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**COMPREHENSIVE STORMWATER
MANAGEMENT MODEL ORDINANCE**

For the Whippany River Watershed Action Committee

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Note: This ordinance is intended to be applied in municipalities within the Whippany River Watershed. The ordinance presents a set of technical management standards which are rigorous, designed to achieve the water resource objectives which have been established for the Watershed. Standards incorporate existing and anticipated state standards, as well as regulatory models developed by Cahill and other consultants in the area. The hope is that municipalities will integrate as much of this "model" as possible within their existing regulations, though clearly the model ordinance must be tailored to each municipality.

Special emphasis has been placed on trying to "do the most with the least" by tiering the standards so that needless duplication of stormwater management systems is avoided, structuring in incentives where possible. Special emphasis has been placed on ongoing maintenance requirements at the end of the ordinance.

Ordinance requirements are designed to be operationalized through the subdivision and land development process and as such are triggered by the land development process. Although the issue of retrofitting of existing basins at existing land uses is important in the Watershed, in most cases additional programs need to be explored beyond land development regulations if this retrofit is to be achieved.

STORMWATER MANAGEMENT MODEL ORDINANCE

1. STATUTORY AUTHORITY

The Stormwater Management Act, P.L. 1981 a, c. 32, which amends and supplements the Municipal Land Use Law, N.J.S.A. 40:44D-1 et seq., 55D-1 et seq., 55D-93 et seq., and the Soil Erosion and Sediment Control Act, N.J. S.A. 4:24-39 et seq., authorizes municipalities to prepare stormwater management ordinances as needed.

2. FINDINGS OF FACT

It is hereby determined that:

- A. Land development projects and activities alter the hydrologic response of watersheds as the result of creation of impervious surfaces, such as structures, roads, and parking lots, and removal of natural vegetation and compaction of the soil mantle; these changes result in increased stormwater rates of runoff and total volumes of runoff, which in turn increases flooding, both in its severity and its duration.
- B. Waterbodies, roadways, structures and other property within the municipality are at times subjected to flooding, posing a danger to the lives and property of the public and is also a danger to the natural resources of the municipality and the region;
- C. Increased stormwater runoff resulting from land development projects and activities flushes particulate and dissolved contaminants into streams and wetlands, causes increased soil erosion with increased sediment and pollutant transport and deposition, and creates stream channel erosion, resulting in a deterioration of the water resources of the municipality.
- D. Impervious surfaces and the graded and compacted earth surfaces associated with land development projects and activities reduce the natural infiltration of rainfall, reduce the recharge of groundwater resources into aquifers, lower the water table with potential impacts on private and public water supply systems, reduce the natural rates of stream baseflow and the critical discharge of groundwater to wetlands.
- E. The related removal of natural vegetation resulting from land development projects and activities significantly reduces natural quantities of evapotranspiration with consequent microclimate impacts.
- F. All of these impacts, including worsened flooding, soil erosion, stream channel erosion, nonpoint source pollution, reduced infiltration and aquifer recharge, and microclimate impacts can be minimized and even prevented through the comprehensive management of stormwater. This comprehensive management begins with municipal regulation.
- G. All of these adverse stormwater-related impacts have been documented by a

variety of scientific studies and reports prepared for the Whippany River Watershed, comprising all of _____, including the Whippany River Watershed Management Plan, the *Whippany River Watershed Action Now Strategy*, and *A Cleaner Whippany River Watershed*. Because of water quality degradation occurring as the result of land development, TMDLs (total maximum daily loads) pursuant to the Federal Clean Water Act have been established for the Whippany on May 12, 1999. In order to address these and related water resource problems here, detailed recommendations have been included in the *Action Now Strategy* and *A Cleaner Whippany* which set forth comprehensive stormwater management as an essential part of the watershed management program. This ordinance is a direct result of these recommendations and this overall program to restore water resource values in _____.

- H. In support of comprehensive stormwater management, the State of New Jersey's Surface Water Quality Standards (N.J.A.C. 7:9B-1.1 et seq.) establish surface water quality standards and antidegradation policies applicable to all surface waters of the state and these standards and antidegradation policies provide reasonable guidance to New Jersey municipalities for the regulation of stormwater runoff for purposes of protecting surface water resources from degradation.
- I. In support of comprehensive stormwater management, New Jersey has established general requirements for municipal stormwater management ordinances and plans at N.J.A.C. 7:8-1.1 et seq. Revised regulations have been drafted (March 21, 2001). Existing regulations establish design and performance standards for stormwater management including safety standards for basins.
- J. In support of comprehensive stormwater management, New Jersey has published the *Revised Manual for New Jersey: Best Management Practices for Control of Nonpoint Source Pollution from Stormwater* (May 3, 2000 Draft), which provides effective and economical alternatives for better stormwater management and, in particular, the control of nonpoint source pollution from land development.
- K. In support of comprehensive stormwater management, New Jersey Residential Site Improvement Standards have been enacted (N.J.A.C. 5:21-1) to standardize stormwater management standards statewide for residential development projects. These standards "...are to be interpreted as the minimum required to ensure public health and safety, and the maximum that may be required in connection with residential development." 5:21-1.5(b)

It is therefore determined that it is in the public interest to regulate stormwater runoff from land development projects and other construction activities within _____ as provided in this Ordinance.

3. PURPOSE

It is the purpose of this ordinance to regulate stormwater generated from land development projects and other construction activities in order:

- A. To minimize increased stormwater runoff rates and volumes and generally maintain pre-development hydrologic regimes (low flow, flood flow, average flow, etc.) after

development, whenever possible;

- B. To minimize and prevent where feasible artificially-induced flood damage to public health and to property;
- C. To minimize the deterioration of existing water courses, natural and artificial, including culverts, bridges, dams and other structures that would result from increased stormwater runoff;
- D. To maintain the integrity and stability of stream channels to support their designated biological uses and functions, as well as to function for drainage, the conveyance of floodwater, and other purposes;
- E. To maintain pre-development rates of groundwater infiltration, aquifer recharge, stream baseflow, and maintenance of the water table, with infiltration-oriented management practices which take into account soil permeability and appropriate geological conditions;
- F. To protect all surface and groundwater resources from degradation related to land development projects and activities;
- G. To maximize water quality, including temperature, in all streams and other surface water bodies, in support of New Jersey stream classifications and the uses on which these classifications are based:
- H. To control and minimize soil erosion, the transport of sediment, and nonpoint source pollution related to land development projects and activities;
- I. To promote whenever feasible natural and nonstructural stormwater management approaches which maximize prevention of stormwater generation, as well as mitigation of unavoidable stormwater impacts.
- J. To minimize public safety hazards at any stormwater management facility constructed pursuant to subdivision or site plan approval.

4. APPLICABILITY

This ordinance shall be applicable to any major subdivision or site plan application, as defined in the Municipal Land Use Law and the Code of _____, and which involves land disturbances of 5,000 square feet or more and/or the creation of an additional 1,000 square feet of impervious area. Provisions of this ordinance pertaining to runoff from roof areas and requirements for drywells shall also apply to all applications for building permits except as otherwise provided for herein. The ordinance shall be applied to the extent feasible with respect to modifications of previously developed sites with few or no stormwater management provisions; special provisions have been added to manage these previously developed sites in order to encourage redevelopment of already developed areas.

5. DEFINITIONS

Unless specifically defined below, or in the Municipal Land Use Law (N.J.S.A. 40:55D-1 et seq.), or in the Soil Erosion and Sediment Control Act (N.J.S.A. 4:24-39 et seq.), or in New Jersey's Surface Water Quality Standards (N.J.A.C. 7:9B-1.1 et seq.), words or phrases used in this ordinance shall be interpreted so as to give them the meaning they have in common usage.

(Municipalities should include the following definitions in their adopted ordinance unless the definition is already provided for in the adopted subdivision and land development ordinance)

Agricultural development - land uses normally associated with the production of food, fiber, and/or livestock for sale. For purposes of this Ordinance, such uses shall not include the development of land for the processing or sale of food and the manufacture of agriculturally related products.

Constructed wetland - a man-made freshwater wetland, designed and constructed for a specific purpose.

Detention basin - an impoundment area created by constructing an embankment, excavating a pit, or both, for the purpose of temporarily storing stormwater.

Detention facility - a detention basin or alternative structure designed to store stormwater runoff.

Floodplain - the area inundated by NJDEP's regulatory flood including the water course that creates it. NJDEP's regulatory flood means NJDEP's adopted Flood Hazard Area Design Flood along streams for which NJDEP has an adopted flood hazard area and floodway study, and the 100-year flood along non-delineated streams for which NJDEP has not delineated a flood hazard area.

Floodway - the channel of a natural stream and portions of the flood hazard areas adjoining the channel which are reasonably required to carry and discharge the regulatory flood. For this Ordinance, the term floodway refers to both the delineated floodway along streams which have state adopted flood hazard area and floodway studies, and the area between NJDEP approved encroachment lines located on both sides of non-delineated streams for which no state adopted flood hazard area and floodway study exists.

Freshwater wetlands - an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation; provided, however, that in designating a wetland, the three parameter approach (that is, hydrology, soils and vegetation) enumerated in the "Federal Manual for Identifying and Delineating Jurisdictional Wetlands," and any subsequent amendments thereto shall be used.

Infiltration facility - structure or device designed to infiltrate retained water to the subsurface and which is not an injection well. These facilities may be above grade or below grade.

NJDEP - the New Jersey Department of Environmental Protection.

NJDEP BMP Manual - the New Jersey Department of Environmental Protection's "Revised Manual for New Jersey Best Management Practices for Control of Nonpoint Source Pollution from Stormwater" (5th Draft, May 3, 2000)

Nonpoint source pollution - pollution from any source other than from any discernible, confined, and discrete conveyances, and shall include, but not be limited to, pollutants from agricultural, silvicultural, mining, construction, subsurface disposal and urban runoff sources.

Recharge - the replenishment of underground water reserves.

Regulatory flood - the 100-Year flood along non-delineated watercourses or the Flood Hazard Area design flood along delineated watercourses.

Retention basin - an impoundment area with a permanent pool made by constructing an embankment, or excavating a pit, or both, for the purpose of temporarily storing storm water. A retention basin is also called a "wet basin" or "wet detention basin".

Stormwater runoff - flow on the surface of the ground, resulting from precipitation.

S.C.S. - the Soil Conservation Service (now the Natural Resources Conservation Service) of the U.S. Department of Agriculture.

Treatment train - a sequence of structures or devices through which runoff passes before exiting the project site. The combined characteristics of the individual structures or devices shall satisfy the performance requirements associated with the no net increase provisions of this ordinance.

Water Quality Storm - a one-year frequency, 24-hour storm, (2.7 inches of rainfall), using the Type III rainfall distribution recommended for New Jersey by the U.S. Soil Conservation Service or a storm of 1.25 inches of rainfall falling uniformly in two hours.

6. TECHNICAL STANDARDS

The goal of this Ordinance is to accomplish the performance standards set forth below in the most cost effective manner feasible. Every effort should be made to achieve standards with the most straightforward stormwater management systems, achieving multiple standards with the least complicated systems, where possible. In many cases, total volume control, peak control, and water quality control standards can be achieved through use of a single infiltration-oriented Best Management Practice.

A. No Net Increase Management Goals

1. No Net Increase in Stormwater Quantity: Total Runoff and Infiltration Volume Control - In order to avoid downstream flooding problems and maintain groundwater recharge, stormwater management systems, post-development, shall be designed to infiltrate the quantity of runoff that exceeds pre-development runoff for up to the two-year storm occurring within a 24 hour period, based on calculations using methodologies as set forth below. Increased stormwater runoff shall be calculated by the applicant's engineer and approved by the _____ Engineer.

If infiltration on site for the design storm is not feasible based on soil permeability constraints, topography, or groundwater level considerations as determined below, waivers may be issued at the discretion of _____ in those cases where the Standard 1 volume requirement cannot reasonably be satisfied, and infiltration practices are not practicable. Applicants may request a partial waiver, where a portion of the Standard 1 volume requirement is waived (i.e., volume control is achieved for a lesser storm

such as the 6-month storm). Or applicants may request a total waiver, where the entire Standard 1 volume requirement is set aside. The need for waivers of any type must be based on demonstration by the applicant that due to the existing soil, bedrock, water table, or other natural conditions and limitations at the site, the Standard 1 volume requirement cannot be satisfied through use of reasonable Best Management Practices, as defined in this Ordinance. Waivers are discouraged strongly by _____ and will be issued only after thorough scrutiny by _____ has been directed toward all possible stormwater management options, including off-site mitigations options below.

If infiltration on site for the design storm is not feasible based on soil permeability constraints, topography, or groundwater level considerations as determined below, as well as intensity of the proposed building program, and a full and/or partial waiver has been issued by _____, an applicant is strongly encouraged to provide off-site mitigation subject to the approval of the _____ Planning Board/Zoning Board, prior to project commencement. Off-site options for mitigation are as follows.

- a. the acquisition of, and mitigation on privately owned lands, preferably adjacent to state open waters and nearby and within the same drainage basin, to be dedicated for preservation or reforestation, and used to off-set the increase in volume of the 1.25 inch two hour rainfall from the proposed development site.
- b. mitigation on previously developed properties, public or private, and preferably nearby within the same drainage basin, that currently lack storm water management facilities designed and constructed in accordance with the purposes and standards of this Ordinance in order to off-set the increase in volume of the 1.25 inch two hour rainfall from the proposed development site.
- c. funding specific projects recommended in watershed based storm water management plans in order to off-set the increase in volume of the 1.25 inch two hour rainfall from the proposed development site.
- d. funding stormwater related studies or regional stormwater management plans approved by _____ in an amount equivalent to a construction cost estimate of a suitable infiltration system sized for the proposed development submitted and prepared by the applicant's professional engineer and approved by _____.

2. No Net Increase in Stormwater Quantity: Peak Rate Control - Assuming full compliance with Standard 1 volume provisions (assuming no waiver), the peak rate stormwater discharges from the site for all design storms up to and including a 100-year frequency rainfall shall not exceed the peak discharges from the site of the same storms before disturbance, based on calculations using methodologies as set forth below. Design storms include:

- **2-year, 24-hour storm;**
- **5-year, 24-hour storm;**
- **10-year, 24-hour storm;**

- **25-year, 24-hour storm;**
- **50-year, 24-hour storm;**
- **100-year, 24-hour storm.**

If a partial waiver has been issued for Standard 1 but at least 50 percent of the volume requirement specified under Standard 1 is being achieved, these Standard 2 provisions also apply.

If a partial waiver has been issued for Standard 1 but less than 50 percent of the volume requirement specified under Standard 1 is being achieved, storm water control systems shall be designed to control storm water runoff resulting from a development site such that the post-development peak runoff rates from the site shall be 50 percent of the pre-development peak for the 2-year storm event, 75 percent of the pre-development peak for the 10-year storm event, and 80 percent of the pre-development peak for the 100 year storm event. If Standard 1 infiltration is not being achieved, all or in part, but off-site mitigation is being provided as set forth in a. through d., then these additional design storm percentage reductions for additional peak rate control are not required, provided that the applicant can demonstrate that flooding downstream will not be significantly worsened by the proposed project.

If a storm water management plan for the region or watershed containing the watercourse affected by the proposed development has been adopted, the project's storm water control systems shall be designed to conform to that regional or watershed plan as well, to the extent practicable.

Waivers in general are discouraged by _____. In all cases, the _____ applicant must demonstrate to the satisfaction of the _____ Engineer that adjacent waterways will not be impacted in particular by:

- Deterioration or damage of existing culverts, bridges, dams, and other structures;
- Deterioration of their biological functions, drainage, flood water conveyance, and other purposes;
- Streambank or streambed erosion or siltation;
- Increased flooding endangering public health, life and property.

3. No Net Increase in Storm Water Pollutant Loads - Stormwater management systems shall be designed to prevent the degradation of water quality in receiving watercourses from nonpoint source pollution associated with stormwater runoff. NJDEP's Surface Water Quality Standards, NJAC 7:9B, shall be used for this determination. Stormwater management systems shall be designed to reduce, to the maximum extent possible, the total suspended solids (TSS) from stormwater runoff for storm events with magnitudes as high as the Water Quality Storm and to retain, as closely as possible, the pre-development hydrologic response of the site and the watershed
 - a. In all of those cases where Standard 1 is being met and without off-site provisions in subsections a. through d., then Standard 3 is assumed to be achieved, and no additional water quality management is necessary.

- b. In all those cases where a partial waiver has been granted pursuant to Standard 1 requirements but at least 50 percent of the required infiltration volume is being achieved through the proposed stormwater management system at the site, then Standard 3 is assumed to be achieved, and no additional water quality management is necessary. If waivers, full and/or partial, have been issued but off-site mitigation is being provided pursuant to subsections a. through d. as above, then no additional water quality management is required as well.
- c. In those cases where a full waiver or a partial waiver has been granted pursuant to Standard 1 requirements but 50 percent or less of the required infiltration volume is being achieved through the proposed stormwater management system and adequate off-site mitigation is not provided, then additional water quality management is necessary. In such cases, water quality management systems shall be designed to the extent practicable so that there is no calculated or anticipated increase from pre-development to post-development conditions in conventional pollution loads (e.g. total suspended solids, nitrogen, phosphorus, etc.) to the receiving water course due to stormwater runoff. Compliance with this provision shall be attained when it is demonstrated by the applicant that appropriate BMP's (e.g., those presented in the NJDEP BMP Manual) are incorporated into the project in order to achieve the goal of no net increase in storm water pollutant loads. Implementation of these measures should be successful in achieving 80 percent removal of total suspended solids loading as defined in the NJDEP BMP Manual. A nonpoint source pollutant loading analysis shall be prepared and submitted, demonstrating that the nonpoint source pollutant and sediment loadings resulting from the proposed land development or construction project do not exceed the standards set forth in this ordinance. In preparing the required analysis it shall be acceptable to utilize the average removal efficiency statistics provided in the NJDEP BMP Manual.
- d. Nonstructural storm water management practices are preferred and shall be utilized prior to the use of structural management measures, unless it is demonstrated that these practices are not feasible from an engineering, environmental or economic perspective on a particular site. Nonstructural measures include elements of site design to protect water quality (e.g., vegetated buffers adjacent to watercourses), limitations on use of impervious surfaces, limitation on site disturbance, use of native vegetation, and requirement of appropriate fertilizer and pesticide use.
- e. The applicant shall not be required to install BMP's which exceed the goal, but, where possible, is strongly encouraged to do so.

- f. The applicant must provide economic or other justification where implementation of the Plan is not predicted to achieve compliance with the goal of no net increase in storm water pollutant loads.

- 4. Special Requirements for High Pollutant Producing Uses - For all those projects involving land uses considered to be high pollutant producers or "hotspots" (automobile service stations, industrial/commercial waste storage areas, fast food businesses, any activity involving chemical mixing or loading/unloading, and even some high traffic retail uses), additional water quality requirements may be imposed by the _____ Engineer which supersede 3 a. through f. above.

- 5. Use of Development Design Credits (as per NJDEP BP Manual) - Applicants are strongly encouraged in all cases to incorporate the system of credits established in the NJDEP BMP Manual, as per Manual specifications, as below. These credits can affect both quantity and quality calculations, as set forth in 1 through 3 above.
 - a. Credit 1 Conservation of Natural Areas
 - i. Definition: natural areas include woodland areas, buffers of wetlands and riparian zones, steep slopes, wellhead protection areas, karst/sinkhole zones, and others
 - ii. Credit: subtract the natural areas from the total site area when calculating the 80 percent total suspended solids requirement pursuant to Standard 3 above; use the "woods in good condition" curve number for all natural areas when applying TR-55.
 - iii. Requirements: natural areas must not be disturbed during construction; limits of disturbance must be delineated on construction drawings and flagged in the field; the natural area must be protected in perpetuity, either through viable conservation easement or through enforceable regulation of some type; it must be properly inspected and managed.
 - b. Credit 2 Disconnection of Runoff
 - i. Definition: disconnection of runoff relates to all rooftop areas or other impervious ground surface areas which are directed into pervious areas where it is either infiltrated into the soil or filtered through vegetation, accomplished typically by grading; these areas must either have adequate size and permeability for adequate infiltration and/or extended detention with filtering; vegetated rooftops with storage also may be used
 - ii. Credit: disconnected areas may be subtracted from other areas on the site requiring water quality treatment pursuant to Standard 3 above; depending upon volume provisions, areas may also be subtracted from TR-55 calculations.
 - iii. Requirements: runoff should not be from "hotspot"

uses (see below); maximum contributing flow length shall be 100 feet; the flow length of disconnection shall not be less than 1.5 times the contributing flow length; the disconnection shall drain continuously through a vegetated channel, swale, forest buffer, or other filter strip to the property line or BMP; the disconnection shall consist of at least 80 percent of hydrologic soil groups And B with average slope not exceeding 4 percent (undisturbed group C with dense vegetation may be counted as B with _____ approval).

- c. Credit 3 Environmentally Sensitive Design
 - i. Definition: when site design techniques from a. and b. are grouped and applied to residential developments, this credit is granted.
 - ii. Credit: eliminates the need for additional BMPs to satisfy the Standard 3 (total suspended solids) and can significantly reduce stormwater volume as per Standards 1 and 2.
 - iii. Requirements: where total site impervious areas is less than 15 percent, where clustering is used, where roof and ground surface impervious areas are disconnected as per b., where grass swales are used rather than conventional curbing with gutter, where at least 30 percent of the site is protected in natural areas as per a., and where all runoff from the site is directed as sheet flow to filter strips or riparian buffers, the design is deemed to be environmentally sensitive.

Application of these credits is to be accomplished in addition to requirements and specifications set forth for Standards 1 through 3 above.

B. Procedures for Measuring Compliance with the No Net Increase Goals of the Ordinance

- 1. Hydrologic/hydraulic analyses shall be prepared and submitted demonstrating that the post-development stormwater runoff rates do not exceed the standards set forth in this ordinance for the water quality storm and the 2, 10, 25, 50 and 100-year storms.
 - a. The hydrologic and hydraulic analyses shall generally conform with methods developed by the Natural Resources Conservation Service and published in National Engineering Handbook, Section 4 - Hydrology, Technical Release No. 55 and Technical Release No. 20.
 - b. Standards and procedures for developing hydrographs and calculating peak rates of runoff shall be as shown in the Somerset County Storm Water Detention Basin Handbook.
 - c. Rainfall - Frequency relationships shall be as shown in Technical Paper No. 40, Rainfall Frequency Atlas of the United States published by the U.S. Weather Bureau.

2. For infiltration facilities proposed to meet the no net increase goals of this Ordinance, the results of a subsurface investigation and soil tests demonstrating the suitability of the area's soils and groundwater table for infiltration and treatment of runoff shall be provided.

C. Design Standards for Stormwater Management Systems

Design standards for stormwater management systems are contained in the NJDEP BMP Manual. These design standards shall be used in the project design in order to achieve stormwater management standards set forth in this Ordinance.

In most instances, the water quality control and infiltration performance requirements of this ordinance will be satisfied by multiple structures or devices (see Sections 6F and 6G of this ordinance). Furthermore, most structures or devices will achieve both a water quality control and infiltration benefit. Compliance with the no net increase provisions of the ordinance will be based on a project-wide summation of runoff characteristics. The applicant shall show how the collection of structures or devices incorporated in the stormwater management plan will jointly satisfy the performance requirements of this ordinance.

In order to meet the no net increase provisions of this Ordinance with regard to stormwater runoff volumes, nonpoint source loadings, and other nonpoint source pollutant loadings, stormwater management facilities shall provide for the control of stormwater runoff in accordance with the following basic principles:

1. Infiltration should be implemented which will retain and infiltrate all runoff generated for storms up to the 2-year, 24-hour storm, using the Type III rainfall distribution recommended for New Jersey by the U.S. Soil Conservation Service or the Somerset County 24-Hour Design Storm Distribution.
2. Runoff shall be managed at the source whenever possible.
3. Water quality and infiltration stormwater management systems shall be designed that utilize the natural qualities of the landscape as much as feasible.
4. Detention/retention basins are generally not suitable as infiltration facilities.

Utilizing the above design principles, a Comprehensive Stormwater Management Plan shall be developed for the proposed project, as set forth below, utilizing the stormwater "Best Management Practices" (BMPs) presented in the "Revised Manual for New Jersey: Stormwater and Nonpoint Source Pollution Control Best Management Practices for Control of Nonpoint Source Pollution from Stormwater," May 3 2000, prepared by the New Jersey Department of Environmental Protection and the New Jersey Department of Agriculture, as from time to time revised or amended. In estimating the removal efficiencies of the water quality control measures proposed, it shall be acceptable to utilize the average removal efficiency statistics provided in this NJDEP BMP Manual.

7. REQUIREMENTS FOR A COMPREHENSIVE STORMWATER MANAGEMENT PLAN

A. Submission of a Comprehensive Stormwater Management Plan

1. Whenever an applicant seeks _____ approval of major subdivision or site plan subject to this ordinance, the applicant shall submit a Comprehensive Stormwater Management Plan as part of the application.
2. The applicant shall demonstrate in this Comprehensive Stormwater Management Plan that the project meets the standards set forth in this Ordinance.

B. Comprehensive Stormwater Management Plan Approval

The applicant's Comprehensive Stormwater Management Plan shall be reviewed as a part of the subdivision or site plan review process. _____ shall consult the _____ Engineer retained by _____ to determine if all of the requirements have been satisfied and to determine if the project meets the standards set forth in this Ordinance.

C. Required Contents of the Comprehensive Stormwater Management Plan

The following information shall be required in a Comprehensive Stormwater Management Plan:

1. Topographic Base Map - A topographic base map of the site shall be submitted which extends a minimum of 200 feet beyond the limits of the proposed development, at a scale of 1"=200' or more detailed, showing 2-foot contour intervals. The map shall indicate existing surface water drainage, wetlands and wetland buffers, riparian areas, pervious or vegetative surfaces, existing man-made structures, roads, property lines, and all other significant natural and man-made features. The _____ Engineer may require upstream tributary drainage system information as necessary.
2. Environmental Site Analysis - A written and graphic description of the natural and man-made features of the site and its environs shall be provided. This description should include a discussion of soil conditions, slopes, wetlands, and vegetation on the site. Particular attention should be given to unique, unusual, or environmentally sensitive features and to those site features that provide particular opportunities or constraints for development.
3. Project Description and Site Plan(s) - A written description of the proposed project shall be provided with particular emphasis on aspects of the project which relate to stormwater runoff quantity (both total volume and peak rate) and pollutant loads, and changes to the stormwater drainage characteristics of the site compared to existing conditions. The project description should clearly describe all stormwater management practices, methods, and BMP systems that will be used on the site to meet the goal of

no net increase, as set forth in the above standards. The description should clearly indicate how the Comprehensive Stormwater Management Plan will meet the goal of no net increase. Guidelines for calculating pre-development and post-development pollutant loads and pollutant removal efficiencies are contained in the NJDEP BMP Manual. These guidelines should be used in the Comprehensive Stormwater Management Plan, unless the applicant demonstrates that alternative guidelines are more appropriate.

A map, (or maps) shall be provided 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 groundwater elevations.

4. Stormwater Management Facilities Plan - The following information shall be provided and illustrated on a plan of the same scale as the topographic base map, and shall include:
 - a. Total area to be paved or built upon, total area to be disturbed, proposed surface contours, estimated land area to be occupied by the stormwater management facilities and the type of vegetation thereon, and details of the plan to control and dispose of surface water.
 - b. Details of all stormwater management facilities 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.
5. Drainage Sub-Basin Map - A map showing the total drainage area and sub-basin drainage areas shall be provided. The map shall also show soil types and their boundaries as shown in the Morris County Soil Survey, or as may otherwise be determined by an on-site soil investigation.
6. Calculations
 - a. Comprehensive hydrologic, hydraulic and pollutant load data and design calculations for the pre-development and post-development conditions for the design storms as specified in this Ordinance shall be provided.
 - b. When the proposed stormwater management control measures (e.g. infiltration basins) depend on the hydrologic properties of soils, then a soils report shall be submitted. The soils report shall be based on on-site boring logs or soil pit profiles. The number and location of required soil borings or soil pits shall depend upon what is needed to determine the suitability and distribution of soil types present at the location of the control measure, to be reviewed and approved by the _____ Engineer.
7. Safety Measures

Safety measures are to be incorporated in the design of all stormwater management system projects. These may include but not be limited to fencing, warning signs, staff gauges indicating depth at lowest point, and outlet structures designed to limit access.

8. Maintenance and Repair Plan - A goal for the planning and design of a stormwater management system is for its operation with the least practical amount of maintenance. To accomplish this, the system shall be developed to eliminate avoidable maintenance tasks, minimize the long term amount of regular maintenance, facilitate the performance of required maintenance tasks, and reduce the potential for extensive, difficult, and costly remedial or emergency maintenance efforts.

Proper maintenance and repair of the stormwater management system is essential if water quantity and water quality standards are to be achieved.

Furthermore, proper maintenance reduces clogging of outlet structures, trash racks, and other facility components; prevents damage to vegetated areas; reduces potential for mosquito breeding; promotes aesthetics; and reduces problems such as excessive algae production.

- a. Maintenance and Repair Plan shall be prepared as part of the Comprehensive Stormwater Management Plan; this Maintenance and Repair Plan shall be guided by the principles set forth in the NJDEP BMP Manual (Chapter 6 Maintenance and Retrofitting Considerations).
- b. Maintenance procedures shall be detailed and shall provide for the continuation of the intended function of the facility. Procedures shall be specified in the Plan for both the construction phase and the post-construction phase.
- c. The Maintenance and Repair Plan for stormwater management facilities shall identify the parts or components of the system that need to be maintained, shall identify those actions which need to be taken by component, and shall identify frequency of these maintenance actions.
- d. The Maintenance and Repair Plan must include inspection routines to reduce the potential for extensive, difficult, and costly remedial or emergency maintenance efforts, including checklists, for both construction and post-construction phases of the project. Post-construction checklists must vary with the system proposed but can be expected to include:
 - obstruction of inlet or outlet devices by trash and debris
 - evidence of erosion/or and sedimentation
 - bare areas on banks and bottoms of ponds and basins
 - embankment or berm cracking or settling
 - malfunctioning of valves, sluice gates, locks, access hatches, or other
 - animal burrowing
 - for vegetated systems, presence of invasive or noxious weeds; saturated conditions in non-wetland areas where non-hydrophytic

species may be killed; discoloration indicative of nutrient, pH, and/or other imbalances; excessive sediment accumulation, smothering vegetation and impeding infiltration

--inadequate draining or clogging of infiltration devices

--presence of algae, stagnation, odor

--poor or distressed stands of grass and other vegetation

--distressed aquatic shoreline and other vegetation

--cracks or other deterioration of inlets, outlets, pipes, and conduits

--erosion and debris in emergency spillways and/or filter strips

--seepage at the outside toe of embankment of water-holding structures

--deterioration of downstream channels

--vandalism

--flow through embankment outside of conduit

--deteriorated conduit outlet

- e. Costs should be estimated for the Maintenance and Repair Plan; reliable sources of funding to cover these estimated costs shall be identified with evidence of commitment provided in the Maintenance and Repair Plan.
- f. Where a storm water management facility is used for sediment control during construction, a debris and sediment disposal site shall be identified and confirmed for availability before the facility is constructed. The disposal site may or may not be at the site of the proposed development. Disposal site(s) shall be included in the Maintenance and Repair Plan and shall be approved by the municipal engineer.
- g. Post-construction, sediment removal is critical as well and will vary with project and project site. The Maintenance and Repair Plan must specify procedures, as necessary, to remove and dispose of excess sediment, taking into account upstream watershed conditions.
- h. The Maintenance and Repair Plan must address mosquito generation. Stormwater management systems which include facilities which hold water must guard against mosquito generation by avoiding creation of stagnant water; proper design including consistent inflow during non-storm periods. Solar powered aeration sprinklers, prompt removal of floating debris, stocking of appropriate fish species are all techniques which can be used to manage mosquito generation. The Maintenance and Repair Plan must incorporate these techniques as necessary.
- i. The Maintenance and Repair Plan must address mowing of vegetated systems such as filter strips, where mowing should occur at least once annually in order to guard against woody vegetative growth, after July 15 (nesting birds departure) and through later September. Because vegetated management systems as set forth in the above sections are intended to include native meadow and other species which require minimum maintenance, frequent lawn mowing is to be avoided, especially important in discouraging Canadian geese proliferation and related water quality problems.
- j. The Maintenance and Repair Plan must include, as necessary, removal (trapping) of burrowing animals as necessary with refill of

burrows; reseeded of any exposed areas with use of erosion control matting; and filling of any eroded areas around flow control devices.

- k. Provisions for periodic review and evaluation to determine the overall effectiveness of the maintenance program and the need for revised or additional maintenance procedures, personnel and equipment shall be included in the Maintenance and Repair Plan.

8. MAINTENANCE AND REPAIR REQUIREMENTS

A. Applicability

Projects subject to review as specified in this ordinance shall comply with the requirements of this section.

B. Responsibility for Maintenance and Repair

Responsibility for operation, maintenance, repair, and safety of storm water management facilities, including periodic removal and disposal of accumulated particulate material and debris, shall remain with the property owner and all successors in title, or if the property is subdivided and sold separately a homeowners' association, or similar permanent entity, unless specifically assumed by _____. The requirements of this section do not apply to stormwater management facilities that are dedicated to and accepted by _____.

1. Prior to granting approval or as a condition of final subdivision or site plan approval to any project subject to review under this ordinance, the applicant shall enter into an agreement (the Maintenance and Repair Agreement) with _____ to ensure the long term/perpetual operation, maintenance, repair, and safety of the storm water management facility. In cases where property is subdivided and sold separately, a homeowners' association, or similar permanent entity, shall be established as the responsible person absent an agreement by a governmental agency to assume responsibility. It shall be demonstrated to _____ that any proposed new responsible entity has the capability to perform the required maintenance.
2. In the event that any storm water management system becomes a danger to public safety or public health, or if it is in need of maintenance, _____ shall so notify the responsible entity in writing. Upon receipt of that notice the responsible entity shall have fourteen (14) days to effect maintenance and repair of the facility in a manner that is approved by the municipal engineer or a designee. If for reasons of safety there is need for immediate action, the responsible entity shall act forthwith to remove the danger. If the responsible entity fails or refuses to perform such maintenance and repair, _____ may immediately proceed to do so and shall be reimbursed for the cost thereof by the responsible entity.

C. Maintenance and Repair Procedures

1. Maintenance procedures are required to maintain the intended operation and safe condition of the storm water management facility by reducing the occurrence of problems and malfunctions. To be effective, maintenance shall be performed on a regular basis and include such routine procedures as training of staff, periodic inspections, grass cutting and fertilizing, silt and debris removal and disposal, upkeep of moving parts, control of mosquitos and other insects, pond maintenance, and review of maintenance and inspection work to identify where the maintenance program could be more effective. Maintenance and Repair procedures will vary from site to site and must be established in detail in the Maintenance and Repair Plan, to be included in the Comprehensive Stormwater Management Plan for each project.
2. Repair procedures are required to correct a problem or malfunction at a storm water management facility and to restore the facility's intended operation and safe condition. Based upon the severity of the problem, repairs shall be performed on an as-needed or emergency basis and include such procedures as structural repairs, mosquito control, removal of debris, sediment and trash which threaten discharge capacity, erosion repair, snow and ice removal, fence repair, and restoration of vegetation.

D. Maintenance Responsibilities

Failure of any person, individual lot owner or private entity to properly maintain any stormwater management facility shall be construed to be a violation of this Ordinance and is declared to be a public nuisance.

1. General Responsibilities - Owners of stormwater management facilities shall be responsible for their proper maintenance during and after development. A Maintenance and Repair Plan, as defined above, shall be prepared for review and approval by _____ and shall be executed and signed by the applicant and/or property owner, as part of the Comprehensive Stormwater Management Plan. Where appropriate, as described below, this Maintenance and Repair Plan also must be part of the Homeowners/Property Owners Association covenants. Where appropriate, maintenance responsibilities must be included as deed restrictions on individual lots. All deeds shall incorporate these specified maintenance responsibilities, making explicit individual owners responsibilities for stormwater management measures and for the common property.

On or before completion of subdivision or land development improvements, the permanent stormwater management system for a tract shall be fully installed and functional in accordance with the approved Comprehensive Stormwater Management Plan. Temporary sediment trapping facilities in detention basins, upon inspection and approval by _____, shall be converted into permanent stormwater management basins, or otherwise treated as per the Plan. Additional facilities designed to serve more than an individual lot shall be determined to be fully operational. All such work shall be as specified in the approved Plan.

2. Homeowners/Property Owners Association Ownership (Other than On-Lot

Stormwater Facilities) - A single entity taking the form of a private corporation, partnership firm, estate or other legal entity empowered to own real estate exclusive of individual lot owners (i.e., Homeowners/Property Owners Association) shall be set up to manage stormwater management facilities that are suitable for such management, and perform other functions defined in this Ordinance. Responsibilities for ownership and management of facilities shall be defined in the Comprehensive Stormwater Management Plan, including the Maintenance and Repair Plan.

3. Individual Lot Stormwater Facilities - Stormwater management systems that are located on an individual lot are the responsibility of that landowner to maintain, unless otherwise specified. In these individual lot situations, the Comprehensive Stormwater Management Plan, including Maintenance and Repair Plan, must include:
 - a. All obligations concerning perpetuation of natural drainage or infiltration facilities, and/or the maintenance of facilities constructed by the individual lot owner under terms of his building permit (e.g., berms, cisterns, downspout connections, surface and sub-surface infiltration devices, etc.)
 - b. Assurances that no action will be taken by the occupant to disrupt or in any way impair the effectiveness of any stormwater management system.
 - c. A description of the facilities and systems on the lot, as called for above, setting forth in deed restrictions binding on the landowner's successors in interest.
 - d. If any stormwater management facility is not properly maintained by the responsible entity, _____ has the right, though not the responsibility, to perform or have performed all work necessary and pass appropriate charges on to the responsible entity.

4. Municipal Ownership - Where _____ has accepted an offer of dedication of the permanent stormwater management facilities, _____ shall be responsible for maintenance. Municipal ownership notwithstanding, the applicant is required to prepare a Comprehensive Stormwater Management Plan including a Maintenance n Repair Plan, as defined above. Upon approval of the stormwater management system by _____, the applicant shall provide a financial security, in a form approved by _____ for maintenance guarantees, as follows:
 - a. Long-Term Maintenance Bond - The long-term maintenance bond shall be in any amount equal to the present worth of maintenance of the facilities for an 18-month period. The estimated annual maintenance cost for the facilities shall be estimated by the applicant, with review by the municipality.
 - b. Documentation - The terms of the maintenance guarantees shall be documented as part of the Comprehensive Stormwater Management Plan and the Maintenance Plan subpart.

E. Need for Corrective Measures

If _____ determines at any time that permanent stormwater management facilities as stipulated in the Comprehensive Stormwater Management Plan, including Maintenance and

Repair Plan, have been eliminated, altered, improperly maintained, or are no longer functioning, the owner and/or otherwise responsible entity shall be advised of corrective measures required within a period of time set by _____. If such measures are not taken by the owner, _____ may cause the work to be done and direct all costs to the owner.

F. Inspections of Land Disturbances Related to Subdivision or Land Development

All land disturbance work shall be performed in accordance with an inspection and construction control schedule approved by _____ as part of the Comprehensive Stormwater Management Plan. _____ should be consulted for guidance regarding the timing and other details of necessary inspections. No work shall proceed to a subsequent phase, including the issuance of the Use and Occupancy Permit, until inspected and approved by the _____ Engineer.

G. Land Disturbances not Related to Subdivision or Land Development

The timing and frequency of inspections of land disturbance activities not related to the subdivision/land development process shall be a determined by _____ prior to final approval of the Comprehensive Stormwater Management Plan. Adherence to that schedule shall be a condition of Plan approval.

H. Fees Associated with Inspections

Inspection fees for activities required by this Ordinance shall be paid according to the provisions of the appropriate _____ ordinances.

9. ENFORCEMENT, VIOLATIONS, AND PENALTIES

A. Enforcement

This ordinance shall be enforced by the municipal engineer who is empowered to cause any storm water management facility to be inspected and examined and to order the remedying of any condition found to exist in violation of any provision of this ordinance.

B. Violations and Penalties

Violations and penalties shall be as provided in ____ of the _____ Code.

C. Notification of Non-Compliance with Comprehensive Stormwater Management Plan

Any activity conducted pursuant to a Comprehensive Stormwater Management Plan including the Maintenance and Repair Plan approved by Township shall be performed in strict compliance with the provisions of the Plan. Violations shall be treated in the following manner:

1. Any non-compliance with the provisions of the Plan that is identified by _____ or its designee in the course of inspections as specified in this Ordinance shall be remedied by the applicant/owner or otherwise responsible entity according to the terms in this Ordinance.
2. If at any time, work does not conform to the Comprehensive Stormwater

Management Plan, including all conditions and specifications and modifications thereof, a written notice to comply shall be given to the applicant/owner. Such notice shall set forth the nature of corrections required and the time within which corrections shall be made. Upon failure to comply within the time specified, the applicant/owner shall be considered in violation of this Ordinance, and _____ shall issue a Stop Work Order if the project is in the construction phase on all work on the site, including any building or other construction, until corrections are made. If corrections are not undertaken within a specified time or the applicant/owner violates the cease and desist order: (1) penalties shall be imposed and/or (2) the work shall be completed by _____ and the costs charged to the applicant/owner.

D. Penalties

Anyone violating the terms of this Ordinance shall be guilty of a summary offense and, upon conviction, shall be subject to a fine or penalty of not more than \$300 for each and every violation. Each day that the violation continues after proper notification shall be a separate offense. In addition thereto, the Township may institute injunctive, mandamus, or any other appropriate action or proceeding at law or equity for the enforcement of this Ordinance or to correct violations of this Ordinance, and any court of competent jurisdiction, shall have the right to issue restraining orders, temporary or permanent injunctions, or mandamus or other appropriate forms of remedy or relief.

10. 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 of _____ and do not relieve the applicant of the responsibility to secure required permits or approvals for activities regulated by 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 ordinance, rule or regulation, statute, or other provision of law. Where any provision of this Ordinance imposes restrictions different from those imposed by any other ordinance, rule or regulation, or other provision of law, whichever provisions are more restrictive or impose higher standards shall control.

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.

12. EFFECTIVE DATE

This Ordinance shall take effect upon final passage by the municipality.