



Consulting, Municipal & Environmental Engineers
Planners • Surveyors • Landscape Architects

Perryville III Corporate Park
53 Frontage Road, Suite 120
P.O. Box 4017 Clinton, N.J. 08809
Tel: 908.238.0900 Fax: 908.238.0901
www.maserconsulting.com

Stormwater Management Plan

For

Township of Union

Hunterdon County, New Jersey

Prepared by:

Robert C. Bogart. P.E.
Maser Consulting P.A.
Perryville III Corporate Park
53 Frontage Road, Suite 120
P.O. Box 4017
Clinton, New Jersey 08809
(908) 238-0900

April 2006
Revised September 26, 2006

MC Project No. UNT-112

List of Figures

- Figure 1 – Hydrologic Cycle
- Figure C-2 – Streams and Rivers
- Figure C-3 – USGS Map
- Figure C-4 – Groundwater Recharge areas
- Figure C-5 – Well Head Protection Areas
- Figure C-6 – Land use/Land Cover
- Figure C-7 – HUC14 Drainage Areas
- Figure C-8 – Zoning

Introduction

This Municipal Stormwater Management Plan (MSMP) documents the strategy for Union 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.

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.

Stormwater Management Goals

The goals of this MSMP are to:

- Safely convey floodwaters and 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 and quality;
- Prevent, to the greatest extent feasible, an increase in nonpoint pollution;
- Decrease overbank flooding (overbank flooding occurs when excess water overloads the stream channel and flows out into the floodplain) and maintain the integrity of stream channels for their biological functions, as well as for drainage and habitat, through the development of riparian buffer zones;
- Minimize pollutants in stormwater runoff from new and existing development to restore, enhance, and maintain the chemical, physical, and biological integrity of the water 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;

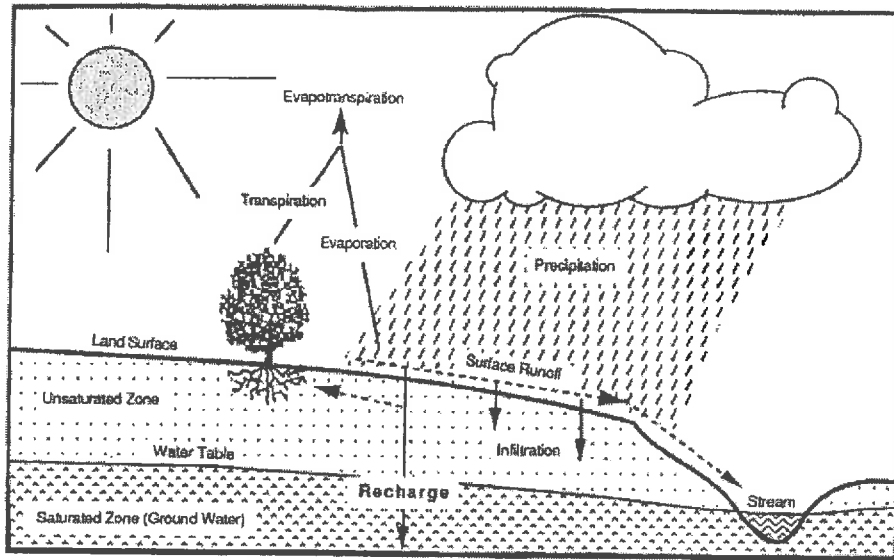
- Preserve and protect the environmentally sensitive areas, including but not limited to steep slopes, wetlands, floodplains, groundwater recharge areas as defined by the N.J.A.C. 7:8, and wildlife habitats; and
- Educate the public about and generate acceptance for the stormwater control measures detailed in the MSWMP.

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 this 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, the 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, 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 fluctuation between normal and storm flow rates, which 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 1: Groundwater Recharge in the Hydrologic Cycle



Source: New Jersey Geological Survey GSR-32

In addition to increase 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.

Municipal Background

The Township encompasses 20.5 square miles in the central part of Hunterdon County, New Jersey. The predominant land use throughout the municipality is agricultural. The existing land use map is depicted in Figure C-6 and is based on the 1995 New Jersey Department of Environmental Protection Land Use/ Land Cover Mapping. The various zoning districts found in the Township and the current zoning map is shown in Figure C-8.

The undeveloped areas that exist in Union are located throughout the Township and can be seen on the 1995 NJ DEP Land Use/ Land Cover Map Figure C-6. Figure C-2 illustrates the hydrology of Union and Figure C-3 identifies the topography as depicted on the USGS 7.5 Minute Quadrangle Maps.

According to the 2000 census, Union has 6,160 residents. The population rose approximately 21.31 percent since the 1990 census. Population increases have resulted in considerable demand for new development throughout Hunterdon County; these changes in the landscape have most likely increased stormwater runoff volumes and pollutant loads to the waterways of the municipality. Additionally, this population increase is significant and is less than the overall state and county increases of approximately 9 and 13 percent respectively over the same period

The Township is situated just west of the South Branch of the Raritan River in the Raritan Basin. The major streams in the Township include the Mulhockaway Creek, which flows along the northern portion of the Township into the Spruce Run Reservoir and the Grandin Stream, which flows easterly through the middle of the Township. Figure C-3 depicts the Township boundary on the USGS quadrangle maps.

The Spruce Run Reservoir is located in the northeast corner of the Township. The reservoir and adjacent park contains 2,012± acres and is popular with picnickers, swimmers, fishermen, boaters and campers. The reservoir was one of the first water supply facilities to be constructed and operated by the state and covers 1,290 acres with 15 miles of shoreline for recreation. The Reservoir has 11 billion gallons of water storage and is contained by a 6,000 foot long earthen dam and two earthen dikes. The Spruce Run Reservoir is an integral part of a water supply system that also consists of Round Valley Reservoir and the Delaware & Raritan Canal Transmission Complex which together have the capability of delivering 225 million gallons of raw water per day to the water utilities that serve central New Jersey.

The Township drains to two (2) Category 1 (C-1) streams: Mulhockaway Creek is a FW2-TMC1 and FW2-TPC1, and Grandin Creek is FW2-NTC1. The Township is located in the two different Watershed Management Areas (WMA); the North and South Branch Raritan (WMA8) and Central Delaware (WMA11). The Township contains portions of seven (7) Hydrologic Unit Code (HUC) areas: the Mulhockaway Creek (02030105020030); Spruce Run/ Willoughby Brook (02030105020040); Spruce Run/ Rockaway Run (02030105020020); Grandin Stream (02030105020070); Cakepoulin Creek (02030105020060); Harihokake Creek (02040105170030) and Hakihokake Creek (02040105170020). These HUC-14 areas are shown in Figure C-7.

A brief overview of the HUC and WMA designations:

The United States Geological Service has developed a method for identifying and inventorying watersheds in the U.S. called the hydrologic unit code system. Through this system all U.S. watersheds have a name and a corresponding number, this number is called the hydrologic unit code (HUC) or watershed address. (Source: USGS)

The term "HUC-14" is from the hydrologic unit code system for delineating and identifying drainage areas. The system starts with the largest possible drainage area (basin) and progressively breaks it down into smaller subdivisions (subbasins, watersheds

and subwatersheds respectively). These subdivisions are delineated and numbered in a nested fashion (see example below). A drainage area with a 14 numbered address, or HUC-14, is a subwatershed of a larger watershed with 11 numbers, or a HUC-11, see the table below. There are 921 HUC-14 subwatersheds in New Jersey that average 8.5 square miles. There are 150 HUC-11 watersheds in New Jersey with an average size of 51.9 square miles. To see a graphic depiction of the breakdown of New Jersey go to:

<http://www.nj.gov/dep/watershedmgt/hucmap.htm>

(Source: NJDEP–Division of Watershed Management)

Example of how a USGS hydrologic unit code system works:

<u>DESCRIPTION</u>	<u>ADDRESS</u>
Basin	020301
Watershed Region (Subbasin)	02030105
Watershed HUC 11	02030105010
Subwatershed HUC 14	02030105010070

The dephuc14 is NJDEP's version of the USGS HUC-14 that delineates the extent of the DEP watershed management regions and areas to be used for the statewide watershed initiative. The NJDEP Watershed Management Area (WMA) and dephuc14 area are very similar; both were created from the USGS HUC-14 data. (Source: NJDEP – Division of Watershed Management).

In 1992, the New Jersey Department of Environmental Protection (NJDEP) has established an Ambient Biomonitoring Network (AMNET) to document the health of the state's waterways. Monitoring the effects of stormwater pollution on the health of our waterways enables us to determine the best strategies to improve water quality for residents locally and throughout the State. There are over 800 AMNET sites throughout the state of New Jersey. These sites are sampled for benthic macroinvertebrates (*biological indicators of stream health*) by NJDEP on a five-year cycle. Streams are classified as non-impaired, moderately impaired, or severely impaired based on the AMNET data.

Non-impaired: Benthic community comparable to other undisturbed streams within the region. A community characterized by a maximum taxa richness, balanced taxa groups and good representation of intolerant individuals.

Moderately Impaired: Macroinvertebrate richness is reduced, in particular EPT taxa. Taxa composition changes result in reduced community balance and intolerant taxa become absent.

Severely Impaired: A dramatic change in the benthic community has occurred. Macroinvertebrates are dominated by a few taxa that are very abundant. Tolerant taxa are the only individuals present.

Source: New Jersey Department of Environmental Protection Bureau of Freshwater and Biological Monitoring (NJDEP/BFBM): <http://www.state.nj.us/dep/wmm/bfbm/>.

The data is used to generate a New Jersey Impairment Score (NJIS), which is based on a number of biometrics related to the benthic macroinvertebrate community dynamics in the waterways.

Biological Assessment	Total Score
Non-impaired	24-30
Moderately Impaired	9-21
Severely Impaired	0-6

Source: NJDEP/BFBM: <http://www.state.nj.us/dep/wmm/bfbm/>.

The AMNET table was modified from the NJDEP data to include only those sites located in the Township of **Union**, Hunterdon County. For clarification the following information is provided to explain the column labeled "HABITAT2".

Definition: Habitat Score for second round of sampling. Parameters evaluated included in-stream substrate, channel morphology, bank structural features, and riparian vegetation. The area evaluated included the sample site and its immediate surroundings (usually within a 100-200 foot radius). The qualitative habitat assessment involves four condition categories, rating each parameter as optimal, suboptimal, marginal or poor based on recently revised EPA criteria (Barbour et. Al, 1997 "Revision to Rapid Bioassessment Protocols for Use in Streams and Rivers: Periphyton, Benthic Macro invertebrates, and Fish. USEPA 841-D-97-002). Note: a score of 999 indicates the site was not assessed for habitat (Source: NJDEP/BFBM).

Based on the AMNET data, the water bodies within Union are either moderately impaired or not impaired. Please see the following website for additional AMNET information and data: <http://www.state.nj.us/dep/wmm/bfbm/publications.html>. Historic AMNET data can be downloaded from: <http://www.state.nj.us/dep/wmm/bfbm/downloads.html>.

Stream health can be determined from a variety of factors, e.g. biological, chemical, physical, etc... The most common testing parameters include but are not limited to: fecal coliform, e. coli, total phosphorous, dissolved oxygen, total suspended solids, temperature, nitrates/nitrites, pH, and turbidity (United States Environmental Protection Agency, USEPA). For a list and thorough description of why the individual parameters should be monitored go to <http://www.epa.gov/volunteer/stream/vms50.html>. In addition to the AMNET data, the NJDEP and other regulatory agencies collect water quality chemical data on the streams in the state. These data show that the instream total fecal coli form concentrations of the Spruce Run (near Glen Gardner) and Mulhockaway Creek (at Van Syckel) occasionally exceed the state's criteria. The Spruce Run (near Glen Gardner) exceeds the state's water temperature criteria and the Reservoir exceeds the state's criteria for Fish Community, Mercury. This means that the Reservoir and stream are considered impaired waterways and the NJDEP is required to develop a Total Maximum Daily Load (TMDL) for these pollutants for each waterway.

A TMDL is the amount of a pollutant that can be accepted by a water body without causing an exceedance of water quality standards or interfering with the ability to use a water body for one or more of its designated uses. The allowable load is allocated to the various sources of the pollutant, such as stormwater and wastewater discharges, which require an NJPDES permit to discharge, and 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 BMP's.

The *New Jersey 2004 Integrated Water Quality Monitoring and Assessment Report* ("the 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 Total Maximum Daily Load ("TMDL") are needed. The Mulhockaway Creek is listed on Sublist 5.

The Delaware, Lamington, Musconetcong, Neshanic and Raritan River are also listed on the 2004 Integrated List. The integrated list is available from the NJDEP website at: <http://www.nj.gov/dep/wmm/sgwqt/wat/integratedlist/integratedlist2004.html> or you may contact the NJDEP for a specific listing. Note: The USEPA Guidance for developing Integrated Reports (USEPA 2001, USEPA 2003) of water quality and listings of impaired water segments recommends placing the assessment results into one of five specific categories. The USEPA's Guidance defines the five categories in which a water body may be placed. The NJDEP has renamed Category 1-5 (USEPA designation) to Sublist 1-5 to avoid confusion with Category 1 Water body Designation. The following list is how the "Sublists" were determined:

- Sublist 1: Attaining a water quality standard and no use is threatened.
- Sublist 2: Attaining some of the designated uses; no use is threatened; and insufficient or no data and information is available to determine if the remaining uses are attained or threatened.
- Sublist 3: Insufficient or no data and information to determine if any designated use is attained.
- Sublist 4: Impaired or threatened for one or more designated uses but does not require the development of a TMDL. (Three Categories).
 1. TMDL has been completed.
 2. Other enforceable pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future.
 3. Impairment is not caused by a pollutant.

- Sublist 5: The water quality standard is not attained. The water body is impaired or threatened for one or more designated uses by a pollutant(s), and requires a TMDL.

Source NJDEP: <http://www.state.nj.us/dep/wmm/sgwqt/wat/integratedlist/integratedlist2004.html>

The AMNET data show that the Mulhockaway Creek is listed as non-impaired for Benthic Macroinvertebrates according to the Ambient Biomonitoring Network Watershed Management Areas 7, 8, 9 and 10 Raritan Region 1999 Benthic Macroinvertebrate Data prepared by the New Jersey Department of Environmental Protection, dated June 2000.

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 NJDES 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.

Design and Performance Standards

The Township will adopt the design and performance standards for stormwater management measures as present 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 Stormwater Management Ordinances will be submitted to the county for review and approval within 30 days of Municipal approval of both the Stormwater Management Ordinance and the revised Stormwater Management Plan amendment to the Master Plan.

The Stormwater Management Ordinance will establish minimum stormwater management requirements and controls for major development and reduce the amount of non-point source pollution entering waterways. The ordinance will guide new development that is proactive and minimally impacts natural resources. Specifically, the Stormwater Management Ordinance shall:

- Reduce artificially induced flood damage to public health, life, and property;
- Minimize increased stormwater runoff rates and volumes;
- Minimize the deterioration of existing structures that would result from

- increased rates of stormwater runoff;
- Induce water recharge into the ground wherever suitable infiltration, soil permeability, and favorable geological conditions exist;
- Prevent an increase in nonpoint source pollution;
- Maintain the integrity and stability of stream channels for their biological functions, as well as for drainage, the conveyance of floodwater, and other purposes;
- Control and minimize soil erosion and the transport of sediment;
- Minimize public safety hazards at any stormwater detention facility constructed pursuant to subdivision or site plan approval;
- Maintain high water in all streams and other surface water bodies;
- Protect all surface water resources from degradation; and
- Protect ground water resources from degradation.

This plan and the adopted ordinance(s) in no way abrogates any other ordinance, rule or regulation, statute, or other provision of law imposed by local, county, state or federal entities. Where any provision of this ordinance imposes restrictions different from those imposed by any other ordinance, rule or regulation, or other provision of law, whichever provisions are more restrictive or impose higher standards shall control.

During construction, Township inspectors will observe construction projects 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.

The Township is approximately 19% developed. The existing land use, based on 2002 aerial photography, is shown in Figure 4. The existing zoning is shown in Figure 5. The vast majority of the developed land is residential. The ground water recharge rates for native soils in this area are generally between 10 and 16 inches annually. The average annual groundwater recharge rates are shown graphically in Figure C-4.

According to NJDEP, “A Well Head Protection Area (WHPA) in New Jersey is a map area calculated around a Public Community Water Supply (PCWS) well in New Jersey that delineates the horizontal extent of ground water captured by a well pumping at a specific rate over a two- (Tier 1), five- (Tier 2), and twelve- (Tier 3) year period of time for unconfined wells. The confined wells have a fifty foot radius delineated around each well serving as the well head protection area to be controlled by the water purveyor in accordance with Safe Drinking Water Regulations (see NJAC 7:10 – 11.7 (b)1).”

WHPA delineations are conducted in response to the Safe Drinking Water Act Amendments of 1986 and 1996 as part of the Source Water Area Protection Program (SWAP). The delineations are the first step in defining the sources of water to a public supply well. Within these area, potential contamination will be assessed and appropriate monitoring will be undertaken as subsequent phases of the NJDEP SWAP. As shown in Figure C-5, the Township has three (3) Community Water Supply Wells and one (1) Tier 1 wellhead protection area. The total area involved encompasses small amount of the Township land area.

Nonstructural Stormwater Management Strategies

The Township is currently implementing a Stormwater Control Ordinance (April 2006). No current ordinances are to be removed, revised or changed.

**AN ORDINANCE AMENDING
THE LAND USE CODE OF THE TOWNSHIP OF UNION,
HUNTERDON COUNTY, NEW JERSEY
REGARDING STORMWATER CONTROL
(Land Use Amendment No. ____)**

WHEREAS, the Union Township Planning Board adopted a Stormwater Management Plan for Union Township on March 24, 2005, for inclusion in the Union Township Master Plan, pursuant to N.J.A.C. 7:8-4.3 (a) and;

WHEREAS, the Union Township Committee adopted Resolution 2005-50 on March 16, 2005, endorsing and supporting the Stormwater Management Plan for the Township of Union dated February, 2005, and recommending that the Planning Board adopt the MSMP as an integral part of the Union Township Master Plan; and

WHEREAS, N.J.S.A 7:8-4.3 (b) requires the Municipality to adopt a Stormwater Control Ordinance to implement the adopted Storm Water Management Plan and to submit the adopted Municipal Stormwater Management Plan and Ordinances to the County Review Agency for approval; and

WHEREAS, the adopted Municipal Stormwater Management Plan and Ordinances shall not take effect without approval by the County Review Agency; and

WHEREAS, the Stormwater Control Ordinance to be adopted herein is based upon a model Stormwater Control Ordinance for Municipalities developed by the Hunterdon County Environmental Toolbox Committee with some minor changes by the Union Township Engineer's Office; and

WHEREAS, the Union Township Planning Board has approved this Stormwater Control Ordinance;

NOW, THEREFORE, BE IT ORDAINED by the Township Committee of the Township of Union, in the County of Hunterdon, State of New Jersey, that the Land Use Code of the Township of Union is hereby amended as follows:

I. SECTION 30-24 STORMWATER MANAGEMENT, shall be deleted in its entirety and replaced with the following:

SECTION 30-24 STORMWATER CONTROL

30-24.1 Scope and Purpose

A. Policy Statement

Stormwater Management is the process of minimizing stormwater runoff and directing stormwater appropriate nonstructural and structural stormwater management measures so as to control flooding, recharge groundwater and reduce pollution of water- resources.

Transport of stormwater-related pollutants into local surface and ground waters can result in: the destruction of fish, wildlife, and habitats; threats to public health due to contaminated food and drinking water supplies; and losses of recreational and aesthetic values. Stormwater management shall occur with the understanding and acceptance of stormwater as a resource; low impact and nonstructural measures shall be tailored to a site and applied wherever and to the extent feasible.

B. Purpose

The purpose of this ordinance is to establish minimum stormwater management requirements and controls for major development and to reduce the amount of nonpoint source pollution entering surface and ground waters. This ordinance guides new development in a manner that is proactive and minimizes harmful impacts to natural resources. Specifically, this ordinance shall:

1. Reduce artificially induced flood damage to public health, life, and property;
2. Minimize increased stormwater runoff rates and volumes;
3. Minimize the deterioration of existing structures that would result from increased rates of stormwater runoff;
4. Induce water recharge into the ground wherever suitable infiltration, soil permeability, and favorable geological conditions exist;
5. Prevent an increase in nonpoint source pollution;
6. Maintain the integrity and stability of stream channels and buffers for their ecological functions, as well as for drainage, the conveyance of floodwater, and other purposes;
7. Control and minimize soil erosion and the transport of sediment;
8. Minimize public safety hazards at any stormwater detention facility constructed pursuant to subdivision or site plan approval;
9. Maintain adequate baseflow and natural flow regimes in all streams and other surface water bodies to protect the aquatic ecosystem;
10. Protect all surface water resources from degradation; and
11. Protect groundwater resources from degradation and diminution.

C. Applicability

1. This ordinance shall be applicable to all site plans and subdivisions for the following major developments that require preliminary or final site plan or subdivision review:
 - a. Non-residential major developments; and
 - b. Aspects of residential major developments that are not pre-empted by the Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21. The provisions of both this ordinance and the RSIS are to be applied and reviewed concurrently for any residential major development.
 - c. In the case of agricultural or horticultural development that meets the definition of major development" under N.J.A.C. 7:8, a farm conservation plan that addresses the protection of soil and water resources shall be developed and implemented. Such a plan shall be approved by the Hunterdon County Soil Conservation District.
2. *This ordinance shall also be applicable to all major developments undertaken by the Township of Union.*
3. This ordinance does not apply to activities of Hunterdon County, the State of New Jersey and the government of the United States of America when those activities are specifically exempted from municipal regulation by relevant State or Federal law.

D. Compatibility with Other Permit and Ordinance Requirements

Development approvals issued for subdivisions and site plans pursuant to this ordinance are to be considered an integral part of development approvals under the subdivision and site plan review process and do not relieve the applicant of the responsibility to secure required permits or approvals for activities regulated by any other applicable code, rule, act, or ordinance. In their interpretation and application, the provisions of this ordinance shall be held to be the minimum requirements for the promotion of the public health, safety, and general welfare. This ordinance shall be construed to assure consistency with the requirements of New Jersey laws and acts amendatory thereof or supplementary thereto, applicable implementing regulations, and any existing or future municipal NJPDES Permits and any amendments or revisions thereto or reissuance thereof. This ordinance is not intended to interfere with, abrogate, or annul any other ordinance, rule or regulation, statute, or other provision of law. Where any provision of this ordinance imposes restrictions different from those imposed by any other ordinance, rule or regulation, or other provision of law, whichever provisions are more restrictive or impose higher standards shall control.

30-24.2 Definitions

Unless specifically defined below, words or phrases used in this ordinance shall be interpreted so as to give them the meaning they have in common usage and to give this ordinance its most reasonable application. Where common definitions exist, the definitions below are the same as or based on the corresponding definitions in the Stormwater Management Rules at N.J.A.C. 7:8-1.2.

“Agriculture or horticulture” or “Agricultural or horticultural use” means the use of the land for common farmsite activities including but not limited to production, harvesting, storage, grading, packaging, processing and the wholesale and retail marketing of crops, plants, animals and other related commodities and the use and application of techniques and methods of soil preparation and management, fertilization, weed, disease and pest control, disposal of farm waste, irrigation, drainage, and water management, and grazing.

“Agricultural or horticultural development” means construction for the purposes of supporting common farmsite activities, including but not limited to: the production, harvesting, storage, grading, packaging, processing, and the wholesale and retail marketing of crops, plants, animals, and other related commodities and the use and application of techniques and methods of soil preparation and management, fertilization, weed, disease, and pest control, disposal of farm waste, irrigation, drainage and water management, and grazing.

“BMP” means Best Management Practices as contained in the NJ Stormwater Best Management Practices Manual dated April 2004 and as updated, available from www.njstormwater.com.

“Category 1 (C1) Waters” means Waters of the State, including unnamed waterways that appear on Soil Survey and USGS Topographic Quadrangle within the same HUC 14 watershed, designated in NJAC 7:9B-1.15 (c) through (h) for purposes of implementing the anti-degradation policies set forth at NJAC 7:9B-1.5(d) for protection from measurable changes in water quality characteristics because of their clarity, color, scenic setting, other characteristics of aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, or exceptional fisheries resources(s).

“Compaction” means the increase in soil bulk density caused by subjecting soil to greater-than normal loading. Compaction can also decrease soil infiltration and permeability rates.

“Core” means a pedestrian-oriented area of commercial and civic uses serving the surrounding municipality, generally including housing and access to public transportation.

“County review agency” means the Hunterdon County Planning Board, as designated by the County Board of Chosen Freeholders to review municipal stormwater management plans and implementing ordinance(s).

“Department” means the New Jersey Department of Environmental Protection.

“Designated Center” means a State Development and Redevelopment Plan Center, such as urban, regional, town, village, or hamlet, as designated by the State Planning Commission.

“Design Engineer” means a person professionally qualified and duly licensed in New Jersey to perform engineering services that may include, but not necessarily be limited to, development of project requirements, creation and development of project design and preparation of drawings and specifications.

“Development” means the division of a parcel of land into two or more parcels, the construction, reconstruction, conversion, structural alteration, relocation or enlargement of any building or structure, any mining excavation or landfill, and any use or change in the use of any building or other structure, or land or extension of use of land, by any person, for which permission is required under the Municipal Land Use Law, N.J.S.A. 40:55D-1 et seq. In the case of development of agricultural lands, development means: any activity that requires a State permit; any activity reviewed by the County Agricultural Board (CAB) and the State Agricultural Development Committee (SADC), and municipal review of any activity not exempted by the Right to Farm Act, N.J.S.A 4:1C-1 et seq.

“Disturbance” means any activity including the clearing, excavating, storing, grading, filling or transportation of soil or any other activity that causes soil to be exposed to the danger of erosion.

“Drainage area” means a geographic area within which stormwater, sediments, or dissolved materials drain to a particular receiving waterbody or to a particular point along a receiving waterbody.

“Environmentally critical area” means an area or feature which is of significant environmental value, including but not limited to: stream corridors; natural heritage priority sites; habitat of endangered or threatened species; large areas of contiguous open space or upland forest; steep slopes; well head protection areas; and groundwater recharge areas. Habitats of endangered or threatened species are those identified by the Department’s Landscape Project as approved by the Department’s Endangered and Nongame Species Program, or by the Department pursuant to the Highlands Act at NJSA 13:20-32k and 13:20-34a(4).

“Erosion” means the detachment and movement of soil or rock fragments by water, wind, ice or gravity.

“Groundwater” means a body of water below the surface of the land in a zone of saturation where the spaces between the soil or geological materials are fully saturated with water.

“Highlands Act” means the Highlands Water Protection and Planning Act, P.L. 2004, c.120, codified at N.J.S.A. 13:20-1 et. seq. as amended.

“HUC-14” means a watershed as defined by the United States Geological Survey, with a 14-digit identifier; a subwatershed.

“Impervious surface” means a surface that has been covered with a layer of material so that it is highly resistant to infiltration by water relative to natural conditions in the area.

“Infiltration” is the process by which water from precipitation seeps into the soil to a level below the normal root soil of plant species.

“Karst Terrain” means an area where karst topography, with its characteristic surface and subterranean features, is developed as a result of the dissolution of limestone, dolomite, or other soluble rock. Characteristic physiographic features present in karst terrains include but are not limited to sinkholes, sinking streams, caves, blind valleys, large springs and subterranean drainage. See also limestone area.

“Limestone area” means an area of Hunterdon County underlain by carbonate sedimentary rock consisting chiefly of calcium carbonate. Limestone is commonly used as a general term for the class of rocks that consist of at least 80 percent calcium or magnesium carbonate. See also karst terrain.

“Low Impact Development” (LID) means methods incorporating design measures to replicate pre-development hydrology to reduce the impacts of development at a lot-level basis, treating rainwater where it falls by creating conditions that allow the water to infiltrate back into the ground. LID emphasizes greater infiltration of stormwater on-site rather than regarding the stormwater as a nuisance condition and disposable.

“Maintenance Plan” means a document required for all major development projects for stormwater management maintenance. The document shall contain specific preventive maintenance tasks and schedules; cost estimates, including estimated cost of sediment, debris, or trash removal; and the name, address, and telephone number of the person or persons responsible for preventive and corrective maintenance (including replacement).

“Major development” means any “development” that provides for ultimately disturbing one or more acres of land or would create one-quarter acre or more of impervious surface.

“Maximum Extent Practicable” means compliance with the specific objective to the greatest extent possible taking into account equitable considerations and competing factors, including but not limited to, environmental benefits, pollutant removal effectiveness, regulatory compliance, ability to implement given site-specific environmental conditions, cost and technical or engineering feasibility.

“Mitigation” means an action by an applicant -providing compensation or offset actions for onsite stormwater management requirements where the applicant has demonstrated the inability or impracticality of strict compliance with the stormwater management requirements set forth in NJAC 7:8, in an adopted regional stormwater management plan, or in this local ordinance, and has received a waiver from strict compliance from the municipality. Mitigation, for the purposes of this ordinance, includes both the mitigation plan detailing how the project’s failure to strictly comply will be compensated, and the implementation of the approved mitigation plan within the same HUC-14 within which the subject project is proposed (if possible and practical), or a contribution of funding toward a regional stormwater control project, or provision for equivalent treatment at an alternate location, or other equivalent water quality benefit.

“Municipality” means any city, borough, town, township, or village.

“Node” means an area designated by the State Planning Commission concentrating facilities and activities that are not organized in a compact form.

“Nonstructural Stormwater Management Techniques” means techniques that control or reduce stormwater runoff in the absence of stormwater structures (e.g., basins and piped conveyances), such as minimizing site disturbance, preserving important site features including, but not limited to, natural vegetation, reducing and disconnecting impervious cover, minimizing slopes, utilizing native vegetation, minimizing turf grass lawns, increasing time of concentration and maintaining and enhancing natural drainage features and characteristics.

“Nutrient” means a chemical element or compound, such as nitrogen or phosphorus, which is essential to and promotes the development of plants, algae and other organisms or vegetation.

"Nutrient load" means the total amount of a nutrient such as nitrogen or phosphorus entering the water during a given time, such as "tons of nitrogen per year", or "pounds of phosphorus per day." Nutrients may enter the water from runoff, groundwater recharge, point source discharges, or the air (in the form of wet deposition such as rain or snow as well as dry deposition).

"Nutrient concentration" means the amount of a nutrient in a defined volume of water (such as milligrams of nitrogen per liter). The relationship between nutrient concentration and nutrient load can vary and depends on the surface water flow, the volume of water in the water body or aquifer, and watershed characteristics.

"Permeable" means a surface or land cover capable of transmitting or percolating a significant amount of precipitation into the underlying soils.

"Person" means any individual, corporation, company, partnership, firm, association, the Township of Union, or political subdivision of this State subject to municipal jurisdiction pursuant to the Municipal Land Use Law, N.J.S.A. 40:55D-1 et seq.

"Pollutant" means any dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, refuse, oil, grease, sewage sludge, munitions, chemical wastes, biological materials, medical wastes, radioactive substance (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.), thermal waste, wrecked or discarded equipment, rock, sand, cellar dirt, industrial, municipal, agricultural, and construction waste or runoff, or other residue discharged directly or indirectly to the land, groundwaters or surface waters of the State, or to a domestic treatment works. "Pollutant" includes both hazardous and nonhazardous pollutants.

"Pollution" means the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water to the extent that the pollutant concentration or level violates either the Groundwater Quality Standards (N.J.A.C. 7:9-6) or the Surface Water Quality Standards (N.J.A.C. 7:9B) of New Jersey.

"Recharge" means the amount of water from precipitation that infiltrates into the ground, and becomes part of a groundwater body.

"Review agency (municipal)" means the municipal body or official that is responsible for the review of a major development project for compliance with the stormwater management requirements.

"Sediment" means solid material, mineral or organic, that is in suspension and is being transported or has been moved from its site of origin by air, water or gravity as a product of erosion.

"Site" means the lot or lots upon which a major development is to occur or has occurred.

"Soil" means all unconsolidated mineral and organic material of any origin.

"Solid and floatable materials" means sediment, debris, trash, and other floating, suspended, or settleable solids.

"Source material" means any material(s) or machinery, located at an industrial facility, that is directly or indirectly related to process, manufacturing, or other industrial activities, that could be a source of pollutants in any industrial stormwater discharge to ground or surface water. Source materials include, but are not limited to raw materials, intermediate products, final products, waste materials, by-products, industrial machinery and fuels, and lubricants, solvents, and detergents that are related to process, manufacturing, or other industrial activities that are exposed to stormwater.

“Special Resource Waters” means water bodies receiving special protections due to their drinking water status or role as high-quality habitat for Threatened and Endangered species or species of commercial or recreational importance. This includes waterways so designated through the NJ Stormwater Management Rules (N.J.A.C. 7:8) because of exceptional ecological significance, exceptional water supply significance, exceptional recreational significance, exceptional shellfish resource, or exceptional fisheries resource. Waters so designated are protected by a 300-foot buffer extending on either side of the waterway measured perpendicular from top-of-bank or center of channel for waterways lacking a defined top-of-bank.

“State Development and Redevelopment Plan Metropolitan Planning Area (PA1)” means an area delineated on the State Plan Policy Map and adopted by the State Planning Commission that is intended to be the focus for much of the state’s future redevelopment and revitalization efforts.

“State Plan Policy Map” is defined as the geographic application of the State Development and Redevelopment Plan’s goals and statewide policies, and the official map of these goals and policies.

“Stormwater” means water resulting from precipitation (including rain and snow) that runs off the land’s surface, is transmitted to the subsurface, or is captured by separate storm sewers or other sewage or drainage facilities, or conveyed by snow removal equipment.

“Stormwater runoff” means the flow of stormwater on or across the surface of the ground, in drainage facilities or in storm sewers.

“Stormwater management basin” means an excavation or embankment and related areas designed to retain stormwater runoff. A stormwater management basin may either be normally dry (that is, a detention basin or infiltration basin), retain water in a permanent pool (a retention basin), or be planted mainly with wetland vegetation (a constructed stormwater wetland).

“Stormwater management measure” means any structural or nonstructural strategy, practice, technology, process, program, or other method intended to control or reduce stormwater runoff and associated pollutants, or to induce or control the infiltration or groundwater recharge of stormwater or to eliminate illicit or illegal non-stormwater discharges into Stormwater conveyances.

“Stream buffer” means a strip of land located immediately adjacent to a stream channel consisting of natural, undisturbed vegetative cover, which serves as a transition area between uplands and riparian lands. A stream buffer may encompass wetlands, may be contained within a flood plain or floodway or may extend beyond a wetland, floodplain or floodway boundary.

“Structural Stormwater Techniques” means a stormwater management measure that involves control of concentrated stormwater runoff or infiltration such as stormwater basins, piped conveyance systems and manufactured stormwater devices, and can include various types of basins, filters, surfaces, and devices located on individual lots in a residential development or throughout a commercial, industrial, or institutional development site in areas not typically suited for larger, centralized structural facilities.

“Threatened and Endangered Species” – Endangered Species are those whose prospects for survival in New Jersey are in immediate danger because of a loss or change in habitat, overexploitation, predation, competition, disease, disturbance or contamination.

Assistance is needed to prevent future extinction in New Jersey. Threatened Species are those who may become endangered if conditions surrounding them begin to or continue to deteriorate. Habitats of endangered or threatened species are those identified by the Department's Landscape Project as approved by the Department's Endangered and Nongame Species Program, or by the Department pursuant to the Highlands Act at NJSA 13:20-32k and 13:20-34a(4).

"Time of concentration" is defined as the time it takes for stormwater runoff to travel from the hydraulically most distant point of the watershed to the point of interest within a watershed.

"Transition area" means an area of protected upland adjacent to a freshwater wetland that minimizes adverse impacts on the wetland or serves as an integral component of the wetlands ecosystem. Also called "buffer" area.

"Urban Redevelopment Area" is defined as previously developed portions of areas delineated on the State Plan Policy Map (SPPM) as the Metropolitan Planning Area (PA1), Designated Centers, Cores or Nodes.

"Waters of the State" means the ocean and its estuaries, all springs, streams, wetlands, and bodies of surface or groundwater, whether natural or artificial, within the boundaries of the State of New Jersey or subject to its jurisdiction.

"Wetlands" or "wetland" means an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation.

30-24.3 General Standards

A. Design and Performance Standards for Stormwater Management Measures

1. Stormwater management measures for major development shall be designed to meet the erosion control, groundwater recharge, and stormwater runoff quantity and quality standards in Section 4, as described in technical guidance documents listed in Section 7. As detailed in Section 4, to the maximum extent practicable, these standards shall be met by incorporating nonstructural stormwater management strategies into the design. If these strategies alone are not sufficient to meet these standards, structural Stormwater management measures necessary to meet these standards shall be incorporated into the design along with the practicable nonstructural strategies.
2. The standards in this ordinance apply to both new major development and redevelopment and are intended to minimize the impact of stormwater runoff on water quality and water quantity in receiving water bodies and maintain groundwater recharge. The standards do not apply to major development to the extent that alternative design and performance standards are applicable under a regional stormwater management plan or Water Quality Management Plan adopted in accordance with Department rules.

Section 4: Stormwater Management Requirements for Major Development

A. Nonstructural Stormwater Management Strategies

1. To the maximum extent practicable, the standards in Subsections 4.B and 4.C shall be met by incorporating nonstructural stormwater management strategies set forth in this subsection into the design. The applicant shall identify the nonstructural measures incorporated into the design of the project. Documentation of the use of nonstructural stormwater management measures shall require the preparation by the applicant of the NJDEP Low Impact Development checklist. If the applicant contends that it is not feasible for engineering, environmental, or safety reasons to incorporate any or only specific nonstructural stormwater management measures identified in Subsection 4.A.2 below into the design of a particular project, the applicant shall identify the strategy or strategies considered and provide a basis for the contention. In both cases, the applicant bears the burden of proving any impracticability.
2. Nonstructural stormwater management strategies incorporated into site design shall:
 - a. Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;
 - b. Minimize the creation of new impervious surfaces and reduce, break up or otherwise disconnect the flow of runoff over impervious surfaces;
 - c. Maximize the protection of natural drainage features and vegetation, except where native or natural vegetation is considered invasive;
 - d. Minimize the decrease in the "time of concentration" from pre-construction to post construction;
 - e. Minimize land clearing and disturbance and overall site grading;
 - f. Minimize soil compaction;
 - g. Retain native, non-invasive vegetation, plant low-maintenance landscaping, plant native vegetation, and minimize the creation of lawns and the use of plantings and vegetation that require the excessive use of fertilizers, pesticides and irrigation;
 - h. Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas;
 - i. Provide other source controls to prevent or minimize the use, exposure and/or mobilization of pollutants and prevent or minimize the release and transport of those pollutants into stormwater runoff.

Such source controls include, but are not limited to:

- (1) Site design features that help to prevent accumulation of trash and debris in drainage systems, including features that satisfy Section 4.A.3 below;

- (2) Site design features that help to prevent discharge of trash and debris from drainage systems;
 - (3) Site design features that help to prevent and/or contain spills or other harmful accumulations of pollutants at industrial or commercial developments; and
 - (4) When establishing vegetation after land disturbance, application of fertilizer in accordance with the requirements established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq., and implementing rules. Prior to applying fertilizer, soil tests must be conducted onsite to determine the type of fertilization necessary.
3. Site design features identified under Section 4.A.2.i.(2) above shall comply with the following standard to control passage of solid and floatable materials through storm drain inlets. For exemptions to this standard see Section 4.A.3.c below.
 - a. Design engineers shall use either of the following grates whenever they use a grate in pavement or another ground surface to collect stormwater from that surface into a storm drain or surface water body under that grate:
 - (1) The New Jersey Department of Transportation (NJDOT) bicycle safe grate, which is described in Chapter 2.4 of the NJDOT Bicycle Compatible Roadways and Bikeways Planning and Design Guidelines (April 1996); or
 - (2) A different grate, if each individual clear space in that grate has an area of no more than seven (7.0) square inches, or is no greater than 0.5 inches across the smallest dimension.
 - b. Whenever design engineers use a curb-opening inlet, the clear space in that curb opening (or each individual clear space, if the curb opening has two or more clear spaces) shall have an area of no more than seven (7.0) square inches, or be no greater than two (2.0) inches across the smallest dimension.
 - c. This standard does not apply:
 - (1) Where the review agency determines that this standard would cause inadequate hydraulic performance that could not practicably be overcome by using additional or larger storm drain inlets that meet these standards;
 - (2) Where flows from the water quality design storm as specified in Section 4.C.1 are conveyed through any device (e.g., end of pipe netting facility, manufactured treatment device, or a catch basin hood) that is designed, at a minimum, to prevent delivery of all solid and floatable materials that could not pass through one of the following:
 - (a) A rectangular space four and five-eighths inches long and one and one-half inches wide (this option does not apply for outfall netting facilities); or
 - (b) A bar screen having a bar spacing of 0.5 inches.

- (3) Where flows are conveyed through a trash rack that has parallel bars with one-inch (1") spacing between the bars, to the elevation of the water quality design storm as specified in Section 4.C.1; or
 - (4) (Where the New Jersey Department of Environmental Protection determines, pursuant to the New Jersey Register of Historic Places Rules at N.J.A.C. 7:4-7.2(c), that action to meet this standard is an undertaking that constitutes an encroachment or will damage or destroy the New Jersey Register listed historic property.
4. Any land area used as a nonstructural stormwater management measure to meet the performance standards in Sections 4.B and 4.C shall be:
 - a. dedicated to a government agency;
 - b. subjected to a conservation restriction filed with the Hunterdon County Clerk's office; or
 - c. subject to an approved equivalent restriction that ensures that measure or an equivalent stormwater management measure approved by the reviewing agency is maintained in perpetuity.
5. Guidance for nonstructural stormwater management strategies is available in the New Jersey Stormwater Best Management Practices Manual. The BMP Manual may be obtained from the address identified in Section 7, or found on the Department's website at www.njstormwater.org.

B. Erosion Control, Groundwater Recharge and Stormwater Runoff Quantity Control Standards

1. This subsection contains minimum design and performance standards to control erosion, maintain groundwater recharge, and control stormwater runoff quantity impacts of major development projects.
 - a. The minimum design and performance standards for erosion control are those established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq. and implementing rules.
 - b. The minimum design and performance standards for groundwater recharge are as follows:
 - (1) Using the criteria for calculating stormwater runoff and groundwater recharge in Section 5B, the design engineer shall comply with at least one of the following standards:
 - (a) Demonstrate through hydrologic and hydraulic analysis that the postdeveloped project site maintains 100 percent of the site's pre-developed average annual groundwater recharge volume; or
 - (b) Demonstrate through hydrologic and hydraulic analysis that any increase in the project site's projected stormwater runoff

volume produced by the 2-Year, 24-hour storm from pre-developed to post-developed conditions is fully infiltrated.

- (2) Groundwater recharge is not required at major development projects located within an "urban redevelopment area" as defined in Section 2 or from those portions of major development projects that produce stormwater runoff described in (3) below.
1. The following two types of stormwater runoff shall not be recharged:
 - (a) Stormwater runoff from areas of high pollutant loading. High pollutant loading areas are:
 - 1) areas in industrial and commercial developments where solvents and/or petroleum products are loaded/unloaded, stored, or applied;
 - 2) areas where pesticides are loaded/unloaded or stored;
 - 3) areas where hazardous materials are expected to be present in greater than "reportable quantities" as defined by the United States Environmental Protection Agency (EPA) at 40 CFR 302.4; and 4) areas where recharge would be inconsistent with a Department approved remedial action work plan or landfill closure plan and areas with high risks for spills of toxic materials, such as gas stations and vehicle maintenance facilities; and
 - (b) Stormwater runoff from industrial areas exposed to "source material."
- (4) The design engineer shall assess and certify the hydraulic impact on the groundwater table and design the project site and all site groundwater recharge measures so as to avoid adverse hydraulic impacts. Adverse hydraulic impacts include, but are not limited to, raising the groundwater table so as to cause surface ponding, flooding of basements and other subsurface facilities, and interference with the proper operation of subsurface sewage disposal systems and other subsurface structures in the vicinity of a groundwater recharge measure.
- c. The minimum design and performance standards for the control of stormwater runoff quantity are as follows:
 - (1) Using the criteria for calculating stormwater runoff and groundwater recharge in Section 5, the design engineer shall comply with at least one of the following standards:
 - (a) Demonstrate through hydrologic and hydraulic analysis that the postdeveloped stormwater runoff hydrographs from the project site for the 2, 10, and 100-Year storms do not exceed, at any point in time, the site's predeveloped runoff hydrographs for the same storms;

(b) Demonstrate through hydrologic and hydraulic analysis that under postdeveloped site conditions:

- 1) there is no increase in pre-developed stormwater runoff rates from the project site for the 2, 10, and 100-Year storms; and
- 2) any increased stormwater runoff volume or change in stormwater runoff timing for these storms will not increase flood damage at or downstream of the project site. When performing this analysis for predeveloped site conditions, all off-site development levels shall reflect existing conditions. When performing this analysis for post-developed site conditions, all off-site development levels shall reflect full development in accordance with current zoning and land use ordinances.

(c) Design onsite stormwater management measures so that the peak postdeveloped stormwater runoff rates from the project site for the 2, 10 and 100-Year storms are 50, 75 and 80 percent, respectively, of the site's peak pre-developed stormwater runoff rates. Peak stormwater outflow rates for these storms shall be adjusted where necessary to account for the discharge of increased stormwater runoff rates and/or volumes from project site areas not controlled by the onsite measures. The percentages do not have to be applied to those portions of the project site that are not proposed for development at the time of application provided that such areas are:

1. protected from future development by conservation easement, deed restriction, or other acceptable legal measures or
2. would be subject to review under these standards if they are proposed for any degree of development in the future.

(2) Any application for a new agricultural or horticultural development that meets the definition of major development in Section 2 shall be submitted to the appropriate Soil Conservation District for review and approval in accordance with the requirements of this section and any applicable Soil Conservation District guidelines for stormwater runoff quantity and erosion control.

C. Stormwater Runoff Quality Standards

1. Stormwater management measures shall be designed to reduce by 80 percent the anticipated post-construction load of total suspended solids (TSS) in stormwater

runoff from the developed site, expressed as pounds per year. Stormwater management measures shall also be in conformance with Section 4.C.8.c of this ordinance. Stormwater management measures shall only be required for water quality control if an additional $\frac{1}{4}$ acre or more of impervious surface is being proposed on a development site. The requirement to reduce TSS does not apply to any stormwater runoff in a discharge regulated under a numeric effluent limitation for TSS imposed under the New Jersey Pollution Discharge Elimination System (NJPDES) rules, N.J.A.C. 7:14A, or in a discharge specifically exempt under a NJPDES permit from this requirement. Daily limits of TSS (TMDL) may apply to the site development based on conditions of regulatory approvals.

2. The water quality design storm shall be 1.25 inches of rainfall in two hours. Water quality calculations shall take into account the distribution of rain from the water quality design storm, as reflected in Table 1, subject to revision due to subsequent rule changes. The calculation of the volume of runoff may take into account the implementation of nonstructural and structural stormwater management measures.

Time (Min utes)	Cumulative Rainfall (Inches)	Time (Min utes)	Cumulative Rainfall (Inches)
0	0.0000	65	0.8917
5	0.0083	70	0.9917
10	0.0166	75	1.0500
15	0.0250	80	1.0840
20	0.0500	85	1.1170
25	0.0750	90	1.1500
30	0.1000	95	1.1750
35	0.1330	100	1.2000
40	0.1660	105	1.2250
45	0.2000	110	1.2334
50	0.2583	115	1.2417
55	0.3583	120	1.2500
60	0.6250		

- For purposes of TSS reduction calculations, Table 2 below presents the presumed removal rates for certain BMPs designed, constructed and maintained in accordance with the New Jersey Stormwater Best Management Practices Manual, subject to revision due to subsequent rule changes. The current edition of the BMP Manual may be obtained from the address identified in Section 7, or found on the Department's website at www.njstormwater.org. The BMP Manual and other sources of technical guidance are listed in Section 7. TSS reduction shall be calculated based on the removal rates for the BMPs in Table 2 below. Alternative BMPs, removal rates and methods of calculating removal rates may be approved if the design engineer provides documentation demonstrating the capability of these alternative BMPs, removal rates and computational methods to the review agency. Documentation for alternative rates and methods shall consist of published (peer-reviewed) journal article or scientific paper. A copy of any

approved alternative rate or method of calculating the removal rate, including documentation, shall be provided to the Department at the following address: Division of Watershed Management, New Jersey Department of Environmental Protection, PO Box 418 Trenton, New Jersey, 08625-0418.

4. If more than one BMP in series is necessary to achieve the required 80 percent TSS reduction for a site, the applicant shall utilize the following formula to calculate TSS reduction:

$$R = A + B - (AXB)/100$$

Where

R = total TSS percent load removal (expressed as a whole number) from application of both BMPs, and

A = the TSS percent removal rate (whole number) applicable to the first (upstream) BMP

B = the TSS percent removal rate (whole number) applicable to the second (downstream) BMP

In cases where three (or more) BMPs are used in series, the applicant shall calculate the TSS reduction for the two most upstream BMPs in the series using the above formula, then substitute the result (R) of that calculation in the formula for "A" when calculating the combined result with the next BMP in the series.

Table 2: TSS Removal Rates for BMPs	
(Source: New Jersey Stormwater Best Management Practices Manual)	
Best Management Practice	TSS Percent Removal Rate
Bioretenn Systems	90
Wetland	90
Extended Detention Basin	40-60
Infiltration Structure	80
Manufactured Treatment Device	See Section 6.C
Sand Filter	80
Vegetative Filter Strip	60-80
Wet Pond	50-90

5. If there is more than one onsite drainage area, the 80 percent TSS removal rate shall apply to the discharge of each drainage subarea, unless the runoff from the subareas converge on site, in which case the removal rate can be demonstrated through a calculation using an area-weighted average.
6. Stormwater management measures shall also be designed to reduce, to the maximum extent practicable, the post-construction nutrient load from the developed site in stormwater runoff generated from the water quality design storm. In achieving reduction of nutrients to the maximum extent practicable, the design of the site shall include nonstructural strategies and structural measures that optimize nutrient removal while still achieving the performance standards in Sections 4.B and 4.C. This standard may be superceded by a more stringent numeric effluent limitation imposed under the New Jersey Pollution Discharge Elimination System (NJPDES) rules, N.J.A.C. 7:14A, or in a discharge specifically exempt under a NJPDES permit from this requirement. Daily limits for nutrient loading (TMDL) may apply to the site development based on conditions of regulatory approvals.
7. Additional information and examples are contained in the New Jersey Stormwater Best Management Practices Manual, which may be obtained from the address identified in Section 7.
8. In accordance with the definition of FW1 at N.J.A.C. 7:9B-1.4, stormwater management measures shall be designed to prevent any increase in stormwater runoff and any new stormwater discharge point to waters classified as FW1.
9. Special water resource protection areas shall be established along all waters designated Category One at N.J.A.C. 7:9B, and along all perennial or intermittent streams that drain into or upstream of the Category One waters as shown on the USGS Quadrangle Maps or in the County Soil Surveys, within the associated HUC14 drainage area. Other authoritative sources of stream delineation may be utilized, such as a delineation that is part of the Municipal or Regional Stormwater Management Plan or a stream delineation overlay prepared by the Department. These areas shall be designated and protected as follows:
 - a. The applicant shall preserve and maintain a special water resource protection area in accordance with one of the following, unless superceded by a local Stream Corridor Protection Ordinance:
 - (1) A 300-foot special water resource protection area shall be provided on each side of the waterway, measured perpendicular to the waterway from the top of the bank outwards or from the centerline of the waterway where the bank is not defined, consisting of existing vegetation or vegetation allowed to follow natural succession.
 - (2) Encroachment within the designated special water resource protection area under Subsection (1) above shall only be allowed where previous development or disturbance has occurred (for example, pre-existing active

agricultural use, parking area or maintained lawn area). The encroachment shall only be allowed where the applicant demonstrates to the satisfaction of the review agency that the functional value and overall condition of the special water resource protection area will be maintained to the maximum extent practicable. In no case shall the remaining special water resource protection area be reduced to less than 150 feet as measured perpendicular to the top of bank of the waterway or centerline of the waterway where the bank is undefined. All encroachments proposed under this subparagraph shall be subject to review and approval by the Department.

- b. All stormwater shall be discharged outside of and flow through the special water resource protection area and shall comply with the Standard for Off-Site Stability in the "Standards For Soil Erosion and Sediment Control in New Jersey," established under the Soil Erosion and Sediment Control Act , N.J.S.A. 4:24-39 et seq.
- c. If stormwater discharged outside of and flowing through the special water resource protection area cannot comply with the Standard For Off-Site Stability in the "Standards for Soil Erosion and Sediment Control in New Jersey," established under the Soil Erosion and Sediment Control Act , N.J.S.A. 4:24-39 et seq., then the stabilization measures in accordance with the requirements of the above standards may be placed within the special water resource protection area, provided that:
 - (1) Stabilization measures shall not be placed within 150 feet of the Category One waterway;
 - (2) Stormwater discharges allowed by this section shall achieve a 95 percent TSS postconstruction removal rate;
 - (3) Thermal pollution by stormwater discharges shall be addressed to ensure no significant increase or decrease in temperature occurs in the receiving waterway outside of the mixing zone;
 - (4) The encroachment shall only be allowed where the applicant demonstrates to the satisfaction of the review agency that the ecological value and condition of the special water resource protection area will be maintained to the maximum extent practicable;
 - (5) A conceptual project design meeting shall be held with the appropriate Department staff and Soil Conservation District staff to identify necessary stabilization measures; and
 - (6) All encroachments proposed under this section shall be reviewed and approved by the Department prior to approval by the review agency.
- d. A stream corridor protection plan for a waterway subject to paragraph C.8 shall maintain or enhance the current ecological value and condition of the special water resource protection area as defined in paragraph C.8.a.(1) above. In no case shall a stream corridor protection plan allow the reduction of the Special Water Resource Protection Area to less than 150 feet as measured perpendicular to the waterway subject to this subsection.
- e. Paragraph C.8 does not apply to the construction of one individual single

family dwelling that is not part of a larger development and is on a lot receiving preliminary or final subdivision approval on or before February 2, 2004, provided that the construction begins on or before February 2, 2009.

D. Maintenance Plan

The development shall incorporate a maintenance plan for the stormwater management measures incorporated into the design of a major development in accordance with Section 10.

E. Exemptions

The following linear development projects are exempt from the groundwater recharge, stormwater runoff quantity, and stormwater runoff quality requirements of Sections 4.B and 4.C:

1. The construction of an underground utility line provided that the disturbed areas are revegetated upon completion;
2. The construction of an aboveground utility line provided that the existing conditions are maintained to the maximum extent practicable; and
3. The construction of a public pedestrian access, such as a sidewalk or trail with a maximum width of 14 feet, provided that the access is constructed of permeable material such as wood chips, unpacked gravel, and porous pavement (See Section 7 for guidance).

F. Waivers from Strict Compliance

1. A waiver from strict compliance with the groundwater recharge, stormwater runoff quantity, and stormwater runoff quality requirements of Sections 4.B and 4.C may be obtained for the enlargement of an existing public roadway or railroad; or the construction or enlargement of a public pedestrian access, provided that the following conditions are met:
 - a. The applicant demonstrates that there is a public need for the project that cannot be accomplished by any other means;
 - b. The applicant demonstrates, through an alternatives analysis acceptable to the review agency, that through the use of nonstructural and structural stormwater management strategies and measures, the option selected complies with the requirements of Sections 4.B and 4.C to the maximum extent practicable;
 - c. The applicant demonstrates that, in order to meet the requirements of Sections 4.B and 4.C, existing structures currently in use, such as homes and buildings, would need to be condemned; and

- d. The applicant demonstrates that it does not own or have other rights to areas, including the potential to obtain through condemnation lands not falling under F.1.c. above within the upstream drainage area of the receiving stream, that would provide additional opportunities to mitigate the requirements of Sections 4.B and 4.C that were not achievable on-site.
2. *A waiver from strict compliance with the requirements of Sections 4.B and 4.C may be issued in those cases where an applicant has demonstrated the inability or impracticality of strict compliance, other than projects addressed under Subsection F.1, with the Stormwater management requirements set forth in NJAC 7:8, in an adopted regional Stormwater management plan, or in a local ordinance which is as strict as NJAC 7:8. A waiver from strict compliance for such projects can only be obtained if the applicant agrees to undertake a suitable mitigation measure identified in the mitigation section of the municipality's Stormwater Management Plan. In such cases, the Applicant must submit a mitigation plan detailing how the project's failure to strictly comply will be compensated. In cases where a waiver is granted, an applicant should provide mitigation, if possible and/or practical within the same HUC-14 watershed within which the subject project is proposed, or contribute funding toward a regional stormwater control project, or provide for equivalent treatment at an alternate location, or other equivalent water quality benefit, in lieu of implementing the required stormwater control measures on their specific site.*

G. Threatened and Endangered Species

When habitat for threatened and endangered species (see definition for Environmental Critical Areas in Section 2), is present on a site, stormwater management measures shall be implemented to avoid adverse impacts caused by pollutant discharge, the creation of concentrated flow, or the alteration of recharge;

30-24.5 Calculation of Stormwater Runoff and Groundwater Recharge

A. Stormwater Runoff Calculations

1. In complying with the design and performance standards in Section 4, the design engineer shall calculate stormwater runoff using one of the following methods:
 - a. The USDA Natural Resources Conservation Service (NRCS) methodology, including the NRCS Runoff Equation, NRCS Dimensionless Unit Hydrograph, and appropriate NRCS 24-Hour design storm, as described in the current NRCS National Engineering Handbook Part 630 – Hydrology, and the current Technical Release 55 – Urban Hydrology for Small Watersheds or superceding document; or

Groundwater Recharge Spreadsheet (NJGRS) computer program as described in the Department's current Stormwater Best Management Practices Manual. Alternative groundwater recharge calculation methods may be used upon approval by the municipal engineer.

2. In complying with the design and performance standards in Section 4, the design engineer shall calculate stormwater runoff infiltration volumes in accordance with the USDA Natural Resources Conservation Service (NRCS) methodology, including the NRCS Runoff Equation, as described in the current NRCS National Engineering Handbook Part 630 – Hydrology and the current Technical Release 55 – Urban Hydrology for Small Watersheds. In addition, the design engineer shall use appropriate 2-Year, 24-Hour rainfall depths as developed for the project site by the National Oceanic and Atmospheric Administration.
3. When selecting or calculating runoff coefficients for pre-developed project site conditions for groundwater recharge or stormwater runoff infiltration calculations, the project site's land cover shall be assumed to be woods. However, another land cover may be used to calculate runoff coefficients if:
 - a. such land cover has existed at the site or portion thereof site without interruption for at least five years immediately prior to the time of application; and
 - b. the design engineer can document the character and extent of such land cover through the use of photographs, affidavits, and/or other acceptable land use records. If more than one land cover other than woods has existed on the site during the five years immediately prior to the time of application, the land cover with the lowest runoff potential (including woods) shall be used for the computations. All pre-developed land covers shall be assumed to be in good hydrologic condition and, if cultivated, shall be assumed to have conservation treatment.

30-24.6 Standards for Structural Stormwater Management Measures

A. Structural Management Measures

Standards for structural stormwater management measures are as follows:

1. Structural stormwater management measures shall be designed to factor into the design the existing site conditions which may cause the measure to fail, have an adverse effect on water quality or quantity, or cause harm or damage to persons or property, including, for example, environmentally critical areas, wetlands; flood-prone areas; slopes; depth to seasonal high water table; soil type, permeability and texture; drainage area and drainage patterns; existing or former mines; significant land filling; and the presence of solution-prone carbonate rocks (limestone) and related Karst topography.

2. Structural stormwater management measures shall be designed to minimize maintenance, facilitate maintenance and repairs, and ensure proper functioning. Trash racks shall be installed at the intake to the outlet structure as appropriate, and shall have parallel bars with one-inch (1") spacing between the bars to the elevation of the water quality design storm. For elevations higher than the water quality design storm, the parallel bars at the outlet structure shall be spaced no greater than one-third (1/3) the width of the diameter of the orifice or one-third (1/3) the width of the weir, with a minimum spacing between bars of one inch and a maximum spacing between bars of six inches. In addition, the design of trash racks must comply with the requirements of Section 8.B.
3. Structural stormwater management measures shall be designed, constructed, and installed to be strong, durable, and corrosion resistant. Measures that are consistent with the relevant portions of the Residential Site Improvement Standards at N.J.A.C. 5:21-7.3, 7.4, and 7.5 shall be deemed to meet this requirement. The measures are to be sequenced in the site development process so that erosion control standards are met and so the measure is not compromised or impaired by construction runoff.
4. At the intake to the outlet from the stormwater management basin, the orifice size shall be a minimum of two and one-half inches in diameter.
5. Stormwater management basins shall be designed to meet the minimum safety standards for stormwater management basins at Section 8.
6. Where tailwater will affect the hydraulic performance of a stormwater management measure, the design engineer shall include such effects in the measure's design.

B. Guidelines for Management Measures

Stormwater management measure guidelines are available in the New Jersey Stormwater Best Management Practices Manual and other documents as described in Section 7. Other stormwater management measures may be utilized provided the design engineer demonstrates to the satisfaction of the review agency that the proposed measure and its design will accomplish the required water quantity, groundwater recharge and water quality design and performance standards established by Section 4 of this ordinance.

C. Manufactured Treatment Devices

1. Manufactured treatment devices may be used to meet the requirements of Section 4 of this ordinance, provided the pollutant removal rates are verified by the New Jersey Corporation for Advanced Technology and certified by the Department.
2. Non-verified manufactured treatment devices may also be used for purposes other than underground discharge of stormwater, where such devices provide a clear

benefit to stormwater quality or flow control in a manner that facilitates improved nonstructural stormwater management controls on the site, or avoids the need for approval of off-site mitigation. The benefits of proposed non-verified manufactured treatment devices must be proved to the satisfaction of the review agency.

3. Manufactured treatment devices may be used only where the maintenance plan required by Section 10 ensures that the manufactured device will be properly maintained for its functional lifespan and will be replaced as needed with management measures that are at least as effective as the original manufactured treatment device working in accordance with manufacturer's specifications.

30-24.7 Sources for Technical Guidance

A. Primary Technical Guidance

Technical guidance for stormwater management measures can be found in the documents listed at 1 and 2 below, which are available from Maps and Publications, New Jersey Department of Environmental Protection, 428 East State Street, P.O. Box 420, Trenton, New Jersey, 08625; telephone (609) 777-1038.

1. Guidelines for stormwater management measures are contained in the New Jersey Stormwater Best Management Practices Manual, as amended. Information is provided on stormwater management measures such as: bioretention systems, constructed Stormwater wetlands, dry wells, extended detention basins, infiltration structures, manufactured treatment devices, pervious paving, sand filters, vegetative filter strips, and wet ponds. This document is also available at www.njstormwater.org.
2. The New Jersey Department of Environmental Protection Stormwater Management Facilities Maintenance Manual, (NJDEP Ocean County Demonstration Study, Stormwater Management Facilities Maintenance Manual, dated June 1989) as amended.

B. Additional Technical Guidance

Additional technical guidance for stormwater management measures can be obtained from the following:

1. The "Standards for Soil Erosion and Sediment Control in New Jersey" promulgated by the State Soil Conservation Committee and incorporated into N.J.A.C. 2:90. Copies of these standards may be obtained by contacting the State Soil Conservation Committee, P.O. Box 330, Trenton, New Jersey 08625; (609) 292-5540, or the Hunterdon County Soil Conservation District, 687 Pittstown Road, Suite 1, Frenchtown, NJ 08825, (908) 788-1397.

2. The Rutgers Cooperative Extension Service, 732-932-9306.
3. The Hunterdon County Soil Conservation District, 687 Pittstown Road, Suite 1, Frenchtown, NJ 08825, (908) 788-1397.
4. The United States Environmental Protection Agency, including the National Management Measures to Control Nonpoint Source Pollution from Urban Areas, available at the Web site: <http://www.epa.gov/owow/nps/urbanmm/index.html>.
5. Field guides of the United States Department of Agriculture, Natural Resources Conservation Service, where supplemental to and not conflicting with a source of Primary Guidance in Section 7.A.
6. Other similarly authoritative governmental or trade association sources acceptable to the municipality.

30-24.8 Safety Standards for Stormwater Management Basins

A. General Scope

This section sets forth requirements to protect public safety through the proper design and operation of stormwater management basins. This section applies to any new Stormwater management basin.

B. Requirements for Trash Racks, Overflow Grates and Escape Provisions

1. A trash rack is a device intended to intercept runoff-borne trash and debris that might otherwise block the hydraulic openings in the outlet structure of a structural Stormwater management measure. Trash racks shall be installed upstream of such outlet structure openings to ensure proper functioning of the structural stormwater management measure in accordance with the following:
 - a. The trash rack should be constructed primarily of bars aligned in the direction of flow with a maximum bar spacing of approximately $\frac{1}{2}$ the diameter or width of the hydraulic opening it is protecting. Transverse bars aligned perpendicular to flow should be sized and spaced as necessary for rack stability and strength.
 - b. The trash rack shall not adversely affect the hydraulic performance of either the outlet structure opening it is protecting or the overall outlet structure.
 - c. The trash rack shall have sufficient net open area under clean conditions to limit the peak design storm velocity through it to a maximum of 2.5 feet per second.

- d. The trash rack shall be constructed and installed to be rigid, durable, and corrosion resistant, and shall be designed to withstand a perpendicular live loading of 300 lbs/ft sq.
2. An overflow grate is a device intended to protect the opening in the top of a Stormwater management measure outlet structure. If an outlet structure has an overflow grate, such grate shall meet the following requirements:
 - a. The overflow grate shall be secured to the outlet structure but removable for emergencies and maintenance;
 - b. The overflow grate spacing shall be no more than two inches across the smallest dimension;
 - c. The overflow grate shall be constructed and installed to be rigid, durable, and corrosion resistant, and shall be designed to withstand a perpendicular live loading of 300 lbs./ft sq.
3. *Structural stormwater management measures shall include escape provisions as follows:*
 - a. If a structural stormwater management measure has an outlet structure, escape provisions shall be incorporated in or on the structure. Escape provisions means the permanent installation of ladders, steps, rungs, or other features that provide readily accessible means of ingress and egress from the outlet structure.
 - b. Safety ledges shall be constructed on the slopes of all new structural Stormwater management measures having a permanent pool of water deeper than two and one-half feet. Such safety ledges shall be comprised of two steps. Each step shall be four to six feet in width. One step shall be located approximately two and one-half feet below the permanent water surface, and the second step shall be located one to one and one-half feet above the permanent water surface. See Section 8.D for an illustration of safety ledges in a stormwater management basin.
 - c. In new stormwater management basins, the maximum slope of the interior and exterior of an earthen dam, embankment, or berm shall not be steeper than 5 horizontal to 1 vertical in accordance with N.J.A.C. 7:8-6(c)3.
 - d. An emergency drawdown method for detention basins is required where the permanent pool will be more than two and one-half feet deep. This drawdown method must consider downstream or offsite stability at the outfall in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey.

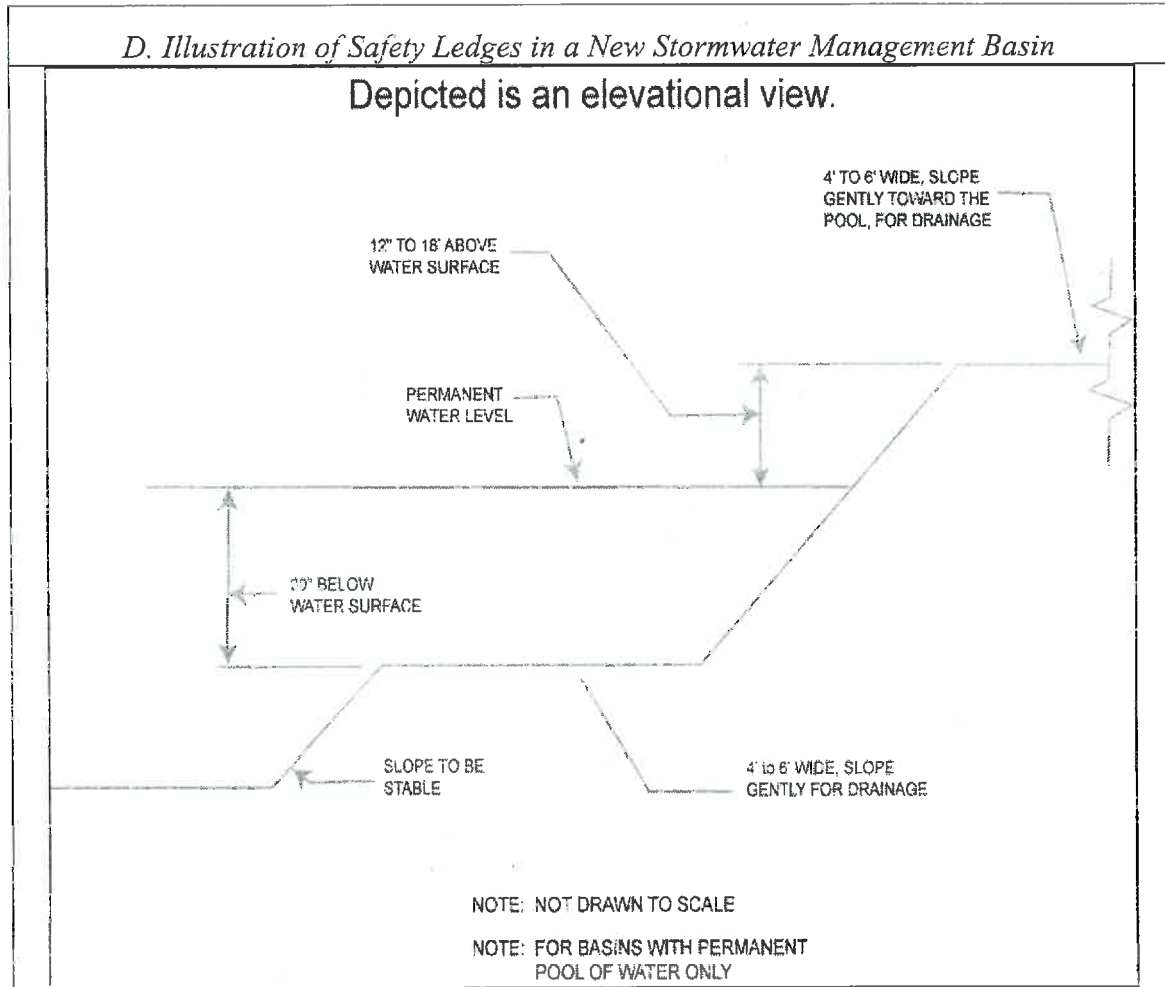
C. Variance or Exemption from Safety Standards

1. A variance or exemption from the safety standards for stormwater management basins may be granted only, upon a written finding by the appropriate reviewing

agency (municipality, county or Department) that the variance or exemption will not constitute a threat to public safety.

D. Illustration of Safety Ledges in a New Stormwater Management Basin

A stormwater basin that creates an impoundment regulated by the Department under the Dam Safety Act will require a 10-foot berm around the basin, to the extent that a berm is created.



30-24.9 Requirements for a Site Development Stormwater Plan

A. Submission of Site Development Stormwater Plan

1. Whenever an applicant seeks municipal approval of a development subject to this ordinance, the applicant shall submit all of the required components of the Checklist for the Site Development Stormwater Plan at Section 9.C below as part of the submission of the applicant's application for subdivision or site plan approval.

2. The applicant shall demonstrate through Submission Requirements that the project meets the standards set forth in this ordinance.
3. The applicant shall submit to the approving municipal authority the required number of copies of the materials listed in the checklist for site development stormwater plans in accordance with Section 9.C of this ordinance.

B. Site Development Stormwater Plan Approval

The applicant's Site Development project shall be reviewed as a part of the subdivision or site plan review process by the municipal board or official from which municipal approval is sought (the review agency). That review agency shall consult the engineer retained by the Planning and/or Zoning Board (as appropriate) to determine if all of the checklist requirements have been satisfied and to determine if the project meets the standards set forth in this ordinance.

C. Submission Requirements

The information in 9.C.1 through 9.C.7 below shall be provided unless a waiver is approved through 9.C.8 below:

1. Existing Site Conditions Base Map, including topography, streams, roads and current built environment. The reviewing engineer may require upstream tributary drainage system information as necessary. It is recommended that the topographic base map of the site be submitted which extends a minimum of 300 feet beyond the limits of the proposed development, at a scale appropriate to show site details, showing 2-foot contour intervals.
2. Environmental Site Analysis
A written and graphic description of the natural and man-made features of the site and its environs. This description should include a discussion of soil conditions, slopes, wetlands, waterways and vegetation on the site. Particular attention should be given to unique, unusual, or environmentally critical areas and to those that provide particular opportunities or constraints for development.
3. Project Description and Site Plan(s)
A map (or maps) at a scale appropriate for the site indicating the location of existing and proposed buildings, roads, parking areas, utilities, structural facilities for Stormwater management and sediment control, and other permanent structures. The map(s) shall also clearly show areas where alterations occur in the natural terrain and cover, including lawns and other landscaping, and seasonal high groundwater elevations. A written description of the site plan and justification of proposed changes in natural conditions may also be provided.

4. Stormwater Site Planning and Design Summary

This plan shall provide a demonstration of how the goals and standards of Sections 3 through 6 are being met, including both nonstructural and structural approaches. The focus of this plan shall be to describe how the site is being managed or developed to meet the objective of controlling groundwater recharge, stormwater quality and stormwater quantity problems at the source by land management and source controls whenever possible. Refer to the Municipal Stormwater Management Plan and/or the Municipal Stormwater Pollution Prevention Plan for additional requirements. It should explain in full the maps required by this section.

5. Stormwater Management Facilities Map(s)

The following information, illustrated on a map at a scale appropriate for the site, shall be included:

- a. Total area to be paved or built upon, proposed surface contours, land area to be occupied by the stormwater management facilities and the type of vegetation thereon, land area to remain in natural vegetation, and details of the proposed plan to infiltrate, manage, control and dispose of stormwater.
- b. Details of all stormwater management facility designs, during and after construction, including discharge provisions, discharge capacity for each outlet at different levels of detention, and emergency spillway provisions with maximum discharge capacity of each spillway.

6. Calculations

- a. Comprehensive hydrologic and hydraulic design and discharge stability calculations for the pre-development and post-development conditions for the design storms specified in Section 4 of this ordinance.
- b. When the proposed stormwater management control measures (e.g., infiltration basins) depend on the hydrologic properties of soils, then a soils report shall be submitted. The soils report shall be based on onsite boring logs or soil pit profiles. The number and location of required soil borings or soil pits shall be determined based on what is needed to determine the suitability and distribution of soils present at the location of the control measure. The municipality shall be notified of site investigation activities and given the opportunity to have a witness, either prior to approval or as a condition of approval, as appropriate for the specific type of measure. Subsequent to approval of the major development, post-construction bulk soil density and infiltration testing shall be required for all infiltration measures that were used as justification for meeting the recharge standard, to ensure that they were properly constructed.

7. Maintenance and Repair Plan

The design and planning of the stormwater management facility shall meet the maintenance requirements of Section 10.

8. Waiver from Submission Requirements

The review agency may, in consultation with the municipal engineer, waive submission of any of the requirements in Sections 9.C.1 through 9.C.6 of this ordinance when it can be demonstrated that the information requested is impossible to obtain or it would create a significant economic hardship on the applicant to obtain and its absence will not materially affect the review process.

30-24.10 Maintenance and Repair

A. Applicability

1. Projects subject to review pursuant to Section 1.C of this ordinance shall comply with the requirements of Sections 10.B and 10.C.

B. General Maintenance

1. The design engineer shall prepare a maintenance plan for the stormwater management measures incorporated into the design of a major development. This plan shall be separate from all other documents and designed for ongoing use by the site owners or operators in performing and documenting maintenance and repair, and by the municipality in ensuring implementation of the maintenance plan. The final maintenance plan shall be updated and provided to the municipality post-construction to include an evaluation based on the specifications of the initial maintenance plan and as-built conditions.
2. The maintenance plan shall contain specific preventive maintenance tasks and schedules; cost estimates, including estimated cost of sediment, debris, or trash removal and disposal; safety needs; identification of methods and disposal sites for materials removed during maintenance; maintenance requirements for created wetlands and other ecological systems; safety devices and systems; warranty and operational standards from the manufacturers of any manufactured treatment devices (See Section 6.C); and the name, address, and telephone number of the person or persons responsible for preventive and corrective maintenance (including replacement), using maintenance guidelines for Stormwater management measures from Section 7, the Municipal Stormwater Management Plan and any relevant regional Stormwater management plan. If the maintenance plan identifies a person other than the developer (for example, a public agency or homeowners' association) as having the responsibility for continuing maintenance, the plan shall include documentation of such person's agreement to assume this responsibility, or of the developer's obligation to dedicate a Stormwater management facility to such person under an applicable ordinance or regulation.
3. Responsibility for maintenance shall not be assigned or transferred to the owner or tenant of an individual property in a residential development or

project, unless such owner or tenant owns or leases the entire residential development or project.

4. If the person responsible for maintenance identified under Section 10.B.2 above is not a public agency, the maintenance plan and any future revisions based on Section 10.B.7 below shall be recorded upon the deed of record for each property on which the maintenance described in the maintenance plan must be undertaken.
5. Preventive and corrective maintenance shall be performed to maintain the function of the stormwater management measures, including repairs or replacement to the structures; removal of sediment, debris, or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; and repair or replacement of nonvegetated linings.
6. The person responsible for maintenance identified under Section 10.B.2 above shall maintain a detailed log of all preventive and corrective maintenance for the structural Stormwater management measures incorporated into the design of the development, including a record of all inspections and copies of all maintenance-related work orders. **The log shall be kept on-site and be made available for inspection by any review agency having jurisdiction.**
7. The person responsible for maintenance identified under Section 10.B.2 above shall evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed. **Adjustments to the plan and/or deed must be submitted to the Township Committee for review and approval.**
8. The person responsible for maintenance identified under Section 10.B.2 above shall retain, submit annually to the municipality and make available, upon request by any public entity with administrative, health, environmental, or safety authority over the site, the maintenance plan and the documentation required by Sections 10.B.6 and 10.B.7 above.
9. The requirements of Sections 10.B.3 and 10.B.4 do not apply to stormwater management facilities that are dedicated to and accepted by the municipality or another governmental agency of competent jurisdiction.
10. In the event that the stormwater management facility becomes a danger to public safety or public health or is in need of maintenance or repair, the municipality shall so notify the responsible person in writing. Upon receipt of that notice, the responsible person shall have fourteen (14) days to affect maintenance and repair of the facility in a manner that is approved by the municipal engineer or his designee. The municipality, in its discretion, may extend the time allowed for effecting maintenance and repair for good cause.

If the responsible person fails or refuses to perform such maintenance and repair, the municipality or County may immediately proceed to do so and shall bill the cost thereof to the responsible person.

- C. Nothing in this section shall preclude the municipality in which the major development is located from requiring the posting of a performance or maintenance guarantee in accordance with N.J.S.A. 40:55D-53.
- D. The maintenance plan shall specifically provide a specific municipal right of access for inspection of measures, and for maintenance if required under Section B.10.

30-24.11 Penalties

Any person who erects, constructs, alters, repairs, converts, maintains, or uses any building, structure or land in violation of this ordinance shall be subject to the following penalties **not to exceed Five Hundred Dollars (\$500.00) and/or imprisonment for a time not to exceed sixty (60) days. After notified of violation, each day of continuance thereof may, in the discretion of the court, be treated as a separate and distinctive violation hereof.**

II. Effective Date This ordinance shall take effect immediately upon the approval by the county review agency, or sixty (60) days from the receipt of the ordinance by the Hunterdon County Planning Board if the Hunterdon County Planning Board, as county review agency, should fail to act.

III. Severability If the provisions of any section, subsection, paragraph, subdivision, or clause of this ordinance shall be judged invalid by a court of competent jurisdiction, such order of judgment shall not affect or invalidate the remainder of any section, subsection, paragraph, subdivision, or clause of this ordinance.

IV. Publication and Filing The Township Clerk shall publish notice of the passage of the Ordinance after the public hearing and adoption, as well as filing a copy of the Ordinance as finally adopted with the Hunterdon County Planning Board as required by N.J.S. 40:55D-16. In addition, this section should further indicate that the Township Clerk shall also transmit a copy of the Ordinance after final passage to the Township Tax Assessor as required by N.J.S. 40:49-2.1.

V. Repealer The Stormwater Control Ordinance shall supersede all applicable ordinances in conflict.

VI. Short Title The Short title of this Ordinance shall be known as and may be cited as "Amendment No. _____ to the Union Township Land Use Code."

Attest:

Bruce A. Rossi, Mayor

K. Judith Fabian, Clerk

First Reading: _____

Publication: _____

Second Reading: _____

Published by
Title Only: _____

NOTICE

Please Take Notice that the following Ordinance was adopted on first reading by the Township Committee of the Township of Union, County of Hunterdon, State of New Jersey, at a meeting held on the 1st day of March, 2006. The Ordinance was then ordered to be published according to law. Notice is hereby given that the said Ordinance will be considered for final passage at a public hearing to be held on the 5th day of April, 2006, at 7:30 p.m., or as soon thereafter as the matter may be reached, at the Township Municipal Building, 140 Perryville Road, Hampton, New Jersey, at which time all interested parties will be heard.

**K. Judith Fabian,
Municipal Clerk**

Land Use / Build – Out Analysis

A detailed land use analysis for the Township was conducted. Figure 4 illustrates the existing land use in the Township based on Hunterdon County Division of GIS information from NJDEP. Figure C-7 illustrates the HUC14s within the Township. The Township zoning map is shown in Figure C-8. The build-out calculations for impervious coverage are shown in Table 2. It is important to note that this Build – Out Calculation provides only an estimate for potential additional impervious coverage. A portion of the critical areas has been developed, thus the remaining developable areas may also be somewhat underestimated and the total of Critical Areas (Acres) and Existing Developed Areas (Acres) may exceed the Total Acres of a given zone within a HUC14 location. Under this circumstance, a negative number appears in the Remaining Developable Areas (Acres) column, which leads to the assumption that no additional impervious coverage will result. In any case, when developing agricultural and forestlands, the build-out of these HUC14s will result in a significant increase in impervious surfaces.

Table 3 presents the pollutant loading coefficients by land cover. The pollutant loads at full build-out are presented in Table 4.

Table 2: Build – Out Calculations for HUC14s

HUC14 and Zone*	Total Acres*	Existing Impervious (%)*	Existing Impervious (Acres)*	Critical Areas (Acres)*	Existing Developed Areas (Acres)*	Remaining Developable Areas (Acres) ¹	Allowable Impervious (%) ²	Build-Out Impervious (Acres) ³
02030105020030 – Mulhockaway Creek								
AP1	322.75	5	1.91	9.09	38.27	275.39	5	13.77
AP2	455.65	5	17.89	93.43	357.83	4.39	5	0.22
CM	1825.05	5	46.53	115.44	930.62	778.99	5	38.95
CR	650.25	35	21.14	116.29	60.39	473.57	35	165.75
INS	170.87	25	42.72		170.87		25	0.00
OR	251.56	5	12.00		239.96	11.60	5	0.58
P	336.99	5	16.85		336.99		5	0.00
PC	227.83	75	100.33		133.77	94.06	75	70.55
PO	92.49	25	0.00		0.00	92.49	25	23.12
Q	113.91	0.6	0.68		113.66	0.25	0.6	0.00
VC	118.66	25	9.92		39.68	78.98	25	19.75
VR	132.90	25	28.08		112.33	20.57	25	5.14
WM	830.61	5	27.00		540.09	290.52	5	14.53
Totals	5529.52		325.05					352.35

HUC14 and Zone*	Total Acres*	Existing Impervious (%)*	Existing Impervious (Acres)*	Critical Areas (Acres)*	Existing Developed Areas (Acres)*	Remaining Developable Areas (Acres) ¹	Allowable Impervious (%) ²	Build-Out Impervious (Acres) ³
02030105020040 – Spruce Run Reservoir/Willoughby Brook								
CR	118.05	35	41.32		118.05		35	0.00
INS	2300.16	25	0.00	2274.54	0.00	25.62	25	6.41
P	267.28	5	12.32	20.91	246.37		5	0.00
PC	27.24	75	13.13		17.50	9.74	75	7.31
PO	30.87	25	7.72		30.87		25	0.00
Q	40.87	0.6	0.07		12.06	28.81	0.6	0.17
RM	152.66	15	0.00		0.00	152.66	15	22.90
VC	67.19	25	15.30		61.19	6.00	25	1.50
VR	94.43	25	15.99		63.96	30.47	25	7.62
WM	874.24	5	0.00	674.77	0.00	199.47	5	9.97
Totals	3972.99		105.84					55.87
02030105020060 – Cakepoulin Creek								
AP2	928.39	5	11.61	102.45	232.17	593.77	5	29.69
Totals	928.39		11.61					29.69
02030105020070 – Grandin Stream								
AP2	1109.28	5	21.06	65.36	421.10	622.82	5	31.14
CM	120.53	5	1.87		37.43	83.10	5	4.16
CR	736.20	35	0.00	96.89	0.01	639.31	35	223.76
INS	293.46	25	71.67		286.70	6.76	25	1.69
P	136.25	5	6.81		136.25		5	0.00
Q	31.44	0.6	0.10		17.17	14.27	0.6	0.09
RM	110.05	15	16.51		110.05		15	0.00
VC	20.10	25	0.00		0.00	20.10	25	0.00
VR	110.05	25	27.13		108.52	1.53	25	0.38
Totals	2667.36		145.15			1387.89		261.21
02040105170030 – Harihokake Creek								
CM	103.04	5	0.00		0.00	103.04	5	5.15
Totals			0.00					5.15
Total Existing Impervious Coverage			587.66	Potential Additional Impervious Coverage				704.28
* Information Provided by Hunterdon County Planning Department								
1 Remaining Developable Areas (Acres) = Total Acres - Critical Areas (Acres) - Existing Developed Areas (Acres)								
2 Allowable Impervious (%) is the Maximum Impervious Coverage permitted by the Zoning Ordinance								
3 Build - Out Impervious (Acres) = Remaining Developable Areas (Acres) x Allowable Impervious (%)								

Table 3: Pollutant Loads by Land Cover

Land Cover	Total Phosphorous 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

Source: NJDEP Stormwater BMP Manual 2004

Table 4: Nonpoint Source Loads at Build – Out for HUC14s

HUC14 and Zone	Build - Out Zoning	Acres	Total Phosphorous lbs/acre/year	Total Phosphorous lbs/year	Total Nitrogen lbs/acre/year	Total Nitrogen lbs/year	Total Suspended Solids lbs/acre/year	Total Suspended Solids lbs/year
02030105020030 – Mulhockaway Creek								
AP1	5	13.77	1.3	17.90	10	137.70	300	4131.00
AP2	5	0.22	1.3	0.29	10	2.20	300	66.00
CM	5	38.95	1.3	50.64	10	389.50	300	11685.00
CR	35	165.75	0.6	99.45	5	828.75	100	16575.00
INS	25	0	0.6	0.00	5	0.00	100	0.00
OR	5	0.58	2.1	1.22	22	12.76	200	116.00
P	5	0	0.1	0.00	3	0.00	40	0.00
PC	75	70.55	2.1	148.16	22	1552.10	200	14110.00
PO	25	23.12	2.1	48.55	22	508.64	200	4624.00
Q	0.6	0	0.5	0.00	5	0.00	60	0.00
VC	25	19.75	2.1	41.48	22	434.50	200	3950.00
VR	25	5.14	1.4	7.20	15	77.10	140	719.60
WM	5	14.53	0.1	1.45	3	43.59	40	581.20
Totals				416.32		3986.84		56557.80

HUC14 and Zone	Build - Out Zoning	Acres	Total Phosphorous lbs/acre/year	Total Phosphorous lbs/year	Total Nitrogen lbs/acre/year	Total Nitrogen lbs/year	Total Suspended Solids lbs/acre/year	Total Suspended Solids lbs/year
02030105020040 – Spruce Run Reservoir /Willoughby Brook								
CR	35	0	0.6	0.00	5	0.00	100	0.00
INS	25	6.41	0.6	3.85	5	32.05	100	641.00
P	5	0	0.1	0.00	3	0.00	40	0.00
PC	75	7.31	2.1	15.35	22	160.82	200	1462.00
PO	25	0	2.1	0.00	22	160.82	200	0.00
Q	0.6	0.17	0.5	0.09	5	0.85	60	10.20
RM	15	22.9	1.4	32.06	15	343.50	140	3206.00
VC	25	1.5	2.1	3.15	22	33.00	200	300.00
VR	25	7.62	1.4	10.67	15	114.30	140	1066.80
WM	5	9.97	0.1	1.00	3	29.91	40	398.80
Totals				66.16		714.43		7084.80
02030105020060 – Cakepoulin Creek								
AP2	5.00	29.69	1.3	38.60	10	296.90	300	8907.00
Totals				38.60		296.90		8907.00
02030105020070 – Grandin Stream								
AP2	5	31.14	1.3	40.48	10	311.40	300	9342.00
CM	5	4.16	1.3	5.41	10	41.60	300	1248.00
CR	35	223.75	0.6	134.25	5	1118.75	100	22375.00
INS	25	1.69	0.6	1.01	5	8.45	100	169.00
P	5	0.00	0.1	0.00	3	0.00	40	0.00
Q	0.6	0.09	0.5	0.05	5	0.45	60	5.40
RM	15	0.00	1.4	0.00	15	0.00	140	0.00
VC	25	0.00	2.1	0.00	22	0.00	200	0.00
VR	25	0.38	1.4	0.53	15	5.70	140	53.20
Totals				181.73		1486.35		33192.60
02040105170030 – Harihokake Creek								
CM	5.00	5.15	1.3	6.70	10	51.50	300	1545.00
Totals				6.70		51.50		1545.00
Total Non-Point Source Loads At Build-Out				709.50		6536.20		107287.20

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.

In the event that it is deemed impracticable or impossible to meet the requirements of N.J.A.C. 7:8 a variance or exemption from strict compliance may be granted.

At 7:8-4.2c(11): In order to grant a variance or exemption from the design and performance standards in N.J.A.C. 7:8-5, include a mitigation plan that identifies what measures are necessary to offset the deficit created by granting the variance or exemption. The mitigation plan shall ensure that mitigation is completed within the drainage area and for the performance standard for which the variance or exemption was granted;

At 7:8-4.6: Variance or exemption from the design and performance standards for stormwater management measures A municipality may grant a variance or exemption from the design and performance standards for stormwater management measures set forth in its approved municipal Stormwater management plan and stormwater control ordinance(s), provided the municipal plan includes a mitigation plan in accordance with N.J.A.C. 7:8 4.2(c)11 and the municipality submits a written report to the county review agency and the Department describing the variance or exemption and the required mitigation.

The applicant must demonstrate, through sufficient datum, that there is no practicable, alternative to address Stormwater Quantity, Stormwater Quality or Groundwater Recharge within the project limits. Alternatives should include the options of acquiring additional property, reduction of the scale of development and a no-build option. The applicant must demonstrate that the design is to the maximum extent practical conforming to the NJDEP's current Best Management Practices (BMPs) for non-point source control.

Chapter 3 of the New Jersey Stormwater Best Management Practices Manual (BMP Manual) provides detailed information on what the NJDEP requires for mitigation strategies http://www.state.nj.us/dep/watershedmgt/DOCS/BMP_DOCS/bmpfeb2004pdfs/feb2004chap3.pdf. There are many options available for mitigation and they vary greatly for each municipality.

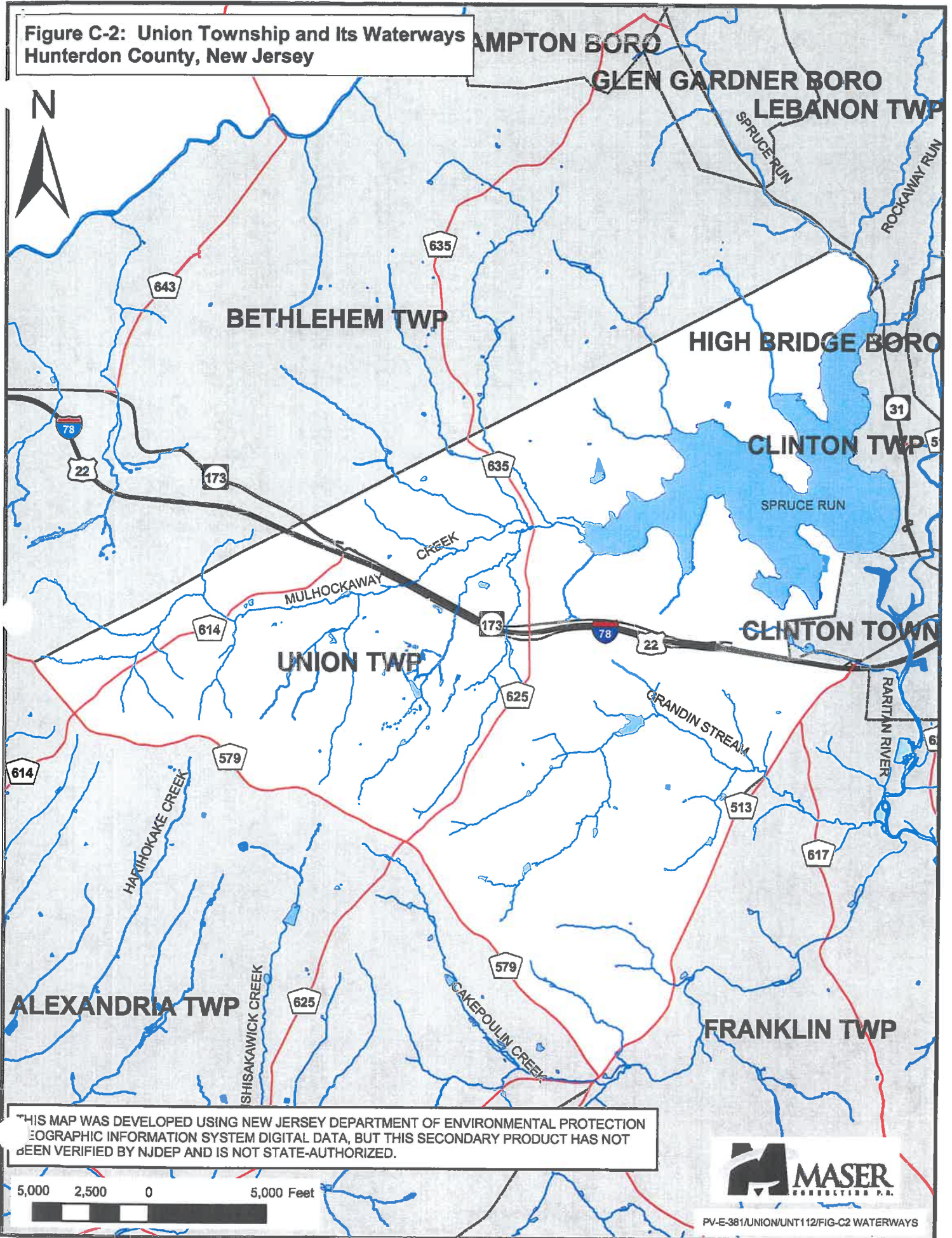
Mitigation Project Hierarchy Criteria

1. The mitigation project must be implemented in the same drainage area of the proposed development. The project must provide additional protection from stormwater runoff quality and quantity from previously developed property that does not currently meet the design and performance standards outlined in the Municipal Stormwater Management Plan. The developer must ensure the long-term maintenance of the project, including the maintenance requirements under Chapters 8 and 9 of the NJDEP Stormwater BMP Manual.
 - a. The applicant can develop a project 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 Municipal Engineer. At this time the Municipal Governing Body has not identified any specific projects within the Municipal boundaries.

2. If a suitable site cannot be located in the same drainage area as the proposed development, as discussed in Option 1, the mitigation project may provide mitigation that is not equivalent to the impacts for which the variance or exemption is sought, but that addresses the same issue.
3. If a suitable mitigation project cannot be implemented within the same drainage area of the proposed development, a project addressing the same issues may be acceptable within an adjacent upstream or downstream drainage area.
4. A developer may, at the discretion of the municipality, provide funding or partial funding for an environmental enhancement project, 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 or mitigation, and the cost associated with the long-term maintenance requirements of the mitigation measure.

Source: http://www.state.nj.us/dep/watershedmgt/DOCS/BMP_DOCS/bmpfeb2004pdfs/feb2004appdxc.pdf

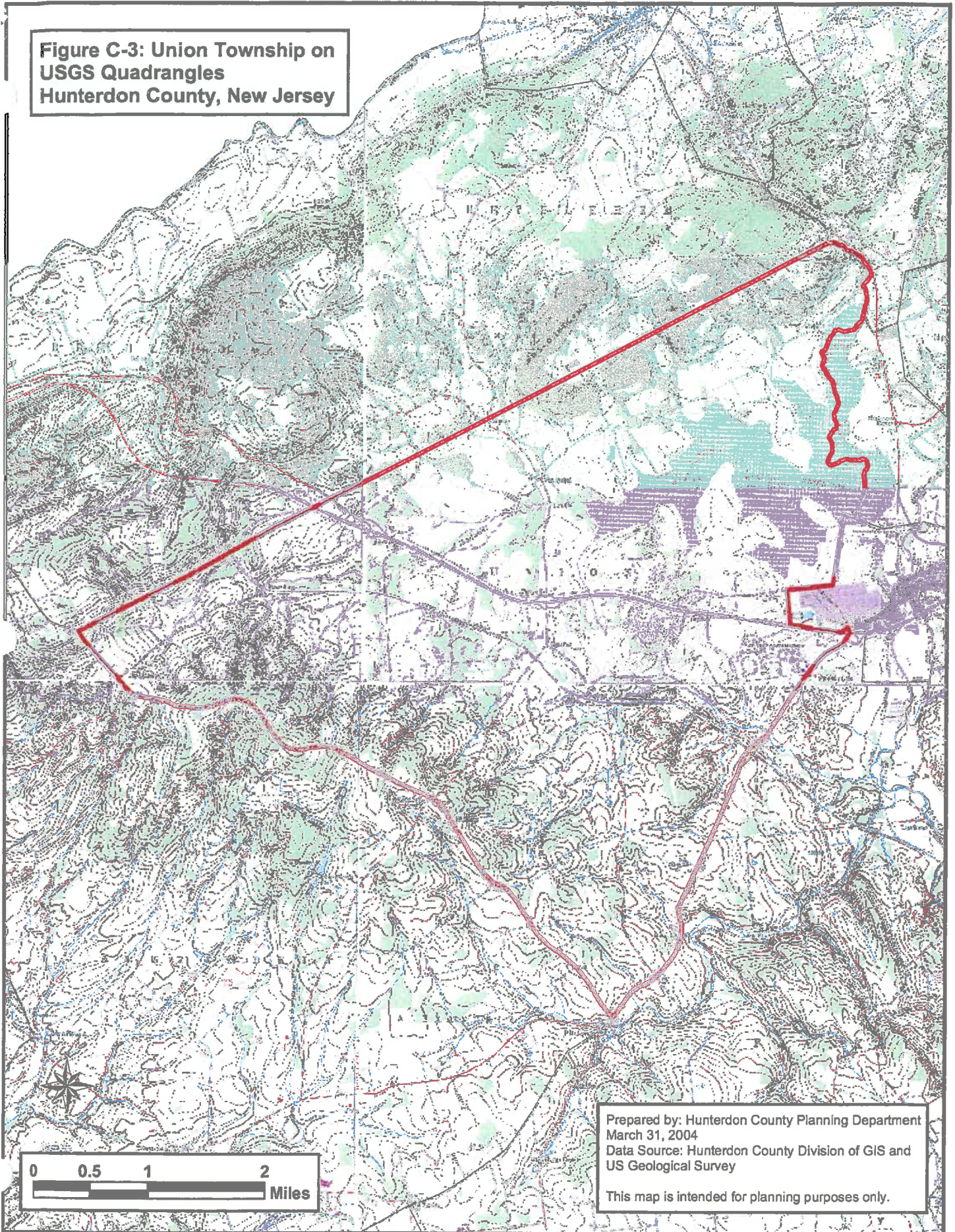
Figure C-2: Union Township and Its Waterways
Hunterdon County, New Jersey



THIS MAP WAS DEVELOPED USING NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
 GEOGRAPHIC INFORMATION SYSTEM DIGITAL DATA, BUT THIS SECONDARY PRODUCT HAS NOT
 BEEN VERIFIED BY NJDEP AND IS NOT STATE-AUTHORIZED.



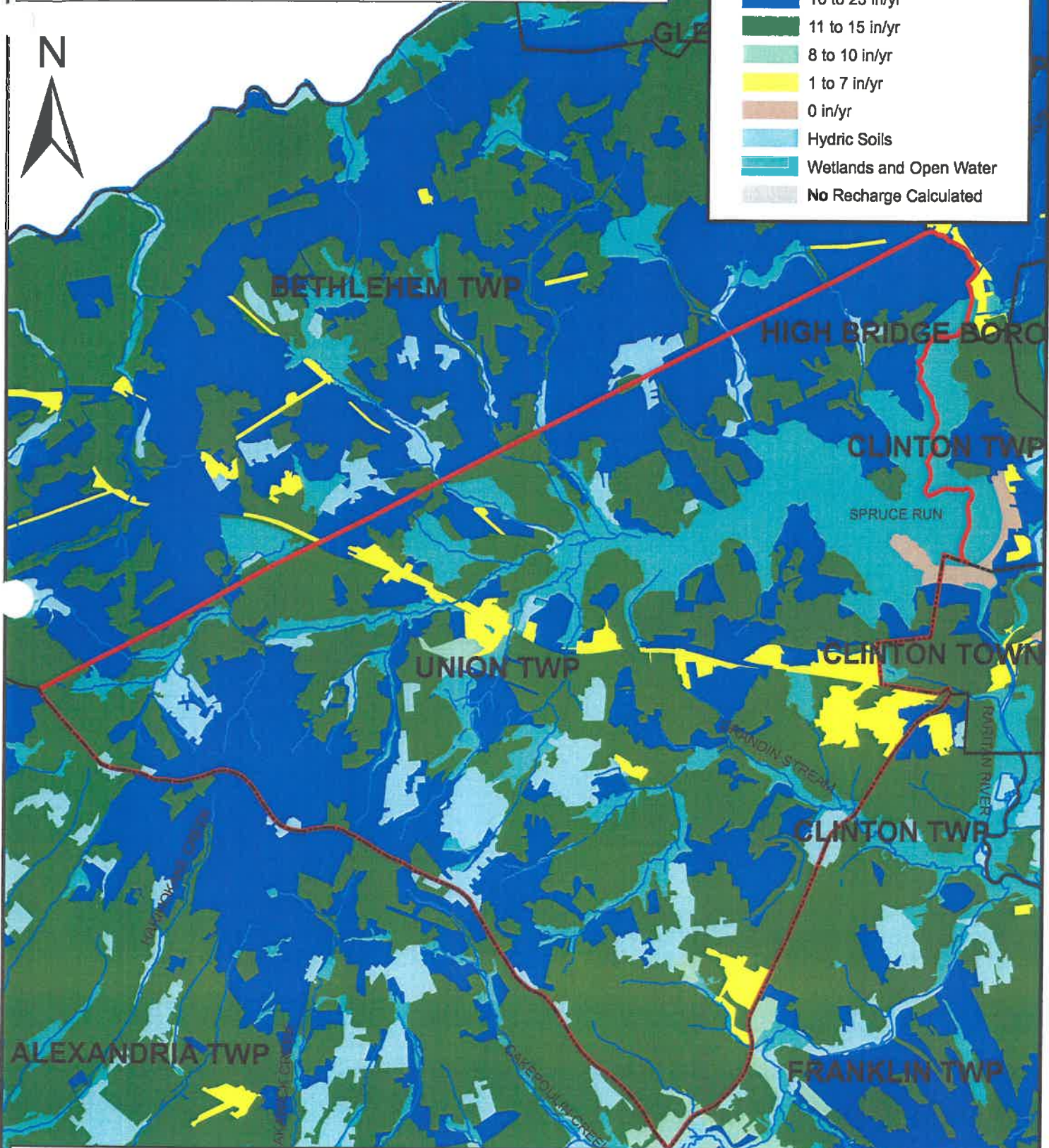
**Figure C-3: Union Township on
USGS Quadrangles
Hunterdon County, New Jersey**



**Figure C-4: Groundwater Recharge Areas in Union Township
Hunterdon County, New Jersey**

NJ GS Groundwater Recharge

- 16 to 23 in/yr
- 11 to 15 in/yr
- 8 to 10 in/yr
- 1 to 7 in/yr
- 0 in/yr
- Hydric Soils
- Wetlands and Open Water
- No Recharge Calculated



THIS MAP WAS DEVELOPED USING NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION GEOGRAPHIC INFORMATION SYSTEM DIGITAL DATA, BUT THIS SECONDARY PRODUCT HAS NOT BEEN VERIFIED BY NJDEP AND IS NOT STATE-AUTHORIZED.



**Figure C-5: Wellhead Protection Areas in Union Township BORO
Hunterdon County, New Jersey**

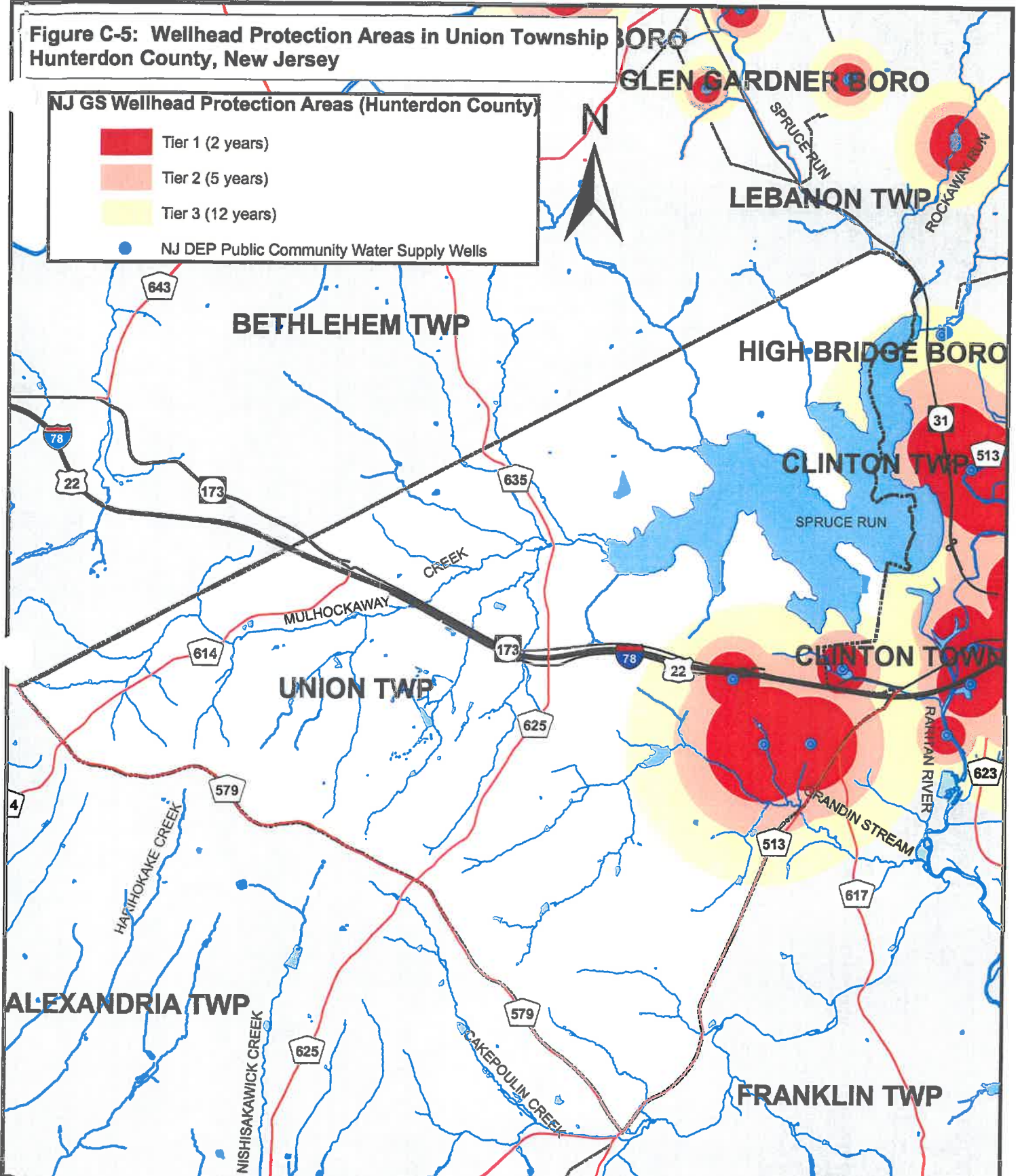
NJ GS Wellhead Protection Areas (Hunterdon County)

 Tier 1 (2 years)

 Tier 2 (5 years)

 Tier 3 (12 years)

 NJ DEP Public Community Water Supply Wells



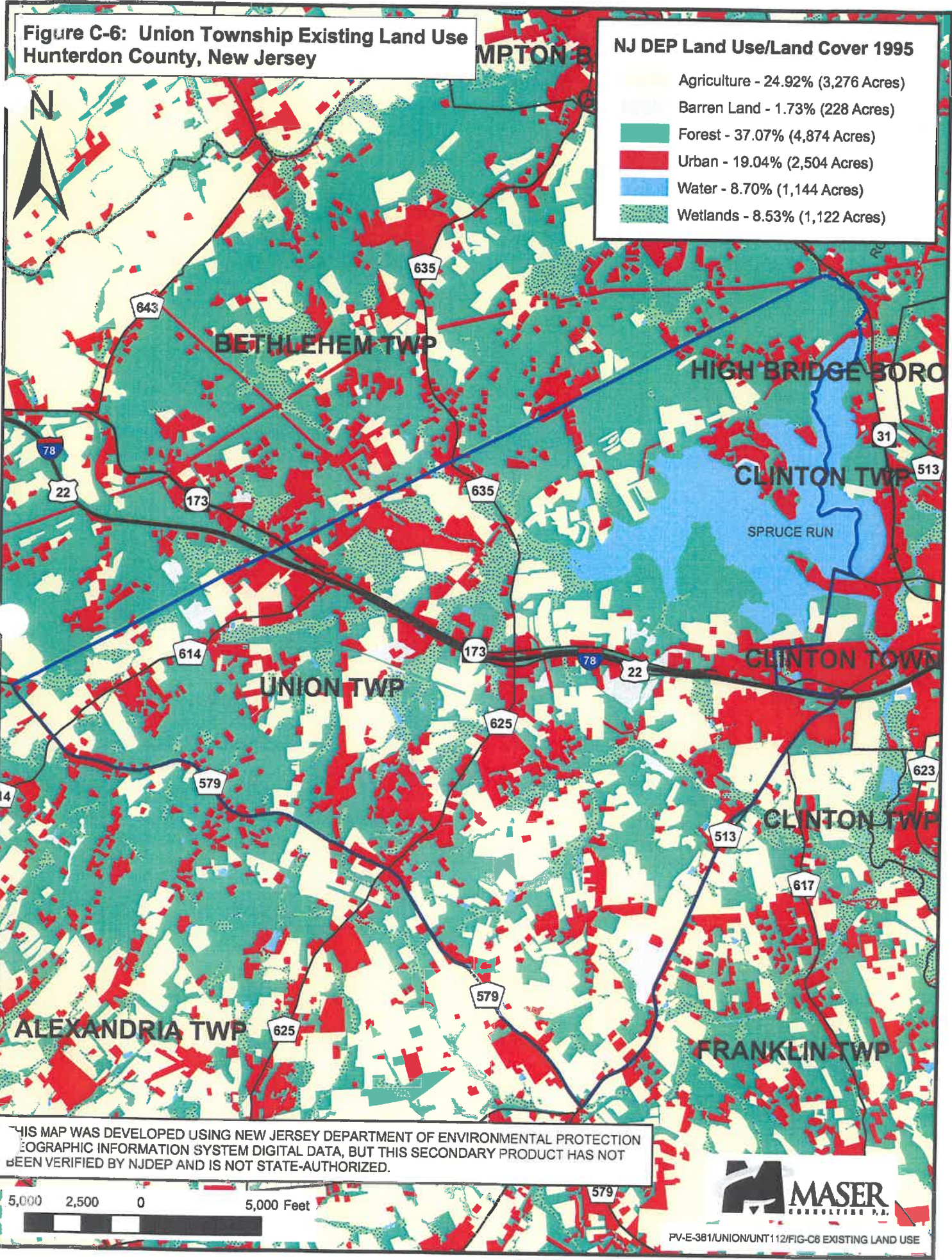
THIS MAP WAS DEVELOPED USING NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION GEOGRAPHIC INFORMATION SYSTEM DIGITAL DATA, BUT THIS SECONDARY PRODUCT HAS NOT BEEN VERIFIED BY NJDEP AND IS NOT STATE-AUTHORIZED.



**Figure C-6: Union Township Existing Land Use
Hunterdon County, New Jersey**

NJ DEP Land Use/Land Cover 1995

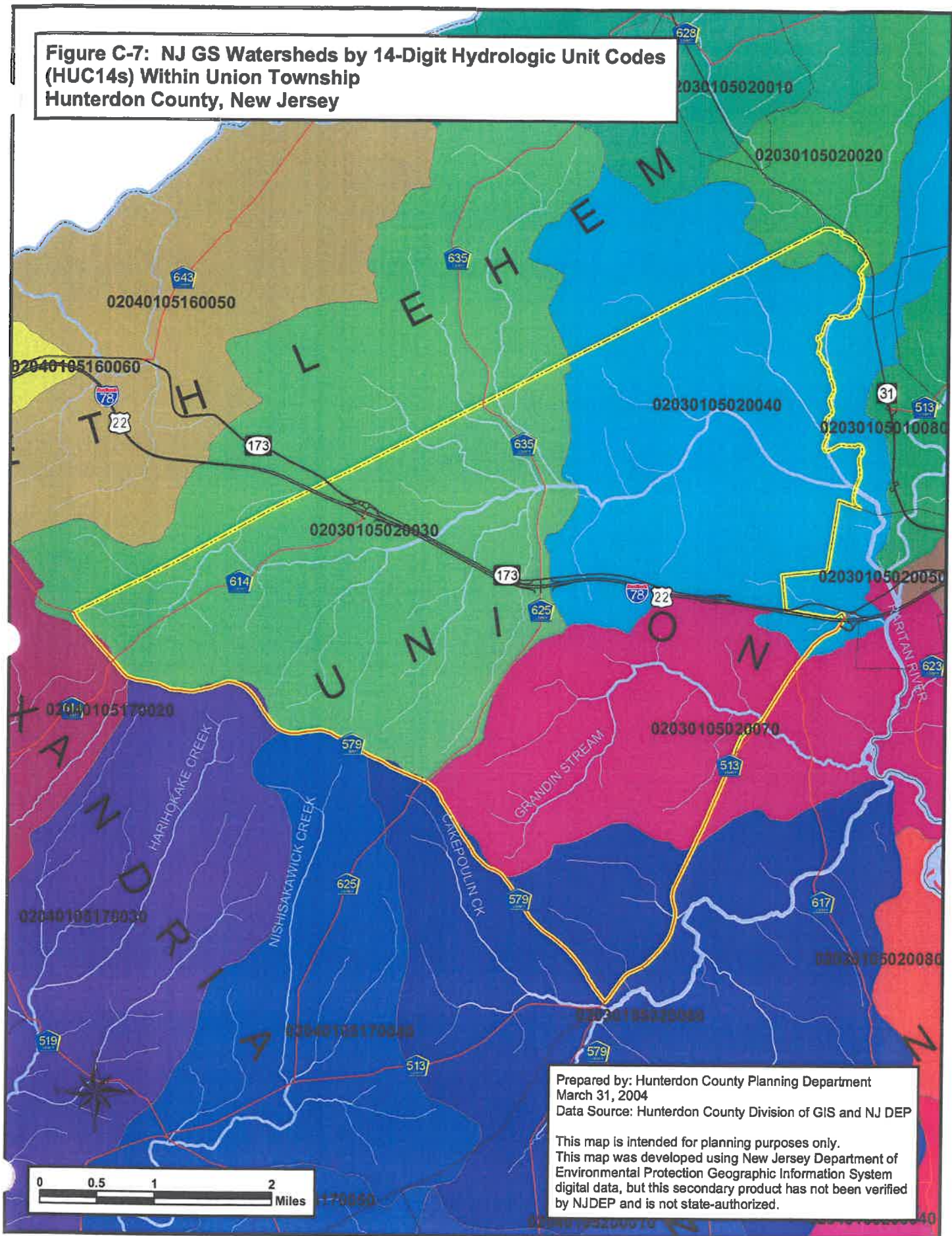
- Agriculture - 24.92% (3,276 Acres)
- Barren Land - 1.73% (228 Acres)
- Forest - 37.07% (4,874 Acres)
- Urban - 19.04% (2,504 Acres)
- Water - 8.70% (1,144 Acres)
- Wetlands - 8.53% (1,122 Acres)



THIS MAP WAS DEVELOPED USING NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION GEOGRAPHIC INFORMATION SYSTEM DIGITAL DATA, BUT THIS SECONDARY PRODUCT HAS NOT BEEN VERIFIED BY NJDEP AND IS NOT STATE-AUTHORIZED.



Figure C-7: NJ GS Watersheds by 14-Digit Hydrologic Unit Codes (HUC14s) Within Union Township Hunterdon County, New Jersey





















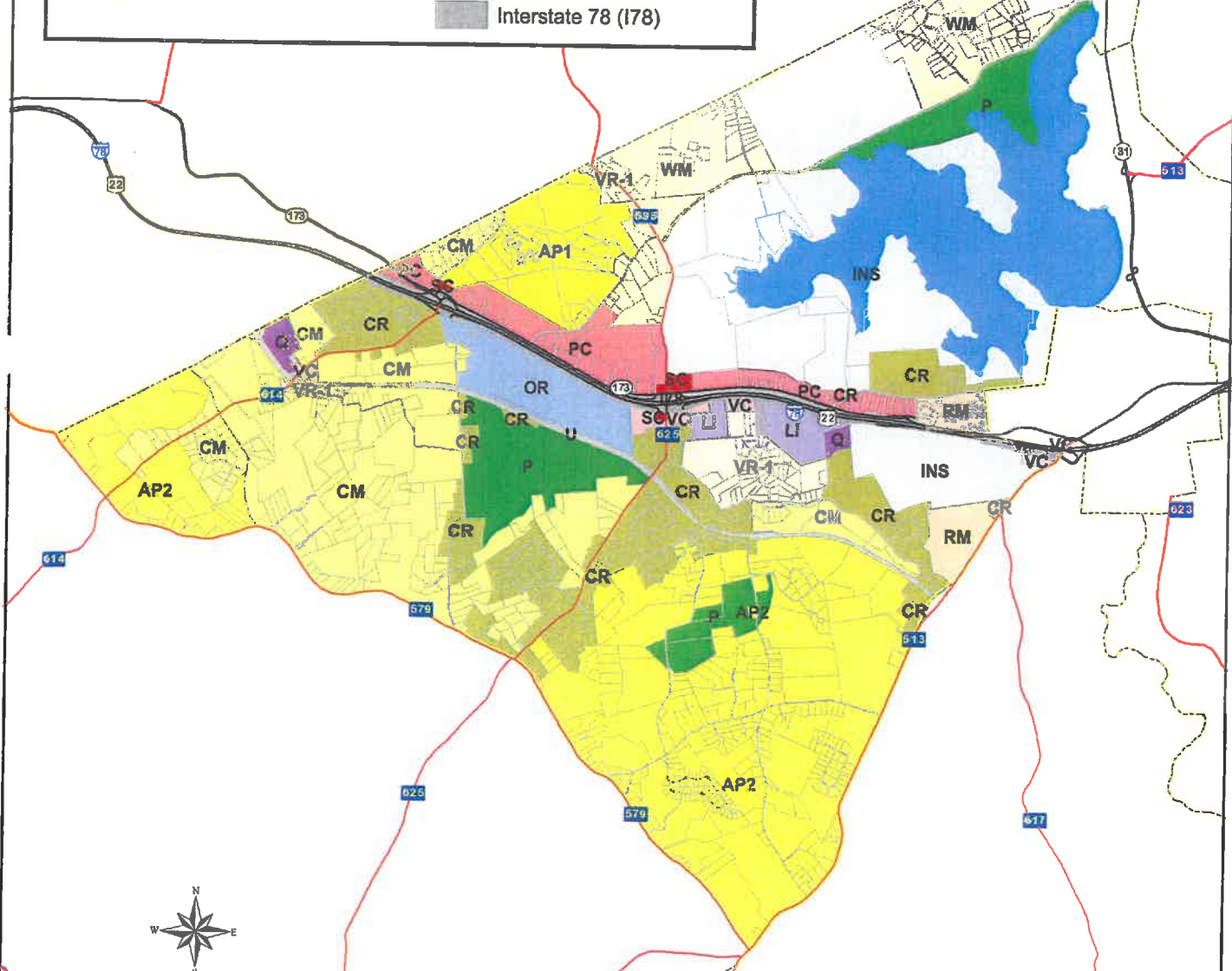
Prepared by: Hunterdon County Planning Department
 March 31, 2004
 Data Source: Hunterdon County Division of GIS and NJ DEP

This map is intended for planning purposes only.
 This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.



**Figure C-8: Zoning Districts Within Union Township
Hunterdon County, New Jersey**

 Hunterdon County Parcels	 Village Commercial (VC)
Zoning Classification	 Planned Commercial (PC)
 Watershed Management (WM)	 Special Commercial (SC)
 Conservation Management (CM)	 Office Research (OR)
 Agricultural Preservation (AP2)	 Light Industrial (LI)
 Agricultural Preservation (AP1)	 Quarry (Q)
 County Residential (CR)	 Parkland (P)
 Village Residential (VR-1)	 Institutional (INS)
 Multifamily Residential (RM)	 Utility (U)
	 Interstate 78 (I78)



Prepared by: Hunterdon County Planning Department
March 31, 2004
Data Source: Hunterdon County Division of GIS
This map is intended for planning purposes only.

