

Frelinghuysen Township

STORMWATER MANAGEMENT PLAN

Warren County, New Jersey

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Prepared for
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STORMWATER MANAGEMENT PLAN
Warren County, New Jersey

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STORMWATER MANAGEMENT PLAN

Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for the Frelinghuysen 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.

Goals

The goals of this MSWMP are to:

- reduce flood damage, including damage to life and property;
- minimize, to the extent practical, any increase in stormwater runoff from any new development;
- reduce soil erosion from any development or construction project;
- assure the adequacy of existing and proposed culverts and bridges, and other in-stream structures;
- maintain groundwater recharge;
- prevent, to the greatest extent feasible, an increase in nonpoint pollution;
- maintain the integrity of stream channels for their biological functions, as well as for drainage;
- minimize pollutants in stormwater runoff from new and existing development to restore, enhance, and maintain the chemical, physical, and biological integrity of the waters of the state, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, and other uses of water; and
- protect public safety through the proper design and operation of stormwater basins.

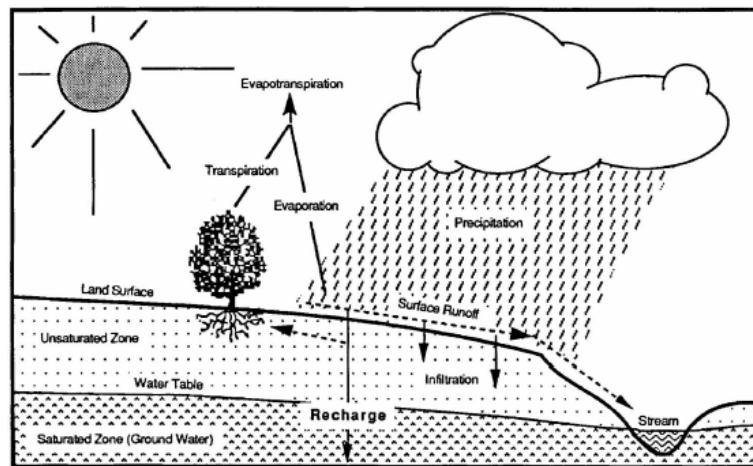
To achieve these goals, this plan outlines specific stormwater design and performance standards for new development. Additionally, the plan proposes stormwater management controls to address impacts from existing development. Preventative and corrective maintenance strategies are included in the plan to ensure long-term effectiveness of stormwater management facilities. The plan also outlines safety standards for stormwater infrastructure to be implemented to protect public safety.

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Stormwater Discussion

Land development can dramatically alter the hydrologic cycle (See Figure C-1) of a site and, ultimately, an entire watershed. Prior to development, native vegetation can either directly intercept precipitation or draw that portion that has infiltrated into the ground and return it to the atmosphere through evapotranspiration. Development can remove this beneficial vegetation and replace it with lawn or impervious cover, reducing the site's evapotranspiration and infiltration rates. Clearing and grading a site can remove depressions that store rainfall. Construction activities may also compact the soil and diminish its infiltration ability, resulting in increased volumes and rates of stormwater runoff from the site. Impervious areas that are connected to each other through gutters, channels, and storm sewers can transport runoff more quickly than natural areas. This shortening of the transport or travel time quickens the rainfall-runoff response of the drainage area, causing flow in downstream waterways to peak faster and higher than natural conditions. These increases can create new and aggravate existing downstream flooding and erosion problems and increase the quantity of sediment in the channel. Filtration of runoff and removal of pollutants by surface and channel vegetation is eliminated by storm sewers that discharge runoff directly into a stream. Increases in impervious area can also decrease opportunities for infiltration which, in turn, reduces stream base flow and groundwater recharge. Reduced base flows produce greater fluctuations between normal and storm flow rates, which can increase channel erosion. Reduced base flows can also negatively impact the hydrology of adjacent wetlands and the health of biological communities that depend on base flows. Finally, erosion and sedimentation can destroy habitat from which some species cannot adapt.

Figure C-1: Groundwater Recharge in the Hydrologic Cycle



Source: New Jersey Geological Survey Report GSR-32.

In addition to increases in runoff peaks, volumes, and loss of groundwater recharge, land development often results in the accumulation of pollutants on the land surface that runoff can mobilize and transport to streams. New impervious surfaces and cleared areas created by development can accumulate a variety of pollutants from the atmosphere, fertilizers, animal wastes, and leakage and wear from vehicles. Pollutants can include metals, suspended solids, hydrocarbons, pathogens, and nutrients. In addition to increased pollutant loading, land development can adversely affect water quality and stream biota in more subtle ways. For example, stormwater falling on impervious surfaces or stored in detention or retention basins can become heated and raise the temperature of the downstream waterway, adversely affecting cold water fish species such as trout. Development can remove trees along stream banks that normally provide shading, stabilization, and leaf litter that falls into streams and becomes food for the aquatic community.

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Background

Demographics - Frelinghuysen Township encompasses 23.55 square mile area in Warren County, New Jersey. In recent years, the Township has been under moderate development pressure. The population of the Township has increased from 1,779 in 1990, to 2,083 in 2000, an increase of 17%¹. The population is expected to grow to 2,492 in 2015 and 2,816 by 2025² or slightly less than 30% over the next 20 years. This population increase has resulted in changes in the landscape which have most likely increased stormwater runoff volumes and pollutant loads to the waterways of the municipality. Figure C-2 illustrates the waterways in the Township. Figure C-3 depicts the Township boundary on the USGS quadrangle maps.

Stream Monitoring - The New Jersey Department of Environmental Protection (NJDEP) has established an Ambient Biomonitoring Network (AMNET) to document the health of the state's waterways. There are over 800 AMNET sites throughout the state of New Jersey. These sites are sampled for benthic macroinvertebrates (see inset for information on these animals are used) by NJDEP on a five-year cycle. Streams are classified as non-impaired, moderately impaired, or severely impaired based on the AMNET data. The data is used to generate a New Jersey Impairment Score (NJIS), which is based on a number of biometrics related to benthic macroinvertebrate community dynamics.

There is only one AMNET sampling point in the Township. Located on Dark Moon Road at the stream crossing, The location was not tested in the first round of sampling and produced a moderate impairment rating in the second sampling round. The Paulins Kill borders the Township to the north. There is one AMNET sampling point on the river in Blairstown just west of the Township boundary. This location had no impairment in either sampling. A third site is situated on Bear Creek just south of the Township in Allamuchy at its crossing of Shades of Death Road. This location produced a no impairment rating in the first sampling and a moderate rating in the second.

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 temperatures of the Paulins Kill exceed the state's criteria. This means that these streams are impaired waterways and the NJDEP is required to develop a Total Maximum Daily Load (TMDL) for these pollutants for each waterway.

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

THE NORTHEAST OHIO RIVERS PROJECT

"The term "benthic" means bottom-dwelling. Benthic invertebrates are animals without backbones that live in, crawl upon, or attach themselves to the bottom (substrate). The term "macroinvertebrates" refers to those invertebrates seen with the unaided eye. Most benthic macroinvertebrates in flowing water are aquatic insects or the aquatic stages of insects. Other benthic macroinvertebrates include other arthropods, worms, and clams.

Benthic macroinvertebrates often go unnoticed because of their size and habitat, but they are an extremely important part of river ecosystems. Collecting benthic macroinvertebrates can provide a greater understanding of a river's condition. Benthic organisms have several characteristics that make them useful indicators of water quality. For example, they are sensitive to physical and chemical changes in their habitat. Also, they live in the water for the entire aquatic stage of their life cycle and so reflect conditions in the water throughout that period of time. Third, benthic organisms cannot easily by swimming away, as some fish can. Finally benthic macroinvertebrates are easily collected in many streams and rivers.

We will classify benthic macroinvertebrates into three groups based on their sensitivity to pollution. The number of taxa in each of these groups will be tallied and assigned a score. The scores are then summed to yield a score which can be used as an estimate of the quality of the watercourse for life."

¹ - Frelinghuysen Township Web Site

² - Warren County Web Site

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The New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d)) (Integrated List) is required by the federal Clean Water Act to be prepared biennially and is a valuable source of water quality information. This combined report presents the extent to which New Jersey waters are attaining water quality standards, and identifies waters that are impaired. Sublist 5 of the Integrated List constitutes the list of waters impaired or threatened by pollutants, for which one or more TMDLs are needed. The impairments listed above pertain to both the Paulins Kill and Bear Creek on the 2004 Integrated List of Waterbodies. TMDL's are required due to the benthic macroinvertebrates and temperature conditions found in streams of the Township.

Stream Hydraulic Capacity - In addition to water quality problems, the Township has exhibited water quantity problems including flooding and erosion. Many of the road crossing culverts in the Township are undersized. During severe storm events, these undersized culverts do not have adequate capacity, thereby causing a backwater effect and flooding upstream. This was vividly demonstrated during the hurricane induced rainfalls of September 2004.

These culverts were, in many instances, not designed for the magnitude of storm that such facilities should. At the time these facilities were installed, hydrologic conditions were different (i.e., less impervious area directly connected to roads) than presently exist in the Township. In 1994, Township undertook a study of the drainage patterns and effectiveness of the existing drainage system. The study inventoried the road drainage facilities and identified many undersize culverts and areas where culverts were needed. A map³ showing the inventory, areas studied and problems identified is attached as Appendix B.

Impervious Cover/Groundwater Recharge - As shown on map of the groundwater recharge areas shown in Figure C-4, the Township currently enjoys a relatively good groundwater recharge potential. There is little impervious cover that inhibits recharge. However, as the imperviousness increased in the Township, the groundwater recharge will be degraded while peak flows and volumes of stream flow will be increased.

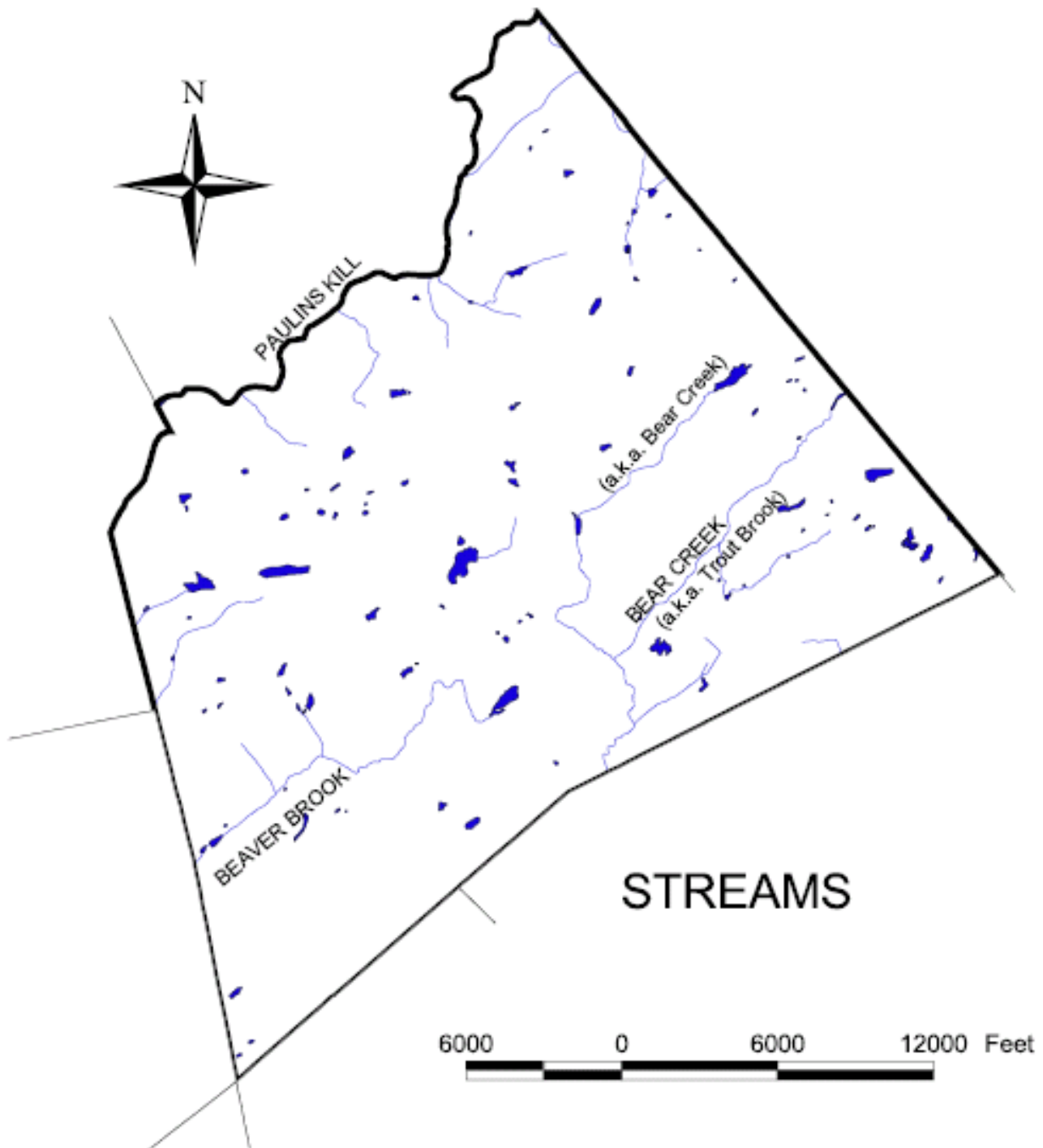
With higher impervious cover due to property development, the Township will experience decreased groundwater recharge which will, in turn, decrease base flows in streams during dry weather periods. Lower base flows can have a negative impact on instream habitat during the summer months. It will also impact the potential yield from wells dependent on recharge. Though wellhead protection, also required as part of the MSWMP, will help minimize the direct impact of well pollution, maintaining recharge is the only means of protecting yield. Currently there are no public community water supply wells within the Township. Two such wells, owned by the Blairstown Water Company, located on the Paulins Kill west of the Township boundary have wellhead protection areas that influence the Township. Those wellhead protection areas are shown in Figure C-5.

Additional to the impact on groundwater resources, the increased flow can result in added roadway flooding as well as erosion. Stream bank erosion can result in unstable areas at roadway/bridge crossings, and, together with increased erosion in drainage catchments, will degrade stream habitats.

³ - Costic, Bogan & Associates, Inc.; "Stream Corridor & Wetlands Map"; 10/14/94

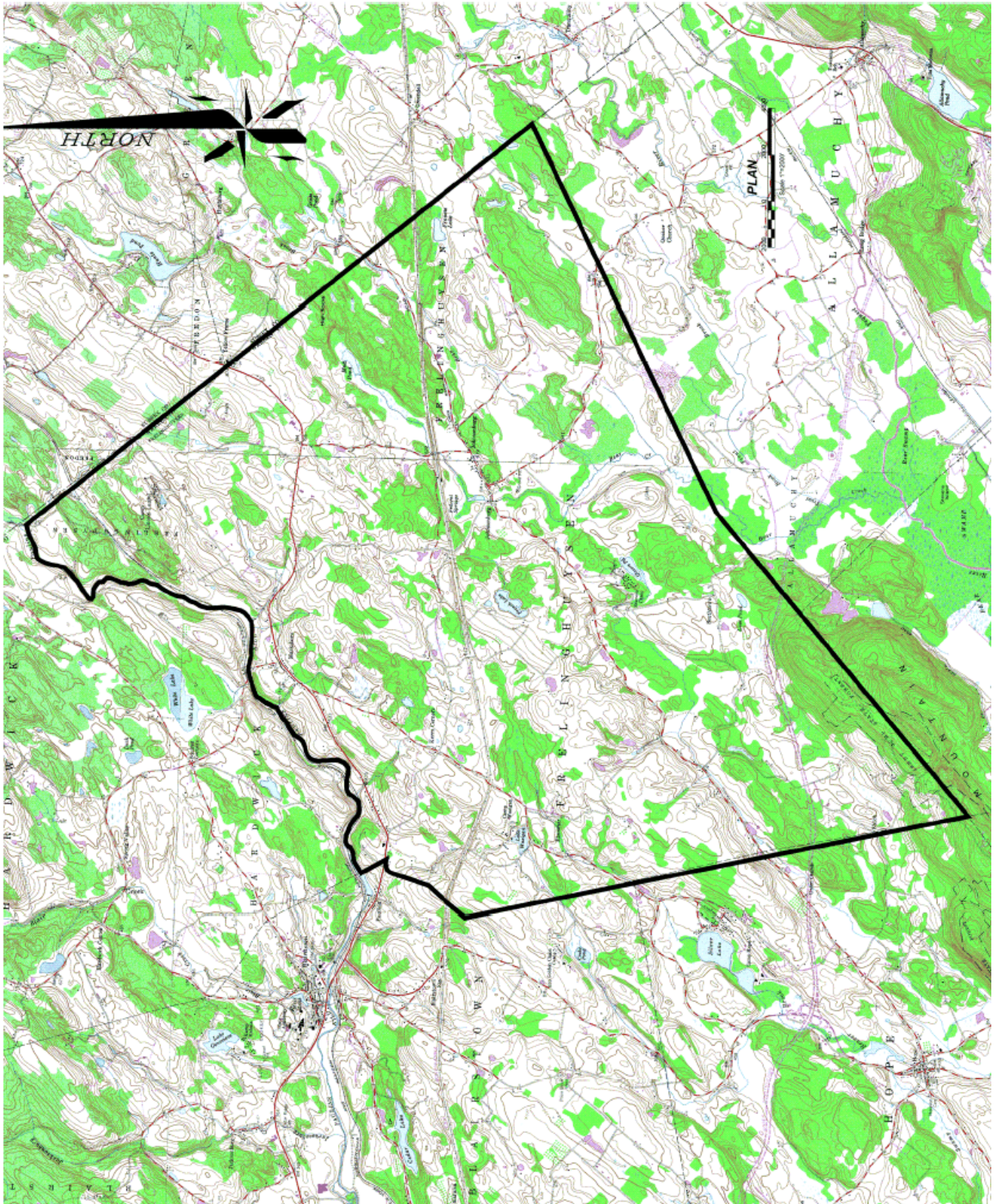
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Figure C-2: Township Waterways



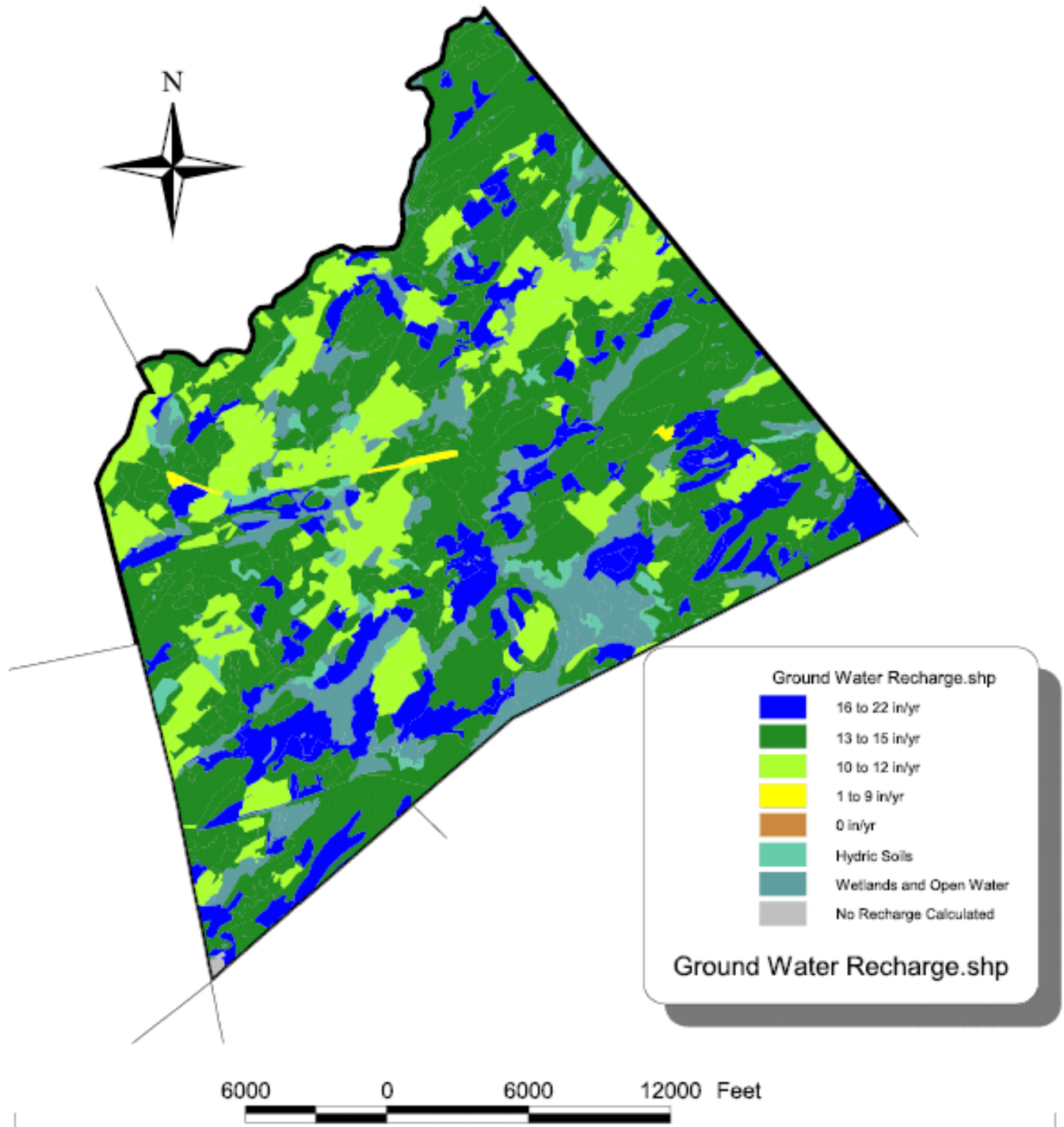
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Figure C-3: Township Boundary on USGS Quadrangles



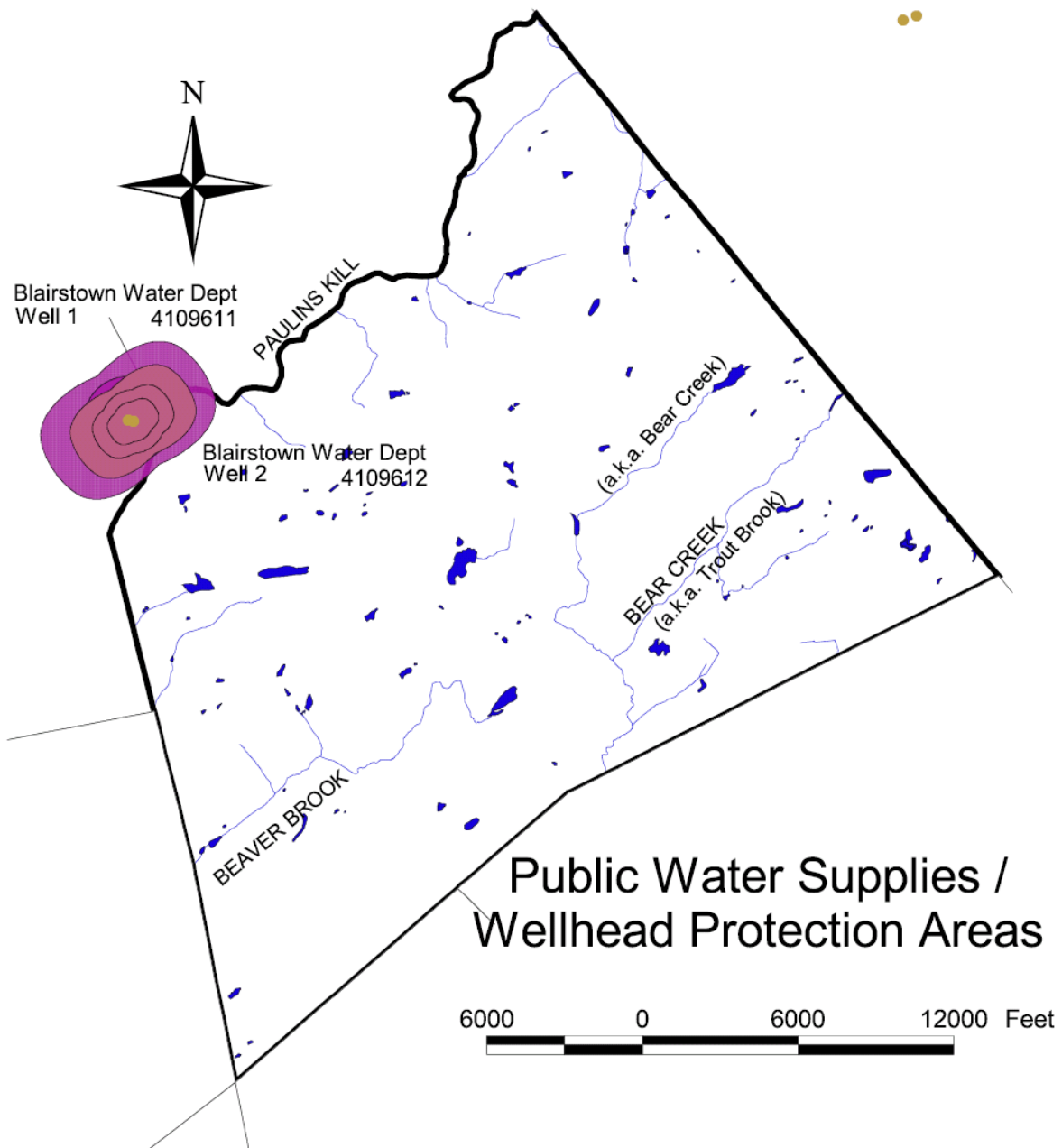
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Figure C-4: Groundwater Recharge Areas in the Township



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Figure C-5: Wellhead Protection Areas in the Township



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Design and Performance Standards

The Township will adopt the design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8 Subchapter 5 - Design and Performance Standards for Stormwater Management Measures of the Stormwater Management Rules to minimize the adverse impact of stormwater runoff on water quality and water quantity and loss of groundwater recharge in receiving water bodies. The design and performance standards include the language for maintenance of stormwater management measures consistent with the stormwater management rules at N.J.A.C. 7:8-5.8 - Maintenance Requirements, and language for safety standards consistent with N.J.A.C. 7:8-6 - Safety Standards for Stormwater Management Basins. The ordinances will be submitted to the county for review and approval within 24 months of the effective date of the Stormwater Management Rules.

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

Plan Consistency

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

The Municipal Stormwater Management Plan is consistent with the Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21. The municipality will utilize the most current update of the RSIS in the stormwater management review of residential areas. This Municipal Stormwater Management Plan will be updated to be consistent with any future updates to the RSIS.

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

Nonstructural Stormwater Management Strategies

As part of the requirements for municipal stormwater management plans in the Stormwater Management Rules at N.J.A.C. 7:8-4 - Municipal Stormwater Management Planning, municipalities are required to evaluate the municipal master plan, and land use and zoning ordinances to determine what adjustments need to be made to allow the implementation of nonstructural stormwater management techniques, also called Low Impact Development (LID) techniques.

Following are the ordinances contained in the Land Development Ordinance of the Township (Appendix II of the General Ordinance) identified for revision. This listing is presented in the outline format of New Jersey Stormwater Best Management Practices Manual, February 2004, Municipal Regulations Checklist. Once the ordinance texts are completed, they will be submitted to the county review agency for review and approval within [24 months of the effective date of the Stormwater Management Rules]. A copy must also be sent to the Department of Environmental Protection at the time of submission.

Part 1: Vegetation and Landscaping

A. Preservation of Natural Areas

Municipal regulations should include requirements to preserve existing vegetated areas, minimize turf grass lawn areas, and use native vegetation.

Section 400 - District Regulations: Currently there is a minimum "non-critical" yard acreage requirement for only the VN zone in the Township. This requirement should be extended to all zones to limit work in critical areas. Concurrently, a consideration should be made to set maximum disturbed areas to protect natural features that act as stormwater buffers and to restrict residents from enlarging existing turf lawn and impervious cover areas.

Section 506 Natural Features: Currently this section of the Ordinance encourages "...a conscious effort shall be made to preserve natural features such as trees, hilltops and views, natural terrain, open waters and natural drainage ridge lines." Though water related features are greatly covered by NJDEP regulations, natural features, such as forested areas, hilltops, and views, should be preserved whenever possible. Existing forested areas should be preserved in their natural state to enhance soil stability and landscaped treatment, as well as ensure that leaf litter and other beneficial aspects of the forest are maintained.

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Section 508 A. Landscaping: This section deals only with landscaping around parking lots. A new section under the Design Standards should, in part, provide for incentives to use of vegetation as filters for stormwater runoff.

Section 604 B.9. Open Space Requirements: This section specifies that 30% of a tract proposed to use lot size averaging be set aside for open space “...not...included in lots”. This approach is impractical when applied to small tracts and should be modified to require an restrictive easement on a contiguous portion of the lot or lots being proposed for subdivision.

Section 804 B.12: This section requires applicants to locate trees or tree groupings on a parcel. However, this is a checklist item and should be made part of Section 500 - General Provisions and Design Standards.

Section 804 B.20: This section requires sets the standards for buffers between residential and non-residential areas. This checklist item should be made part of Section 500 - General Provisions and Design Standards.

B. Tree Protection Ordinances

Currently the Township has no tree ordinance to minimize the removal of trees and to replace trees that are removed. However, it is recommended that the modification to provide a Landscaping section to the Design Standards as suggested at 508 A. Landscaping above encompass tree and forested cover protection. To the extent it may be legally permissible, consideration should also be made to setting standards (percentages) for protection of forested areas.

C. Landscaping Island and Screening Ordinances

Section 502 Drainage: Amendments to the drainage section of the Ordinance should include requirements for the incorporation of non-structural landscaping solutions that provide for filtration and disconnection of runoff through impervious areas.

Section 506 Natural Features: This section provides for the planting of shade trees along street of residential subdivisions. This specification should be made part of the suggested Landscaping section of the Design Standards and referenced in the section pertaining to streets and driveways. The specification should encourage the use of natural vegetative stands and the use of planting strips for stormwater control. Additionally, the language should encourage tree plantings in clusters that can incorporate feature such as bioretention rather than the linear arrangement now specified.

Section 508 A. Landscaping: This section provides the minimum standard for landscaping in and around parking lots. The section should be augmented to encourage the use bioretention vegetation and systems that are more beneficial to stormwater quality, groundwater recharge, or stormwater quantity.

As suggested previously, there should be a new section under the Design Standards covering Landscaping. This section should provide for the use of natural vegetation, bioretention islands and other stormwater practices within landscaped areas or setbacks.

Section 804 B.20: As suggested earlier this section should be made part of Section 500 - General Provisions and Design Standards. The new section should require the use of vegetation to the maximum extent practicable before the use of walls or berms for screening.

D. Riparian Buffers

Section 603 B. Regulations for Flood Plain Areas: Regulation of riparian corridors is covered in nearly all situations by NJDEP regulations covering stream encroachment and wetlands. However, there are some minor streams which may not fall under the stream encroachment regulations and have no wetlands associated with them. The provisions of Section 603 B. should be modified to incorporate reference to the NJDEP regulations and set reasonable standards for minor streams. Incorporated in those standards should be the minimum width of buffers in which construction activity and use is limited.

Part 2: Minimizing Land Disturbance

The minimization of disturbance can be used at different phases of a development project. The goal is to limit clearing, grading, and other disturbance associated with development to protect existing features that provide stormwater benefits.

A. Limits of Disturbance

Section 400 District Regulations: As indicated earlier, the current ordinance provides for a minium “non-critical” yard acreage requirement for only the VN zone in the Township and that this requirement should be extended to all zones

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to limit work in critical areas. Also recommended was that concurrent to the change in minimum yards there be a consideration to set maximum disturbed areas to protect natural features that act as stormwater buffers and to restrict residents from enlarging existing turf lawn and impervious cover areas. Such control of turf grass or impervious cover limits can also be accomplished through setting maximum disturbance setbacks from buildings or other improvements. This strategy helps preserve the site's existing hydrologic character, as well as limiting the occurrence of soil compaction. The following maximums are offered for consideration:

- front yard – 20 feet;
- rear yard – 25 feet; and
- side yard – 8 feet.

Section 402 AR-4 Agricultural Residential: Currently the AR-4 zone, which encompasses most of the Township, allows coverage of the principal and accessory buildings to reach 12 percent. Ancillary facilities, such as driveways and the like, could be added to the building coverage at an unlimited rate. For a four acre zoning district the building coverage alone is quite high, being comparable to the total coverage allowed in areas where the lot size is smaller. The total impervious coverage should be reviewed and set at a more reasonable limit.

Section 505 Lot Configuration: This section contains many of requirements that govern activity on environmentally sensitive portion of a building lot. The language should be modified to incorporate: 1) the depiction of existing conditions that are environmentally critical and environmentally constrained (Environmentally critical areas are areas or features with significant environmental value, such as steep slopes, stream corridors, natural heritage priority sites, and habitats of threatened and endangered species. Environmentally constrained areas are those with development restrictions, such as wetlands, floodplains, and sites of endangered species.), and 2) identification of specific areas that provide significant hydrologic functions, such as existing surface storage areas, forested areas, riparian corridors, and areas with high groundwater recharge capabilities.

Additionally, consideration of a prohibition on clearcutting of the project site should be made for incorporation in this section.

Section 604 B . Lot Size Averaging: Designing with the terrain, or site fingerprinting, requires an assessment of the characteristics of the site and the selection of areas for development that would minimize the impact. Some language to this allowing the Township to review the placement of open space in lot size averaged designs is provided in this section. That language should be expanded to assure environmentally sensitive areas are covered.

Section 804 B.14: This section requires developers to comply with the New Jersey Soil Erosion and Sediment Control Standards via approval of a Soil Erosion and Sediment Control Plan by the local Soil Conservation District. There should be a section added to the Design standards that expands on the usual requirement of a Soil Erosion and Sediment Control Plan to incorporate feature such as: 1) the restoration to compacted areas in accordance with the Soil Erosion and Sediment Control Standards, 2) limits of disturbance should be incorporated into Soil Erosion and Sediment Control and construction plans for review and approval by the Township, and 3) limitation and identification of construction traffic to specific areas.

B. Open Space and Cluster Development

Section 604 B . Lot Size Averaging: This section provides a method for development in clusters and generating open space or designs. Such method allows a more flexible site design. However, there is no incentive for developers to utilize this design option

Though the section sets a standard for amount of open space to be set aside, there are no limitations on the allowable disturbance of existing vegetated areas. Likewise, no limitations are placed on allowable impervious cover or requirements to re-establish vegetation disturbed in open space areas dedicated for active recreation use by the owners of lots in the subject development.

Part 3: Impervious Area Management

A. Streets and Driveways

Section 505 Lot Configuration: A paragraph encouraging layouts that will allow shared driveways should be added to this section.

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Section 514 Streets, Curbs and Sidewalks: Specifications for street right of way and pavement widths are governed by NJAC 5:21- Residential Site Improvement Standards (RSIS) administered by the NJ Department of Community Affairs. As such the Township has little flexibility in modifying those elements to provide for low impact development designs. This section should be extensively modified to provide for compliance with the RSIS standards. With such modifications, consideration should be made to encourage street features in residential and non-residential areas such as: 1) curb cuts or flush curbs with curb stops as an allowable alternative to raised curbs, 2) landscaped islands allowed to or required to receive runoff, 3) minimum cul-de-sac radius be reduced or is a landscaped island required in the center of the cul-de-sac, and 4) alternative turn-arounds such as “hammerheads” allowed on short streets in low density residential developments.

Chapter XIII. 13-1 Construction of Driveway Entrances: The standards for minimum driveway widths and paving of portions of the driveway should be reviewed to determine if there can be reductions that would promote better stormwater infiltration.

B. Parking Areas and Sidewalks

Section 400 - District Regulations: Requirements for parking in non-residential zones are set in the various subsections under this heading. These criteria should be codified in one section under the current Section 508. The number of spaces required for each type of use should be reviewed to determine if reductions can be made. In particular, the limits of less than 3.0 spaces per 1000 sq. ft. of gross floor area for professional office building, and less than 4.5 spaces per 1000 sq. ft. of gross floor area for shopping centers should be sought. Additionally, parking requirements should be reviewed to determine if they are set as maximum or median rather than minimum requirements and if shared parking arrangements would be appropriate to reduce the parking area.

Section 508 Off-street Parking, Loading Areas and Driveways: Stalls are required to be a minimum of 10' wide by 18' deep. This should be modified to allow stall that are 9' x 18'. Allowing the stall lengths to be reduced to allow vehicle overhang into a vegetated areas and the use of permeable material in overflow parking areas, should also be considered.

Section 514 Streets, Curbs and Sidewalks: In residential zones, the RSIS governs whether and when sidewalks are required and the materials used. Within the confines of the RSIS, the section should require that sidewalks be pitched to allow drainage into landscape area adjoining the road rather than into the roadway. For sidewalks in non-residential zones consideration of pervious materials for construction and methods should be considered.

C. Unconnected Impervious Areas

Section 502 Drainage: This section should be extensively modified to provide for compliance with the RSIS standards. And to specify that the drainage design shall comply with the Stormwater Control Ordinance proposed as part of this report. The modifications should incorporate language that encourages the uses of management practices such as: 1) natural vegetated swales in lieu of inlets and pipes, 2) disconnection of impervious surfaces to promote pollutant removal and groundwater recharge, and 3) re-infiltrated of runoff from impervious areas into vegetated areas to promote the reduction of the runoff volume.

Section 508 Off-street Parking, Loading Areas and Driveways: A requirement that, wherever possible and practical, re-infiltration of runoff from parking areas into vegetated areas to promote the reduction of the runoff volume should be incorporated in this section.

Section 514 Streets, Curbs and Sidewalks: As recommended previously, this section should be extensively modified to provide for compliance with the RSIS standards. Incorporation curb cuts or flush curbs with curb stops as an allowable alternative to raised curbs should be made at that time.

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Part 4: Vegetated Open Channels

The use of vegetated channels, rather than the standard concrete curb and gutter configuration, can decrease flow velocity, and allow for stormwater filtration and re-infiltration. One design option is for vegetated channels that convey smaller storm events, such as the water quality design storm, and provide an overflow into a storm sewer system for larger storm events.

Section 502 Drainage: Language that promotes the use of natural vegetated swales in lieu of inlets and pipes and design criteria for vegetated channels should be incorporated in this section.

Section 514 Streets, Curbs and Sidewalks: In modifying this section, the allowance or requirement for the use of vegetated open channel conveyance instead of the standard curb and gutter designs should be incorporated.

Section 507 Non-conforming Lots, Structures and Uses: Nonconforming Uses, Structures or Lots requires a variance for existing single family homes proposing additions that exceed the maximum percent impervious. The homeowner must mitigate the impact of the additional impervious surfaces unless the stormwater management plan for the development provided for these increases in impervious surfaces. This mitigation effort must address water quality, flooding, and groundwater recharge as described in Chapter 135. A detailed description of how to develop a mitigation plan is present in the Township Code.

Sections 509 Performance Standards for All Uses: Performance Standards provide pollution source control. It prohibits materials or wastes to be deposited upon a lot in such form or manner that they can be transferred off the lot, directly or indirectly, by natural forces such as precipitation, evaporation or wind. It also requires that all materials and wastes that might create a pollutant or a hazard be enclosed in appropriate containers

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Land Use/Build-Out Analysis

A detailed land use analysis for the Township was conducted. Figure C-6 illustrates the existing land use in the Township based on 1995/97 GIS information from NJDEP. Figure C-7 illustrates the five major HUC14s (NJDEP 14 Digit Hydrologic Unit Code delineations for New Jersey) within the Township.

- Paulins Kill
- Bear Creek
- Bear Creek - Sussex / Warren County
- Beaver Brook - above Hope Village
- Beaver Brook - Union Church Tributary

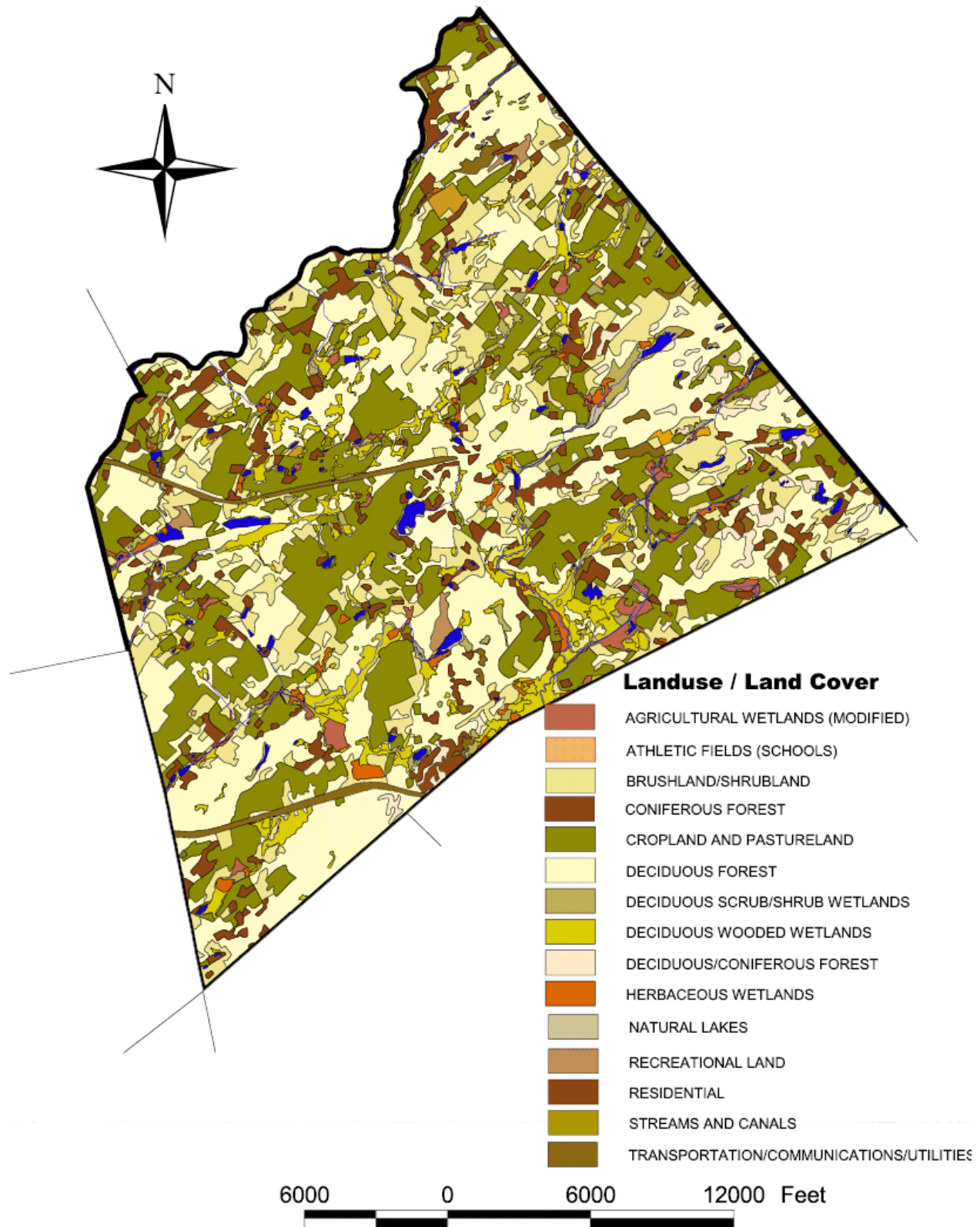
The Township Zoning Map is shown in Figure C-8. Figure C-9 illustrates the Wetlands and Water Land Uses Within the Township – Constrained Land.

The build-out calculations for impervious cover are shown in Table C-1, Build-Out Calculations. This table quantifies the degree to which development of the Township's agricultural and forest lands will increase impervious cover. The result of buildout under the current zoning, with the impervious cover allowances now set, would result in approximately a seven-fold increase in the total impervious are effecting the five HUC14s.

Based on the pollutant loading coefficients by land cover data shown in Table C-2, Pollutant Loads by Land Cover, pollutant loads at full build-out where calculated for three major pollutant categories - Phosphorus, Nitrogen and Suspended Solids. Those results area shown in Table C-3 Nonpoint Source Loads at Build-Out. Full buildout of the low density, rural residential AR-4 zoning areas will have a negative impact (i.e. - greater pollutant discharge) when that development occurs in existing forested areas. By contrast, replacement of agricultural uses will reduce the total pollutant loads. However, that "gain" is offset by the negative impact of the increased impervious surface as shown in Table C-1.

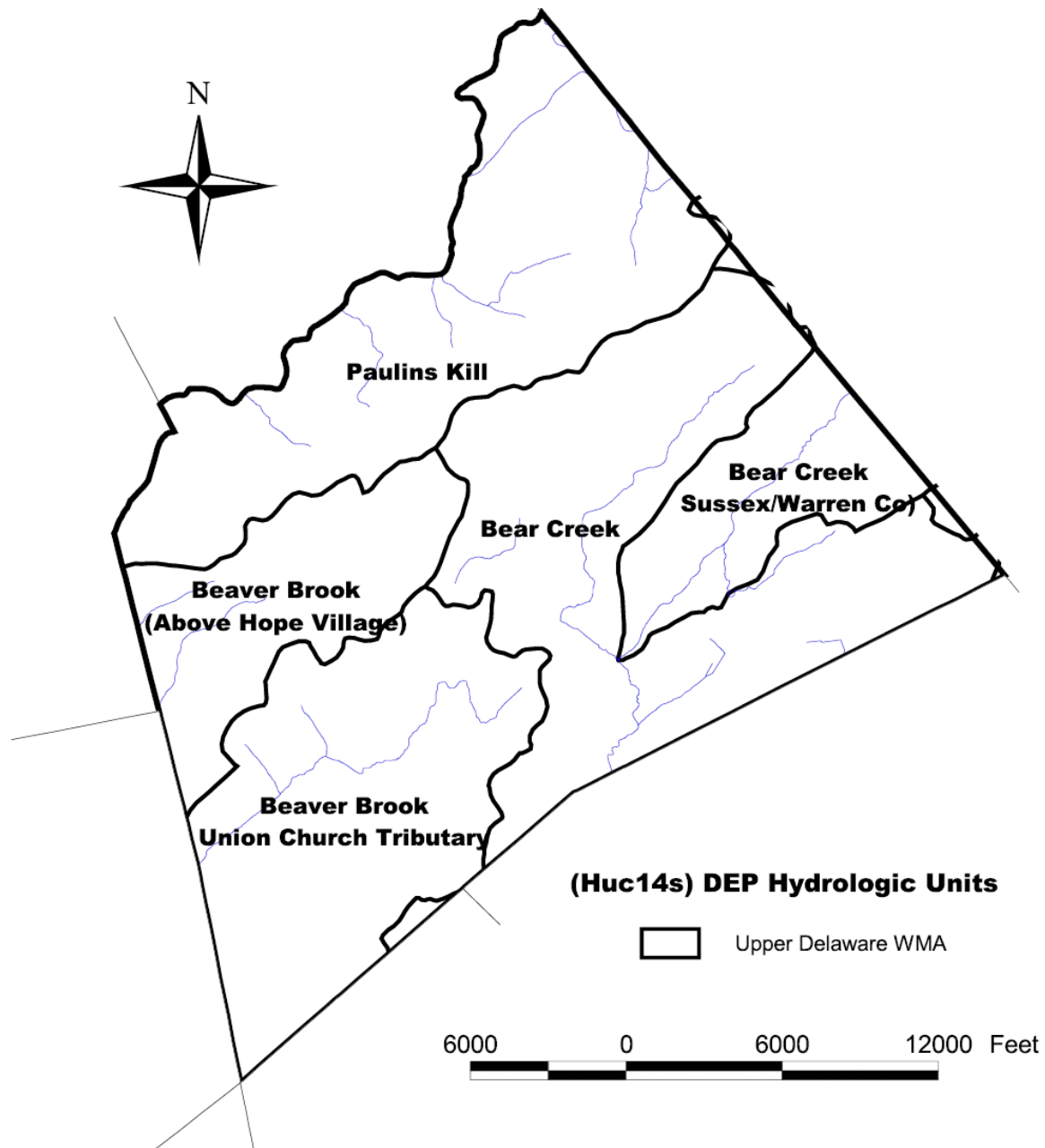
STORMWATER MANAGEMENT PLAN

Figure C-6: Township's Existing Land Use



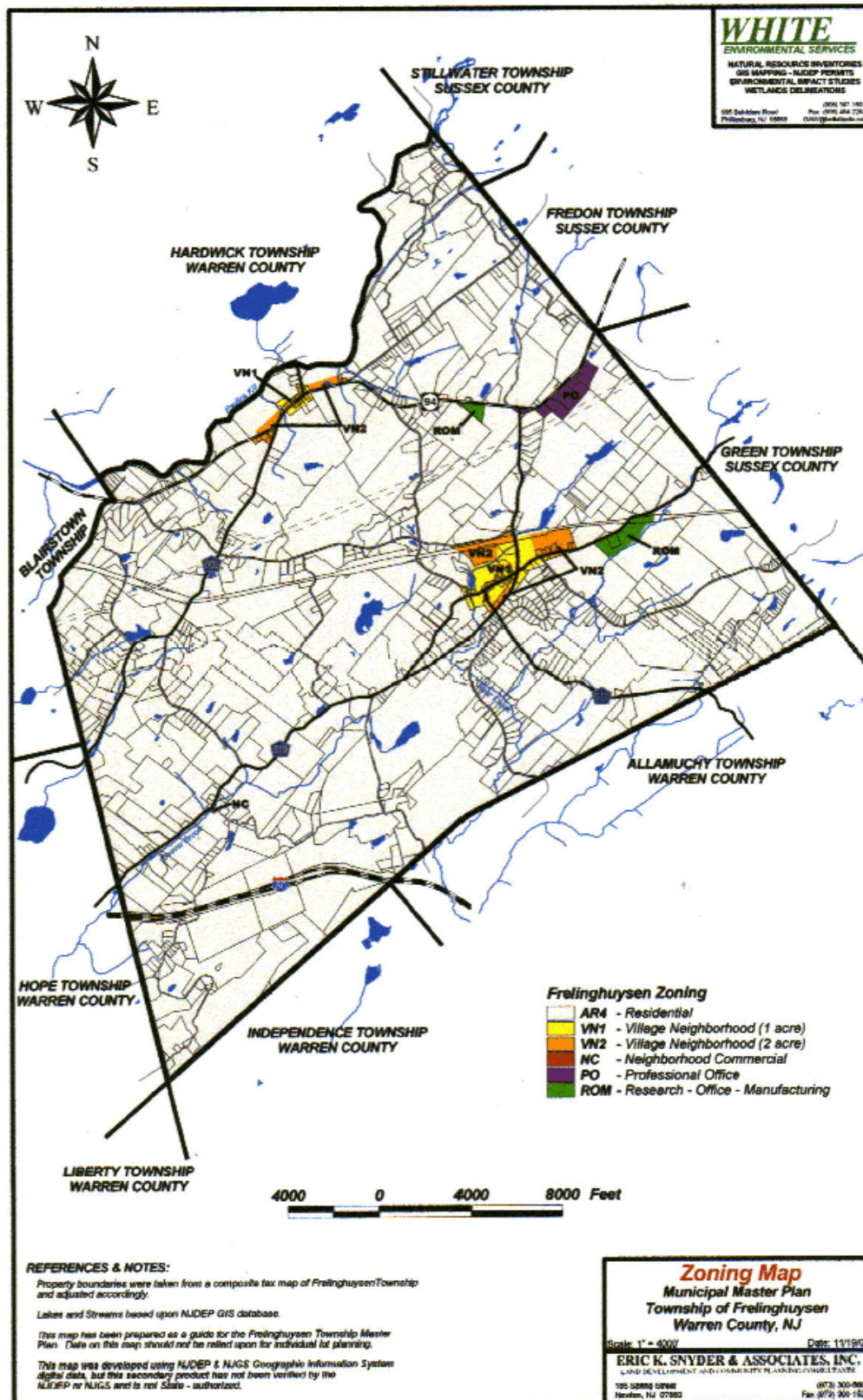
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Figure C-7: Hydrologic Units (HUC14s) Within the Township



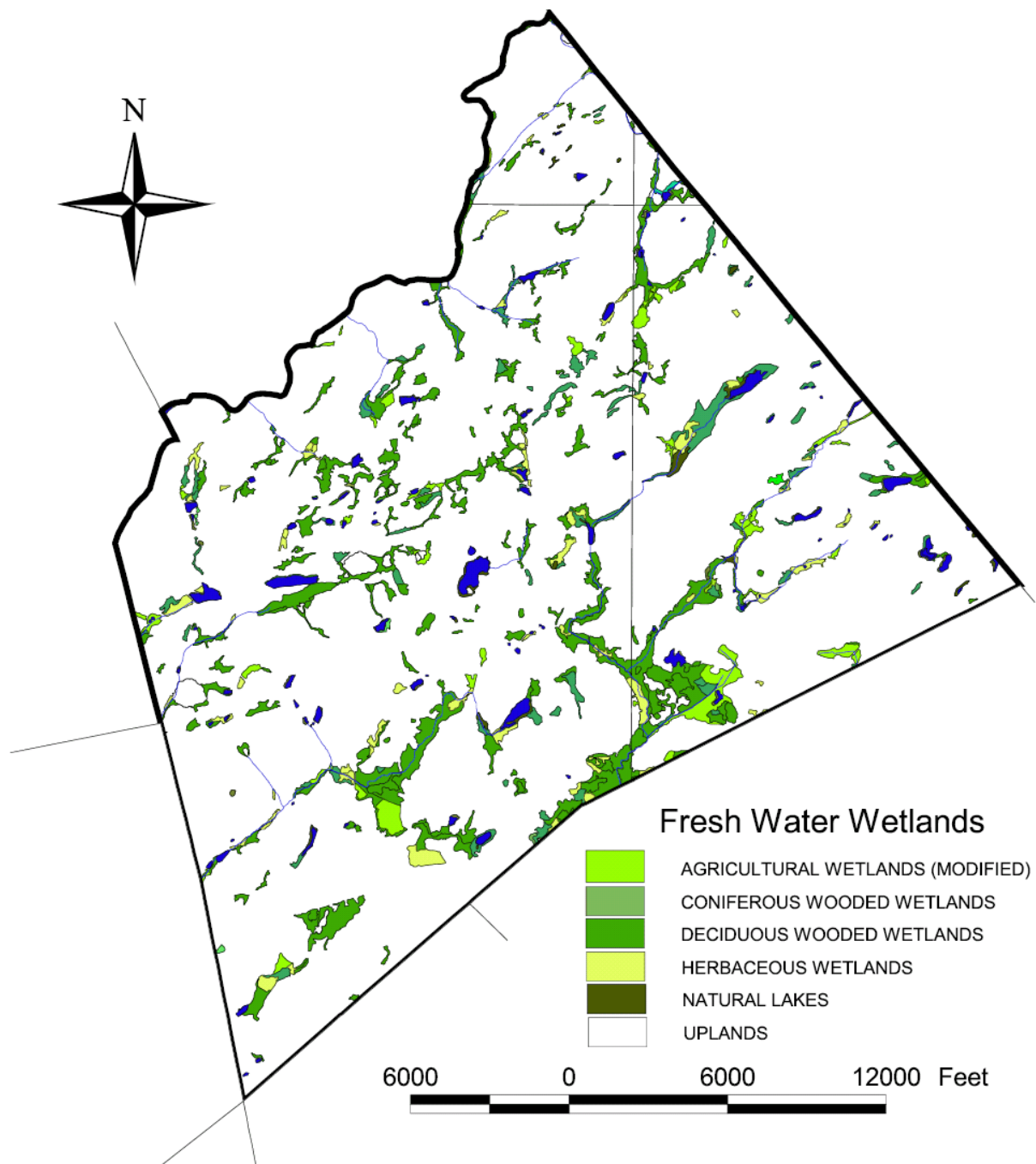
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Figure C-8: Zoning Districts Within the Township



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Figure C-9: Wetlands and Water Land Uses Within the Township – Constrained Land



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Table C-1: Build-Out Calculations										
HUC14 and Zone	Total Area (acres)	Existing Impervious (%)	Existing Impervious (acres)	Preserve Farmland (Acres)	Wetlands / Water Area (acres)	Preserved Other (Acres)	Developable Area (acres)	Allowable Impervious (%)	Build-Out Impervious (acres)	
02040105050020 Paulins Kill										
AR-4	3,919.7	1%	49.0	282.1	279.7	2.5	3,355.5	12%	402.7	
VN-1	24.7	29%	7.0				24.7	60%	14.8	
VN-2	37.5	13%	4.7	9.0	2.0		26.5	60%	15.9	
ROM	11.6	0%	0.0				11.6	55%	6.4	
TOTALS	3,993.4	2%	60.7	291.1	281.6	2.5	3,418.2	13%	439.7	
02040105050030 Beaver Brook-Above Hope Village										
AR-4	1,743.0	1%	21.8	52.2	228.3		1,462.5	12%	175.5	
TOTALS	1,743.0	1%	21.8	52.2	228.3		1,462.5	12%	175.5	
02040105100010 Beaver Brook-Union Brook Tributary										
AR-4	3,321.8	1%	41.5	393.7	337.2	550.8	2,040.1	12%	244.8	
NC	1.4	55%	0.8				1.4	55%	0.8	
TOTALS	3,323.2	1%	42.3	393.7	337.2	550.8	2,041.5	12%	245.6	
02040105080010 Bear Creek- Sussex/Warren										
AR-4	1,262.8	3%	31.6	125.5	202.1	217.7	717.5	12%	86.1	
VN-1	1.3	17%	0.2				1.3	60%	0.78	
VN-2	17.4	10%	1.8			8.0	9.4	60%	5.63	
ROM	39.2	25%	9.8		8.6		30.7	55%	16.87	
TOTALS	1,320.7	3%	43.3	125.5	210.7	225.7	758.9	14%	109.38	
02040105080020 Bear Creek										
AR-4	4,156.6	1%	52.0	195.6	675.2	399.4	2,886.3	12%	346.4	
VN-1	124.3	8%	9.3		13.1	9.8	101.4	60%	60.9	
VN-2	73.2	1%	0.7		2.1	27.4	43.7	60%	26.2	
PO	71.0	3%	1.8	9.4			61.6	55%	33.9	
TOTALS	4,425.2	1%	63.8	205.0	690.4	436.6	3,093.1	15%	467.3	
GRAND TOTAL	14,805.5	2%	231.9	1,067.5	1,748.3	1,215.6	10,774.2	13%	1,437.5	

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Table C-2: Pollutant Loads by Land Cover

No.	Land Cover	Total Phosphorus Load (lbs/acre/year)	Total Nitrogen Load (lbs/acre/year)	Total Suspended Solids Load (lbs/acre/yr)
1	High, Medium Density Residential	1.4	15	140
2	Low Density, Rural Residential	0.6	5	100
3	Commercial	2.1	22	200
4	Industrial	1.5	16	200
5	Urban, Mixed Urban, Other Urban	1.0	10	120
6	Agricultural	1.3	10	300
7	Forest, Water, Wetlands	0.1	3	40
8	Barrenland/Transi tional Area	0.5	5	60
Source: NJDEP Stormwater BMP Manual 2004.				

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Table C-3: Nonpoint Source Loads at Build-Out								
HUC14 and Zone	Build-Out Cover No.	Developable Area (Acres)	TP (Lbs/acre/yr)	TP (Lbs/yr)	TN (Lbs/acre/yr)	TN (Lbs/yr)	TSS (Lbs/acre/yr)	TSS (Lbs/yr)
02040105050020 Paulins Kill								
AR-4	2	3,355.5	0.6	2,013	5	16,777	100	335,550
VN-1	3	24.7	2.1	52	22	542	200	4,930
VN-2	3	26.5	2.1	56	22	583	200	5,300
ROM	3	11.6	2.1	24	22	254	200	2,313
Preserved Ag.	6	291.1	1.3	378	10	2,911	300	87,327
Wetlands / Water	7	281.6	0.1	28	3	845	60	16,898
Preserved Forest	7	2.5	0.1	0	3	7	60	149
TOTALS		3,993.4		2,551.8		21,920.5		452,467
02040105050030 Beaver Brook-Above Hope Village								
AR-4	2	1,462.5	0.6	877	5	7,312	100	146,249
Preserved Ag.	6	52.2	1.3	68	10	522	300	15,655
Wetlands / Water	7	228.3	0.1	23	3	685	60	13,701
Preserved Forest	7	0.0	0.1	0	3	0	60	0
TOTALS		1,743.0		968.2		8,519.3		175,605
02040105100010 Beaver Brook-Union Brook Tributary								
AR-4	2	2,040.1	0.6	1,224	5	10,201	100	204,011
NC	3	1.4	2.1	3	22	31	200	285
Preserved Ag.	6	393.7	1.3	512	10	3,937	300	118,113
Wetlands / Water	7	337.2	0.1	34	3	1,011	60	20,229
Preserved Forest	7	550.8	0.1	55	3	1,652	60	33,048
TOTALS		3,323.2		1,827.7		16,832.9		375,687
02040105080010 Bear Creek- Sussex/Warren								
AR-4	2	717.5	0.6	430	5	3,587	100	71,749
VN-1	3	1.3	2.1	3	22	29	200	261
VN-2	3	9.4	2.1	20	22	206	200	1,876
ROM	3	30.7	2.1	64	22	675	200	6,136
Preserved Ag.	6	125.5	1.3	163	10	1,255	300	37,636
Wetlands / Water	7	210.7	0.1	21	3	632	60	12,643
Preserved Forest	7	225.7	0.1	23	3	677	60	13,543
TOTALS		1,320.7		724.1		7,061.2		143,843
02040105080020 Bear Creek								
AR-4	2	2,886.3	0.6	1,732	5	14,432	100	288,633
VN-1	3	101.4	2.1	213	22	2,231	200	20,285
VN-2	3	43.7	2.1	92	22	961	200	8,737
PO	3	61.6	2.1	129	22	1,356	200	12,325
Preserved Ag.	6	205.0	1.3	267	10	2,050	300	61,513
Wetlands / Water	7	690.4	0.1	69	3	2,071	60	41,425
Preserved Forest	7	436.6	0.1	44	3	1,310	60	26,198
TOTALS		4,425.2		2,545.2		24,411.4		459,116
GRAND TOTAL		14,805.5		8,601.3		78,568.0		1,605,674.

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STORMWATER MANAGEMENT PLAN

Mitigation Plans

A mitigation plan is required to grant a variance or exemption from the design and performance standards of a Municipal Stormwater Management Plan (MSWMP). This mitigation plan is provided for a hypothetical development that is granted a variance or exemption from the stormwater management design and performance standards. Presented is a hierarchy of options.

Mitigation Project Criteria

1. The mitigation project must be implemented in the same drainage area as the proposed development. The project must provide additional groundwater recharge benefits, or protection from stormwater runoff quality and quantity from previously developed property that 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 select one of the following projects listed to compensate for the deficit from the performance standards resulting from the proposed project. More detailed information on the projects can be obtained from the Township Engineer. Listed below are specific projects that can be used to address the mitigation requirement.

Groundwater Recharge

- Retrofit the site and detention basin to provide an additional average annual groundwater recharge.
- Replace the existing impervious parking lot with permeable paving to provide additional average annual groundwater recharge.

Water Quality

- Retrofit the existing stormwater management facility to provide the removal of 80 percent of total suspended solids from parking lot runoff.
- Retrofit the existing parking area to provide the removal of 80 percent of total suspended solids. Due to site constraints, the retrofit BMP must be installed underground and cannot reduce the existing number of parking spaces.

Water Quantity

- Install stormwater management measures in the open space to reduce the peak flow from the upstream development on the receiving stream for the 2, 10, and 100-year storms.

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. For example, if a variance is given because the 80 percent TSS requirement is not met, the selected project may address water quality impacts due to a fecal impairment. Listed below are specific projects that can be used to address the mitigation option.

Water Quality

- Re-establish vegetative buffer (minimum 50 foot wide) at road and parking areas to filter stormwater runoff from the high traffic areas.

Options 1 and 2 would be available only if the MSWMP includes a list of environmental enhancement projects that provide groundwater recharge, control flooding, or control nonpoint source pollution. These are fictitious projects for the purposes of providing examples for this plan. Although only a brief description of each project is presented here, it is important for the municipality to have sufficient information on each project, including size of the project, permit requirements, land ownership, and estimated project costs (i.e., permitting fees, engineering costs, construction costs, and maintenance costs).

The municipality may allow a developer to provide funding or partial funding to the municipality for an environmental enhancement project that has been identified in a Municipal Stormwater Management Plan, or towards the development of a Regional Stormwater Management Plan. The funding must be equal to or greater than the cost to implement the mitigation outlined above, including costs associated with purchasing the property or easement for mitigation, and the cost associated with the long-term maintenance requirements of the mitigation measure.

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A P P E N D I X A

Proposed Stormwater Control Ordinance

Section 1: Purpose

A. Policy Statement

Flood control, groundwater recharge, and pollutant reduction through nonstructural or low impact techniques shall be explored before relying on structural best management practices (BMPs). Structural BMPs should be integrated with nonstructural stormwater management measures and proper maintenance plans. Nonstructural measures include both environmentally sensitive site design and source controls that prevent pollutants from being placed on the site. Source control plans should be developed based upon physical site conditions and the origin, nature, and the anticipated loading of potential pollutants. Multiple stormwater management BMPs may be necessary to achieve the established performance standards for water quality, quantity, and groundwater recharge.

B. Purpose

It is the purpose of this ordinance to establish minimum stormwater management requirements and controls for major development.

C. Applicability

This ordinance shall be applicable to any site plan or subdivision that requires preliminary or final site plan review.

D. Compatibility with Other Permit and Ordinance Requirements

Development approvals issued 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 is not intended to interfere with, abrogate, or annul any other ordinances, rule or regulation, statute, or other provision of law except that, where any provision of this ordinance imposes restrictions different from those imposed by any other ordinance, rule or regulation, or other provision of law, the more restrictive provisions or higher standards shall control.

Section 2: General Standards

A. Design and Performance Standards for Stormwater Management Measures

1. Stormwater management measures for major development shall be developed to meet the erosion control, groundwater recharge, stormwater runoff quantity, and stormwater runoff quality standards in this section. To the maximum extent feasible, 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.
2. The standards in this ordinance apply only to new major development 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 new 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. Such alternative standards shall provide at least as much protection from stormwater-related loss of groundwater recharge, stormwater quantity and water quality impacts of major development projects as would be provided under the standards in this subchapter.
3. For site improvements regulated under the Residential Site Improvement Standards (RSIS) at N.J.A.C.5:21, the RSIS shall apply in addition to this section except to the extent the RSIS are superseded by this section or alternative standards applicable under a regional stormwater management plan or Water Quality Management Plan adopted in accordance with Department rules.

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Section 3: Stormwater Management Requirements for Major Development

- A. The development shall incorporate a maintenance plan for the stormwater management measures incorporated into the design of a major development.
- B. Stormwater management measures shall avoid adverse impacts of concentrated flow on habitat for threatened and endangered species as documented in the Department's Landscape Project or Natural Heritage Database established under N.J.S.A. 13:1B-15.147 through 15.150, particularly *Helonias bullata* (swamp pink) and/or *Clemmys muhlnebergi* (bog turtle).
- C. The following linear development projects are exempt from the groundwater recharge, stormwater runoff quantity, and stormwater runoff quality requirements at Sections 3.F and 3.G:
 - 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 made of permeable material.
- D. A waiver from strict compliance from the groundwater recharge, stormwater runoff quantity, and stormwater runoff quality requirements at Sections 3.F and 3.G 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:
 - 1. The applicant demonstrates that there is a public need for the project that cannot be accomplished by any other means;
 - 2. The applicant demonstrates through an alternatives analysis, that through the use of nonstructural and structural stormwater management strategies and measures, the option selected complies with the requirements of Sections 3.F and 3.G to the maximum extent practicable;
 - 3. The applicant demonstrates that, in order to meet the requirements at Sections 3.F and 3.G, existing structures currently in use, such as homes and buildings would need to be condemned; and
 - 4. 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 D.3 above within the upstream drainage area of the receiving stream, that would provide additional opportunities to mitigate for requirements of Sections 3.F and 3.G that were not achievable on-site.
- E. Nonstructural Stormwater Management Strategies
 - 1. To the maximum extent practicable, the standards in 3.F and 3.G shall be met by incorporating nonstructural stormwater management strategies at 3.E into the design. The applicant shall identify the nonstructural measures incorporated into the design of the project. If the applicant contends that it is not feasible for engineering, environmental, or safety reasons to incorporate any nonstructural stormwater management measures identified in 3.E.2 below into the design of a particular project, the applicant shall identify the strategy considered and provide a basis for the contention.
 - 2. Nonstructural stormwater management measures incorporated into site design shall:
 - a. Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;
 - b. Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces;
 - c. Maximize the protection of natural drainage features and vegetation;
 - d. Minimize the decrease in the "time of concentration" from pre-construction to post construction. "Time of concentration" is defined as the time it takes for runoff to travel from the hydraulically most distant point of the watershed to the point of interest within a watershed;
 - e. Minimize land disturbance including clearing and grading;

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- f. Minimize soil compaction;
 - g. Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides;
 - 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 or exposure of pollutants at the site in order to prevent or minimize the release of those pollutants into stormwater runoff. These source controls include, but are not limited to:
 - (1) Site design features that help to prevent accumulation of trash and debris in drainage systems;
 - (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, applying 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.
 - 3. Any land area used as a nonstructural stormwater management measure to meet the performance standards in Sections 3.F and 3.G shall be dedicated to a government agency, subjected to a conservation restriction filed with the appropriate County Clerk's office, or 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.
 - 4. Guidance for nonstructural stormwater management measures is available in the New Jersey Stormwater Best Management Practices Manual. The manual is available on the Department of Environmental Protection's stormwater web page at <http://www.njstormwater.org>.
- F. Erosion Control, Groundwater Recharge and Runoff Quantity Standards
- 1. This section contains minimum design and performance standards to control erosion, encourage and control infiltration and groundwater recharge, and control stormwater runoff quantity impacts of major development.
 - 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) The design engineer shall, using the assumptions and factors for stormwater runoff and groundwater recharge calculations at Section 4, either:
 - (a) Demonstrate through hydrologic and hydraulic analysis that the site and its stormwater management measures maintain 100% of the average annual pre-construction groundwater recharge volume for the site; or
 - (b) Demonstrate through hydrologic and hydraulic analysis that the increase of stormwater runoff volume from pre-construction to post-construction for the 2-year storm is infiltrated.
 - (2) This groundwater recharge requirement does not apply to projects within the "urban redevelopment" area, or projects subject to (3) below.
 - (3) The following types of stormwater shall not be recharged:
 - (a) Stormwater from areas of high pollutant loading. High pollutant loading areas are areas in industrial and commercial developments where solvents and/or petroleum products are loaded/unloaded, stored, or applied, areas where pesticides are loaded/unloaded or stored; 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; areas where recharge would be inconsistent with 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

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- (b) Industrial stormwater exposed to “source material”. “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, which could be a source of pollutants in any industrial stormwater discharge to groundwater. 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.
 - (4) The design engineer shall assess the hydraulic impact on the groundwater table and design the site so as to avoid adverse hydraulic impacts. Potential adverse hydraulic impacts include, but are not limited to, exacerbating a naturally or seasonally high water table so as to cause surficial ponding, flooding of basements, or interference with the proper operation of subsurface sewage disposal systems and other subsurface structures in the vicinity or downgradient of the groundwater recharge area.
 - c. In order to control stormwater runoff quantity impacts, the design engineer shall, using the assumptions and factors for stormwater runoff calculations at Section 4, complete one of the following:
 - (1) Demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the 2, 10, and 100 year storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events;
 - (2) Demonstrate through hydrologic and hydraulic analysis that there is no increase, as compared to the pre-construction condition, in the peak runoff rates of stormwater leaving the site for the 2, 10, and 100 year storm events and that the increased volume or change in timing of stormwater runoff will not increase flood damage at or downstream of the site. This analysis shall include the analysis of impacts of existing land uses and projected land uses assuming full development under existing zoning and land use ordinances in the drainage area;
 - (3) Design stormwater management measures so that the post-construction peak runoff rates for the 2, 10 and 100 year storm events are 50, 75 and 80 percent, respectively, of the preconstruction peak runoff rates. The percentages apply only to the post-construction stormwater runoff that is attributable to the portion of the site on which the proposed development or project is to be constructed. The percentages shall not be applied to post-construction stormwater runoff into tidal flood hazard areas if the increased volume of stormwater runoff will not increase flood damages below the point of discharge; or
 - (4) In tidal flood hazard areas, stormwater runoff quantity analysis in accordance with 1, 2 and 3 above shall only be applied if the increased volume of stormwater runoff could increase flood damages below the point of discharge.
 - 2. Any application for a new agricultural development that meets the definition of major development at Section 12 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. For the purposes of this section, “agricultural development” means land uses normally associated with the production of food, fiber and livestock for sale. Such uses do not include the development of land for the processing or sale of food and the manufacturing of agriculturally related products.
- G. Stormwater Runoff Quality Standards
- 1. Stormwater management measures shall be designed to reduce the post-construction load of total suspended solids (TSS) in stormwater runoff by 80 percent of the anticipated load from the developed site, expressed as an annual average. Stormwater management measures shall only be required for water quality control if an additional 1/4 acre 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. The water quality design storm is 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. The calculation of the volume of runoff may take into account the implementation of non-structural and structural stormwater management measures.

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Table 1: Water Quality Design Storm Distribution			
Time (Minutes)	Cumulative Rainfall (Inches)	Time (Minutes)	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		

2. For purposes of TSS reduction calculations, Table 2 below presents the presumed removal rates for certain BMPs designed in accordance with the New Jersey Stormwater Best Management Practices Manual. The BMP Manual may be obtained from the address identified in Section 6, or found on the Department's website at www.njstormwater.org. The BMP Manual and other sources of technical guidance are listed in Section 6. TSS reduction shall be calculated based on the removal rates for the BMPs in Table 2 below. Alternative removal rates and methods of calculating removal rates may be used if the design engineer provides documentation demonstrating the capability of these alternative rates and methods to the review agency. A copy of any approved alternative rate or method of calculating the removal rate 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.
3. If more than one BMP in series is necessary to achieve the required 80% 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 from application of both BMPs, and

A = the TSS percent removal rate applicable to the first BMP

B = the TSS percent removal rate applicable to the second BMP

Table 2: TSS Removal Rates for BMPs	
Best Management Practice	TSS % Removal Rate

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Bioretention Systems	90
Constructed Stormwater Wetland	90
Extended Detention Basin	40-60
Infiltration Structure	80
Manufactured Treatment Device	See Section 5.C
Sand Filter	80
Vegetative Filter Strip	60-80
Wet Pond	50-90

4. If there is more than one onsite drainage area, the 80% TSS removal rate shall apply to each drainage area, unless the runoff from the subareas converge on site in which case the removal rate can be demonstrated through a calculation using a weighted average.
5. Stormwater management measures shall also be designed to reduce, to the maximum extent feasible, the post-construction nutrient load of the anticipated load from the developed site in stormwater runoff generated from the water quality design storm. In achieving reduction of nutrients to the maximum extent feasible, the design of the site shall include nonstructural strategies and structural measures that optimize nutrient removal while still achieving the performance standards in Sections 3.F and 3.G.
6. 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 6.
7. 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 to waters classified as FW1.
8. Special water resource protection areas shall be established along all waters designated Category One at N.J.A.C. 7:9B and 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. These areas shall be established for the protection of water quality, aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, and exceptional fisheries significance of those established Category One waters. 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:
 - (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 is provided.
 - (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, active agricultural use, parking area or maintained lawn area). The encroachment shall only be allowed where applicant demonstrates 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.

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- 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 associated with discharges allowed by this section shall achieve a 95% TSS postconstruction removal rate;
 - (3) Temperature shall be addressed to ensure no impact on receiving waterway;
 - (4) The encroachment shall only be allowed where the applicant demonstrates that the functional value and overall 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 subject to review and approval by the Department.
- d. A stream corridor protection plan may be developed by a regional stormwater management planning committee as an element of a regional stormwater management plan, or by a municipality through an adopted municipal stormwater management plan. If a stream corridor protection plan for a waterway subject to Section 2.G(8) has been approved by the Department of Environmental Protection, then the provisions of the plan shall be the applicable special water resource protection area requirements for that waterway. A stream corridor protection plan for a waterway subject to G.8 shall maintain or enhance the current functional value and overall condition of the special water resource protection area as defined in G.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. This subsection does not apply to the construction of one individual single family dwelling that is not part of a larger development on a lot receiving preliminary or final subdivision approval on or before [effective date of the Stormwater Management Rules], provided that the construction begins on or before [five years from effective date of the Stormwater Management Rules].

Section 4: Calculation of Stormwater Runoff and Groundwater Recharge

- A. Stormwater runoff shall be calculated in accordance with the following:
 - 1. The design engineer shall calculate runoff using one of the following methods:
 - a. The USDA Natural Resources Conservation Service (NRCS) methodology, including the NRCS Runoff Equation and Dimensionless Unit Hydrograph, as described in the NRCS National Engineering Handbook Section 4 – Hydrology and Technical Release 55 – Urban Hydrology for Small Watersheds; or
 - b. The Rational Method for peak flow and the Modified Rational Method for hydrograph computations.
 - 2. For the purpose of calculating runoff coefficients and groundwater recharge, there is a presumption that the pre-construction condition of a site or portion thereof is a wooded land use with good hydrologic condition. The term “runoff coefficient” applies to both the NRCS methodology at Section 4.A.1.a and the Rational and Modified Rational Methods at Section 4.A.1.b. A runoff coefficient or a groundwater recharge land cover for an existing condition may be used on all or a portion of the site if the design engineer verifies that the hydrologic condition has existed on the site or portion of the site for at least five years without interruption prior to the time of application. If more than one land cover have existed on the site during the five years immediately prior to the time of application, the land cover with the lowest runoff potential shall be used for the computations. In addition, there is the presumption that the site is in good hydrologic condition (if the land use type is pasture, lawn, or park), with good cover (if the land use type is woods), or with good hydrologic condition and conservation treatment (if the land use type is cultivation).

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3. In computing pre-construction stormwater runoff, the design engineer shall account for all significant land features and structures, such as ponds, wetlands, depressions, hedgerows, or culverts, that may reduce pre-construction stormwater runoff rates and volumes.
 4. In computing stormwater runoff from all design storms, the design engineer shall consider the relative stormwater runoff rates and/or volumes of pervious and impervious surfaces separately to accurately compute the rates and volume of stormwater runoff from the site. To calculate runoff from unconnected impervious cover, urban impervious area modifications as described in the NRCS Technical Release-55, Urban Hydrology for Small Watersheds and other methods may be employed.
 5. If the invert of the outlet structure of a stormwater management measure is below the flood hazard design flood elevation as defined at N.J.A.C. 7:13, the design engineer shall take into account the effects of tailwater in the design of structural stormwater management measures.
- B. Groundwater recharge may be calculated in accordance with the following:
1. The New Jersey Geological Survey Geological Survey Report GSR-32 A Method for Evaluating Ground-Water Recharge Areas in New Jersey, incorporated herein by reference as amended and supplemented. Information regarding the methodology is available from the New Jersey Stormwater Best Management Practices Manual; at <http://www.state.nj.us/dep/njgs/>; or at New Jersey Geological Survey, 29 Arctic Parkway, P.O. Box 427 Trenton, New Jersey 08625-0427; (609) 984-6587.

Section 5: Standards for Structural Stormwater Management Measures

- A. Standards for structural stormwater management measures are as follows:
1. Structural stormwater management measures shall be designed to take into account the existing site conditions, 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; and the presence of solution-prone carbonate rocks (limestone).
 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 7.D.
 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.
 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 7.
- B. Stormwater management measure guidelines are available in the New Jersey Stormwater Best Management Practices Manual. Other stormwater management measures may be utilized provided the design engineer demonstrates that the proposed measure and its design will accomplish the required water quantity, groundwater recharge and water quality design and performance standards established by this subchapter.
- C. Manufactured treatment devices may be used to meet the requirements of this subchapter, provided the pollutant removal rates are verified by the New Jersey Corporation for Advanced Technology and certified by the Department.

Section 6: Sources for Technical Guidance

- A. 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, Department of Environmental Protection, 428 East State Street, P.O. Box 420, Trenton, New Jersey, 08625; telephone (609) 777-1038.

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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.
 2. The New Jersey Department of Environmental Protection Stormwater Management Facilities Maintenance Manual, as amended.
- B. 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 or any of the Soil Conservation Districts listed in N.J.A.C. 2:90-1.3(a)4. The location, address, and telephone number of each Soil Conservation District may be obtained from the State Soil Conservation Committee, P.O. Box 330, Trenton, New Jersey 08625; (609) 292-5540;
 2. The Rutgers Cooperative Extension Service, 732-932-9306; and
 3. The Soil Conservation Districts listed in N.J.A.C. 2:90-1.3(a)4. The location, address, and telephone number of each Soil Conservation District may be obtained from the State Soil Conservation Committee, P.O. Box 330, Trenton, New Jersey, 08625, (609) 292-5540.

Section 7: Safety Standards for Stormwater Management Basins

- A. This section sets forth requirements to protect public safety through the proper design and operation of stormwater management basins. This subchapter applies to any new stormwater management basin.
- B. The provisions of this section are not intended to preempt more stringent municipal or county safety requirements for new or existing stormwater management basins.
- C. Requirements for Trash Racks, Overflow Grates and Escape Provisions
1. A trash rack is a device designed to catch trash and debris and prevent the clogging of outlet structures. Trash racks shall be installed at the intake to the outlet from the stormwater management basin to ensure proper functioning of the basin outlets in accordance with the following:
 - a. The trash rack shall have parallel bars, with no greater than six inch spacing between the bars.
 - b. The trash rack shall be designed so as not to adversely affect the hydraulic performance of the outlet pipe or structure.
 - c. The average velocity of flow through a clean trash rack is not to exceed 2.5 feet per second under the full range of stage and discharge. Velocity is to be computed on the basis of the net area of opening through the rack.
 - 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 designed to prevent obstruction of the overflow 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 less 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. For purposes of this subsection, escape provisions means the permanent installation of ladders, steps, rungs, or other features that provide easily accessible means of egress from stormwater management basins. Stormwater management basins shall include escape provisions as follows:
 - a. If a stormwater management basin has an outlet structure, escape provisions shall be incorporated in or on the structure. With the prior approval of the reviewing agency identified in Section 7.D a freestanding outlet structure may be exempted from this requirement.

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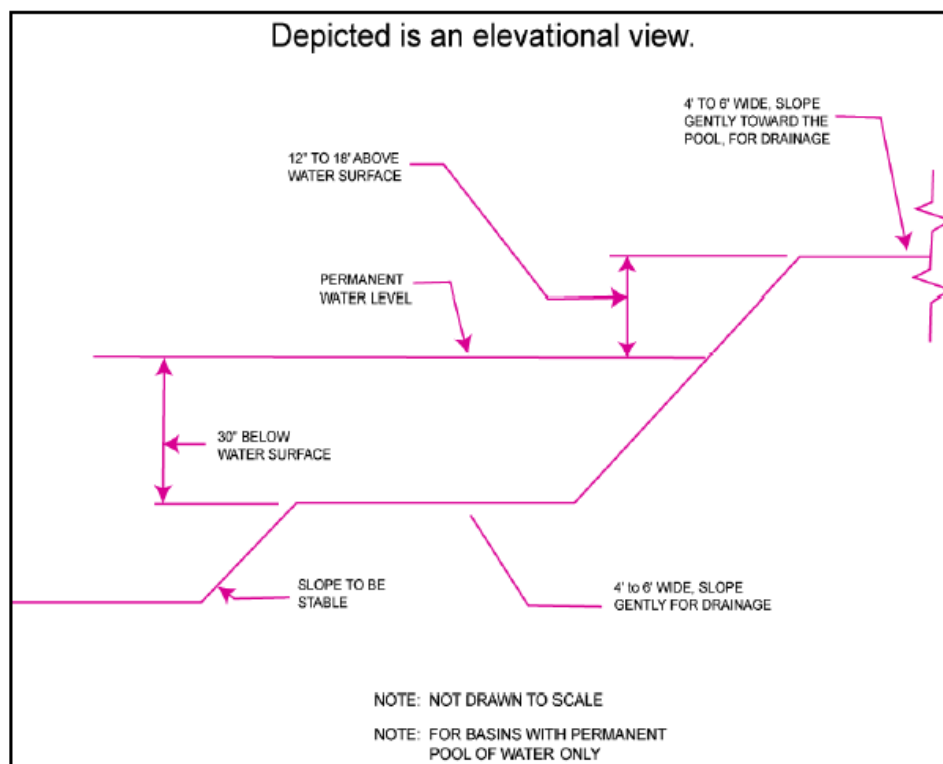
b. Safety ledges shall be constructed on the slopes of all new stormwater management basins having a permanent pool of water deeper than two and one-half feet. Such safety ledges shall be comprised of two steps. Each step shall be four to six feet in width. One step shall be located approximately two 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 7.E for an illustration of safety ledges in a stormwater management basin.

c. In new stormwater management basins, the maximum interior slope for an earthen dam, embankment, or berm shall not be steeper than 3 horizontal to 1 vertical.

D. 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.

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



Section 8: 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 8.C below as part of the submission of the applicant's application for subdivision or site plan approval.
2. The applicant shall demonstrate that the project meets the standards set forth in this ordinance.
3. The applicant shall submit [specify number] copies of the materials listed in the checklist for site development stormwater plans in accordance with Section 8.C of this ordinance.

B. Site Development Stormwater Plan Approval

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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. That municipal board or official shall consult the engineer retained by the Planning and/or Zoning Board (as appropriate) to determine if all the checklist requirements have been satisfied and to determine if the project meets the standards set forth in this ordinance.

C. Checklist Requirements

The following information shall be required:

1. Topographic Base Map

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 200 feet beyond the limits of the proposed development, at a scale of 1"=200' or greater, showing 2-foot contour intervals. The map as appropriate may indicate the following: existing surface water drainage, shorelines, steep slopes, soils, erodible soils, perennial or intermittent streams that drain into or upstream of the Category 1 waters, wetlands and flood plains along with their appropriate buffer strips, marshlands and other wetlands, pervious or vegetative surfaces, existing man-made structures, roads, bearing and distances of property lines, and significant natural and manmade features not otherwise shown.

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 sensitive features and to those that provide particular opportunities or constraints for development.

3. Project Description and Site Plan(s)

A map (or maps) at the scale of the topographical base map 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 ground water elevations. A written description of the site plan and justification of proposed changes in natural conditions may also be provided.

4. Land Use Planning and Source Control Plan

This plan shall provide a demonstration of how the goals and standards of Sections 2 through 5 are being met. The focus of this plan shall be to describe how the site is being 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.

5. Stormwater Management Facilities Map

The following information, illustrated on a map of the same scale as the topographic base map, 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, and details of the proposed plan to 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 calculations for the pre-development and postdevelopment conditions for the design storms specified in Section 3 of this ordinance.
- b. When the proposed stormwater management control measures (e.g. infiltration basins) depends 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 soil types present at the location of the control measure.

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7. Maintenance and Repair Plan

The design and planning of the stormwater management facility shall meet the maintenance requirements of Section 9.

8. Waiver from Submission Requirements

The municipal official or board reviewing an application under this ordinance may, in consultation with the municipal engineer, waive submission of any of the requirements in Sections 8.C.1 through 8.C.6 of this ordinance when it can be demonstrated that the information requested is impossible to obtain or it would create a hardship on the applicant to obtain and its absence will not materially affect the review process.

Section 9: Maintenance and Repair

A. Applicability

1. Projects subject to review as in Section 1.C of this ordinance shall comply with the requirements of Section 9B and 9.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.
2. The maintenance plan shall contain specific preventative 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 preventative and corrective maintenance (including replacement). Maintenance guidelines for stormwater management measures are available in the New Jersey Stormwater Best Management Practices Manual. If the maintenance plan identifies a person other than the developer (for example, a public agency or homeowners' association) as having the responsibility for 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 9.B.2 above is not a public agency, the maintenance plan and any future revisions based on Section 9.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. Preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measure, including repairs or replacement to the structure; 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 9.B.2 above shall maintain a detailed log of all preventative 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.
7. The person responsible for maintenance identified under Section 9.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.
8. The person responsible for maintenance identified under Section 9.B.2 above shall retain 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 9.B.6 and 9.B.7 above.
9. The requirements of Sections 9.B.3 and 9.B.4 do not apply to stormwater management facilities that are dedicated to and accepted by the municipality or another governmental agency.
10. In the event that the stormwater management facility becomes a danger to public safety or public health, or if it is in need of maintenance, the municipality shall so notify the responsible person in writing. Upon receipt of that notice, the responsible person shall have fourteen (14) days to effect maintenance and repair of the facility in a manner that is approved by the municipal engineer or his designee. If the responsible person fails or refuses to

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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.

B. 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.

C. Penalties

Any responsible person who violates any portion or section of this ordinance shall be subject to the following penalties:
[Municipality to specify].

Section 10: Effective Date

This ordinance shall take effect upon the approval by the county review agency, or sixty (60) days after submission to the county review agency if they fail to act.

Section 11: Severability

If the provisions of any article, 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 article, section, subsection, paragraph, subdivision, or clause of this ordinance.

Section 12: 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.

“CAFRA Planning Map” means the geographic depiction of the boundaries for Coastal Planning Areas, CAFRA Centers, CAFRA Cores and CAFRA Nodes pursuant to N.J.A.C. 7:7E-5B.3.

“CAFRA Centers, Cores or Nodes” means those areas within boundaries accepted by the Department pursuant to N.J.A.C. 7:8E-5B.

"Compaction" means the increase in soil bulk density.

“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 an agency designated by the County Board of Chosen Freeholders to review municipal stormwater management plans and implementing ordinance(s). The county review agency may either be:

A county planning agency; or

A county water resource association created under N.J.S.A 58:16A-55.5, if the ordinance or resolution delegates authority to approve, conditionally approve, or disapprove municipal stormwater management plans and implementing ordinances.

"Department" means the New Jersey Department of Environmental Protection.

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

“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, 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.

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“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 constrained area” means the following areas where the physical alteration of the land is in some way restricted, either through regulation, easement, deed restriction or ownership such as: wetlands, floodplains, threatened and endangered species sites or designated habitats, and parks and preserves. Habitats of endangered or threatened species are identified using the Department’s Landscape Project as approved by the Department’s Endangered and Nongame Species Program.

“Environmentally critical areas” 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; and well head protection and groundwater recharge areas. Habitats of endangered or threatened species are identified using the Department’s Landscape Project as approved by the Department’s Endangered and Nongame Species Program.

“Empowerment Neighborhood” means a neighborhood designated by the Urban Coordinating Council “in consultation and conjunction with” the New Jersey Redevelopment Authority pursuant to N.J.S.A 55:19-69.

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

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

“Infiltration” is the process by which water that seeps into the soil from precipitation.

“Major development” means any “development” that provides for ultimately disturbing one or more acres of land or increasing impervious surface by one-quarter acre or more. Disturbance for the purpose of this rule is the placement of impervious surface or exposure and/or movement of soil or bedrock or clearing, cutting, or removing of vegetation. Projects undertaken by any government agency which otherwise meet the definition of “major development” but which do not require approval under the Municipal Land Use Law, N.J.S.A. 40:55D-1 et seq. are also considered “major development.”

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

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

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

“Person” means any individual, corporation, company, partnership, firm, association, or political subdivision of this State and any state, interstate or federal agency.

“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, ground waters or surface waters of the State, or to a domestic treatment works.

“Pollutant” includes both hazardous and nonhazardous pollutants.

“Recharge” means the amount of water from precipitation that infiltrates into the ground and is not evapotranspired.

“Sediment” means solid material, mineral or organic, that is in suspension, 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.

“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.

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“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.

“Stormwater runoff” means water flow on the surface of the ground or in storm sewers, resulting from precipitation.

“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 (most constructed stormwater wetlands).

“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.

“Tidal Flood Hazard Area” means a flood hazard area, which may be influenced by stormwater runoff from inland areas, but which is primarily caused by the Atlantic Ocean.

“Urban Coordinating Council Empowerment Neighborhood” means a neighborhood given priority access to state resources through the New Jersey Redevelopment Authority.

“Urban Enterprise Zones” means a zone designated by the New Jersey Enterprise Zone Authority pursuant to the New Jersey Urban Enterprise Zones Act, N.J.S.A. 52:27H-60 et. seq.

“Urban Redevelopment Area” is defined as previously developed portions of areas:

- (1) Delineated on the State Plan Policy Map (SPPM) as the Metropolitan Planning Area (PA1), Designated Centers, Cores or Nodes;
- (2) Designated as CAFRA Centers, Cores or Nodes,
- (3) Designated as Urban Enterprise Zones; and
- (4) Designated as Urban Coordinating Council Empowerment Neighborhoods.

“Waters of the State” means the ocean and its estuaries, all springs, streams, wetlands, and bodies of surface or ground water, 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 ground water 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.

