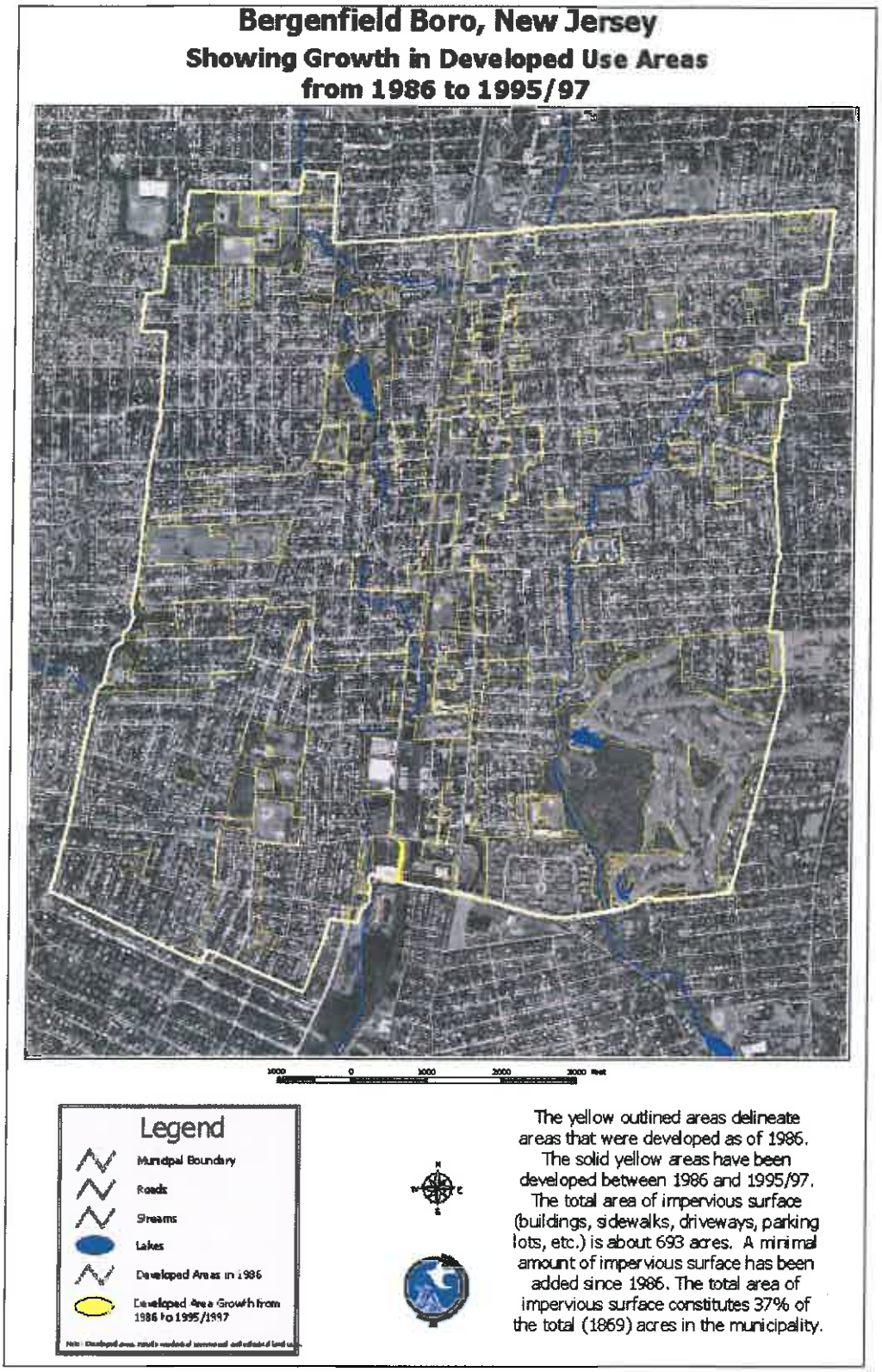
TMDL - Total Maximum Daily Load

USEPA – United States Environmental Protection agency

USGS - United States Geological Survey

WHPA - Well Head Protection Area

APPENDIX A



Source: www.state.nj.us/dep/gis/maps4mayors.htm - February 2005