TOWNSHIP OF RARITAN
HUNTERDON COUNTY

MUNICIPAL STORMWATER MANAGEMENT PLAN

2005

Adopted March 22nd, 2005

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Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for the Township of Raritan ("the Township") 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.

A "build-out" analysis has been included in this plan based upon existing zoning and land available for development. The plan also addresses the review and update of existing ordinances, the Township 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 Municipal Stormwater Management Plan are to:

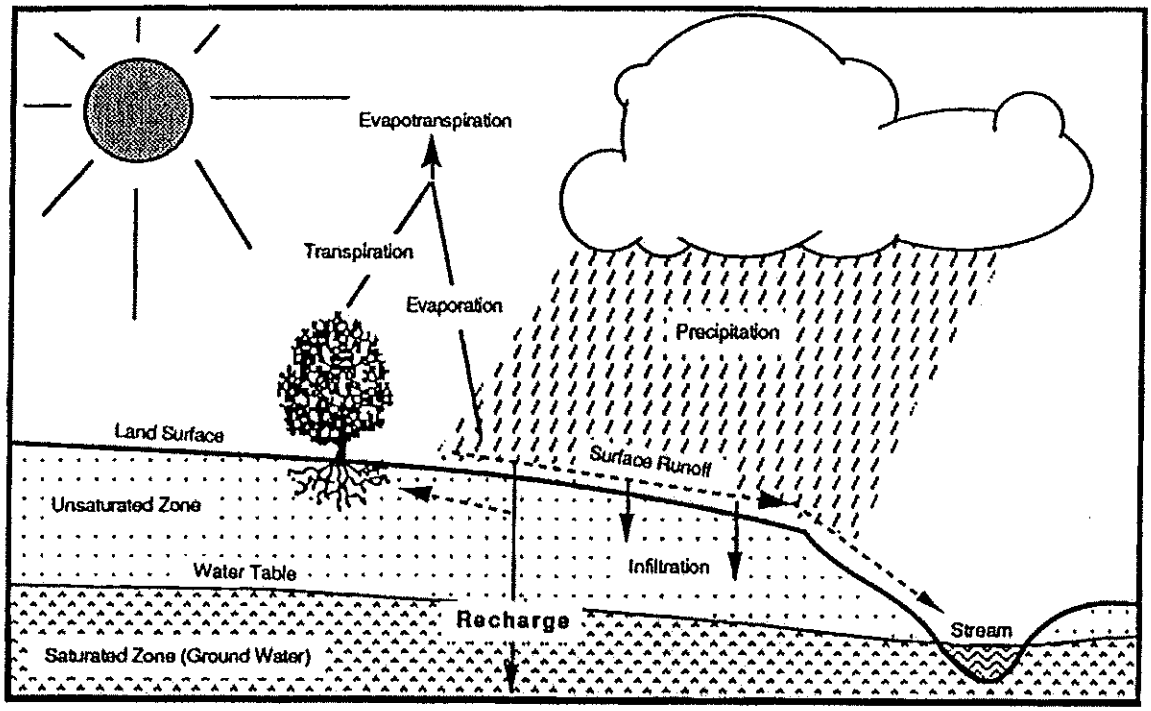
- reduce flood damage, including damage to life and property;
- minimize, to the extent practical, any increase in stormwater runoff from any new development;
- reduce soil erosion from any development or construction project;
- assure the adequacy of existing and proposed culverts and bridges, and other in-stream structures;
- maintain groundwater recharge;
- prevent, to the greatest extent feasible, an increase in non-point 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;
- 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 below) 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.

Background

Township Background

The Township encompasses 38 square mile area in Hunterdon County, New Jersey. In recent years, the Township has been under significant development pressure. The population of the Township has increased from 8292 in 1980, to 15,616 in 1990, to 19,809 in the year 2000. This population increase has resulted in considerable demand for new development; changes in the landscape have most likely increased stormwater runoff volumes and pollutant loads to the waterways of the municipality. Map 2 illustrates the waterways in the Township. Map 3 depicts the Township boundary on the USGS quadrangle maps.

The township contains a variety of zoning districts. However, the majority of the township (85%) is zoned residential, with 11% zoned for industry and office and the remaining 4% zoned for commercial development. Approximately ½ of the residential zoning is on low density lots of 5 acres or more, with 90% on lots of 1 acre or more. The majority of vacant land is located in the lowest density residential districts.

Township Infrastructure

The Township is partially served by public water and public sanitary sewer. Maps 25 and 26 indicate the extent of the public water and sanitary sewer services areas (planned). The existing sewer treatment plant is operating at or near capacity and an expansion is not currently planned. Public water is provided by the Elizabethtown Water Company through a franchise agreement. A very limited area is serviced by the Flemington Water Company. The majority of the commercial and industrial areas and the existing Planned Residential developments are connected to the public water and sanitary sewer systems. The remaining single family areas are largely served by on site well and septic systems.

The stormwater management system of the township was largely developed recently from the 1970's onward. The system consists of development based detention basins and underground structural systems. The systems area designed to detain the 100 year storm. However, the majority of these systems are not designed to assist in water quality. Many

of these systems may be failing or in need of repair. In addition, the extent of the older systems is largely unknown. As part of the outfall mapping project the Township will be going further by mapping inlets and detention basins in an attempt to create a complete plan of the township drainage system.

The Township roadway network consists of 180 miles of roads. These roads are all paved and serviced by some form of stormwater management system. The roads are maintained by the Township of Raritan Department of Public Works. In addition the Township contains three state highways and a number of County roads.

Environmental Data

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. There is one major river within the Township, the South Branch of the Raritan River In addition extending through the Southern portion of the Township is the Neshanic River and its tributaries and to the west is the Wickecheokee Creek. Attached is the most recent NJDEP AMNET data. The data indicates that both the South Branch of the Raritan River and the Neshanic River show moderate impairments (See Maps 6-10). In addition 2001 Fish IBI data rates the Neshanic River as "fair".

A TMDL is the amount of a pollutant that can be accepted by a water body without causing an exceedance of water quality standards or interfering with the ability to use a water body for one or more of its designated uses. The allowable load is allocated to the various sources of the pollutant, such as stormwater and wastewater discharges, which require an NJPDES permit to discharge, and non-point 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, the Township has exhibited limited water quantity problems including flooding, stream bank erosion, and diminished base flow in its

streams. As the imperviousness increased in the Township, the peak and volumes of stream flows also increased. The increased amount of water resulted in stream bank erosion, which resulted in unstable areas at roadway/bridge crossings, and degraded stream habitats.

The following table includes those areas subject to consistent flooding. (See Map 11)

Location	Frequency/Year	Depth (ft.)
1. Kuhl Road (eastern bridge)	3	1-4
2. Kuhl Road (western bridge)	3	1-3
3. Stanton Station Road	1	1-2
4. Everitts Road West	2	2-3
5. Reaville Road	2	1-2
6. Dayton Road	3	>1
7. Copper Hill Road	2-3	2-3
8. River Road (north)	2-3	1
9. Old Croton Road	2-3	1-2
10. Goose Island Road	2	1

The increased imperviousness of the Township has decreased groundwater recharge, decreasing base flows in streams during dry weather periods. Lower base flows can have a negative impact on in-stream habitat during the summer months. A map of the groundwater recharge areas are shown in Map 13. Wellhead protection areas, also required as part of the MSWMP, are shown in Map 27.

Design and Performance Standards

The Township 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. Designs shall first address non-structural stormwater management standards. Only after all non-structural stormwater management methods have been exhausted shall structural methods be used. Every major application shall first hold a pre-application meeting with the Township Professionals at which time the project shall complete and submit a low impact development checklist for review.

Groundwater recharge shall be prohibited on sites with soil contamination. During construction, Township inspectors will observe the construction of the project to ensure that the stormwater management measures are constructed and function as designed.

All projects will be required to file a maintenance plan and submit on-going maintenance documents to the township Engineer to ensure the continued maintenance of any storm water management system. No residential stormwater management system shall be the responsibility of a single property owner.

The Wickecheoke Creek has been classified as a Category One Waters. Special water resource protection areas are mandated for all C-1 waters in the sate and all perennial or intermittent stream that drain into these watercourses. A stream corridor and protection plan and ordinance is proposed to enforce these areas.

Plan Consistency

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

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 Township'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, Township 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 Township has reviewed the master plan and ordinances, and has provided a list of the sections in the Township 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. A copy will be sent to the Department of Environmental Protection at the time of submission.

Chapter 16 of the Township Code, entitled Development Regulations, was reviewed with regard to incorporating nonstructural stormwater management strategies.

16.16.030: A section requiring the submission of geo-referenced as-built plans of the drainage system should be added.

16.16.050.A: The section should be amended to eliminate individual homeowners as being responsible for the maintenance of detention basins.

16.16.050.C: The maintenance of subdivisions under construction should be amended to include street sweeping as being required.

16.18.070.C.19: The requirement for the submission of a storm water management plan should be amended to make it clear that the plan should include all necessary information to determine compliance with the regulations.

16.18.090.D.9.b: The section regarding the design of the storm water management plan needs to be updated to reflect the changes in the goals for the design of the systems under the best management practices.

16.18.100.C.4: Changes in elevation should be revised to limit permitted changes in the natural land contours.

16.18.100.D: This sections list the extent of what is considered a drainage system. The list should be expanded to include the new types of systems listed in the bmp manual.

16.18.110.A.1: The development pattern of subdivisions should include the desire for a layout which greater respects the natural environments and existing natural features.

16.18.110.B.2 (subsections c and d): The roadway and right of way widths for roads should be revised to reflect those found in the RSIS.

16.18.110.D: Street Design Standards. The design standards need to be updated to reflect those found in the RSIS.

16.20.020.D.18. Site Plan Submission Requirements. The requirement for the submission of a storm water management plan should be amended to make it clear that the plan should include all necessary information to determine compliance with the regulations.

16.20.030.D. Landscaping. Should reflect an increase use of native species. Also the use of existing vegetation should be encouraged for the purposed of buffering.

16.20.040.C. Design of Parking Areas. Should be revised to require the separation of large impervious areas. Should include the use of grass swales and planting strips and recommend the use of pervious pavement where appropriate

16.20.040.C.7. Joint Use of Parking Facilities. Should be amended to encourage the use of joint facilities by developers.

16.20.040.D. Landscaping. Use of native species should be recommended. In addition the requirement for the amount of landscaping within parking areas should be increased.

16.20.040.E. Buffers. The use of buffers should include the use of the area for recharge, bio-retention and constructed wetlands. The use of native species should be recommended.

16.20.040.K. Environmental Considerations. The entire sections needs to be revised. The section needs to references the bmp's. A change is need to limit any disturbance in stream and wetland buffer areas. Buffers for streams need to be increased. The soil removal and site conditions sections need to be updated with current soil erosion and sediment control standards.

16.20.040.M. Engineering Design Considerations. Entire section needs rewriting to conform to new standards.

16.20.040.N.5. Maintenance. Should be amended to include requirement for maintenance plan.

16.20.040.O.5. The manual references need to be updated.

16.20.040.P. Easements. The language needs to be updated to reflect current maintenance and enforcement standards.

16.20.060. Construction Procedures. A section requiring the submission of geo-referenced as-built plans of the drainage system should be added.

16.20.080. Certificates of Occupancy. Add a section requiring the submission of geo-referenced as-built plans of the drainage system and a maintenance plan.

16.64.110. Preservation of Natural Features. Increase stream setbacks from 75 ft. to 100 ft. for structures, from 50 ft. to 75 ft. for grading/clearing. Recognize C-1 waters and their buffer requirements. The section also is currently limited to only blue line streams. Additional categories of streams should be added to this section.

16.68.060 (C and D). Standards for Riding Academies, Boarding Stables and Kennels. A stream setback should be added as a standard.

Chapter 16.70. Parking. A previous draft revision of the parking ordinance was prepared that mandate banking parking and reduced required parking. That revision should be adopted.

Chapter 16.80 Soil Erosion. Must be updated with latest soil erosion and sediment control measures.

Chapter 16.84 Floodplain Control Regulations. Also included stormwater regulations. The section must be completely re-written to comply with the new regulations.

Land Use/Build-Out Analysis

A detailed land use analysis for the Township was conducted. Map 24 illustrates the existing land use in the Township based on 1995/97 GIS information from NJDEP. Map 22 illustrates the HUC14s within the Township. The Township zoning map is shown in Map 21. Map 20 illustrates the constrained lands within the Township. The build-out calculations for impervious cover are shown in Table C-1. As expected when developing agricultural and forest lands, the build-out of these two HUC14s will result in a significant increase in impervious surfaces.

Page 22 presents the pollutant loading coefficients by land cover. The pollutant loads at full build-out are also presented in the table.

Mitigation Plan

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 currently does not meet the design guidelines 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 Chapter 8 and 9 of the NJDEP Stormwater BMP Manual.
   The applicant can select one or more of the following projects listed to compensate for the deficit in 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 requirements.

   Groundwater Recharge (refer to attached Map 1)
   - Rolling Hills Rd. – Construct an infiltration swale in a meadow downstream of a pipe and ditch drainage outfall. Potential annual recharge value is 48,000 c.f./ac.
   - Woodside Farms Development – Construct an infiltration basin downstream of the inlet pipe and within the basin floor of a large existing detention facility. Potential annual recharge value is 55,000 c.f./ac.
   - Rolling Hills Development – Same as the above for the detention area on Florys Mill Rd.
   - Copper Penny Park – Reforest approximately 3 ac. of open space with native trees and ground cover.

   Water Quality (refer to Map 1)

- Install stream bank protection to reduce serious side slope erosion along Walnut Brook in Mine Brook Park. Utilize combination of structural and bioremediation practices. Relocate walking trail.
- Reforest tilled croplands and stream bank in Blackwell Park on Lavada Lane and Everitts Rd.
- Remove unused pavement areas at old municipal building on Raritan Ave. estimated at 9,000 s.f. Vegetate and landscape the removal area.
- Reinforce eroded stream banks of the Neshanic River adjacent to Kuhl Rd. that are undermining pavement areas.
- Clean silt, stones and debris from Assiscong Creek at several bridge crossings to Cherryville Hollow Rd.
- Provide assistance to the South Branch Water Association with labor and/or funding for their annual clean up of the river.
- Retrofit about 16 inlets at the Municipal Complex and Lenape Park with trash retardant heads.

Water Quantity (refer to Map 1)

Retrofit outlet structures at older detention basins to attenuate storm discharges of lesser intensity than the 100-year recurrence interval and coincidentally to increase retention time for containment of the water quality storm. Reconfiguration of low flow channels, clean up and silt removal may also be a supplemental considerations. Locations and receiving waters are as follows:

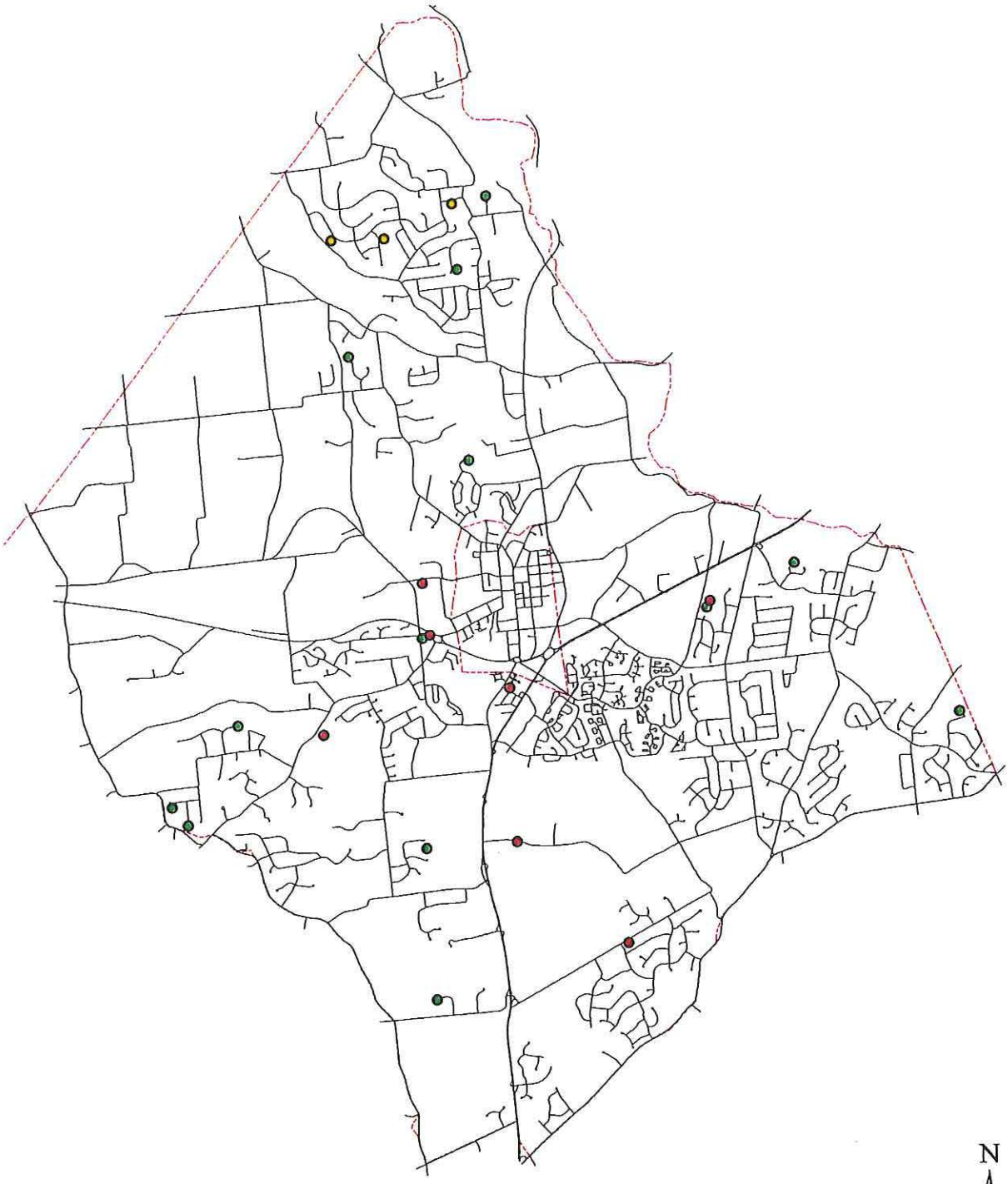
- Municipal Police Dept. – Dayton Rd. and Rte. 523 (Trib. Walnut Brook)
- Woodside Farms Development – Buchanan Way (Trib. S. Branch Raritan River)
- Meadow Run West Development – Vanderbilt Ct. /Merrill Rd. (Trib. S. Branch Raritan River)
- Vantage Estates – Vantage Dr. (2nd. Neshanic)
- Copper Hill Estates – Summershade Lane (3rd. Neshanic)
- Hampton Manor Development – Nashaway Dr. (2nd. Neshanic)
- Clover Hill Estates – Morgan Rd. (Trib. South Branch Raritan River)
- Crestviews Development – Cindy Ct/White Rd. (2nd. Neshanic)
- Barton Estates – Wildwood Ct. (Walnut Brook)
- Maple Glen Development– Grandin Drive (Bushkill Brook)
- Fair Fax Court (S. Branch Raritan River)
- Sleepy Hollow Drive (S. Branch Raritan River)

The list above is partial in that there are at least 30-50 additional old detention basins that were designed and built to address the 100 year storm only and can be accessed for remediation according to current standards given in the Storm Water Management Plan. These will be added in the future when the above near completion.

If a suitable site cannot be located in the same drainage area as the proposed development, then another site may be selected from the above lists to address the development shortfall as to water quality and groundwater recharge only.

The Township may allow a developer to provide funding or partial funding to the Township 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.

Township of Raritan
Mitigation Plan
Proposed Sites



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Legend

Mitigation Projects

- Ground Water Recharge
- Water Quality
- Water Quantity

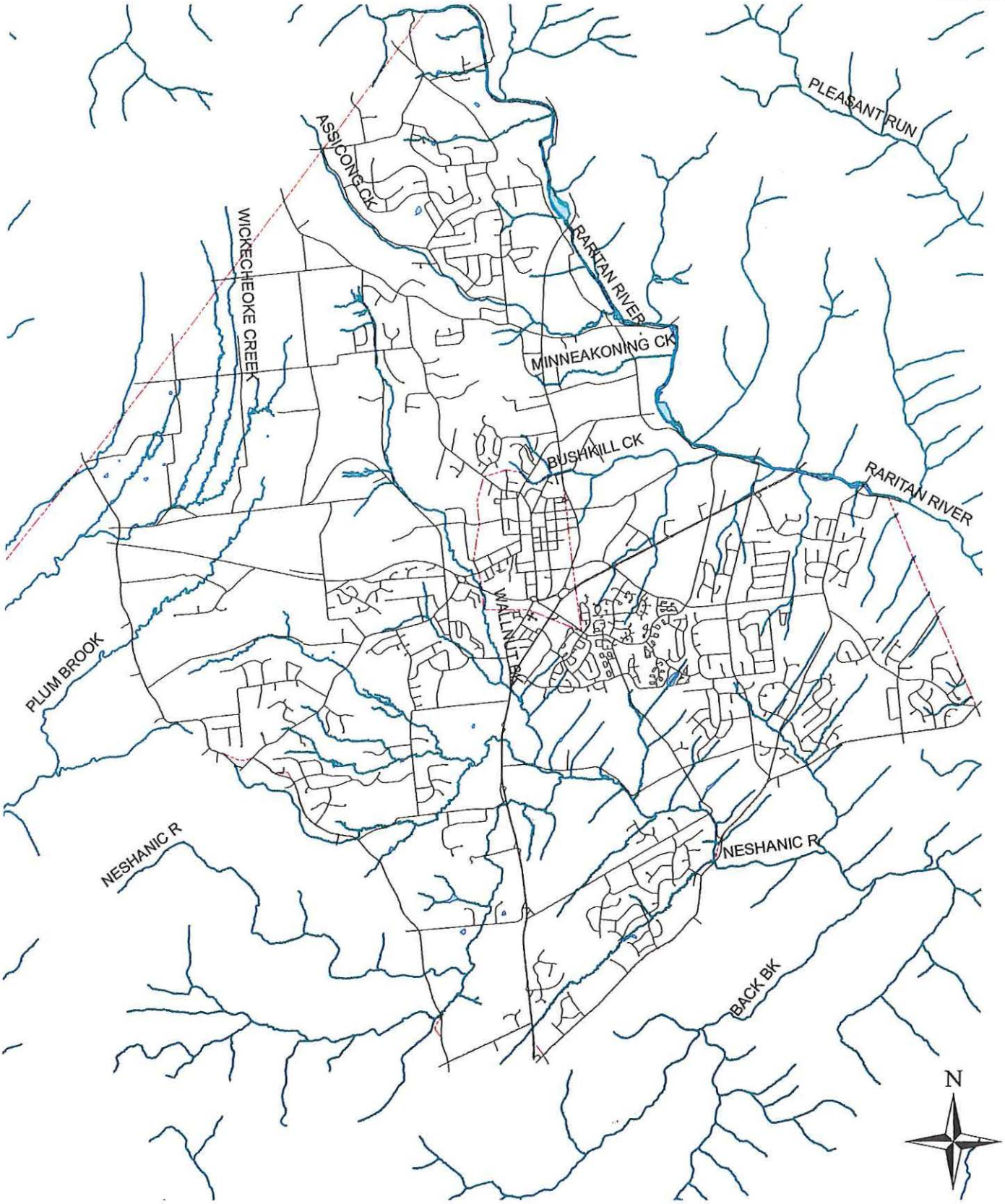
1:85,000

0 6,000 12,000 24,000 Feet

This map was developed using Hunterdon County GIS digital data, but this secondary product has not been verified by Hunterdon County and is not county authorized.

Map 2

Township of Raritan
County of Hunterdon
Waterways



1:80,000

0 5,500 11,000 22,000 Feet

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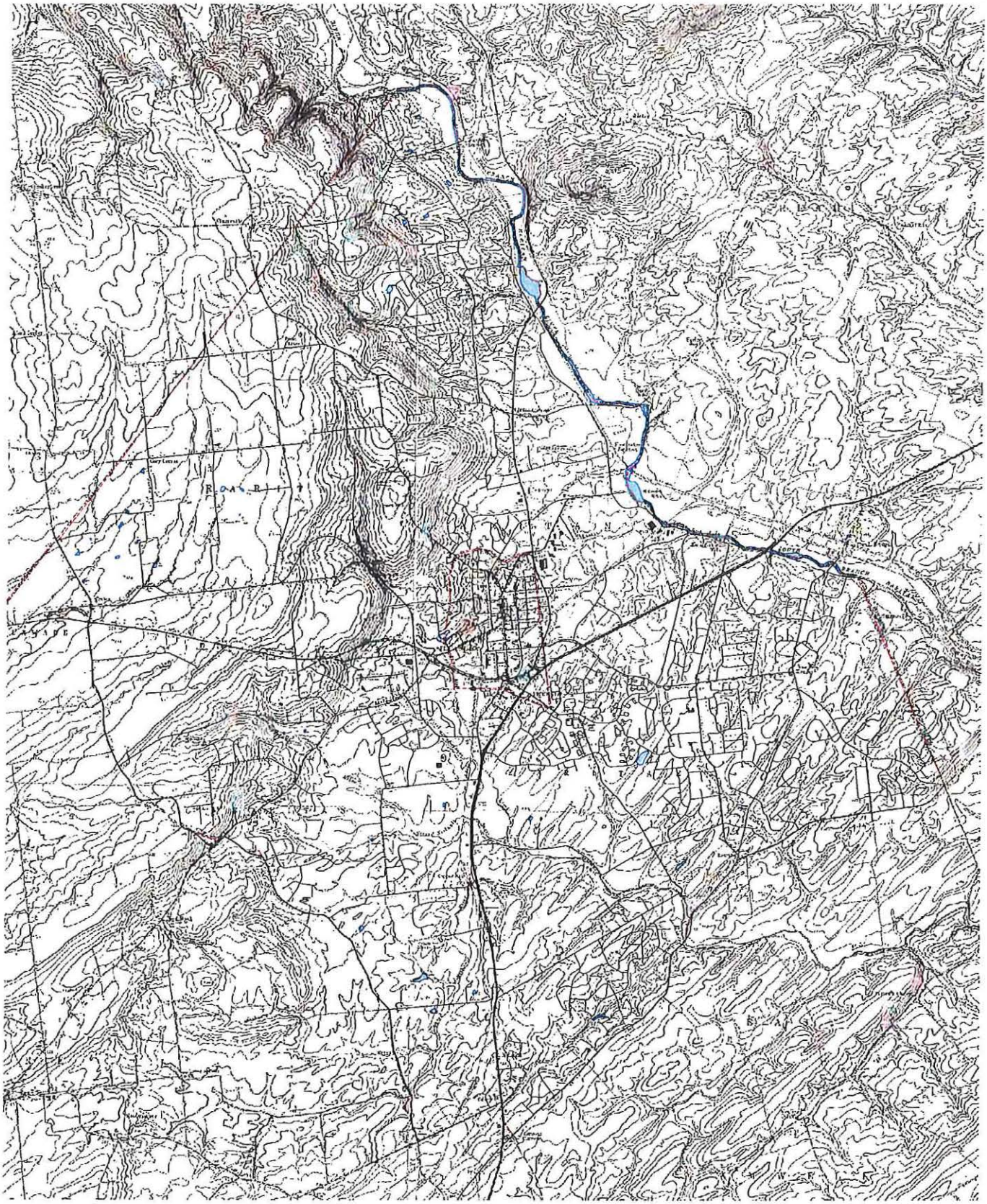
Township of Raritan
County of Hunterdon
USGS Quadrangles



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1:80,000

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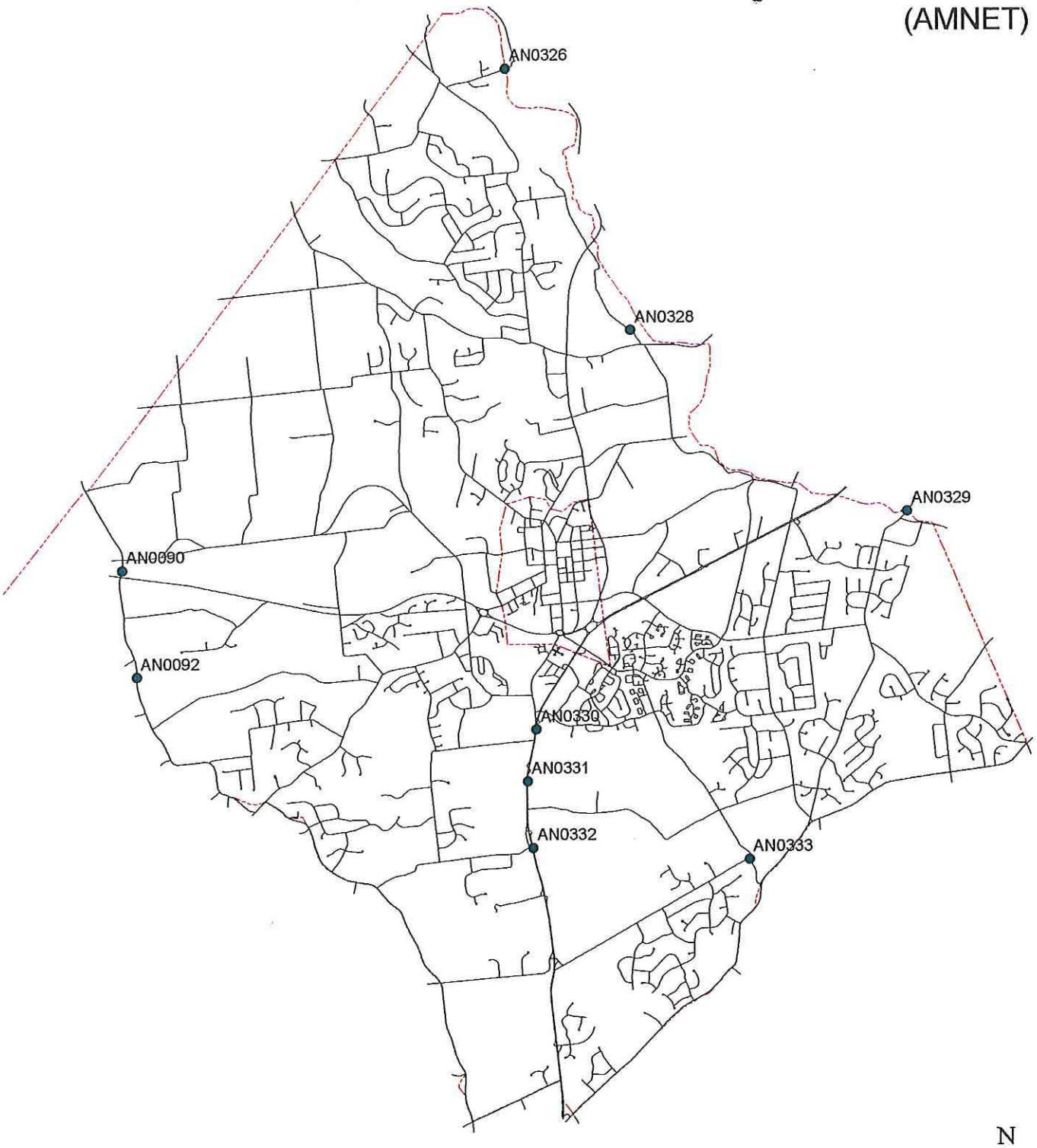
Township of Raritan
County of Hunterdon
NJDEP Ambient Biomonitoring Network for New Jersey (AMNET) 2000



Legend

- AMNET Sites

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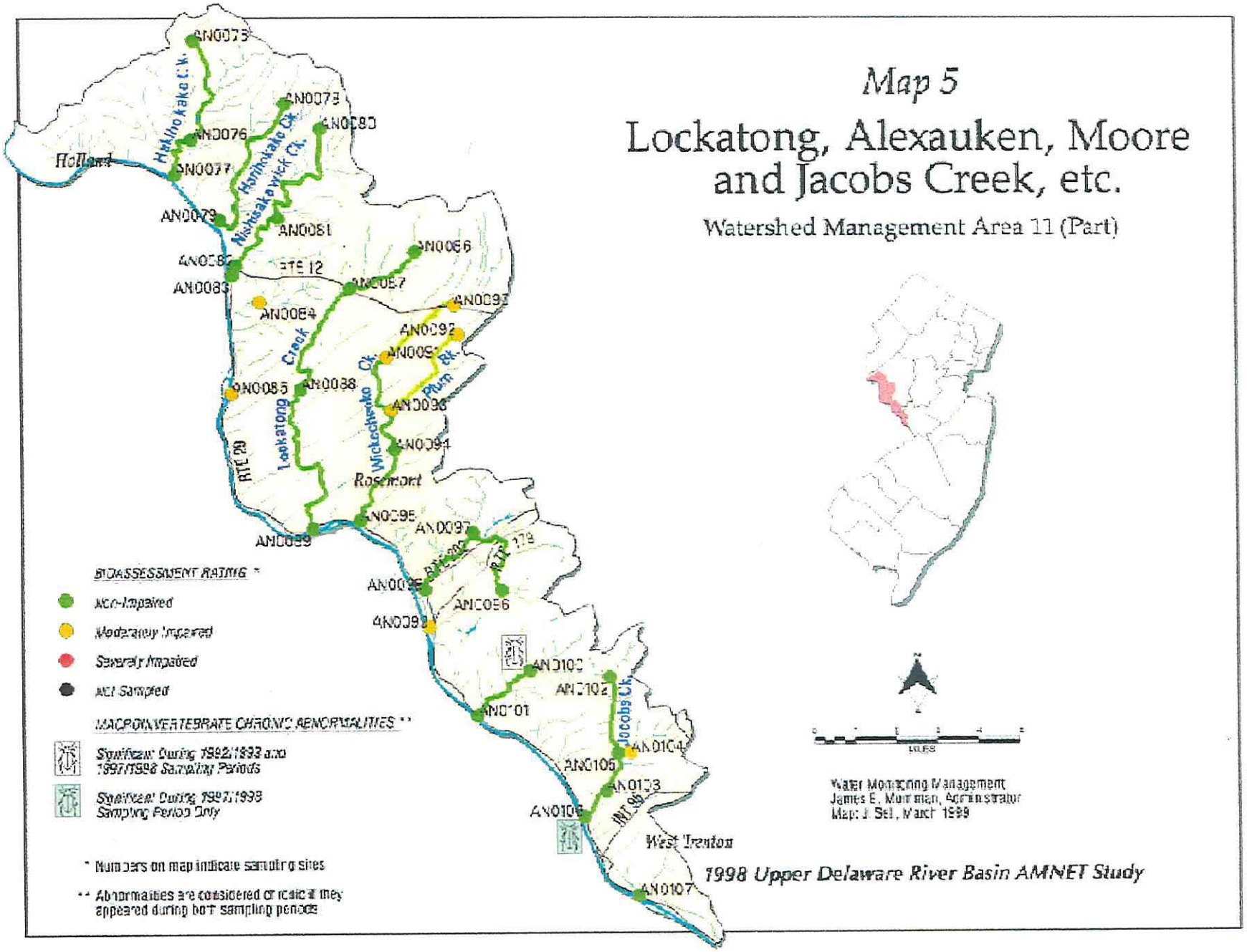

Map 5
Lockatong, Alexauken, Moore and Jacobs Creek, etc.
Watershed Management Area 11 (Part)
Holland
Hakihokake Ck.
Hamiltonbakewick Ck.
Nishisakewick Ck.
Lockatong Creek
Wickecheoke Ck.
Plum Ck.
Jacobs Ck.
RTE 29
RTE 12
RTE 179
Rosemont
West Trenton
AN0073
AN0076
AN0077
AN0079
AN0080
AN0081
AN0082
AN0083
AN0084
AN0085
AN0086
AN0087
AN0088
AN0089
AN0090
AN0091
AN0092
AN0093
AN0094
AN0095
AN0096
AN0097
AN0098
AN0099
AN0100
AN0101
AN0102
AN0103
AN0104
AN0105
AN0106
AN0107
BIOASSESSMENT RATING *
Non-Impaired
Moderately Impaired
Severely Impaired
Not Sampled
MACROINVERTEBRATE CHRONIC ABNORMALITIES **
Significant During 1992/1993 and 1997/1998 Sampling Periods
Significant During 1997/1998 Sampling Period Only
* Numbers on map indicate sampling sites
** Abnormalities are considered chronic if they appeared during both sampling periods
Water Monitoring Management
James E. Mortimer, Administrator
Map 5, Sept., March 1999
1998 Upper Delaware River Basin AMNET Study

Station: AN0090
Wickecheoke Ck, Rt 579 , Croton, Hunterdon County
Pittstown USGS Quadrangle
Date Sampled: 06/02/98

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	30
Chironomidae	6	21
Naididae	7	18
Physidae	7	10
Asellidae	8	8
Baetidae	4	7
Tubificidae	10	3
Planorbidae	6	2
Erpobdellidae	8	2
Elmidae	4	2
Gerridae	8	2
Dytiscidae	5	1
Nemouridae	2	1
Culicidae	8	1
BloodRed Chironomidae	8	1
Corixidae	9	1

Statistical Analysis

Number of Taxa: 16
Total Number of Individuals: 110
% Contribution of Dominant Family: 27.27 % (Gammaridae)
Family Biotic Index: 5.89
Scraper/Filterer Collector Ratio: 4.00
Shredder/Total Ratio: 0.01
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 2
% EPT: 7.27
EPT/C: 0.33
NJIS Rating: 15
Biological Condition: Moderately Impaired
Habitat Analysis: 168
Deficiency(s) noted: Paucity of Clean Water Organisms

Observations

Streamwater: Clear....Flow: Slow....Width/Depth (ft): 9/1
Substrate: Cobbles....StreamBank Vegetation/Stability: Trees,shrubs,grasses/Stable
Canopy: Mostly Open....Other: Rural; Water temp.16.7 /pH 6.6 /DO 7.0 /Cond.159

Station: AN0092
Plum Bk, Rt 579 , Nr Croton, Hunterdon County
Stockton USGS Quadrangle
Date Sampled: 06/02/98

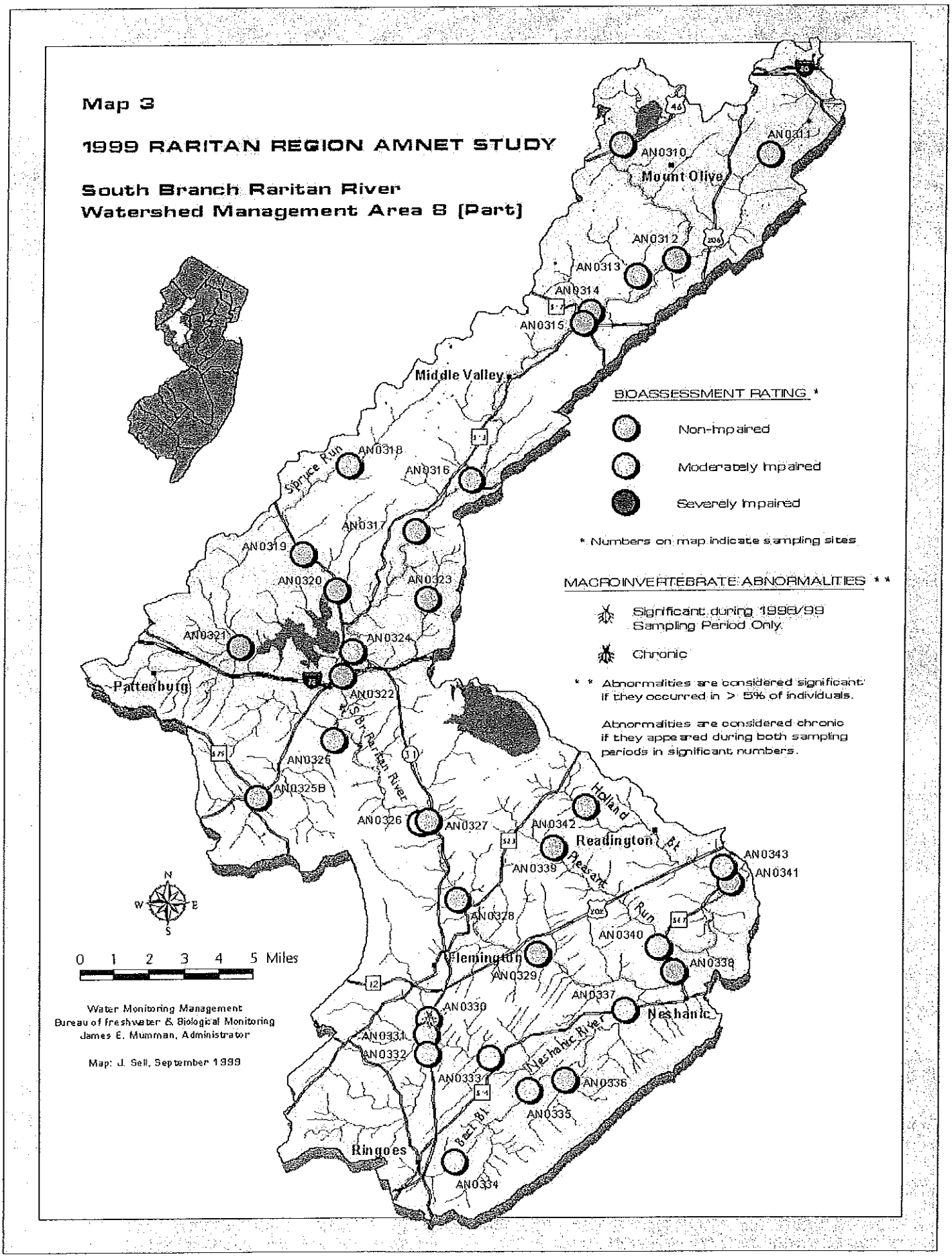
Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	24
Physidae	7	19
Corixidae	9	13
Baetidae	4	10
Leptophlebiidae	2	7
Naididae	7	5
Planorbidae	6	4
Perlodidae	2	4
Gerridae	8	4
Lumbricidae	10	3
Nemouridae	2	2
Dytiscidae	5	2
Lepidostomatidae	1	1
BloodRed Chironomidae	8	1
Lymnaeidae	6	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 100
% Contribution of Dominant Family: 24.00 % (Chironomidae)
Family Biotic Index: 6.06
Scraper/Filterer Collector Ratio: 0.00
Shredder/Total Ratio: 0.27
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 5
% EPT: 24.00
EPT/C: 0.96
NJIS Rating: 21
Biological Condition: Moderately Impaired
Habitat Analysis: 163

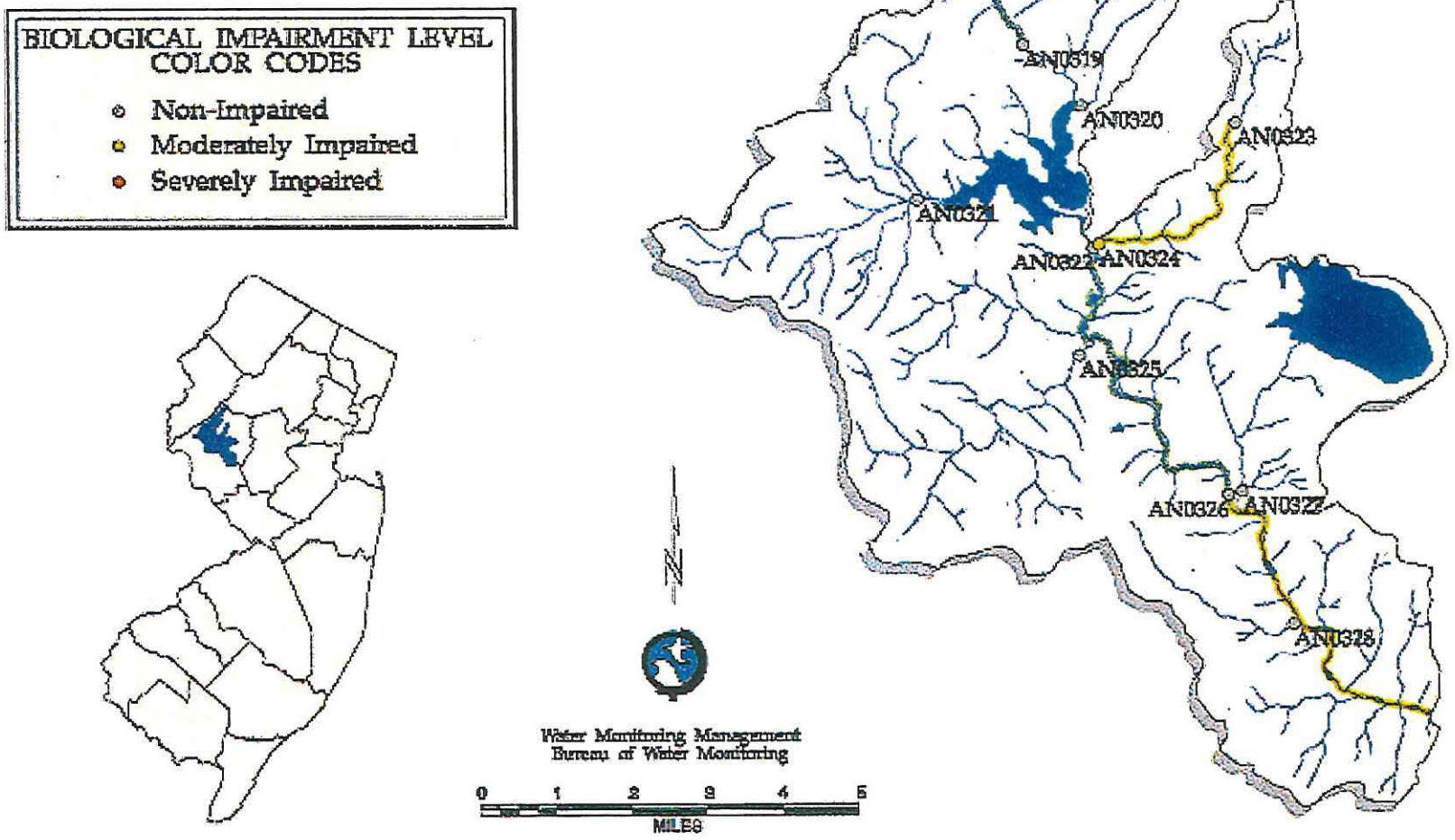
Observations

Streamwater: Clear....Flow: Slow....Width/Depth (ft): 5/<1
Substrate: Cobbles....StreamBank Vegetation/Stability: Trees,shrubs,grasses/Stable
Canopy: Mostly Open....Other: Rural/Agricultural cropland; Water temp.15.5 /pH 7.0 /DO 7.6 /Cond.171


Map 3
1999 RARITAN REGION AMNET STUDY
South Branch Raritan River
Watershed Management Area 8 [Part]
AN0310
Mount Olive
AN0311
AN0312
AN0313
AN0314
AN0315
Middle Valley
Spruce Run
AN0318
AN0316
AN0317
AN0319
AN0320
AN0323
AN0321
AN0324
Pattenburg
AN0322
South Branch Raritan River
AN0326
AN0325B
AN0327
Holland Br.
AN0342
Readington
AN0343
AN0341
AN0339
Pleasant Run
AN0328
AN0340
AN0338
Flemington
AN0329
AN0337
Neshanic
AN0330
AN0331
AN0332
Neshanic River
AN0333
AN0336
AN0335
Ringoes
Back Br.
AN0334
BIOASSESSMENT RATING *
Non-Impaired
Moderately Impaired
Severely Impaired
* Numbers on map indicate sampling sites
MACROINVERTEBRATE ABNORMALITIES * *
Significant during 1998/99 Sampling Period Only
Chronic
* * Abnormalities are considered significant if they occurred in > 5% of individuals.
Abnormalities are considered chronic if they appeared during both sampling periods in significant numbers.
N
W
E
S
0 1 2 3 4 5 Miles
Water Monitoring Management
Bureau of Freshwater & Biological Monitoring
James E. Mumman, Administrator
Map: J. Sell, September 1999

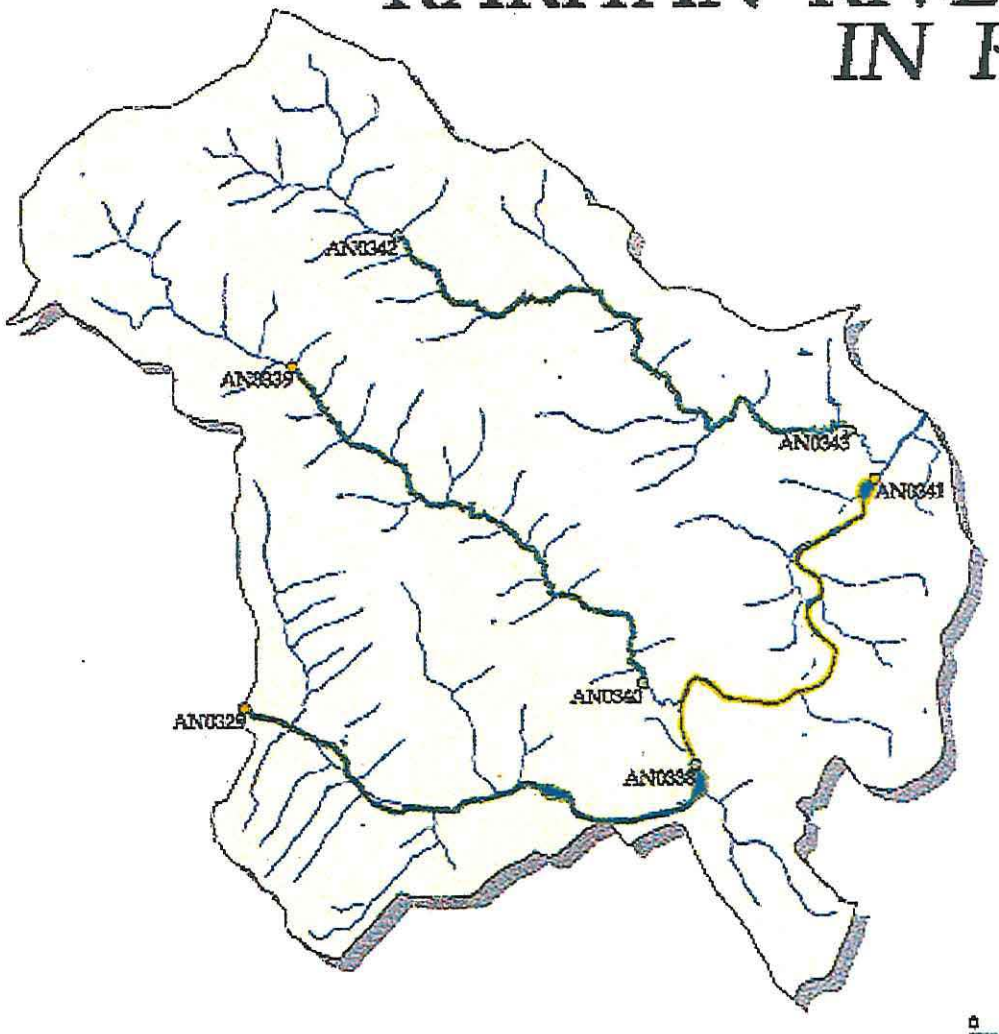
Map 5

SOUTH BRANCH RARITAN RIVER WATERSHED IN PART



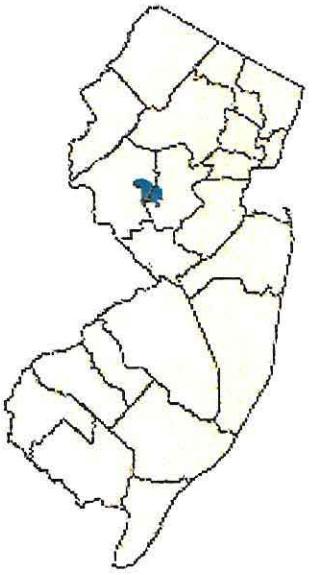
Map 6

SOUTH BRANCH RARITAN RIVER WATERSHED IN PART



BIOLOGICAL IMPAIRMENT LEVEL COLOR CODES

- Non-Impaired
- Moderately Impaired
- Severely Impaired



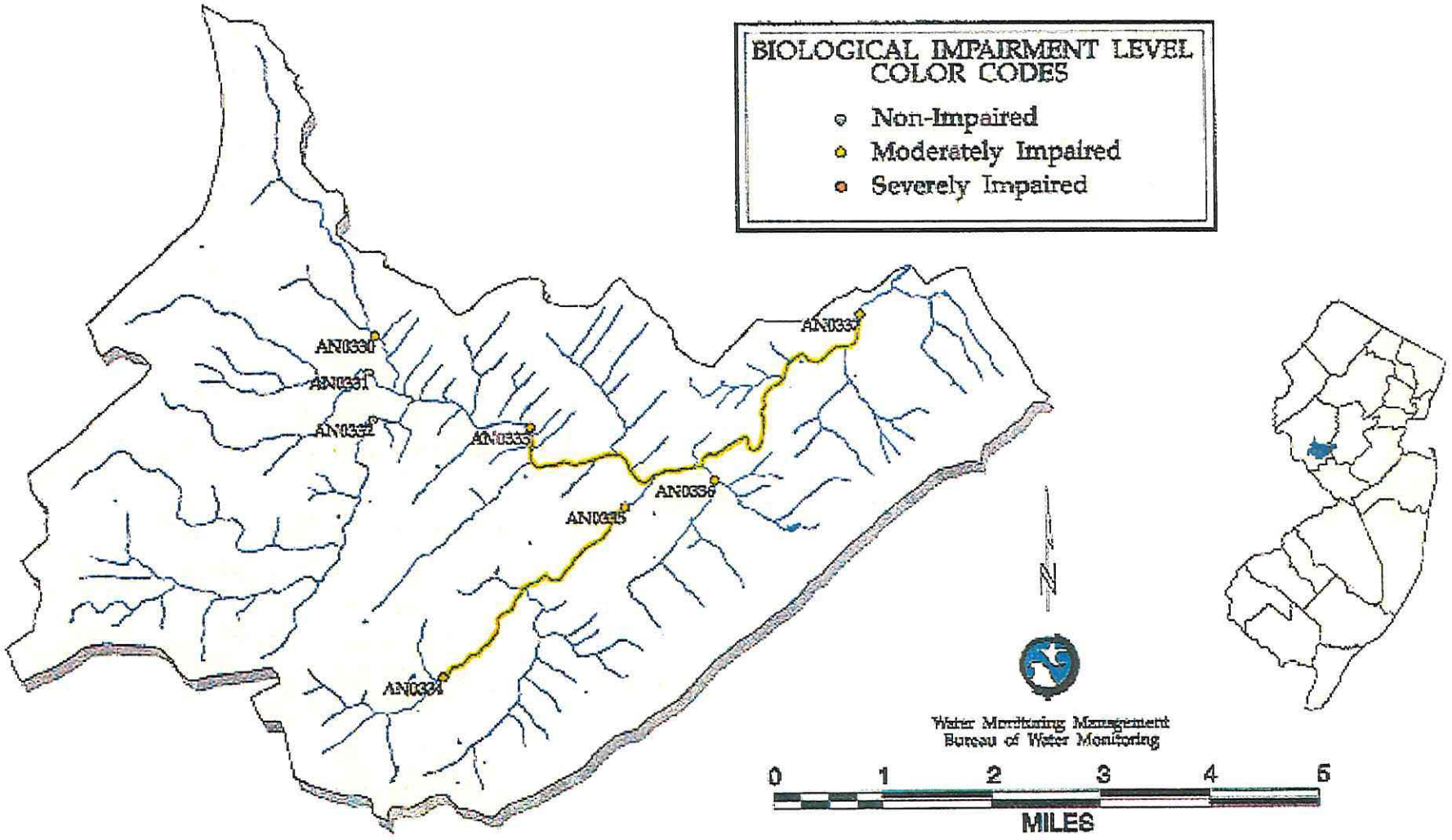
Water Monitoring Management
Bureau of Water Monitoring

0 1 2 3 4
MILES

Map 8

Map 7

SOUTH BRANCH RARITAN RIVER WATERSHED IN PART



Map 9

Station: AN0326
South Br. Raritan River, Stanton Rd., Readington Twp., Hunterdon County
Flemington USGS Quadrangle
Date Sampled: 05/12/99

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	76
Ephemerellidae	1	4
Heptageniidae	4	4
Sphaeriidae	8	3
Hydrobiidae	8	2
Lumbriculidae	8	2
Perlidae	1	2
Coenagrionidae	9	1
Asellidae	8	1
Baetidae	4	1
Planorbidae	6	1
Lumbricidae	10	1
Elmidae	4	1
Physidae	7	1

Statistical Analysis

Number of Taxa: 14
Total Number of Individuals: 100
% Contribution of Dominant Family: 76.00 % (Gammaridae)
Family Biotic Index: 4.30
Scraper/Filterer Collector Ratio: 4.00
Shredder/Total Ratio: 0.77
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 4
% EPT: 11.00
EPT/C: 0.00
NJIS Rating: 18
Biological Condition: Moderately Impaired
Habitat Analysis: 143
Deficiency(s) noted: Gammaridae Family Overwhelmingly Dominant -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 45/2
Substrate: Cobbles, Gravel/Sand....StreamBank Vegetation/Stability: Trees, Weeds/Fair
Canopy: Open....Other: Agriculture-livestock, Forested; Sampled dwstr of bridge, USGS gauge
Macrophytes, Geese, Clam shells; Water temp. 17.8C / pH 8.0SU / DO 9.9mg/L / Cond. 269umhos

Station: AN0327
Prescott Brook, Stanton Rd., Readington Twp., Hunterdon County
Flemington USGS Quadrangle
Date Sampled: 05/12/99

Family	Family Tolerance Value (FTV)	Number of Individuals
Ephemerellidae	1	24
Chironomidae	6	12
Philopotamidae	3	11
Gammaridae	4	11
Elmidae	4	7
Heptageniidae	4	6
Hydropsychidae	4	4
BloodRed Chironomidae	8	4
Plagiostomidae	4	3
Psephenidae	4	3
Baetidae	4	2
Naididae	7	2
Planariidae	4	2
Glossosomatidae	0	2
Perlidae	1	2
Aeshnidae	3	1
Gomphidae	1	1
Lumbricidae	10	1
Leptoceridae	4	1
Limnephilidae	4	1

Statistical Analysis

Number of Taxa: 20
Total Number of Individuals: 100
% Contribution of Dominant Family: 24.00 % (Ephemerellidae)
Family Biotic Index: 3.51
Scraper/Filterer Collector Ratio: 2.80
Shredder/Total Ratio: 0.28
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 9
% EPT: 53.00
EPT/C: 3.31
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 168
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 15/1
Substrate: Cobbles, Gravel/Sand....StreamBank Vegetation/Stability: Trees, Shrubs, Vines, Weeds/Fair
Canopy: Mostly Open....Other: Suburban, Forested; Storm sewers, Sampled dwnstr of bridge
Minnows, Macrophytes; Water temp. 14.6C / pH 7.9SU / DO 10.2mg/L / Cond. 238umhos

Station: AN0328
Assiscong Creek, River Rd., Raritan Twp., Hunterdon County
Flemington USGS Quadrangle
Date Sampled: 05/12/99

Family	Family Tolerance Value (FTV)	Number of Individuals
Ephemerellidae	1	22
Chironomidae	6	20
Heptageniidae	4	16
Nemouridae	2	15
Leptophlebiidae	2	13
Baetidae	4	5
Perlodidae	2	4
Gammaridae	4	3
Aeshnidae	3	2
Gomphidae	1	2
Naididae	7	2
Calopterygidae	5	1
Hydropsychidae	4	1
Psephenidae	4	1
Elmidae	4	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 108
% Contribution of Dominant Family: 20.37 % (Ephemerellidae)
Family Biotic Index: 3.16
Scraper/Filterer Collector Ratio: 40.00
Shredder/Total Ratio: 0.35
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 7
% EPT: 70.37
EPT/C: 3.80
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 161
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Slow....Width/Depth (ft): 8/1
Substrate: Gravel/Sand, Mud....StreamBank Vegetation/Stability: Trees, Vines/Fair
Canopy: Mostly Closed....Other: Forested (S. Br. Res.); Sampled dwnstr of bridge
Minnows, Fish (>4"), Salamanders; Water temp. 14.1C / pH 8.0SU / DO 9.9mg/L / Cond. 263umhos

Station: AN0329
South Br Raritan River, Rt. 613, Readington Twp., Hunterdon County
Flemington USGS Quadrangle
Date Sampled: 05/12/99

Family	Family Tolerance Value (FTV)	Number of Individuals
Baetidae	4	18
Chironomidae	6	17
Elmidae	4	13
Heptageniidae	4	11
Psephenidae	4	10
Ephemerellidae	1	10
Gammaridae	4	7
Naididae	7	3
Coenagrionidae	9	2
BloodRed Chironomidae	8	2
Asellidae	8	1
Empididae	6	1
Gomphidae	1	1
Glossosomatidae	0	1
Tubificidae	10	1
Lumbriculidae	8	1
Pyralidae	5	1

Statistical Analysis

Number of Taxa: 17
Total Number of Individuals: 100
% Contribution of Dominant Family: 18.00 % (Baetidae)
Family Biotic Index: 4.41
Scraper/Filterer Collector Ratio: 0.00
Shredder/Total Ratio: 0.20
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 4
% EPT: 40.00
EPT/C: 2.11
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 127
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 100/2
Substrate: Gravel/Sand, Mud....StreamBank Vegetation/Stability: Trees, Shrubs/Fair
Canopy: Open....Other: Agriculture-cropland, Suburban; Sampled upstr of bridge
Macrophytes, Filamentous algae, Geese, Large (>1.5ft.) fish; Water temp. 10.3C / pH 7.7SU / DO 10.7mg/L / Cond. 493umhos

Station: AN0330
First Neshanic River, NJ Rt. 31, Raritan Twp., Hunterdon County
Hopewell USGS Quadrangle
Date Sampled: 04/06/99

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	84
Lumbriculidae	8	8
Simuliidae	6	4
Tubificidae	10	2
Dytiscidae	5	1
Lumbricidae	10	1
Nemouridae	2	1
BloodRed Chironomidae	8	1
Physidae	7	1
Limnephilidae	4	1
Ephemerellidae	1	1
Siphlonuridae	7	1
Elmidae	4	1

Statistical Analysis

Number of Taxa: 13
Total Number of Individuals: 107
% Contribution of Dominant Family: 78.50 % (Chironomidae)
Family Biotic Index: 6.17
Scraper/Filterer Collector Ratio: 0.75
Shredder/Total Ratio: 0.02
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 4
% EPT: 3.74
EPT/C: 0.05
NJIS Rating: 12
Biological Condition: Moderately Impaired
Habitat Analysis: 138
Deficiency(s) noted: Chironomidae Family Overwhelmingly Dominant -
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 10-20/1-2
Substrate: Cobbles, Gravel/Sand, Silt....StreamBank Vegetation/Stability: Some Trees, Shrubs, Grasses/Fair
Canopy: Mostly Open....Other: Urban, large parking lot, service station; Storm sewers
Water Temp. 8.5C / pH 7.7SU / DO 14.2mg/L / Cond. 266umhos;

Station: AN0331
Second Neshanic River, NJ Rt. 31, Raritan Twp., Hunterdon County
Hopewell USGS Quadrangle
Date Sampled: 04/06/99

Family	Family Tolerance Value (FTV)	Number of Individuals
Simuliidae	6	35
Chironomidae	6	31
Elmidae	4	9
Gammaridae	4	8
Psephenidae	4	4
Planariidae	4	3
Ephemerellidae	1	2
Siphlonuridae	7	1
Nemouridae	2	1
Baetidae	4	1
Caenidae	7	1
Empididae	6	1
Corixidae	9	1
Lymnaeidae	6	1
Heptageniidae	4	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 100
% Contribution of Dominant Family: 35.00 % (Simuliidae)
Family Biotic Index: 5.39
Scraper/Filterer Collector Ratio: 0.46
Shredder/Total Ratio: 0.32
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 6
% EPT: 7.00
EPT/C: 0.23
NJIS Rating: 21
Biological Condition: Moderately Impaired
Habitat Analysis: 148
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 6-20/1-2
Substrate: Cobbles, Gravel/Sand, Silt....StreamBank Vegetation/Stability: Some Trees, Shrubs, Grasses/Good
Canopy: Mostly Open....Other: Urban, Rural, Storage tank facility adjacent; Storm sewers (from storage facility)
Waterfowl, tadpoles, minnows, black fly larvae; Water temp. 6.9C / pH 7.4SU / DO 14.5mg/L / Cond. 255umhos

Station: AN0332
Third Neshanic River, NJ Rt. 31, Raritan Twp., Hunterdon County
Hopewell USGS Quadrangle
Date Sampled: 04/06/99

Family	Family Tolerance Value (FTV)	Number of Individuals
Simuliidae	6	30
Chironomidae	6	28
Elmidae	4	21
Baetidae	4	4
Planorbidae	6	4
Hydrophilidae	5	2
Planariidae	4	2
Asellidae	8	1
Aeshnidae	3	1
Caenidae	7	1
Hydropsychidae	4	1
Ephemerellidae	1	1
Gammaridae	4	1
Empididae	6	1
Coenagrionidae	9	1
Leptoceridae	4	1
Heptageniidae	4	1

Statistical Analysis

Number of Taxa: 17
Total Number of Individuals: 101
% Contribution of Dominant Family: 29.70 % (Simuliidae)
Family Biotic Index: 5.35
Scraper/Filterer Collector Ratio: 0.87
Shredder/Total Ratio: 0.01
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 6
% EPT: 8.91
EPT/C: 0.32
NJIS Rating: 21
Biological Condition: Moderately Impaired
Habitat Analysis: 149
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 15-18/1
Substrate: Cobbles, Gravel/Sand....StreamBank Vegetation/Stability: Trees, Shrubs/Good
Canopy: Partly Open....Other: Rural, Car dealer & autobody shop; Storm sewer
Minnow, Sunfish, Trash & debris; Water temp. 7.8C / pH 7.5SU / DO 13.4mg/L / Cond. 222umhos

Station: AN0333
Neshanic River, Everitt Rd. (Usgs Gauge), East Amwell Twp., Hunterdon County
Hopewell USGS Quadrangle
Date Sampled: 04/06/99

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	52
Notonectidae	9	12
Gammaridae	4	9
Hydrobiidae	8	8
Simuliidae	6	6
Physidae	7	5
Baetidae	4	4
BloodRed Chironomidae	8	3
Glossiphoniidae	8	1
Limnephilidae	4	1
Coenagrionidae	9	1
Lumbriculidae	8	1
Planorbidae	6	1
Elmidae	4	1
Tabanidae	6	1

Statistical Analysis

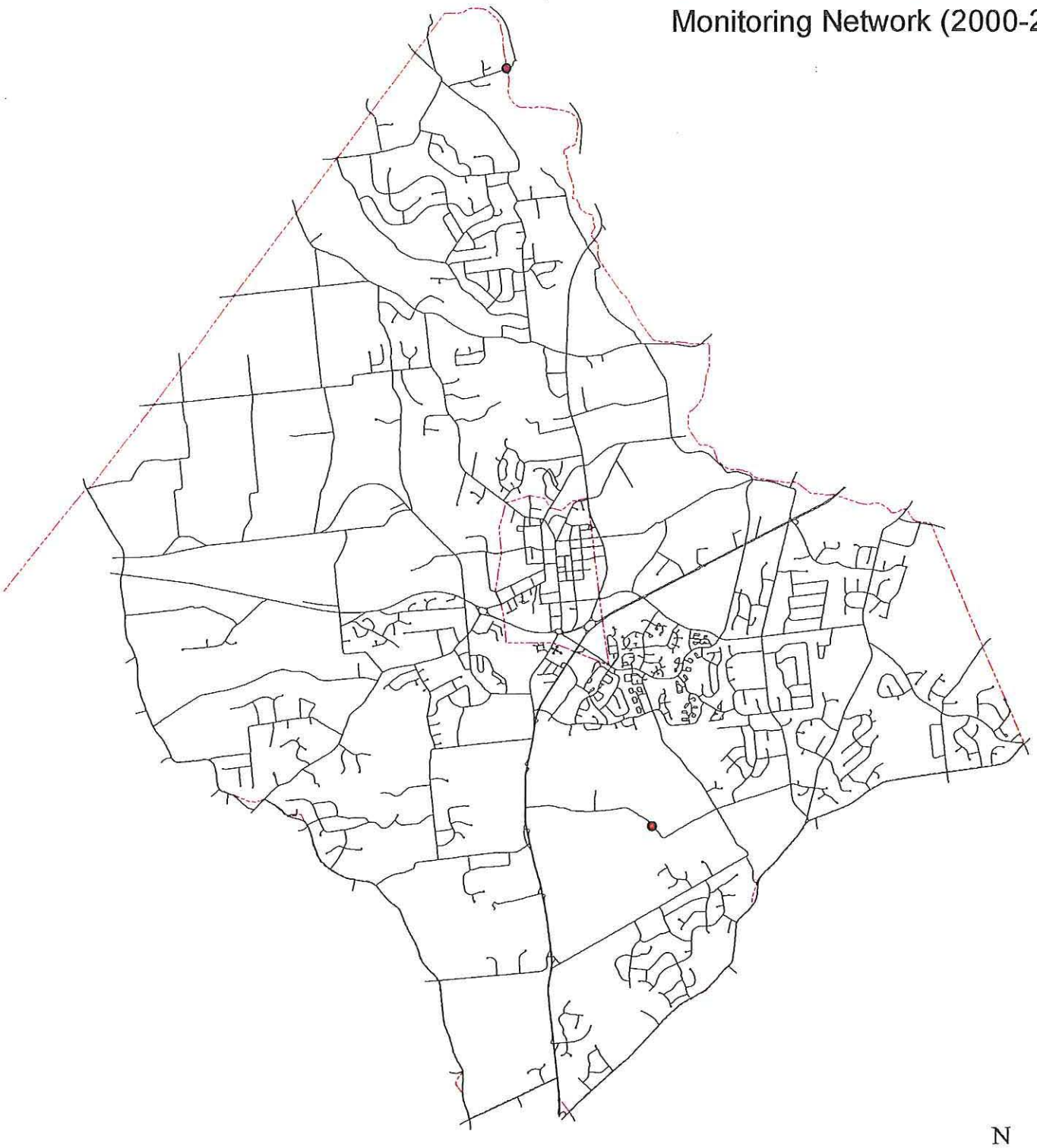
Number of Taxa: 15
Total Number of Individuals: 106
% Contribution of Dominant Family: 49.06 % (Chironomidae)
Family Biotic Index: 6.38
Scraper/Filterer Collector Ratio: 2.50
Shredder/Total Ratio: 0.58
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 2
% EPT: 4.72
EPT/C: 0.09
NJIS Rating: 12
Biological Condition: Moderately Impaired
Habitat Analysis: 133
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Slow....Width/Depth (ft): 45-50/1-2
Substrate: Cobbles, Gravel/Sand....StreamBank Vegetation/Stability: Trees, some Shrubs/Fair
Canopy: Mostly Open....Other: Agriculture - cropland, Rural; Trout stocked (trout observed), Tadpoles, Minnows
Water Temp. 9.2C / pH 7.5SU / DO 16.9mg/L / Cond. 244umhos;

Map 10

Township of Raritan
County of Hunterdon
NJDEP Fish Index of Biotic Integrity Monitoring Network (2000-2002)



N

Legend

IBI_RATING

- Excellent
- Fair
- Good
- Poor

1:80,000

0 5,500 11,000 22,000 Feet

This map was developed using Hunterdon County GIS digital data, but this secondary product has not been verified by Hunterdon County and is not county authorized.

bureau of freshwater & biological monitoring

Index by Topic Program Units

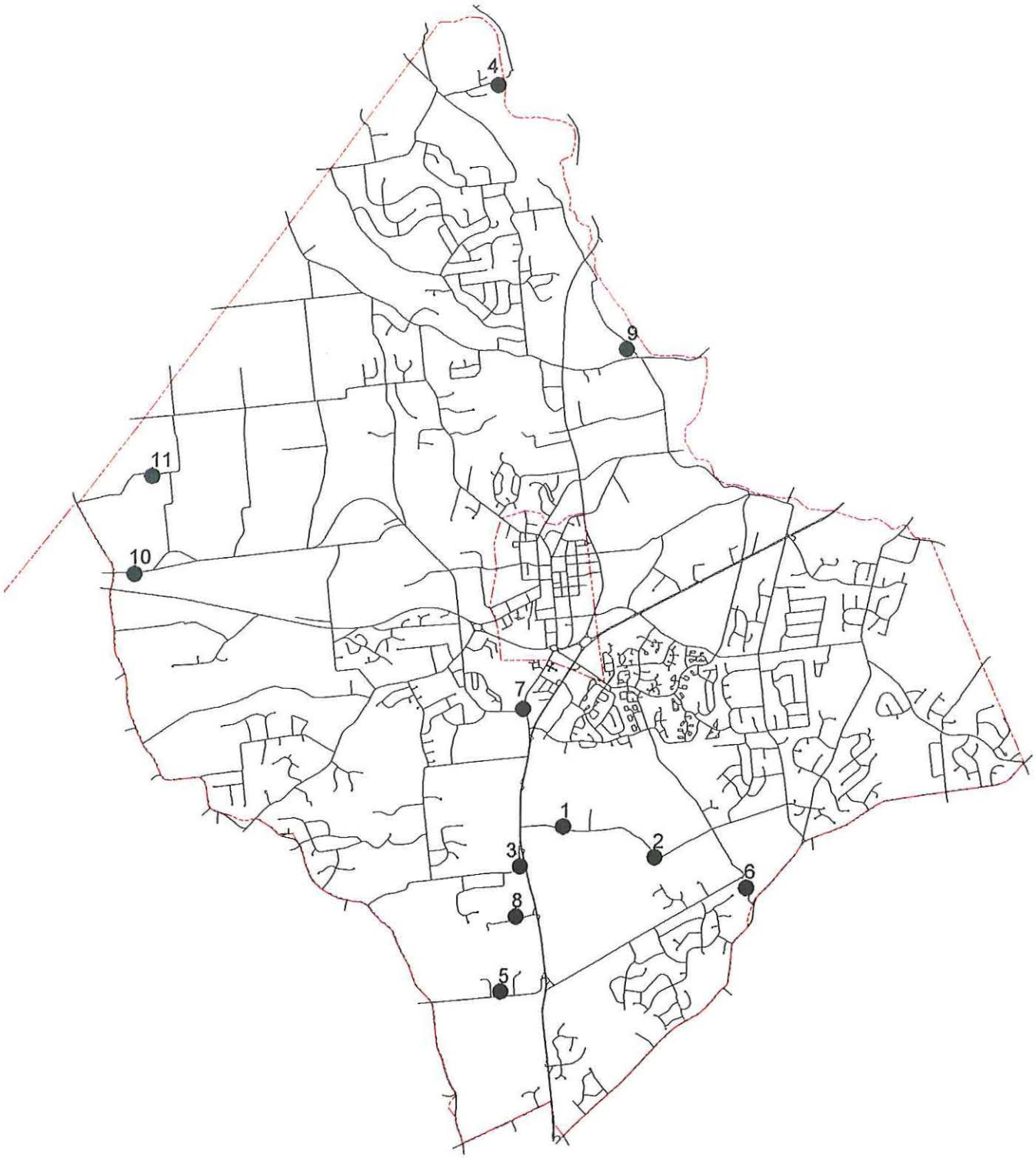
2001 FISH IBI DATA SUMMARY

map

FIBI Site	Waterbody	Location	County	IBI Rating
FIBI008	Sidney Brook (Grandin)	Sidney Rd - CR 617	Hunterdon	Excellent
FIBI011a	Meadow Brook (High Mountain)	Downstream of Belmont Ave crossing	Passaic	Good
FIBI021	Rockaway River	Knoll Rd	Morris	Fair
FIBI023	Neshanic River	along Kuhl Rd	Hunterdon	Fair
FIBI024	Passaic River	Stonehouse Rd.	Morris & Somerset	Fair
FIBI025	Peters Brook	Park Ave @ park	Somerset	Fair
FIBI026	Nishisakawick Creek	Creek Road @ Frenchtown Park	Hunterdon	Good
FIBI027	Lockatong Creek	CR 519	Hunterdon	Good
FIBI028	Moores Creek	off Pleasant Valley Rd, Bridge to house #48	Mercer	Good
FIBI029	Alexauken Creek	off Alexauken Ck Rd	Hunterdon	Good
FIBI030	Stony Bk	off Stony Brook Rd	Mercer	Good
FIBI031	North Branch Raritan River	Easton Tpk	Somerset	Good
FIBI032	Lamington River	off Black River Rd	Somerset	Good
FIBI033	Pohatcong Creek	SR 31	Warren	Good
FIBI034	Harihokake Creek	Milford-Frenchtown Rd (CR 619)	Hunterdon	Good
FIBI035	Plum Brook	Pine Hill Rd	Hunterdon	Good
FIBI036	Spruce Run	Main St	Hunterdon	Excellent
FIBI037	Drakes Brook	Old R.R. off N. 4 Bridges Road	Morris	Good
FIBI038	Middle Brook	River Rd	Somerset	Good
FIBI039	Van Campens Brook	Depew Rec Site Rd, off Old Mine Rd	Warren	Excellent

Map 11

Township of Raritan
County of Hunterdon
Stormwater Problems



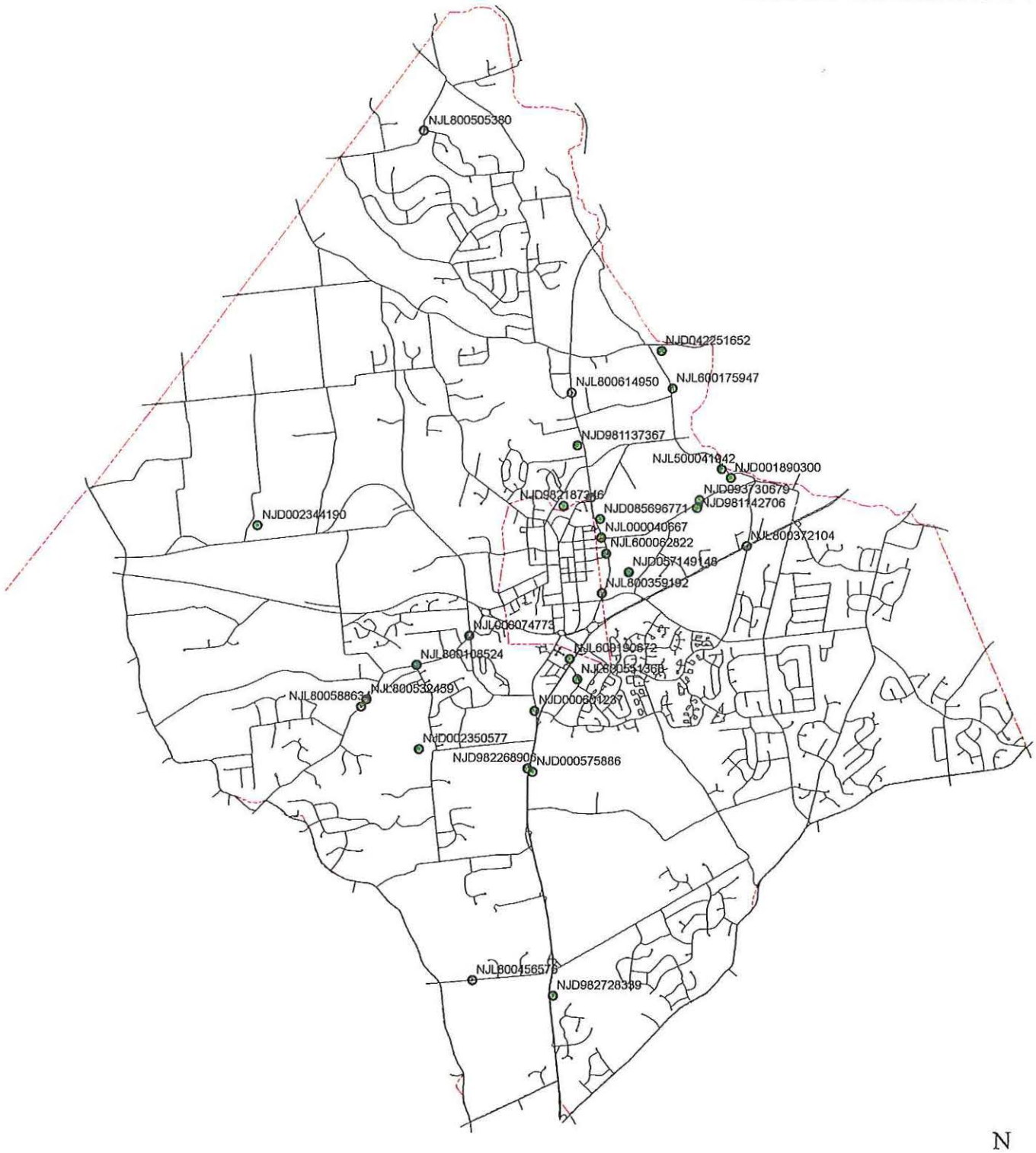
1:80,000

0 5,500 11,000 22,000 Feet

This map was developed using Hunterdon County GIS digital data, but this secondary product has not been verified by Hunterdon County and is not county authorized.

Map 12

Township of Raritan
County of Hunterdon
Known Contaminated Sites



N

1:80,000

Legend

- Known Contaminated Sites

0 5,500 11,000 22,000 Feet

This map was developed using Hunterdon County GIS digital data, but this secondary product has not been verified by Hunterdon County and is not county authorized.

KCS-NJ County - Municipality Listing (2001 Edition)
County and Municipality: HUNTERDON RARITAN TOWNSHIP

County: HUNTERDON
Municipality: RARITAN TOWNSHIP

A SITES WITH ON-SITE SOURCE(S) OF CONTAMINATION

Site Name / Contact	Case Number	Site Address / Case Status	Status Date	Site Identifier / Control/Remedial Action Type
1100 ROUTE 523		1100 RTE 523		NJL800108524
BFO-N	950109121323	ACTIVE	- 1/13/00	
125 SERGEANTSVILLE RD		125 SERGEANTSVILLE RD		NJL800588634
BFO-N	000725112950	ACTIVE	- 9/18/00	
24 CHERRYVILLE RD		24 CHERRYVILLE RD		NJL800505380
BFO-N	990716105914	ACTIVE	- 8/12/99	
AGWAY ENERGY PRODUCTS		RD 3 BOX 53		NJL600175947
BUST	0051338	ACTIVE	- 7/29/93	
BUCKEYE PIPE LINE COMPANY		201 RTE 202		NJD982268906
BEECRA	E86744	ACTIVE	- 12/22/92	
E M HAYNES JUNIOR INCORPORATED		307 S MAIN ST		NJD000601237
BFO-N	9404131	PENDING	- 4/29/94	
EXXON TERMINAL		RTE 202 & 31		NJD000575886
BEECRA	E86743	ACTIVE	- 8/17/92	
BEECRA	E92352	ACTIVE	- 4/27/93	
FLEMINGTON BITUMINOUS		205 PENNSYLVANIA AVE		NJD093730679
BEECRA	E89877	ACTIVE	- 2/13/90	
BEECRA	E89619	ACTIVE	- 2/13/90	
FLEMINGTON RARITAN LANDFILL		204 PENNSYLVANIA AVE		NJD981142706
BFO-CA	9307157	PENDING	- 7/28/93	
HUNTERDON CENTRAL HIGH SCHOOL		RTE 31		NJD085696771
BFO-IN	9709187	PENDING	- 9/25/97	
HUNTERDON CONCRETE COMPANY		270 EVERETT RD		NJL800456576
BUST	0043706	ACTIVE	- 12/30/99	
NJ STATE POLICE		64 RTE 202		NJD982728339
BFMCR	9411134	PENDING	- 11/22/94	
RARITAN TOWNSHIP POLICE DEPARTMENT		RTE 523 & DAYTON RD		NJL000074773
BUST	0032933	ACTIVE	- 4/4/96	
REXHAM CORP FLEXIBLE PACKAGING DIVISION		CHURCH ST EXT		NJD057149148
BEECRA	E89128	ACTIVE	- 6/28/93	
BEECRA	E87913	ACTIVE	- 6/28/93	

KCS-NJ County - Municipality Listing (2001 Edition)
County and Municipality: HUNTERDON RARITAN TOWNSHIP

A SITES WITH ON-SITE SOURCE(S) OF CONTAMINATION

Site Name / Contact	Case Number	Site Address / Case Status	- Status Date	Site Identifier / Control/Remedial Action Type
SAINT PAUL LUTHERAN CHURCH		201 RTE 31		NJL800614950
BFO-N	001207141615	ACTIVE	- 1/16/01	
SHINES GARAGE INC		15 COMMERCE ST		NJL800551368
BFO-N	000215102826	ACTIVE	- 6/29/00	
TENNECO CHEMICAL INCORPORATED		129 RIVER RD		NJD001890300
BEECRA	E86315	ACTIVE	- 2/26/93	
TEXACO SERVICE STATION RARITAN TOWNSHIP		RTES 12 & 579		NJL600041743
BUST	0064253	ACTIVE	- 7/3/89	
BUST	0157953	ACTIVE	- 3/8/91	
THOMAS J LIPTON COMPANY		RTE 523 (FLEMINGTON-WHITEHOUSE RD)		NJD042251652
BCM	NJD042251652	ACTIVE	- 4/7/99	
TREDEGAR FILM PRODUCTS		55 RIVER RD		NJL500041942
BEECRA	E94019	ACTIVE	- 1/20/94	
US BRONZE POWDERS		480 RTE 202		NJD002344190
BFO-N	8803301550	ACTIVE	- 4/30/93	
VALLEY VIEW SUCULENT NURSERY		521 SERGEANTSVILLE RD		NJL800532459
BFO-IN	0333038	ACTIVE	- 10/4/00	
YALE MATERIALS HANDLING CORPORATION		15 JUNCTION RD & RTES 523 & 31		NJD059008169
BFO-N	960327100622	ACTIVE	- 5/15/96	

23 SITES WITH ON-SITE SOURCE(S) OF CONTAMINATION IN RARITAN TOWNSHIP

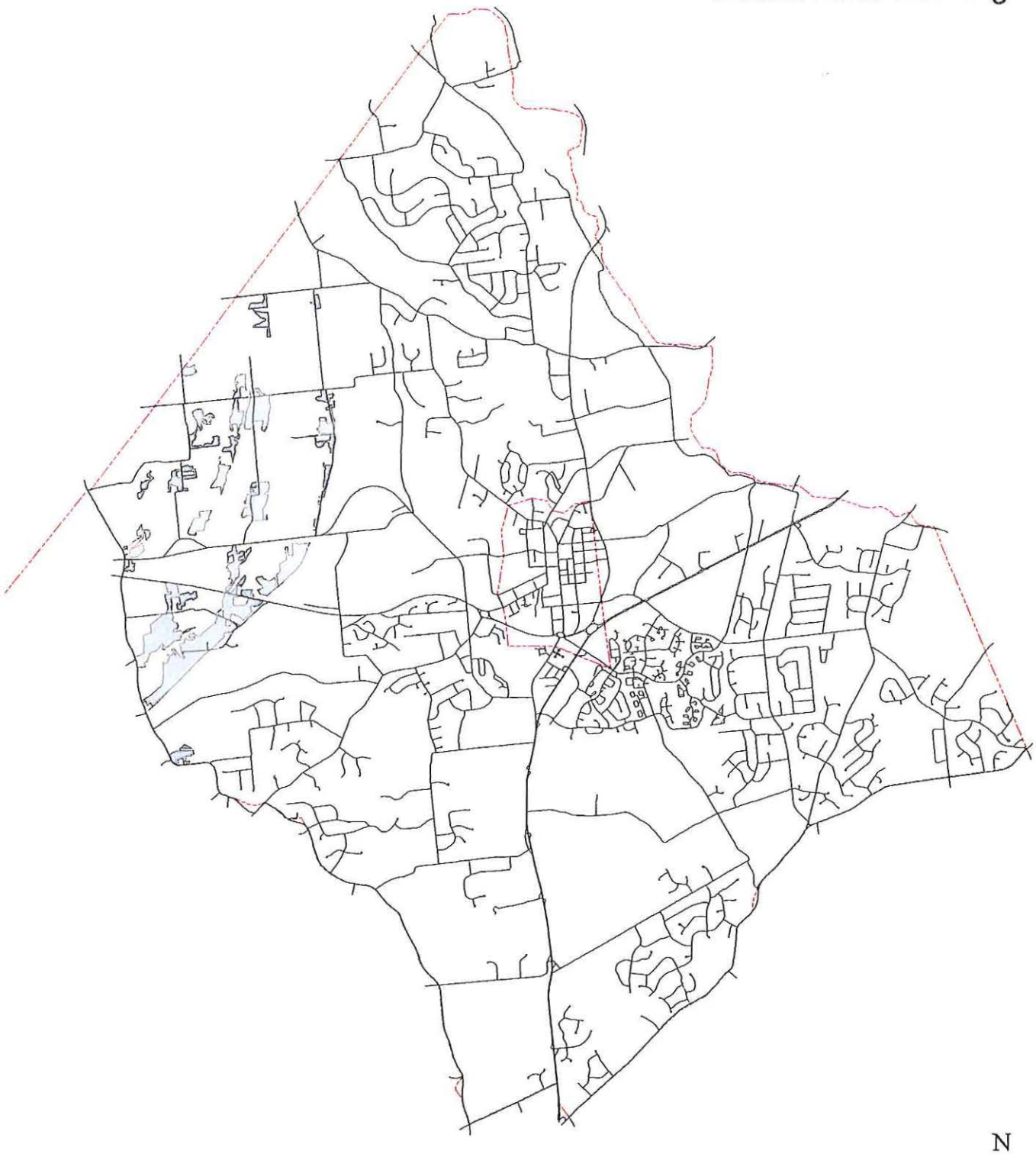
C SITES WITH CLOSED CASE(S) WITH RESTRICTIONS

Site Name / Contact	Case Number	Site Address / Case Status	- Status Date	Site Identifier / Control/Remedial Action Type
HUNTERDON COUNTY ROAD DEPARTMENT GARAG		RTE 12 W		NJL600045066
BUST	0069546	NFA-A	- 11/24/99	CEA
JOHANNA FARMS INCORPORATED		JOHANNA FARMS RD		NJD002350577
BUST	0094232	NFA-A	- 9/28/00	CEA

2 SITES WITH CLOSED CASE(S) WITH RESTRICTIONS IN RARITAN TOWNSHIP

Map 13

Township of Raritan
County of Hunterdon
Groundwater Recharge Areas



N

1:80,000

Legend

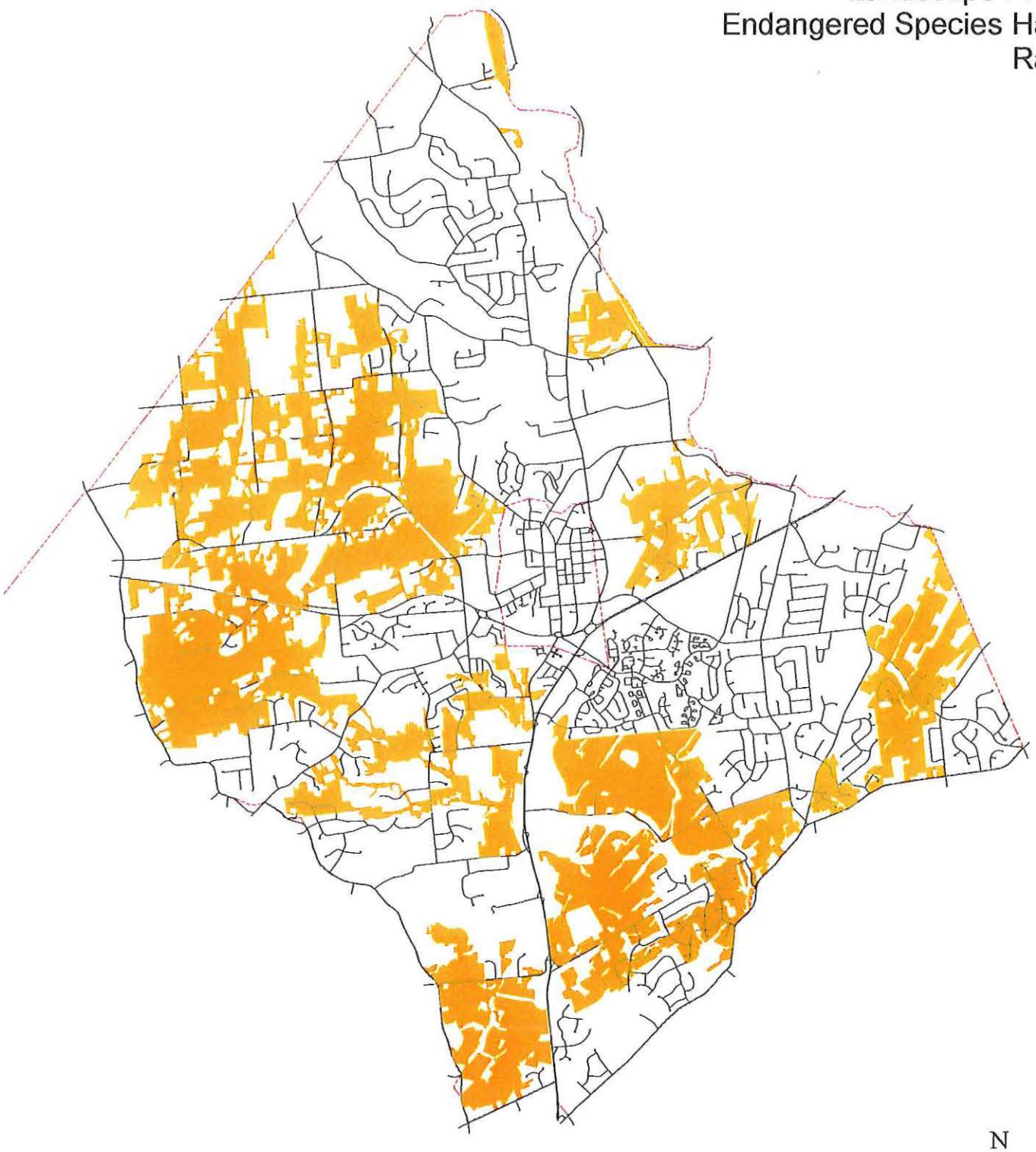
Ground Water Recharge Areas

0 5,500 11,000 22,000 Feet

This map was developed using Hunterdon County GIS digital data, but this secondary product has not been verified by Hunterdon County and is not county authorized.

Township of Raritan
County of Hunterdon
Landscape Project
Endangered Species Habitat
Rank 2

Map 14



N

Legend

Rank 2

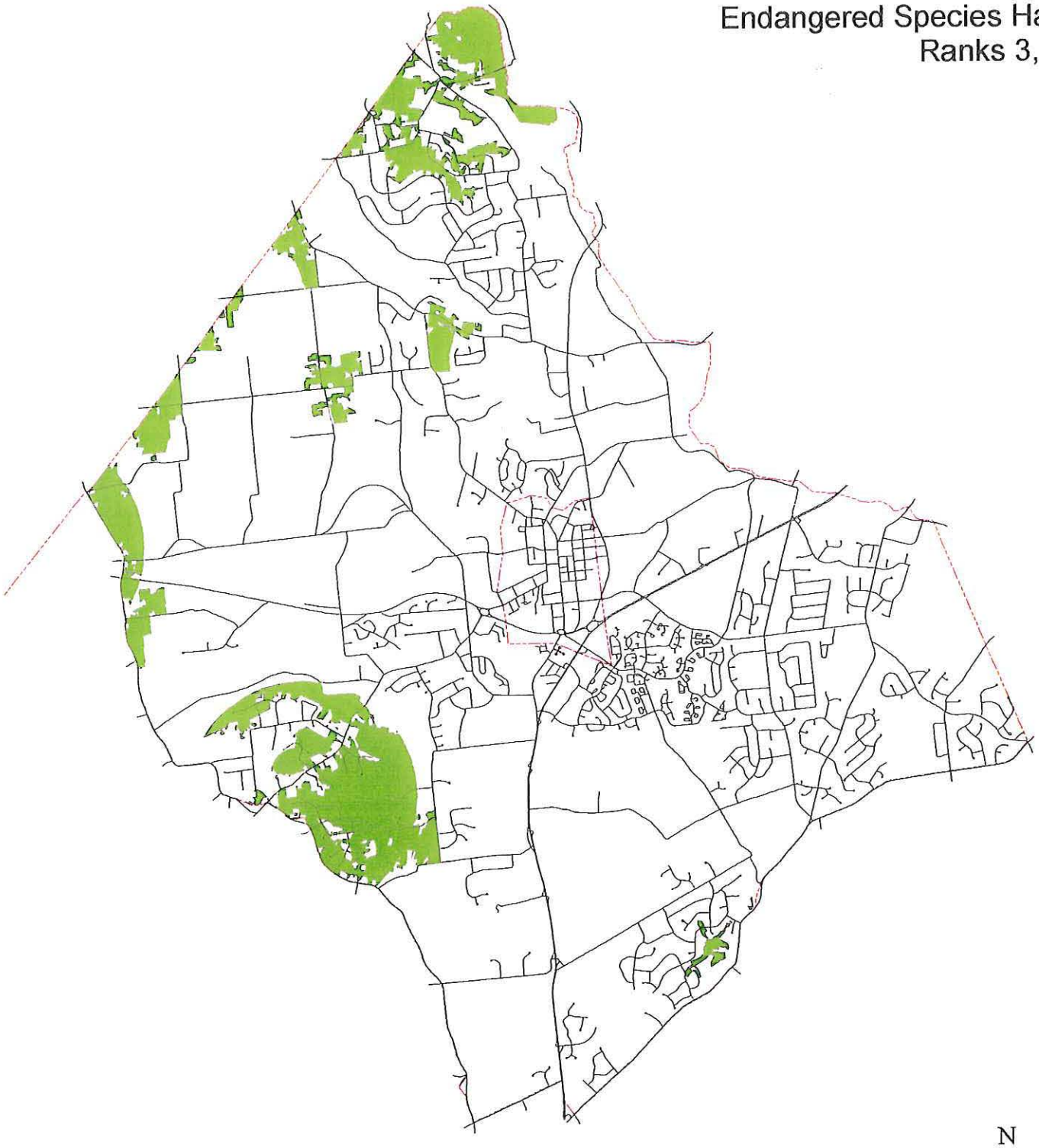
1:80,000

0 5,500 11,000 22,000 Feet

This map was developed using Hunterdon County GIS digital data, but this secondary product has not been verified by Hunterdon County and is not county authorized.

Map 15

Township of Raritan
County of Hunterdon
Landscape Project
Endangered Species Habitat
Ranks 3, 4 ,5



N

1:80,000

Legend

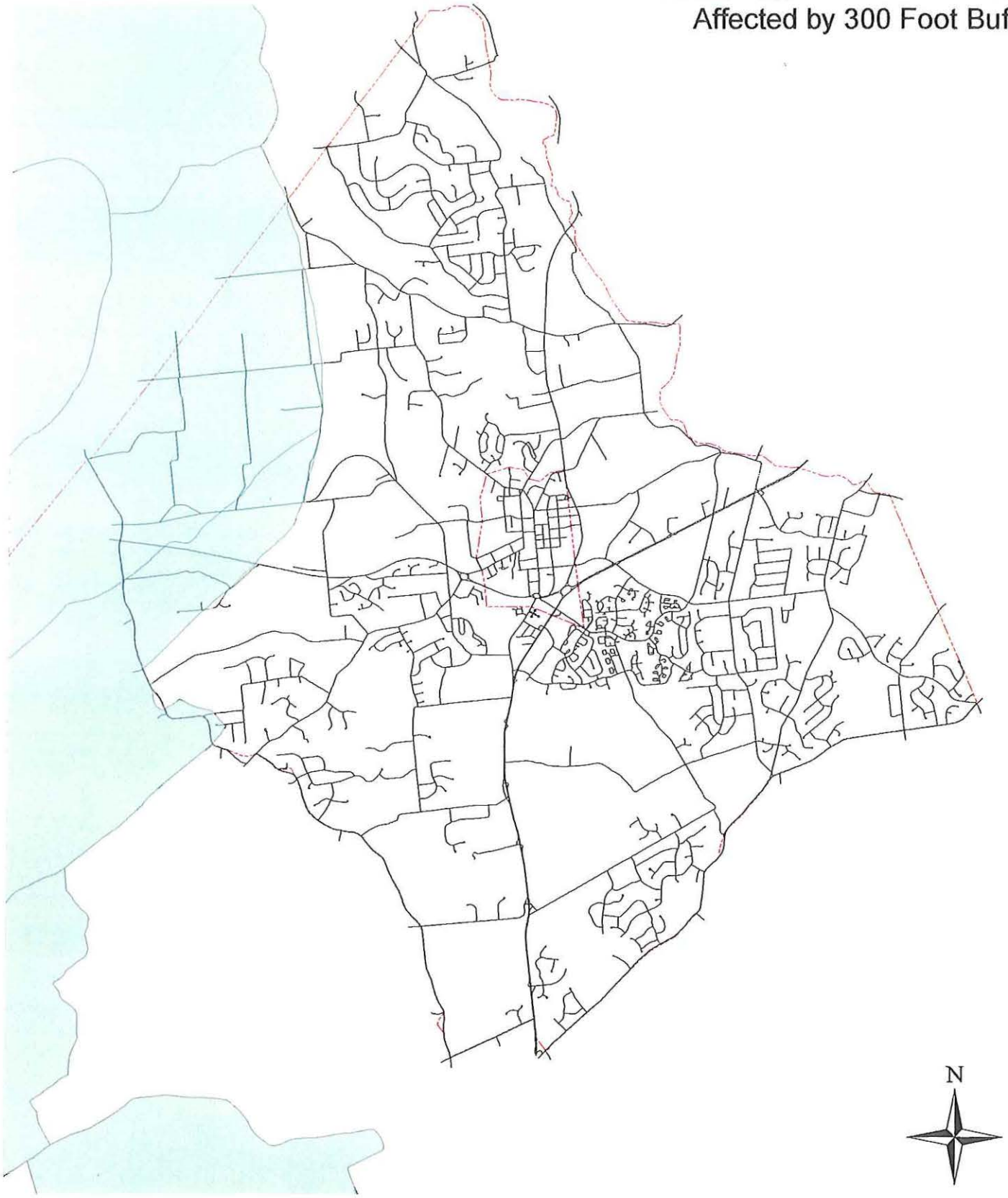
Ranks 3, 4 and 5

0 5,500 11,000 22,000 Feet

This map was developed using Hunterdon County GIS digital data, but this secondary product has not been verified by Hunterdon County and is not county authorized.

Map 16

Township of Raritan
County of Hunterdon
NJDEP Stormwater Rule Areas
Affected by 300 Foot Buffers



1:80,000

Legend

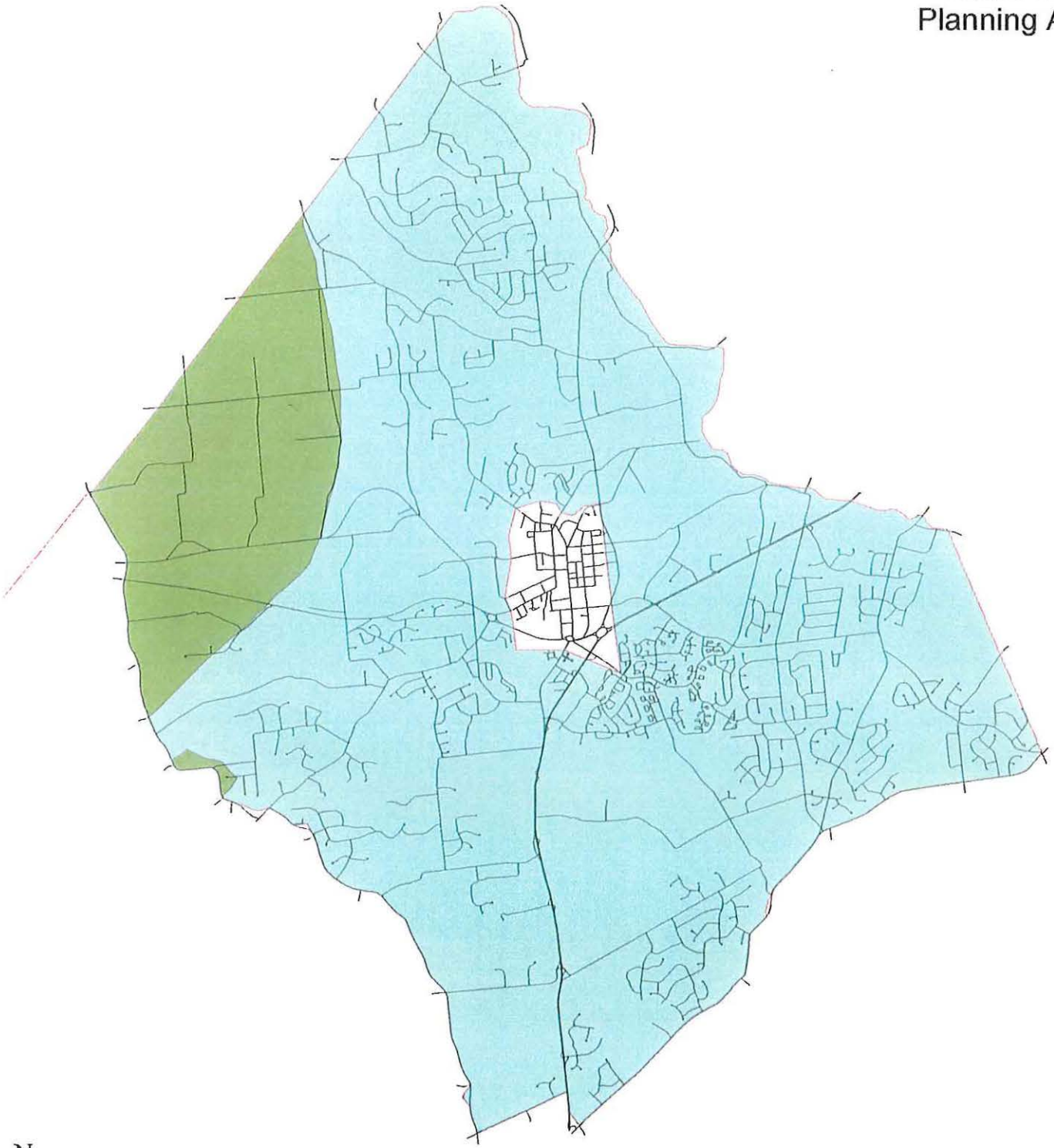
Area Affected by 300 ft. buffer

0 5,500 11,000 22,000 Feet

This map was developed using Hunterdon County GIS digital data, but this secondary product has not been verified by Hunterdon County and is not county authorized.

Map 17

Township of Raritan
County of Hunterdon
Water Supply
Planning Areas



N

Legend

Planning Area

9

10

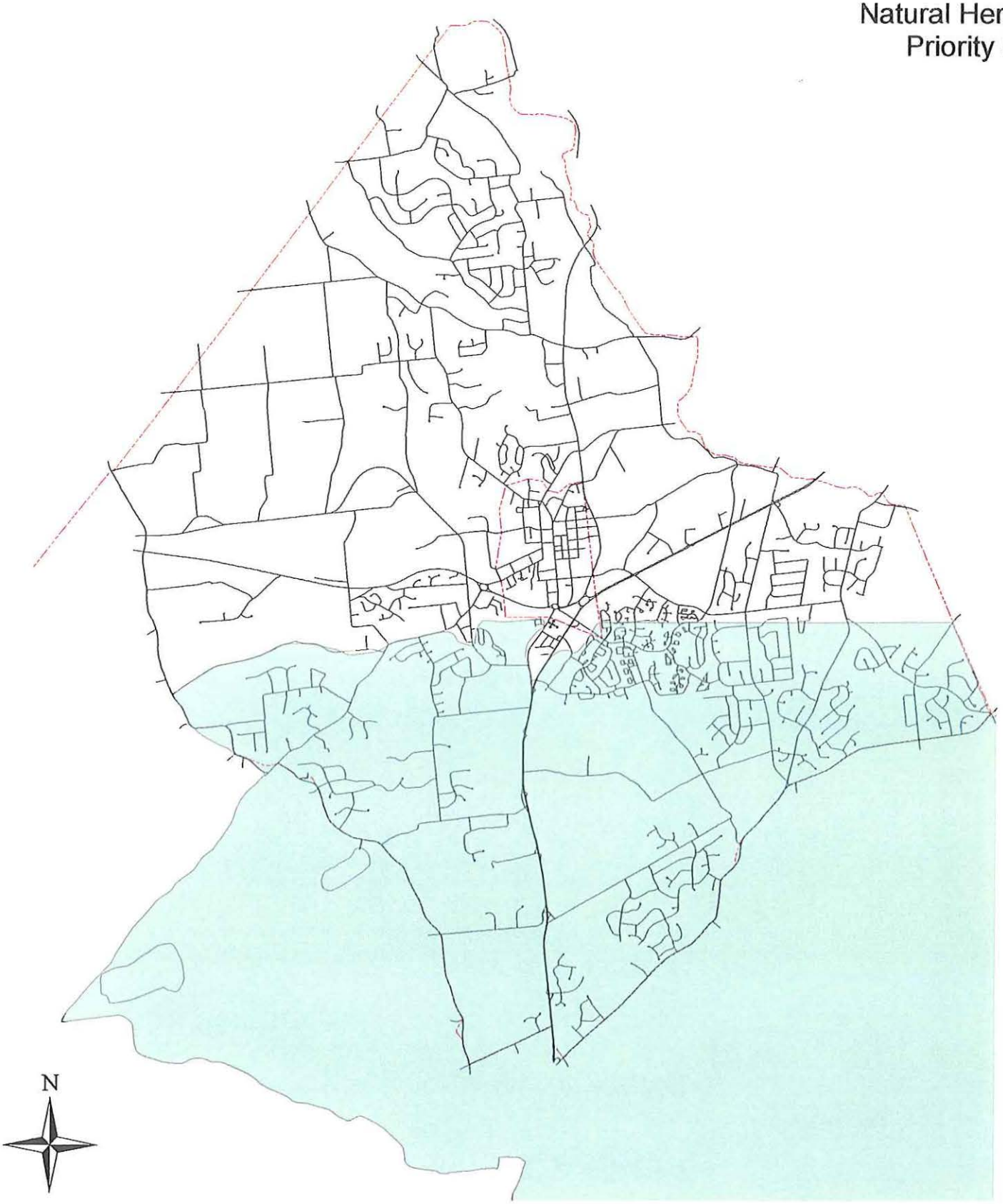
1:80,000

0 5,500 11,000 22,000 Feet

This map was developed using Hunterdon County GIS digital data, but this secondary product has not been verified by Hunterdon County and is not county authorized.

Map 18

Township of Raritan
County of Hunterdon
Natural Heritage
Priority Sites



1:80,000

Legend

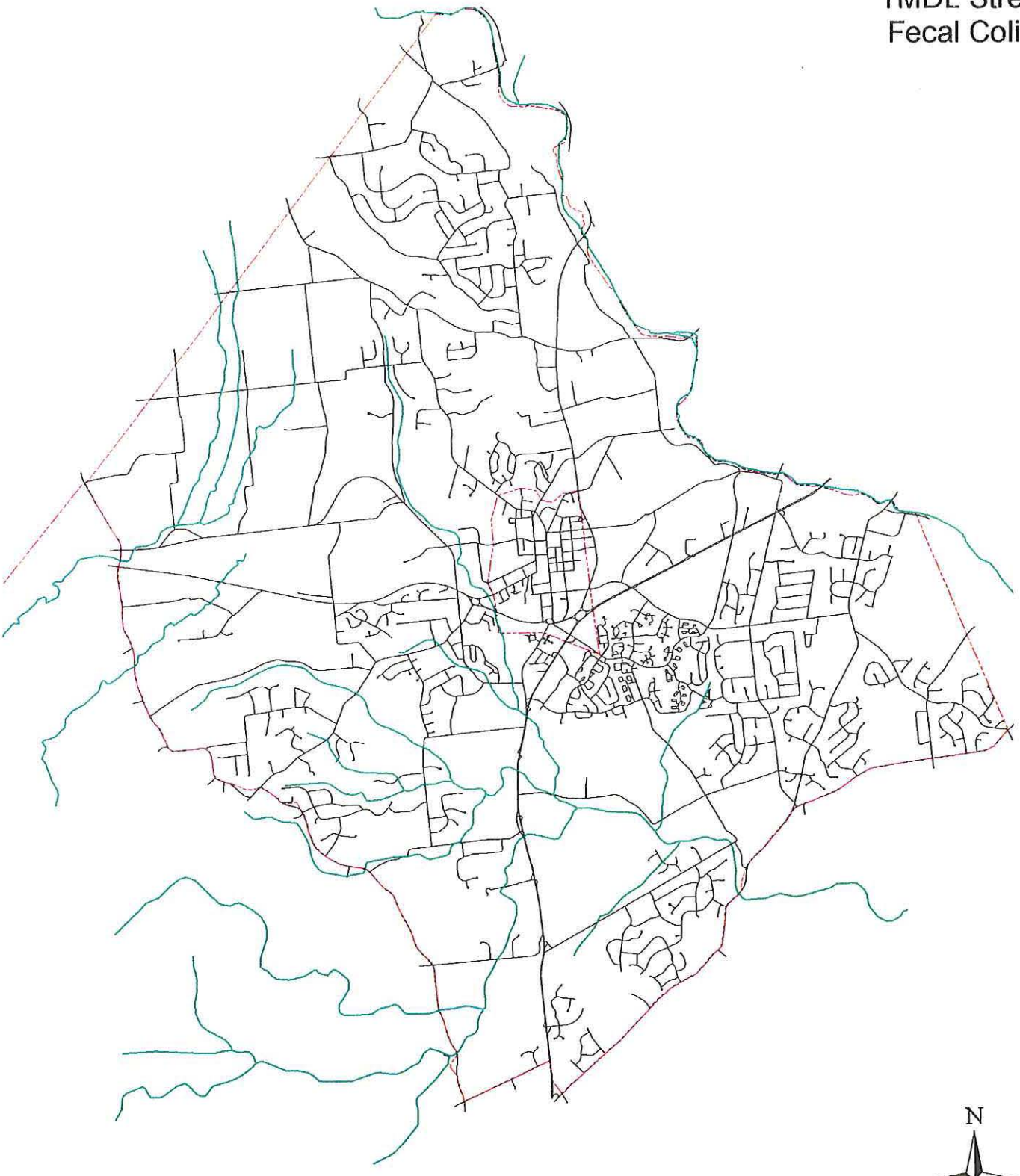
B4 Macro Site

0 5,500 11,000 22,000 Feet

This map was developed using Hunterdon County GIS digital data, but this secondary product has not been verified by Hunterdon County and is not county authorized.

Map 19

Township of Raritan
County of Hunterdon
TMDL Streams
Fecal Coliform



N

1:80,000

Legend
Fecal Coliform

0 5,500 11,000 22,000 Feet

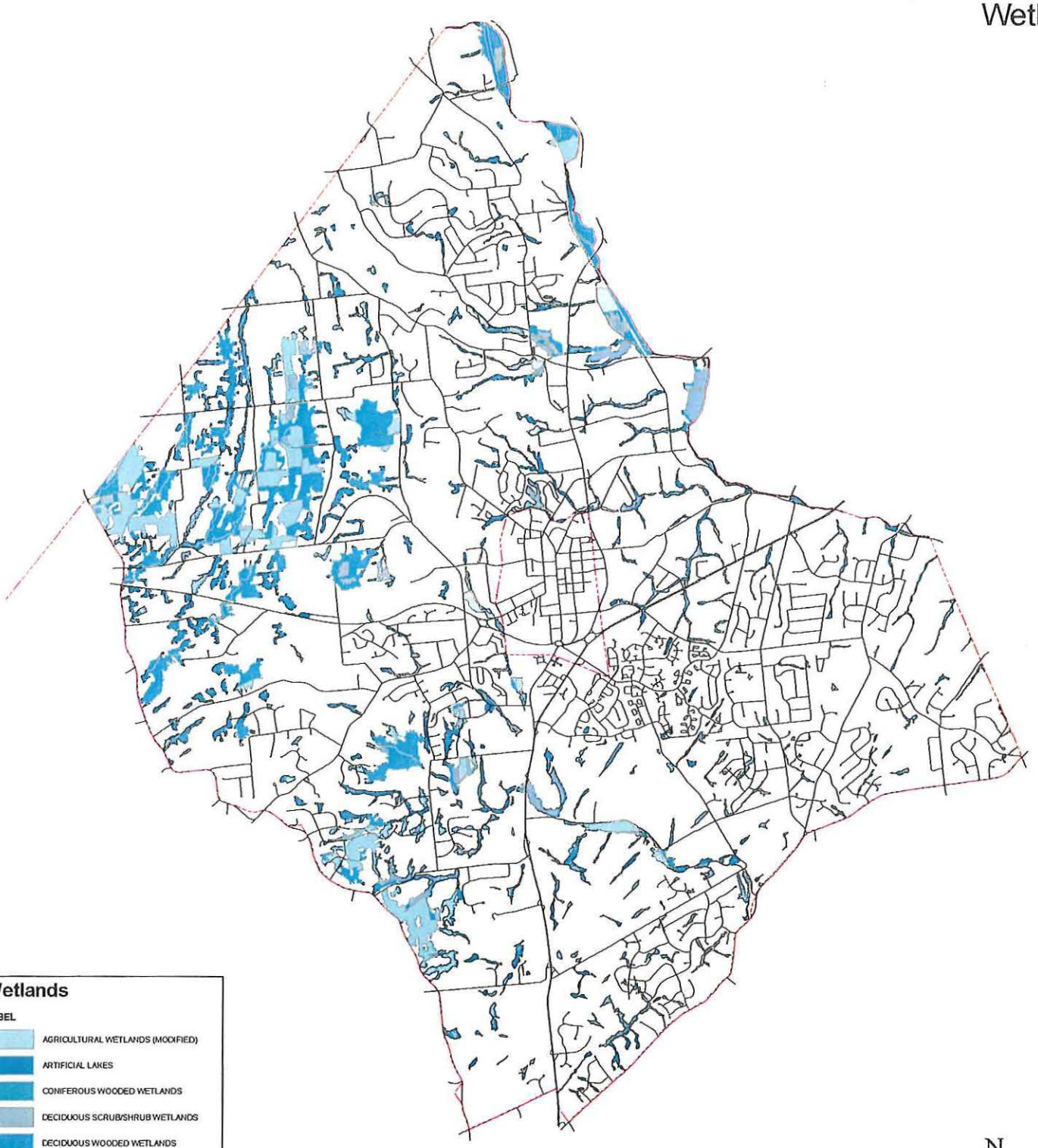
This map was developed using Hunterdon County GIS digital data, but this secondary product has not been verified by Hunterdon County and is not county authorized.

Township of Raritan
Stormwater Management Plan
Build out calculations

Zone District	Developable Area (acres)	Land Cover Type	TP (lbs/acre/yr)	TP (lbs/yr)	TN (lbs/acre/yr)	TN (lbs/yr)	TSS (lbs/acre/yr)	TSS (lbs/yr)
R-1	1909	Rural Residential	0.6	1,146	5	9,547	140	267,315
R-1A	549	Rural Residential	0.6	330	5	2,747	140	76,917
R-2	13	Rural Residential	0.6	8	5	67	140	1,883
R-3	2645	Rural Residential	0.6	1,587	5	13,227	140	370,353
R-4	4	Rural Residential	0.6	2	5	19	140	529
R-5	189	Medium Density Residential	1.4	265	15	2,839	140	26,501
R-6	63	Medium Density Residential	1.4	89	15	951	140	8,878
R-6LM	53	Medium Density Residential	1.4	74	15	798	140	7,445
R-7	8	Medium Density Residential	1.4	12	15	124	140	1,156
R-8	28	Medium Density Residential	1.4	39	15	416	140	3,881
R-9	9	Medium Density Residential	1.4	13	15	142	140	1,330
AR	250	Rural Residential	0.6	150	5	1,251	140	35,027
B-1	5	Commercial	2.1	10	22	101	200	921
B-2	295	Commercial	2.1	620	22	6,498	200	59,070
B-3	30	Commercial	2.1	62	22	651	200	5,922
B-4	20	Commercial	2.1	41	22	433	200	3,939
B-5	36	Commercial	2.1	76	22	792	200	7,204
O-1	22	Commercial	2.1	46	22	478	200	4,342
O-2	178	Commercial	2.1	374	22	3,915	200	35,591
I-1	156	Industrial	1.5	233	16	2,490	200	31,123
I-2	597	Industrial	1.5	896	16	9,554	200	119,422
P	149	Mixed Urban	1	149	10	1,494	300	44,811
H	31	Commercial	2.1	66	22	689	200	6,260
HU	6	Commercial	2.1	13	22	135	200	1,224
PCOS	30	Commercial	2.1	62	22	651	200	5,914
Totals				6,362		60,008		1,126,956

Map 20

Township of Raritan
County of Hunterdon
Wetlands



Wetlands

LABEL

- AGRICULTURAL WETLANDS (MODIFIED)
- ARTIFICIAL LAKES
- CONIFEROUS WOODED WETLANDS
- DECIDUOUS SCRUB/SHRUB WETLANDS
- DECIDUOUS WOODED WETLANDS
- DISTURBED WETLANDS (MODIFIED)
- HERBACEOUS WETLANDS
- MANAGED WETLANDS (MODIFIED)
- STREAMS AND CANALS
- WETLAND RIGHTS-OF-WAY (MODIFIED)

N

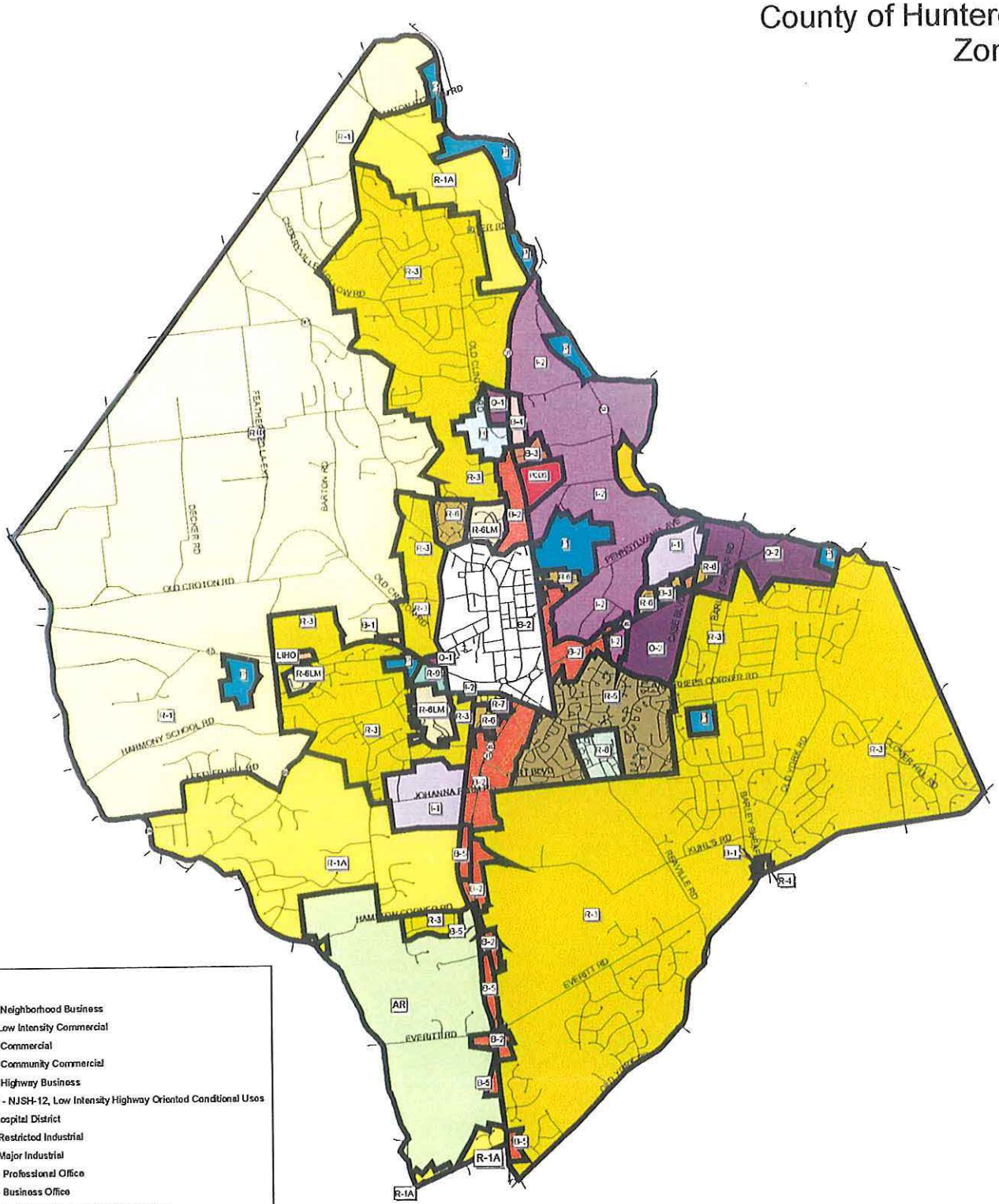
1:80,000

0 5,500 11,000 22,000 Feet

This map was developed using Hunterdon Gounty GIS digital data, but this secondary product has not been verified by Hunterdon County and is not county authorized.

Map 21

Township of Raritan
County of Hunterdon
Zoning



Legend

- B-1 - Neighborhood Business
- B-5, Low Intensity Commercial
- B-2 - Commercial
- B-3 - Community Commercial
- B-4 - Highway Business
- LIHO - NJSH-12, Low Intensity Highway Oriented Conditional Uses
- H - Hospital District
- I-1 - Restricted Industrial
- I-2 - Major Industrial
- O-1 - Professional Office
- O-2 - Business Office
- PCOS - Planned Commercial Office Service
- P - Public
- R-1 - Rural Residential (Very Low Density)
- R-1A - Rural Residential (Low Density)
- R-2 - Rural Residential (Conservation Density)
- R-3 - Residential
- R-4 - Residential
- R-5 - Planned Residential
- R-6 - Residential
- R-6LM - Low/Mod Residential
- R-7 - Residential (multi-family)
- R-8 - Age Restricted Residential
- R-9 - Age Restricted Residential - Assisted Living
- AR - Agricultural Residential

N

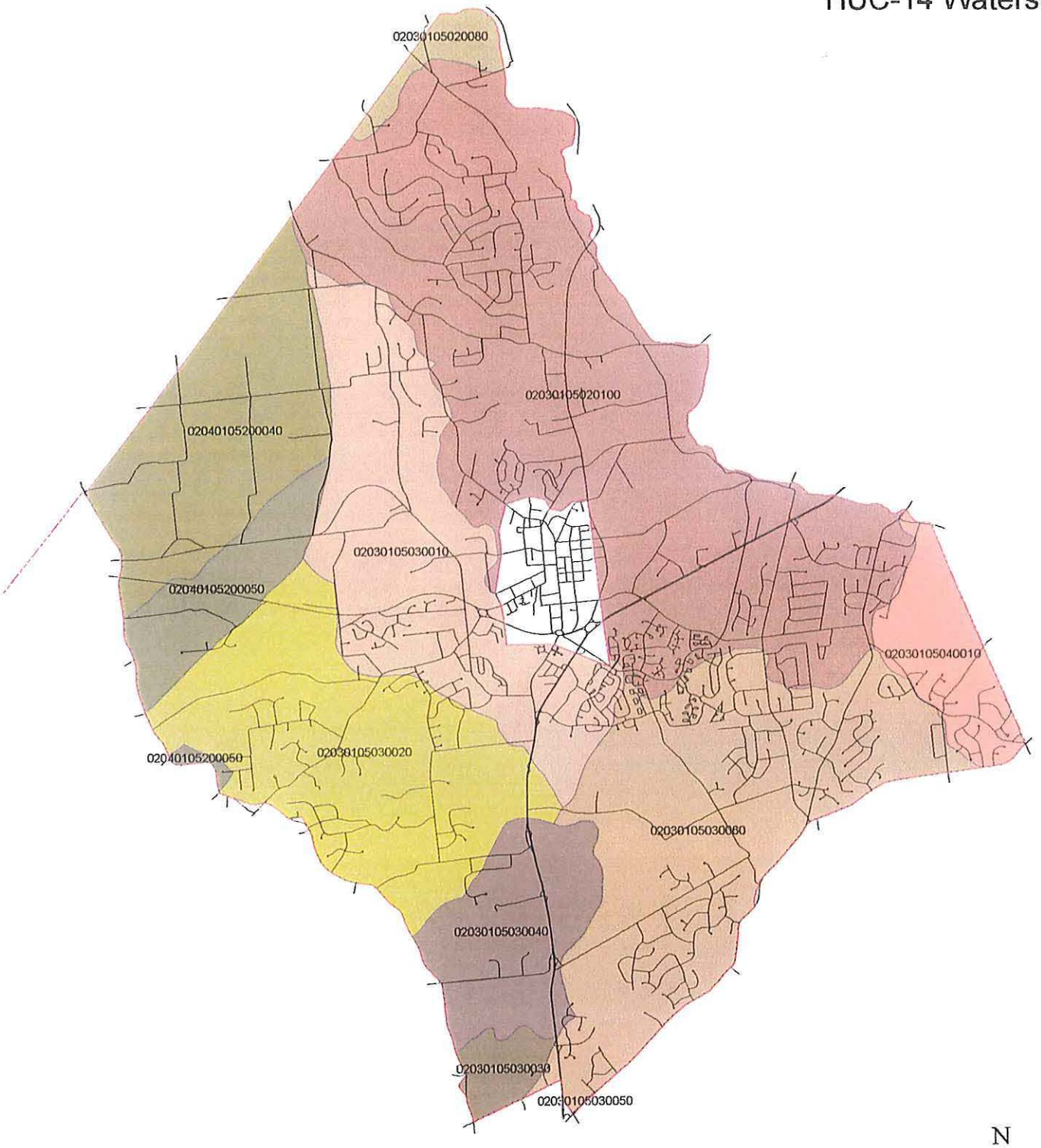
1:80,000

0 4,050 8,100 16,200 Feet

This map was developed using Hunterdon County GIS digital data, but this secondary product has not been verified by Hunterdon County and is not county authorized.

Map 22

Township of Raritan
County of Hunterdon
HUC-14 Watersheds



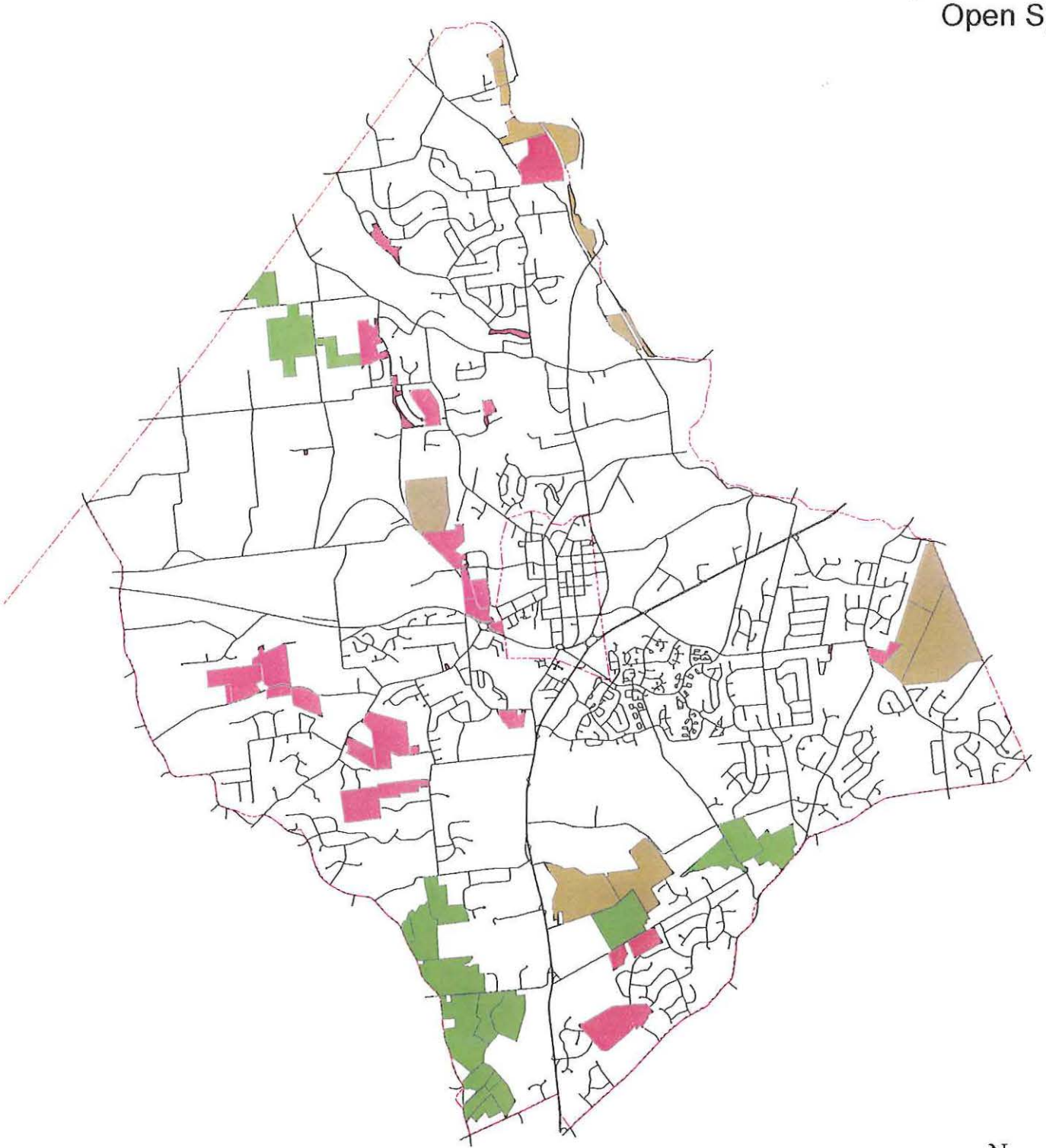
1:80,000

0 5,500 11,000 22,000 Feet

This map was developed using Hunterdon County GIS digital data, but this secondary product has not been verified by Hunterdon County and is not county authorized.

Map 23

Township of Raritan
County of Hunterdon
Open Space



Open Space 2005
Preserved Lands
- Farmland
- Township
- State and County

N

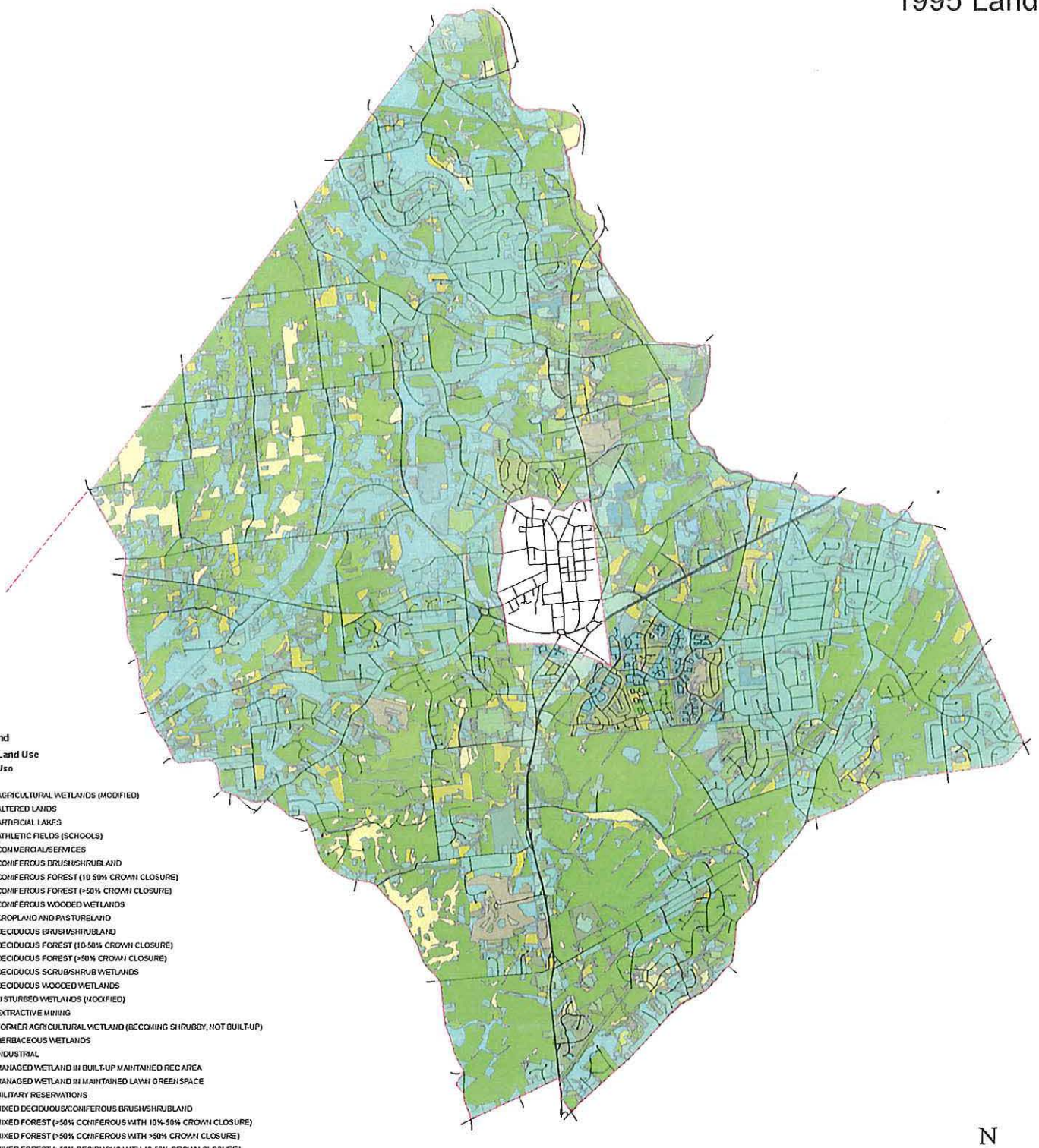
1:80,000

0 5,500 11,000 22,000 Feet

This map was developed using Hunterdon County GIS digital data, but this secondary product has not been verified by Hunterdon County and is not county authorized.

Township of Raritan
County of Hunterdon
1995 Land Use

Map 24



Legend

1995 Land Use

Land Use

- AGRICULTURAL WETLANDS (MODIFIED)
- ALTERED LANDS
- ARTIFICIAL LAKES
- ATHLETIC FIELDS (SCHOOLS)
- COMMERCIAL/SERVICES
- CONIFEROUS BRUSH/SHRUBLAND
- CONIFEROUS FOREST (10-50% CROWN CLOSURE)
- CONIFEROUS FOREST (>50% CROWN CLOSURE)
- CONIFEROUS WOODED WETLANDS
- CROPLAND AND PASTURELAND
- DECIDUOUS BRUSH/SHRUBLAND
- DECIDUOUS FOREST (10-50% CROWN CLOSURE)
- DECIDUOUS FOREST (>50% CROWN CLOSURE)
- DECIDUOUS SCRUB/SHRUB WETLANDS
- DECIDUOUS WOODED WETLANDS
- DISTURBED WETLANDS (MODIFIED)
- EXTRACTIVE MINING
- FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)
- HERBACEOUS WETLANDS
- INDUSTRIAL
- MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA
- MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE
- MILITARY RESERVATIONS
- MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND
- MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)
- MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)
- MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)
- MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)
- OLD FIELD (< 25% BRUSH COVERED)
- ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS
- OTHER AGRICULTURE
- OTHER URBAN OR BUILT-UP LAND
- PLANTATION
- RECREATIONAL LAND
- RESIDENTIAL, HIGH DENSITY, MULTIPLE DWELLING
- RESIDENTIAL, RURAL, SINGLE UNIT
- RESIDENTIAL, SINGLE UNIT, LOW DENSITY
- RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY
- STREAMS AND CANALS
- TRANSITIONAL AREAS
- TRANSPORTATION/COMMUNICATION/UTILITIES
- UNDIFFERENTIATED BARREN LANDS
- WETLAND RIGHTS-OF-WAY (MODIFIED)

N

1:80,000

0 5,500 11,000 22,000 Feet

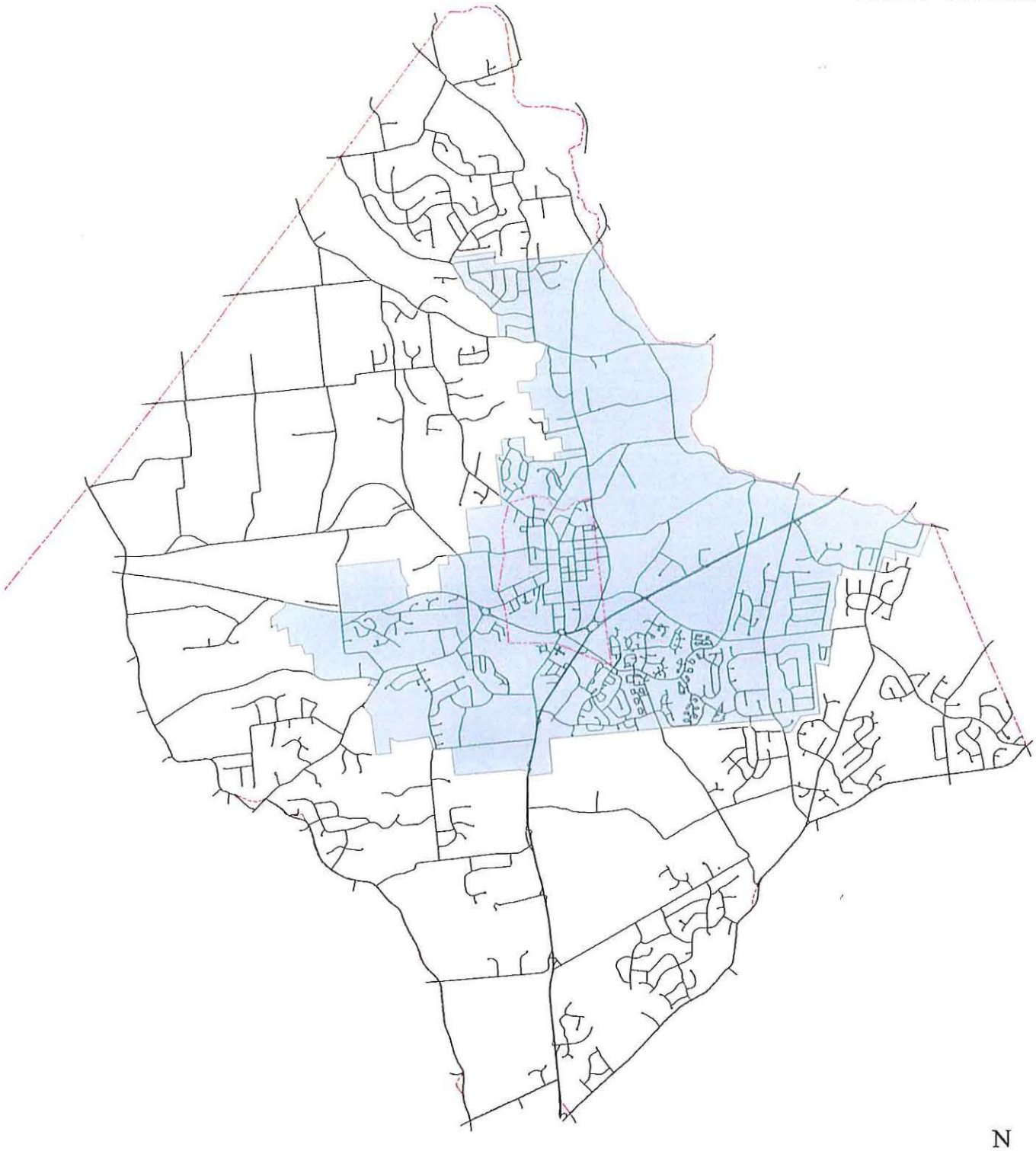
This map was developed using Hunterdon County GIS digital data, but this secondary product has not been verified by Hunterdon County and is not county authorized.

	A	C	D	H	I	J
1	Stormwater Management Plan					
2	Buildable Area by Zone					
3	(The buildable area is the entire land are minus wetlands, open space, preserved farmland, rights of way, streams, rivers, and other open water)					
4						
5						
6						
7	HUC-14	Zoning District	Buildable Acreage	Permitted Impervious	Total Impervious At Buildout (Acres)	Total Impervious At Buildout (sq. ft.)
8						
9						
10	00040	R-1	1122.511	0.4	449.004	19,558,632
11	00050	R-1	544.619	0.4	217.848	9,489,441
12	00050	R-1A	14.799	0.4	5.920	257,858
13	20080	R-1	205.32	0.4	82.128	3,577,496
14	20100	B-2	82.913	0.6	49.748	2,167,014
15	20100	B-2	105.747	0.6	63.448	2,763,804
16	20100	B-2	0.001	0.6	0.001	26
17	20100	B-2	0.002	0.6	0.001	52
19	20100	B-2	0.003	0.6	0.002	78
20	20100	B-2	0.016	0.6	0.010	418
21	20100	B-2	0.004	0.6	0.002	105
22	20100	B-3	21.233	0.6	12.740	554,946
23	20100	B-3	28.113	0.6	16.868	734,761
24	20100	B-4	32.822	0.6	19.693	857,836
25	20100	H	78.246	0.4	31.298	1,363,358
26	20100	I-1	103.76	0.6	62.256	2,711,871
27	20100	I-2	27.166	0.6	16.300	710,011
28	20100	I-2	964.809	0.6	578.885	25,216,248
29	20100	I-2	0.002	0.6	0.001	52
30	20100	O-1	28.948	0.75	21.711	945,731
31	20100	O-2	0.001	0.55	0.001	24
32	20100	O-2	0.004	0.55	0.002	96
33	20100	O-2	323.549	0.55	177.952	7,751,587
34	20100	P	19.061	0.55	10.484	456,663
35	20100	P	0.048	0.55	0.026	1,150
36	20100	P	4.568	0.55	2.512	109,440
37	20100	P	5.627	0.55	3.095	134,812
38	20100	P	132.537	0.55	72.895	3,175,321
39	20100	PCOS	59.138	0.5	29.569	1,288,026
40	20100	R-1	1056.143	0.4	422.457	18,402,236
41	20100	R-1A	420.773	0.4	168.309	7,331,549
42	20100	R-2	33.63	0.4	13.452	585,969
43	20100	R-3	840.178	0.4	336.071	14,639,261
44	20100	R-3	133.338	0.4	53.335	2,323,281
45	20100	R-3	1293.005	0.4	517.202	22,529,319
46	20100	R-3	21.242	0.4	8.497	370,121
47	20100	R-3	0.2	0.4	0.080	3,485
48	20100	R-5	213.325	0.4	85.330	3,716,975
49	20100	R-6	26.035	0.4	10.414	453,634
50	20100	R-6	18.33	0.4	7.332	319,382

	A	C	D	H	I	J
51	20100	R-6	54.919	0.4	21.968	956,909
52	20100	R-6	31.296	0.4	12.518	545,302
53	20100	R-6	0.005	0.4	0.002	87
54	20100	R-6LM	40.169	0.4	16.068	699,905
55	20100	R-8	17.826	0.4	7.130	310,600
56	30010	B-1	7.288	0.6	4.373	190,479
57	30010	B-2	0.01	0.6	0.006	261
58	30010	B-2	0.05	0.6	0.030	1,307
59	30010	B-2	188.587	0.6	113.152	4,928,910
60	30010	HU	15.297	0.4	6.119	266,535
61	30010	I-1	38.629	0.6	23.177	1,009,608
62	30010	I-2	3.209	0.6	1.925	83,870
63	30010	P	21.502	0.55	11.826	515,145
64	30010	R-1	1080.143	0.4	432.057	18,820,412
65	30010	R-3	89.971	0.4	35.988	1,567,655
66	30010	R-3	60.502	0.4	24.201	1,054,187
67	30010	R-3	538.796	0.4	215.518	9,387,982
68	30010	R-5	109.914	0.4	43.966	1,915,142
69	30010	R-5	0.059	0.4	0.024	1,028
70	30010	R-5	0.012	0.4	0.005	209
71	30010	R-6	27.959	0.4	11.184	487,158
72	30010	R-6LM	66.183	0.4	26.473	1,153,173
73	30010	R-6LM	26.603	0.4	10.641	463,531
74	30010	R-7	20.646	0.4	8.258	359,736
75	30010	R-9	23.742	0.4	9.497	413,681
76	30020	AR	120.237	0.4	48.095	2,095,009
77	30020	B-2	16.943	0.6	10.166	442,822
78	30020	B-2	14.981	0.6	8.989	391,543
79	30020	B-5	20.568	0.4	8.227	358,377
80	30020	I-1	116.971	0.6	70.183	3,057,154
81	30020	P	57.338	0.55	31.536	1,373,704
82	30020	R-1	764.74	0.4	305.896	13,324,830
83	30020	R-1A	842.197	0.4	336.879	14,674,441
84	30020	R-3	24.901	0.4	9.960	433,875
85	30020	R-3	18.723	0.4	7.489	326,230
86	30020	R-3	134.141	0.4	53.656	2,337,273
87	30030	AR	114.831	0.4	45.932	2,000,815
88	30030	R-1A	17.935	0.4	7.174	312,499
89	30030	R-1A	20.719	0.4	8.288	361,008
90	30030	R-3	0.027	0.4	0.011	470
91	30040	AR	384.519	0.4	153.808	6,699,859
92	30040	B-2	30.441	0.6	18.265	795,606
93	30040	B-2	22.182	0.6	13.309	579,749
94	30040	B-2	27.396	0.6	16.438	716,022
95	30040	B-2	0.008	0.6	0.005	209
96	30040	B-2	0.013	0.6	0.008	340
97	30040	B-2	0.002	0.6	0.001	52
98	30040	B-2	0.001	0.6	0.001	26
100	30040	B-2	0.047	0.6	0.028	1,228
101	30040	B-5	4.346	0.4	1.738	75,725

	A	C	D	H	I	J
102	30040	B-5	3.356	0.4	1.342	58,475
103	30040	B-5	31.915	0.4	12.766	556,087
104	30040	B-5	13.835	0.4	5.534	241,061
105	30040	R-1A	36.002	0.4	14.401	627,299
106	30040	R-3	184.148	0.4	73.659	3,208,595
107	30040	R-3	33.447	0.4	13.379	582,781
108	30060	AR	5.89	0.4	2.356	102,627
109	30060	B-1	0.375	0.6	0.225	9,801
110	30060	B-1	0.009	0.6	0.005	235
111	30060	B-2	2.695	0.6	1.617	70,437
112	30060	B-2	0.189	0.6	0.113	4,940
113	30060	B-2	0.017	0.6	0.010	444
114	30060	B-5	16.031	0.4	6.412	279,324
115	30060	P	30.679	0.55	16.873	735,007
116	30060	P	0.22	0.55	0.121	5,271
117	30060	R-1A	21.086	0.4	8.434	367,402
118	30060	R-3	2782.115	0.4	1,112.846	48,475,572
119	30060	R-3	2.858	0.4	1.143	49,798
120	30060	R-3	44.845	0.4	17.938	781,379
121	30060	R-4	9.308	0.4	3.723	162,183
126	30060	R-4	0.077	0.4	0.031	1,342
127	30060	R-4	0.009	0.4	0.004	157
128	30060	R-4	0.057	0.4	0.023	993
129	30060	R-5	149.918	0.4	59.967	2,612,171
130	30060	R-8	51.474	0.4	20.590	896,883
131	40010	R-3	411.012	0.4	164.405	7,161,473
132			17010.865		7,276.989	316,985,619.060

Township of Raritan
County of Hunterdon
Sewer Service Area



N

1:80,000

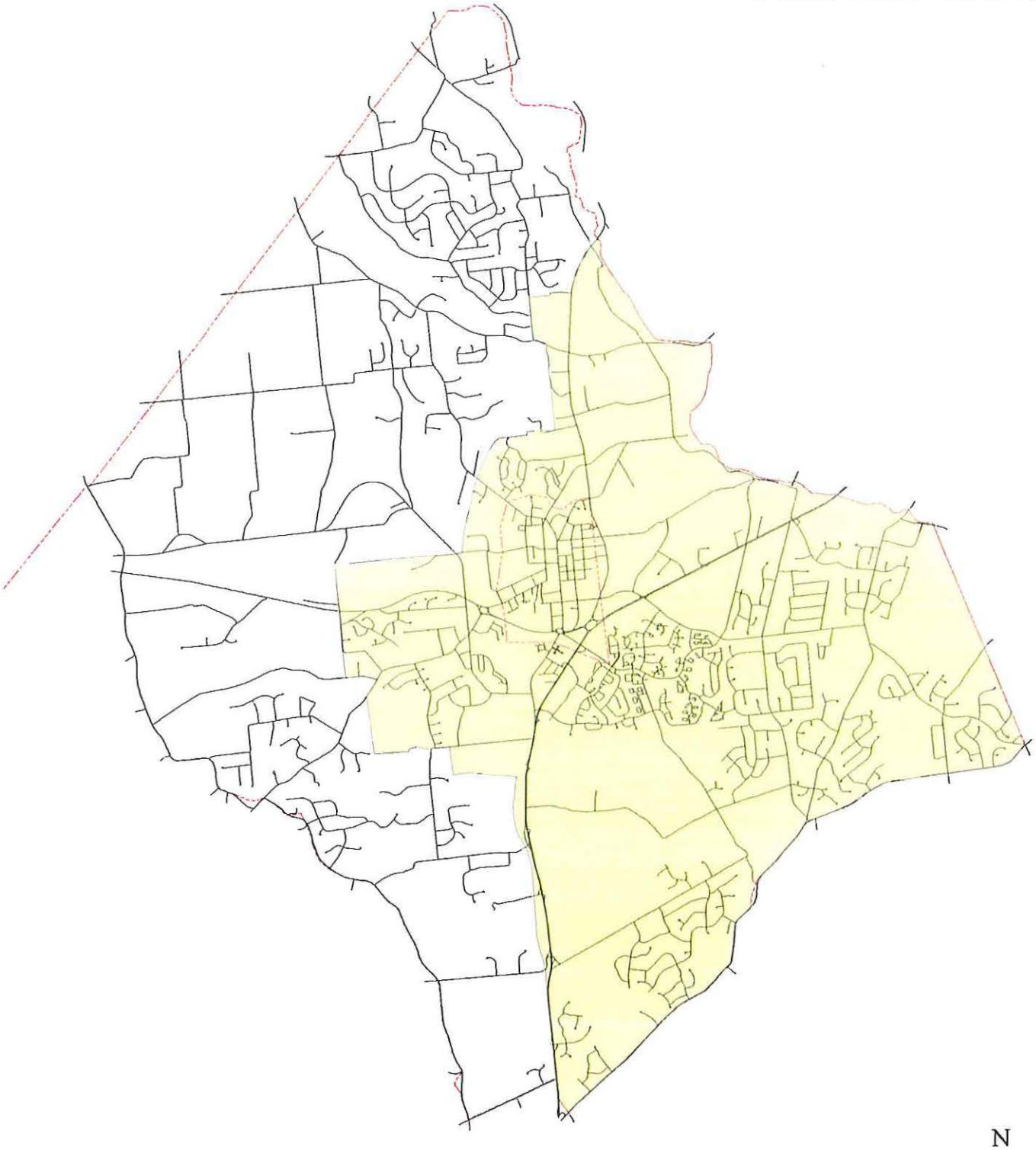
Legend

sewer area

0 5,500 11,000 22,000 Feet

This map was developed using Hunterdon County GIS digital data, but this secondary product has not been verified by Hunterdon County and is not county authorized.

Township of Raritan
County of Hunterdon
Public Water Service Area



N

Legend

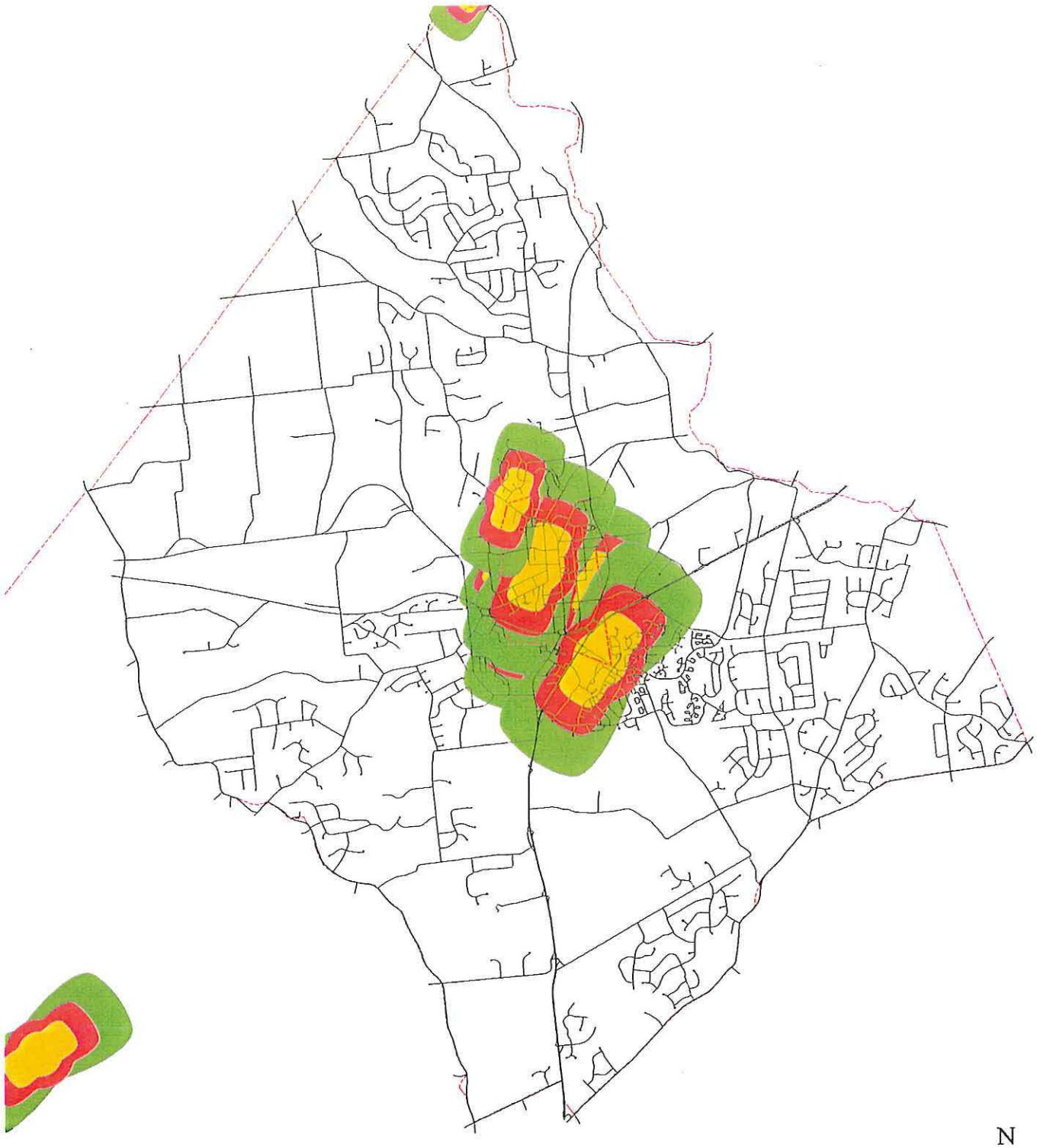
public water

1:80,000

0 5,500 11,000 22,000 Feet

This map was developed using Hunterdon County GIS digital data, but this secondary product has not been verified by Hunterdon County and is not county authorized.

Township of Raritan
County of Hunterdon
Wellhead Protection Areas



N

Legend

TIER
- 1
- 2
- 3

1:80,000

0 5,500 11,000 22,000 Feet

This map was developed using Hunterdon County GIS digital data, but this secondary product has not been verified by Hunterdon County and is not county authorized.