

Bass River Township

Municipal Stormwater Management Plan

Prepared by:

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Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for the Bass River Township (“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.

The plan 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 Township has no needs for a mitigation strategy therefore no variance or exemption of the design and performance standards will be permitted.

Goals

The goals of this MSWMP are to:

- reduce flood damage, including damage to life and property;
- minimize, to the extent practical, any increase in stormwater runoff from any new development;
- reduce soil erosion from any development or construction project;
- assure the adequacy of existing and proposed culverts and bridges, and other in-stream structures;
- maintain groundwater recharge;
- prevent, to the greatest extent feasible, an increase in nonpoint pollution;
- maintain the integrity of stream channels for their biological functions, as well as for drainage;
- minimize pollutants in stormwater runoff from new and existing development to restore, enhance, and maintain the chemical, physical, and biological integrity of the waters of the state, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, and other uses of water; and
- protect public safety through the proper design and operation of stormwater basins. To achieve these goals, this plan outlines specific stormwater design and performance standards for new development. Additionally, the plan proposes stormwater management controls to address impacts from existing development. Preventative and corrective maintenance strategies are included in the plan to ensure long-term effectiveness of stormwater management facilities. The plan also outlines safety standards for stormwater infrastructure to be implemented to protect public safety.

Stormwater Discussion

Land development can dramatically alter the hydrologic cycle (See Figure C-1) of a site and, ultimately, an entire watershed. Prior to development, native vegetation can either directly intercept precipitation or draw that portion that has infiltrated into the ground and return it to the atmosphere through evapotranspiration. Development can remove this beneficial vegetation and replace it with lawn or impervious cover, reducing the site’s evapotranspiration and infiltration rates. Clearing and grading a site can remove depressions that store rainfall. Construction activities may also compact the soil and diminish its infiltration ability, resulting in increased volumes and rates of stormwater runoff from the site. Impervious areas that are connected to each other through gutters, channels, and storm sewers can transport runoff more quickly than natural areas. This shortening of the transport or travel time quickens the rainfall-runoff response of the drainage area, causing flow in downstream waterways to peak faster and higher than natural conditions. These increases can create new and aggravate existing downstream flooding and erosion problems and increase the quantity of sediment in the channel. Filtration of runoff and removal of pollutants by surface and channel vegetation is eliminated by storm sewers that discharge runoff directly into a stream. Increases in impervious area can also decrease opportunities for infiltration which, in turn, reduces stream

base flow and groundwater recharge. Reduced base flows and increased peak flows produce greater fluctuations between normal and storm flow rates, which can increase channel erosion. Reduced base flows can also negatively impact the hydrology of adjacent wetlands and the health of biological communities that depend on base flows. Finally, erosion and sedimentation can destroy habitat from which some species cannot adapt.

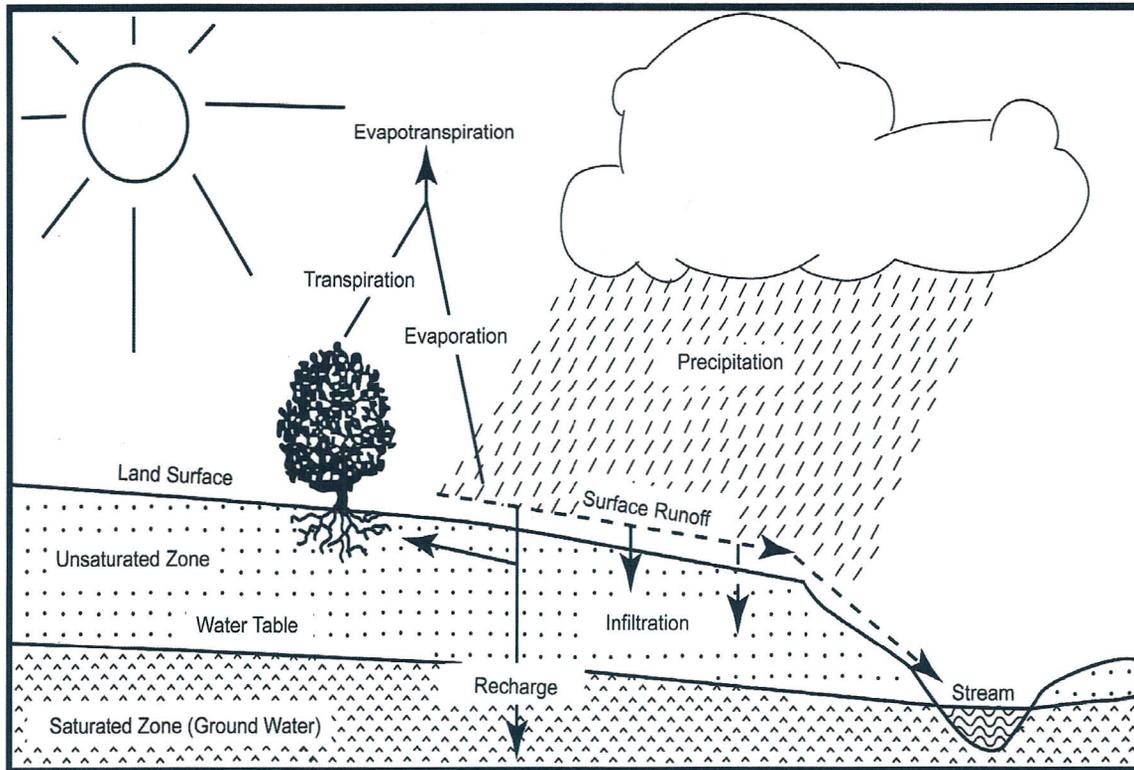


Figure C-1

Source: New Jersey Geological Survey Report GSR-32.

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

The Township encompasses 78.39 square mile area in Burlington County, New Jersey. In recent years, the Township has been growing very slowly. The population of the Township has increased from 1,344 in 1980 to 1,580 in 1990, and then decreased to 1,510 in 2000. This relatively unchanged population resulted in low demand for new development. The lack of changes in the landscape has not increased stormwater runoff volumes and pollutant loads to the waterways of the municipality. Figure C-2 illustrates the waterways in the Township. Figure C-3 depicts the Township boundary on the USGS quadrangle map.

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. Wading River borders the Township to the southwest, and is designated as non-impaired. There is one river flowing through the township, Bass River which dissects the township. This river is also non-impaired based on AMNET data.

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

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

Due to the very low development density the Township has not exhibited water quantity problems such as flooding, stream bank erosion, and diminished base flow in its streams. Most of the culverts associated with road crossings in the Township are owned by the County and the State.

The low imperviousness of the Township has not decreased groundwater recharge. A map of the groundwater recharge areas are shown in Figure C-4. There are no public wells located within the township therefore the wellhead protection areas are not shown.

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 within 36 months of the effective date of the Stormwater Management Rules.

During construction, Township inspectors will observe the construction of the project to ensure that the stormwater management measures are constructed and function as designed.

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 intends to approve a Customized Model Stormwater Control Ordinance for the portion of township located within Pinelands Commission jurisdiction and NJDEP Customized Model Stormwater Control Ordinance for the remaining part of the township.

Once the ordinance texts are completed, they will be submitted to the Burlington County Planning Board for review and approval. A copy will be sent to the Department of Environmental Protection at the time of submission.

Land Use/Build-Out Analysis

A build-out analysis for the Township has been conducted assuming full development under existing zoning for each HUC14 drainage area in the municipality. The build-out analysis was prepared as follows to satisfy the requirements for the municipal stormwater management plan:

1. The total land area within each of the HUC14s of the municipality was determined.
2. The area of constrained lands within each HUC14 of the municipality was determined.
3. The land available for development was determined by subtracting the constrained lands from the total land area for each HUC14.
4. For each HUC14, a build-out analysis was completed using the municipal zoning map and applicable ordinances to determine the acreage of new development. Once the build-out acreage of each land use was determined for each HUC14, nonpoint source loadings were determined for the build-out scenario.

Figure C-6 illustrates the existing land use in the Township based on GIS information from NJDEP. Figure C-7 illustrates the HUC14s within the Township. The Township zoning map is shown in Figure C-8. Figure C-9 illustrates the constrained lands within the Township. The build-out calculations for impervious cover are shown in Table B-1. Table B-2 presents the pollutant loading coefficients by land cover. The pollutant loads at full build-out are presented in Table C-3.

Mitigation Plans

At present the Township does not have any needs for a mitigation plan, therefore, no variances or exemptions from the stormwater management design and performance standards will be granted.

Table B-1: Build Out Calculations for HUC14s

HUC14 and Zone	Total Area (Acres)	Constrained Lands - Wetlands / Water/ State Forest (Acres)	Developable Area (Acres)	Allowable Impervious (%)	Build-Out Impervious (Acres)
2040301200040					
Rural Development District	33	4	29	20	6
Preservation Area District	4185	2857	1328	20	266
Totals	4218	2861	1357	20	271
2040301200010					
Preservation Area District	3792	3678	115	20	23
Totals	3792	3678	115	20	23
2040301140010					
Preservation Area District	1210	290	921	20	184
Totals	1210	290	921	20	184
2040301130050					
Preservation Area District	358	16	342	20	68
Totals	358	16	342	20	68
2040301180060					
Special Agricultural Area District	1822	694	1129	20	226
Preservation Area District	6592	5298	1295	20	259
Totals	8415	5991	2423	20	485
2040301180070					
Preservation Area District	3521	2827	694	20	139
Totals	3521	2827	694	20	139
2040301180040					
Special Agricultural Area District	1360	215	1145	20	229
Preservation Area District	948	419	529	20	106
Totals	2308	634	1674	20	335
2040301180030					
Special Agricultural Area District	305	46	259	20	52
Preservation Area District	848	447	401	20	80
Totals	1153	493	660	20	132
2040301180050					
Special Agricultural Area District	85	39	46	20	9
Preservation Area District	486	88	398	20	80
Totals	571	127	444	20	89

Table B-1: Build Out Calculations for HUC14s

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Table B-2: Pollutants By Land Cover

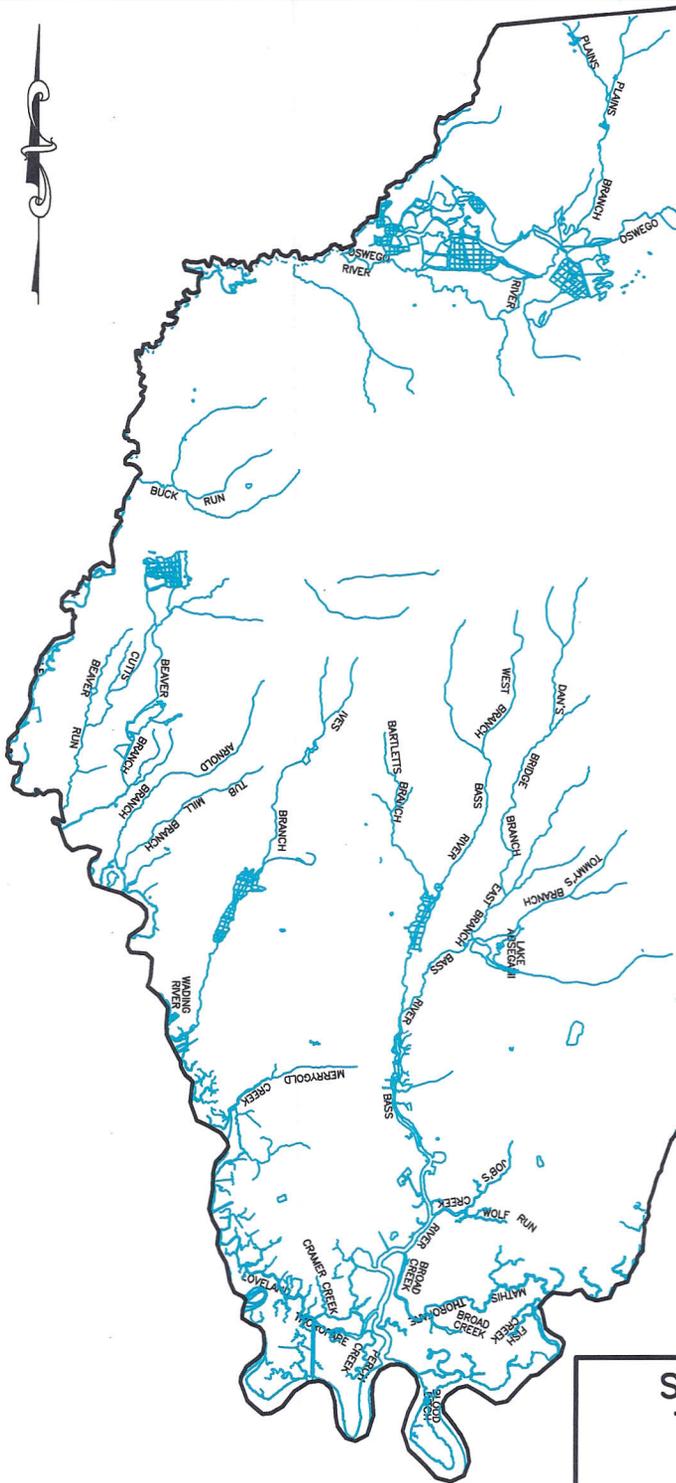
Land Cover	Total Phosphorus Load (lbs/acre/year)	Total Nitrogen Load (lbs/acre/year)	Total Suspended Solids Load (lbs/acre/year)
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
Commercial	2.1	22	200
Industrial	1.5	16	200
Urban, Mixed Urban, Other Urban	1.0	10	120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

Table B-3: Nonpoint Source Loads at Build Out for HUC14s

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)
2040301140020								
Preservation Area District	Rural Residential	17	0.60	10	5	86	100	1,719
Totals		17		10		86		1,719
2040301200020								
Preservation Area District	Rural Residential	945	0.60	567	5	4,727	100	94,546
Totals		945		567		4,727		94,546
2040301200080								
New Gretna Village District	High, Medium Density Residential	8	1.40	11	15	116	140	1,085
Coastal Wetlands District	Forest, Water, Wetlands	254	0.10	25	3	761	40	10,148
Totals		261		36		877		11,232
2040301210010								
New Gretna Village District	High, Medium Density Residential	3	1.40	5	15	51	140	472
Coastal Wetlands District	Forest, Water, Wetlands	606	0.10	61	3	1,818	40	24,240
Totals		609		65		1,869		24,712
2040301200070								
Rural Development District	Rural Residential	109	0.60	65	5	545	100	10,899
Residential Lot Subdivision District	High, Medium Density Residential	44	1.40	61	15	653	140	6,097
Highway Frontage District	Commercial	4	2.10	9	22	89	200	811
Forest Area District	Forest, Water, Wetlands	301	0.10	30	3	903	40	12,034
Coastal Wetlands District	Forest, Water, Wetlands	0	0.10	0	3	0	40	0
Preservation Area District	Rural Residential	0	0.60	0	5	1	100	25
Totals		458		165		2,191		29,867
2040301200060								
New Gretna Village District	High, Medium Density Residential	912	1.40	1276	15	13,673	140	127,618
Rural Development District	Rural Residential	26	0.60	16	5	130	100	2,608
Highway Commercial District	Commercial	242	2.10	509	22	5,331	200	48,466
Village Commercial District	Commercial	77	2.10	161	22	1,686	200	15,328
Forest Area District	Forest, Water, Wetlands	250	0.10	25	3	751	40	10,010
Coastal Wetlands District	Forest, Water, Wetlands	0	0.10	0	3	0	40	0
Preservation Area District	Rural Residential	44	0.60	26	5	219	100	4,377
Totals		1,551		2,013		21,791		208,407
2040301140030								
Rural Development District	Rural Residential	1	0.60	1	5	5	100	96
Preservation Area District	Rural Residential	53	0.60	32	5	264	100	5,287
Totals		54		32		269		5,383
2040301200030								
New Gretna Village District	High, Medium Density Residential	476	1.40	667	15	7,143	140	66,666
Rural Development District	Rural Residential	38	0.60	23	5	191	100	3,829
Coastal Wetlands District	Forest, Water, Wetlands	0	0.10	0	3	1	40	17
Preservation Area District	Rural Residential	941	0.60	564	5	4,703	100	94,063
Totals		1,456		1,254		12,039		164,575

Table B-3: Nonpoint Source Loads at Build Out for HUC14s

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)
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————— WATER



GRAPHIC SCALE: 1" = 2 MILES

**STORMWATER MANAGEMENT PLAN
TOWNSHIP AND ITS WATERWAYS
BASS RIVER TOWNSHIP
BURLINGTON COUNTY, NEW JERSEY**

KLUK CONSULTANTS

**2 EASTWICK DRIVE - SUITE 202
GIBBSBORO, NEW JERSEY, 08026**

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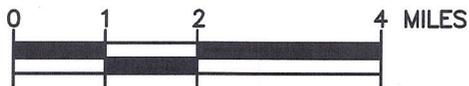
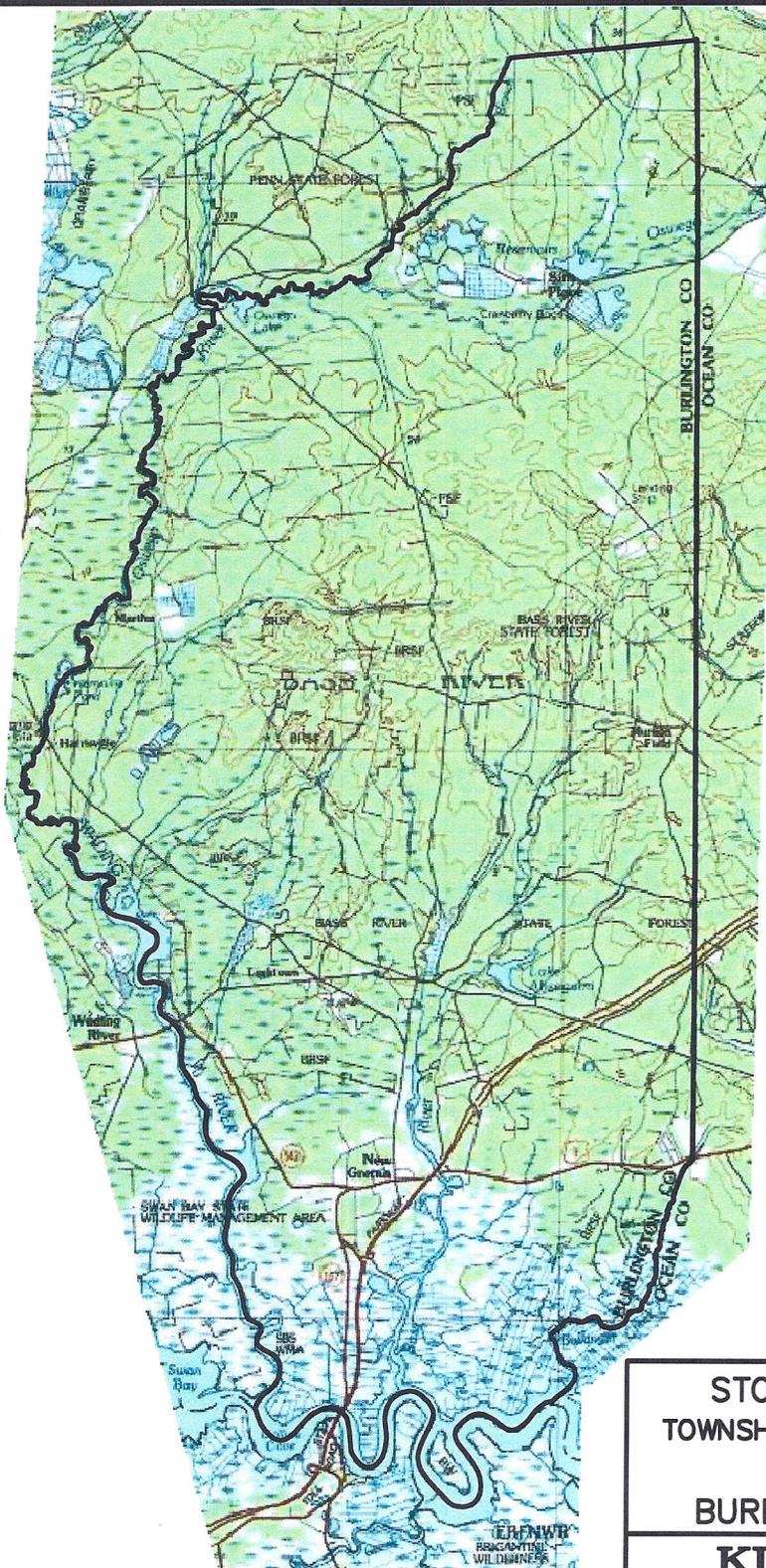
FAX (856) 346-1340

SCALE: 1"=2 MILES

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DATE: 08/02/06

FIGURE: C-2



GRAPHIC SCALE: 1" = 2 MILES

**STORMWATER MANAGEMENT PLAN
TOWNSHIP BOUNDARY ON USGS QUADRANGLES
BASS RIVER TOWNSHIP
BURLINGTON COUNTY, NEW JERSEY**

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2 EASTWICK DRIVE - SUITE 202
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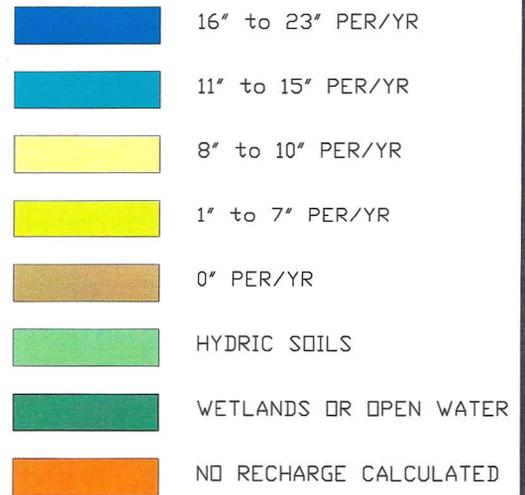
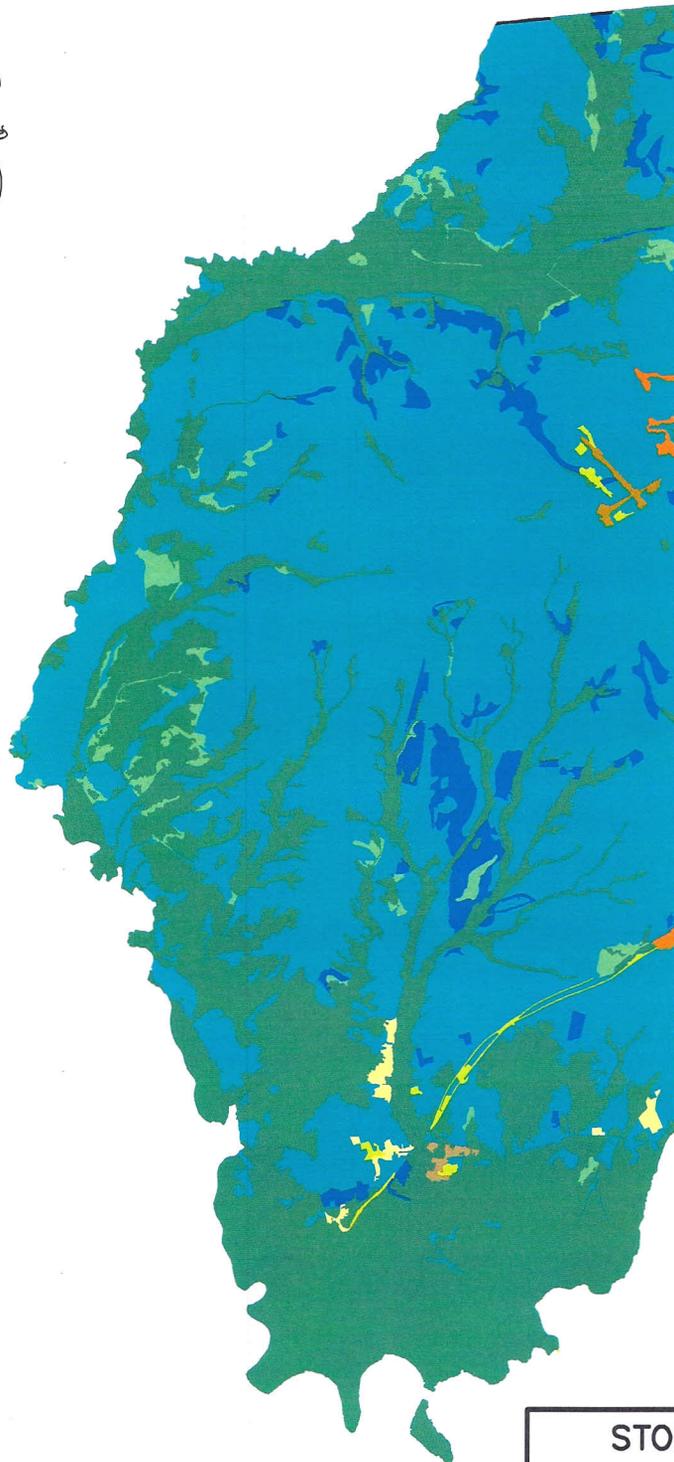
FAX (856) 346-1340

SCALE: 1"=2 MILES

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DATE: 08/02/06

FIGURE: C-3



GRAPHIC SCALE: 1" = 2 MILES

**STORMWATER MANAGEMENT PLAN
GROUNDWATER RECHARGE AREAS
BASS RIVER TOWNSHIP
BURLINGTON COUNTY, NEW JERSEY**

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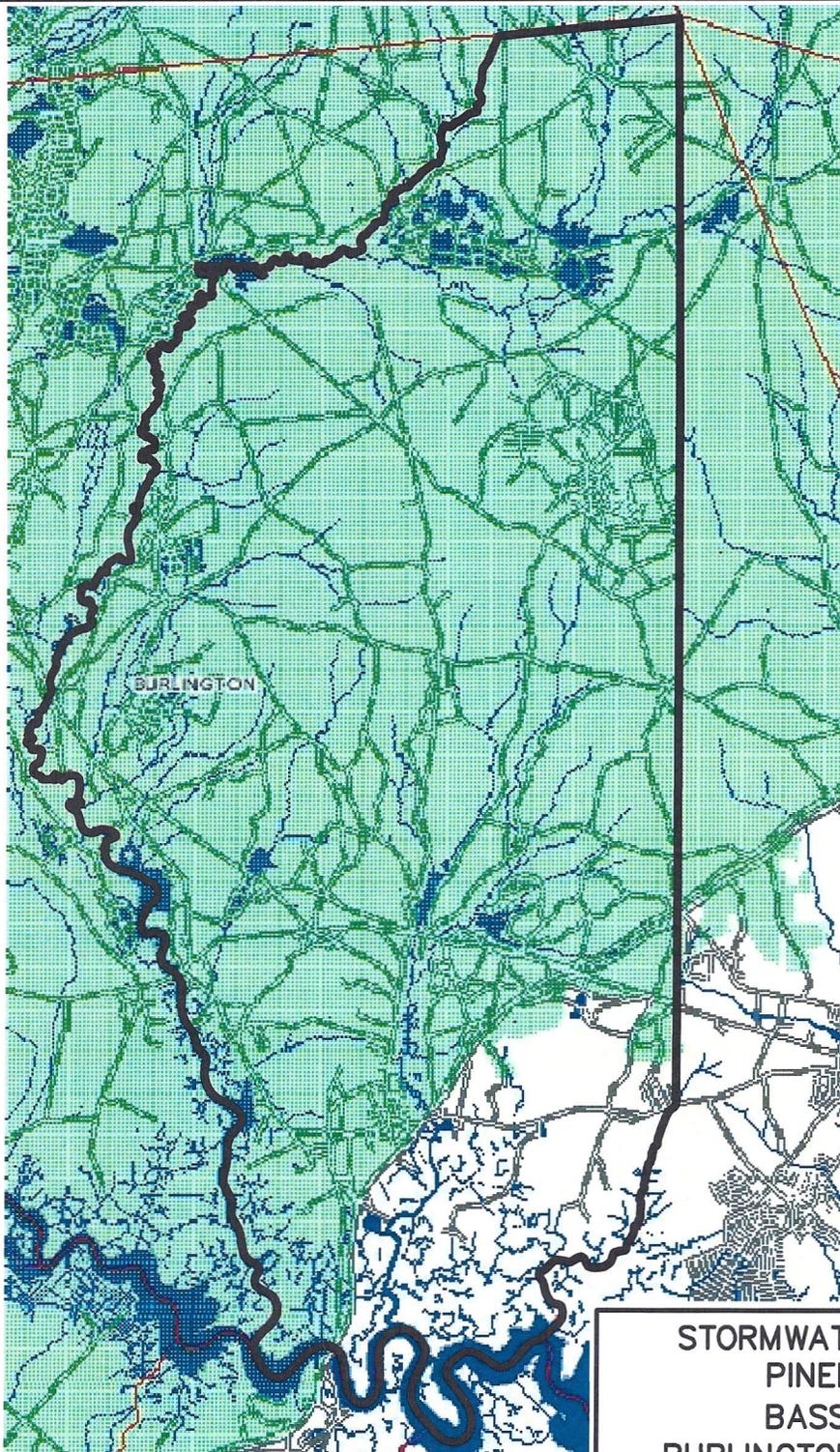
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SCALE: 1"=2 MILES

DRAWN BY: MAG

DATE: 08/02/06

FIGURE: C-4



 PINELANDS BOUNDARY



GRAPHIC SCALE: 1" = 2 MILES

**STORMWATER MANAGEMENT PLAN
PINELANDS BOUNDARY
BASS RIVER TOWNSHIP
BURLINGTON COUNTY, NEW JERSEY**

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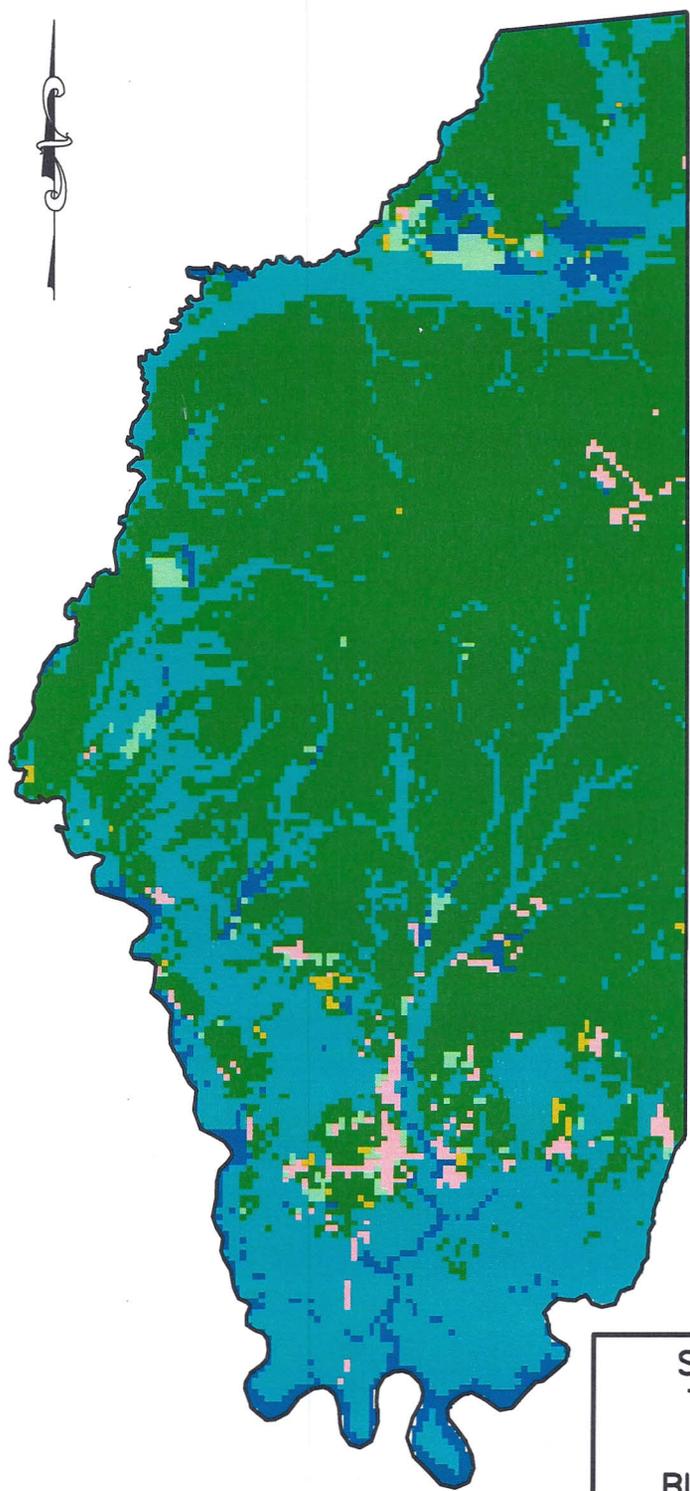
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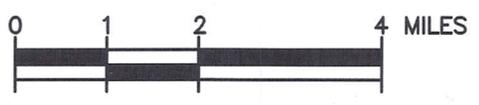
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DATE: 08/02/06

FIGURE: C-5



-  AGRICULTURE
-  BARREN LAND
-  FOREST
-  URBAN
-  WATER
-  WETLANDS



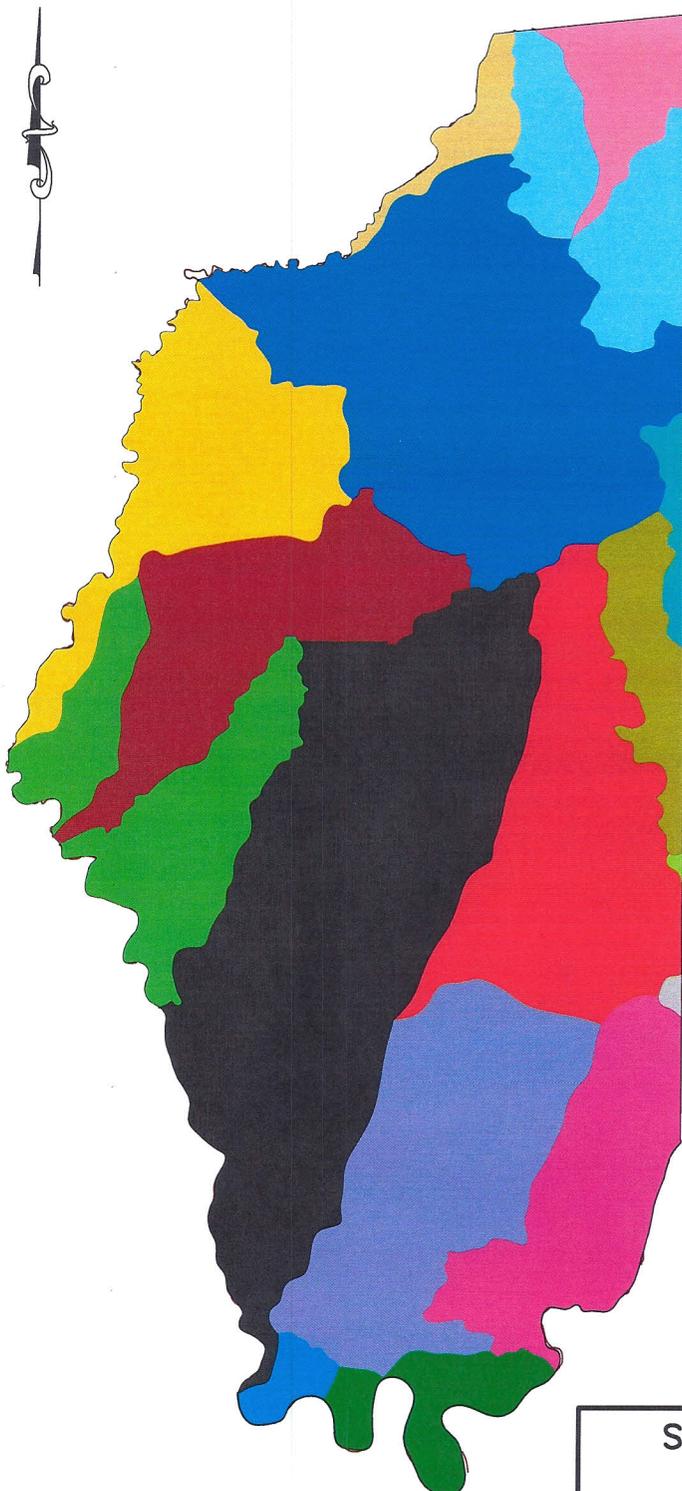
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STORMWATER MANAGEMENT PLAN
TOWNSHIP'S EXISTING LAND USE
BASS RIVER TOWNSHIP
BURLINGTON COUNTY, NEW JERSEY

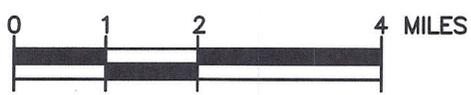
KLUK CONSULTANTS

2 EASTWICK DRIVE - SUITE 202
GIBBSBORO, NEW JERSEY, 08026
TEL. (856) 566-0013, FAX (856) 346-1340

SCALE: 1"=2 MILES	DRAWN BY: MAG
DATE: 08/02/06	FIGURE: C-6

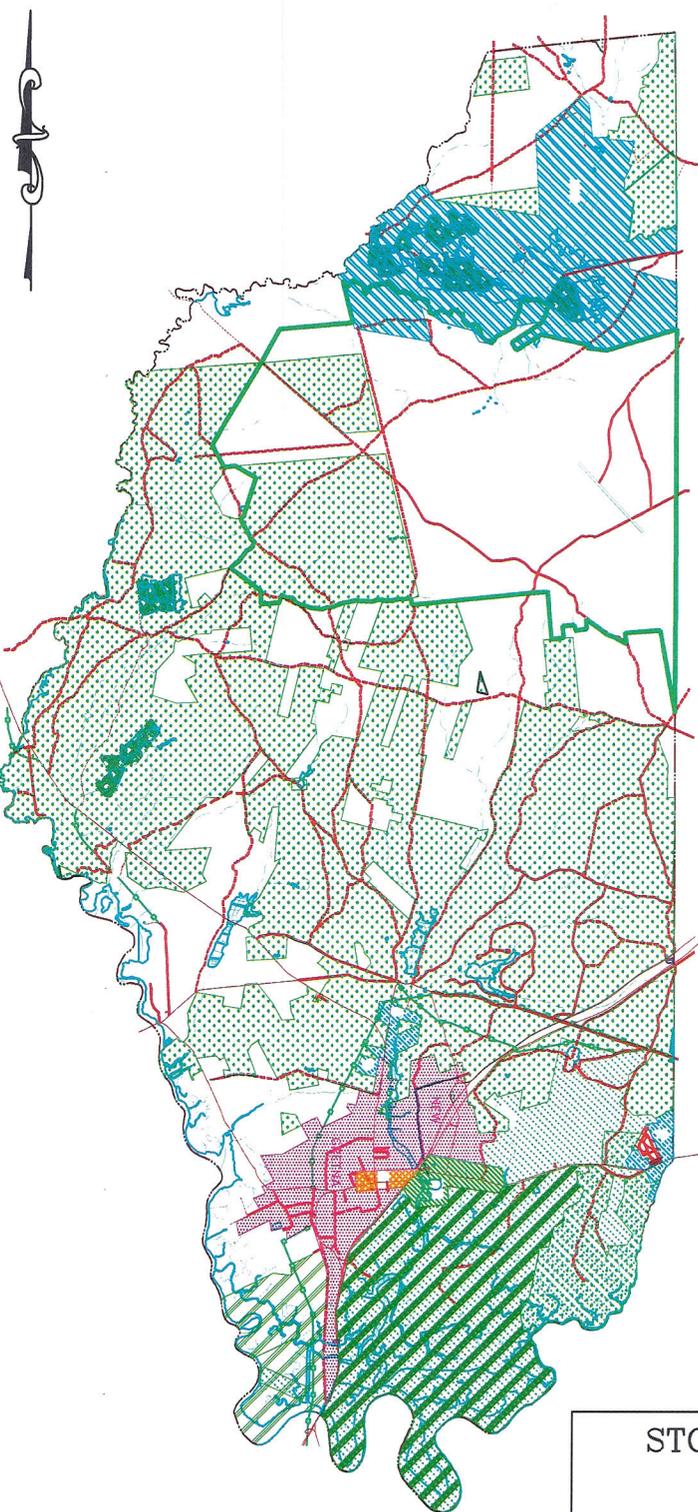


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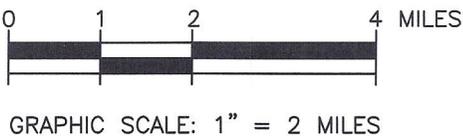


GRAPHIC SCALE: 1" = 2 MILES

<p>STORMWATER MANAGEMENT PLAN HYDROLOGIC UNITS (HUC14s) BASS RIVER TOWNSHIP BURLINGTON COUNTY, NEW JERSEY</p>	
<p>KLUK CONSULTANTS</p>	
<p>2 EASTWICK DRIVE - SUITE 202 GIBBSBORO, NEW JERSEY, 08026</p>	
<p>TEL. (856) 566-0013, FAX (856) 346-1340</p>	
<p>SCALE: 1"=2 MILES</p>	<p>DRAWN BY: MAG</p>
<p>DATE: 08/02/06</p>	<p>FIGURE: C-7</p>



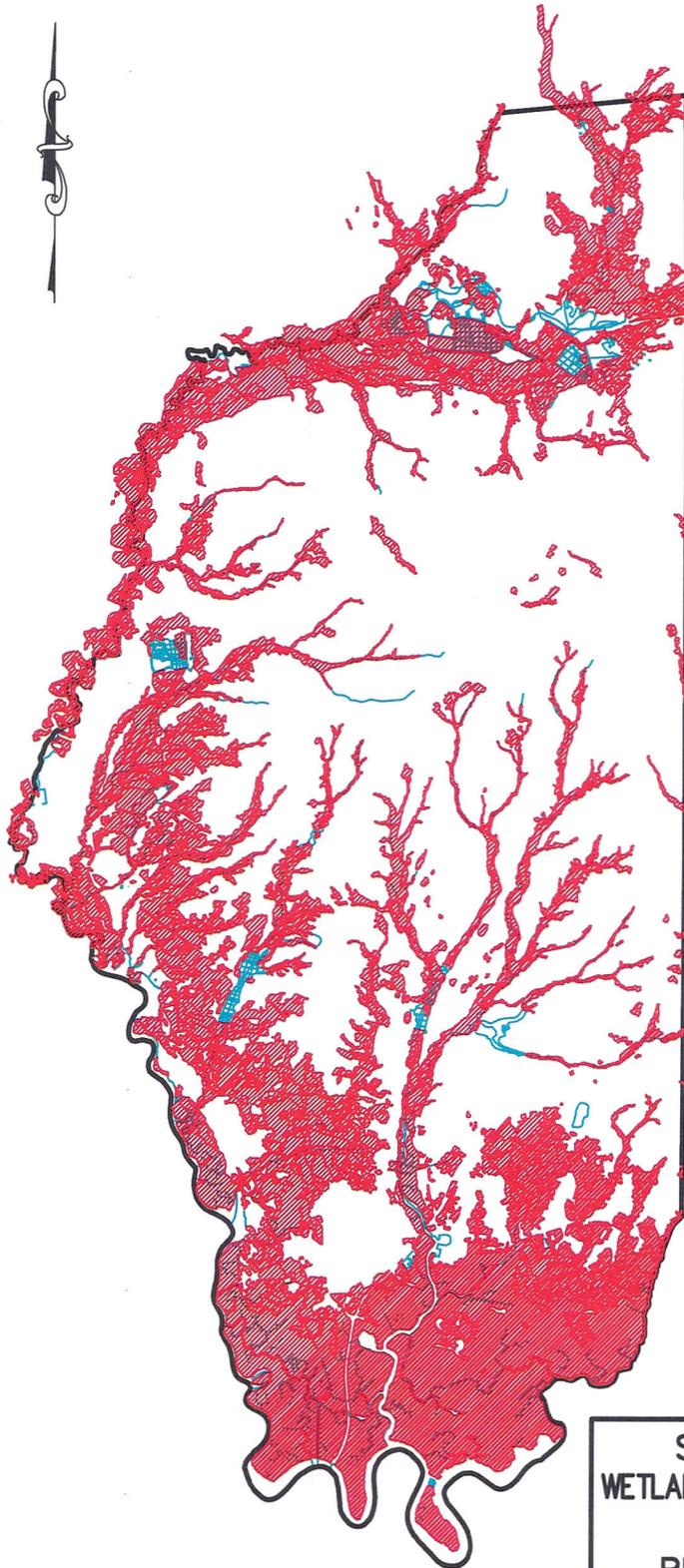
LEGEND	
TOWNSHIP LINE	—
WATERWAYS	—
STATE PARK AND FEDERAL ROADS	—
ZONING LINE	—
COUNTY AND STATE HIGHWAYS	—
TOWNSHIP STREET	—
UNIMPROVED TOWNSHIP ROAD	—
OTHER BYWAYS	—
PRIVATE LANES	—
UTILITY RIGHT-OF-WAY	—
WARREN GROVE BOMBING RANGE (RESTRICTED AREA)	—
PARK LANDS - (WHARTON AND BASS RIVER STATE FOREST)	—
ZONING DESIGNATIONS	
1-PRESERVATION AREA DISTRICT	—
2-FOREST AREA	—
CW-COASTAL WETLANDS	—
4-RURAL DEVELOPMENT AREA	—
NGV-NEW GREYNA VILLAGE	—
HC-HIGHWAY COMMERCIAL	—
VC-VILLAGE COMMERCIAL	—
RLS-RESIDENTIAL LOT SUBDIVISION	—
HF-HIGHWAY FRONTAGE	—
SAP-SPECIAL AGRICULTURAL PRODUCTION	—



STORMWATER MANAGEMENT PLAN
ZONING DISTRICTS
BASS RIVER TOWNSHIP
BURLINGTON COUNTY, NEW JERSEY

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SCALE: 1"=2 MILES	DRAWN BY: MAG
DATE: 08/02/06	FIGURE: C-8



WATER



WETLANDS



GRAPHIC SCALE: 1" = 2 MILES

**STORMWATER MANAGEMENT PLAN
WETLANDS & LAND WATER USES-CONSTRAINED LAND
BASS RIVER TOWNSHIP
BURLINGTON COUNTY, NEW JERSEY**

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TEL. (856) 566-0013,

FAX (856) 346-1340

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FIGURE: C-9