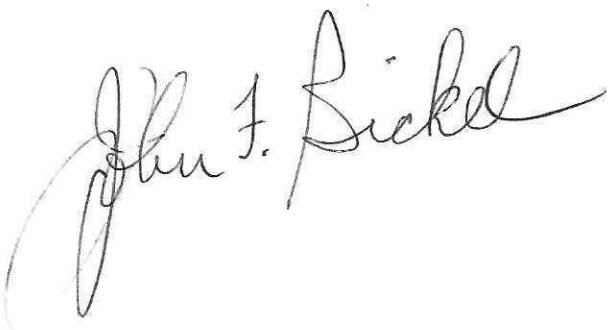
STORMWATER MANAGEMENT PLAN
QUINTON TOWNSHIP
SALEM COUNTY, NEW JERSEY

DECEMBER 2005



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INTRODUCTION

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for Quinton Township, Salem County, New Jersey 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 recharge, stormwater quantity and stormwater quality impacts by incorporating stormwater design and performance standards for new major developments, defined as projects that disturb one or more acres 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, 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 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 safe guard 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 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 evapo-transpiration. 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 aggrative 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 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

Quinton Township is a rural community that has slow development. It is located in the State of New Jersey and Salem County. It is expected that within the period of 2005 to 2010 there will be considerable development, both residential and industrial. Presently the land use in the municipality is stable but, as stated, changes are expected.

The Township encompasses approximately 24.54 square miles in Salem County, New Jersey. The population in the 1990 census was 2511. The population in the 2000 census was 2786.

It can be seen that there was an 11 percent increase in the population of the Township.

It is expected that the next census will show a larger increase in population. Any increase in population could be due to major residential developments. The developments would be expected to occur in the proposed sewer line area. The increase in development will result in changes in the landscape with most likely increased stormwater runoff volumes and pollutant loads to the waterways of the municipality.

Figure 2 illustrates the waterways in the Township.

Figure 3 depicts the Township 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 microinvertebrates 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 bethnic macroinvertebrate community dynamics.

No streams in Quinton Township have been listed as impaired.

The NJDEP is required to develop a Total Maximum Daily Load (TMDL) for the pollutants of impaired waterways. 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 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.

Quinton Township has exhibited severe water quantity problems including flooding, stream bank erosion, and diminished base flow in its streams.

A map of the groundwater contaminated areas is shown in Figures 10 and 11. Well head protection areas are shown in Figure 9.

DESIGN AND PERFORMANCE STANDARDS

Quinton Township will adopt 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. Quinton Township will require design and performance standards that include the language for the maintenance of stormwater management measures that are consistent with the stormwater management rules at N.J.A.C. 7:8-5.8 Maintenance Requirements. Safety standards will be required to be consistent with N.J.A.C. 7:8-6 Safety Standards for Stormwater Management Basins.

The Township will submit ordinances to Salem County for review and approval on or before June 30, 2006.

During construction of projects that come within the regulations of the Stormwater Management Plan and the Residential Site Improvement Standards, Township inspectors will observe the construction of the project to ensure that the stormwater management measures are constructed and function as designed and required.

PLAN CONSISTENCY

Quinton 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. Quinton Township 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.

Quinton Township's Stormwater Ordinance shall require all new development and redevelopment plans to comply with New Jersey's Soil Erosion and Sediment Control Standards. During construction, Township inspectors, under the guidance of the Quinton Township Engineer, will observe on-site soil erosion and sediment control measures and report any inconsistencies to the local Soil Conservation District.

NONSTRUCTURAL STORMWATER MANAGEMENT STRATEGIES

Quinton Township Personnel have reviewed the Master Plan and Ordinances, and have 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. Following are the ordinances that have been identified for revision(s). Once the ordinance texts are revised, they will be submitted to the Salem County review agency for review and approval by April 1, 2006. A copy of the revised ordinance sections will be sent to the Department of Environmental Protection at the time that the changes are submitted to the Salem County Agency.

Chapter 170 of the Quinton Township Land Use Code was reviewed with regard to incorporating nonstructural stormwater management strategies. The following Ordinance Section 5 shall be revised to include the following statement.

THE ORDINANCE SHALL BE AMENDED TO INCLUDE THE REQUIREMENTS OF THE RESIDENTIAL SITE IMPROVEMENT STANDARDS AND THE MUNICIPAL STORMWATER MANAGEMENT PLAN.

Section	
170-23, 24	PBR District
170-25	OSC Open Space Cluster
170-26, 27	R1 Residence District
170-28, 29	R2 Residence District
170-30, 31	VR Village Residential District
170-32, 33	HC Highway Commercial District
170-41	Exceptions
170-45	Calculation of Common Open Space
170-46	Planned Developments
170-49	Density Restrictions
170-54	Planned Unit Development
170-56	Planned Adult Communities
170-57	Mobile Home Parks
170-79	Preliminary Site Plan Approval
170-80	Final Site Plan Approval

170-83	Site Design and Building Layout
170-90	Environmental Considerations
170-97	Site Design and Building Layout
170-101	Environmental Considerations
170-130	Preservation of Natural or Man-Made Assets
Article XXIII	Stormwater Control
Article XXIV	Approval Procedure for Planned Developments in the PB-R District

Future changes to the Codes and instructions to developers will require satisfying the percent impervious requirements with no relief of responsibility to comply with the Quinton Township Stormwater Management Plan and Chapter 170 of the Land Use Ordinance.

The Township is evaluating the maximum impervious cover for each zone to determine whether a reduction in impervious coverage is appropriate. The Township is also evaluating a maximum percent of disturbance for each zone. Also, if a developer is granted a variance to exceed the maximum allowable percent imperviousness, the developer must mitigate the impact of the additional impervious surfaces. The mitigation effort must address water quality, flooding and groundwater recharge. The Township will prepare a mitigation plan.

LAND USE/BUILD OUT ANALYSIS

A land use analysis was conducted for Quinton Township. Figure 5 illustrates the HUC14s within the Township. The Township Zoning Map is shown on Figure 8.

The build-out calculations for impervious cover are shown in Tables B01-B010. As expected when developing agricultural and forest lands, the build-out of the HUC14s will result in a significant increase in impervious surfaces.

MITIGATION PLAN

A mitigation plan is required for an agency to grant a variance or exemption from the design and performance standards of this municipal stormwater plan.

The Mitigation Plan will cover the various items of concern expressed in this municipal stormwater management plan.

A mitigation plan must be approved by the Planning Board or Zoning Board Engineer and the Township Engineer. The mitigated project shall 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 this Municipal Stormwater Management Plan. The developer must ensure the long-term maintenance of the project, including the maintenance requirements under Chapters 3, 8 and 9 of the NJDEP Stormwater BMP Manual.

The applicant is permitted to select one of the following projects 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 typical projects that can be used to address the mitigation requirement. The items mentioned are suggestive but do not include all the possible projects.

GROUNDWATER RECHARGE

Repair detention basins or repair a parking lot.

WATER QUALITY

Retrofit an existing stormwater facility to provide the removal of 80 percent of Total Suspended Solids from the facility runoff.

WATER QUANTITY

Install stormwater measurement measures in an open space area to reduce the peak flow from an upstream development on a receiving stream by 20 cfs, 35 cfs and 100 cfs for the 2, 10 and 100 year storms respectively.

WATER QUALITY

Re-establish a vegetative buffer (minimum 50 feet wide) along a specified length of shoreline at a specific location as a goose control measure and to filter stormwater runoff from the high goose traffic areas.

FOLLOW-UP ACTION ITEMS

Evaluate the extent to which the Quinton Township Master Plan (including the land use plan element), official map and development regulations (including the zoning ordinances) implement principles expressed in the nonstructural stormwater management strategies.

Land Use will require corrections and additions to comply with the Quinton Township Stormwater Management Plan. The changes will stress the intent to provide low impact development techniques.

The items to be addressed in the Land Use Ordinance will include, but not necessarily be limited to, the following:

- Preservation of Natural Areas.
- Tree Protection.
- Landscaping and screening.
- Minimize land disturbance.
- Open space and cluster development.
- Impervious Area Management, including streets, driveways, parking areas and sidewalks.
- Vegetated and Open Channels.

These items, along with specific ordinances for adoptions and enforcements, will be addressed within the required time period.

In addition, the Municipality will follow the required procedures for inspections, notification to the residents and annual reports.

Build-Out Calculations

HUC14 and Zone	Total Area (acres)	Existing Impervious (%)	Existing Impervious (acres)	Wetlands/ Water Area (acres)	Developable Area (acres)	Allowable Impervious (%)	Build-Out Impervious (acres)
A020402060400	20						
LI/O	505.0	1	6	5	494	40	197.60
R2	206.6	3	6	5	195.6	5	9.78
PBR	400	17	68	5	327	5	16.35
TOTALS	1111.6	7.1	80	15	1016.6		223.73

Table Pollutant Loads by Land Cover

Land Cover	Total Phosphorus Load (lbs/acre/year)	Total Nitrogen Load (lbs/acre/year)	Total Suspended Solids Load (lbs/acre/yr)
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
Commercial	2.1	22	200
Industrial	1.5	16	200
Urban, Mixed Urban, Other Urban	1.0	10	120
Agricultural	1.3	10	300
Forest, Water, Wetlands	0.1	3	40
Barrenland/Transitional Area	0.5	5	60

Source: NJDEP Stormwater BMP Manual 2004.

Build-Out Calculations

HUC14 and Zone	Total Area (acres)	Existing Impervious (%)	Existing Impervious (acres)	Wetlands/ Water Area (acres)	Developable Area (acres)	Allowable Impervious (%)	Build-Out Impervious (acres)
B02040206040040							
PBR	25	4.3	1	1	23	5	1.15
TOTALS	25	4.3	1	1	23	5	1.15

Table Pollutant Loads by Land Cover

Land Cover	Total Phosphorus Load (lbs/acre/year)	Total Nitrogen Load (lbs/acre/year)	Total Suspended Solids Load (lbs/acre/yr)
High, Medium Density Residential	1.4	15	140
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Source: NJDEP Stormwater BMP Manual 2004.

Build-Out Calculations

HUC14 and Zone	Total Area (acres)	Existing Impervious (%)	Existing Impervious (acres)	Wetlands/ Water Area (acres)	Developable Area (acres)	Allowable Impervious (%)	Build-Out Impervious (acres)
C02040206060040							
PBR	807.6	2	16.2	10	781.4	5	39.07
M	30.0	50	17.2	1	11.8	40	4.72
TOTALS	837.6		33.4	11	793.2		43.79

Table Pollutant Loads by Land Cover

Land Cover	Total Phosphorus Load (lbs/acre/year)	Total Nitrogen Load (lbs/acre/year)	Total Suspended Solids Load (lbs/acre/yr)
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
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Source: NJDEP Stormwater BMP Manual 2004.

Build-Out Calculations

HUC14 and Zone	Total Area (acres)	Existing Impervious (%)	Existing Impervious (acres)	Wetlands/ Water Area (acres)	Developable Area (acres)	Allowable Impervious (%)	Build-Out Impervious (acres)
DO2040206060050							
PBR	2320	2	46.4	20	2253.6	5	112.68
M	4.4	50	2.2	0	2.2	40	0.88
VR	82.5	10	8.25	5	69.25	5	3.46
RI	68.9	10	6.89	5	57.01	5	2.85
TOTALS	2475.8		63.74	30	2382.06		119.87

Table Pollutant Loads by Land Cover

Land Cover	Total Phosphorus Load (lbs/acre/year)	Total Nitrogen Load (lbs/acre/year)	Total Suspended Solids Load (lbs/acre/yr)
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
Commercial	2.1	22	200
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Forest, Water, Wetlands	0.1	3	40
Barrenland/Transitional Area	0.5	5	60

Source: NJDEP Stormwater BMP Manual 2004.

Build-Out Calculations

HUC14 and Zone	Total Area (acres)	Existing Impervious (%)	Existing Impervious (acres)	Wetlands/ Water Area (acres)	Developable Area (acres)	Allowable Impervious (%)	Build-Out Impervious (acres)
E02040206060060							
PBR	2910	2	58.2	10	2849.8	5	142.49
TOTALS	2910	2	58.2	10	2849.8	5	142.49

Table Pollutant Loads by Land Cover

Land Cover	Total Phosphorus Load (lbs/acre/year)	Total Nitrogen Load (lbs/acre/year)	Total Suspended Solids Load (lbs/acre/yr)
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
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Agricultural	1.3	10	300
Forest, Water, Wetlands	0.1	3	40
Barrenland/Transitional Area	0.5	5	60

Source: NJDEP Stormwater BMP Manual 2004.

Build-Out Calculations

HUC14 and Zone	Total Area (acres)	Existing Impervious (%)	Existing Impervious (acres)	Wetlands/ Water Area (acres)	Developable Area (acres)	Allowable Impervious (%)	Build-Out Impervious (acres)
F02040206060070							
PBR	3710	2	74.2	25	3610.8	5	180.54
HC	28.7	40	11.48	1	16.22	40	6.49
TOTALS	3738.7		85.68	26	3627.02		187.03

Table Pollutant Loads by Land Cover

Land Cover	Total Phosphorus Load (lbs/acre/year)	Total Nitrogen Load (lbs/acre/year)	Total Suspended Solids Load (lbs/acre/yr)
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
Commercial	2.1	22	200
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Urban, Mixed Urban, Other Urban	1.0	10	120
Agricultural	1.3	10	300
Forest, Water, Wetlands	0.1	3	40
Barrenland/Transitional Area	0.5	5	60

Source: NJDEP Stormwater BMP Manual 2004.

Build-Out Calculations

HUC14 and Zone	Total Area (acres)	Existing Impervious (%)	Existing Impervious (acres)	Wetlands/ Water Area (acres)	Developable Area (acres)	Allowable Impervious (%)	Build-Out Impervious (acres)
G02040206060080							
PBR	50	2	1	1	48	5	2.4
TOTALS	50	2	1	1	48	5	2.4

Table Pollutant Loads by Land Cover

Land Cover	Total Phosphorus Load (lbs/acre/year)	Total Nitrogen Load (lbs/acre/year)	Total Suspended Solids Load (lbs/acre/yr)
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
Commercial	2.1	22	200
Industrial	1.5	16	200
Urban, Mixed Urban, Other Urban	1.0	10	120
Agricultural	1.3	10	300
Forest, Water, Wetlands	0.1	3	40
Barrenland/Transitional Area	0.5	5	60

Source: NJDEP Stormwater BMP Manual 2004.

Build-Out Calculations

HUC14 and Zone	Total Area (acres)	Existing Impervious (%)	Existing Impervious (acres)	Wetlands/ Water Area (acres)	Developable Area (acres)	Allowable Impervious (%)	Build-Out Impervious (acres)
H02040206070030							
HC	27.4	40	10.96	5	11.44	40	4.58
PBR	2210	2	44.2	25	2140.8	5	107.04
TOTALS	2237.4		54.98	30	2152.24		111.62

Table Pollutant Loads by Land Cover

Land Cover	Total Phosphorus Load (lbs/acre/year)	Total Nitrogen Load (lbs/acre/year)	Total Suspended Solids Load (lbs/acre/yr)
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
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Agricultural	1.3	10	300
Forest, Water, Wetlands	0.1	3	40
Barrenland/Transitional Area	0.5	5	60

Source: NJDEP Stormwater BMP Manual 2004.

Build-Out Calculations

HUC14 and Zone	Total Area (acres)	Existing Impervious (%)	Existing Impervious (acres)	Wetlands/ Water Area (acres)	Developable Area (acres)	Allowable Impervious (%)	Build-Out Impervious (acres)
J02040206070050							
PBR	2010	2	40.2	10	1959.8	5	97.99
HC	22.3	40	8.92	1	12.38	40	4.95
TOTALS	2032.3	42	49.12	11	1972.18		102.94

Table Pollutant Loads by Land Cover

Land Cover	Total Phosphorus Load (lbs/acre/year)	Total Nitrogen Load (lbs/acre/year)	Total Suspended Solids Load (lbs/acre/yr)
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
Commercial	2.1	22	200
Industrial	1.5	16	200
Urban, Mixed Urban, Other Urban	1.0	10	120
Agricultural	1.3	10	300
Forest, Water, Wetlands	0.1	3	40
Barrenland/Transitional Area	0.5	5	60

Source: NJDEP Stormwater BMP Manual 2004.

Build-Out Calculations

HUC14 and Zone	Total Area (acres)	Existing Impervious (%)	Existing Impervious (acres)	Wetlands/ Water Area (acres)	Developable Area (acres)	Allowable Impervious (%)	Build-Out Impervious (acres)
K02040206070060							
PBR	92	2	1.84	2	88.16	5	4.41
TOTALS	92	2	1.84	2	88.16	5	4.41

Table Pollutant Loads by Land Cover

Land Cover	Total Phosphorus Load (lbs/acre/year)	Total Nitrogen Load (lbs/acre/year)	Total Suspended Solids Load (lbs/acre/yr)
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Low Density, Rural Residential	0.6	5	100
Commercial	2.1	22	200
Industrial	1.5	16	200
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Agricultural	1.3	10	300
Forest, Water, Wetlands	0.1	3	40
Barrenland/Transitional Area	0.5	5	60

Source: NJDEP Stormwater BMP Manual 2004.

Nonpoint Source Loads at Build-Out

HUC14 and Zone	Build-Out Zoning	Developable Area (acres)	TP (lbs/acre/yr)	TP (lbs/yr)	TN (lbs/acre/yr)	TN (lbs/yr)	TSS (lbs/acre/yr)	TSS (lbs/yr)
A 02040206040020								
LI/O	Light Industrial Office	505.0	1.5	757.5	16	8080	200	101000
R2	Residential	206.6	1.4	289.24	15	3099	140	28924
PBR	Residential	400	0.6	240	5	200	100	20000
TOTALS		1111.6		1286.74		11379		169924

Nonpoint Source Loads at Build-Out

HUC14 and Zone	Build-Out Zoning	Developable Area (acres)	TP (lbs/acre/yr)	TP (lbs/yr)	TN (lbs/acre/yr)	TN (lbs/yr)	TSS (lbs/acre/yr)	TSS (lbs/yr)
B 02040206040040								
PBR	Residential	25	0.6	15	5	125	100	2500
TOTALS		25	0.6	15	5	125	100	2500

Nonpoint Source Loads at Build-Out

HUC14 and Zone	Build-Out Zoning	Developable Area (acres)	TP (lbs/acre/yr)	TP (lbs/yr)	TN (lbs/acre/yr)	TN (lbs/yr)	TSS (lbs/acre/yr)	TSS (lbs/yr)
C 02040206060040								
PBR	16000x1000 Residential	807.6	1.5	1211.4	16	12921.6	200	161520
M	Manufacturing	30.0	0.6	18	5	150	100	3000
TOTALS		837.6		1229.4		13071.6		164520

Nonpoint Source Loads at Build-Out

HUC14 and Zone	Build-Out Zoning	Developable Area (acres)	TP (lbs/acre/yr)	TP (lbs/yr)	TN (lbs/acre/yr)	TN (lbs/yr)	TSS (lbs/acre/yr)	TSS (lbs/yr)
D 020402060050								
PBR	Residential	2320	0.6	1392	5	11600	100	232000
M	Manufacturing	4.4	1.5	6.6	16	163	200	718080
VR	Village Residential	82.5	1.4	115.5	15	1237.5	140	11550
R1	Residential	68.9	1.4	96.46	15	1033.5	140	9646
TOTALS		2475.8		1610.56		140.34		971276

Nonpoint Source Loads at Build-Out

HUC14 and Zone	Build-Out Zoning	Developable Area (acres)	TP (lbs/acre/yr)	TP (lbs/yr)	TN (lbs/acre/yr)	TN (lbs/yr)	TSS (lbs/acre/yr)	TSS (lbs/yr)
E 02040206060060								
PBR	Residential	2910	0.6	1746	5	14550	100	291000
TOTALS		2910	0.6	1746	5	14550	100	291000

Nonpoint Source Loads at Build-Out

HUC14 and Zone	Build-Out Zoning	Developable Area (acres)	TP (lbs/acre/yr)	TP (lbs/yr)	TN (lbs/acre/yr)	TN (lbs/yr)	TSS (lbs/acre/yr)	TSS (lbs/yr)
F 02040206060070								
PBR	Residential	3710	0.6	2226	5	18550	100	371000
HC	Highway Commercial	28.7	2.1	60.27	22	631.4	200	57,40
TOTALS		3738.7		2286.27		19181.4		376740

Nonpoint Source Loads at Build-Out

HUC14 and Zone	Build-Out Zoning	Developable Area (acres)	TP (lbs/acre/yr)	TP (lbs/yr)	TN (lbs/acre/yr)	TN (lbs/yr)	TSS (lbs/acre/yr)	TSS (lbs/yr)
G 02040206060080								
PBR	Residential	50	0.6	30	5	250	100	5000
TOTALS		50	0.6	30	5	250	100	5000

Nonpoint Source Loads at Build-Out

HUC14 and Zone	Build-Out Zoning	Developable Area (acres)	TP (lbs/acre/yr)	TP (lbs/yr)	TN (lbs/acre/yr)	TN (lbs/yr)	TSS (lbs/acre/yr)	TSS (lbs/yr)
H 02040206070030								
HC	Highway Commercial	27.4	2.1	57.54	22	602.8	200	5480
PBR	Residential	2210	0.6	1326	5	11050	100	221000
TOTALS		2237.4		1383.54		11652.8		226480

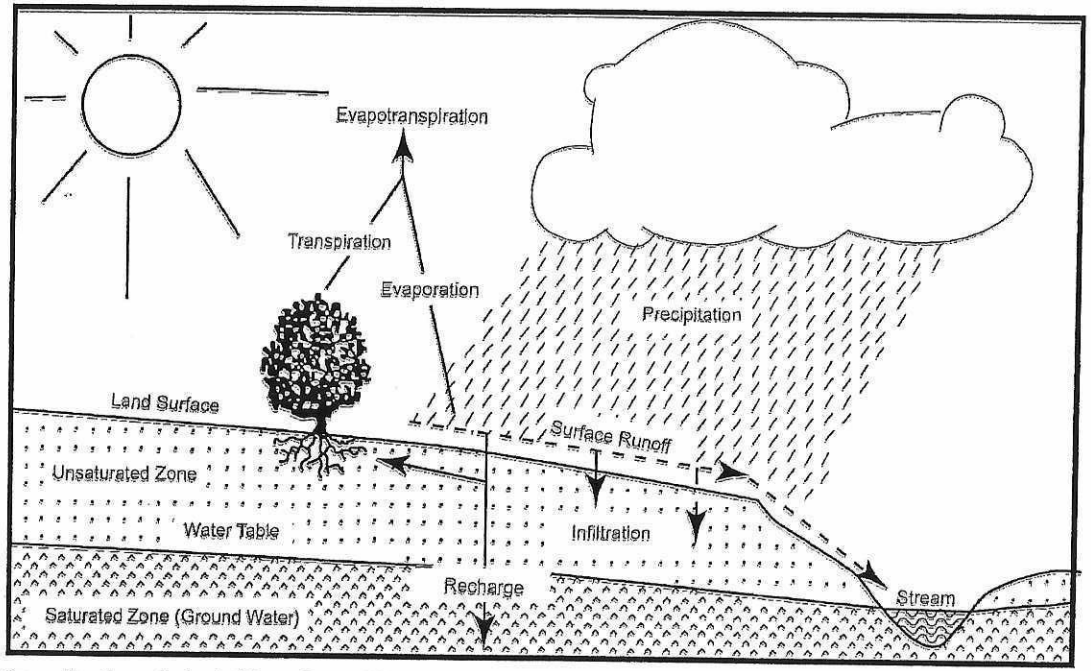
Nonpoint Source Loads at Build-Out

HUC14 and Zone	Build-Out Zoning	Developable Area (acres)	TP (lbs/acre/yr)	TP (lbs/yr)	TN (lbs/acre/yr)	TN (lbs/yr)	TSS (lbs/acre/yr)	TSS (lbs/yr)
J 02040206070050								
PBR	Residential	2010	0.6	1206	5	10050	100	201000
HC	Highway Commercial	22.3	2.1	46.83	22	490.6	200	4460
TOTALS		2032.3		1252.83		10540.6		205460

Nonpoint Source Loads at Build-Out

HUC14 and Zone	Build-Out Zoning	Developable Area (acres)	TP (lbs/acre/yr)	TP (lbs/yr)	TN (lbs/acre/yr)	TN (lbs/yr)	TSS (lbs/acre/yr)	TSS (lbs/yr)
K 02040206070060								
PBR	Residential	92	0.6	55.2	5	460	100	9200
TOTALS		92		55.2		460		9200

Figure 1: Groundwater Recharge in the Hydrologic Cycle



Source: New Jersey Geological Survey Report GSR-32.

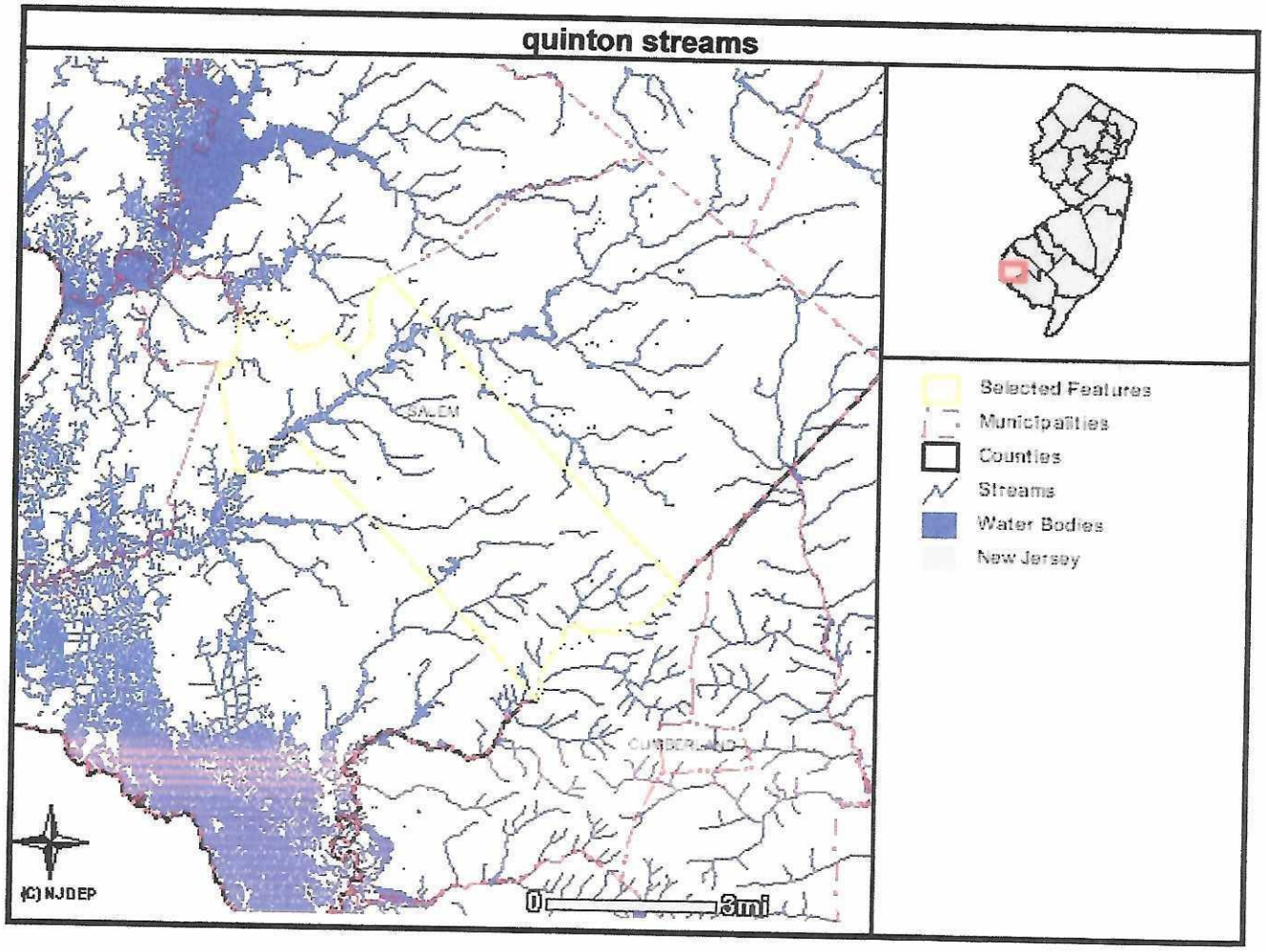

quinton streams
SALEM
CUMBERLAND
(C) NJDEP
0
3mi
Selected Features
Municipalities
Counties
Streams
Water Bodies
New Jersey

FIGURE 2

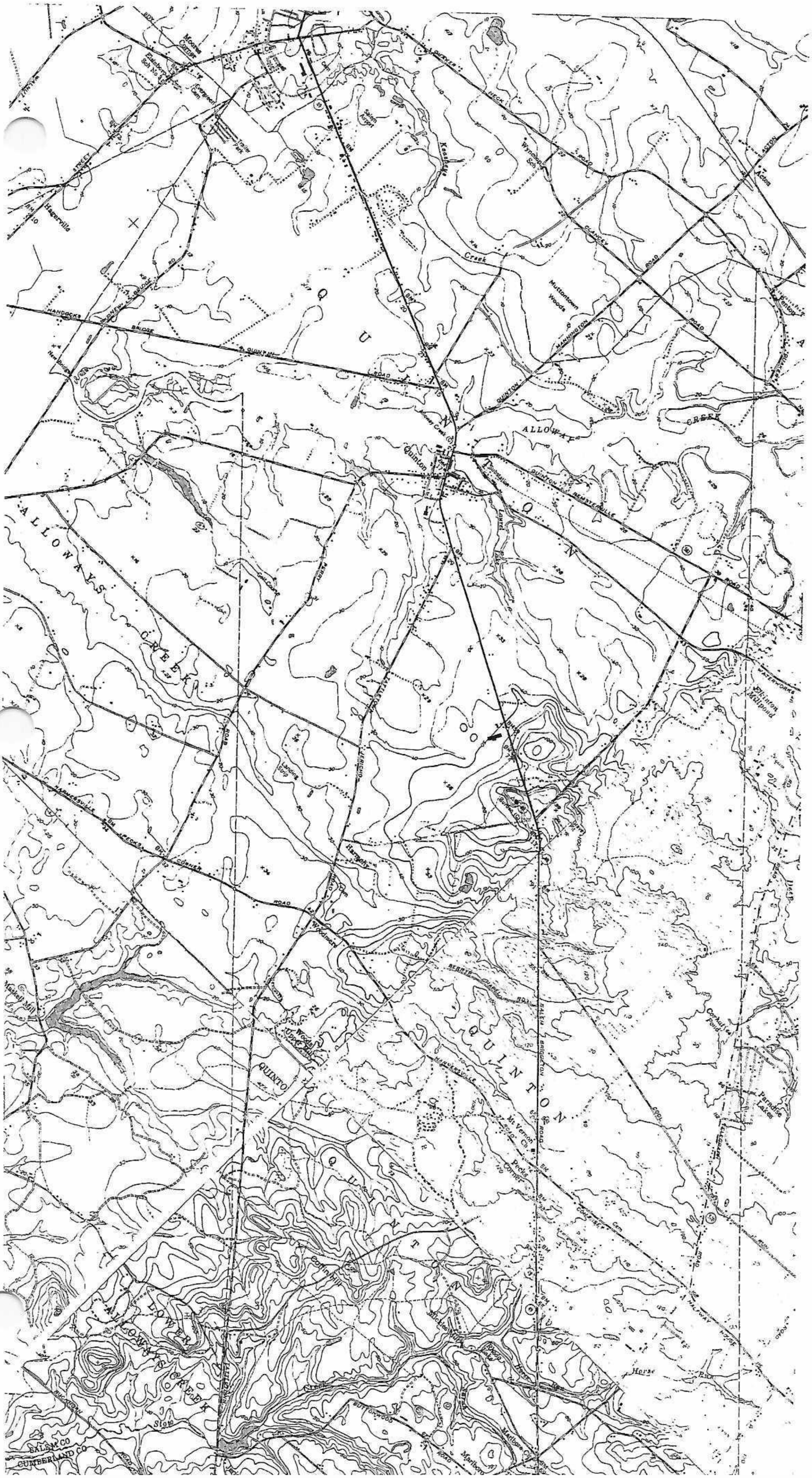
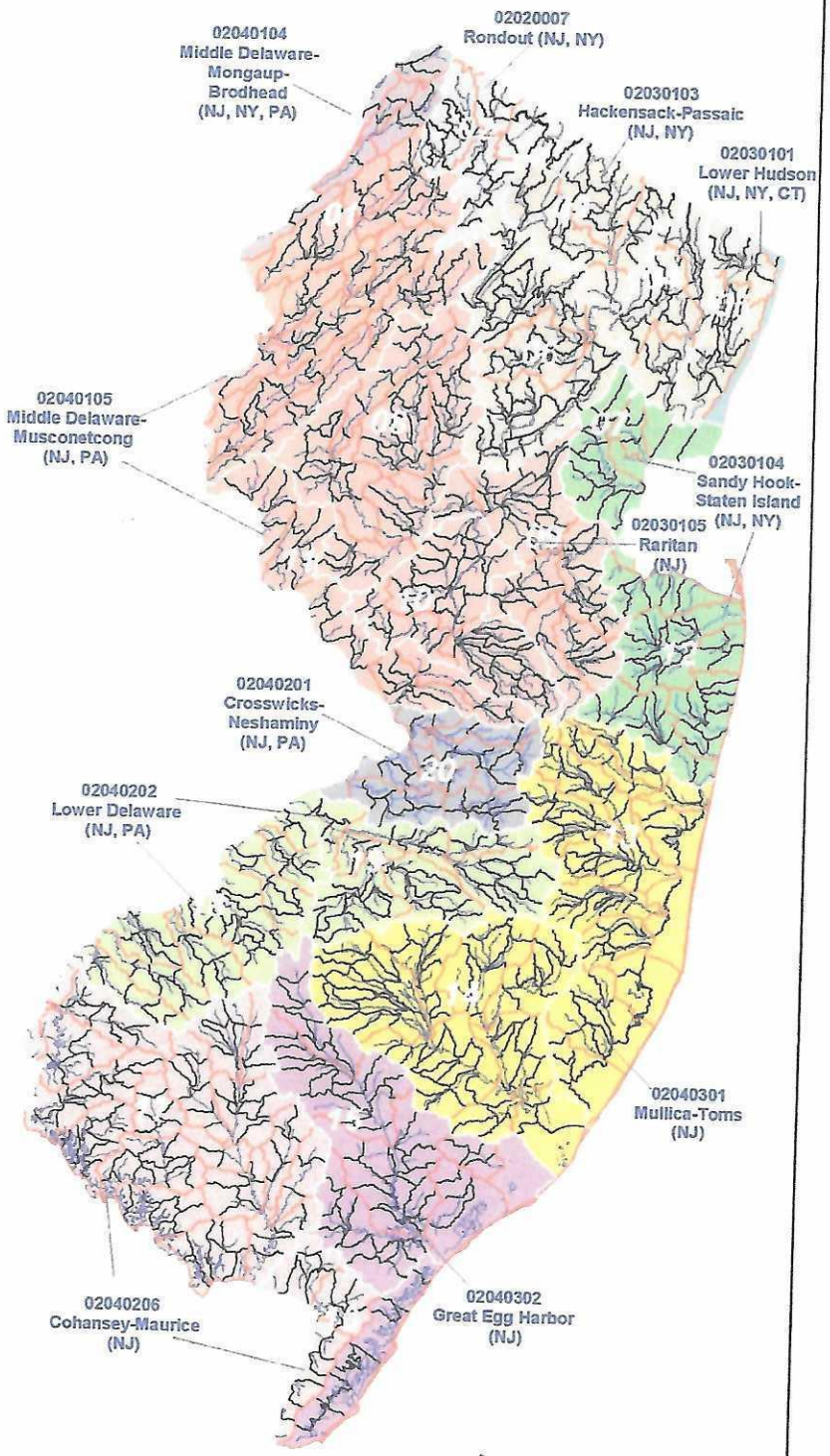

QUINTON
ALLOWAY CREEK
ALLOWAYS CREEK
Quinton
Muttontown Woods
Elkinton Millpond
Hagerville
SALEM CO
CUMBERLAND CO

FIGURE 3

Hydrologic Unit Codes (HUCs) in New Jersey



LEGEND

HUC8 - Regional watersheds - various colors (and labeled in blue).

HUC11 - Watersheds - red boundaries

HUC14 - Subwatersheds - black boundaries

WMA - Boundaries and numbers in white

River

DISTRIBUTION

HUC8 - There are 12 regional watersheds in New Jersey. Many of these extend beyond the State's border into New York or Pennsylvania.

HUC11 - There are 150 of these watersheds onshore. (A few large ones are offshore but not shown on this map.) As currently mapped these do not extend beyond the state's borders.

HUC14 - There are 921 of these subwatersheds onshore. (A few large ones are offshore but not shown on this map.) As currently mapped these do not extend beyond the State's borders.

SIZE

HUC8 - Range 29 to 1,269 square miles. Average 649 square miles.

HUC11 - Range 0.1 to 140.1 square miles. Average 51.9 square miles. (The smallest is mostly offshore.)

HUC14 - Range 0.1 to 42.0 square miles. Average 8.5 square miles. (The smallest is mostly offshore.)

HUC8 & WMA ALIGNMENT

HUC8s and WMA boundaries match well except in three places. Cape May is split between 2 HUC8s but is in one WMA. WMAs 1 and 5 are also split between two HUC8s.

EPA REPORTING REQUIREMENTS

EPA requests reporting on a HUC8 basis for their Index of Watershed Indicators (IWI) which includes 16 water indicators and is posted on the internet. They also have requested supplemental 319 reporting on a HUC 8 basis.

NOTES:

The U.S. Geological Survey has divided and subdivided watersheds using a coding scheme called the Hydrological Unit Codes (HUCs). Regional-level watersheds are numbered with a 8 digit code. They are referred to as HUC8s. The HUC8 boundaries were initially set by the national USGS office. Subdivision of the HUC8s (HUC11s and HUC14s) were set by the local USGS-WRD West Trenton office.

HUC8s are regional watersheds. HUC11s are smaller watersheds nestled in the HUC8s. HUC14s are smaller yet and are inside the HUC11s. For example, the the HUC8 02030103 is the Hackensack-Passaic drainage area (in New Jersey and New York). In New Jersey this is subdivided into 13 HUC11s and 108 HUC14s.

The HUC11s and 14s are currently in their 3rd version. The last revision (2000) was done with DEP cooperation and input. Boundaries were changed to correct some mistakes. The Pennsauken Creek and Cooper River watersheds were moved from one HUC8 to another at DEP's request to better match WMA boundaries. This change was done in consultation with and with agreement of USGS, EPA, NRCS and other agencies.

The current version of the HUC8s extends beyond the State's borders. The HUC11s and HUC14s do not. Future versions, done in conjunction with the other states and the USGS, may correct this.

Let's protect our earth

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

New Jersey Department of Environmental Protection
Division of Science, Research & Technology
New Jersey Geological Survey
January 2004

FIGURE 4

Subwatersheds of New Jersey

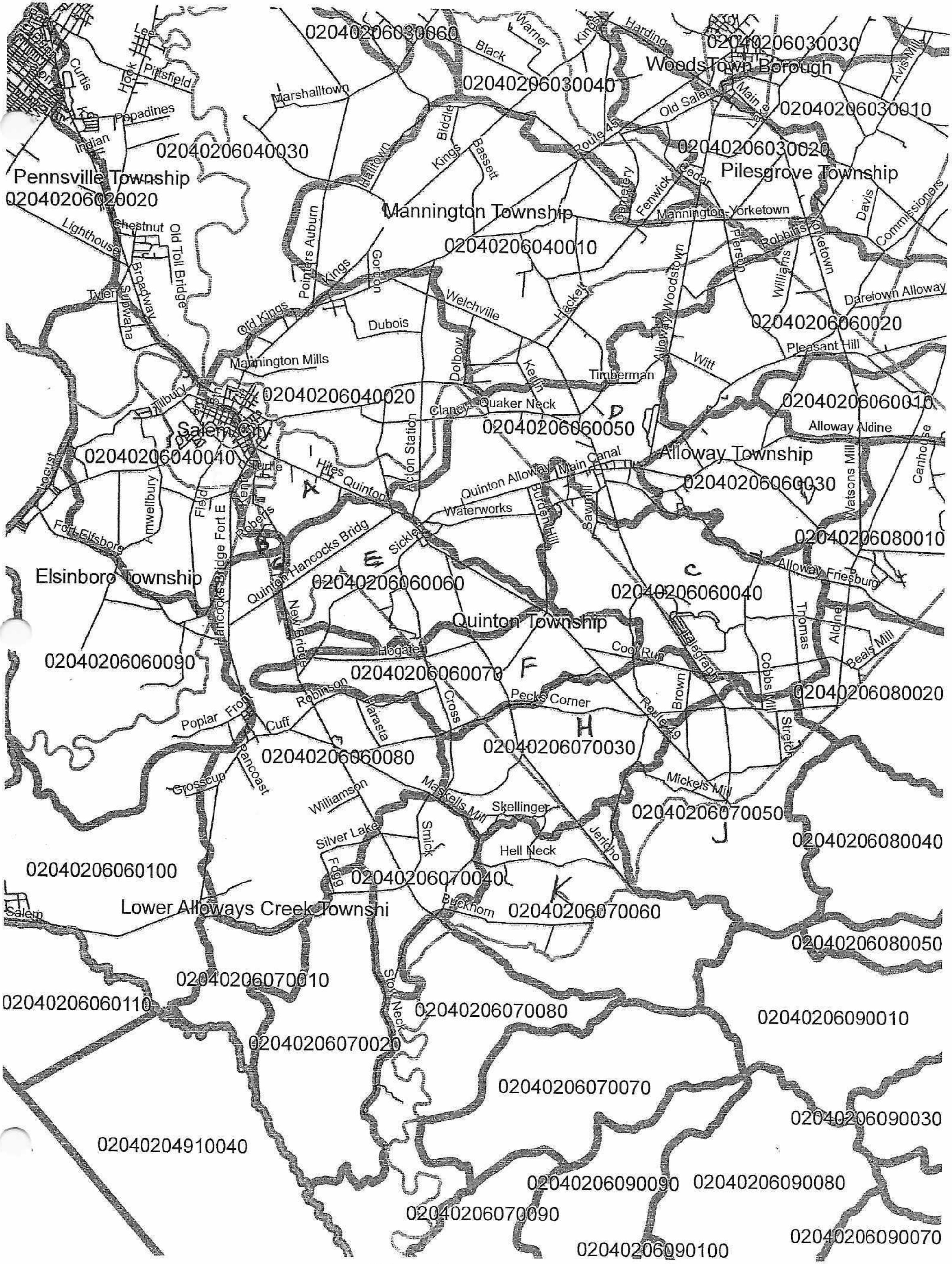
Entry	SWID	Subwatershed Description	HUC14 Code	Downstream SWID
664	16AA03	West Ck (Paper Mill Rd to Rt 550)	02040206210030	16AA04
665	16AA04	West Ck (below PaperMillRd) to MooresBch	02040206210040	17NA02
666	16AA05	Savages Run (above East Creek Pond)	02040206210050	16AA06
667	16AA06	East Creek	02040206210060	17NA02
668	16BA01	Dennis Ck / Cedar Swamp(Rt 47 to Rt 550)	02040206220010	16BA03
669	16BA02	Sluice Creek	02040206220020	16BA04
670	16BA03	Dennis Creek (Jakes Landing Rd to Rt 47)	02040206220030	16BA04
671	16BA04	Dennis Creek (below Jakes Landing Rd)	02040206220040	17NA01
672	16CA01	Bidwell Creek (above Rt 47)	02040206230010	16CA02
673	16CA02	Bidwell Ck(below Rt 47)-Dias to GoshenCk	02040206230020	17NA01
674	16CA03	Dias Creek	02040206230030	17NA01
675	16CA04	Green Ck (Norburys Landng to Pierces Pt)	02040206230040	17NA01
676	16CA05	Fishing Creek / Fishing Mill Stream	02040206230050	17NA01
677	16CA06	Cox Hall Creek / Mickels Run (to Villas)	02040206230060	17NA01
678	16CA07	Pond Creek / Cape May Canal West	02040206230070	17NA01
679	16DA01	Crook Horn Creek (above Devils Island)	02040302080010	16DA02
680	16DA02	Corson Inlet & Sound / Ludlam Bay	02040302080020	16EA02
681	16DA03	Mill Creek / Sunks Ck / Big Elder Creek	02040302080030	16DA04
682	16DA04	Cape May Bays (Reubens Wharf-BigElderCk)	02040302080040	16EA04
683	16DA05	Cape May Courthouse tribs	02040302080050	16DA07
684	16DA06	Mommy Teal Ck / Cresse Ck / Gravelly Run	02040302080060	16DA07
685	16DA07	Cape May Bays (Rt 47 to Reubens Wharf)	02040302080070	16EA05
686	16DA08	Mill Creek / Jones Creek / Taylor Creek	02040302080080	16DA09
687	16DA09	Cape May Harbor & Bays (below Rt 47)	02040302080090	16EA06
688	16EA01	Atlantic Coast (34th St to Corson Inlet)	02040302940010	16EA06
689	16EA02	Atlantic Coast(Corson to Townsends Inlt)	02040302940020	16EA06
690	16EA03	Atlantic Coast(Townsends to Hereford In)	02040302940030	16EA06
691	16EA04	Atlantic Coast (Hereford to Cape May In)	02040302940040	16EA06
692	16EA05	Atlantic Coast (CM Inlet to Cape May Pt)	02040302940050	16EA06
693	16EA06	Atlantic Coast (Seaward Cape May)	02040302940060	ATOC
694	17AA01	LDRV tribs (Lakeview Ave to Oldmans Ck)	02040206020010	17AA02
695	17AA02	LDRV tribs (Marsh Pt-Main St Pennsville)	02040206020020	17BB04
696	17BA01	Salem River (above Woodstown gage)	02040206030010	17BA03
697	17BA02	Nichomus Run	02040206030020	17BA03
698	17BA03	Salem R (CountyHomeRd to Woodstown gage)	02040206030030	17BA04
699	17BA04	Salem R (CoursesLanding to CountyHomeRd)	02040206030040	17BA06
700	17BA05	Game Creek (above Rt 48)	02040206030050	17BA07
701	17BA06	Salem R (39-40-14 dam-CoursesLndg)/Canal	02040206030060	17AA01
702	17BA07	Game Creek (below Rt 48)	02040206030070	17BA06
703	17BB01	Mannington Creek	02040206040010	17BB03
A 704	17BB02	Fenwick Creek / Keasbeys Creek	02040206040020	17BB04
705	17BB03	Salem R (Fenwick Ck to 39d40m14s dam)	02040206040030	17BB04
B 706	17BB04	Salem R (below Fenwick Creek)	02040206040040	17CA09
707	17CA01	Cool Run	02040206060010	17CA02
708	17CA02	Alloway Ck (above Alloway-Woodstown Rd)	02040206060020	17CA05
709	17CA03	Cedar Brook / Carlisle Run	02040206060030	17CA05
C 710	17CA04	Deep Run (Alloway)	02040206060040	17CA05
D 711	17CA05	Alloway Ck (Quinton to Alloway-WdstwnRd)	02040206060050	17CA06
E 712	17CA06	Alloway Creek (New Bridge to Quinton)	02040206060060	17CA08
F 713	17CA07	Harmony trib (Alloway Creek)	02040206060070	17CA08
G 714	17CA08	Alloway Ck (HancocksBridge to NewBridge)	02040206060080	17CA09

FIGURE 5

Subwatersheds of New Jersey

Entry	SWID	Subwatershed Description	HUC14 Code	Downstream SWID
715	17CA09	Alloway Ck (below HancocksBr) to Salem R	02040206060090	17CA10
716	17CA10	Hope Creek / Artificial Island	02040206060100	17CA11
717	17CA11	Delaware Bay (Fishing Ck to Alloway Ck)	02040206060110	17NA04
718	17DA01	Fishing Creek / Bucks Ditch/Pattys Fork	02040206070010	17NA04
719	17DA02	Mad Horse Ck / Little Ck / Turners Fork	02040206070020	17NA04
H · 720	17DA03	Canton Drain (above Maskell Mill)	02040206070030	17DA04
721	17DA04	Canton Drain (below Maskell Mill)	02040206070040	17DA08
J · 722	17DA05	Stow Creek (above Jericho Road)	02040206070050	17DA06
K · 723	17DA06	Stow Creek (Canton Road to Jericho Road)	02040206070060	17DA08
724	17DA07	Raccoon Ditch (Stow Creek)	02040206070070	17DA08
725	17DA08	Stow Creek (below Canton Rd)	02040206070080	17NA04
726	17DA09	Phillips Creek / Jacobs Creek	02040206070090	17NA04
727	17EA01	Cohansey River (above Beals Mill)	02040206080010	17EA02
728	17EA02	Cohansey R (incl HandsPond - Beals Mill)	02040206080020	17EA04
729	17EA03	Parsonage Run / Foster Run	02040206080030	17EA04
730	17EA04	Cohansey R (incl Beebe Run to HandsPond)	02040206080040	17EA05
731	17EA05	Cohansey R (incl CornwellRun - BeebeRun)	02040206080050	17EB03
732	17EB01	Barrett Run (above West Ave)	02040206090010	17EB03
733	17EB02	Indian Fields Branch / Jackson Run	02040206090020	17EB03
734	17EB03	Cohansey R (Rocaps Run to Cornwell Run)	02040206090030	17EB06
735	17EB04	Mill Creek (above/incl Maple House Bk)	02040206090040	17EB05
736	17EB05	Mill Creek (below Maple House Bk)	02040206090050	17EB06
737	17EB06	Cohansey R (75d15m to/incl Rocaps Run)	02040206090060	17EB07
738	17EB07	Cohansey R (75d17m50s to 75d15m)	02040206090070	17EB08
739	17EB08	Cohansey R (Greenwich to 75d17m50s)	02040206090080	17EB10
740	17EB09	Pine Mount Creek	02040206090090	17EB10
741	17EB10	Cohansey R (below Greenwich)	02040206090100	17NA03
742	17FA01	Middle Marsh Ck (DrumboCk to Sea Breeze)	02040206100010	17NA03
743	17FA02	Bridges Sticks Creek / Ogden Creek	02040206100020	17FA03
744	17FA03	Back Creek (Sea Breeze Rd to Cedar Ck)	02040206100030	17NA03
745	17FA04	Cedar Creek (above Rt 553)	02040206100040	17FA05
746	17FA05	Cedar Creek (below Rt 553)	02040206100050	17NA03
747	17FA06	Nantuxent Creek (above Newport Landing)	02040206100060	17FA07
748	17FA07	Nantuxent Creek (below Newport Landing)	02040206100070	17NA03
749	17GA01	Newport Neck (Nantuxent to Beadons Ck)	02040206110010	17NA03
750	17GA02	Fortesque Ck / Fishing Ck / Straight Ck	02040206110020	17NA03
751	17GA03	Oranoaken Creek	02040206110030	17NA02
752	17GA04	Mill Creek (Dividing Creek)	02040206110040	17GA06
753	17GA05	Dividing Creek (above Mill Creek)	02040206110050	17GA06
754	17GA06	Dividing Creek (below Mill Creek)	02040206110060	17NA02
755	17GA07	New England Creek (Kenny Pt to Elder Pt)	02040206110070	17NA02
756	17HA01	MauriceR(BlkwtrBr to/incl WillowGroveLk)	02040206140010	17HA06
757	17HA02	Burnt Mill Branch / Hudson Branch	02040206140020	17HA01
758	17HA03	Green Branch / Endless Branch	02040206140030	17HA01
759	17HA04	Blackwater Branch (above/incl Pine Br)	02040206140040	17HA05
760	17HA05	Blackwater Branch (below Pine Branch)	02040206140050	17HA06
761	17HA06	Maurice R (Sherman Ave to Blackwater Br)	02040206140060	17HB03
762	17HA07	Parvin Branch / Tarkiln Branch	02040206140070	17HB03
763	17HB01	Lebanon Branch (Mill Creek)	02040206160010	17HB03
764	17HB02	Chatfield Branch (Mill Creek)	02040206160020	17HB03
765	17HB03	Maurice River(Union Lake to Sherman Ave)	02040206160030	17HC03

FIGURE 5


Pennsville Township
Mannington Township
Pilesgrove Township
WoodsTown Borough
Salem City
Elsinboro Township
Alloway Township
Quinton Township
Lower Alloways Creek Townshi
02040206030060
02040206030030
02040206030040
02040206030010
02040206030020
02040206040030
02040206020020
02040206040010
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02040206090100
02040206090070
Black
Warner
Kings
Harding
Avis Mill
Curtis
Lee
Hook
Pittsfield
Marshalltown
Popadines
Indian
Old Salem
Main
Biddle
Kings
Bassett
Halltown
Route 45
Cemetery
Fenwick
Cedar
Mannington-Yorketown
Davis
Commissioners
Lighthouse
Chestnut
Old Toll Bridge
Pointers Auburn
Kings
Gordon
Woodstown
Pierson
Robbins
Yorketown
Williams
Tyler
Broadway
Supwaha
Old Kings
Welchville
Hackett
Daretown Alloway
Dubois
Pleasant Hill
Mannington Mills
Dolbow
Kellin
Timberman
Alloway
Witt
Tilbury
Clancy
Quaker Neck
Acton Station
Alloway Aldine
Canhouse
Locust
Amwellbury
Turtle
Hites
Quinton
Quinton Alloway
Main
Canal
Watsons Mill
Field
Kent
Roberts
Waterworks
Burden Hill
Sawmill
Fort Elfsboro
Quinton Hancocks Bridg
Sickler
Alloway Friesburg
Hancocks Bridge Fort E
New Bridge
Thomas
Aldine
Beals Mill
Hogate
Cool Run
Telegraph
Cobbs Mill
Robinson
Harasta
Cross
Pecks Corner
Brown
Route 49
Poplar
Front
Cuff
Stretch
Rancoast
Grosscup
Williamson
Maskells Mill
Skellinger
Mickels Mill
Silver Lake
Smick
Jericho
Hell Neck
Fogg
Buckhorn
Salem
Stow Neck
A
B
C
D
E
F
G
H
I
J
K

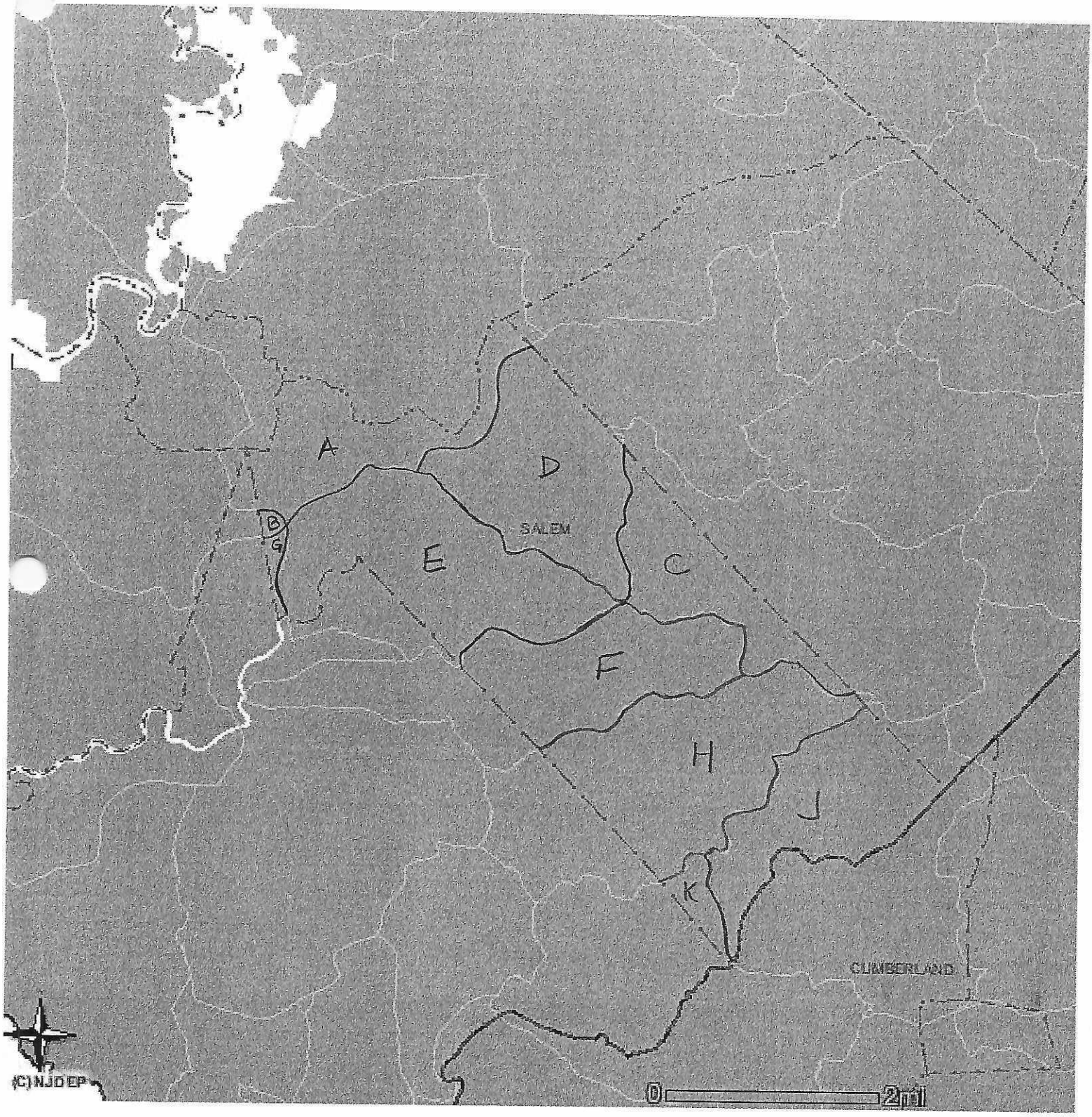


FIGURE 7

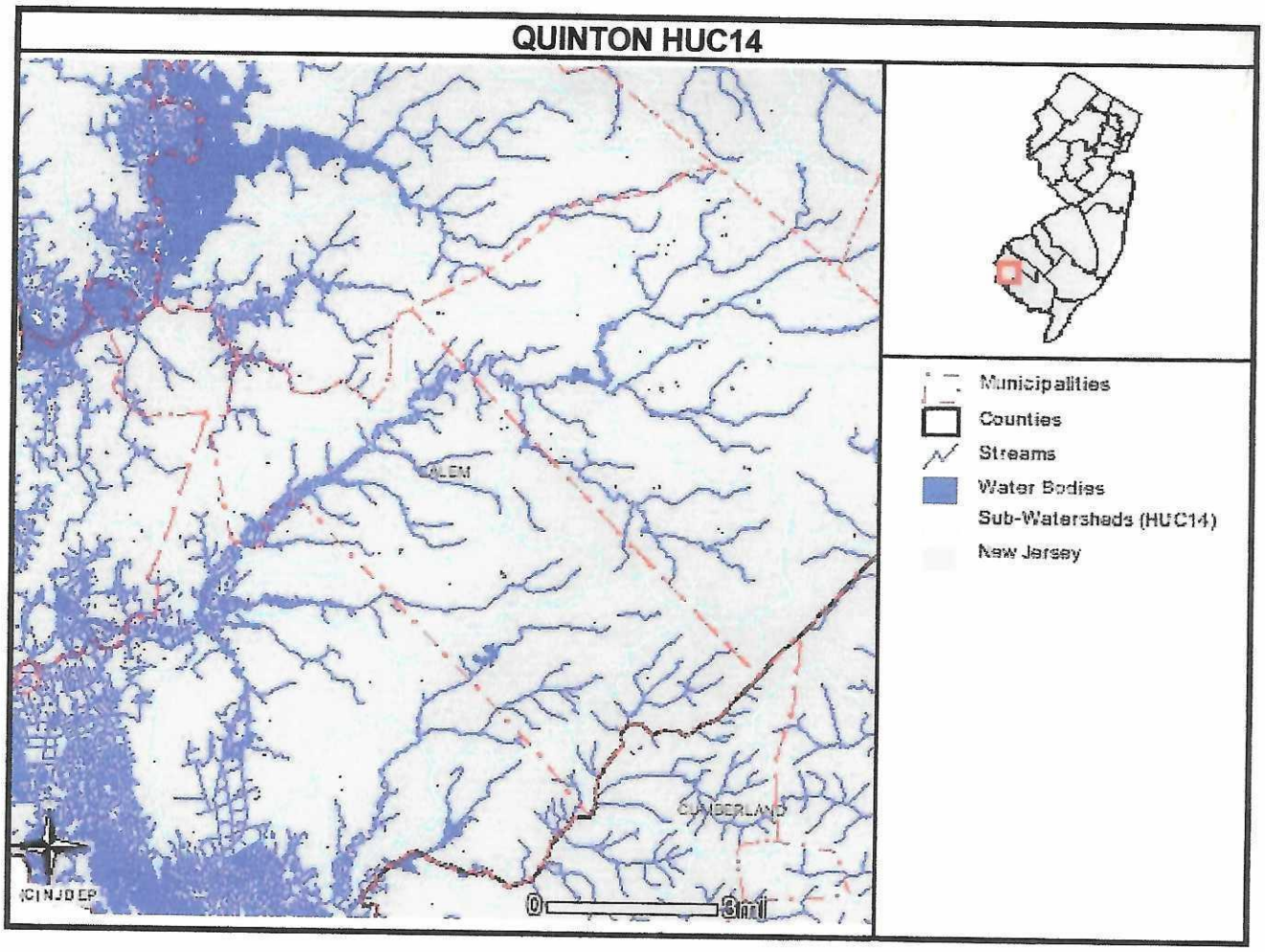

QUINTON HUC14
Municipalities
Counties
Streams
Water Bodies
Sub-Watersheds (HUC14)
New Jersey
0
3mi

FIGURE 7

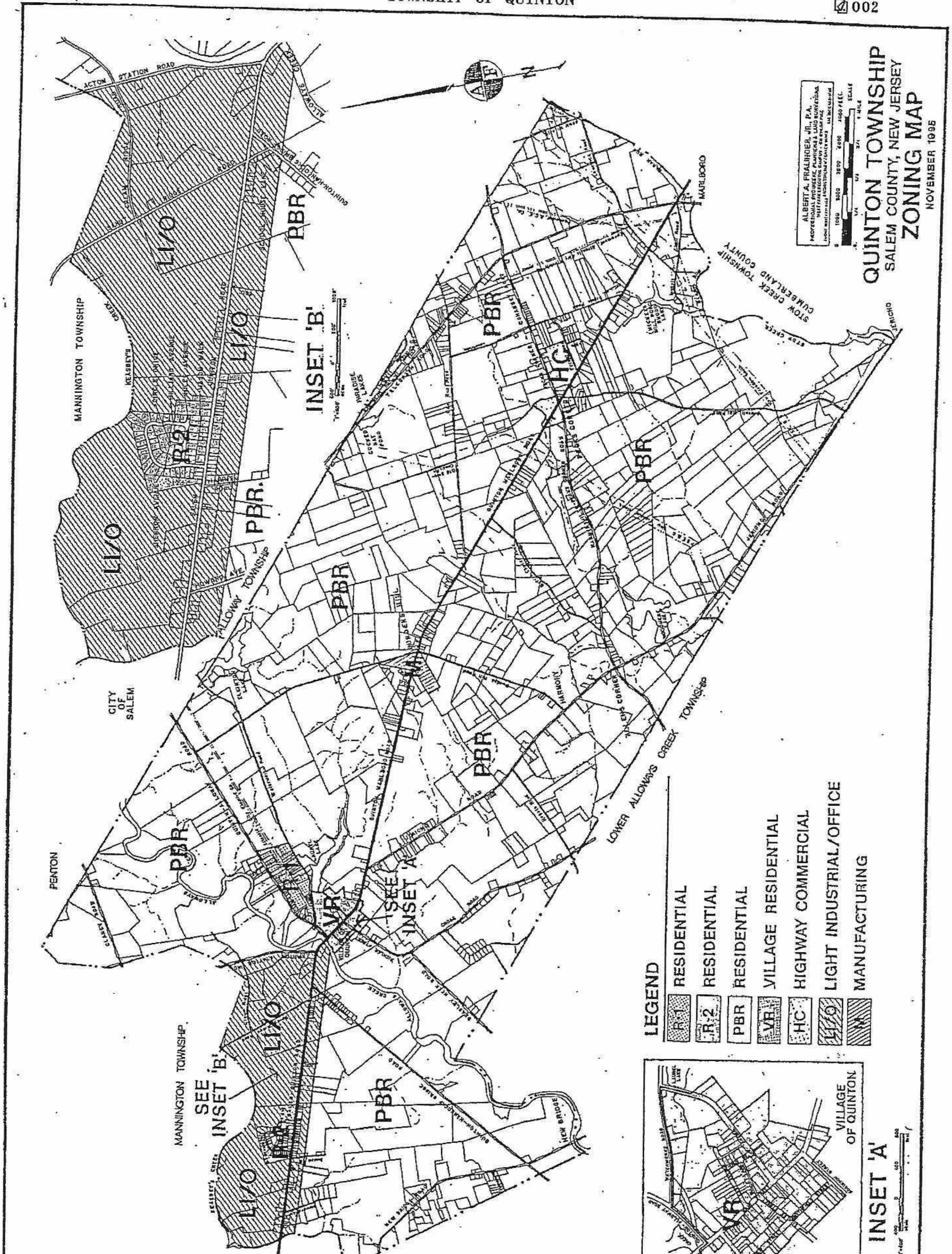

QUINTON TOWNSHIP
SALEM COUNTY, NEW JERSEY
ZONING MAP
NOVEMBER 1996
LEGEND
R-1 RESIDENTIAL
R-2 RESIDENTIAL
PBR RESIDENTIAL
VR VILLAGE RESIDENTIAL
HC HIGHWAY COMMERCIAL
LI/O LIGHT INDUSTRIAL/OFFICE
M MANUFACTURING
INSET 'A'
VILLAGE OF QUINTON
INSET 'B'
SEE INSET 'B'
SEE INSET 'A'
MANNINGTON TOWNSHIP
CITY OF SALEM
ALLOWAY TOWNSHIP
LOWER ALLOWAYS CREEK TOWNSHIP
STOW CREEK TOWNSHIP
CUMBERLAND COUNTY
PENTON
MARLBORO
JERICHO
HARMONY
NEW BRIDGE
ACTON STATION ROAD
PBR
LI/O
R2
VR
HC

FIGURE 8

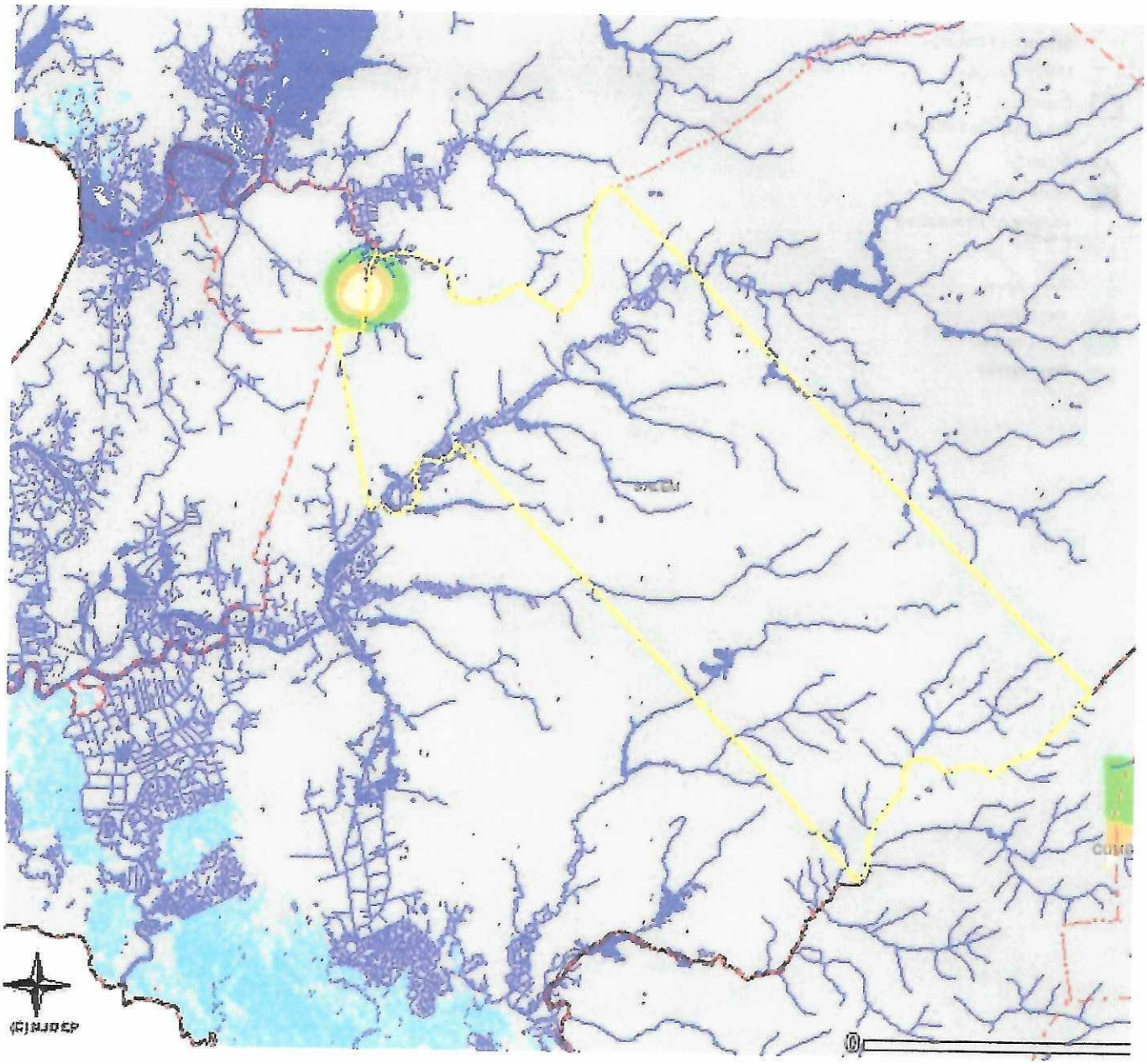


FIGURE 9

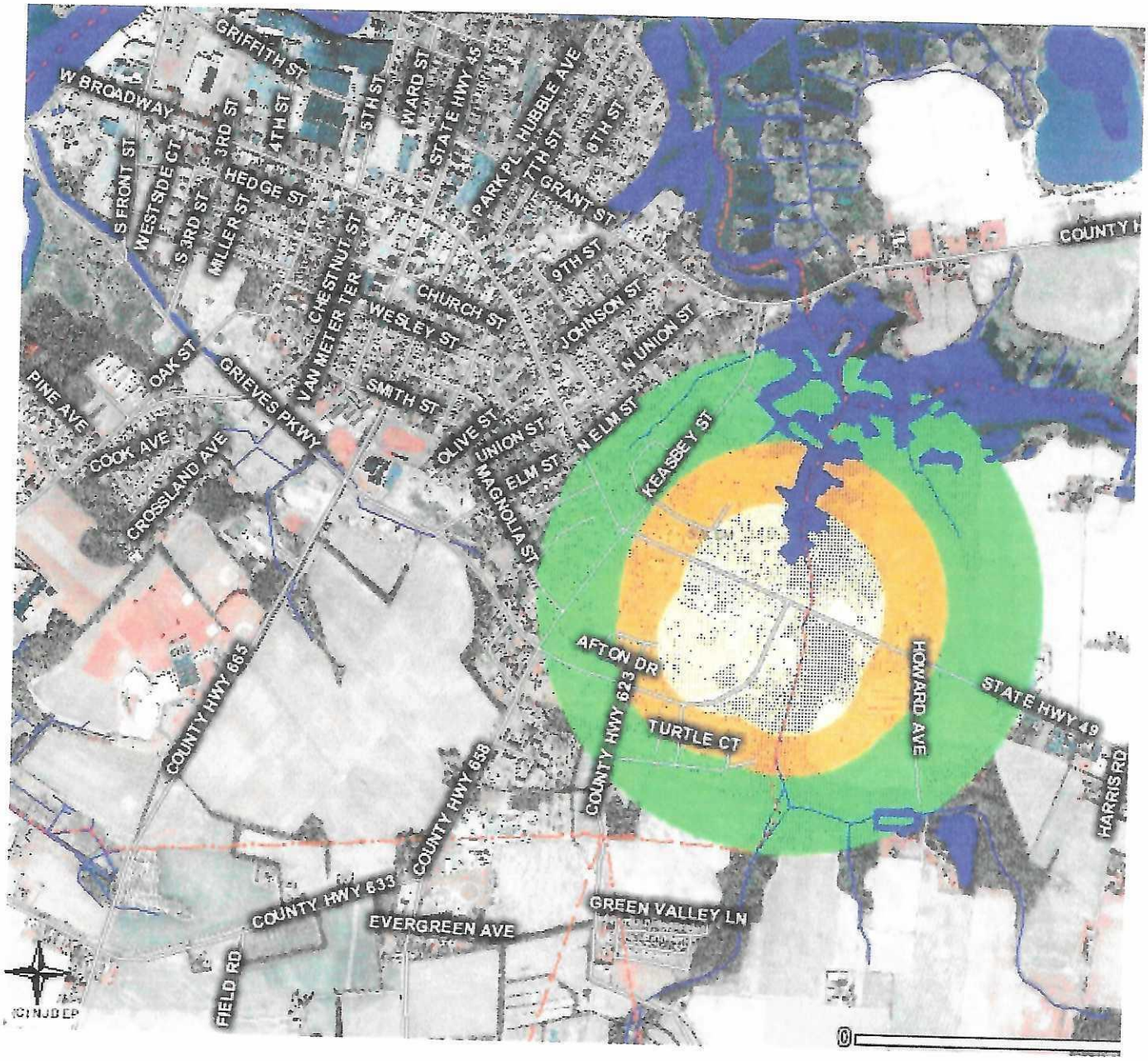

GRIFFITH ST
W BROADWAY
S FRONT ST
WESTSIDE CT
3RD ST
4TH ST
5TH ST
WARD ST
STATE HWY 45
PARK PL
HUBBLE AVE
6TH ST
7TH ST
GRANT ST
HEDGE ST
S 3RD ST
MILLER ST
CHESTNUT ST
VAN METER TER
WESLEY ST
CHURCH ST
9TH ST
JOHNSON ST
N UNION ST
COUNTY
PINE AVE
OAK ST
GRIEVES PKWY
SMITH ST
OLIVE ST
UNION ST
N ELM ST
KEASBEY ST
COOK AVE
CROSSLAND AVE
MAGNOLIA ST
ELM ST
AFTON DR
COUNTY HWY 665
COUNTY HWY 623
HOWARD AVE
STATE HWY 49
TURTLE CT
COUNTY HWY 658
HARRIS RD
COUNTY HWY 633
EVERGREEN AVE
GREEN VALLEY LN
FIELD RD
©NJDEP
0

FIGURE 9


Municipalities
Counties
Roads (Tele Atlas)
Streams
Water Bodies
Well Head Protection Areas
Tier 1. 2 Year
Tier 2. 5 Year
Tier 3. 12 Year
Aerial Photos 2002
New Jersey

FIGURE 9

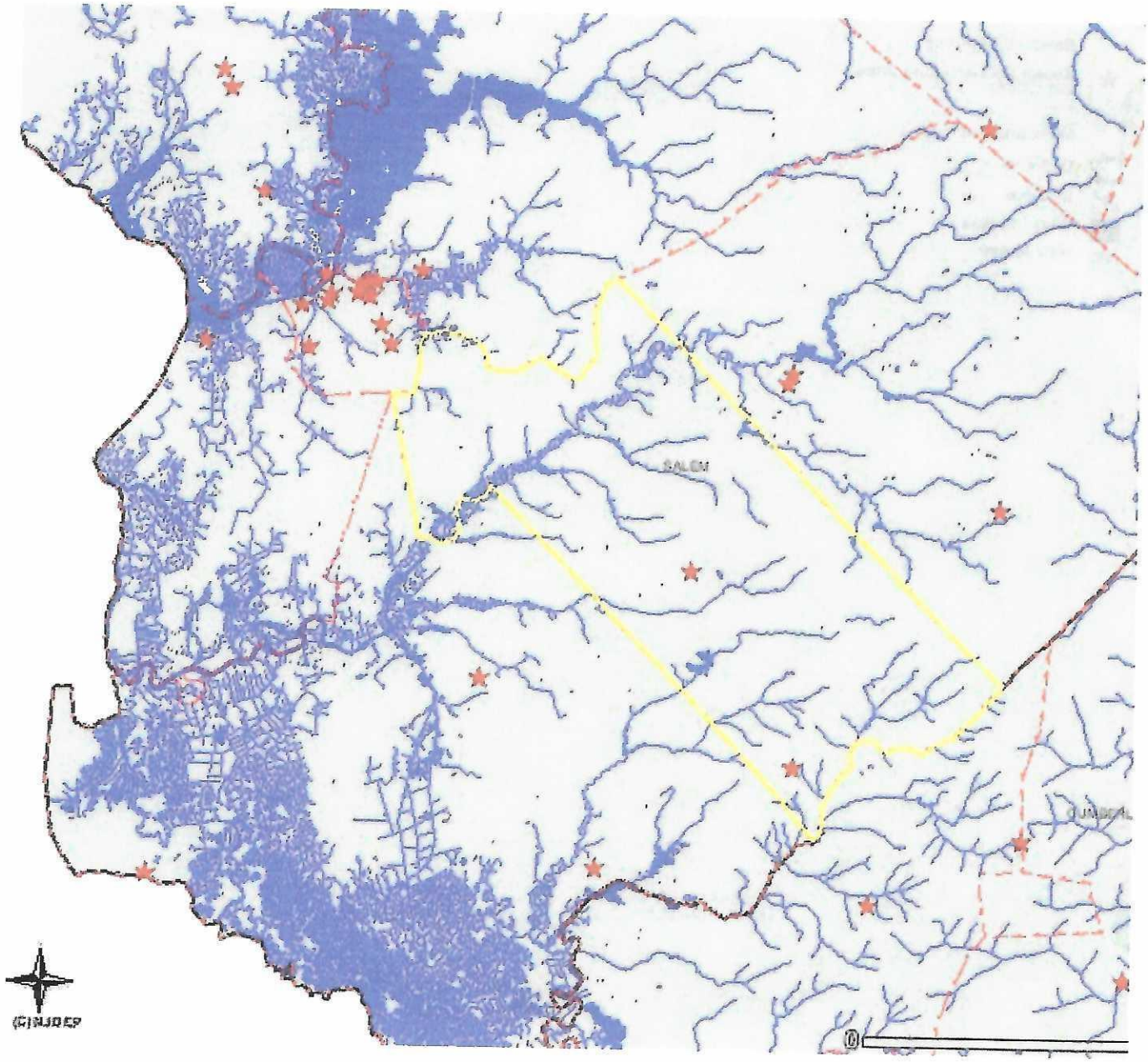


FIGURE 10

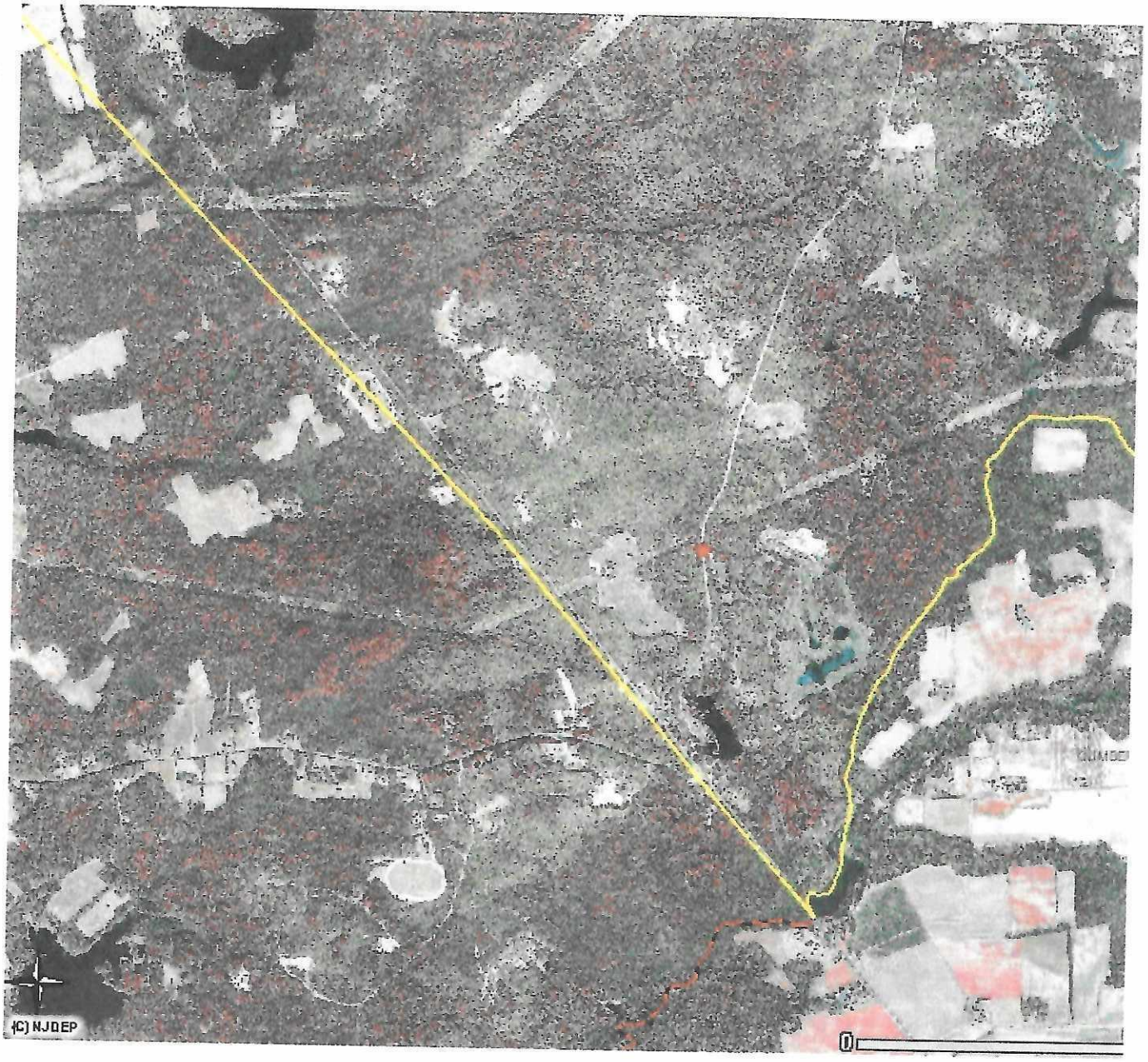


FIGURE 11

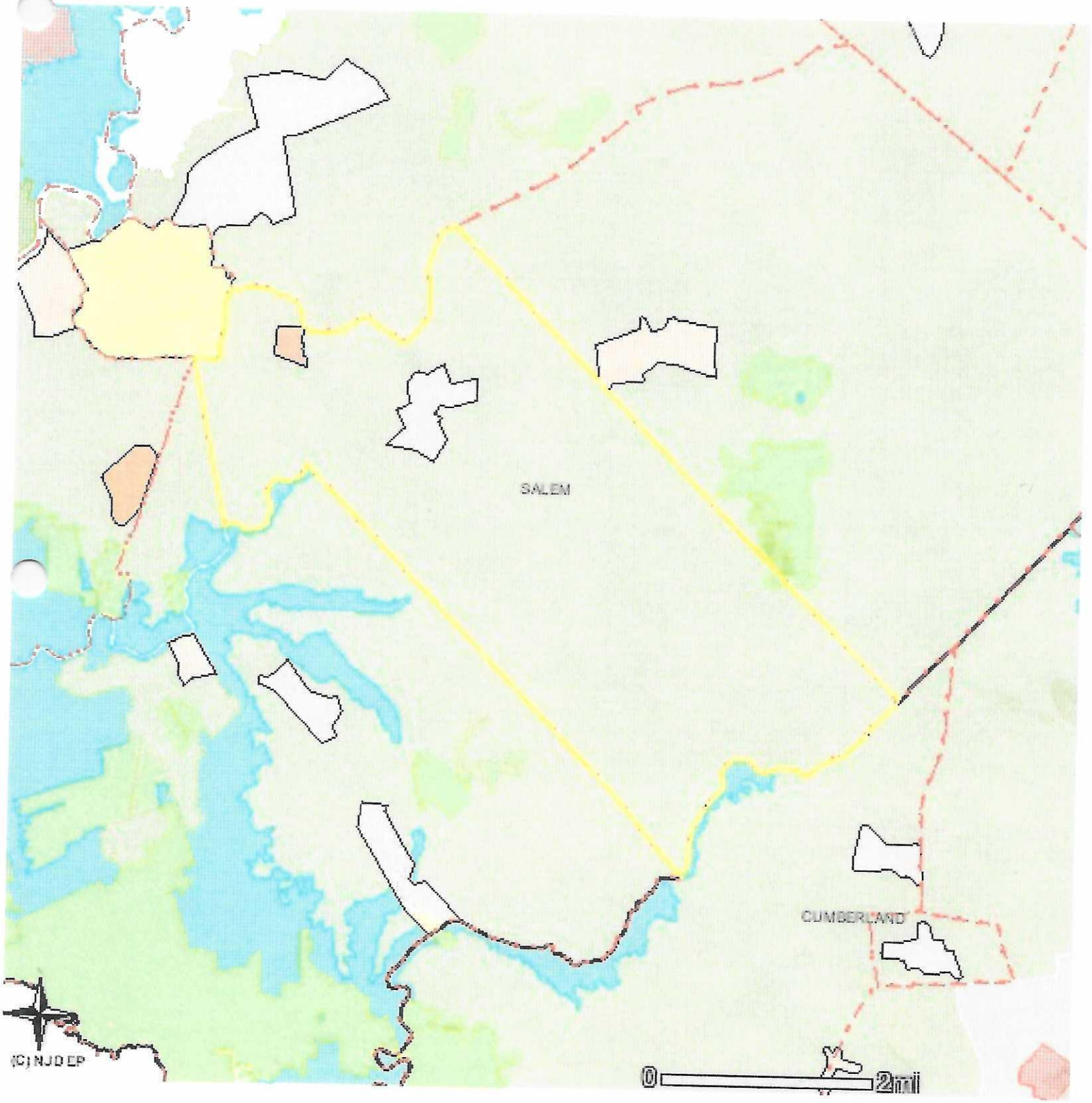


FIGURE 12


Selected Features
Municipalities
Counties
State Plan Centers
DESIGNATED TOWN
DESIGNATED REGIONAL CENTER
DESIGNATED HAMLET
PLANNED REGIONAL CENTER
URBAN CENTER
PLANNED VILLAGE
DESIGNATED VILLAGE
PLANNED HAMLET
PLANNED TOWN
Other
State Planning Areas
ENVIRONMENTALLY SENSITIVE
FRINGE
RURAL
WATER
PARK 2ND PLAN
STATE PARK
ENV SENSITIVE BARRIER IS
ELLIS ISLAND
NEW JERSEY MEADOWLANDS
COUNTY PARK
COUNTY PARK P2
PARK 1ST PLAN
MILITARY
ELLIS ISLAND NY
RURAL ENV SENSITIVE
METROPOLITAN
SUBURBAN
NATIONAL PARK CROSS ACC.
FED PARK CROSS ACC.
PARK 1ST & 2ND PLAN
FEDERAL PARK
PINELANDS
Other
New Jersey

FIGURE 12

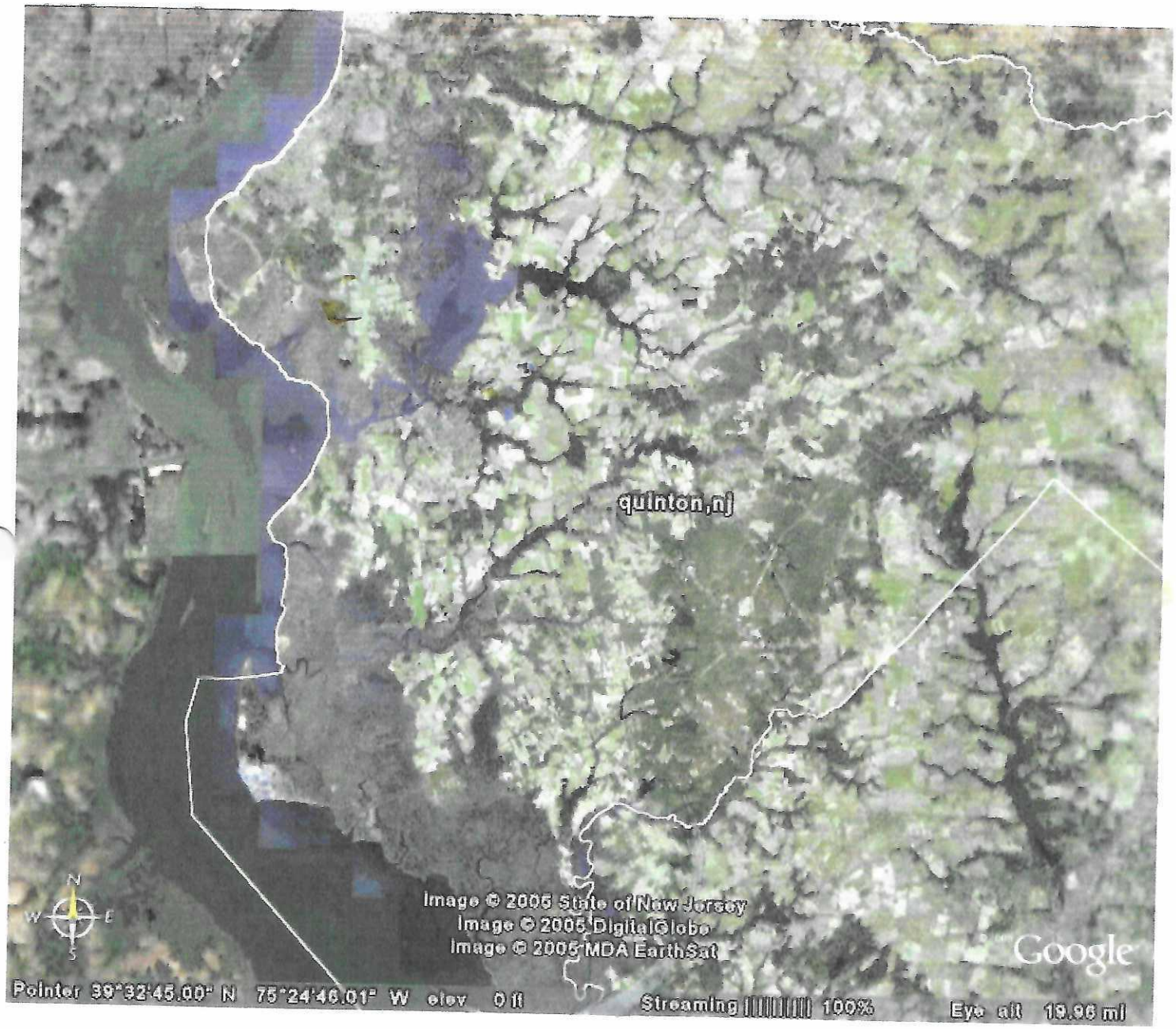

quinton,nj
Image © 2005 State of New Jersey
Image © 2005 DigitalGlobe
Image © 2005 MDA EarthSat
Google
Pointer 39°32'45.00" N 75°24'46.01" W elev 0 ft
Streaming 100%
Eye alt 19.96 mi

FIGURE 13

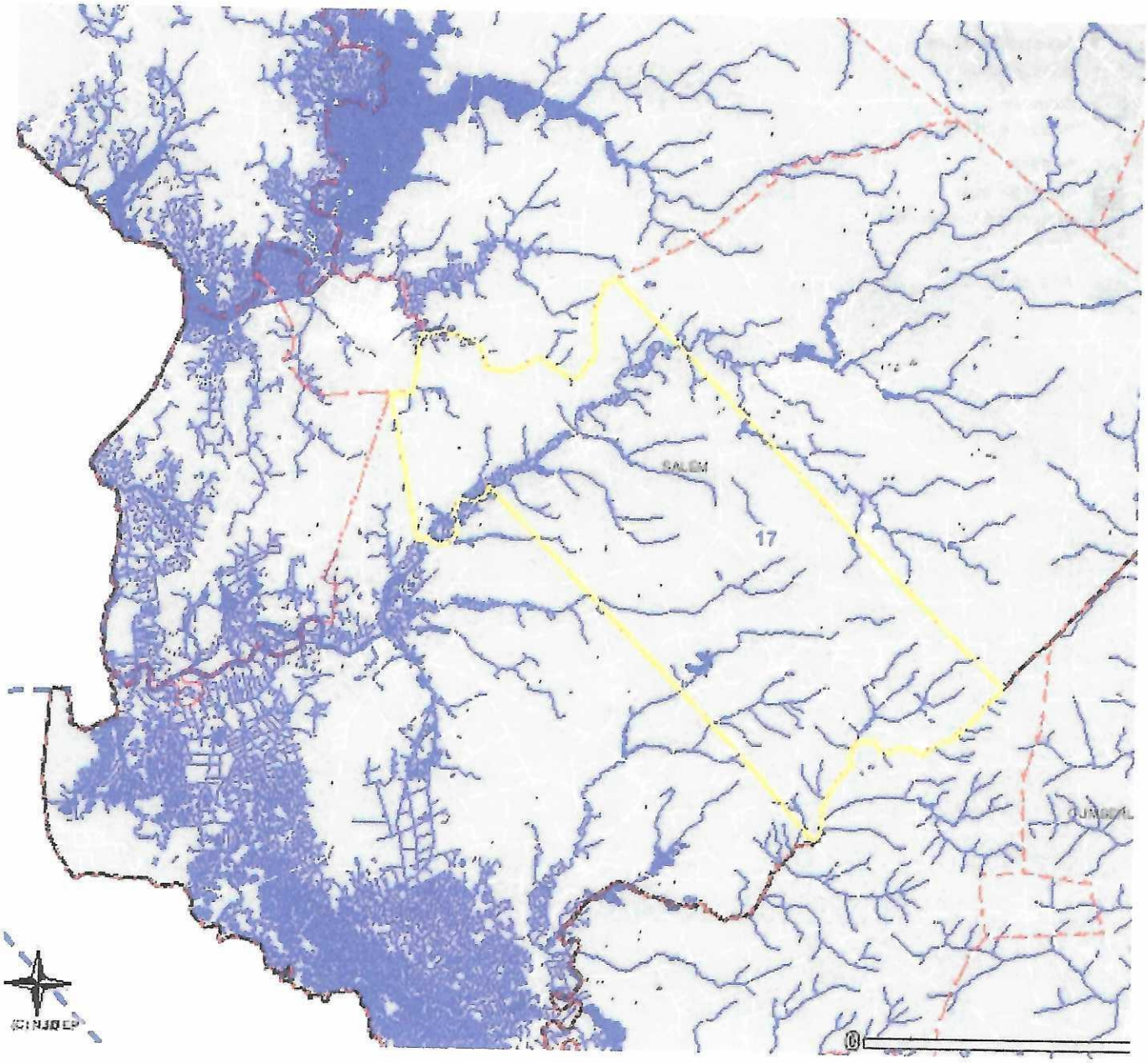


FIGURE 14


Selected Features
Municipalities
Counties
Roads (NJDOT)
Streams
Water Bodies
Watershed Management Areas
New Jersey

FIGURE 14

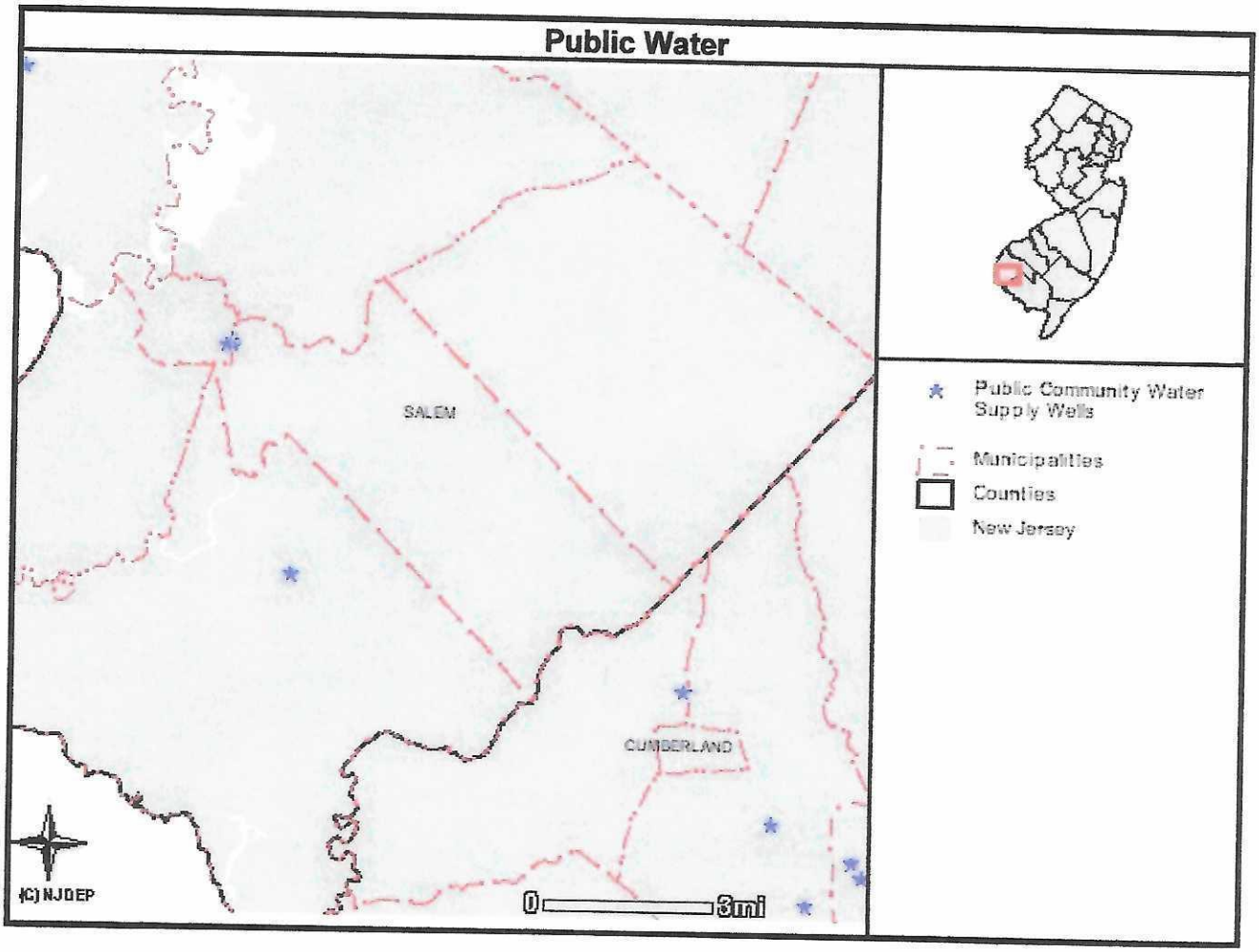
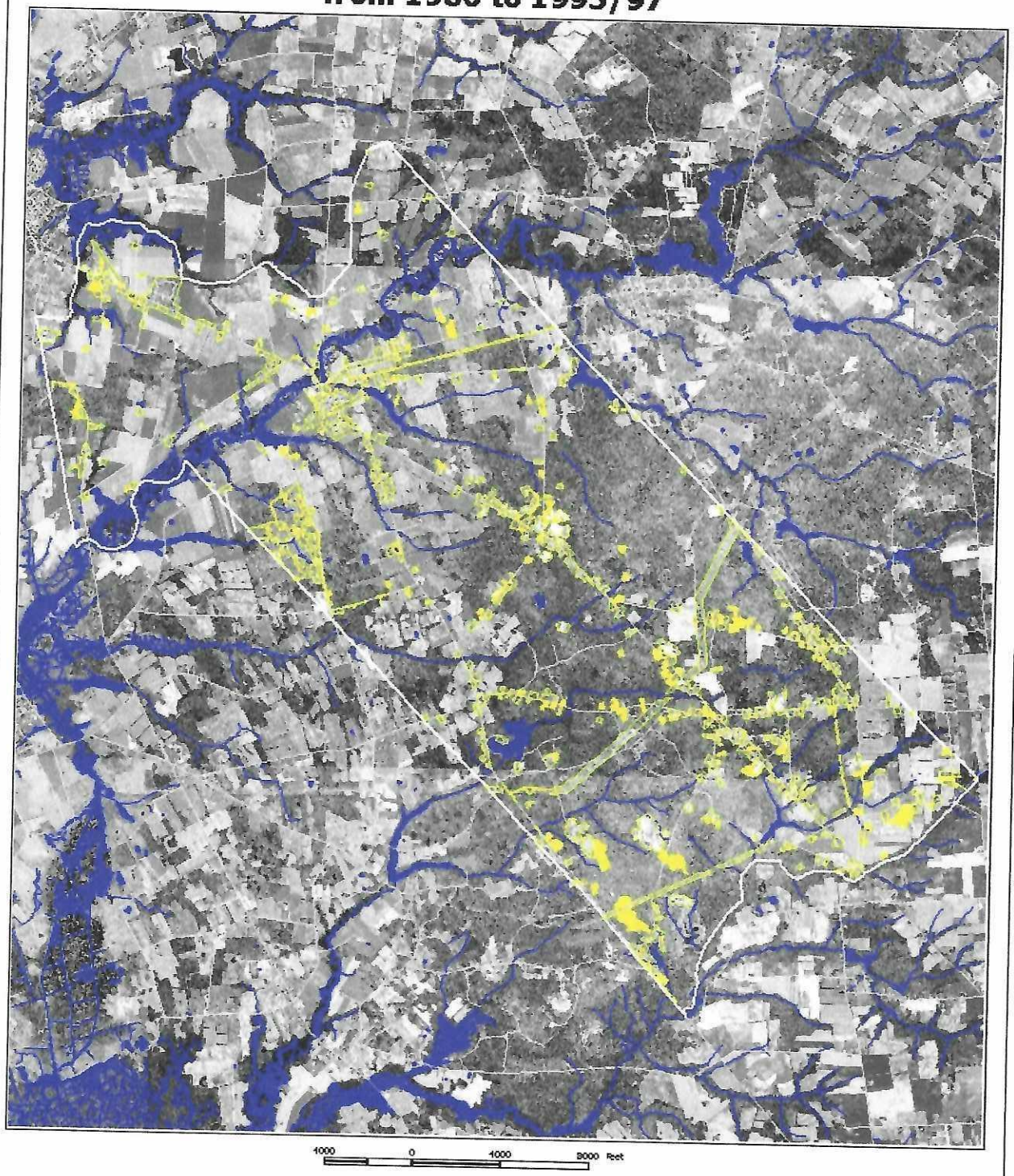

Public Water
SALEM
CUMBERLAND
(C) NJDEP
0
3mi
Public Community Water Supply Wells
Municipalities
Counties
New Jersey

FIGURE 15

Quinton Twp, New Jersey

Showing Growth in Developed Use Areas from 1986 to 1995/97



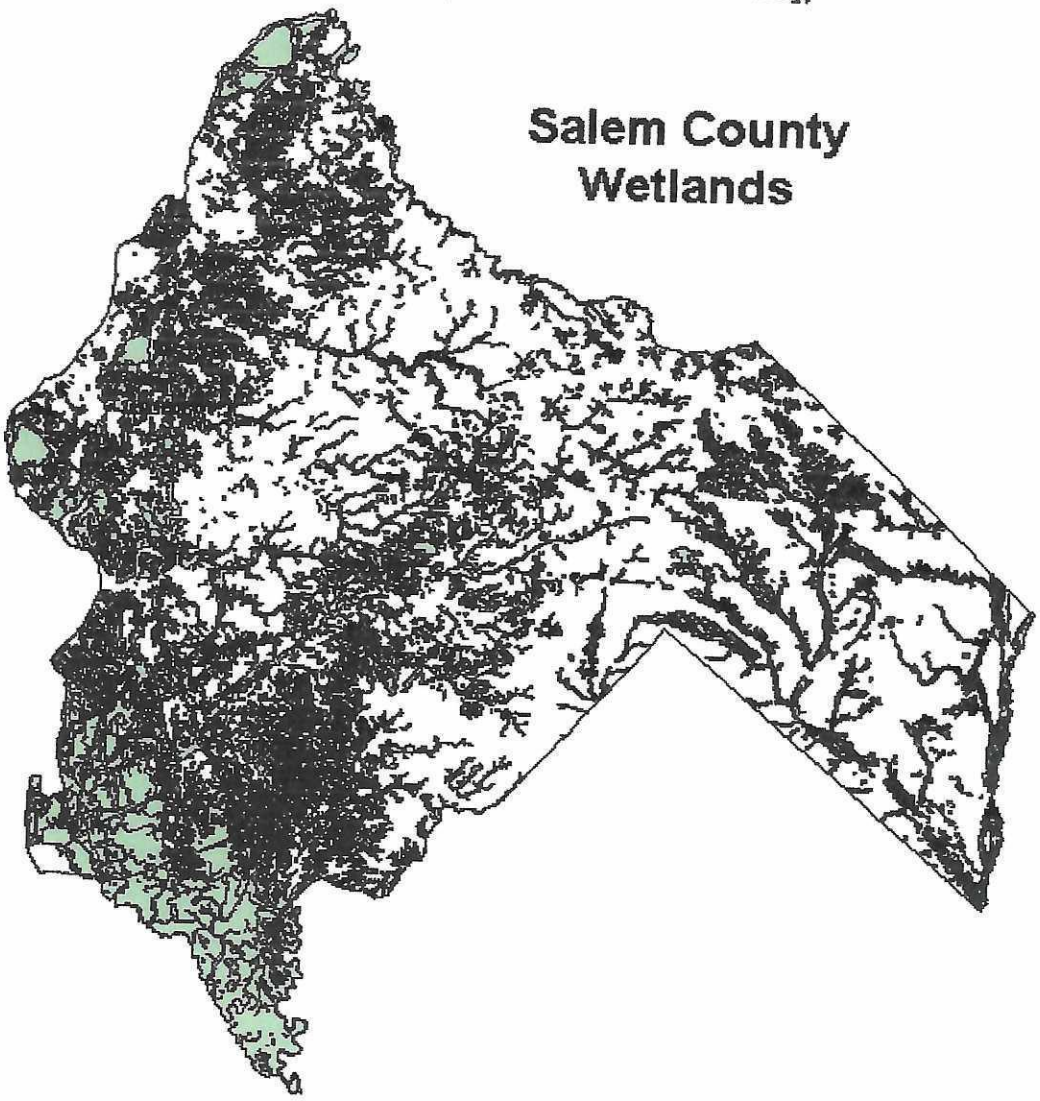
Legend

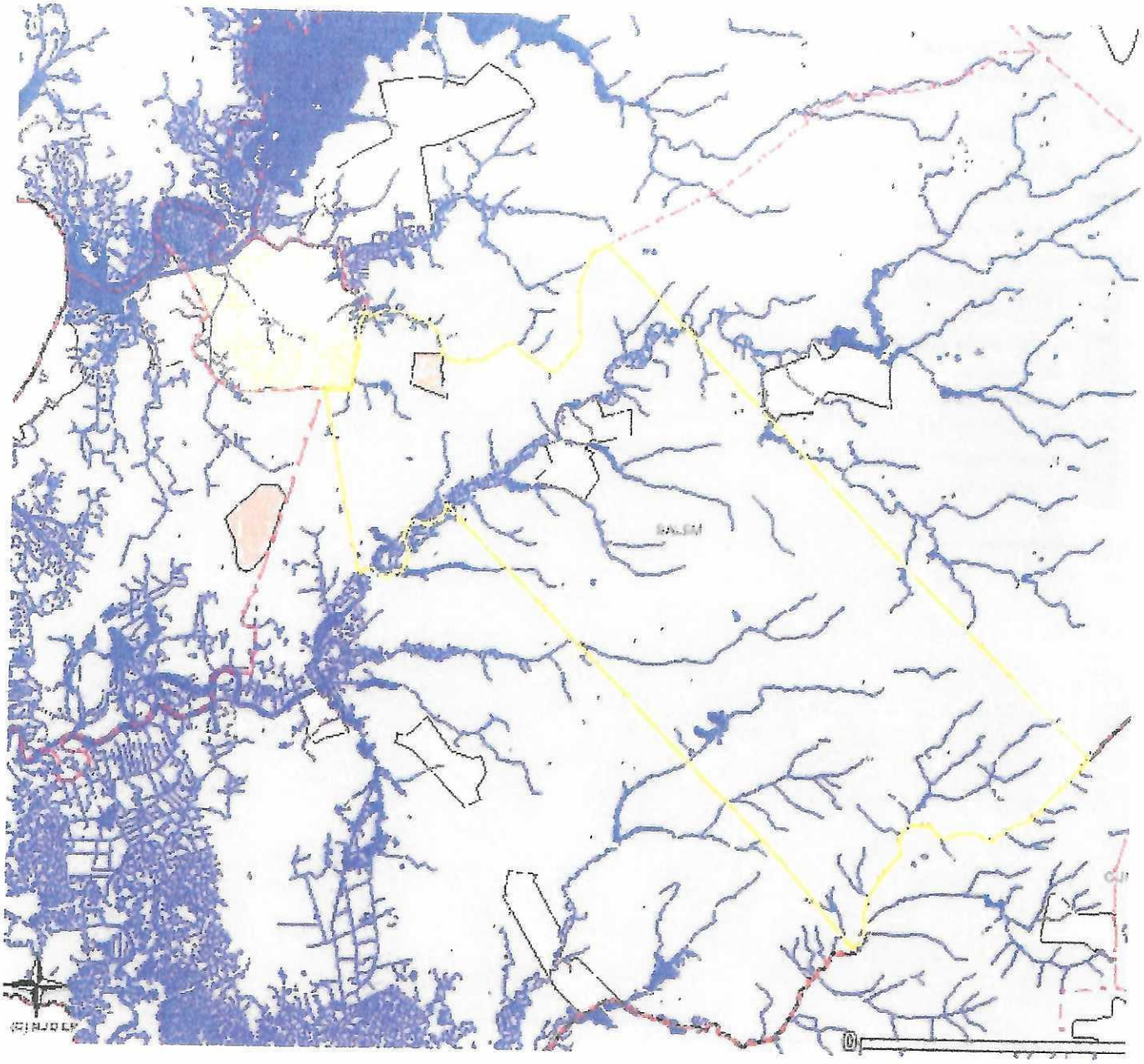
- Municipal Boundary
- Roads
- Streams
- Lakes
- Developed Areas in 1986
- Developed Area Growth from 1986 to 1995/1997

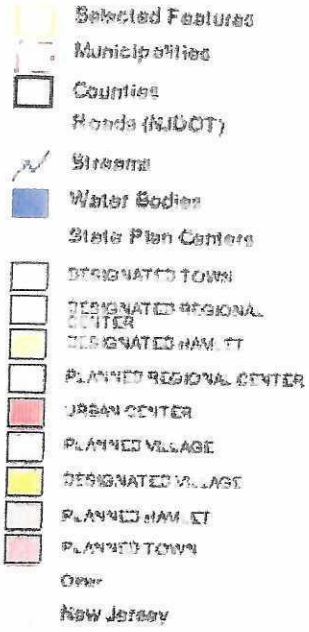
N
W
E
S

The yellow outlined areas delineate areas that were developed as of 1986. The solid yellow areas have been developed between 1986 and 1995/97. The total area of impervious surface (buildings, sidewalks, driveways, parking lots, etc.) is about 220 acres. About 25 acres of this total were added since 1986. The total area of impervious surface constitutes 1% of the total (15,628) acres in the municipality.

(County Boundary Shown for Reference Only)






Selected Features
Municipalities
Counties
Roads (NJDOT)
Streams
Water Bodies
State Plan Centers
DESIGNATED TOWN
DESIGNATED REGIONAL CENTER
DESIGNATED HAMLET
PLANNED REGIONAL CENTER
URBAN CENTER
PLANNED VILLAGE
DESIGNATED VILLAGE
PLANNED HAMLET
PLANNED TOWN
Other
New Jersey