BIRDSALL ENGINEERING, INC.
CONSULTING & ENVIRONMENTAL ENGINEERS

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MUNICIPAL STORMWATER MANAGEMENT PLAN

TOWNSHIP OF SADDLE BROOK
BERGEN COUNTY, NEW JERSEY

SADDLE BROOK PLANNING BOARD

JULY 2008

Prepared By:

Andre M. Lennertz, P.P., A.I.C.P.
New Jersey License No. 588100

A
BIRDSALL SERVICES GROUP
COMPANY

STORMWATER MANAGEMENT PLAN
TOWNSHIP OF SADDLE BROOK

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1.0 INTRODUCTION

Saddle Brook Township has consulted with Birdsall Engineering, Inc. (BEI) to revise the Township's Municipal Stormwater Management Plan (MSWMP), which was adopted in March 2005. This MSWMP outlines a strategy for Saddle Brook to alleviate the Township's stormwater management problems through the incorporation of more stringent stormwater policies within their Land Use Regulations. The creation of this MSWMP is required by N.J.A.C. 7:14A-25, the Municipal Stormwater Regulations, which were proposed in the New Jersey Register on January 6, 2003, and made effective on February 2, 2004. This plan also includes the Township's Stormwater Control Ordinance (Appendix A) which will incorporate both the goals of this plan and the new stormwater management standards into the Township's existing regulations by applying the newly adopted design standards to "Major Development"(development or redevelopment projects that either disturb one or more acres of land, or propose to add ¼ acre or more of impervious surface).

This plan will incorporate all of the required elements described in N.J.A.C. 7:8 Stormwater Management Rules as well as the nine planning goals that should be addressed when devising municipal level stormwater management plans (N.J.A.C. 7:8-2.2). Further, the plan addresses groundwater recharge, stormwater quantity, and stormwater quality impacts by incorporating the newly adopted stormwater design and performance standards for new development proposals. 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 to receiving water bodies. Also, to reduce the discharge of pollutants to the maximum extent practicable and protect water quality, the plan incorporates the six control measures outlined within the Phase II New Jersey Pollutant Discharge Elimination System Stormwater Regulation Program Rules (N.J.A.C. 7:14A).

To accomplish these ends, Birdsall Engineering has completed a review of the Township's existing ordinances, the Saddle Brook Master Plan, and other planning documents to ensure that nonstructural stormwater management techniques have been integrated into these documents to the maximum extent practicable. In addition, a Mitigation Plan (Section 6.4) that allows Saddle Brook, in limited circumstances, to waive the strict compliance of one or more of the stormwater design and performance standards where full compliance cannot be reasonably accommodated on site has also been included in this MSWMP.

Also, as Saddle Brook can demonstrate through the Housing Element of its Master Plan that it has a combined total of less than one square mile (46.963 acres) of vacant or agricultural lands, a Build Out Analysis pursuant to N.J.A.C. 7:8 4-2 has not been included in this report.

2.0 GOALS AND OBJECTIVES

To improve water quality, reduce the risk of flooding, and in turn improve the quality of life for residents of Saddle Brook, the incorporation of more stringent stormwater management techniques have been identified as a priority by both state and local level government agencies. The new stormwater management requirements and best management practices will advance the goals and objectives of both the New Jersey Department of Environmental Protection, and Saddle Brook Township itself. As the incorporation of more stringent stormwater management regulations are designed to reduce the risk of flooding and help protect environmentally sensitive areas, the goals of this plan are consistent with those of Saddle Brook Township.

Further, the New Jersey Department of Environmental Protection (NJDEP) has established a minimum set of goals and objectives that all municipal stormwater management plans should follow, they include to:

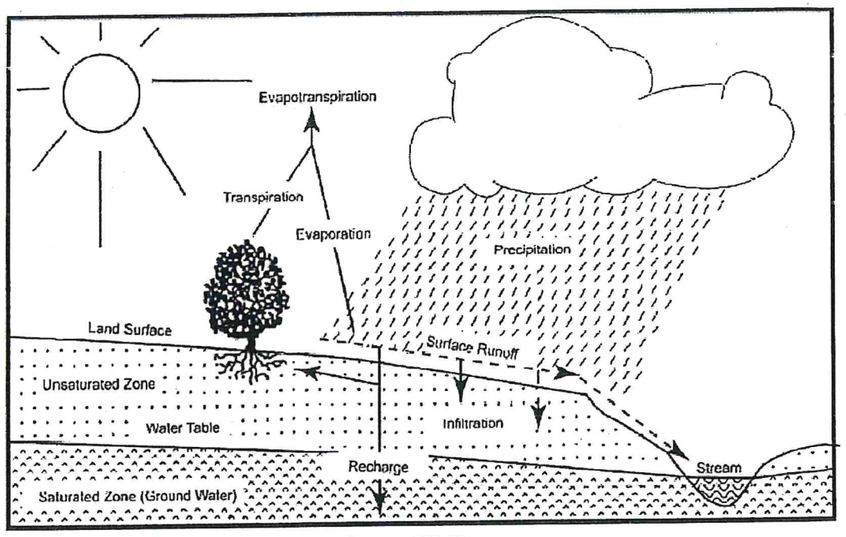
- Reduce flood damage, including damage to life and property;
- Minimize, to the extent practical, any increase in stormwater runoff from any new development;
- Reduce soil erosion from any development or construction project;
- Assure the adequacy of existing and proposed culverts and bridges, and other 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 examines the most pressing stormwater related issues facing Saddle Brook, and in turn provides a draft Stormwater Control Ordinance that will incorporate design and performance standards that create a more ecologically sensitive and sustainable code for managing stormwater. By examining the Township's history, demographics, and current conditions concerning water quality, water quantity, and flooding issues, a clearer picture can be drawn in regards to what the stormwater management issues are at this time, and what type of policy amendments should be taken to improve them. The Township's Stormwater Control Ordinance also calls for additional stormwater management regulations to be adopted by the Township in order to assure that preventative and corrective maintenance strategies have been formulated to maintain the long-term efficacy of stormwater management facilities

3.0 EFFECTS OF STORMWATER RUNOFF

The hydrologic cycle is defined as the constant cyclical movement of water from the ground to the atmosphere and back to the ground. As illustrated by the figure below, this process includes evaporation, transpiration, evapotranspiration, condensation, transport, precipitation, infiltration, percolation, surface runoff, interflow, and groundwater flow. Land development has a dramatic effect on the natural function of this process.

TABLE 1: GROUNDWATER RECHARGE IN THE HYDROLOGIC CYCLE



Source: New Jersey Geological Survey Report GSR-32.

Prior to development, native vegetation acts to both intercept falling precipitation, and return water that has infiltrated into the ground through evapotranspiration. By clearing vegetation, compacting soil, and replacing it with impervious cover, lawns, or landscaping, the development process serves to reduce the natural rate of water that may infiltrate into the soil, and in turn evapotranspiration. Land development can remove this beneficial vegetation and replace it with lawn or impervious cover, reducing the site's evapo-transpiration and infiltration rates. Clearing and grading a site can also remove depressions, which store and infiltrate 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. Further, 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 would be experienced under natural conditions.

In developed areas, following a precipitation event, both the volume and the rate of stormwater runoff will increase in proportion to the amount of additional impervious cover that is generated through a given development. Often gutters, channels, and storm sewers are the tools with which this additional stormwater is carried to local waterways. These man-made stormwater management tools transport water more quickly downstream which creates peak flows that are faster and higher than would be produced in a natural state. The increased peak flow during and shortly after a precipitation event produce greater fluctuations between normal and storm flow rates, which can increase channel erosion.

Table 1: The Effect of Impervious Cover on Runoff

Share of Land With Impervious Cover	Share of Rainwater that Becomes Runoff
0% (natural state)	10 %
10-20%	20%
35-50%	30%
75-100%	75-100%

Source: NJDEP Planning for Clean Water: The Municipal Guide Trenton, NJ 2000.

Not only does the development process increase the peak rate of stormwater flows, the addition of impervious cover also results in water pollution. Pollutants carried within stormwater runoff can take the form of nutrients such as nitrogen and phosphorous which encourage the growth of algae in downstream water ways, or trash and oils that accumulate on sidewalks and roadways between precipitation events. In locations where stormwater sewers discharge runoff directly into a stream, the aggregate accumulation of sediment and pollutants that are carried within it are dumped directly into local waterways. In addition to the chemical and physical contaminants, runoff from impervious systems also requires another form of pollution, heat. When rain falls on pavement that has collected heat through the day, the temperature of runoff can reach as high as 83 degrees Fahrenheit, which is sufficiently warm enough to damage sensitive plant and animal species. Table 2 below, includes a comprehensive list of the possible pollutants contained within untreated stormwater flows.

Table 2: Pollutants Carried in Stormwater
The following pollutants collected and carried in stormwater runoff can seriously degrade water quality in the community:
Nutrients- Include nitrogen and phosphorous, which plants need to grow. However, high levels can cause a health hazard in drinking water and stimulate excessive aquatic plant growth, which can ultimately lower dissolved oxygen levels in the water, causing fish and other aquatic life to smother. Algae blooms are examples of how excess nutrients pollute. Sources of excess nutrients include animal waste, fertilizers, septic systems, road salt applications and auto emissions. About half of the fertilizers applied to lawns in the New Jersey coastal zone enter streams and head to the bay and ocean.
Pathogens- Are disease causing bacteria and viruses associated with the presence of fecal matter. They affect human health directly when people contact contaminated water and consume shellfish. Sources include failing septic systems, animal waste, and boat sanitation facilities.
Sediment- Is fine particles of eroded soil or sand. Common origins are concentrated, excessive stormwater runoff from construction sites. Sediment smothers aquatic habitat, carries pollutants bound to soil particles, makes water cloudy and inhibits the breeding and movement of aquatic species.
Toxic Contaminants- Include pesticides as well as heavy metals such as copper, lead and zinc which are commonly found in old paint, tires, lawn chemicals and preservatives. They attach to sediments, resist breakdown, accumulate in organisms and represent threats to the food chain.
Debris- Consists of various items of trash, such as old tires, shopping carts and plastics. It comes from illegal dumping, street litter, and boating waste. It threatens aquatic life and detracts from recreational and aesthetic values.
Oil- Is one of the worst offenders. One gallon of oil dumped down a storm drain can create a slick up to 8 acres and may pollute up to 1 million gallons of water.
Thermal Stress- From elevated water temperatures reduces survival rates and disease resistance of valued native species and allows the spread of non-native (exotic) species. Water temperature rises because of increased pavement near streams, loss of vegetated stream buffers and stream channelization.
Source: Association of New Jersey Environmental Commissions (1998, Spring). ANJEC Report

4.0 CURRENT CONDITONS

4.1 SETTING/DEMOGRAPHICS

The Township of Saddle Brook, which is depicted in Figure 1-Quad Map, covers 2.72 square miles, or 1,740.8 acres. The land mass of the Township is covered by different land use categories including residential, commercial, office, mixed use, industrial, public and quasi-public, recreational and open space, vacant land, roads, and railroads. A complete overview of land uses both within and proximate to the Township can be found through Figure 2- Land Use Map, which has been included within this report. Up until recently, the Township had experienced little in the way of development as illustrated by the Township's small losses in population over the most recent decades below in Table 2.

Table 2: Population Growth Saddle Brook Township and Bergen County

Year	Population	Change in Number	% Change
1900	306	N/A	N/A
1910	473	167	54.6%
1920	819	346	73.2%
1930	2,424	1,605	196.0%
1940	3,169	745	30.7%
1950	7,955	4,786	151.0%
1060	13,834	5,879	73.9%
1970	15,975	2,141	15.5%
1980	14,084	-1,891	-11.8%
1990	13,296	-788	-5.6%
2000	13,155	-141	-1.1%

Source: U.S. Census Bureau

4.2 WATERWAYS

WATERSHED MANAGEMENT AREA

Saddle Brook Township is located within the NJDEP's Watershed Management Area 4 (WMA 4). This watershed includes the Lower Passaic River (from the Pompton River confluence downstream to the Newark Bay) and its tributaries, including the Saddle River. The drainage area is about 180 square miles and lies within the portions of Passaic, Essex, Hudson, Morris and Bergen Counties.

The Saddle River Watershed itself has a drainage area of 51 square miles. This watershed is extensively developed and contains many older cities and industrial centers including Newark, Paterson, Clifton and East Orange. Like the Lower Passaic, the Saddle River's water quality is affected by its industrial past, current point sources of pollution and urban runoff. Reflecting the area's industrialized history, the conditions are affected by the number of hazardous waste sites and contamination problems found in these areas.

SADDLE RIVER

The Saddle River is the most prominent and volumous waterway that flows through Saddle Brook Township. The river flows along the easternmost portion of the Township, and at times serves as the boundary between Saddle Brook and Rochelle Park, and Lodi Borough.

The Saddle River is one of the larger tributaries to the Lower Passaic River. The Saddle River Watershed has a drainage area of approximately 51 square miles. Land in this watershed is extensively developed and contains many older cities and industrial centers beyond Saddle Brook including Newark, Paterson, Clifton, and East Orange.

Given the impaired nature of water quality in the Saddle River, several stations in the Saddle River watershed were prepared to assess the status and spatial extent of bacterial contamination. The results of this testing, along with a more detailed description of the criteria and qualifications that are utilized by the NJDEP to establish New Jersey's 2006 Integrated List of Waters have been included within this report as Appendix B. Further water quality testing on the Saddle River has been completed by the NJDEP through the AMNET program. The results of these tests can be found in Appendix C.

The United States Environmental Protection Agency (EPA) has established a Total Maximum Daily Load (TDML) limiting the amount of fecal coliform that can be found in the River. More detailed information, including a copy of the TDML information can be found in Appendix D of this report.

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 macrounvertebrates 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 one major river within the Township that has been studied under the AMNET program is the Saddle River. The river was moderately impaired, although no testing locations were contained within the borders of Saddle Brook Township itself.

PEHLE BROOK/ DEWEY'S DITCH

In addition to the Saddle River, Pehle Brook originates in the western portion of the Township, proximate to Pehle Avenue and flows eastward before emptying into the Saddle River. Another small tributary know as the Dewey Ditch originates near the center of the Township and flows eastward into the Saddle River. The entire Township of Saddle Brook and its Waterways are illustrated thought Figure 3-Waterways Map.

4.3 FLOODING

To inform both public and private land use decision makers of areas that are subject to flooding, the Federal Emergency Management Agency has completed Flood Insurance Rate Maps (FIRM) for Saddle Brook Township. As illustrated through Figure 4-FEMA Flood Zone Map, portions of Saddle Brook have been classifies as A, AE by FEMA. Both of these designations have an annual probability of flooding of 1% or greater. IN addition areas of Saddle Brook have also been designated as being contained within the X500 flood zone. These lands, which have an annual probability of flooding of 0.2% to 1%, have been determined as areas that are either between the limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths of less than one (1) foot. In addition, flooding is aggravated by the accumulation of debris at bridges and culverts. Although the FIRM maps delineate floodplain boundary designations for the entire Township, specific base flood elevations have only been determined at a few selected points.

4.4 SOILS

In planning for the future of Saddle Brook, such elements as topography, the type of soils found in the Township and the drainage characteristics of these soils must be considered Drainage conditions within Saddle brook vary, but generally the soils in the Township exhibit drainage that ranges from good to excellent. The soil types that are found within and proximate to the Township are illustrated in greater detail through Figure 5-Soils Map.

4.5 GROUNDWATER RECHARGE

The high imperviousness of the Township has significantly decreased groundwater recharge, and in turn contributed to the water quantity issues that exist in Saddle Brook. The average annual groundwater recharge rates are shown graphically in Figure 6-Ground Water Recharge Map. New Jersey Geologic Survey (NJGS) estimates groundwater recharge using methodology from NJGS Report GSR-32 "A Method for Evaluation of Ground-Water-Recharge Areas in New Jersey". To calculate Groundwater Recharge Rates, Land-use/land-cover, soil and municipality-based climatic data were combined and used to produce an estimate of ground-water recharge in inches/year. Recharge was then ranked by volume (billions of gallons/year) using natural breaks in the percentage of total volume.

The general recharge characteristics of WMA 4, which includes Saddle Brook Township, are related to the geology of each area. In most locations in WMA 4, the bedrock is covered by glacial drift. Where bedrock is exposed, it typically represents a recharge area. Where the surficial glacial deposits are coarse, have rapid permeability, and exhibit little or moderate runoff, infiltrating precipitation will pass through the root zone more quickly and more of it will reach the water table. Other areas are covered with till or fine-grained lake-bottom deposits, which have lower permeability and tend to slow the downward movement of infiltrating precipitation and to deflect it laterally. For the most

part, soils with rapid permeability are in need of greater protection from sources of pollution.

4.6 WELLHEAD PROTECTION AREAS

Wellhead protection areas, also required as part of the MSWMP, are illustrated in Figure 7-Wellhead Protection Areas. According to the NJDEP, "A Well Head Protection Area (WHPA) in New Jersey is a map area calculated around a Public Community Water Supply (PCWS) well 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 for unconfined wells. ...The confined wells have a fifty foot radius delineated around each well serving as the well head protection area to be controlled by the water purveyor in accordance with Safe Drinking Water Regulations" (see NJAC 7:10-11.7(b) 1). Well Head Protection Area delineations are conducted in response to the Safe Drinking Water Act Amendments of 1986 and 1996 as part of the Source Water Area Protection Program (SWAP). The delineations are the first step in defining the sources of water to a public supply well. Within these areas, potential contamination will be assessed and appropriate monitoring will be undertaken as subsequent phases of the NJDEP SWAP program. Although Spring Lake has not adopted a Wellhead Protection ordinance, this issues is currently being reviewed by the Township.

5.0 STORMWATER MANAGEMENT

5.1 INFRASTRUCTURE

Saddle Brook Township receives approximately 44 inches of rain in an average year. To manage the public risk that flooding imposes on residents, a substantial stormwater management system has been developed. As illustrated earlier through Table 2, the rate, amount, and condition of the stormwater that finds its way into local waterways is in large part determined by the amount of impervious cover the land contains. With less absorption of rainwater into the ground, the increased runoff collects more pollutants from the surface, which promotes erosion, damages stream banks, and in turn dumps sediment into streambeds.

To control stormwater runoff quantity impacts (N.J.A.C. 7:8-5.4 3.), a major development must meet one of three design standards: (1) demonstrate that at no point in time, the post-construction runoff hydrograph exceeds the pre-construction runoff hydrograph, (2) demonstrate there is no increase, as compared to the pre-construction condition, in the peak runoff rates of stormwater leaving the site for the 2, 10, 100-year storm event and that the increased volume or change in timing of stormwater runoff will not increase flood damage at or downstream of the site, and (3) demonstrate the postconstruction peak runoff rates for the 2, 10 and 100-year storm events are 50, 75 and 80 percent, respectively, of the pre-construction runoff rates. However, for stormwater water runoff quantity requirement (3), stream encroachment standards (N.J.A.C. 7:13-

2.8) will require for the 100-year storm event 75 percent of the pre-construction peak runoff rates.

N.J.A.C. 7:8 spells out guidelines for how to manage stormwater more effectively and also how to incorporate best management practices into the planning stages of project design. These standards now require stormwater detention capacity to hold and slowly release the runoff from storms that have a likelihood of occurring once every two, ten and one hundred years. Some sites may be able to achieve these standards through vegetative swales, buffers, and other landscaping measures to control non-point source pollution. Other sites may require the building of a stormwater basin. In these cases, where the development of structural stormwater facilities is necessary, the New Jersey Department of Environmental Protection's BMP guide should be consulted as it outlines alternatives and strategies to incorporate Best Management Practices into a projects site design. Guidance on which BMP would be most suited for a particular site can be not only be found within the DEP's BMP Manual, but also on-line as the DEP has prepared a draft document entitled "Matching the BMP to Site and Watershed Conditions" at:
http://72.14.203.104/search?q=cache:lU5IILBHCZkJ:www.state.nj.us/dep/watershedmgt/DOCS/BMP_DOCS/chapter4.PDF

The incorporation of such designs into the Township's existing stormwater management infrastructure is strongly encouraged to enhance groundwater recharge and reduce the amount of runoff that originates on site; thus improving both the quality and quantity of stormwater in Saddle Brook.

5.2 STORM DRAINS

Saddle Brook Township has an annual Capital Improvement Program (CIP) through which infrastructure improvements are designed and constructed. The construction or reconstruction of drainage best management practices, and stormwater management improvements are included in this program.

Since the Effective Date of Permit Authorization (EDPA), the Township of Saddle Brook has not constructed any new development or redevelopment projects on municipal property. In accordance with the State's Stormwater Management Rules (N.J.A.C. 7:8), the Township requires any new storm drain inlets to comply with the NJDEP's newly adopted design standards. Further, once the Township's adopted Stormwater Control Ordinance becomes enforceable, Saddle Brook will ensure such operation and maintenance for any new development or redevelopment projects on municipal property will comply with the maintenance requirements that are specified in that ordinance.

Further, for any BMP that is installed to comply with the requirements of the Township's post construction program, the Township of Saddle Brook will ensure the adequate long-term operation as well as preventative and corrective maintenance (including replacement) of BMP's. For BMP's on private property that is not owned by the Township, long term maintenance and corrective measures will be ensured through adopting and enforcing provisions within the Township's Stormwater Control Ordinance.

These provisions will require private entities to perform the operation and maintenance of a BMP, with penalties that can be enforced should that private entity not comply with these provisions. For example, if a private entity should chose to not perform adequate maintenance of a BMP, the Township can perform this maintenance, and subsequently charge the private entity.

Through its Stormwater Control Ordinance, Saddle Brook Township will also ensure compliance with the NJDEP's design standards to control the passage of solid and floatable materials through storm drain inlets. For most projects, this compliance will be accomplished through either by conveying flows through a trash rack , or by installing an NJDOT bicycle safe grate, and/or (if needed) a curb opening with a space no larger than 2" across the smallest dimension.

To better educate the Saddle Brook community on stormwater management, groundwater recharge, water quality, and water quantiy issues, the Township will include NJDEP flyers and brochures to residents and businesses in Saddle Brook in conjunction with the mailing of annual property tax bills. The first such annual mailing took place in August of 2004 and additional copies are available upon request at the Saddle Brook municipal building. In addition, Saddle Brook's annual educational event will be held each year in coordination with the Township's annual town picnic, which is typically held on the last Saturday in August. The first annual event was held in conjunction with Saddle Brook's annual Town Picnic on August 28, 2004.

The Township has successfully labeled all of its storm drain inlets. The labels were applied by local boy scouts using durable paints and stencils in 2002. During the Township's annual catch basin cleaning program, these labels will be checked to ensure that they are still clearly visible. If they are not, the labels will be replaced as soon as possible.

The NJDEP's Stormwater Management Rules require that all MS4 outfall pipes within a municipality be mapped. There are no MS4 outfall pipes that discharge to a surface water body within the jurisdiction of the Township of Saddle Brook. All stormwater in the Township flows into the municipal separate storm systems of adjacent municipalities and then into the Saddle River, at which point it is within the jurisdiction of the County of Bergen. As such, there are no outfall pipes to be mapped or subsequently inspected.

The Township has also implemented an annual catch basin cleaning program to maintain catch basin function and efficiency. All catch basins will be inspected at least once each year. If, at the time of inspection, no sediment, trash, or debris is observed in the catch basin, then that catch basin will not be cleaned. All catch basins will be inspected annually, even if they have been found to be "clean" the previous year. At the time of the cleaning, the catch basins will also be inspected for proper function. Maintenance will be scheduled for those basins that are in disrepair.

For the purposes of catch basin cleaning and inspection, the Township has been divided into four sections as described below:

Section 1 includes all streets form Wilson Street, south to Colonial Avenue and from Fairlawn Parkway, west to north Midland Avenue. Section 2 includes all streets from South Broadway, south from Fairlawn Parkway, east to Saddle River Road, including Jarmos Terrace, Kuhn Drive, Bell Avenue, Birk Street and Riverview Avenue. Section 3 includes all streets from Market Street (south side of street only), south to Outwater Lane, from Hollywood Avenue, west to Midland Avenue. Section 4 includes all streets from Pehle Avenue, south to Market Street (north side only), from Saddle River Road, west to Midland Avenue.

5.3 WATERSHED

The Township of Saddle Brook is contained within the Lower Passaic River (from the Pompton River confluence downstream to the Newark Bay) and its tributaries, including the Saddle River. The drainage area is about 180 square miles and lies within the portions of Passaic, Essex, Hudson, Morris and Bergen Counties.

The Saddle River Watershed itself has a drainage area of 51 square miles. This watershed is extensively developed and contains many older cities and industrial centers including Newark, Paterson, Clifton and East Orange. Like the Lower Passaic, the Saddle River's water quality is affected by its industrial past, current point sources of pollution and urban runoff. Reflecting the area's industrialized history, the conditions are affected by the number of hazardous waste sites and contamination problems found in these areas

The term "HUC-14" is from the hydrologic unit code system for delineating and identifying drainage areas. The system starts with the largest possible drainage area (basin) and progressively breaks it down into smaller subdivisions (subbasins, watersheds and subwatersheds respectively). These subdivisions are delineated and numbered in a nested fashion. A drainage area with a 14 numbered address, or HUC-14, is a subwatershed of a larger watershed with 11 numbers, or a HUC-11. There are 921 HUC-14 subwatersheds in New Jersey that average 8.5 square miles. There are 150 HUC-11 watersheds in New Jersey with an average size of 51.9 square miles. A statewide graphic depiction of the breakdown of these watershed areas is available at: http://www.nj.gov/dep/watershedmgt/hucmap.htm (Source: NJDEP – Division of Watershed Management).

Saddle Brook is located within the bounds of three HUC-14 subwatersheds. These subwatersheds have been identified as HUC-14 unit code 02030103140060 (Saddle River -Lodi gage to Rt. 4), 02030103120090 Passaic R Lwr (Saddle R to Dundee Dam), and 02030103140070, (Lower Passaic and Saddle R). The HUC 14 watershed boundaries both within and proximate to the Township are all illustrated on the "Waterways Map" which is included as Figure 3 within this report.

6.0 DESIGN AND PERFORMANCE STANDARDS

To minimize the adverse impact of stormwater runoff on water quality, water quantity and the loss of groundwater recharge in receiving water bodies, the Township will adopt design and performance standards that comply with the stormwater management measures as presented in N.J.A.C. 7:8. The design and performance standards include amended language for the inclusion of maintenance requirements, and safety standards consistent with N.J.A.C. 7:8-6. The ordinances will be submitted to the County for review and approval within 24 months of the effective date of permit authorization (EDPA).

Further, by amending their current Land Use Regulations, it is the intention of the Township of Saddle Brook to incorporate both structural and nonstructural stormwater management strategies as presented in N.J.A.C. 7:8-5 to the maximum extent practicable. So as to minimize the adverse impact on water quality which is imposed by stormwater runoff, the proposed amendments to the Township's current development regulations include the incorporation of stricter stormwater management guidelines relating to water quantity, water quality, and groundwater recharge as identified in the design and performance standards as presented in N.J.A.C. 7:8-5.

The second set of rules is the Phase II New Jersey Pollutant Discharge Elimination System Stormwater Regulation Program Rules (N.J.A.C. 7:14A). These Rules are intended to address and reduce pollutants associated with existing stormwater runoff. The Rules establish a regulatory program for existing stormwater discharges as required under the Federal Clean Water Act. These rules govern the issuance of permits to entities that own or operate small municipal separate storm sewer systems, known as MS4s. Under this program permits must be secured by municipalities, certain public complexes such as universities and hospitals, and State, interstate and Federal agencies that operate or maintain highways. The permit program establishes the Statewide Basic Requirements that must be implemented to reduce nonpoint source pollutant loads from these sources. The Statewide Basic Requirements include measures such as: the adoption of ordinances (litter control, pet waste, wildlife feeding, proper waste disposal, etc.); the development of a municipal stormwater management plan and implementing ordinance(s); requiring certain maintenance activities (such as street sweeping and catch basin cleaning); locating discharge points and stenciling catch basins; and a public education component.

Owners or operators of small MS4s would be required to develop and implement a storm water management program designed to reduce the discharge of pollutants to the maximum extent practicable and protect water quality. Control measures are expected to include, at a minimum, the following components:

- Public education and outreach
- Public involvement and participation
- Illicit discharge detection and elimination
- Construction site storm water runoff control

- Post-construction storm water management in new development and redevelopment
- Pollution prevention/good housekeeping for municipal operations.

6.1 IMPLEMENTING NON-STRUCTURAL STORMWATER MANAGEMENT STRATEGIES

The implementation of non-structural Best Management Practices are strongly encouraged to be added to theTownship's existing development regulations and applied to all new site design proposals. Whenever possible, the following nine strategies should be incorporated into site design:

- Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;
- Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces;
- Maximize the protection of natural drainage features and vegetation;
- Minimize the decrease in the "time of concentration" from pre-construction to post construction. "Time of Concentration" is defined as the time it takes for runoff to travel from the hydraulically most distant point of the drainage area to the point of interest within a watershed;
- Minimize land disturbance including clearing and grading;
- Minimize soil compaction;
- Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides;
- Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas; and
- Provide other source controls to prevent or minimize the use or exposure of pollutants at the site in order to prevent or minimize the release of those pollutants into stormwater runoff. These source controls include, but are not limited to:

  i. Site design features that help to prevent accumulation of trash and debris in drainage systems;

  ii. Site design features that help to prevent discharge of trash and debris from drainage systems;

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

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

Also, Chapter 762 (Site Plan Review Regulations) and Chapter 206 (Zoning) of the Township's Code was reviewed to evaluate the extent to which non-structural stormwater management techniques have been implemented into the site deign of a proposed development. This review included, but was not limited to existing provisions for Curbs and Gutters, Driveways and Accessways, Off-Street Parking and Loading, Streets, and Sidewalks. A summary of the possible amending section to the Township's ordinance are presented below:

Article XII: Buffers (Section 206-54 through 206-58): requires buffer areas for all non-residential uses that abut a residential zone, as well as buffers for all public, semi-public, and institutional uses in the single family residential zones. The language in this section should be changed to include buffers along all lot and street lines separating residential uses from arterial and collector streets, and along all street lines where loading and storage areas can be seen from the street. The landscape requirements for these buffer areas in the existing section do not recommend the use of native vegetation. The language of this section should be amended to require the use of native vegetation. The language of this section should be amended to require the use of native vegetation, which requires less fertilization and watering than non-native species. Additionally, language should be included to allow buffer areas to be used for stormwater management by disconnecting impervious surfaces and treating runoff from these impervious surfaces. Further language should be added to this section to require the preservation of natural wood tracts and limit land disturbance for new construction.

Article XV, Nonconforming Uses, Structures, or Lots (Sections 206-75 through 206-82): Language should be included in this section that requires expansions to non-conforming uses that are granted a d(2) variance by the Board of Adjustment to mitigate the impact of the additional impervious surfaces unless the stormwater management plan for the development provided for these increases in impervious surfaces. This mitigation effort must address water quality, flooding, and groundwater recharge.

Article XiX, Impact Statements and Off-Tract Contributions (Section 206-110 through 206-111): This section should include language to require that any off-site and off-tract stormwater management and drainage improvements must conform to the "Design and Performance Standards" described in this plan.

Article IX, Parking Regulations (Section 206-36): details off-street parking requirements. Language should be added to this section to include the following: All parking lots with more than ten (10) spaces and all loading areas are required to have concrete or Belgian block curbing around the perimeter of the parking areas. Concrete or Belgian block curbing will be installed around all landscaped areas within the parking lot or loading areas. It is also required that this a flush curb with curb stop, or curbing with curb cuts will be required to allow for the discharge of impervious areas into landscaped areas for stormwater management. Also, language should be added to allow for use of natural vegetated swales for the water quality design storm, with overflow for larger storm events into storm sewers.

This section also provides guidance on minimum parking space requirements. These requirements are based on the number of dwelling units and/or gross floor area. The section should be amended to allow pervious paving to be used in areas to provide overflow parking, smaller parking stalls, and shared parking.

Several additional changes should be made to Chapter 206 and Chapter 762 of the Township Ordinance, as follows:

The Township has 5 types of residential districts. Each district has a maximum percent impervious surface allocation, ranging from 25-30 percent for the RM Multi-Family Apartment District, which has a minimum lot size of 160,000 square feet, to 30 percent for the remaining R-A, R-B, R-T and Townhouse Districts, which have a minimum lot size of 6,500; 6,500 and 7,000; 6,500 and 7,000 and 200,00 square feet respectively. The Township has 6 types of nonresidential districts. Each of these districts has a maximum percent impervious surface, the Township Code should 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. The Township is evaluating the maximum allowable impervious cover is appropriate. The Township is evaluating the maximum allowable impervious cover for each zone to determine whether a reduction in impervious cover is appropriate. The Township is also evaluating a maximum percent of disturbance for each zone. 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.

Additionally, the following sections are prototype examples of additions to the Township Ordinance that will further Stormwater Management and Control throughout the Township.

Section __-__: Cluster Development would provide for a cluster development option to preserve land for public and agricultural purposes, to prevent development on environmentally sensitive areas, and to aid in reducing the cost of providing streets, utilities and services in residential developments. This cluster option is an excellent tool for reducing impervious roads and driveways. The option allows for smaller lots with smaller front and side yard setbacks than traditional development options. It also minimizes the disturbance of large tracts of land, which is a key nonstructural stormwater management strategy. The cluster option would be amended to require that a certain percentage of the total tract be preserved as common open space for residential area. The cluster option should require that 25 percent of the green or common area be landscaped with trees and/or shrubs. This language will promote the use of native vegetation, which requires less fertilization and watering than non-native ornamental plants. Although the cluster option would require public concrete sidewalks to be installed along all streets, the option would require paths in open space to be mulched or stone to decrease the impervious area.

Section __-__: Curbs and Gutters would require that concrete curb and gutter, concrete curb, or Belgian block curb be installed along every street within the fronting on a development. This section would 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 __-__: Drainage, Watercourses and Flood Hazard Areas would require that all streets be provided with inlets and pipes where the same are necessary for proper drainage. This section would encourage the use of vegetated swales in lieu of inlets and pipes.

Section __-__: Driveways and Access ways would describe the procedure for construction of any new driveway or access way to any street. This section would allow the use of pervious paving materials to minimize stormwater runoff and promote groundwater recharge.

Section __-__: Natural Features would require that natural features, such as trees, brooks, swamps, hilltops, and views, be preserved whenever possible, and that care be taken to preserve selected trees to enhance soil stability and landscaped treatment of the area. This section would expand trees to forested areas, to ensure that leaf litter and other beneficial aspects of the forest are maintained in addition to the trees.

Section __-__: Performance Standards would provide pollution source control. It prohibits materials or wastes to be deposited upon a lot in such form or manner that they can be transferred off the lot, directly or indirectly, by natural forces such as precipitation, evaporation or wind. It also would require that all materials and wastes that might create a pollutant or a hazard be enclosed in appropriate containers.

Section __-__: Shade Trees would require a minimum of three (3) shad trees per lot to be planed in the front yard. This ordinance would recognize 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 set out a "critical footprint area" that extends twenty feet (20') beyond the driveways and building footprint where clearing of trees cannot occur. This complies with minimizing land disturbance, which is a nonstructural stormwater management strategy. These sections would require the identification of forested areas, and that a certain percentage of forested areas be protected from disturbance.

Section __-__: Sidewalks describe sidewalk requirements for the Township. If sidewalks are not required along all streets, the Township can require them in areas where the probably volume of pedestrian traffic, the development's location in relation to other populated areas and high vehicular traffic, pedestrian access to bus stops, schools, parks, and other public places, and the general type of improvement intended indicate the advisability of providing a pedestrian way. Sidewalks are to be a minimum of four feet (4') wide and constructed of concrete. This section would require developers to design

sidewalks to discharge stormwater to neighboring lawns where feasible to disconnect these impervious surfaces, or use permeable paving materials where appropriate.

Section __-__: Soil Erosion and Sediment Control addresses the soil erosion and sediment control. This ordinance would require developers to comply with the New Jersey Soil Erosion and Sediment Control Standards and outline some general design principles, including: whenever possible, retain and protect natural vegetation; minimize and retain water runoff to facilitate ground water recharge; and, install diversions, sediment basins, and similar required structures prior to any on-site grading or disturbance.

Section __-__: Stormwater Runoff addresses stormwater runoff by including all requirements outlined in N.J.A.C. 7:8-5. These changes were presented earlier in this document.

In addition, Appendix A provides a Draft of Saddle Brook's Stormwater Control Ordinance that will comply with the State's newly adopted stormwater management design and performance standards. A number of additional provisions relating to stormwater basin fees and maintenance, design standards which pertain to both structural and non-structural methods that must be incorporated into a projects design, safety standards for stormwater basins, and maintenance and repair fees as well as responsibility and penalties for non compliance will all be included within the ordinance.

6.2 IMPLEMENTING STRUCTURAL STORMWATER MANAGEMENT STRATEGIES

As mentioned earlier, the NJDEP has implemented more rigid regulations regarding the volume, rate, and quality of stormwater originating on a new development site. Some sites may be able to achieve these standards through vegetative swales, and buffers, and landscaping to control non-point source pollution. Other sites may require the building of a stormwater basin. In these cases, where the development of structural stormwater facilities is necessary, the New Jersey Department of Environmental Protection's BMP guide should be consulted. The structural BMP's utilized in low impact development concentrate on the following practices to be utilized in site development in conjunction with the non-structural methods described above:

- Bio-retention Systems – A bioretention system consists of a soil bed planted with native vegetation located above and underdrained sand layer. It can be configured either as a basin or a swale.
- Constructed Stormwater Wetlands – Constructed wetlands are wetlands systems designed to maximize the removal of pollutants from stormwater runoff through settling and both uptake and filtering by the vegetation.
- Dry Wells - A dry well is a subsurface storage facility that receives and temporarily stores stormwater runoff from roofs and structures. Discharge of the accumulated stormwater from a dry well occurs through infiltration into the surrounding soils.

- Extended Detention Basins - An extended detention basin is a facility constructed through excavation or embankments that provides temporary storage of stormwater runoff. It has an outlet structure that detains runoff inflow and allows for controlled outflow to aid in mitigating stormwater flows from development. Usually this type of structure is utilized to provide both water quantity and water quality mitigation.
- Infiltrative Basins – Infiltration Basins are similar to detention basins in that they both temporarily store stormwater runoff generated from development project. The principal outlet to this type of basin is not a constructed outlet structure, but rather the highly permeable soils allowing for infiltration into the surrounding subsoils.
- Manufactured Treatment Devices – A manufactured treatment device is a pre-fabricated stormwater treatment structure utilizing settling, filtration, absorptive materials, vortex separation, vegetative components, and/or other appropriate technology to remove pollutants from stormwater runoff.
- Pervious Paving Systems – Pervious pavement utilizes paving material which allows for stormwater to infiltrate through the pavement rather than accumulate as is the case with standard paving material. Pervious pavement utilizes void areas within the paving material to provide for this permeable feature.
- Sand Filters – A sand filter consists of a forebay and an underdrained sand bed. Runoff entering the sand filter is conveyed first through the forebay, which removes trash, debris and coarse sediments, and then infiltrates through the sand bed to an outlet pipe at the bottom of said filter.
- Vegetative Filters – A vegetative filter is an area designed to remove suspended solids and other pollutants from stormwater runoff flowing through a length of vegetation, called a vegetative filter strip. The vegetation in a filter strip can range from turf grass to woody vegetation.
- Wet Ponds - A wet pond is a facility constructed through excavation or embankments that provides both permanent and temporary storage of stormwater runoff. It has an outlet structure that creates a permanent pool and detains and attenuates runoff inflows promoting the settlement of pollutants.

Further, all structural stormwater management measures (structural BMP's) shall be designed according to the following conditions:

- They should to take into account the existing site conditions, including, for example, environmentally critical areas, wetlands; flood-prone areas; slopes; depth to seasonal high water table; soil type, permeability and texture; drainage area and drainage patterns; and the presence of solution-prone carbonate rocks (limestone).
- They should be designed, constructed, and installed to be strong, durable, and corrosion resistant. Measures that are consistent with the relevant portions of the Residential Site Improvements Standards at N.J.A.C. 5:21-7.3, 7.4, and 7.5 shall be deemed to meet this requirement.
- At the intake to the outlet from the stormwater management basin, the orifice size shall be a minimum of two and one-half inches in diameter.

- Stormwater management basins shall be designed to meet the minimum safety standards for stormwater management basins at Section N.J.A.C. 7:8-7.
- Stormwater management measure guidelines are available in the New Jersey Stormwater Best Management Practices Manual. Other stormwater management measures may be utilized provided the design engineer demonstrates that the proposed measure and its design will accomplish the required water quantity, groundwater recharge and water quality design and performance standards established by this subchapter.
- In order to ensure adequate long term operation as well as preventative and corrective maintenance of stormwater management measures and structural BMP's, the designers of such facilities should submit to the municipality a Maintenance Plan indicating specific maintenance tasks and schedules as indicated in N.J.A.C. 7:8-5.8 "Maintenance Requirements". This maintenance plan will require the ultimate user of said structural BMP's to provide an annual certification that the stormwater management measures approved are functioning as designed and that the proper maintenance and inspection of said measures have been performed. Random spot inspections by the municipality will be conducted to ensure compliance along with appropriate enforcement actions such as fines to be levied should non-compliance result.

By adhering to the State's newly adopted design standards, the BMP's engineered for each proposed development project will serve to improve stormwater quality, enhance groundwater recharge, and reduce stormwater runoff. Combined, these methods will serve to improve the environment and protect the public interest by minimizing the risk of flooding and maintain the Township's water supply through the future.

6.3 PLAN CONSISTENCY

Currently, no lands within Saddle Brook are contained within the bounds of an adopted Regional Stormwater Management Plan (RSWMP) and no Total Daily Maximum Loads (TDML's) have been developed for waters within the Township. Therefore, at this time, it is not necessary for the amendments proposed in this plan to adhere to standards developed through the adoption of a Regional Stormwater Management Plan.

However, a TDML has been established for the Saddle River in close proximity to Saddle Brook Township, and Bergen County is working to complete a Regional Stormwater Management Plan. As such, upon the completion of any additional RSWMP's or TMDL's Saddle Brook Township will review and if necessary revise this plan as any additional design standards or TMDL's established through such a plan would supersede the Township's existing Land Use Regulations, thereby requiring additional amendments.

Also, as it reinforces the principles and design standards that have already been adopted in the State of New Jersey's Residential Site Improvement Standards (RSIS), this MSWMP is consistent with the RSIS (N.J.A.C. 5:21) and the Township will utilize the most current update of the RSIS in the stormwater management review of residential areas. Further, major development must meet the established design and performance

standards set forth in the Soil Erosions and Sediment Control Act as all new development and redevelopment plans must comply with New Jersey's Soil Erosion and Sediment Control standards. Also, during construction activities, municipal inspectors will observe land disturbance as well as on-site soil erosion and sediment control measures and will report any inconsistency to the Bergen County Soil Conservation District.

Further, the ecologically sensitive measures that are being pursued through this plan and other Township initiatives are consistent with the State Plan. As the entire Township of Saddle Brook has been designated as a (PA1) Metropolitan Planning Area, the goals and objectives outlined within this plan will serve to encourage compact redevelopment of an appropriate scale where land is suited for development to integrate environmentally sensitive stormwater management techniques into the site design of a land development project, to then in turn, protect environmentally sensitive lands from development.

6.4 MITIGATION PLAN

This mitigation plan is provided for a proposed development that is granted a variance or exemption from the stormwater management design and performance standards. The mitigation plan will allow Saddle Brook Township, in limited circumstances to waive the strict compliance with one or more of the performance standards where full compliance cannot be reasonably accommodated on site. In addition, approval of a waiver or exemption from one of the three criteria outlined above provides no guarantee that, if requested, an exemption or waiver will be granted for either or both of the remaining criteria. However, under no circumstances shall Saddle Brook waive the Special Resources Protection Area (SRPA) established under the stormwater management rules at N.J.A.C. 7:8-5.5 (h).

Presented is a hierarchy of options.

MITIGATION PROJECT CRITERIA

Option 1: 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 form 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.

a. The applicant can select one of the projects to compensate for the deficit from the performance standards resulting from the proposed project. Although a comprehensive hierarchy of projects has not been developed by the Township to date, more detailed information on the projects can be obtained form the Township Engineer. The projects are divided into the following categories.

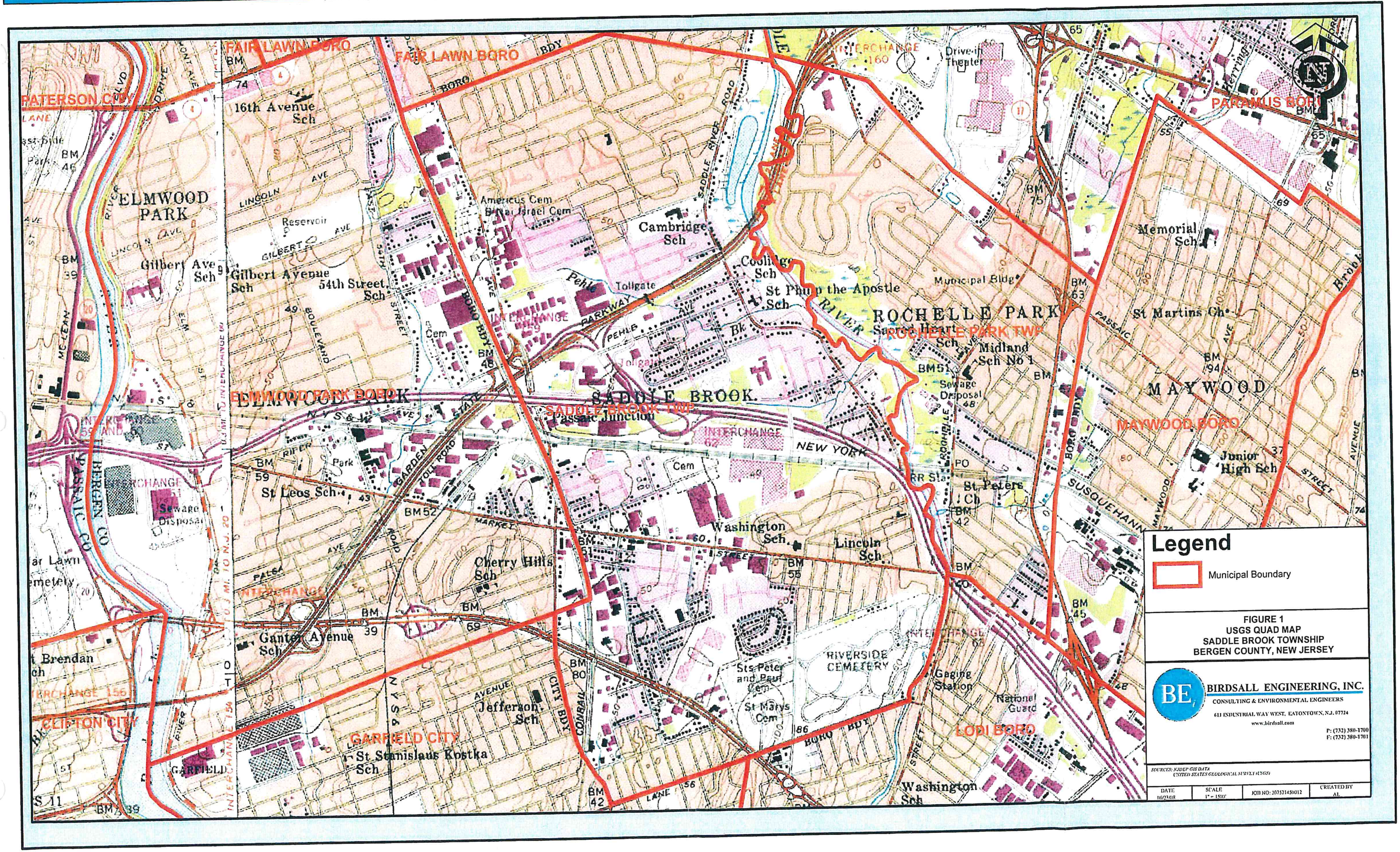
    1) Groundwater Recharge

2) Water Quality
3) Water Quantity

Option 2: If a suitable site can not be located in the same drainage area as the proposed development, as discussed in option 1, the mitigation project may provide mitigation that is not equivalent to the impacts for which the variance or exemption is sought, but that addresses the same issue (groundwater recharge, water quality, and/or water quantity). For example, if a variance is given because the 80 percent TSS requirement is not met, the selected project may address water quantity impacts due to a fecal impairment. Again, details of the projects can be obtained from the Township Engineer.

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

FIGURES


FAIR LAWN BORO
PATERSON CITY
PARAMUS BORO
ELMWOOD PARK
ELMWOOD PARK BORO
SADDLE BROOK
SADDLE BROOK TWP
ROCHELLE PARK
ROCHELLE PARK TWP
MAYWOOD
MAYWOOD BORO
GARFIELD CITY
CLIFTON CITY
LODI BORO
RIVERSIDE CEMETERY
Passaic Junction
16th Avenue Sch
Gilbert Avenue Sch
54th Street Sch
Cambridge Sch
Coolidge Sch
St Philip the Apostle Sch
Midland Sch No 1
Memorial Sch
St Martins Ch
Junior High Sch
Washington Sch.
Lincoln Sch.
St Leos Sch.
Cherry Hills Sch
Ganter Avenue Sch
Jefferson Sch
St Stanislaus Kostka Sch
Sts Peter and Paul Cem
St Marys Cem
Municipal Bldg
Sewage Disposal
Drive-in Theater
INTERCHANGE 160
INTERCHANGE 159
INTERCHANGE 62
INTERCHANGE 63
INTERCHANGE 156
Legend
Municipal Boundary
FIGURE 1
USGS QUAD MAP
SADDLE BROOK TOWNSHIP
BERGEN COUNTY, NEW JERSEY
BIRDSALL ENGINEERING, INC.
CONSULTING & ENVIRONMENTAL ENGINEERS
611 INDUSTRIAL WAY WEST, EATONTOWN, N.J. 07724
www.birdsall.com
P: (732) 380-1700
F: (732) 380-1701
SOURCES: NJDEP GIS DATA
UNITED STATES GEOLOGICAL SURVEY (USGS)
DATE 06/23/08
SCALE 1" = 1500'
JOB NO: 207521450012
CREATED BY AL

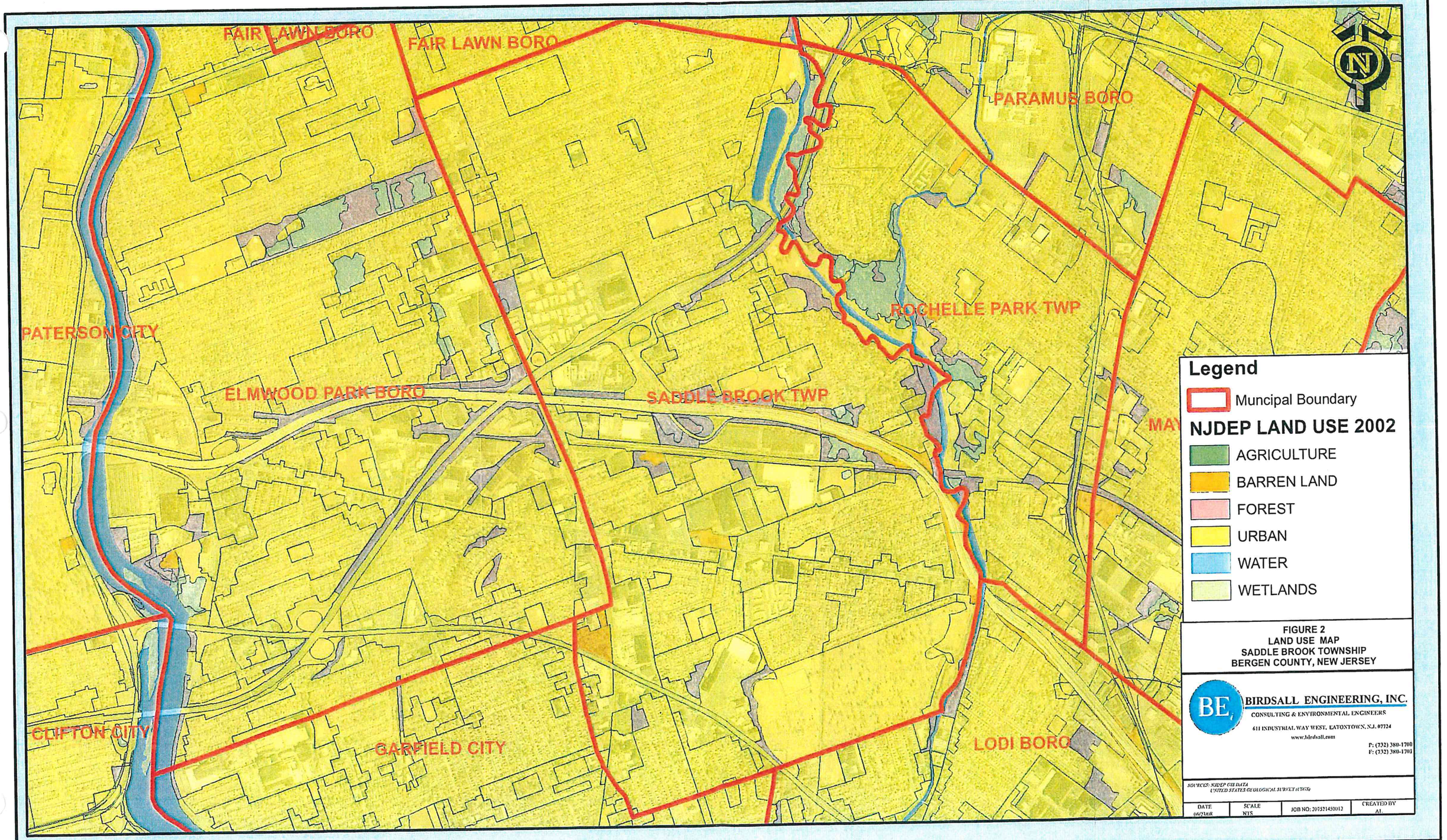


FIGURE 2
LAND USE MAP
SADDLE BROOK TOWNSHIP
BERGEN COUNTY, NEW JERSEY

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SOURCES: NJDEP GIS DATA
UNITED STATES GEOLOGICAL SURVEY (USGS)

DATE	SCALE	JOB NO: 207321450012	CREATED BY
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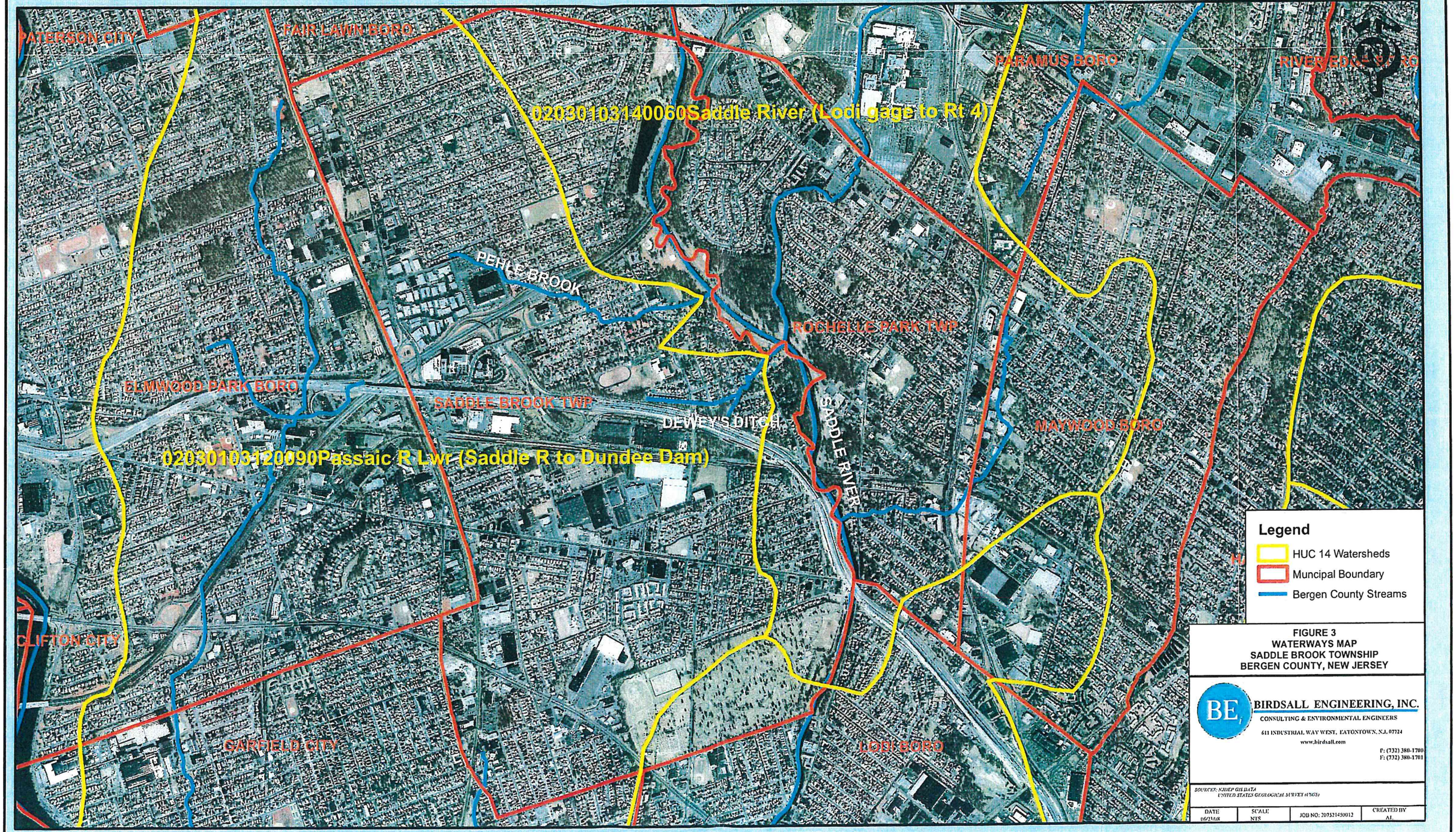

FIGURE 3
WATERWAYS MAP
SADDLE BROOK TOWNSHIP
BERGEN COUNTY, NEW JERSEY

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SOURCE: NJDEP GIS DATA
UNITED STATES GEOLOGICAL SURVEY (USGS)

DATE	SCALE	JOB NO: 207521450012	CREATED BY
06/23/08	NTS		AL

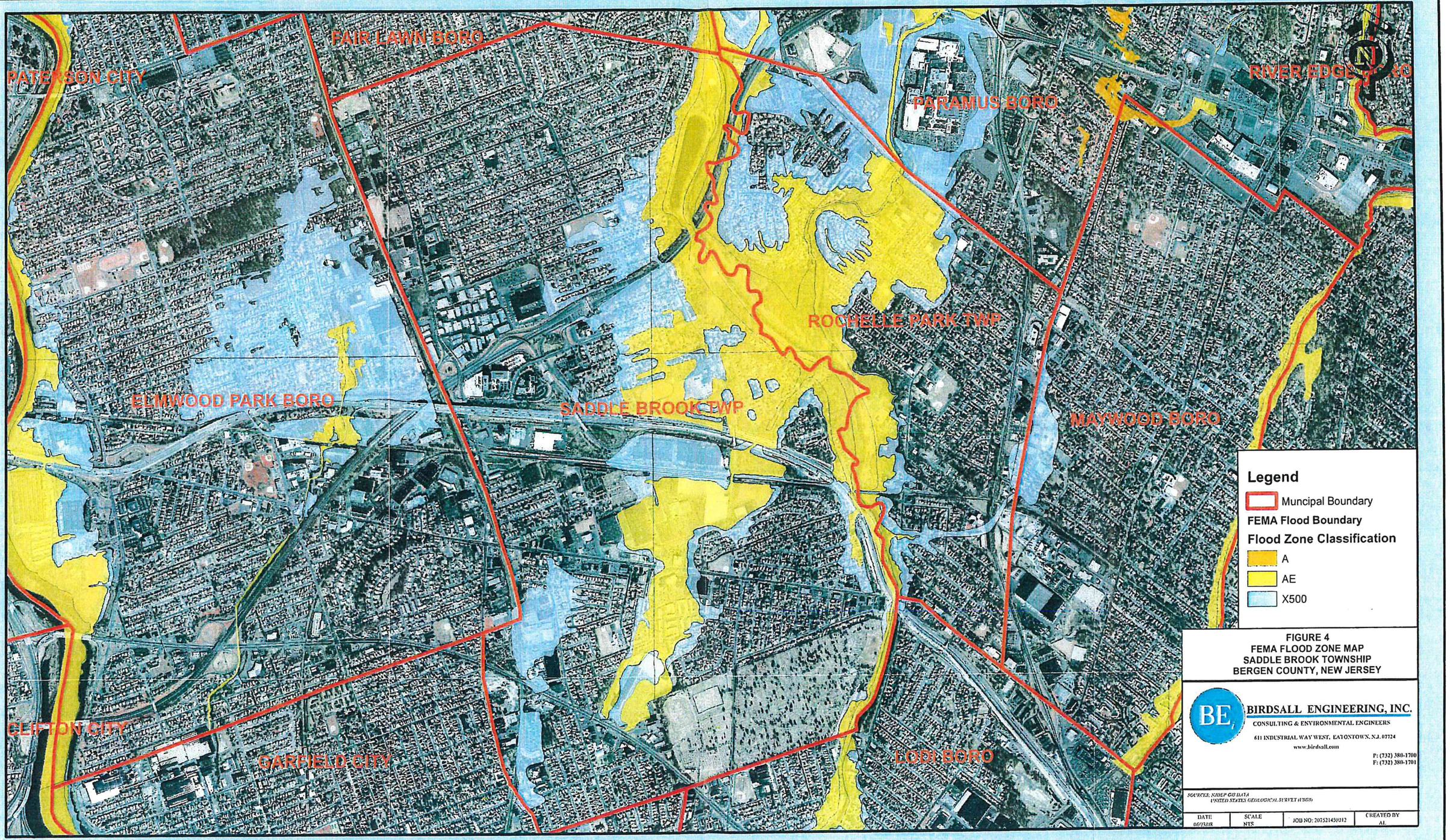

FIGURE 4
FEMA FLOOD ZONE MAP
SADDLE BROOK TOWNSHIP
BERGEN COUNTY, NEW JERSEY

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SOURCES: NJDEP GIS DATA
UNITED STATES GEOLOGICAL SURVEY (USGS)

DATE	SCALE	JOB NO: 207521450012	CREATED BY
06/23/18	NTS		AL

FIGURE 5
SOILS MAP
SADDLE BROOK TOWNSHIP
BERGEN COUNTY, NEW JERSEY

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P: (732) 380-1700
F: (732) 380-1701

SOURCES: NJDEP GIS DATA
UNITED STATES GEOLOGICAL SURVEY (USGS)

DATE	SCALE	JOB NO: 207521450012	CREATED BY
05/23/08	NTS		AL

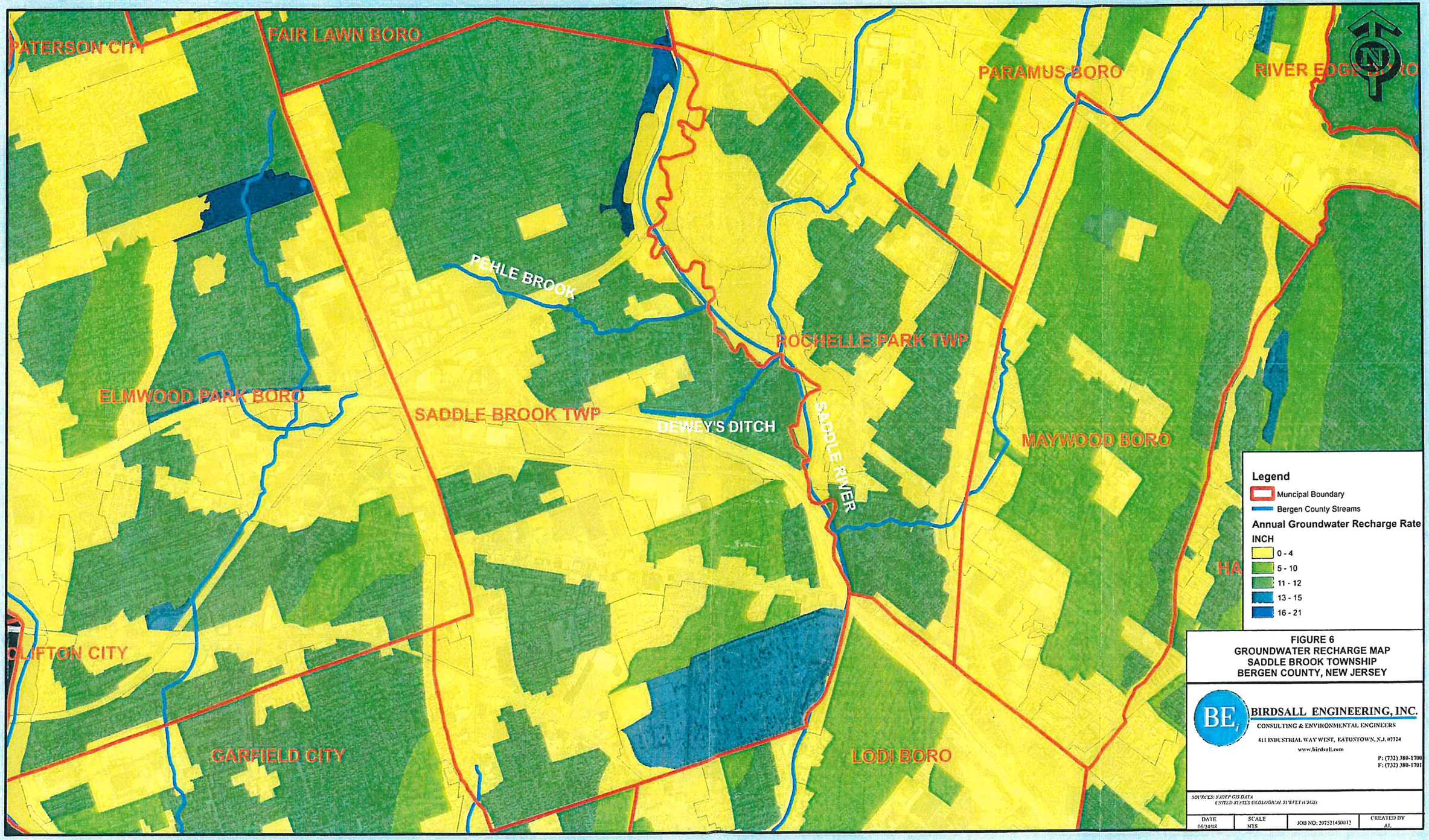

FIGURE 6
GROUNDWATER RECHARGE MAP
SADDLE BROOK TOWNSHIP
BERGEN COUNTY, NEW JERSEY

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CONSULTING & ENVIRONMENTAL ENGINEERS
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SOURCES: NJDEP GIS DATA
UNITED STATES GEOLOGICAL SURVEY (USGS)

DATE	SCALE	JOB NO:	CREATED BY
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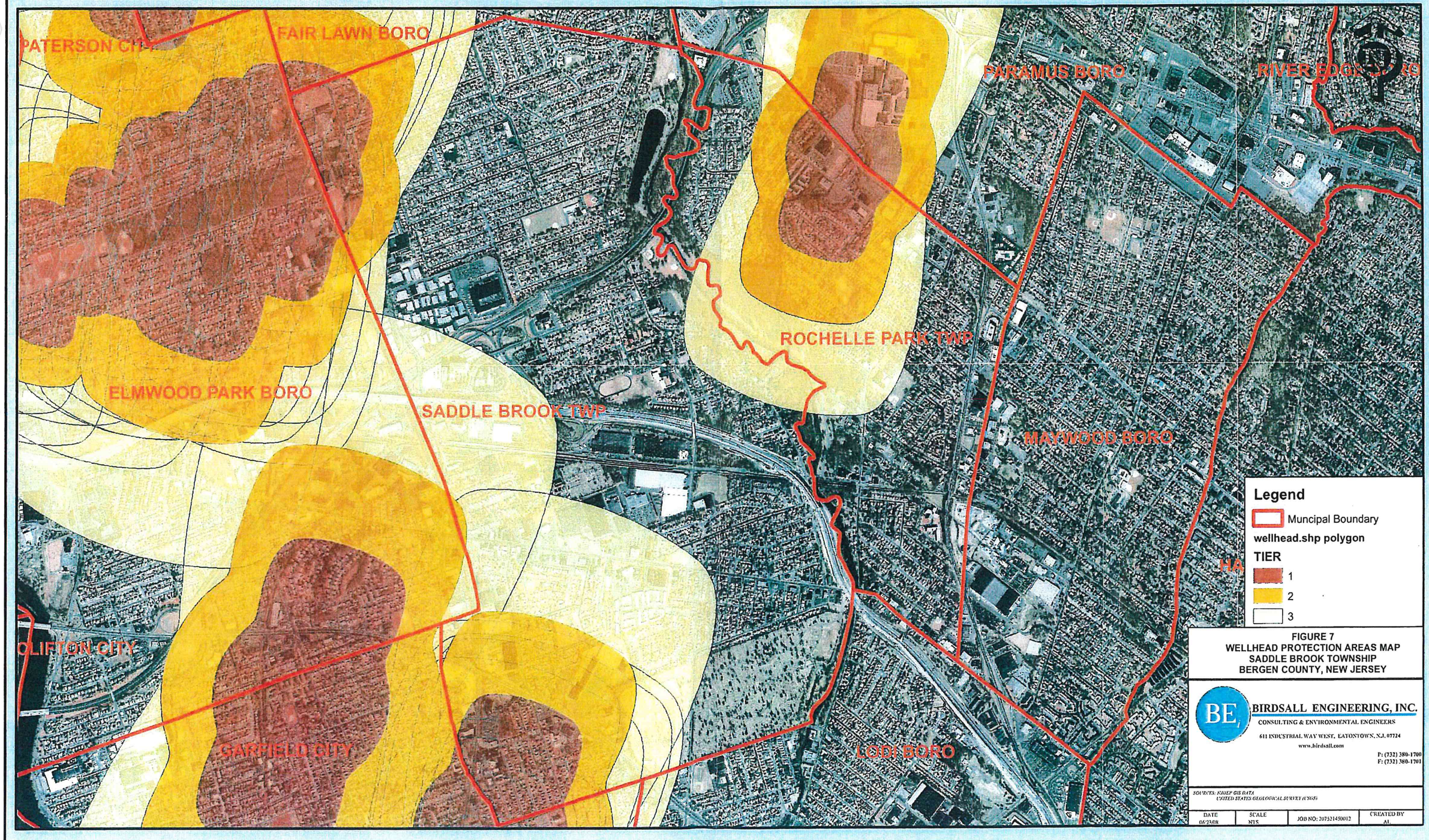

FIGURE 7
WELLHEAD PROTECTION AREAS MAP
SADDLE BROOK TOWNSHIP
BERGEN COUNTY, NEW JERSEY

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SOURCES: NJDEP GIS DATA
UNITED STATES GEOLOGICAL SURVEY (USGS)

DATE	SCALE	JOB NO: 207521450012	CREATED BY
06/23/08	NTS		AL

APPENDIX A

SADDLE BROOK TOWNSHIP PENDING STORMWATER CONTROL ORDINANCE

AN ORDINANCE AMENDING ORDINANCE #1384-06 INTO THE CODE OF THE TOWNSHIP OF SADDLE BROOK

Section 1: Scope and Purpose

A. Policy Statement

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

B. Purpose

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

C. Applicability

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

   a. Non-residential major developments; and

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

2. This ordinance shall also be applicable to all major developments undertaken by the Township of Saddle Brook.

D. Compatibility with Other Permit and Ordinance Requirements

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

Section 2: Definitions

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

"Compaction" means the increase in soil bulk density.

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

"County review agency" means an agency designated by the Bergen County Board of Chosen Freeholders to review the Township of Saddle Brook's municipal stormwater management plan and implementing ordinance(s). The Bergen County Planning Board has been established as Bergen County's review agency.

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

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

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

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

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

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

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

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

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

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

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

"Municipality" means the Township of Saddle Brook.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(3)Designated as Urban Enterprise Zones; and

(4)Designated as Urban Coordinating Council Empowerment Neighborhoods.

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

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

Section 3: General Standards

A. Design and Performance Standards for Stormwater Management Measures

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

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

Section 4: Stormwater Management Requirements for Major Development

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

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

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

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

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

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

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

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

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

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

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

E. Nonstructural Stormwater Management Strategies

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

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

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

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

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

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

   e. Minimize land disturbance including clearing and grading;

   f. Minimize soil compaction;

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

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

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

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

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

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

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

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

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

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

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

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

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

c. This standard does not apply:

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

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

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

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

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

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

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

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

F. Erosion Control, Groundwater Recharge and Runoff Quantity Standards

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

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

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

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

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

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

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

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

(a) Stormwater from areas of high pollutant loading. High pollutant loading areas are areas in industrial and commercial developments where solvents and/or petroleum products are loaded/unloaded, stored, or applied, areas where pesticides are loaded/unloaded or stored; areas where hazardous materials are expected to be present in greater than "reportable quantities" as defined by the United States Environmental Protection Agency (EPA) at 40 CFR 302.4; areas where recharge would be inconsistent with Department approved remedial action work plan or landfill closure plan and areas with high risks for spills of toxic materials, such as gas stations and vehicle maintenance facilities; and

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

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

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

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

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

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

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

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

G. Stormwater Runoff Quality Standards

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

Table 1: Water Quality Design Storm Distribution

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

55	0.3583	120	1.2500
60	0.6250		

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

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

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

Where

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

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

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

Table 2: TSS Removal Rates for BMPs

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

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

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

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

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

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

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

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

b. All stormwater shall be discharged outside of and flow through the special water resource protection area and shall comply with the Standard for Off-Site Stability in the

"Standards For Soil Erosion and Sediment Control in New Jersey," established under the Soil Erosion and Sediment Control Act , N.J.S.A. 4:24-39 et seq.

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

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

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

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

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

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

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

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

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

Section 5: Calculation of Stormwater Runoff and Groundwater Recharge

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

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

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

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

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

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

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

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

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

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

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

1. Structural stormwater management measures shall be designed to take into account the existing site conditions, including, for example, environmentally critical areas, wetlands; flood-prone areas; slopes; depth to seasonal high water table; soil type, permeability and texture; drainage area and drainage patterns; and the presence of solution-prone carbonate rocks (limestone). Where tailwater will affect the hydraulic performance of a stormwater management measure, the design engineer shall include such efforts in the measure's design.

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

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

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

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

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

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

Section 7: Sources for Technical Guidance

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

1. Guidelines for stormwater management measures are contained in the New Jersey Stormwater Best Management Practices Manual, as amended. Information is provided on

stormwater management measures such as: bioretention systems, constructed stormwater wetlands, dry wells, extended detention basins, infiltration structures, manufactured treatment devices, pervious paving, sand filters, vegetative filter strips, and wet ponds.

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

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

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

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

3. The Soil Conservation Districts listed in N.J.A.C. 2:90-1.3(a)4. The Bergen County Soil Conservation District is located at 700 Kinderkamack Road, Suite 106 Oradell, New Jersey 07649 Phone: (201) 261-4407 Fax: (201) 261-7573. The location, address, and telephone number for the remainder of the Soil Conservation District 's within the State of New Jersey may be obtained from the State Soil Conservation Committee, P.O. Box 330, Trenton, New Jersey, 08625, (609) 292-5540

Section 8: Safety Standards for Stormwater Management Basins

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

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

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

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

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

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

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

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

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

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

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

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

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

   b. Safety ledges shall be constructed on the slopes of all new stormwater management basins having a permanent pool of water deeper than two and one-half feet. Such safety

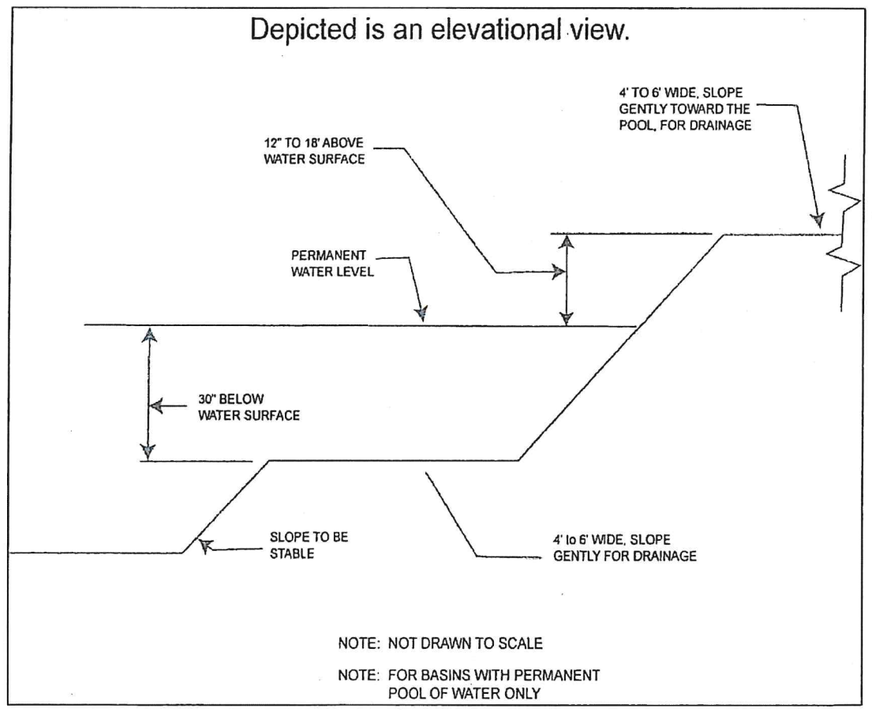
ledges shall be comprised of two steps. Each step shall be four to six feet in width. One step shall be located approximately two and one-half feet below the permanent water surface, and the second step shall be located one to one and one-half feet above the permanent water surface. See Section 8.D for an illustration of safety ledges in a stormwater management basin.

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

C. Variance or Exemption from Safety Standards

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

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



Section 9: Requirements for a Site Development Stormwater Plan

A. Submission of Site Development Stormwater Plan

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

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

3. The applicant shall submit 15 copies of the materials listed in the checklist for site development stormwater plans in accordance with Section 9.C of this ordinance.

B. Site Development Stormwater Plan Approval

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

C. Checklist Requirements

The following information shall be required:

1. Topographic Base Map

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

2. Environmental Site Analysis

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

3. Project Description and Site Plan(s)

A map (or maps) at the scale of the topographical base map indicating the location of existing and proposed buildings, roads, parking areas, utilities, structural facilities for

stormwater management and sediment control, and other permanent structures. The map(s) shall also clearly show areas where alterations occur in the natural terrain and cover, including lawns and other landscaping, and seasonal high ground water elevations. A written description of the site plan and justification of proposed changes in natural conditions may also be provided.

4. Land Use Planning and Source Control Plan

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

5. Stormwater Management Facilities Map

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

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

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

6. Calculations

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

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

7. Maintenance and Repair Plan

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

8. Waiver from Submission Requirements

   The municipal official or board reviewing an application under this ordinance may, in consultation with the municipal engineer, waive submission of any of the requirements in Sections 9.C.1 through 9.C.6 of this ordinance when it can be demonstrated that the

information requested is impossible to obtain or it would create a hardship on the applicant to obtain and its absence will not materially affect the review process.

Section 10: Maintenance and Repair

A. Applicability

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

B. General Maintenance

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

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

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

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

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

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

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

8. The person responsible for maintenance identified under Section 10.B.2 above shall retain and make available, upon request by any public entity with administrative, health,

environmental, or safety authority over the site, the maintenance plan and the documentation required by Sections 10.B.6 and 10.B.7 above.

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

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

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

Section 11: Penalties

Any person who erects, constructs, alters, repairs, converts, maintains, or uses any building, structure or land in violation of this article shall be subject to the penalties outlined within the provisions set forth in §206-87 (Violations and Penalties) of the Township of Saddle Brook's adopted ordinance.

Section 12: Effective Date

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

Section 13: Severability

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

APPENDIX B

NEW JERSEY'S 2006 INTEGRATED LIST OF WATERWAYS

New Jersey's 2006 Integrated List of Waters
(See Appendix A-2 for Lakes)

The assessment units were placed on one of five sublists according to the following: (See Section 7 of the Integrated List Methods Document for more detail on the Sublists). N/A (not applicable) is used when the designated use does not apply to a particular assessment unit.

Sublist 1: There is sufficient data to assess all applicable designated uses for the waterbody and the assessment indicates full attainment for all designated uses.

Sublist 2: Waterbodies are placed on this sublist when an assessment for an individual designated use is complete and results for that assessment indicates full attainment but other designated uses are unassessed, assessed as non attain or have an approved TMDL. When all designated uses are assessed as full attain, these waterbodies will be moved to Sublist 1.

Sublist 3: Waterbodies are placed on this sublist when the designated use assessment indicated insufficient or no data to assess the designated use.

Sublist 4: The waterbody is impaired or threatened for one or more designated uses. There are three subcategories:

Sublist 4A. Waterbodies are placed on this sublist when the designated use is non attain due to pollutants and a TMDL has been adopted in New Jersey Register and approved by the USEPA

Sublist 4B. Waterbodies are placed on this sublist when the designated use is non attain due to pollutants and other enforceable pollution control requirements are reasonably expected to result in the conformance with the applicable water quality standard(s) in the near future.

Sublist 4C. Waterbodies are placed on this sublist when the designated use is non attain and the impairment is not caused by a pollutant.

Sublist 5: Designated use assessment is complete and results for the assessment indicate non-attain.

(The individual pollutants causing the non attainment of the designated uses will be identified on the "303(d) List of Impaired Waterbodies by Parameter with Ranking". The Pollutant will be listed if known or "pollutant unknown" or "toxic unknown" will be used when the pollutant is not known.)

(See Appendix A-2 for Lakes)

WMA	Assessment Unit ID	Assessment Unit Name	Aquatic Life (general)	Aquatic Life (trout)	Primary Contact Recreation	Secondary Contact Recreation	Drinking Water Supply	Agricul-tural Water Supply	Industrial Water Supply	Shellfish Harvest	Fish Consump-tion
4	02030103120060-01	Deepavaal Brook	Sublist 5	N/A	Sublist 4A	Sublist 3	Sublist 3	Sublist 3	Sublist 3	N/A	Sublist 3
4	02030103120070-01	Passaic R Lwr (Fair Lawn Ave to Goffle)	Sublist 5	N/A	Sublist 5	Sublist 3	Sublist 5	Sublist 2	Sublist 2	N/A	Sublist 5
4	02030103120080-01	Passaic R Lwr (Dundee Dam to F.L. Ave)	Sublist 5	N/A	Sublist 5	Sublist 5	Sublist 5	Sublist 2	Sublist 2	N/A	Sublist 5
4	02030103120090-01	Passaic R Lwr (Saddle R to Dundee Dam)	Sublist 5	N/A	Sublist 5	Sublist 5	Sublist 5	Sublist 2	Sublist 2	N/A	Sublist 5
4	02030103120100-01	Passaic R Lwr (Goffle Bk to Pompton R)	Sublist 5	N/A	Sublist 5	Sublist 5	Sublist 5	Sublist 2	Sublist 2	N/A	Sublist 5
4	02030103140010-01	Hohokus Bk (above Godwin Ave)	Sublist 5	N/A	Sublist 4A	Sublist 3	Sublist 5	Sublist 5	Sublist 2	N/A	Sublist 3
4	02030103140020-01	Hohokus Bk(Pennington Ave to Godwin Ave)	Sublist 5	N/A	Sublist 4A	Sublist 4A	Sublist 2	Sublist 2	Sublist 2	N/A	Sublist 3
4	02030103140030-01	Hohokus Bk(below Pennington Ave)	Sublist 5	N/A	Sublist 4A	Sublist 3	Sublist 3	Sublist 3	Sublist 2	N/A	Sublist 3
4	02030103140040-01	Saddle River (above Rt 17)	Sublist 5	Sublist 5	Sublist 4A	Sublist 3	Sublist 2	Sublist 2	Sublist 2	N/A	Sublist 3
4	02030103140050-01	Saddle River (Rt 4 to Rt 17)	Sublist 5	N/A	Sublist 4A	Sublist 4A	Sublist 5	Sublist 5	Sublist 5	N/A	Sublist 3
4	02030103140060-01	Saddle River (Lodi gage to Rt 4)	Sublist 5	N/A	Sublist 4A	Sublist 4A	Sublist 5	Sublist 5	Sublist 5	N/A	Sublist 3
4	02030103140070-01	Saddle River (below Lodi gage)	Sublist 5	N/A	Sublist 4A	Sublist 4A	Sublist 5	Sublist 5	Sublist 5	N/A	Sublist 5
4	02030103150010-01	Third River	Sublist 5	N/A	Sublist 3	Sublist 3	Sublist 3	Sublist 3	Sublist 3	N/A	Sublist 5
4	02030103150020-01	Second River	Sublist 5	N/A	Sublist 5	Sublist 3	Sublist 2	Sublist 3	Sublist 2	N/A	Sublist 3
4	02030103150030-01	Passaic R Lwr (Second R to Saddle R)	Sublist 5	N/A	Sublist 5	Sublist 5	Sublist 5	Sublist 3	Sublist 2	N/A	Sublist 5
4	02030103150040-01	Passaic R Lwr (4th St br to Second R)	Sublist 5	N/A	Sublist 5	Sublist 5	Sublist 5	Sublist 3	Sublist 2	N/A	Sublist 5
4	02030103150050-01	Passaic R Lwr (Nwk Bay to 4th St brdg)	Sublist 5	N/A	N/A	Sublist 5	Sublist 5	Sublist 3	Sublist 2	N/A	Sublist 5
5	02030103170010-01	Pascack Brook (above Westwood gage)	Sublist 5	N/A	Sublist 4A	Sublist 3	Sublist 5	Sublist 5	Sublist 2	N/A	Sublist 3
5	02030103170020-01	Pascack Brook (below Westwood gage)	Sublist 5	N/A	Sublist 4A	Sublist 3	Sublist 5	Sublist 5	Sublist 2	N/A	Sublist 3
5	02030103170030-01	Hackensack River (above Old Tappan gage)	Sublist 5	N/A	Sublist 4A	Sublist 3	Sublist 5	Sublist 2	Sublist 2	N/A	Sublist 3
5	02030103170040-01	Tenakill Brook	Sublist 5	Sublist 5	Sublist 4A	Sublist 4A	Sublist 5	Sublist 2	Sublist 2	N/A	Sublist 3
5	02030103170050-01	Dwars Kill	Sublist 2	N/A	Sublist 3	Sublist 3	Sublist 5	Sublist 2	Sublist 2	N/A	Sublist 3
5	02030103170060-01	Hackensack R (Oradell to OldTappan gage)	Sublist 5	N/A	Sublist 5	Sublist 5	Sublist 5	Sublist 2	Sublist 2	N/A	Sublist 3
5	02030103180010-01	Coles Brook / Van Saun Mill Brook	Sublist 4A	N/A	Sublist 4A	Sublist 4A	Sublist 2	Sublist 2	Sublist 2	N/A	Sublist 3
5	02030103180020-01	Hirshfeld Brook	Sublist 3	N/A	Sublist 3	Sublist 3	Sublist 3	Sublist 3	Sublist 3	N/A	Sublist 3
5	02030103180030-01	Hackensack R (Ft Lee Rd to Oradell gage)	Sublist 5	N/A	Sublist 5	Sublist 5	N/A	N/A	N/A	N/A	Sublist 5
5	02030103180040-01	Overpeck Creek	Sublist 5	N/A	Sublist 5	Sublist 3	Sublist 5	Sublist 5	Sublist 2	N/A	Sublist 5
5	02030103180050-01	Hackensack R (Bellmans Ck to Ft Lee Rd)	Sublist 5	N/A	Sublist 5	Sublist 5	Sublist 3	Sublist 3	Sublist 3	N/A	Sublist 5
5	02030103180060-01	Berrys Creek (above Paterson Ave)	Sublist 5	N/A	Sublist 3	Sublist 3	Sublist 5	Sublist 3	Sublist 3	N/A	Sublist 5
5	02030103180070-01	Berrys Creek (below Paterson Ave)	Sublist 5	N/A	Sublist 3	Sublist 3	Sublist 5	Sublist 3	Sublist 3	N/A	Sublist 5
5	02030103180080-01	Hackensack R (Rt 3 to Bellmans Ck)	Sublist 5	N/A	Sublist 3	Sublist 3	Sublist 3	Sublist 3	Sublist 2	N/A	Sublist 5
5	02030103180090-01	Hackensack R (Amtrak bridge to Rt 3)	Sublist 5	N/A	Sublist 3	Sublist 3	Sublist 3	Sublist 3	Sublist 3	N/A	Sublist 5
5	02030103180100-01	Hackensack R (below Amtrak bridge)	Sublist 5	N/A	Sublist 3	Sublist 3	Sublist 3	Sublist 3	Sublist 2	N/A	Sublist 5
7	02030104010010-01	Newark Airport Peripheral Ditch	Sublist 3	N/A	Sublist 3	Sublist 3	Sublist 3	Sublist 3	Sublist 3	N/A	Sublist 5
7	02030104010020-01	Kill Van Kull West	Sublist 5	N/A	N/A	Sublist 3	N/A	N/A	N/A	N/A	Sublist 5
7	02030104010020-02	Newark Bay / Kill Van Kull (74d 07m 30s)	Sublist 5	N/A	N/A	Sublist 3	N/A	N/A	N/A	N/A	Sublist 5
7	02030104010030-01	Kill Van Kull East	Sublist 5	N/A	N/A	Sublist 3	N/A	N/A	N/A	N/A	Sublist 5
7	02030104010030-02	Upper NY Bay / Kill Van Kull (74d07m30s)	Sublist 5	N/A	N/A	Sublist 3	N/A	N/A	N/A	N/A	Sublist 5
7	02030104020010-01	Elizabeth River (above I-78)	Sublist 3	N/A	Sublist 4A	Sublist 3	Sublist 3	Sublist 3	Sublist 3	N/A	Sublist 3
7	02030104020020-01	Elizabeth R (Elizabeth CORP BDY to I-78)	Sublist 5	N/A	Sublist 4A	Sublist 3	Sublist 5	Sublist 5	Sublist 2	N/A	Sublist 3
7	02030104020030-01	Arthur Kill North	Sublist 5	N/A	N/A	Sublist 3	N/A	N/A	N/A	N/A	Sublist 5
7	02030104020030-02	Elizabeth R (below Elizabeth CORP BDY)	Sublist 5	N/A	Sublist 4A	Sublist 2	Sublist 5	Sublist 5	Sublist 2	N/A	Sublist 5

APPENDIX C

EPA TMDL ESTABLISHED FOR SADDLE RIVER

Detailed TMDL Report

TMDL Document Information

TMDL ID: 10605 **TMDL Name:** SADDLE RIVER AT SADDLE RIVER

TMDL Status: APPROVED/ESTABLISHED **EPA Action:** EPA APPROVED

Lead State: NJ **TMDL Date:** 07/29/2003

Comments: UNITS ARE PERCENT REDUCTION OF THE AMBIENT CONCENTRATION GEOMETRIC MEAN; PERCENTAGE OF THE TARGET CONCENTRATION OF 68 CFU/100 ML.

No TMDL Documents have been uploaded for this TMDL.

TMDL Pollutants

Pollutant: FECAL COLIFORM **TMDL Type:** NONPOINT SOURCE

Total Waste Load Allocation: **Total Load Allocation:** 96

Margin Of Safety: 30 **Implicit Margin Of Safety:** N

Units for Total Waste Load Allocation, Total Load Allocation, and Margin of Safety: PERCENT

TMDL End Point: FECAL COLIFORM LEVELS SHALL NOT EXCEED A GEOMETRIC AVERAGE OF 200 CFU/100 ML NOR SHOULD MORE THAN 10 PERCENT OF THE TOTAL SAMPLES TAKEN DURING ANY 30-DAY PERIOD EXCEED 400 CFU/100 ML IN FW2 WATERS

Listed Water Causes of Impairment for FECAL COLIFORM
Click on the underlined List ID for a Listed Water Information Report. Click on the underlined "MAP 303(d)" literal for a map of the Listed Water.

List ID	State List ID	Waterbody Name	Listed Water Map	Cycles Listed	Cause of Impairment
NJ_04-0013_SADDLE_RIVER	01390470	SADDLE RIVER	No Spatial Data	2002	FECAL COLIFORM

TMDL Methods

Method Name	Method Description
LOAD CURVE	LOAD CURVE

APPENDIX D

AMNET TESTING RESULTS ALONG THE SADDLE RIVER

The New Jersey 2002 Integrated List relocated certain primary WMA4 water bodies in New Jersey's 1998 303(d) list as follows (Table 4.7.3):

Table 4.7.3 2002 Integrated List for Primary Stations vs. 1998 303(d) List*

Waterway	Site ID	Parameters Non- Attaining Standards (2002)	Previously on 1998 303(d) List	Parameters Delisted
Passaic River, Elmwood Pk	01389880	TP, FC, As, Cd, Cr, Cu, Pb, Hg, Ag, Th, Zn, Cn	TP, FC, As, Cd, Cr, Cu, Pb, Hg, Ag, Th, Zn, Cn	
Lower Passaic River& Estuary		As, Hg	As, Cu, Pb, Hg, Ni	Cu, Pb, Ni
Passaic River at Little Falls	01389500	TP, FC, As, Cd, Cr, Cu, Pb, Hg, Ag, Th, Zn, Cn	TP, FC, NH3, As, Cd, Cr, Cu, Pb, Hg, Ag, Th, Zn, Cn	NH3
Passaic River at Singac	01389130	TP, FC, As, Cd, Cr, Cu, Pb, Hg, Ag, Th, Zn, Cn	TP, FC, As, Cd, Cr, Cu, Pb, Hg, Ag, Th, Zn, Cn	-
Saddle River at Fair Lawn	01391200	TP, FC, NH3	TP, FC, NH3, As, Be, Cd, Cr, Cu, Fe, Pb, Hg, Zn	As, Be, Cd, Cr, Cu, Fe, Pb, Hg, Zn
Saddle River at Lodi	01391500	TP, FC	TP, FC, DO, NH3, As, Be, Cd, Cr, Cu, Fe, Pb, Hg, Zn	DO, NH3, As, Be, Cd, Cr, Cu, Fe, Pb, Hg, Zn

*Source: NJDEP Website

In addition, WMA4 monitoring stations that were included in Category 5 (failing category) of the 2002 Integrated List are provided in Table 4.7.4:

Table 4.7.4: NJDEP Category 5 Waterways for WMA4*

Waterway	Site ID	Parameters (not Attaining Standards)	Data Source
Deepavall Brook at Farifield	01389138	FC	NJDEP/USGS Data
Deepavall Brook at Ltl Falls Ave in Fairfield	AN0271	Aquatic Life	NJDEP AMNET
Diamond Brook at Fair Lawn	01389860	FC	NJDEP/USGS Data
Goffle Brook at Hawthorne	01389850	FC	NJDEP/USGS Data
Goffle Brook at Wagaraw Rd in Hawthorne	AN0277	Aquatic Life	NJDEP AMNET
Hohokus Brook at Mouth at Paramus	01391100	FC	NJDEP/USGS Data
Hohokus Brook at Park Ave in Allendale	AN0285	Aquatic Life	NJDEP AMNET
Hohokus Brook at Spring St in Ridgewood Village	AN0288	Aquatic Life	NJDEP AMNET
Molly Ann Brook at Totowa Ave in Paterson City	AN0276	Aquatic Life	NJDEP AMNET
Naachtpunkt Brook at Continental Dr (abv outfall) in Wayne Twp	AN0273A	Aquatic Life	NJDEP AMNET
Naachtpunkt Brook at Continental Dr (blw outfall) in Wayne Twp	AN0273B	Aquatic Life	NJDEP AMNET
Passaic River & Estuary		As, Hg	HEP (GLEC, 1996), USEPA, 1999

Table 4.7.4 continued

| Waterway | Site ID | Parameters (not Attaining Standards) | Data Source |

Passaic River at Elwood Park	01389880	TP, FC, As, Cd, Cr, Cu, Pb, Hg, Ag, Th, Zn, Cn	NJDEP AMNET
Passaic River at Little Falls	01389500	TP, FC, As, Cd, Cr, Cu, Pb, Hg, Ag, Th, Zn, Cn	NJDEP/USGS Data, Metal Recon
Passaic River at River Rd (Dundee Dam) in Garfield City	AN0292O	Aquatic Life	NJDEP AMNET
Passaic River at Singac	01389130	TP, FC, As, Cd, Cr, Cu, Pb, Hg, Ag, Th, Zn, Cn	NJDEP/USGS Data
Passaic River Below Pompton River at Two Bridges	01389005	TP	NJDEP/USGS Data
Peckman River at McBride Ave in West Paterson	AN0275	Aquatic Life	NJDEP AMNET
Peckman River at West Paterson	01389600	FC	NJDEP/USGS AMNET
Preakness Brook at French Hill Road in Wayne Twp	AN0273	Aquatic Life	NJDEP/AMNET
Preakness Brook near Little Falls	01389080	FC	NJDEP/USGS Data
Ramsey Brook at Allendale	01390900	FC	NJDEP/USGS Data
Ramsey Brook at Grenadier Dr W of Cortland Tr in Mahwah Twp	AN0286X	Aquatic Life	NJDEP AMNET
Ramsey Brook at Masonicus Road in Mahwah Twp	AN0286	Aquatic Life	NJDEP AMNET
Saddle River at Dunkerhook Road in Fair Lawn	AN0289	Aquatic Life	NJDEP AMNET
Saddle River at E Allendale Ave in Saddle River	AN0281	Aquatic Life	NJDEP AMNET
Saddle River at Fairlawn	01391200	TP, FC, NH3	NJDEP/USGS Data
Saddle River at Grove Street A	01390518	FC	NJDEP/USGS Data
Saddle River at Lodi	01391500	TP, FC	NJDEP/USGS Data
Saddle River at Marcellus Pl in Garfield City	AN0291	Aquatic Life	NJDEP AMNET
Saddle River at Railroad Ave in Rochelle Park Twp	AN0290	Aquatic Life	NJDEP AMNET
Saddle River at Ridgewood	01390500	PH	NJDEP/USGS Data
Saddle River at Ridgewood Ave at Ridgewood	01390510	FC	NJDEP/USGS Data
Saddle River at Rochelle Park	01391490	TP, FC	NJDEP/USGS Data
Saddle River at Saddle River	01390470	FC	NJDEP/USGS Data
Saddle River W Br at Upper Saddle River	01390445	FC	NJDEP/USGS Data
Second River at McCarter Hwy in Belleville	AN0293	Aquatic Life	NJDEP AMNET
Third River at Kingland Ave Clifton City	AN0292	Aquatic Life	NJDEP AMNET
Verona Park Lake-04	Verona Park Lake	Trophic Status	NJDEP Clean Lakes Program

* Source: NJDEP website