

SCHOOR DEPALMA
Engineers and Consultants

MUNICIPAL STORMWATER MANAGEMENT PLAN
FOR
BOROUGH OF RARITAN
SOMERSET COUNTY

DRAFT

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Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for the Borough of Raritan (“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.

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

Goals

The goals of this MSWMP are to:

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

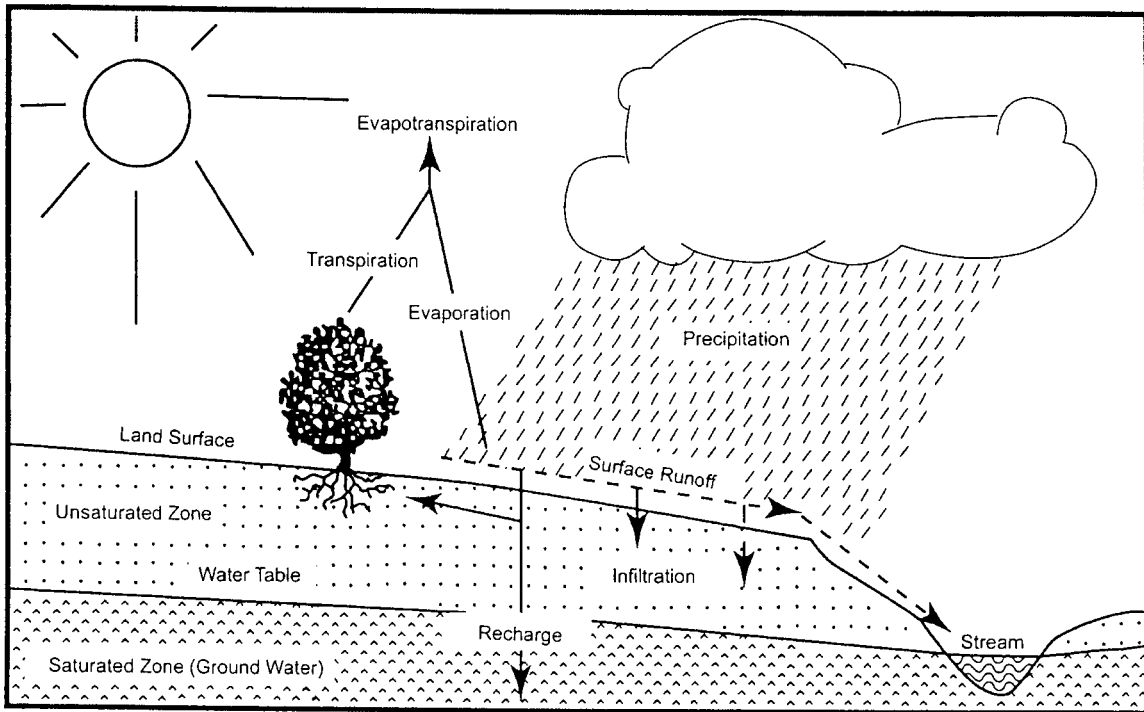
To achieve these goals, this plan outlines specific stormwater design and performance standards for new development. Additionally, the plan proposes stormwater management controls to address impacts from existing development. Preventative and corrective maintenance strategies are included in the plan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

Stormwater Discussion

Land development can dramatically alter the hydrologic cycle (See Figure C-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.

Figure C-1: Groundwater Recharge in the Hydrologic Cycle



Source: New Jersey Geological Survey Report GSR-32.

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.

Background

The Borough encompasses a 2.04 square mile area in Somerset County, New Jersey. In recent years, the Borough has not been under significant development pressure. The 5,798 people residing in the Borough as of 2000 represents a decrease of 540 people from the 1990 population of 6,338 people, and an increase of 210 people from the 1980 population of 6,128. This stable population has most likely not changed the landscape and has not increased stormwater runoff volumes and pollutant loads to the waterways of the municipality. Figure C-2 illustrates the waterways in the Borough. Figure C-3 depicts the Municipal boundary on the USGS quadrangle maps.

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

biometrics related to benthic macroinvertebrate community dynamics. Two (2) waterbodies are located in the Borough, one of which is currently monitored by AMNET. The Peters Brook is classified as moderately impaired, based on AMNET data.

In addition to the AMNET data, the NJDEP and other regulatory agencies collect water quality chemical data on the streams in the state. This data is located on Sublist 5 of New Jersey's Integrated List of Waterbodies. It shows that the benthic macroinvertebrate levels of Peters Brook at times exceed the state's criteria. Additionally, the NJDEP data shows that the Fish-Mercury levels of the entire length of the Raritan River frequently exceed the state's criteria. This means that these watercourses are impaired waterways and the NJDEP is required to develop a Total Maximum Daily Load (TMDL) for these pollutants for each waterway.

A TMDL is the amount of a pollutant that can be accepted by a waterbody without causing an exceedance of water quality standards or interfering with the ability to use a 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 BMPs.

The New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d)) (Integrated List) is required by the federal Clean Water Act to be prepared biennially and is a valuable source of water quality information. This combined report presents the extent to which New Jersey waters are attaining water quality standards, and identifies waters that are impaired. Sublist 5 of the Integrated List constitutes the list of waters impaired or threatened by pollutants, for which one or more TMDLs are needed.

In addition to water quality problems, flooding in the Borough of Raritan occurs infrequently because of the low-runoff generating character of the soil. However, as land is developed, the permeable soils are replaced by impermeable surfaces, which increase runoff volumes. All future development in the Borough of Raritan shall utilize the best available technology to minimize off-site stormwater runoff, increase on-site infiltration, simulate natural drainage systems and minimize off-site discharge of pollutants to ground- or surface water and encourage natural filtration functions

A map of the groundwater recharge areas is shown in Figure C-4. Wellhead protection areas, also required as part of the MSWMP, are shown in Figure C-5.

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 months of the effective date of the Stormwater Management Rules.

Non-structural measures to be considered first shall include site design and preventive source controls. To confirm the effectiveness of such measures, applicants must verify the control of stormwater quantity impacts as detailed in the Stormwater Management rules. The tests of assuring control of the quantity impacts as detailed in these rules will be incorporated into the Borough's Stormwater Ordinance.

The general standards for structural measures will be specified in the Stormwater Management rules and will be incorporated into the Borough of Raritan's Ordinance. These measures shall be incorporated as needed to meet the soil erosion, infiltration and runoff quantity standards included in the Borough's Stormwater Ordinance. The design standards for the specific structural stormwater management measures are those included in the New Jersey Stormwater Best Management Practices Manual. Other designs or practices may be used if they are approved by the Somerset-Union County Soil Conservation District. The design and construction of such facilities must comply with the Soil Erosion and Sediment Control Standards as well as any other applicable state regulation, including the Freshwater Wetland Protection Act rules, the Flood Hazard Control rules, the Surface Water Quality Standards, the Coastal Area Facilities Review Act, Waterfront Development and Harbor Facilities Act, and the Dam Safety rules. The requirement to be consistent with all other applicable rules will be included in the Borough's Stormwater Ordinance. Stormwater runoff quality controls for total suspended solids and nutrient loads shall meet the design and performance standards as specified in the Stormwater Management rules. The minimum design and performance standards for infiltration and groundwater recharge specified in the Stormwater Management Rules will be incorporated into the Borough's Stormwater Ordinance and must be met for all applicable development. Consistent with the Stormwater Management Rules, the Ordinance allows for an exemption from this requirement where the applicant can demonstrate that it is not practicable to meet the standards but has taken all possible steps to meet all stormwater management measures.

During construction, Borough inspectors will observe the construction of the project to ensure that the stormwater management measures are constructed and function as designed. Adequate long term operation, as well as preventative and corrective maintenance of the selected stormwater management measures, will be ensured by requiring the design engineer to prepare a maintenance plan for its stormwater management facilities incorporated into the design of the major development. The maintenance plan shall have specific preventative maintenance tasks, schedules and cost estimates, as well as the responsible party for corrective and preventative maintenance.

Where the Borough assumes maintenance responsibility, preventative maintenance shall be performed on a regular basis and will be appropriate for the particular structural management measure being implemented. These maintenance measures shall be in accordance with

N.J.A.C. 7:8-5 and may include: periodic inspections, vegetation management, sediment, debris and trash removal and mosquito control. Corrective maintenance shall be performed on an as needed basis for structure repairs or replacements, removal of outlet and pipe blockages, erosion restoration, snow and ice removal, etc. The person or persons responsible for maintenance shall keep a detailed log of all preventative and corrective maintenance for the structural management measures incorporated into the design of the development, including a record of all inspections and work orders.

Plan Consistency

The Borough is not within a Regional Stormwater Management Planning Area and no TMDLs have been developed for waters within the Borough; therefore this plan does not need to be consistent with any regional stormwater management plans (RSWMPs) or any TMDLs. If any RSWMPs or TMDLs are developed in the future, this Municipal Stormwater Management Plan will be updated to be consistent.

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

The Borough's Stormwater Management Ordinance will require all new development and redevelopment plans to comply with New Jersey's Soil Erosion and Sediment Control Standards. During construction, 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. 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.

Chapter 42, "Land Development" of the Code of the Borough of Raritan was reviewed with regard to incorporating nonstructural stormwater management strategies. Several amendments will be recommended to be made to Section 2, entitled "Subdivisions and Site Plans" to incorporate these strategies.

Section 42-23. Subdivision Plat Design Standards shall be expanded to include a section entitled, "Stormwater Management which will provide for stormwater management per Residential Site Improvement Standards for all residential development, and per the

Stormwater Management Rules, NJAC 7:8 for all major development which is described as disturbing one or more acres.

Storm Drainage Facilities – A section shall be added to the Land Development Ordinance requiring bicycle safe grates in all roadways, parking lots and pedestrian areas. All curb inlets shall be “N-Eco” Type, limiting curb opening to no larger than 2” high. This section shall also encourage the use of natural vegetated swales in lieu of pipe and inlets where feasible.

Section 42-26. Site Plan Review shall be expanded to include a section entitled, “Stormwater Management which will provide for stormwater management per Residential Site Improvement Standards for all residential development, and per the Stormwater Management Rules, NJAC 7:8 for all major development which is described as disturbing one or more acres.

The Borough, through a grant received from Somerset County, is currently reviewing and updating its entire Land Use Ordinance. This provides a coincidental opportunity to incorporate appropriate SWMP, SPPP measures as the revisions develop.

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

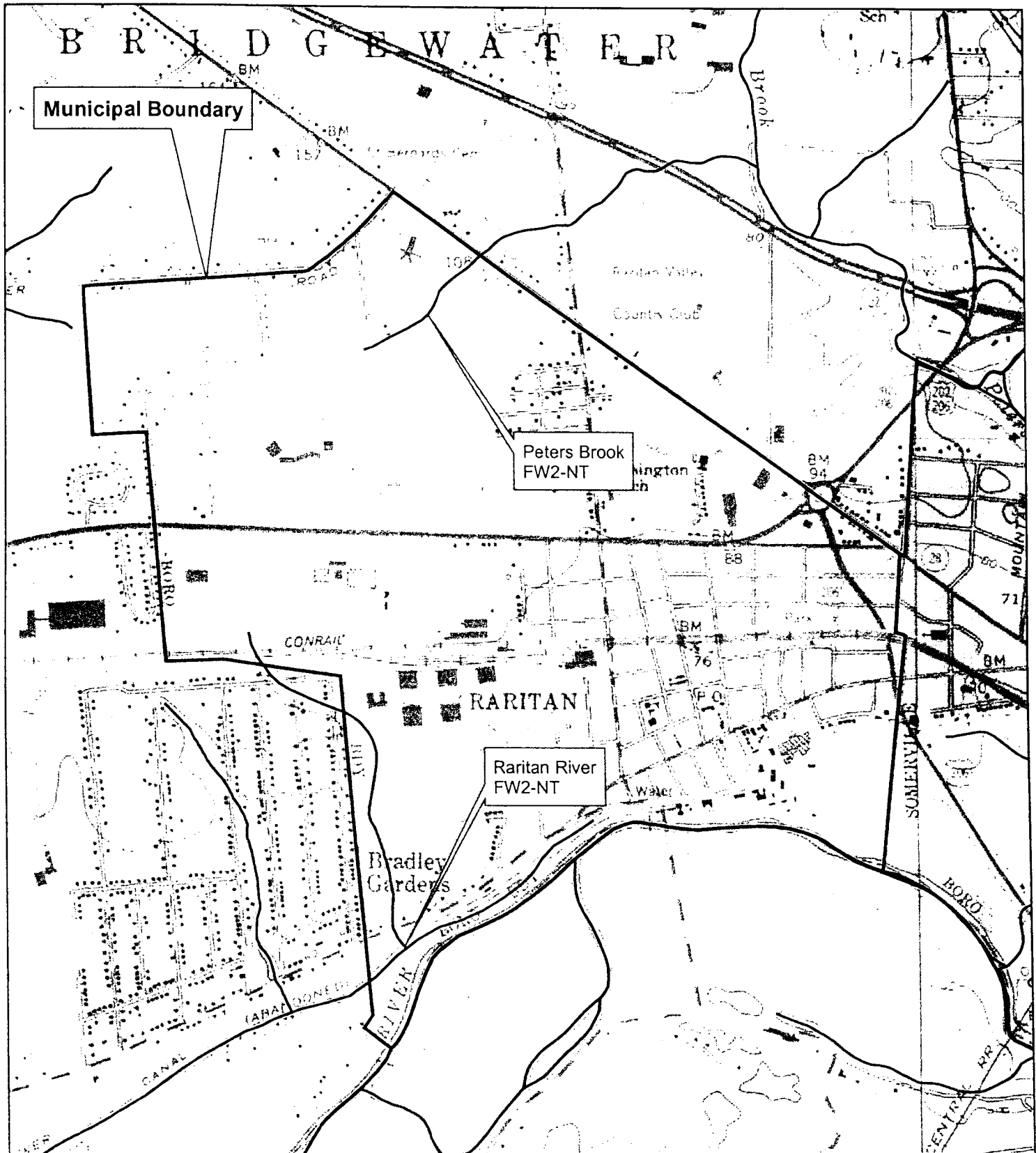
1. The mitigation project must be implemented in the same drainage area as the proposed development. The project must provide additional groundwater recharge benefits, or protection from stormwater runoff quality and quantity from previously developed property that does not currently meet the design and performance standards outlined in the Municipal Stormwater Management Plan. The developer must ensure the long-term maintenance of the project, including the maintenance requirements under Chapters 8 and 9 of the NJDEP Stormwater BMP Manual.
 - a. The applicant can select one of the following projects listed to compensate for the deficit from the performance standards resulting from the proposed project. More detailed information on the projects can be obtained from the Township Engineer. Listed below are specific projects that can be used to address the mitigation requirement.

Water Quality

- Retrofit the existing stormwater management facilities at the following facilities to provide the removal of 80 percent of total suspended solids.
 - Public Works Garage located on Busky Lane

- Retrofit the heads on catch basins as specified by the Borough Engineer to comply with NJDEP Phase II regulations.

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. 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.



Data Type	Source	Relevant Time Period
USGS Quad	UGSG	Feb-Apr 2002
Municipal Boundary	NJDEP	1989
C1 Waters	NJDEP	2003

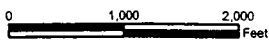





Figure C-2
Borough and
its Waterways

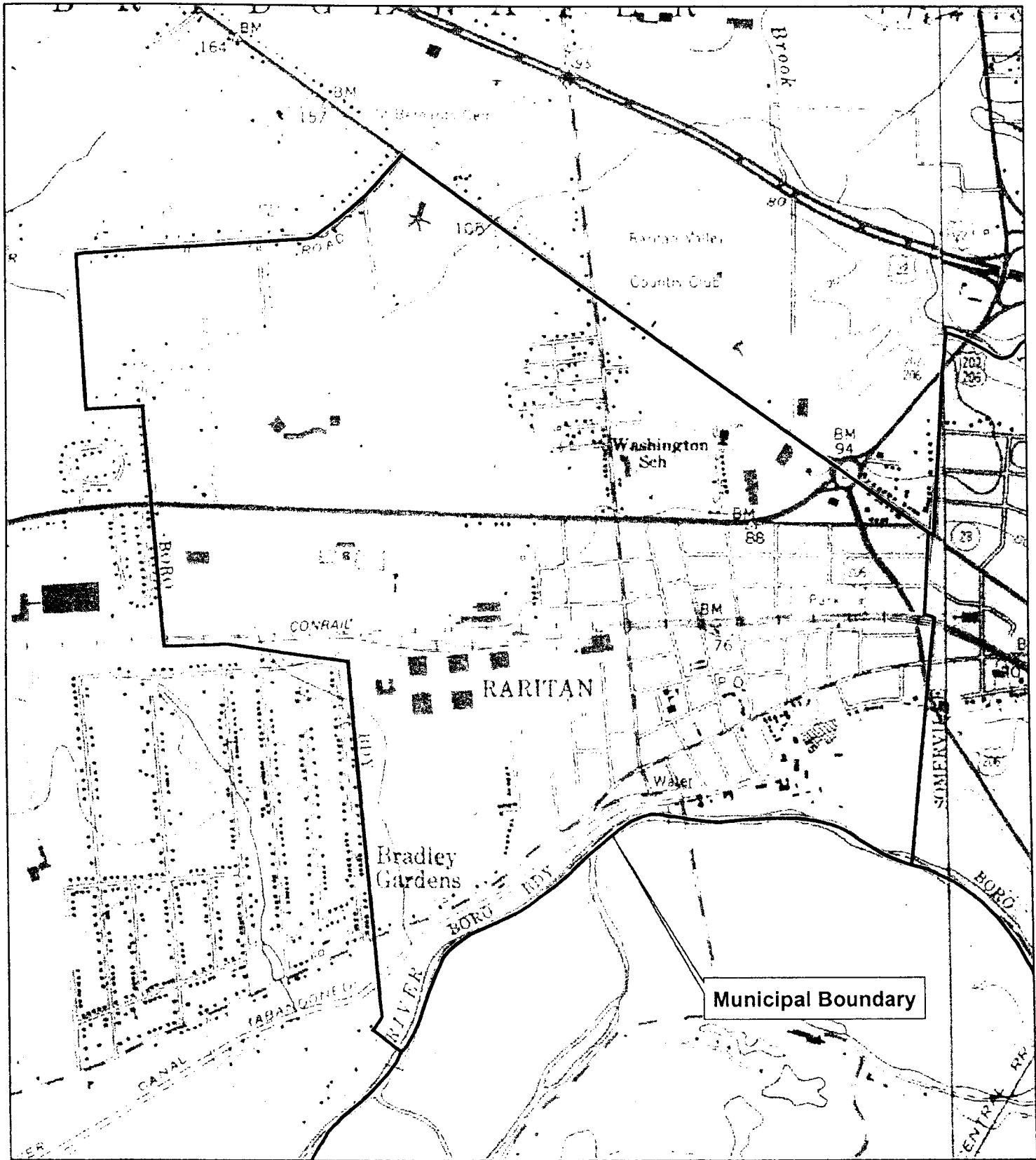
Borough of Raritan
Somerset County, New Jersey

Symbol Legend

-  Municipal Boundary
-  C1 Waters
-  FW2-NT



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

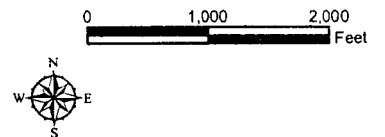


Data Type	Source	Relevant Time Period
USGS Quadrangles		Feb-Apr 2002
Municipal Boundary	NJDEP	1989

Figure C-3

**Municipal Boundary on
USGS Quadrangles**

**Borough of Raritan
Somerset County, New Jersey**



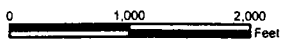
This map was developed using Geographic Information System digital data developed under the auspices of the Department of Environmental Protection, Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not State-authorized.





Municipal Boundary

Data Type	Source	Relevant Time Period
USGS Quad	UGSG	Feb-Apr 2002
Municipal Boundary	NJDEP	1989
Groundwater Recharge Areas	NJDEP	Various



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Figure C-4

Groundwater Recharge Areas in the Borough

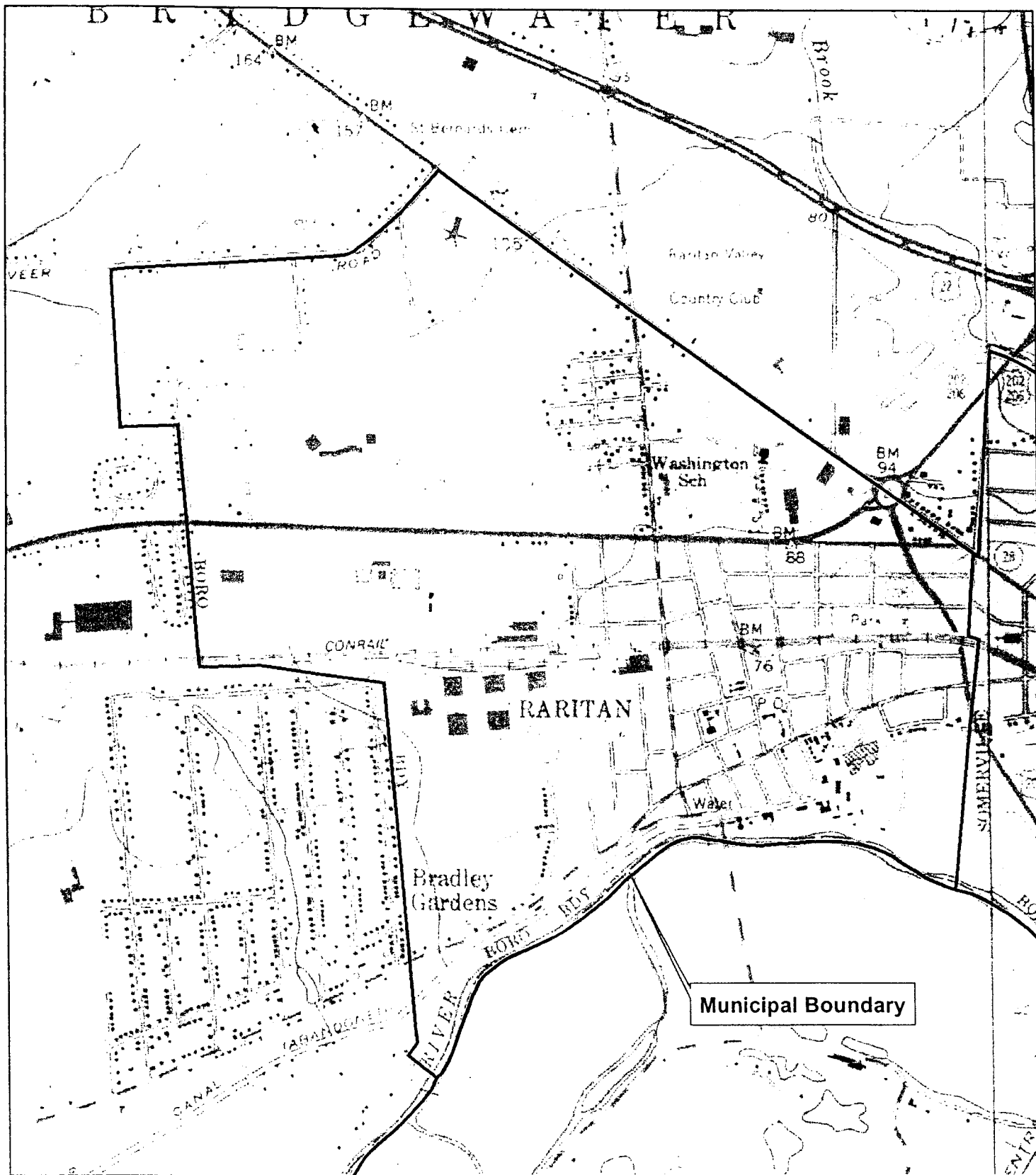
Borough of Raritan
Somerset County, New Jersey

Symbol Legend

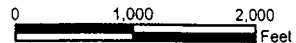
□ Municipal Boundary
Ground Water Recharge Areas

- 0.00 in/yr
- 0.01 - 9.00 in/yr
- 9.01 - 12.00 in/yr
- 12.01 - 16.00 in/yr
- 16.01 - 22.74 in/yr





Data Type	Source	Relevant Time Period
USGS Quadrangles	USGS	Feb-Apr 2002
Municipal Boundary	NJDEP	1989
Wellhead Protection Areas	NJDEP	2004 (Updated)



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Figure C-5

Wellhead Protection Areas in the Borough

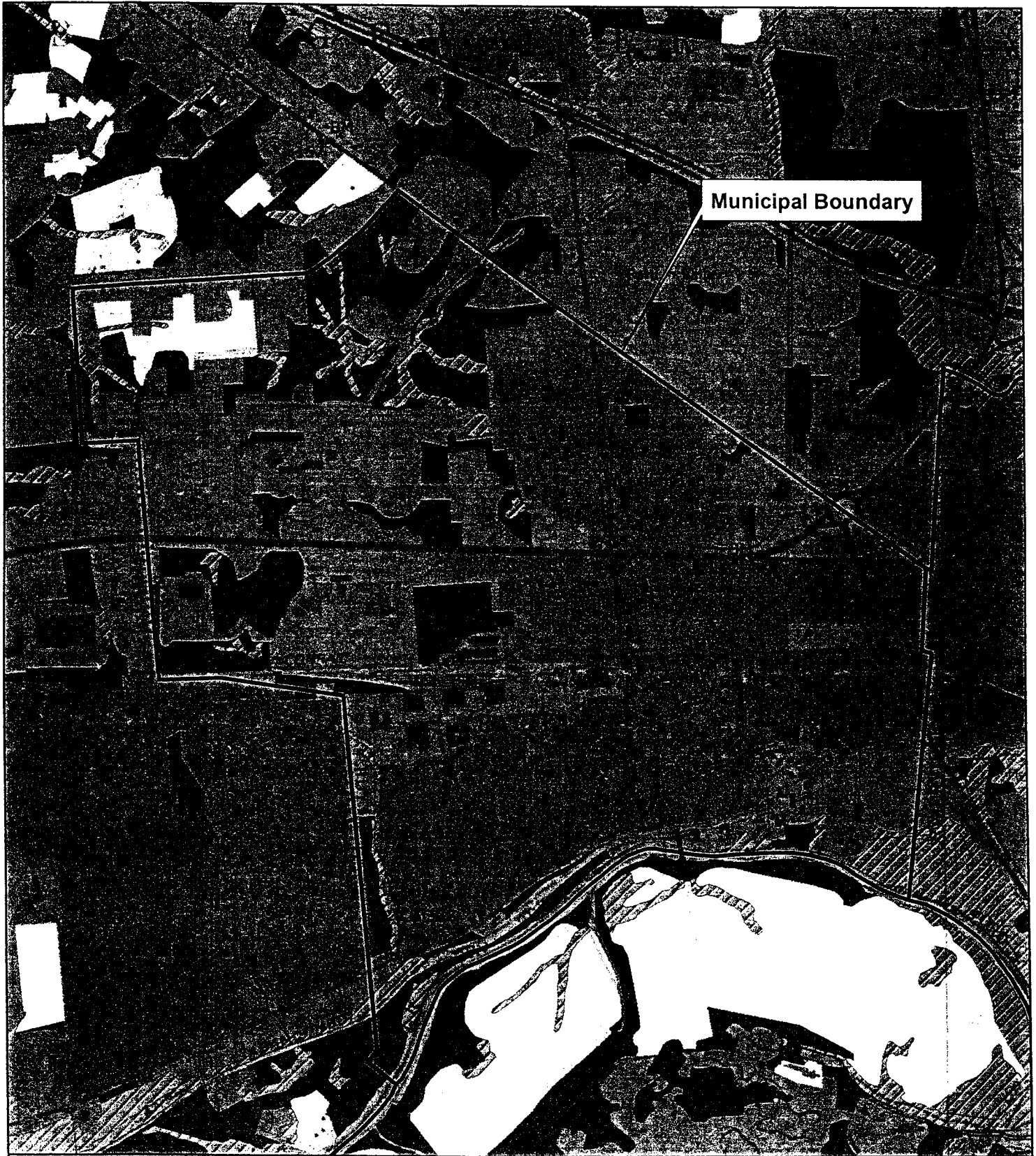
Borough of Raritan

Somerset County, New Jersey

Symbol Legend

	Municipal Boundary
	Wellhead Protection Areas
	2 Year
	5 Year
	12 Year





Municipal Boundary

Data Type	Source	Relevant Time Period
USGS Quad	UGSG	Feb-Apr 2002
Municipal Boundary	NJDEP	1989
Land Use/ Land Cover	NJDEP	1995/1997

0 1,000 2,000
Feet

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

Figure C-6 Borough's Existing Land Use

Borough of Raritan
Somerset County, New Jersey



Symbol Legend

Municipal Boundary

Land Use

AGRICULTURE

BARREN LAND

FOREST

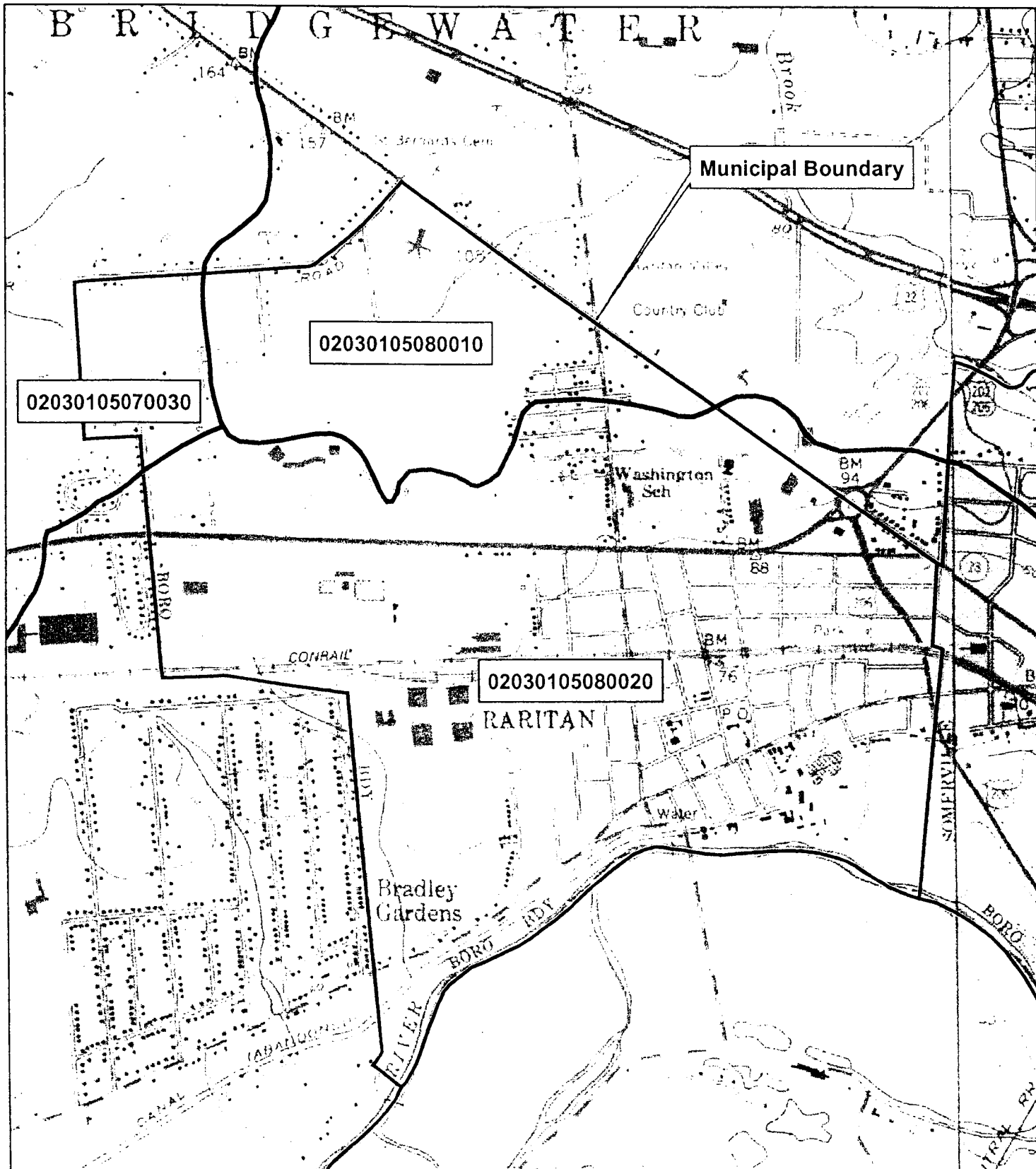
URBAN

WATER

WETLANDS



SCHOOR DEPALMA
Engineers and Constructors



Data Type	Source	Relevant Time Period
USGS Quad	UGSG	Feb-Apr 2002
Municipal Boundary	NJDEP	1989
HUC14	NJDEP	2000





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Figure C-7

Hydrologic Units (HUC14) Within the Borough

Borough of Raritan
Somerset County, New Jersey

Symbol Legend

-  NJDEP Huc 14
-  Municipal Boundary



Zoning Map

Raritan Borough

Somerset County, New Jersey
March 4, 2005

Legend

Completions

NUCH

02001000000 - Urban River (R) to Lowland
02001000010 - Urban River (R) to Lowland to Water
02001000020 - Urban River (R) to Lowland to Water

ZONING LEGEND

A-1 Adaptive Reuse / Mixed Use Redevelopment District
A-2 Central Business District
A-3 High Density Commercial District
B-1 Business District
B-2 Medium Density Business District
B-3 Light Manufacturing District
B-4 Light Industrial District
B-5 Office Building District
C-1 Planned Community Residential Development
C-2 Low Density Residential District
C-3 Medium Density Residential District
C-4 Medium High Density Residential District
C-5 Townhouse / Garden Apartment District

Code	Description
02001000000	Urban River (R) to Lowland
02001000010	Urban River (R) to Lowland to Water
02001000020	Urban River (R) to Lowland to Water
02001000030	Urban River (R) to Lowland to Water
02001000040	Urban River (R) to Lowland to Water
02001000050	Urban River (R) to Lowland to Water
02001000060	Urban River (R) to Lowland to Water
02001000070	Urban River (R) to Lowland to Water
02001000080	Urban River (R) to Lowland to Water
02001000090	Urban River (R) to Lowland to Water
02001000100	Urban River (R) to Lowland to Water
02001000110	Urban River (R) to Lowland to Water
02001000120	Urban River (R) to Lowland to Water
02001000130	Urban River (R) to Lowland to Water
02001000140	Urban River (R) to Lowland to Water
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02001000160	Urban River (R) to Lowland to Water
02001000170	Urban River (R) to Lowland to Water
02001000180	Urban River (R) to Lowland to Water
02001000190	Urban River (R) to Lowland to Water
02001000200	Urban River (R) to Lowland to Water
02001000210	Urban River (R) to Lowland to Water
02001000220	Urban River (R) to Lowland to Water
02001000230	Urban River (R) to Lowland to Water
02001000240	Urban River (R) to Lowland to Water
02001000250	Urban River (R) to Lowland to Water
02001000260	Urban River (R) to Lowland to Water
02001000270	Urban River (R) to Lowland to Water
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02001000290	Urban River (R) to Lowland to Water
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02001000380	Urban River (R) to Lowland to Water
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02001000770	Urban River (R) to Lowland to Water
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02001000890	Urban River (R) to Lowland to Water
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02001000920	Urban River (R) to Lowland to Water
02001000930	Urban River (R) to Lowland to Water
02001000940	Urban River (R) to Lowland to Water
02001000950	Urban River (R) to Lowland to Water
02001000960	Urban River (R) to Lowland to Water
02001000970	Urban River (R) to Lowland to Water
02001000980	Urban River (R) to Lowland to Water
02001000990	Urban River (R) to Lowland to Water
02001001000	Urban River (R) to Lowland to Water

Project Location Map

Scale: 1 inch equals 1,000 feet

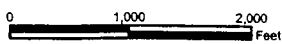
SCHOOL DISTRICTS

0 500 1000 2000 Feet





Data Type	Source	Relevant Time Period
USGS Quad	UGSG	Feb-Apr 2002
Municipal Boundary	NJDEP	1989
Wetlands	NJDEP	1986
Lakes	NJDEP	1986
Streams	NJDEP	1998



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

Figure C-9

Wetlands and Water Land Uses within the Borough

Borough of Raritan
Somerset County, New Jersey

Symbol Legend

- Streams
- Lakes
- Wetlands
- Municipal Boundary

