

# **Stormwater Management Plan**

**for**

**Bound Brook Borough  
Somerset County, New Jersey**

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The plan also outlines safety standards for stormwater infrastructure to be implemented to protect public safety.

### **Stormwater Discussion**

Land development can dramatically alter the hydrologic cycle (see Figure 1) of a site and, ultimately, an entire watershed. Prior to development, native vegetation can either directly intercept precipitation or draw that portion that has infiltrated into the ground and return it to the atmosphere through evapotranspiration. Development can remove this beneficial vegetation and replace it with lawn or impervious cover, reducing the site's evapotranspiration and infiltration rates. Clearing and grading a site can remove depressions that store rainfall. Construction activities may also compact the soil and diminish its infiltration ability, resulting in increased volumes and rates of stormwater runoff from the site. Impervious areas that are connected to each other through gutters, channels, and storm sewers can transport runoff more quickly than natural areas. This shortening of the transport or travel time quickens the rainfall-runoff response of the drainage area, causing flow in downstream waterways to peak faster and higher than natural conditions. These increases can create new and aggravate existing downstream flooding and erosion problems and increase the quantity of sediment in the channel. Filtration of runoff and removal of pollutants by surface and channel vegetation is eliminated by storm sewers that discharge runoff directly into a stream. Increases in impervious area can also decrease opportunities for infiltration which, in turn, reduces stream base flow and groundwater recharge. Reduced base flows and increased peak flows produce greater fluctuations between normal and storm flow rates, which can increase channel erosion. Reduced base flows can also negatively impact the hydrology of adjacent wetlands and the health of biological communities that depend on base flows. Finally, erosion and sedimentation can destroy habitat from which some species cannot adapt.

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

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

## **Introduction**

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for Bound Brook Borough ("the Borough") to address stormwater related impacts. The creation of this plan is required by N.J.A.C. 7:14A-25 Municipal Stormwater Regulations. This plan contains all of the required elements described in N.J.A.C. 7:8 Stormwater Management Rules. The plan addresses groundwater recharge, stormwater quantity, and stormwater quality impacts by incorporating stormwater design and performance standards for new major development, defined as projects that disturb one or more acre of land. These standards are intended to minimize the adverse impact of stormwater runoff on water quality and water quantity and the loss of groundwater recharge that provides baseflow in receiving water bodies. The plan describes long-term operation and maintenance measures for existing and future stormwater facilities.

This plan also addresses the review and update of existing ordinances, the Borough Master Plan, and other planning documents to allow for project designs that include low impact development techniques. In addition, the plan includes a mitigation strategy for when a variance or exemption of the design and performance standards is sought. As part of the mitigation section of the stormwater plan, specific stormwater management measures are identified to lessen the impact of existing development.

## **MSWMP Goals**

The goals of this MSWMP are to:

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

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

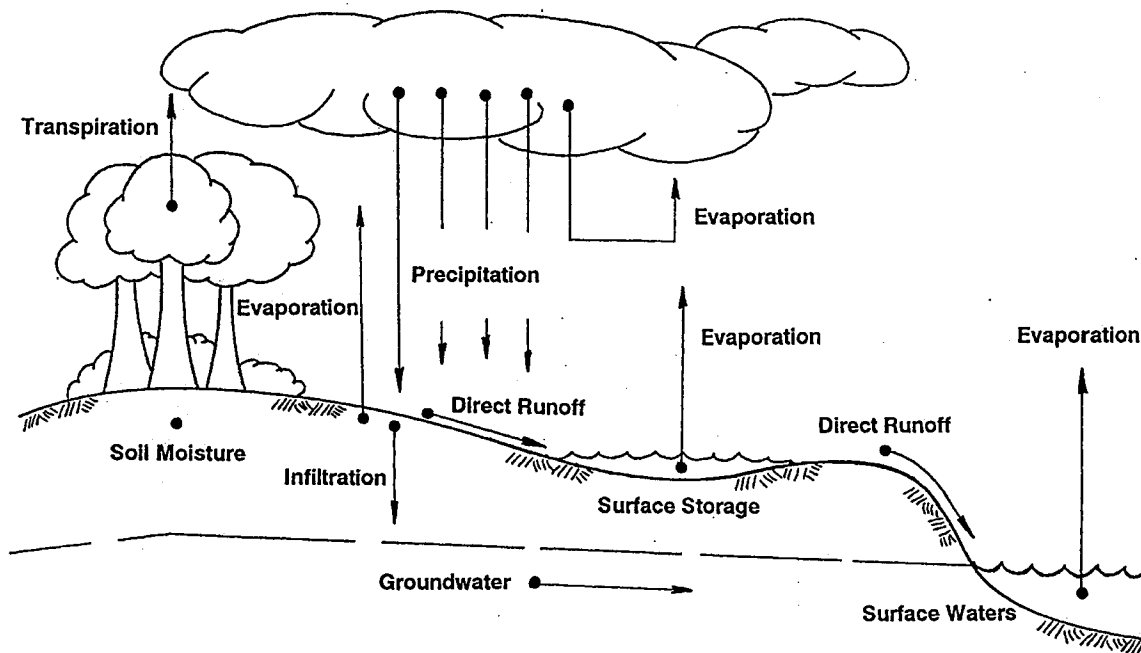


Figure 1 – Hydrologic Cycle

## Background

The Borough encompasses 1.60 square miles in heart of Somerset County, New Jersey. The Borough “enjoys a mix of commercial, professional and residential development while also enjoying the ambiance of a small town with a main street setting unique in the region.” The Borough is an older community and few large areas of undeveloped area remain. The undeveloped areas that do exist are stream corridors along the Raritan River, Middle Brook and Green Brook. Stream and rivers within the Borough are shown in Figure 2 and the topography of the Borough is shown in Figure 3.

According to the 2000 census, the Borough has 10,155 residents. The population rose approximately 7 percent since the 1990 census. This population increase is less than the overall state and county increases of approximately 9 and 24 percent respectively over the same period.

The Borough is situated along the north side of the main stem of the Raritan River in the Raritan Basin. It is located in Watershed Management Area (WMA) 9 – lower Raritan River. The Borough contains portions of two Hydrologic Unit Code (HUC) areas. These HUC14 areas are shown in Figure 4.

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 New Jersey. These sites are sampled for benthic macroinvertebrates by NJDEP on a five-year cycle. Streams are classified as non-impaired, moderately impaired, or severely impaired based on the AMNET data. The data is used to

generate a New Jersey Impairment Score (NJIS), which is based on a number of biometrics related to benthic macroinvertebrate community dynamics.

Based on the AMNET data, the water bodies bordering the Borough are significantly impaired. The closest AMNET sites are located at the East Main Street bridge over the Green Brook (AN0426) and at the West Union Avenue Bridge, NJSH Route 28 over the Middle Brook (AN0420). There are also AMNET sites upstream on the Raritan River at Manville (AN0377) and upstream on both the South and North Branch of the Raritan River (AN0374 & AN0341).

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

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

The New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d)) (Integrated List) is required by the federal Clean Water Act to be prepared biennially and is a valuable source of water quality information. This combined report presents the extent to which New Jersey waters are attaining water quality standards, and identifies waters that are impaired. Sublist 5 of the Integrated List constitutes the list of waters impaired or threatened by pollutants, for which one or more TMDL's are needed. Green Brook at Main Street is listed in the proposed Sublist 5 for benthic macroinvertebrates. The Raritan River is also listed on the 2004 proposed Sublist 5 (March 1, 2004) for phosphorous, total suspended solids, arsenic and benzene.

In addition to water quality problems, the Borough has flooding problems. Flooding occurs on the Raritan River, Green Brook and Middle Brook. Flooding on the Raritan River only affects properties on the southern side of the Borough. While flooding along Middle Brook affects properties along the west side of the Borough and flooding along Green Brook affects properties along the east side of the Borough. Flooding was particularly severe during Hurricane Floyd (September 19-21, 1999). The storm was larger than a 100-year frequency event and flooded the entire downtown area along main street with up to 8 feet of water. Flood marks from Hurricane Floyd are summarized in Table 1. The 100-year floodplain is shown in Figure 5.

**Table 1 – Flood Marks from Hurricane Floyd (September 19-21, 1999)**

<b>Flood Mark No.</b>	<b>Location</b>	<b>Elevation (ft. NGVD29)</b>
1	SW corner of East Main Street and South Main Street	36.93
2	N/A	
3	SW corner of John Street and Second Street	38.15
4	S side of East Main Street just east of Columbus Place	40.05
5	SW corner of Romney Road and West Second Street	40.81
6	SE corner of Vosseller Avenue and East Second Street	40.42
7	E side of Fairview Ave. between W. High Street and E. Second Street	40.53
8	East Second Street and East Street	38.36
9	N/A	
10	W side of Vosseller Avenue at NJ Transit RR	40.35
11	W side of Lamonte Avenue between Talmadge Ave. & NJ Transit RR	41.05
12	S of East Main Street opposite Maiden Lane	39.22
13	S of East Main Street opposite Hamilton Street	39.47
14	NJ Transit Tracks W of Queens Bridge	37.84
15	W side of Hanken Road at Welch Drive	46.19
16	Back of ShopRite along Middle Brook adjacent to Sparcrest Drive	60.13
17	E side of Winsor between East Union Avenue and Somerset Street	40.67
18	NE most point on East High Street (at bend)	38.62
19	E side of East Street between West High Street and Somerset Street	38.52
20	E side of East Street between East Union Avenue and Somerset Street	38.40
21	N/A	
22	East Main Street and Green Brook	38.47
23	NJ Transit Tracks E of Queens Bridge	37.89

*Information from John Cilo, Jr. Associates, September 23, 1999*

In conjunction with the USGS, Somerset County operates a flood information system for its 21 municipalities. The Somerset County Flood Information System (SCFIS) consists of a network of stream and precipitation gages throughout the County. Information from these gages is automatically transmitted to a central location via telephone, radio and satellite. The information is then processed and appropriate actions are taken. These actions include notifying municipal police, fire and emergency management personnel with flood potential and water level information.

There are several SCFIS stream and precipitation gages near Bound Brook Borough. The Bound Brook gages are actually located along the Raritan River between Bridgewater and Franklin Townships between Apgar Drive and Cotton Tail lane. There is also a precipitation gage on the roof of the County Administration Building on Grove Street in Somerville. In addition, there is a stream gage on the Raritan River at Manville on the Finderne Avenue Bridge (Van Vechten Bridge). Information from the stream gages is available on the United States Geological Survey (USGS) web site in real time (<http://waterdata.usgs.gov/nj/nwis>).



The Borough is almost fully developed. The existing land use, based on 1995/1997 aerial photography, is shown in Figure 6. The existing zoning is shown in Figure 7. A current aerial photo with parcel lot lines overlain on it is shown in Figure 8. The vast majority of land is urban land with little chance for groundwater recharge. The Borough is entirely within the State Plan Designation PA1 Metropolitan Planning Area where infiltration requirements are not applicable. However, groundwater recharge rates for native soils in this area are generally between 0 and 14 inches annually. The average annual groundwater recharge rates are shown graphically in Figure 9.

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 in New Jersey that delineates the horizontal extent of ground water captured by a well pumping at a specific rate over a two-, five-, and twelve-year period of time 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)."

WHPA 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

As shown in Figure 10, a portion of the Borough is in a tier 3 well head protection area.

In addition to the rivers and streams that run through and along the Borough, there are a number of wetland areas. These wetland areas, shown in Figure 11, provide flood storage, nonpoint pollutant removal and habitat for flora and fauna.

### **Design and Performance Standards**

The Borough will adopt the design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8-5 to minimize the adverse impact of stormwater runoff on water quality and water quantity and loss of groundwater recharge in receiving water bodies. The design and performance standards include the language for maintenance of stormwater management measures consistent with the stormwater management rules at N.J.A.C. 7:8-5-8 Maintenance Requirements, and language for safety standards consistent with N.J.A.C. 7:8-6 Safety Standards for Stormwater Management Basins. The ordinances will be submitted to the County for review and approval within 24 month of the effective date of the Stormwater Management Rules.

### **Plan Consistency**

The Borough is not within a Regional Stormwater Management Planning Area and no TMDL's have been developed for waters within the Borough; therefore this plan does not need to be

consistent with any regional stormwater management plans (RSWMPs) nor any TMDL's. If any RSWMPs or TMDLs are developed in the future, this Municipal Stormwater Management Plan will be updated to be consistent.

The Borough is within the Raritan Basin and much information on the basin and about its characteristics has been developed as part of the Raritan Plan. Additional information concerning this plan can be found at: <http://www.raritanbasin.org>. The Borough supports the Raritan Plan.

The Municipal Stormwater Management Plan is consistent with the Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21. The Borough will utilize the most current update of the RSIS in the stormwater review of residential areas. This Municipal Stormwater Management Plan will be updated to be consistent with any future updates of the RSIS.

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

### **Nonstructural Stormwater Management Strategies**

The Borough has reviewed the master plan and ordinances, and has provided a list of the sections in the Borough land use and zoning ordinances that are to be modified to incorporate nonstructural stormwater management strategies. All nonstructural stormwater management strategies shall be considered and implemented as given in the NJ Stormwater Best Management Practices Manual, February 24, 2004, as amended except for retention or detention basin, as provided for in the Flood Plain Management Plan. These are the ordinances identified for revision. Once the ordinance texts are completed, they will be submitted to the county review agency for review and approval within 24 months of the effective date of the Stormwater Management Rules. A copy will be sent to the Department of Environmental Protection at the time of submission.

### **Land Use/Build-Out Analysis**

Since the Borough has a combined total of less than one square mile of vacant lands (there are no agricultural lands), the Borough is not required to do a build-out analysis.

### **Mitigation Plans**

This mitigation plan is provided for a proposed development that is granted a variance or exemption from the stormwater management design and performance standards. Presented is a hierarchy of options.

## Mitigation Project Criteria

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

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

In the redevelopment zone, detention basins are for the most part impractical to use as a nonstructural mitigation method due to size and the proximity of the Raritan River, Green Brook and Middle Brook and that lot area is at a premium. Further, the Army Corps of Engineers has prepared a Flood Plain Management Plan which provides for residual basins and that detention or retention basins are not desirable for flood control in the protected area.

Mechanical devices will be utilized coupled with catch basins or drop inlets to achieve desired water quality. The mitigation plan shall be incorporated into the site plan approval by the Land Use Board.

The cost of the mitigation measures cannot be projected due to the variable conditions of each site and shall be determined at the time of review by the Bound Brook Land Use Board.

2. If a suitable site cannot 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. For example, if a variance is given because the 80 percent TSS requirement is not met, the selected project may address water quality impacts that impact aquatic life along Green Brook, Middle Brook and Raritan River. Listed below are specific projects that can be used to address the mitigation options.

A complete mitigation plan will be developed once all the inlets and pipe diameter inverts are surveyed Borough-wide and incorporated onto a map which shall determine the type of mitigation measure to be followed.

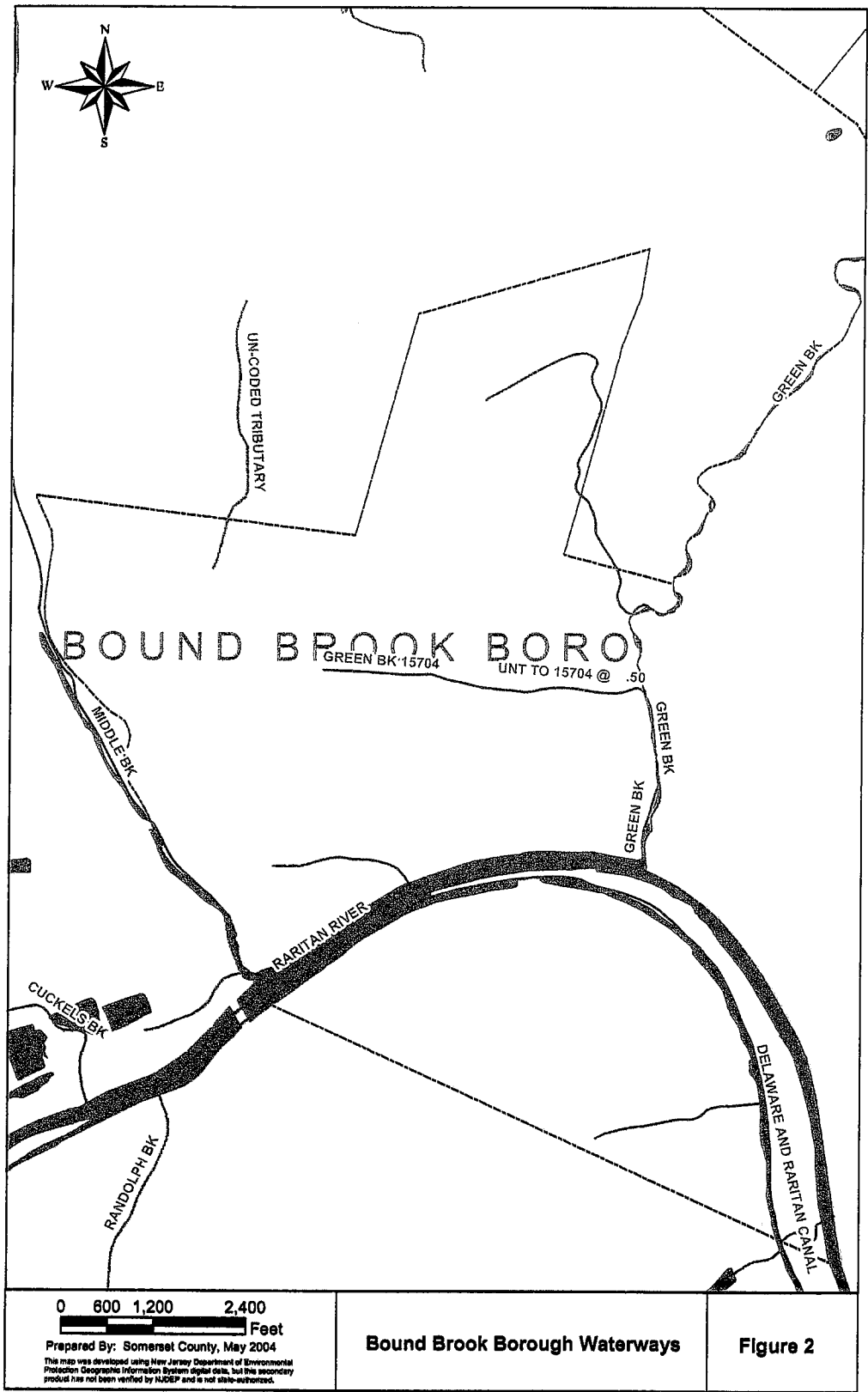
An interim mitigation plan, when an on-site mitigation is impractical, will be to evaluate the water quality downstream of the site initially to establish what type of mitigation devices will be needed to improve water quality with emphasis on nonstructural.

The cost of the mitigation devices, engineering and maintenance will be developed on an on-going basis as each plan is developed.

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

**Recommended Implementing Stormwater Control Ordinances**

The Borough currently has Litter and Levee ordinances in place but will need to repeal said current ordinances and implement Pet Waste, Litter, Improper Waste Disposal, Wildlife Feeding, Yard Waste and Illicit Connection ordinances.



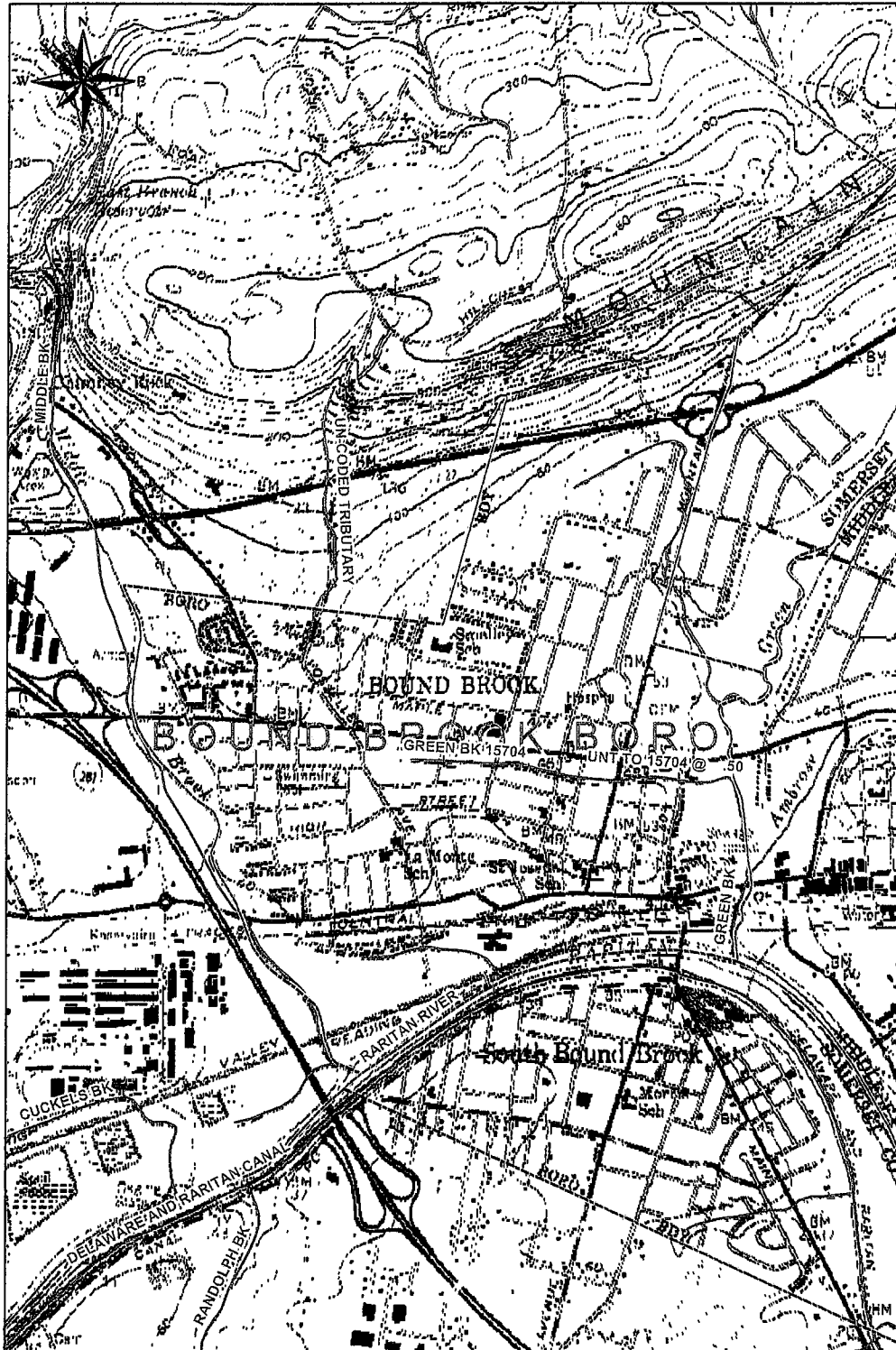
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 Protection Geographic Information System digital data, but this secondary  
 product has not been verified by NJDEP and is not state-authorized.

Bound Brook Borough Waterways

Figure 2



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Prepared By: Somerset County, May 2004

This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

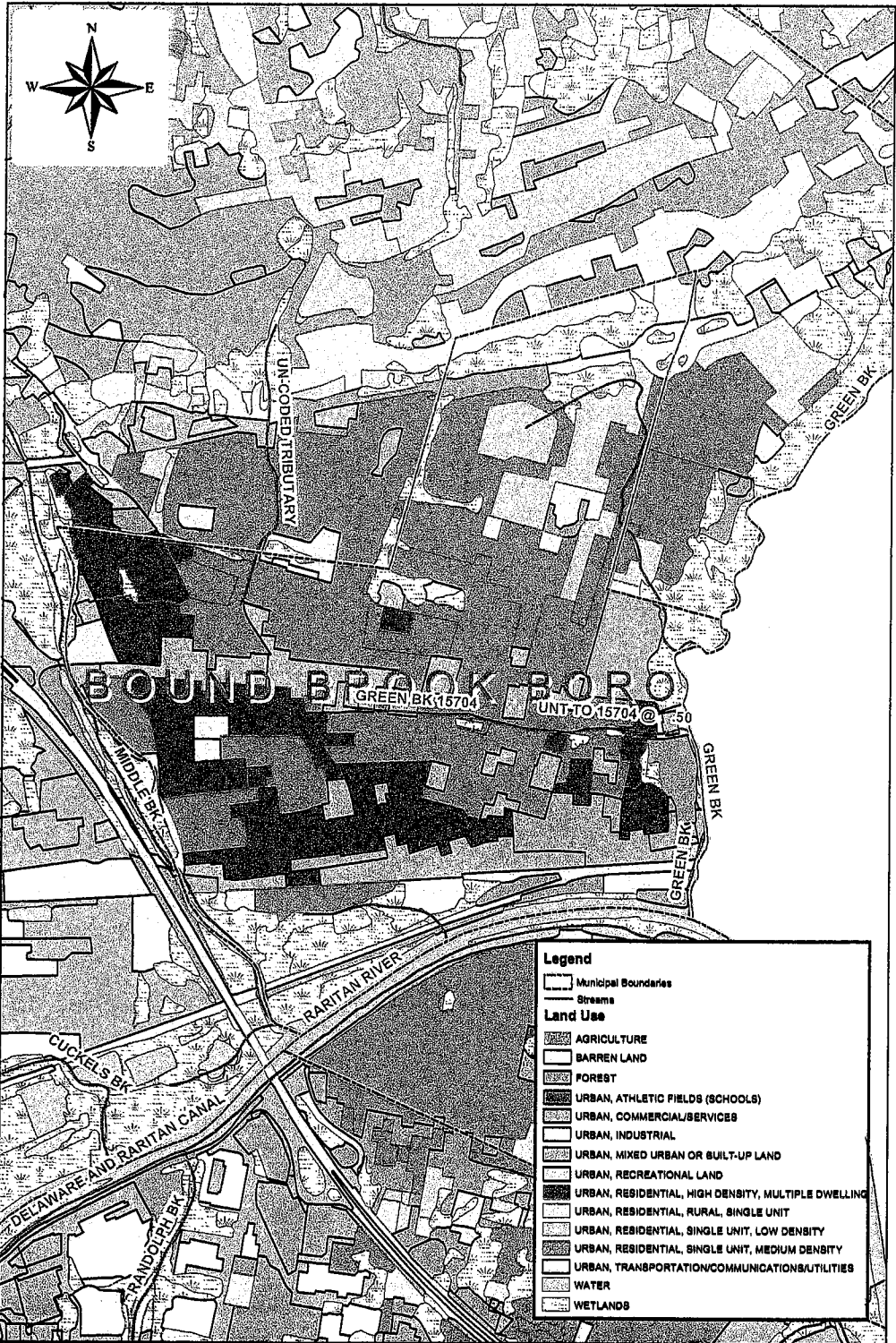
**Bound Brook Borough  
USGS Quadrangle Map**

**Figure 3**







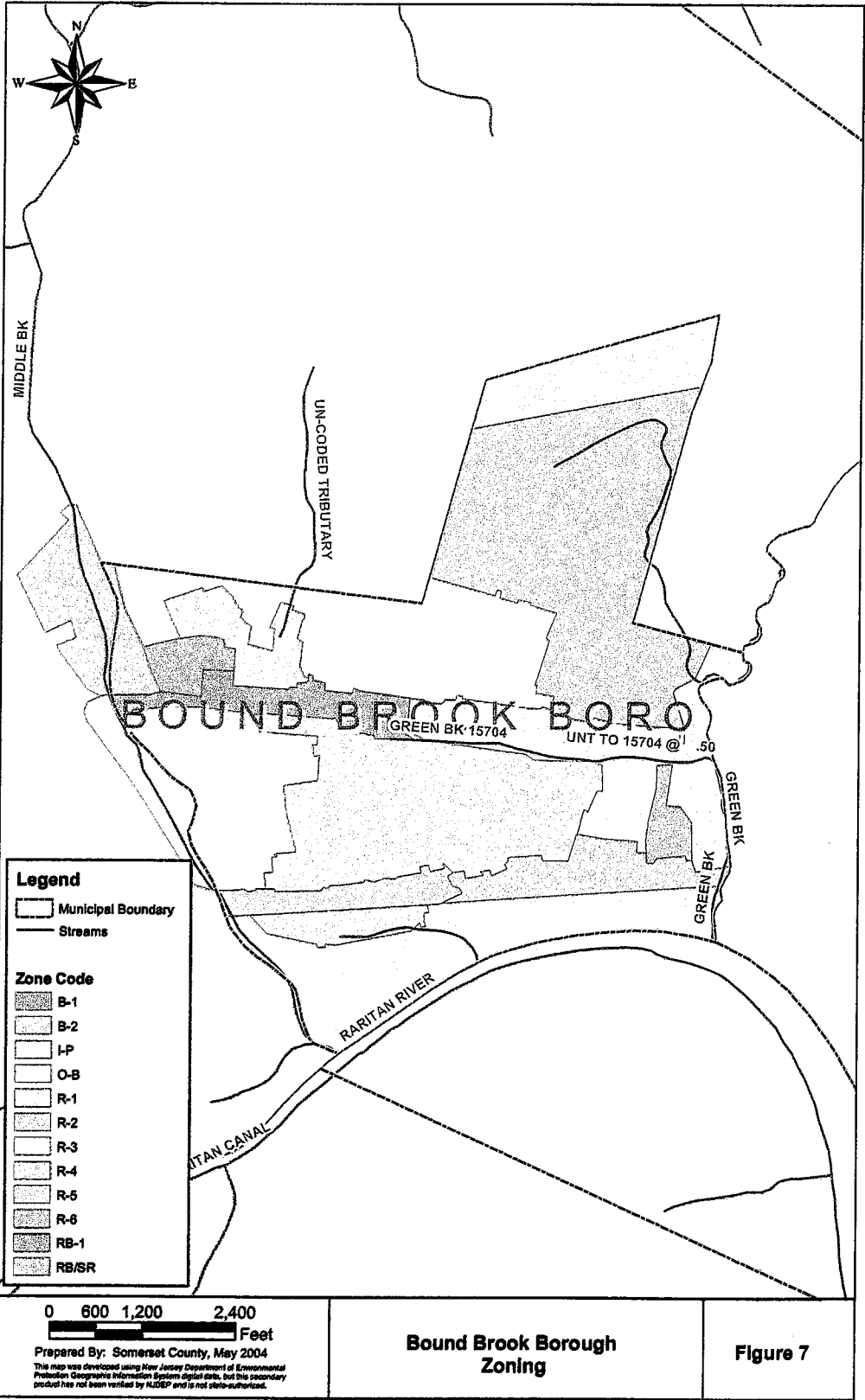


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**Bound Brook Borough  
 Existing Land Use**

**Figure 6**



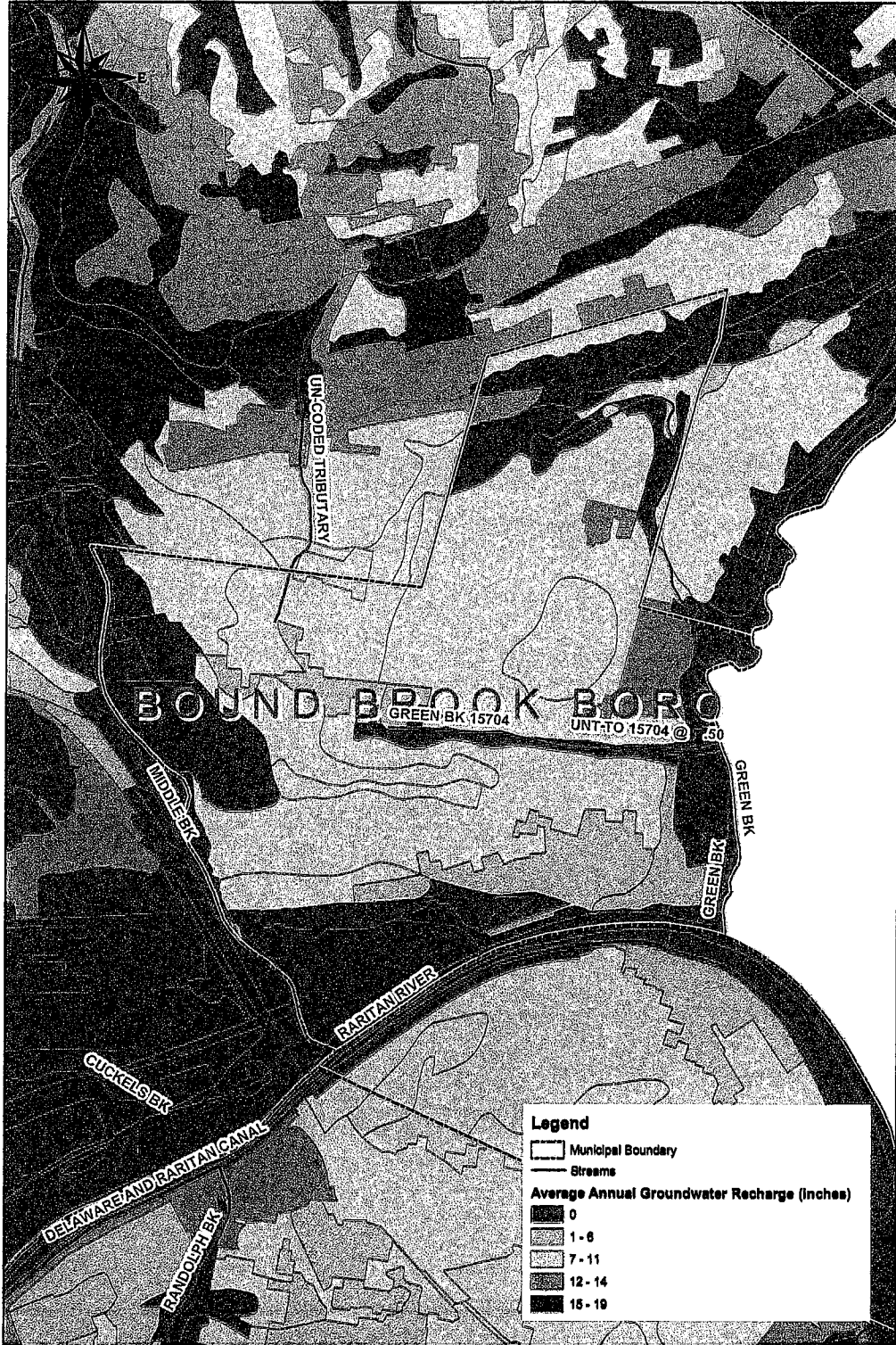


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**Bound Brook Borough  
Aerial Photo with Parcels**

**Figure 8**

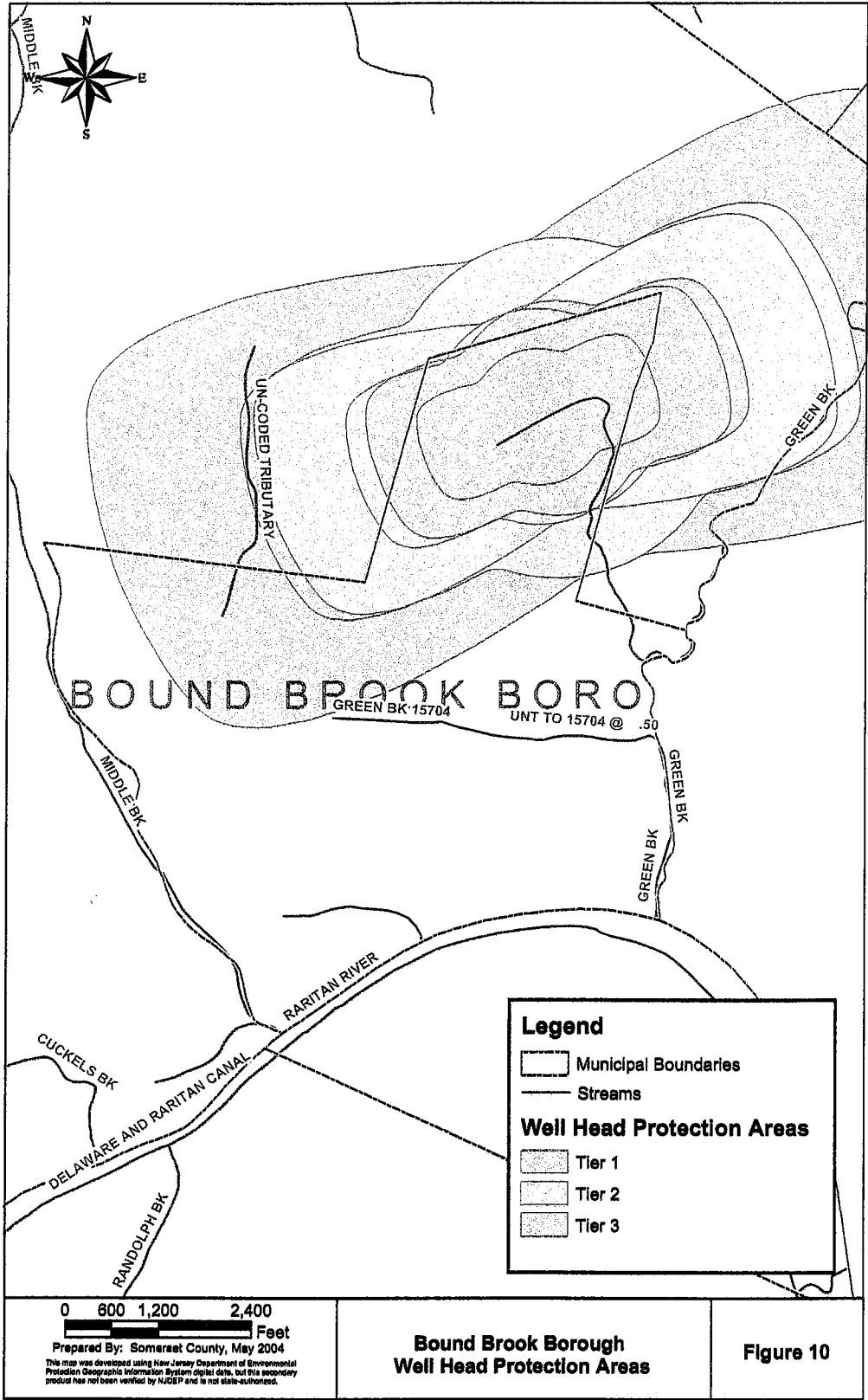


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**Bound Brook Borough  
 Groundwater Recharge**

**Figure 9**



**BOUND BROOK BORO**

**Legend**

- Municipal Boundaries
- Streams

**Well Head Protection Areas**

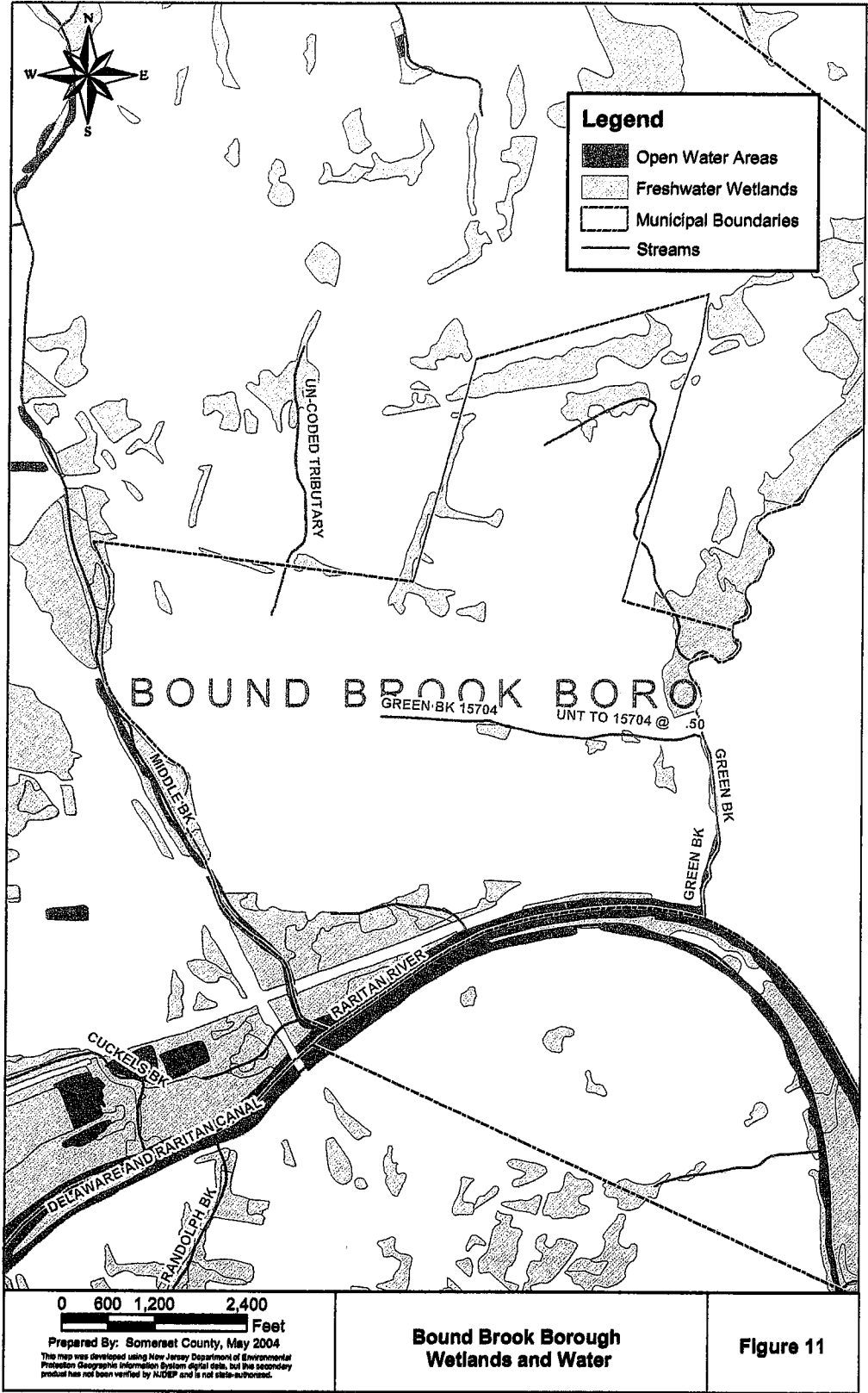
- Tier 1
- Tier 2
- Tier 3

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Prepared By: Somerset County, May 2004  
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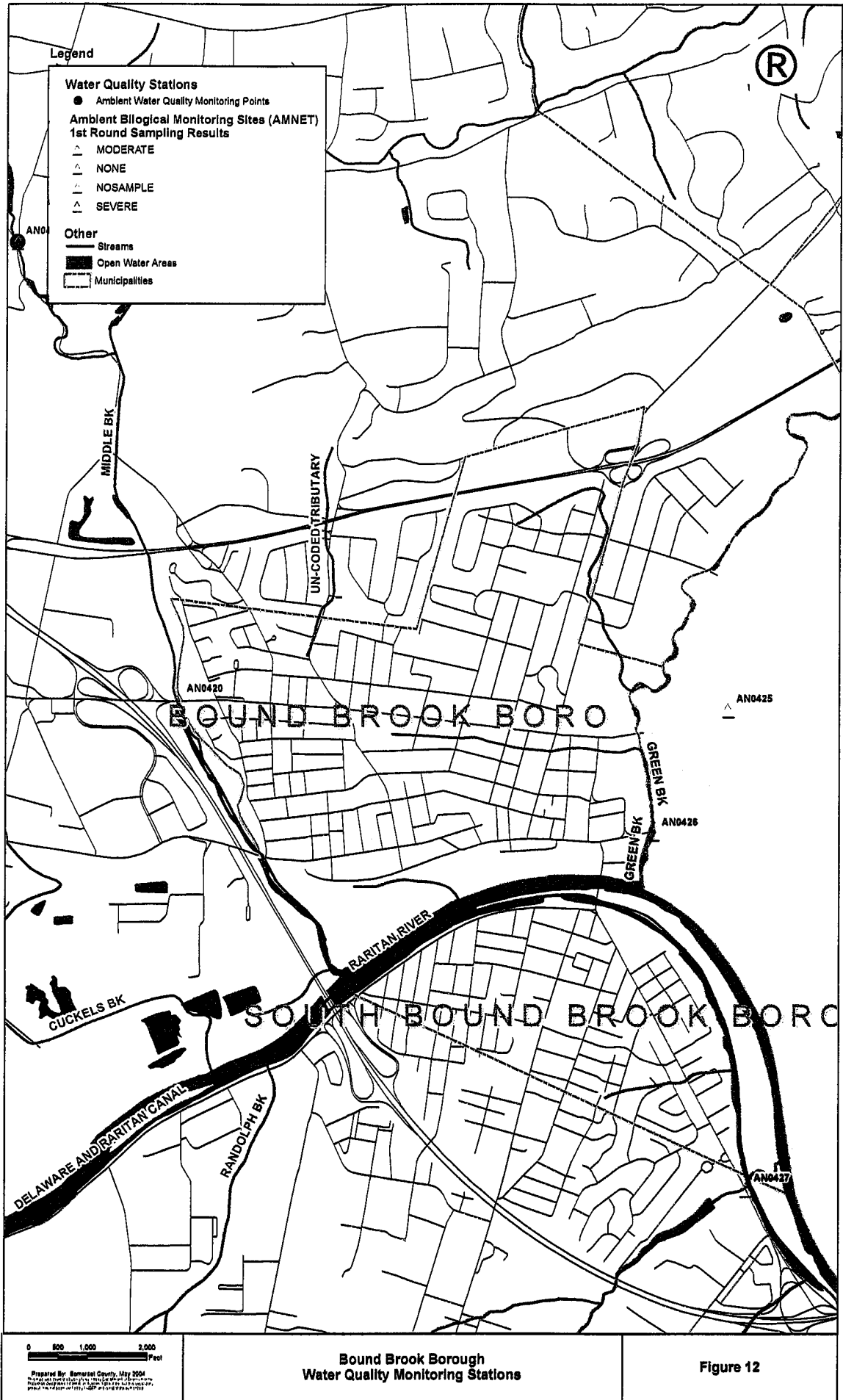
**Bound Brook Borough  
Well Head Protection Areas**

**Figure 10**



**Bound Brook Borough  
 Wetlands and Water**

**Figure 11**



Bound Brook Borough  
Water Quality Monitoring Stations

Figure 12

