

NORTH HANOVER TOWNSHIP

MUNICIPAL

**STORMWATER MANAGEMENT PLAN
(MSWMP)**

MARCH 2005

(Required By NJPDES Permit Number NJGO148156)

Prepared In Accordance With NJAC 7:8-4.2,
“Stormwater Management Rules”

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Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for the North Hanover Township (“the Township”) to address stormwater-related impacts. The creation of this plan is required by NJAC 7:14A-25 Municipal Stormwater Regulations. This plan contains all of the required elements described in NJAC 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 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

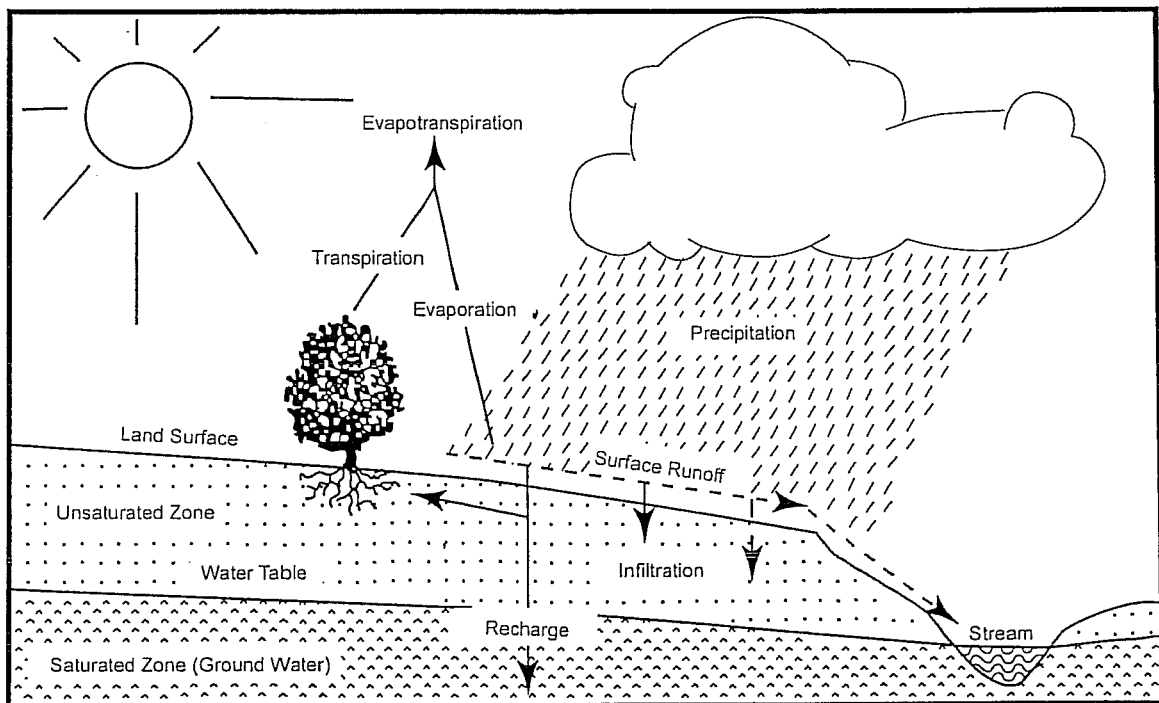
- protect public safety through the proper design and operation of stormwater basins.

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: Groundwater Recharge in the Hydrologic Cycle



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 a 17.38 square mile area in Burlington County, New Jersey. The population of the Township has decreased from 9,050 in 1980 to 7,347 in 2000. Figure C-2 illustrates the waterways in the Township. Figure C-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 macroinvertebrates by NJDEP on a five-year cycle. Streams are classified as nonimpaired, 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 only one (1) AMNET sampling site which is adjacent to North Hanover Township where North Run crosses through the center of Cookstown. Table 2 of the 1998 Delaware River Supplement AMNET Study indicates that this creek is moderately impaired with a score of 15. A total maximum daily load (TMDL) would not have to be required to be developed for this waterway at this time.

The Township has not exhibited major flooding problems or stream bank erosion during heavy storm events. The vast majority of the main roadways within the Township are in the jurisdiction of the County and would be the County's responsibility. Some of the municipally owned culverts may be undersized but do not overly impact flooding during major storm events. The Township, for the most part, is extremely rural with large open space tracts throughout. This allow for significant groundwater recharge throughout the Township.

A map of the groundwater recharge areas is shown in Figure C-4. Wellhead protection areas, also required as part of the MSWMP, are shown in Figure C-2.

North Hanover Township Well Head Protection Areas, HUC-14's and Waterways



Well Head Protection Areas

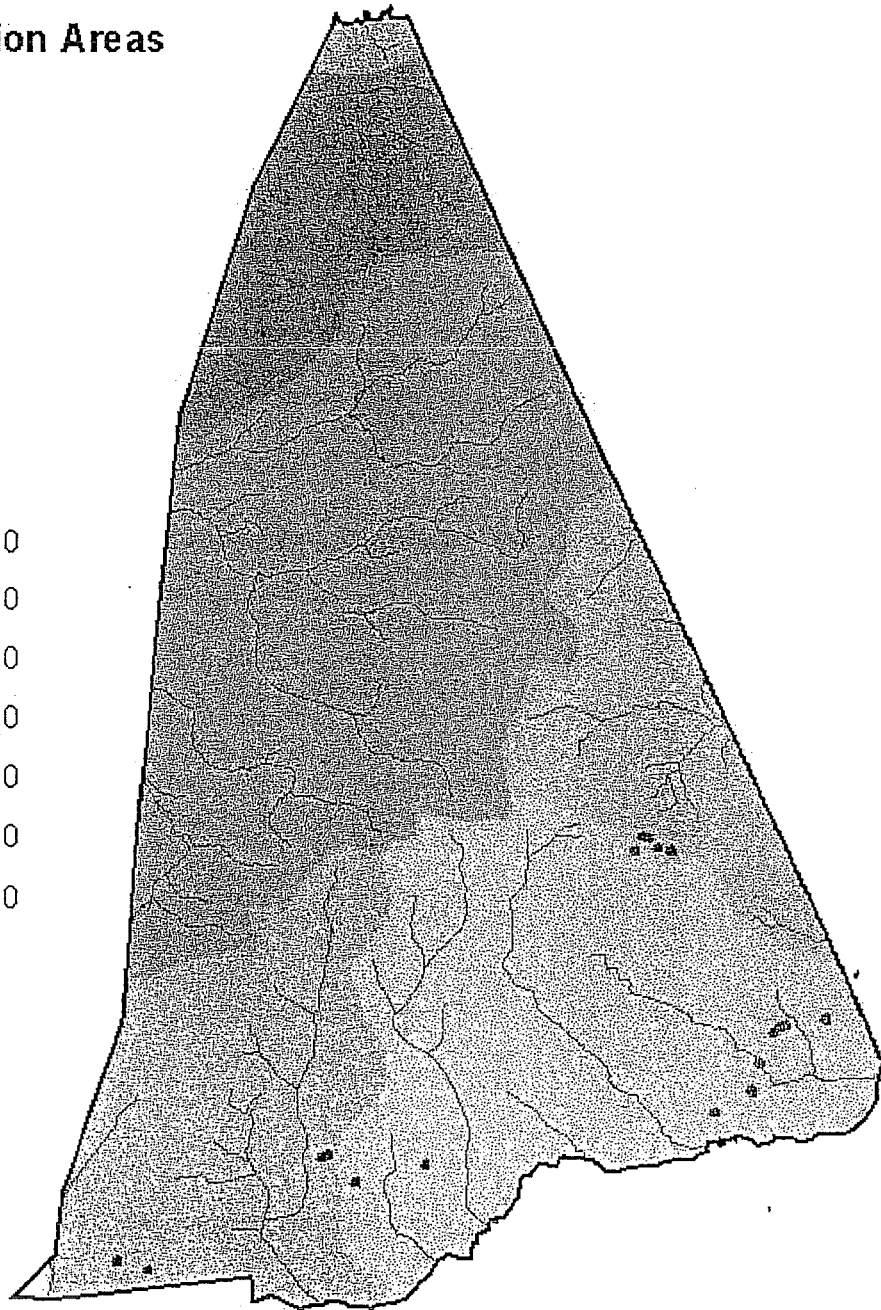
● Confined Wells
(50 ft. radius)

▨ Lakes

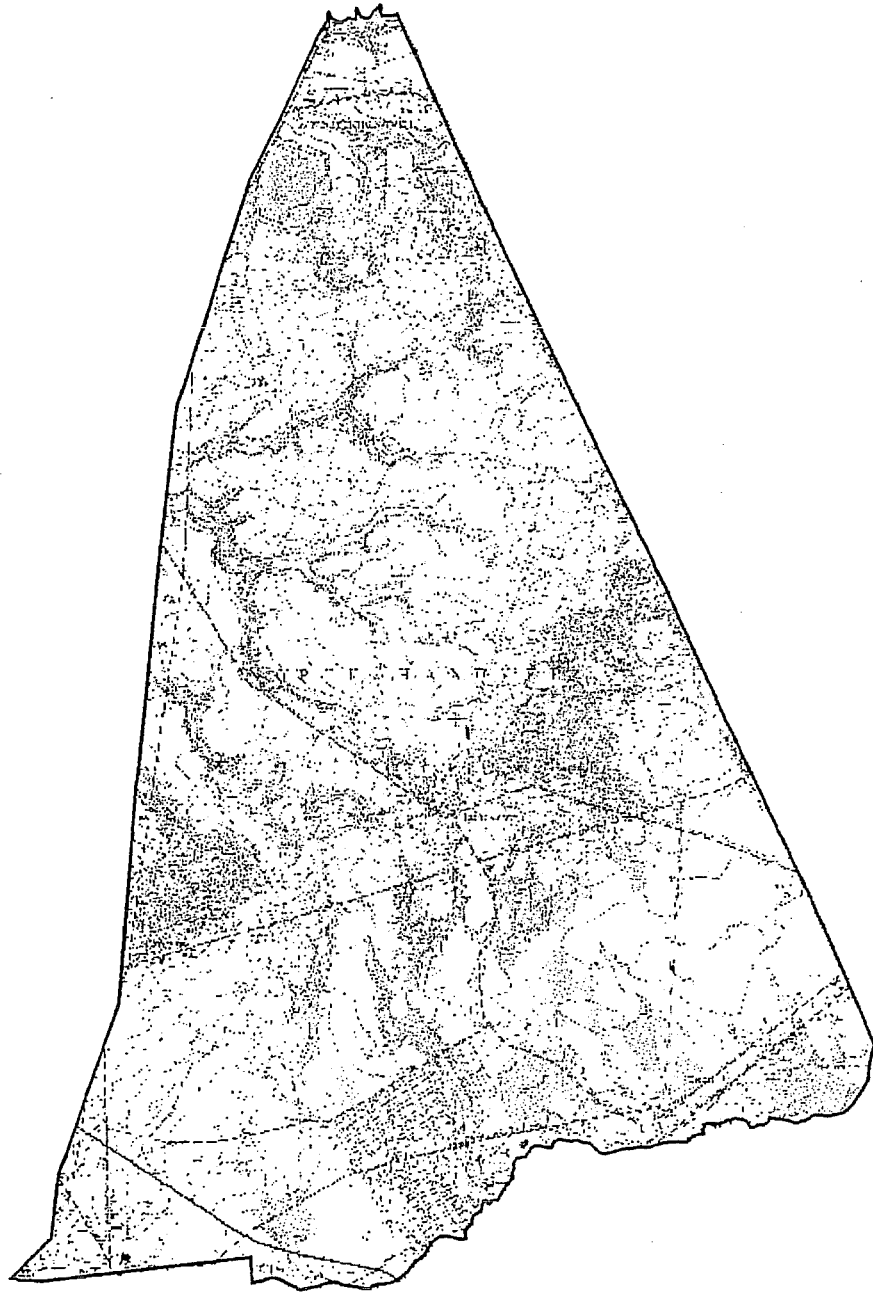
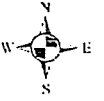
~ Streams

HUC-14's

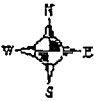
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North Hanover Township
USGS Topography

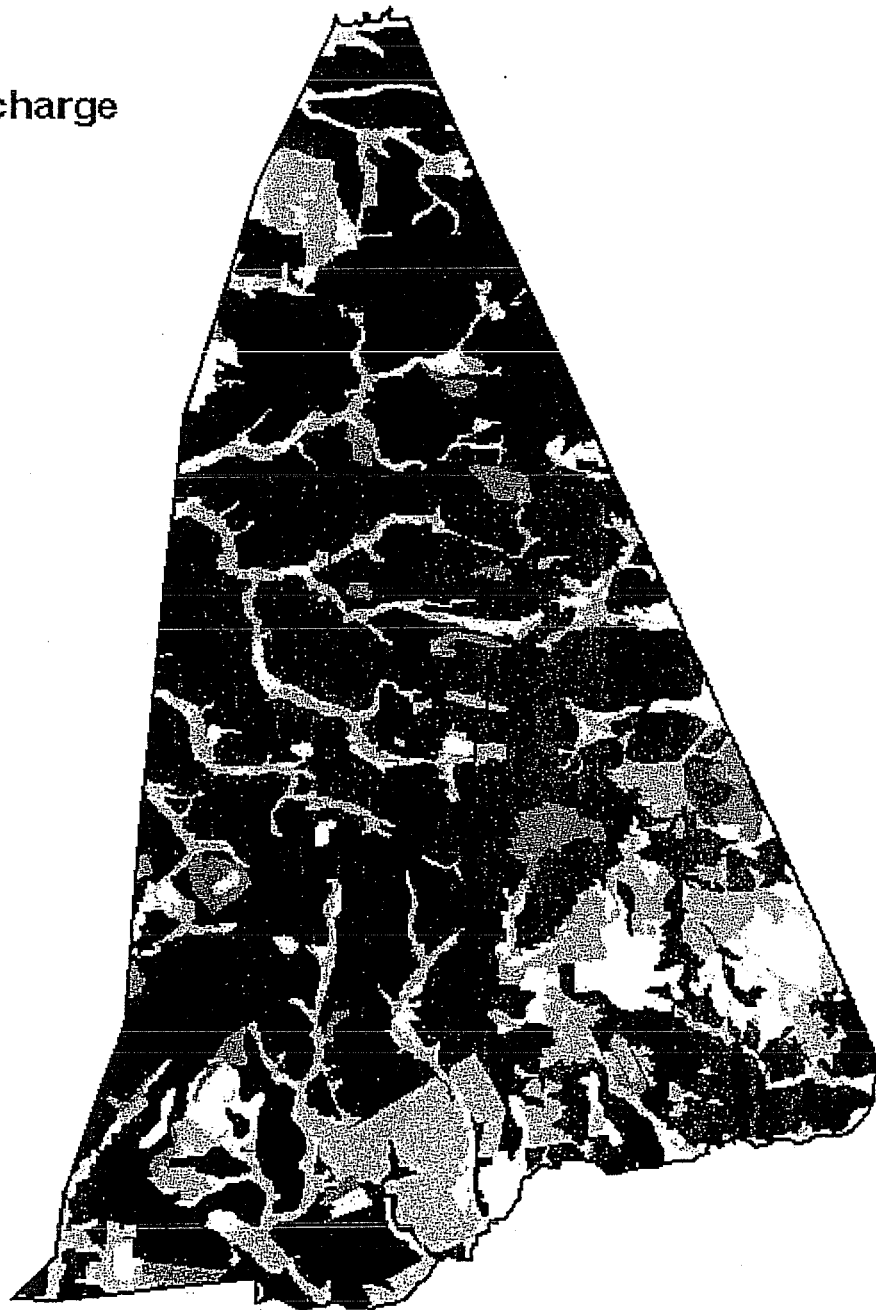
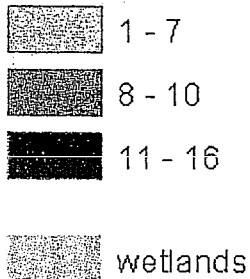


North Hanover Township Groundwater Recharge Rates & Wetlands



Groundwater Recharge

(Inches/year)



Design and Performance Standards

The Township will adopt design and performance standards for stormwater management measures 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 will include language for maintenance of stormwater management measures consistent with the stormwater management rules Maintenance Requirements, and language for safety standards. The ordinances will be submitted to the county for review and approval within [24 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 NJAC 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

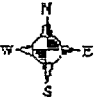
The Township will review the master plan and ordinances, and will provide a list of the sections in the Township land use and zoning ordinances that are to be modified to incorporate nonstructural stormwater management strategies. Once the ordinance texts are completed, they will be submitted to the county review agency for review and approval within [24 months of the effective date of the Stormwater Management Rules]. A copy will be sent to the Department of Environmental Protection at the time of submission.

Land Use/Build-Out Analysis















A detailed land use analysis for the Township was conducted. Figure C-5 illustrates the existing land use in the Township based on 1995/97 GIS information from NJDEP. The Township zoning map is shown in Figure C-6. The build-out calculations for impervious cover are shown in Table C-1.

Table C-2 presents the pollutant loading coefficients by land cover. The pollutant loads at full build-out are presented in Table C-3.

North Hanover Township Land Use Classification



Land Use

-  Agriculture
-  Commercial
-  Community Services
-  Manufacturing
-  Military
-  Mining
-  Parking
-  Recreation
-  Residential
-  Transportation
-  Utility
-  Vacant
-  Water
-  Wooded










ZONING MAP

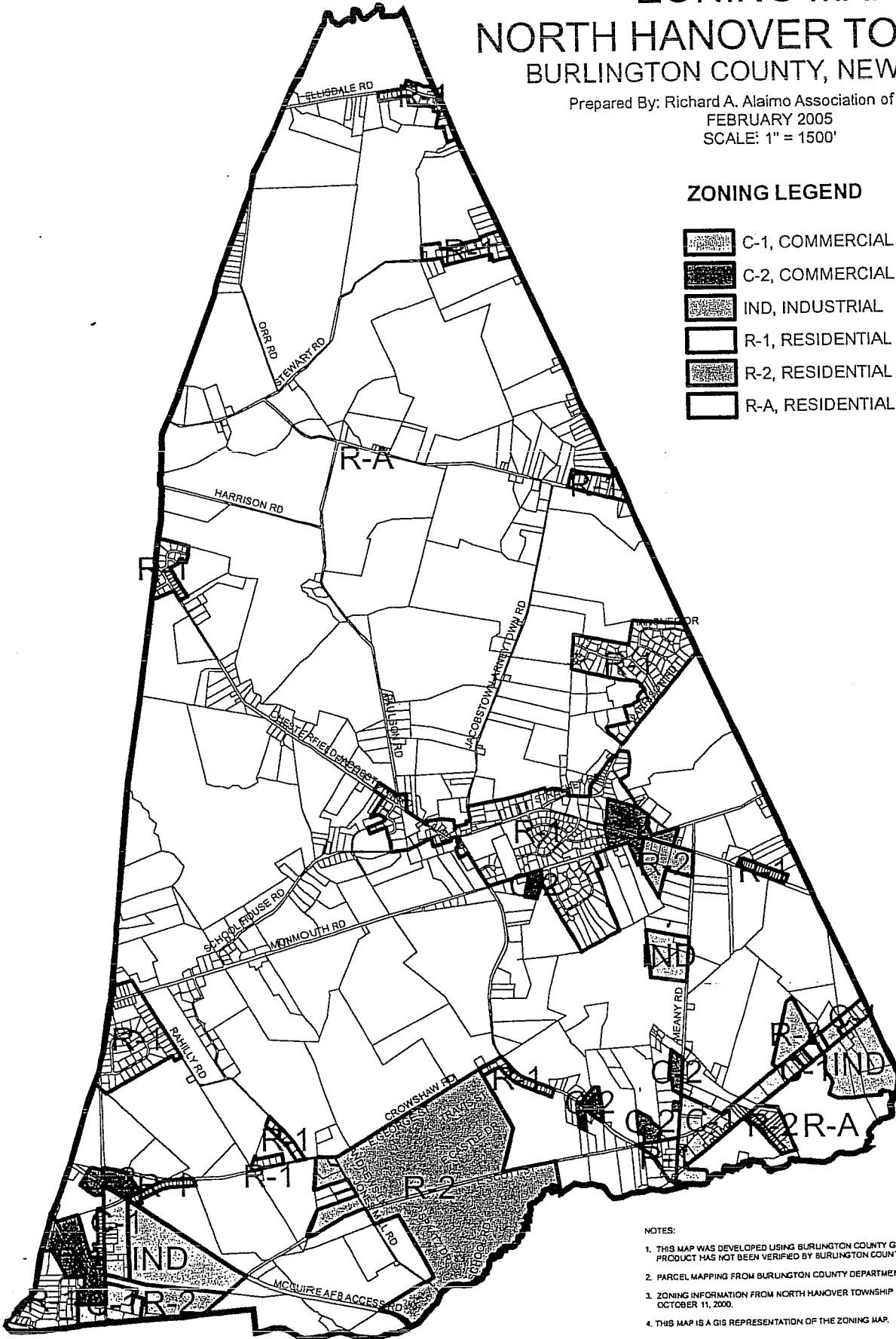
NORTH HANOVER TOWNSHIP

BURLINGTON COUNTY, NEW JERSEY

Prepared By: Richard A. Alaimo Association of Engineers
FEBRUARY 2005
SCALE: 1" = 1500'

ZONING LEGEND

-  C-1, COMMERCIAL - 1
-  C-2, COMMERCIAL - 2
-  IND, INDUSTRIAL
-  R-1, RESIDENTIAL - 1
-  R-2, RESIDENTIAL - 2
-  R-A, RESIDENTIAL / AGRICULTURE



NOTES:

1. THIS MAP WAS DEVELOPED USING BURLINGTON COUNTY GIS DIGITAL DATA, BUT THIS SECONDARY PRODUCT HAS NOT BEEN VERIFIED BY BURLINGTON COUNTY AND IS NOT COUNTY AUTHORIZED.
2. PARCEL MAPPING FROM BURLINGTON COUNTY DEPARTMENT OF INFORMATION TECHNOLOGY, SEPTEMBER 2001.
3. ZONING INFORMATION FROM NORTH HANOVER TOWNSHIP ZONING MAP PREPARED BY RAGAN DESIGN GROUP, OCTOBER 11, 2000.
4. THIS MAP IS A GIS REPRESENTATION OF THE ZONING MAP.

FIGURE C6

Table C-1: Build-Out Calculations for Two HUC14s

HUC14 and Zone	Total Area (Acres)	Wetlands/ Water Area (Acres)	Developable Area (Acres)	Allowable Impervious (%)	Build-Out Impervious (Acres)
02040201050050					
Residential/Agriculture (R-A)	83.67	19.20	64.47	12%	7.74
TOTALS	83.67	19.20	64.47	12%	7.74
02040201050060					
Residential-1 (R-1)	40.20	0.86	39.34	15%	5.90
Residential/Agriculture (R-A)	975.58	240.49	735.09	12%	88.21
TOTALS	1,015.78	241.35	774.43	12%	94.11
02040201080020					
Residential/Agriculture (R-A)	17.33	0.00	17.33	12%	2.08
TOTALS	17.33	0.00	17.33	12%	2.08
02040201080010					
Residential-1 (R-1)	124.09	3.26	120.83	15%	18.12
Residential/Agriculture (R-A)	3,898.99	458.11	3,440.88	12%	412.91
TOTALS	4,023.08	461.37	3,561.71	12%	431.03
02040201050030					
Commercial-2 (C-2)	31.15	3.00	28.15	65%	18.30
Residential-1 (R-1)	183.16	5.78	177.38	15%	26.61
Residential-2 (R-2)	18.38	0.00	18.38	15%	2.76
Residential/Agriculture (R-A)	903.75	231.45	672.30	12%	80.68
TOTALS	1,136.44	240.23	896.21	14%	128.34
02040201040070					
Commercial-1 (C-1)	89.40	15.08	74.32	65%	48.31
Commercial-2 (C-2)	39.31	5.19	34.12	65%	22.18
Industrial (IND)	106.22	16.78	89.44	75%	67.08
Residential-1 (R-1)	232.65	24.85	207.80	15%	31.17
Residential-2 (R-2)	519.09	32.15	486.94	15%	73.04
Residential/Agriculture (R-A)	2,017.02	598.57	1,418.45	12%	170.21
TOTALS	3,003.69	692.62	2,311.07	18%	411.99
02040201040060					
Commercial-1 (C-1)	62.47	0.05	62.42	65%	40.57
Commercial-2 (C-2)	70.31	9.42	60.89	65%	39.58
Industrial (IND)	96.33	1.70	94.63	75%	70.97
Residential-1 (R-1)	164.87	20.51	144.36	15%	21.65
Residential-2 (R-2)	64.91	4.34	60.57	15%	9.09
Residential/Agriculture (R-A)	1,434.35	219.78	1,214.57	12%	145.75
TOTALS	1,893.24	255.80	1,637.44	20%	327.61

Table C-2: 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.

Table C-3: Nonpoint Source Loads at Build-Out for Two 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)
02040201050050								
Residential/Agriculture (R-A)	Low Density, Rural Residential	64.47	0.6	38.68	5	322.35	100	6,447.00
TOTALS		64.47		38.68		322.35		6,447.00
02040201050060								
Residential-1 (R-1)	Low Density, Rural Residential	39.34	0.6	23.60	5	196.70	100	3,934.00
Residential/Agriculture (R-A)	Low Density, Rural Residential	735.09	0.6	441.05	5	3,675.45	100	73,509.00
TOTALS		774.43		464.66		3,872.15		77,443.00
02040201080020								
Residential/Agriculture (R-A)	Low Density, Rural Residential	17.33	0.6	10.40	5	86.65	100	1,733.00
TOTALS		17.33		10.40		86.65		1,733.00
02040201080010								
Residential-1 (R-1)	Low Density, Rural Residential	120.83	0.6	72.50	5	604.15	100	12,083.00
Residential/Agriculture (R-A)	Low Density, Rural Residential	3,440.88	0.6	2,064.53	5	17,204.40	100	344,088.00
TOTALS		3,561.71		2,137.03		17,808.55		356,171.00
02040201050030								
Commercial-2 (C-2)	Commercial	28.15	2.1	59.12	22	619.30	200	5,630.00
Residential-1 (R-1)	Low Density, Rural Residential	177.38	0.6	106.43	5	886.90	100	17,738.00
Residential-2 (R-2)	High, Medium Density Residential	18.38	1.4	25.73	15	275.70	140	2,573.20
Residential/Agriculture (R-A)	Low Density, Rural Residential	672.30	0.6	403.38	5	3,361.50	100	67,230.00
TOTALS		896.21		594.66		5,143.40		93,171.20

Table C-3: Nonpoint Source Loads ... Build-Out for Two HUC14s (Continued)

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)
02040201040070								
Commercial-1 (C-1)	Commercial	74.32	2.1	156.07	22	1,635.04	200	31,214.40
Commercial-2 (C-2)	Commercial	34.12	2.1	71.65	22	750.64	200	14,330.40
Industrial (IND)	Industrial	89.44	1.5	134.16	16	1,431.04	200	26,832.00
Residential-1 (R-1)	Low Density, Rural Residential	207.80	0.6	124.68	5	1,039.00	100	12,468.00
Residential-2 (R-2)	High, Medium Density Residential	486.94	1.4	681.72	15	7,304.10	140	95,440.24
Residential/Agriculture (R-A)	Low Density, Rural Residential	1,418.45	0.6	851.07	5	7,092.25	100	85,107.00
TOTALS		2,311.07		2,019.35		19,252.07		265,392.04
02040201040060								
Commercial-1 (C-1)	Commercial	62.42	2.1	131.08	22	1,373.24	200	12,484.00
Commercial-2 (C-2)	Commercial	60.89	2.1	127.87	22	1,339.58	200	12,178.00
Industrial (IND)	Industrial	94.63	1.5	141.95	16	1,514.08	200	18,926.00
Residential-1 (R-1)	Low Density Rural Residential	144.36	0.6	86.62	5	721.80	100	14,436.00
Residential-2 (R-2)	High, Medium Density Residential	60.57	1.4	84.80	15	908.55	140	8,479.80
Residential/Agriculture (R-A)	Low Density Rural Residential	1,214.57	0.6	728.74	5	6,072.85	100	121,457.00
TOTALS		1,637.44		1,301.05		11,930.10		187,960.80

Mitigation Plans

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

Mitigation Project Criteria

1. A mitigation project must be implemented in the same drainage area as the proposed development. The project must provide additional groundwater recharge benefits, or protection from stormwater runoff quality and quantity from previously developed property that does not currently meet the design and performance standards outlined in the Municipal Stormwater Management Plan. The developer must ensure the long-term maintenance of the project, including the maintenance requirements under Chapters 8 and 9 of the NJDEP Stormwater BMP Manual. Project to be determined by the Township Engineer.
2. The municipality may allow a developer to provide funding or partial funding to the municipality 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.

RESOLUTION NO. 2005-09

TOWNSHIP OF NORTH HANOVER JOINT LAND USE BOARD

PROPOSED AMENDMENT TO THE MASTER PLAN

RESOLUTION APPROVING REPORT TO BE

TRANSMITTED TO THE GOVERNING BODY

PURSUANT TO N.J.S.A. 40:55D-28

RECITAL:

WHEREAS, N.J.S.A. 40:55D-28 gives the North Hanover Joint Land Use Board (the "Board") the authority to review and adopt the Master Plan for the Township of North Hanover and to make any comments and recommendations that the Board deems appropriate; and

WHEREAS, the Township Committee of the Township of North Hanover ("Township Committee") authorized Richard A. Alaimo Association of Engineers to prepare a Municipal Stormwater Management Plan to be included as an element of the Master Plan of North Hanover Township, a copy of which is attached to this resolution;

WHEREAS, on Wednesday, April 27, 2005 a public hearing was conducted wherein the Board reviewed the proposed changes to the Master Plan and sought public comments.

NOW THEREFORE BE IT RESOLVED, by The Joint Land Use Board of the Township of North Hanover, County of Burlington, and State of New Jersey that the attached North Hanover Municipal Stormwater Management Plan dated March 2005 by Richard A. Alaimo Association of Engineers be adopted as an Element of the Master Plan of the Township of North Hanover.

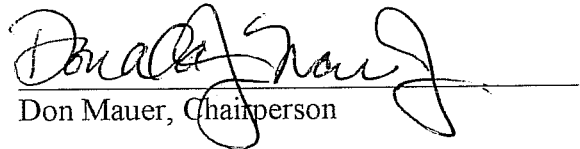
BE IT FURTHER RESOLVED, that a motion was duly made by William Tilton and duly seconded by Kathleen Laird, and the Board voted to adopt said Municipal Stormwater Management Plan as an amendment to the North Hanover Township Master Plan and forward proof of such adoption to the Township Committee.

IN FAVOR: Louis DeLorenzo, Wililam Tilton, William Nobles, Kathleen Laird, Neil Robson, Hilda Coach, Thomas Kimball, and James Durr.

OPPOSED: None.

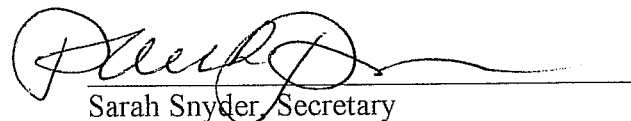
ABSTAIN: None.

BE IT FURTHER RESOLVED, that The Board authorizes The Board's Secretary to forward a certified copy of this Resolution to the Municipal Clerk of the Township of North Hanover.


Don Mauer, Chairperson

CERTIFICATION

This Resolution of Memorialization being adopted by action of The Board on this 25th day of May 2005, is a true copy of the action taken by The Board at its meeting held on April 28, 2005.


Sarah Snyder, Secretary