BOROUGH OF SHREWSBURY
COUNTY OF MONMOUTH

AMENDED STORMWATER ORDINANCE 2021-1078

AN ORDINANCE AMENDING CHAPTER 94, LAND USE AND DEVELOPMENT REGULATION, SPECIFICALLY SECTIONS 94-2.3, 94-8.38 & 94-8.39 TO REFLECT THE AMENDMENTS TO THE STORMWATER MANAGEMENT RULES AT N.J.A.C. 7:8.

WHEREAS, the Borough has established Stormwater Management Rules; and

WHEREAS, the State of New Jersey requires that all municipalities revise their municipal stormwater control ordinances to reflect amendments to the Stormwater Management rules at N.J.A.C. 7:8.

WHEREAS, pursuant to the New Jersey State directive, the purpose of this Ordinance is to amend, supplement, and repeal certain sections of Chapter 94 of the Borough of Shrewsbury Municipal Code.

WHEREAS, on April 19, 2021, the Borough adopted Ordinance No. 1078 to reflect amendments to the Stormwater Management rules at N.J.A.C. 7:8.

WHEREAS, after consultation with Monmouth County and the New Jersey Department of Environmental Protection, it was determined that the Borough's Stormwater Management Rules must be further amended to reflect certain changes in N.J.A.C. 7:8.

WHEREAS, this Ordinance will further amend Sections 94-2.3, 94.8.38 & 94-8.39 to reflect the changes in the Stormwater Management rules at N.J.A.C. 7:8 and to comply with the guidance provided by Monmouth County and the NJDEP.

WHEREAS, all additions are shown in ***bold italics with underlines***. The deletions are shown as ~~***strikeovers in bold italics***~~. Sections of Chapter 94 that will remain unchanged are shown in normal type.

NOW, THEREFORE, BE IT ORDAINED, by the governing body of the Borough of Shrewsbury as follows:

SECTION TWO. It is the intent of this ordinance to incorporate the amendments to the Stormwater Management rules at N.J.A.C. 7:8. The amended Section 94-8.38 of the Borough Code shall read as appears in Appendix "B" appended hereto and incorporated herein by reference.

SECTION THREE. It is the intent of this ordinance to incorporate the amendments to

the Stormwater Management rules at N.J.A.C. 7:8. The amended Section 94-8.39 of the Borough Code shall read as appears in Appendix "C" appended hereto and incorporated herein by reference.

SECTION FOUR. This Ordinance shall hereby become effective upon final passage and publication as provided by law; and

SECTION FIVE. REPEALER. All Ordinances or parts of Ordinances inconsistent herewith are repealed to the extent of such inconsistency. The Borough Clerk is authorized to renumber and/or re-codify any sections affected by such repeal to the extent consistent with this Ordinance.

SECTION SIX. SEVERABILITY. If any word, phrase, clause, section or provision of this Ordinance shall be found by any Court of competent jurisdiction to be unenforceable, illegal or unconstitutional such word, phrase, clause, section or provision shall be severable from the balance of the Ordinance and the remainder of the Ordinance shall remain in full force and effect.

SECTION SEVEN. EFFECTIVE DATE. This Ordinance shall take effect upon publication thereof after final passage according to law.

First Reading/Introduction: June 21, 2021

Second Reading/Public Hearing: July 19, 2021

Adoption: July 19, 2021

ATTEST: _____
Kerry Quinn, Municipal Clerk

APPROVE: _____
Erik Anderson, Mayor

APPENDIX B

§ 94-8.38 **Storm drainage facilities.**
[Amended 11-7-2005 by Ord. No. 860]

A. Storm drains, culverts, catch basins and other drainage structures shall be installed in each development in accordance with plans, reports, and design computations approved by the municipal agency.

(1) All storm drainage facilities shall be constructed in accordance with the applicable requirements of the NJDOT Standard specifications for road and bridge construction, current edition.

(2) The developer shall submit complete calculations, specifications, plans and details for all proposed storm drainage facilities, in accordance with the design standards contained herein.

(3) Any field samples or laboratory tests required to substantiate the conclusions of such calculations shall be conducted at the sole expense of the developer.

B. All development applications which shall result in this disturbance of greater than ***1,000*** ~~***the***~~ square feet, or require the regrading, reshaping, or other alteration of land, or that alter the existing patterns of drainage or runoff shall be accompanied by a grading plan, meeting the following minimum requirements:

(1) A grading plan which includes the design of public improvements must be prepared by a Professional Engineer, licensed in the State of New Jersey.

(2) The plan shall clearly depict the intended pattern of runoff, including accurately drawn contour lines, sufficient spot elevations, finished flood elevations of all structures, and any other information requested by the municipal agency during review.

(3) The minimum overload gradient permitted on grassed surfaces shall be 2.0%. Properly designed water quality swales, or other nonstructural drainage elements shall be permitted at a lesser gradient, where detailed design computations are furnished demonstrating proper function.

(4) The minimum overload gradient permitted on durable surfaces (pavement, concrete, gravel, etc.) shall be 1.0%.

(5) Where new or enlarged structures are proposed, finished grades shall be included at a

minimum of four building corners, as well as all doorways.

(6) When basements are proposed, it must be demonstrated that the basement floor shall lie a minimum of two feet above the seasonal high groundwater elevation.

C. Stormwater management: scope.

(1) Stormwater management measures meeting the requirements of this chapter shall be provided for all developments. Stormwater management systems prepared by design engineers shall emphasize a natural, as opposed to an engineered, drainage strategy. To the maximum extent practicable, stormwater management standards shall be met by incorporating nonstructural stormwater management strategies into a design. Where more than one design or method may be used to comply with the rules, the choice of design approach and the methods used shall rest with the design engineer.

(a) For projects that fall below the threshold of major development, as defined, the control of runoff rate and routing from any site that is the subject of a site plan or subdivision application shall be designed to satisfy the ***Runoff Quantity Standards contained in subsection 94-8.39. Refer to subsection 94-8.39A(3)to determine applicability.*** ~~***requirements of the subchapter set forth in § 94-8.39.D(6)(a)[3].***~~

(2) The applicability of a natural approach depends on such factors as site storage capacity, open channel hydraulic capacity, and maintenance needs and resources. Applicability of a stormwater approach also can be limited by regulatory constraints that govern certain structures (e.g., dams) or areas (e.g., development in a floodplain or wetland).

(3) The person submitting the application for review shall identify the nonstructural strategies 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 strategies, identified in Subsection **C(4)** below, into the design of a particular project, the applicant shall identify the strategy and provide a basis for the contention or infeasibility.

(4) Nonstructural stormwater management strategies incorporated into site design shall:

(a) Protect areas that provide water-quality benefits or areas that are particularly susceptible to erosion and sediment loss;

(b) Minimize impervious surfaces and break up or disconnect the flow of runoff over necessary impervious surfaces;

(c) Maximize the protection of natural drainage features and vegetation;

(d) Minimize the decrease in "time of concentration" from preconstruction 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 drainage area to the point of interest in the watershed;

(e) Minimize land disturbance, including clearing and grading;

(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; and

(i) Provide preventative source controls to prevent or minimize the use or exposure of pollutants at a site that the release of pollutants into stormwater runoff will be prevented or minimized. The 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 in the drainage system; and

[3] When establishing vegetation after land disturbance, applying fertilizer in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey at N.J.A.C. 2:90, as administered by the New Jersey Department of Agriculture.

(5) Guidance for nonstructural stormwater management strategies is available in the New Jersey Stormwater Best Management Practices Manual (hereafter Best Management Practices Manual), current edition.

(6) All stormwater collection and conveyance structures shall be designed in accordance with the provisions of this subchapter. Any structures designed to control stormwater runoff volume, flow rate, quality, or groundwater recharge shall be designed and constructed in accordance with these provisions. Where more than one design or method may be used to comply with the rules, choices among design options to meet the volume, rate, quality, and recharge provisions of this subchapter shall rest with the design engineer.

(7) Construction practices shall conform to Standards for Soil Erosion and Sediment Control in New Jersey, N.J.A.C. 2:90.

(8) The standards of this subchapter do not apply to development if alternative design and performance standards exist under a regional stormwater management plan adopted in accordance with the DEP rules, N.J.A.C. 7:15. The standards must be at least as protective as those of this subchapter.

(9) Stormwater management facilities for developments which do not require site plan and subdivision review, shall be provided in accordance with the Municipal Stormwater Management Plan of the Borough, meeting the following minimum requirements:

(a) Any impervious coverage surfaces which exceed the maximum coverage permitted in the zone, **and for which a variance is granted by the approving authority**, shall be mitigated through the use of dry wells or similar means, ***designed to conform with the minimum standards prescribed by the NJDEP Stormwater Best Management Practices Standards*.**

(b) ***A sketch including the location of drywells, along with sizing calculations acceptable to the Borough Engineer shall be furnished at the time of building permit application. Any infiltration BMP proposed shall lay not less than ten (10) feet from any property line, nor less than ten (10) feet from any building.***

(c) ***Any stormwater management device proposed shall meet the minimum requirements of the NJDEP Best Management Practices Manual.***

(d) A premanufactured drywell may be used provided same is sized and installed in accordance with written instructions of the manufacturer, ***subject to the approval of the Borough Engineer.***

D. Runoff estimation techniques.

(1) ***Runoff shall be estimated in accordance with subsection 94-8.39E.***

~~***Drainage area stormwater management requires the determination of a watershed runoff hydrograph that displays the peak discharge rate and volume. The hydrograph shall compare pre- and post-development conditions. In computing preconstruction stormwater run-off, the design engineer shall account for all significant land features and structures, such as ponds, wetlands, depressions, hedgerows or culverts that reduce preconstruction stormwater runoff rates and volumes. For the purpose of calculating runoff coefficients and groundwater recharge, there is a presumption that the preconstruction condition of a site or portion thereof is a wooded land use with good hydrologic condition. The term "runoff coefficient" applies to both the Natural Resources Conservation Service (NRCS) of the United States Department of Agriculture (USDA) methodology of the TR-55 program. {See Subsection D(3)(a)[3] below.} Both the Rational and Modified Rational***~~

~~*Methods {See Subsection D(3)(a)[1] and [2], respectively, below.}. Both the Rational and Modified Rational Methods are described in "Appendix A-9 — Modified Rational Method" in the Standards for Soil Erosion and Sediment Control in New Jersey at N.J.A.C. 2:90. A runoff coefficient or a groundwater recharge land cover for an existing condition may be used on all or a portion of a site if the design engineer verifies that the hydrologic condition has existed on the site or a portion of the site for at least five years without interruption immediately prior to the time of application. If more than one land cover has 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 is cultivation).*~~

(2) Design engineers shall use the runoff hydrograph peak rate to determine the configuration and sizes of pipes, channels, and other routing or flow-control structures. They also shall use runoff volume calculations generated by the hydrograph to determine the size of detention and retention facilities.

(3) For the runoff peak rate of discharge calculation, design engineers shall have the option to choose the methodology to estimate peak rate of discharge.

~~*(a) Design engineers shall calculate peak rate of runoff in accordance with the following procedures and methods, incorporated herein by reference:*~~

~~*[1] For relatively small drainage areas of up to one-half square mile (320 acres), the peak rate of runoff may be calculated by the Rational Method, its derivatives, or the referenced methods that follow.*~~

~~*[2] Where the project necessitates reduction in the rate of runoff or the calculation of runoff volume in accordance with N.J.A.C. 5:21-7.5, the Modified Rational Method must be used. The use of the Modified Rational Method is limited to drainage areas of 20 acres or less.*~~

~~*[3] NRCS's urban hydrology for small watersheds. Technical Release No. 55 (TR-55).*~~

~~*[4] NRCS's computer program for project formulation-hydrology, technical release No. 20 (TR-20).*~~

~~*[5] HEC-HMS Hydrologic Modeling System, version 2.2, May 2003, Hydraulic Engineering Center, U.S. Army Corps of Engineers, used in appropriate conditions with appropriate*~~

~~*values.*~~

~~*(b) The equation for the Rational Method is:*~~

$$Qp = CIA$$

~~*Where:*~~

~~*Qp*~~	=	~~*the peak runoff rate in cubic feet per second*~~
~~*C*~~	=	~~*the runoff coefficient*~~
~~*I*~~	=	~~*the average rainfall intensity in inches per hour occurring at the time of concentration tc*~~
~~*tc*~~	=	~~*the time of concentration in minutes*~~
~~*A*~~	=	~~*the size of the drainage area in acres*~~

~~*[1] Typical C values for one-hundred-year frequency storm events appear in Table 1.*~~

~~*[2] The Rational Method is most accurate when dealing with uniform drainage areas. Design engineers may divide nonuniform drainage areas into "uniform" sub-drainage areas and calculate the runoff from each of these areas separately, or they may use the weighted average technique for a composite drainage area. Design engineers also may use runoff coefficients from the following sources, incorporated herein by reference:*~~

~~*[a] HEC-22 – Urban Drainage Design Manual, Second Edition, FHWA-NH1-01-021, August 2001, U.S. Department of Transportation, Federal Highway Administration, as supplemented or amended to date.*~~

~~*[b] New Jersey Department of Transportation (NJDOT) Roadway Design Manual, as currently revised.*~~

~~*(c) Design engineers may estimate time of concentration (tc) with Figure 1, Time of Concentration nomograph from Roadway Design Manual, NJDOT, as currently amended. Use of this figure is limited to the design of storm sewer systems. For other purposes, design engineers shall use the procedures outlined in Chapter 3 of Urban Hydrology for Small Watersheds, Technical Release No. 55 (TR-55). U.S. Department of Agriculture, Soil Conservation Service, NCRS.*~~

~~*(d) The National Engineering Handbook, Part 630 (Hydrology) and Part 650 (Engineering Field Handbook) also may be used.*~~

~~*(e) When using the Rational Method, rainfall intensity as a function of duration and storm frequency shall be based upon Figure 2, Rainfall Intensity Curves, and/or local rainfall frequency data, where available for the two-, ten-, twenty-five-, and one-hundred-year storms. Design engineers shall use the Cumulative and Incremental Rainfall Distribution in Table 7.3 for the water quality storm. Figure 2 shows rainfall intensity curves for*~~

~~*Trenton, New Jersey. Design engineers may use this information for other parts of the state or they may substitute local rainfall frequency data, when available. More current data for Trenton and other areas of the state may be obtained from the National Oceanic and Atmospheric Administration's (NOAA) National Weather Service, which is a part of the U.S. Department of Commerce. See http://www.nws.noaa.gov/hdsc. In all instances, design engineers shall use a minimum time of concentration of 10 minutes.*~~

(4) For storm sewer design, a ten-year to twenty-five-year storm frequency consistent with localized circumstances should be considered as a minimum, unless special circumstances are involved such as inadequate downstream stormwater facilities, lack of positive overland relief, or evidence of local flooding. In such special circumstances, design engineers shall design facilities to accommodate, as a minimum, the following storm frequencies:

~~*[1]*~~ ***[a]*** Ten-year storm for storm drain systems where excess flow, up to the one-hundred-year storm, can continue downgrade in the street and not exceed the gutter capacity. Also, ten-year storms shall be used at low points in storm drain systems with overland relief that is routed through the stormwater quantity control structure.

~~*[2]*~~ ***[b]*** Twenty-five-year storm where flow in a storm drain is totally carried by pipe when conditions under 5:21-7.2(c)4.i above do not apply, provided all overland relief up to the one-hundred-year storm is routed through the stormwater control structure.

~~*[3]*~~**[c]** Twenty-five-year storm for culvert design where the culvert will be located in streams shown on the New Jersey State Atlas or the United States Coast and Geodetic Survey maps. Culverts with an upstream drainage area of 50 acres or more shall be designed to accommodate a one-hundred-year frequency storm in accordance with Flood Hazard Area Control Regulations, N.J.A.C. 7:13-2.16.

~~*[4]*~~ ***[d]*** Twenty-five-year storms for open channels where the upstream drainage area is less than 50 acres. When the upstream drainage area is 50 acres or more, design engineers shall design open channels to accommodate the one-hundred-year storm in accordance with Flood Hazard Area Control Regulations, N.J.A.C. 7:13-2.16.

(5) ~~*(f)*~~ The size of the drainage area shall include on-site and off-site lands contributing to the design point.

(6) ~~*(g)*~~ Computer software adaptations of the Rational Method or the Soil Conservation Service's TR-55 are acceptable, provided their data and graphic printout allow review and evaluation.

(7) ~~*(4)*~~ Design engineers shall use a consistent method to calculate peak rate of runoff and volume when computing runoff hydrographs. If TR-55, TR-20, or HEC-1 is used to

calculate peak rate of runoff, then the same method shall be used to determine volume. If the Rational Method is used for peak flow calculations, design engineers shall use the Modified Rational Method to calculate peak volume to be used for basin routing. Both the Rational and Modified Rational Methods are described in "Appendix A-9 — Modified Rational Method" in the Standards for Soil Erosion and Sediment Control in New Jersey at N.J.A.C. 2:90. A maximum drainage area of 20 acres shall be used for the Modified Rational Method.

(8) ~~*(5)*~~ In computing stormwater runoff from all design storms, the design engineer shall consider the relative stormwater runoff rates and/or volumes from pervious and impervious surfaces separately to accurately compute the rates and volume of stormwater runoff from the site. To calculate runoff from unconnected imperious cover, urban impervious area modifications as described in NCRS TR-55. Urban Hydrology for Small Watersheds, or other approved methods may be employed.

E. Design of runoff collection systems.

(1) Design engineers shall determine pipe size based on design runoff, closed-conduit flow based on the Manning Equation, or charts/monographs based on this equation. The hydraulic capacity is termed "Q" and expressed as discharge in cubic feet per second as follows:

$$Q = (1.486/n)\ AR^{2/3}\ S^{1/2}$$

Where

n	=	Manning's roughness coefficient
A	=	Cross-sectional area of flow in square feet
R	=	Hydraulic radius in feet, R=A/P, where P is equal to the wetted perimeter, measured in feet and defined as the length of a line of contact between the flowing water and the channel
S	=	Slope of energy grade line in feet per foot

The Manning's roughness coefficients used by design engineers appear in N.J.A.C. 5:21-7.2, Table 2.

(a) A direct application of Manning's Equation may be used for piped storm sewer systems. As an option, design engineers can use a standard step backwater calculation for storm sewer systems if the use of this approach is deemed appropriate by the designer. For other than pipe storm sewer systems, design engineers shall apply Manning's Equation only when there is uniform flow, as defined by the following conditions:

(b) The bottom slope of the channel, energy grade line, and water surface (hydraulic grade line) are parallel;

(c) The flow regime is in the turbulent range of Reynolds number; and

(d) The boundaries of the cross section of the channel do not move.

(2) The design of open channels and conduits shall take tail water effects into consideration.

(3) Velocities in open channels, excluding water quality swales, at design flow shall not be less than 0.5 of a foot per second and not greater than a velocity that will begin to cause erosion or scouring of the channel. Design engineers shall determine permissible velocities for swales, open channels, and ditches using methods presented in Standards for Soil Erosion and Sediment Control in New Jersey at N.J.A.C. 2:90.

(4) Velocities in closed conduits at design flow shall be at least two feet per second, but not more than the velocity that will cause erosion damage to the conduit, per the manufacturers specifications. Minimum allowable pipe slopes shall produce velocity of at least three feet per second when the flow depth is full or half the pipe diameter.

(5) Design engineers shall base culvert capacity on inlet/outlet analysis, as specified in Hydraulic Design of Highway Culverts, Hydraulic Design Series (HDS) No. 5, Report No. FHWA-IP-85-15. U.S. Department of Transportation, Federal Highway Administration, September 1985, incorporated herein by reference.

(6) Design engineers shall determine pipe size based on design runoff, conduit entrance conditions, and hydraulic capacity.

(7) In general, no pipe size in the storm drainage system shall be less than 15 inches in diameter. Design engineers may use a twelve-inch diameter pipe as a cross-drain to a single inlet. Design engineers shall use the Manning Equation to determine hydraulic capacity of pipes.

(8) All discharge pipes shall terminate with an appropriate precast concrete or flared-end section or concrete headwall with or without wing walls, as conditions require. Design engineers shall consider such site conditions as slope, soil stability, vegetation, grade, and size of conduit to determine whether or not to use wingwalls.

(9) Materials used in the construction of storm sewers shall be constructed of reinforced concrete, ductile iron, or corrugated polyethylene, or when approved by the municipal engineer, corrugated metal. The most cost-effective materials shall be permitted that conform to local site conditions and reflect the relevant operations, maintenance, and system character of the municipal stormwater system. Specifications referred to, such as ASTM or AWWA, etc., should be the latest revision in effect at the time of application.

(a) The following apply to reinforced concrete pipe:

[1] Circular reinforced concrete pipe and fittings shall meet the requirements of ASTM C76.

[2] Elliptical reinforced concrete pipe shall meet the requirements of ASTM C507.

[3] Joint design and joint material for circular pipe shall conform to ASTM C443.

[4] Joints for elliptical pipe shall be bell and spigot or tongue and grove sealed with butyl, rubber tape, rubber ring gaskets, or external sealing bands conforming to ASTM C877.

[5] All pipe shall be Class III minimum unless loading conditions call for stronger pipe (i.e., higher class).

[6] The minimum depth of cover over the concrete pipe shall be as designated by the American Concrete Pipe Association in Table 4.

[7] Minimum depth of cover standards for ductile iron and corrugated polyethylene pipe shall conform to manufacturer standards.

(b) Ductile iron pipe shall conform to ANSI/AWWA C151/A21.51. Joints shall conform to ANSI/AWWA C111/A21.11 or ANSI/AWWA C115/A21.15, as appropriate. Pipe shall be designed in accordance with ANSI/AWWA C150/A21.50. The outside of the pipe shall be coated in accordance with ANSI/AWWA C151/A21.51 and the inside lined in accordance with ANSI/AWWA C104/A21.4. Ductile iron pipe shall be installed in accordance with AWWA C600.

Table 4: Minimum Depth of Coverage Over Concrete Pipe

Pipe Diameter (in inches)	**ASTM Class Pipe**	**Minimum Cover (surface to top of pipe in inches)**
12	III	17
	IV	12
	V	7
15	III	16
	IV	11
	V	7
18	III	16
	IV	10
	V	6
24	III	15
	IV	6
	V	6

Table 4: Minimum Depth of Coverage Over Concrete Pipe		
Pipe Diameter (in inches)	**ASTM Class Pipe**	**Minimum Cover (surface to top of pipe in inches)**
30	III	10
	IV	6
	V	6
36 and above	III	6
	IV	6

Minimum cover as designated by the American Concrete Pipe Association

(c) Corrugated polyethylene pipe shall conform to AASHTO M252 for three through 10 inches and AASHTO M294 for sizes 12 inches and larger. All pipes greater than 12 inches in diameter shall be Type S, unless conditions dictate otherwise. Materials shall conform to ASTM D3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials. Pipe joints and fittings shall be compatible with the pipe material and shall conform to the same standards and specifications as the pipe material. Pipe couplers shall not cover less than one full corrugation on each section of pipe. Installation shall be in accordance with ASTM D2321, Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications. Backfill Material shall be placed in six-inch lifts and compacted to 95% minimum dry density, per AASHTO T99. In areas of high groundwater tables, design engineers shall check for flotation.

(d) Corrugated metal pipe, when approved by the municipal engineer, shall meet the requirements and be installed in the manner specified in Appendix A of this subchapter.

[1] Pipe bedding and backfill shall be provided as specified in Design and Construction of Urban Stormwater Management Systems, ASCE Manuals and Reports of Engineering Practice No. 77, 1993, incorporated herein by reference. Bedding and backfill for any pipe material not covered by this manual shall be installed in accordance with manufacturer's recommendations. The municipal engineer may require the developer to provide professional certification as to the suitability of backfill material and where such suitability does not exist, any modifications needed to use on-site material and the appropriate methods to install this material. The municipal and/or utility engineer shall rely on this certification.

(10) No pipe shall be placed on private property unless the owner of the land is to own or operate the pipe, or an easement deeded to the municipality is obtained. All easements shall be a minimum of 20 feet wide unless depth of pipe, soil conditions, or additional utilities require wider. Where the easement is located adjacent to a right-of-way, the municipality may approve a narrower easement.

F. Inlets, catch basins, manholes, and outlets.

(1) Design engineers shall design inlets, catch basins, and manholes in accordance with ***the current edition of*** the New Jersey Department of Transportation's Standard Specifications for Road and Bridge Construction ~~***(2001)***~~. Design engineers shall use bicycle-safe grates. For Type A inlets, they should use a frame and single grate. Type B inlets require a frame, grate, and curb-type inlet with back piece. Type E inlets require a frame and double grate.

(2) Design engineers shall use one of the following grate types for stormwater inlets:

(a) The NJDOT bicycle-safe grate, as described in the NJDOT Bicycle Compatible Roadways and Bikeways Planning and Design Guidelines ~~***(April 1996)***~~.

(b) If there is no bicycle traffic, a grate where each individual clear space in that grate has an area of no more than seven square inches or is no greater than 0.5 inch across the smallest dimension.

(c) Another grate design may be used, provided that:

[1] There will be no bicycle traffic; and

[2] Runoff discharging through the inlet is routed through a trash rack that complies with N.J.A.C. 5:21-7.8(d)1.ii.

(3) Whenever a curb-opening inlet is used, the clear space in that curb opening (or each individual clear space if the curb opening has two or more clear spaces) shall have an area of no more than seven square inches, or be no greater than two inches across the smallest dimension.

(a) Exception: Compliance with the above dimensional requirements for curb openings shall not be required, provided that runoff discharging through the inlet is routed through a trash rack that complies with N.J.A.C. 5:21-7.8(d)1.ii.

(4) Inlet spacing depends on the inlet capacity. Maximum gutter line flow is 400 feet. The maximum capacity of a curb inlet shall be six cubic feet per second. Area inlets in parking lots should be limited to three cubic feet per second.

(5) Manholes shall be precast concrete or concrete block coated with two coats of portland cement mortar outside the manhole. Masonry brick may be used to make vertical adjustments to rims, as long as the adjustments are 12 inches or less. In acidic soils, all manholes shall have two coats of black bitumastic waterproofing applied per manufacturer's instruction.

(6) If precast manhole barrels and cones are used, they shall conform to ASTM Specification

C478, with round rubber gasketed joints conforming to ASTM Specification C923. Both ASTM specifications are incorporated herein by reference. Maximum absorption shall be 8% in accordance with ASTM Specification C478, Method A.

(7) If precast manholes are used, the top riser section shall terminate less than one foot below the finished grade and the manhole cover shall be flush with the finished grade.

(8) Manhole frames and covers shall be of cast iron, conforming to ASTM Specification A48, Class 30, incorporated herein by reference, and be suitable for H-20 loading capacity. Manhole covers in remote locations may have a locking device.

(9) Outlet grates, fences, and other safety features for stormwater management facilities shall conform with NJDEP Stormwater Management Rules, N.J.A.C. 7:8. Safety requirements for detention basins and other stormwater facilities are incorporated in N.J.A.C. 5:21-7.5(f)6.

(10) The channel should be, insofar as possible, a smooth continuation of the pipe. The pipe may be laid through the manhole and the top half removed by saw cut. The completed channel should be U-shaped. The channel height shall be 3/4 of the diameter of the pipe.

(11) The bench should provide good footing for a workman, and a place where minor tools and equipment can be laid. It must have a slope of four to 8%.

G. Stormwater management: quantity control.

(1) The control of the quantity of runoff for major development shall comply with the Control Ordinances found in § 94-8.39.

~~***(2) For developments not meeting the definition of major development, stormwater management facilities shall be designed to satisfy the requirements of § 94-8.39D(6)(a)[3].***~~

(2) Refer to subsection § 94-8.39A(3) to determine applicability of that section to Non-Major Development.

H. Stormwater management: water quality.

(1) Water quality for stormwater management systems, including special water resource protection areas for Category One Waters and their perennial or intermittent tributaries, shall comply with the Stormwater Control Ordinance found at § 94-8.39.

(2) For developments not meeting the definition of major development, ***refer to section § 94-***

8.39A(3). ~~***stormwater management facilities shall be designed to satisfy the requirements of § 94-39D(6)(a)[3].***~~

I. Recharge.

(1) Groundwater recharge of stormwater shall be in accordance with the Stormwater Control Ordinances found at § 94-8:39. ***Refer to that section to determine applicability.***

J. Detention basins and other stormwater management facilities.

(1) When structural measures are used, they shall comply with the requirements of these rules and the Best Management Practices Manual, ~~***April 2004***~~ ***current*** edition.

(2) Design engineers shall locate detention facilities (either "wet" or "dry") so as to not interfere with or adversely affect existing surface waters on the site or adjacent to the site. Excavation for detention facilities shall be designed to be the maximum practical distance above seasonal high groundwater elevation. In the case of "wet" detention facilities, storage may only be presumed to be available above the elevation of the seasonal high groundwater. If the facility is designed as an infiltration basin, the bottom of the basin shall be a minimum of two feet above the elevation of the seasonal high water table. The determination of the seasonal high water table shall be made by the applicant's engineer ***in accordance with the requirements of the NJDEP Stormwater Best Management Practice Manual.***

(3) Design of outlets from detention basins and other stormwater management facilities shall account for tailwater effects up to the flood hazard design flood elevation.

(4) The following list of general structural criteria shall be used to design stormwater detention basins.

(a) Detention components: principal basin control structure (quantity control), as follows:

[1] Principal basin control structures will consist of orifice and/or weir control devices. Design engineers shall design orifices based upon the following equation:

$$Q = C\ A\ (2gH)^{0.5}$$

Where

Q	=	the flow rate in cubic feet per second
C	=	0.6 (The orifice flow coefficient "C" may vary, depending on entrance conditions. Design engineers may use other coefficients with appropriate references.)
A	=	cross section area of flow in square feet
H	=	the vertical distance in feet between the center of the orifice and the water surface

2g	=	64.4 feet per second^2

To minimize the chance of clogging, orifices intended solely for runoff quantity control will be at least six inches in diameter (or its equivalent). All joints are to be watertight. In addition, trash racks and/or anti-vortex devices shall be required. When weirs are used alone or in conjunction with orifices, design engineers shall use the following equation:

$$Q = CwL(h)^{3/2}$$

Where

Q	=	the flow rate in cubic feet per second
Cw	=	3.2 (design engineers may use other coefficients with appropriate references)
L	=	length of the weir in feet
h	=	the vertical distance in feet between water surface elevation and the crest of the weir

All weirs shall be constructed as part of a reinforced concrete structure with appropriate grates

[2] Trash racks and/or anti-vortex devices shall be installed at the intake to the outlet structure as appropriate, and shall have parallel bars with one-inch spacing between 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 the width of the diameter of the orifice or one-third the width of the weir, with a minimum spacing between bars of one inch and a maximum spacing between bars of six inches. The spacing shall be designed so as not to adversely affect the hydraulic performance of the outlet pipe or structure. In addition, the design of trash racks shall comply with the requirements of Subsection **I(4)(d)[6]** below.

[3] Eight-inch-thick, anti-seep collars are to be installed along outlet pipes when required by the municipal engineer. Reinforcement steel shall be No. 5 bars at 12 inches both ways, with two inches of cover on both faces (minimum).

[4] Where necessary for stability of the outlet pipe, a concrete cradle shall be provided.

[5] All principal basin control structures shall be precast or reinforced concrete. All joints are to be watertight.

[6] Suitable lining shall be placed upstream and downstream of principal basin control structures, as necessary, to prevent scour and erosion. Such lining shall conform to Standards for Soil Erosion and Sediment Control in New Jersey, N.J.A.C. 2:90.

(b) Detention components: emergency spillways, as follows:

[1] Vegetated emergency spillways shall have side slopes not exceeding three horizontal to one vertical.

[2] Maximum velocities in emergency spillways shall be checked based on the velocity of the

peak flow in the spillway resulting from routing the spillway design storm hydrograph as defined in the NJ DEP Dam Safety Rules (N.J.A.C. 7:20) for all detention facilities classified as dams and the one-hundred-year storm hydrograph for all other facilities. The design of the emergency spillway will be based on the one-hundred-year inflow to the basin except for Class IV dams, which shall comply with the Dam Safety Standards, N.J.A.C. 7:20. The design of the emergency spillway assumes the principal spillway is malfunctioning and will not allow any discharge or flow. Where maximum velocities exceed those contained in Table 5, suitable lining shall be provided.

[3] Where maximum velocities exceed the allowable velocities for soil stability as determined in the Standards for Soil Erosion and Sediment Control in New Jersey, N.J.A.C. 2:90, suitable lining should be provided. Design engineers also may check maximum velocities in emergency spillways based on the velocity of the peak flow in the spillway resulting from routing the spillway design storm hydrograph as defined in the NJ DEP Dam Safety Rules (N.J.A.C. 7:20) for all detention facilities classified as dams and the one-hundred-year storm hydrograph for all other facilities. Where maximum velocities exceed those contained in Table 5, suitable lining shall be provided. Linings shall meet specifications required in Hydraulic Engineering Circular No. 15 — Design of Stable Channels with Flexible Linings, published by the U.S. Department of Transportation, Federal Highway Administration or Standards for Soil Erosion and Sediment Control in New Jersey as sited above.

Table 5: Permissible Velocities for Emergency Spillways with Uniform Stands for Various Well-Maintained Grass Covers

		Permissible Velocities On:	
		Erosion-resistant soils	**Easily eroded soils**
Ground Cover	**Slope Percent**	**(fps)**	**(fps)**
Kentucky bluegrass	5% to 10%	6	4
Lawn grass mixture	0% to 5%	5	4
	5% to 10%	4	3
Weeping lovegrass	0% to 5%	3.5	2.5

Alfalfa

Crabgrass

NOTES:
fps = feet per second
Designs are not limited to the ground covers shown above, Design engineers may use reinforced grass technologies and other types of ground cover in accordance with appropriate authoritative standards
SOURCE: Soil Conservation Service, U.S. Department of Agriculture (Washington, D.C.:

Table 5: Permissible Velocities for Emergency Spillways with Uniform Stands for Various Well-Maintained Grass Covers

		Permissible Velocities On:	
		Erosion-resistant soils	Easily eroded soils
Ground Cover	Slope Percent	(fps)	(fps)

Government Printing Office, 1959). Cited in Residential Stormwater Management: Objectives, Principles, and Design Considerations, ULI-ASCE-NAHB, Urban Land Institute, Washington, D.C.: 1975

(c) Detention components: dams, as follows:

[1] "Dam" refers to any artificial dike, levee, or other barrier with appurtenant works that is constructed to impound water on a permanent or temporary basis and raises the water level five feet or more above the usual, mean, low-water height when measured from the downstream toe-of-dam to the emergency spillway crest, or in the absence of an emergency spillway, the top of the dam.

[2] Design engineers shall design all dams in accordance with the Dam Safety Standards, N.J.A.C. 7:20.

(d) Detention basin berms and embankment ponds, as follows:

[1] A detention basin berm is a water impoundment made by either constructing an embankment (a facility referred to as an embankment pond), or excavating a pit or dugout that does not qualify as a dam. Detention basin berms constructed by the second method are referred to as excavated ponds.

[2] Site conditions shall be such that runoff from the design storm can safely pass through: a natural or constructed emergency spillway designed to accept the entire one-hundred-year flow; a combination of a principal spillway and the emergency spillway designed to ensure passage of the one-hundred-year flow when either the principal spillway and/or the emergency spillway flows are impeded by debris; or a principal spillway designed so as to allow it to continue to function reliably, passing the one-hundred-year flow, when impeded by debris.

[a] The drainage area of the pond shall be protected against erosion so that expected sediment does not shorten the planned effectiveness of the structure.

[b] When necessary, embankment ponds shall have foundation cutoff walls of relatively impervious material under the berm. The cutoff walls shall extend up to abutments as required and be deep enough to extend into a relatively impervious layer, or provide for a

stable structure when combined with seepage control. The cutoff trench shall have a bottom width adequate to accommodate the equipment used for excavation, backfill, and compaction operations. Cutoff wall side slopes shall not be steeper than one horizontal to one vertical. The cutoff walls shall extend up to the normal water line and the minimum depth shall be at least three feet.

[c] Design engineers shall include seepage controls if any of the following conditions exist: pervious layers are not intercepted by the cutoff, seepage creates swamping downstream, such control is needed to insure a stable embankment, or special problems may require drainage for a stable berm. Seepage may be controlled by foundation, abutment, or embankment drains; reservoir blanketing; or a combination of these measures.

[d] The minimum top width for a berm shall be six feet. The minimum top width of dams should be 10 feet.

[e] All slopes must be designed to be stable. If needed to protect the slopes of the berm, special measures such as rock riprap, sand gravel, fabrics, geofabrics, geomembranes, or special vegetation shall be provided, as specified by the standards in: Guide for Design and Layout of Vegetative Wave Protection for Earth Dam Embankments, TR-56, and Riprap for Slope Protection Against Wave Action, TR-69. Both reports are published by the NRCS and are incorporated herein by reference.

[f] The minimum elevation of the top of the settled embankment shall be one foot above the water surface in the detention basin, with the emergency spillway flowing at the design depth. The minimum difference in elevation between the crest of the emergency spillway and the settled top width of the structure shall be two feet for all berms having more than a twenty-acre drainage area or more than 20 feet in effective height. Design engineers shall increase the design height of the structure by the amount needed to insure that, after settlement, the height of the berms equals or exceeds the design height. This increase shall not be less than 5%, except where detailed soil testing and laboratory analysis show that a lesser amount is adequate.

[g] Design engineers shall place a pipe conduit with needed appurtenances under or through the berm except where rock, concrete, or other types of mechanical spillways are used, or where the rate and duration of flow can be safely handled by a vegetated or earth spillway.

[3] The design elevation of the top of all embankments and berms shall be one-foot or greater than the maximum water surface elevation in the basin, when stormwater from the one-hundred-year flood passes over the emergency spillway. The "design height," defined as the vertical distance from the top to the bottom of the deepest cut, shall be constructed to insure that the top elevation will be maintained following all settlement.

[a] When the design discharge of the principal spillway is considered in calculating peak outflow through the emergency spillway, the crest elevation of the inlet shall be such that the full flow will be generated in the conduit before there is discharge through the emergency spillway. The inlets and outlets of the principal spillway shall be designed to function satisfactorily for the full range of flow and hydraulic head anticipated. The capacity of the pipe conduit shall be adequate to discharge long-duration, continuous, or frequent flows without flow through the emergency spillways. The pipe diameter shall be no less than six inches. If the pipe conduit diameter is larger than 10 inches, its design discharge may be considered when calculating the peak outflow rate through the emergency spillway.

[b] Pipe conduits under or through the berm shall be capable of withstanding external loading without yielding, buckling, or cracking. Flexible pipe strength shall not be less than that necessary to support the design load with the maximum of 5% deflection. The inlets and outlets shall be structurally sound, and made of materials compatible with those of pipe. All pipe joints shall be made watertight by the use of couplings, gaskets, or caulking.

[4] In earthen berms and embankment ponds, acceptable pipe materials are corrugated polyethylene, reinforced concrete, polyvinyl chloride, and ductile iron. When necessary for stability, concrete and ductile pipe shall be laid in a concrete bedding. Corrugated polyethylene pipe exposed to direct sunlight shall be made of ultraviolet-resistant materials and protected by coating or shielding, or provisions for replacement should be made as necessary. Connections of corrugated polyethylene pipe to less flexible pipe or structure must be designed to avoid stress concentrations that could rupture the plastic. Design engineers shall follow specifications in Table 6 for polyvinyl chloride (PVC) pipe. Design engineers shall provide for seepage control if the conduit is of smooth pipe larger than eight inches in diameter.

Table 6: Acceptable PVC Pipe for Use in Earth Berms*

Normal Pipe Size (inches)	Schedule for Standard Dimension Ratio (SDR)	Maximum Depth of Fill Over Pipe (feet)
4 or smaller	Schedule 40	15
	Schedule 80	20
	SDR 26	10
6, 8, 10, 12	Schedule 40	10
	Schedule 80	15
	SDR 26	10

* Polyvinyl chloride pipe, PVC 1120 or PVC 1220, conforming to ASTM D1785 or ASTM D2241

[5] Seepage along pipes extending through embankments shall be controlled by use of a filter

and drainage diaphragm, unless it is determined that anti-seep collars will adequately serve the purpose.

[a] The drain is to consist of sand meeting fine concrete aggregate requirements (at least 15% passing through the No. 40 sieve, but no more than 10% passing through the No. 100 sieve). If unusual soil conditions exist, design engineers shall make a special design analysis. The drain shall be a minimum of two feet thick, and extend vertically upward and horizontally at least three times the pipe diameter, and vertically downward at least 18 inches beneath the conduit invert. The drain diaphragm shall be located approximately parallel to the center line of the embankment. The drain shall be outletted at the embankment downstream toe, preferably using a drain backfill envelope continuously along the pipe where it exits in the embankment. Protecting drain fill from the surface erosion will be necessary.

[b] When anti-seep collars are used in lieu of a drainage diaphragm, they shall have a watertight connection to the pipe. Maximum spacing shall be approximately 14 times the minimum projection of the collar measured perpendicular to the pipe. Collar material shall be compatible with the pipe materials. The anti-seep collar(s) shall increase by 15% the seepage path along the pipe. When anti-seep collars are used in lieu of a drainage diaphragm, the design engineers shall use the following criteria to determine the size and number of anti-seep collars.

Let V = vertical projection and minimum horizontal projection of the anti-seep collar in feet
Let L = length in feet of the conduit within the zone of saturation, measured from the downstream side of the riser to the toe drain or point where the phreatic line intercepts the conduit, whichever is shorter
Let n = number of anti-seep collars
The ratio (L+2nV)/L shall be at least 1.15. Anti-seep collars should be equally spaced along part of the barrel within the saturated zone at distances of not more than 25 feet

[6] Closed-circuit spillways designed for pressure flow must have adequate anti-vortex devices. To prevent clogging of the conduit, an appropriate trash guard shall be installed at the inlet or riser.

[7] Emergency spillways convey the design flow safely past earth embankments when the principal or auxiliary spillway is disabled. Design engineers shall provide for an emergency spillway for each basin.

[a] Emergency spillways shall provide for passage of the design flow at a safe velocity to a point downstream where the berm will not be endangered. The maximum permissible velocity in the exit channel shall be four feet per second, where only sparse vegetative cover can be expected; where excellent vegetative cover and a vigorous sod can be expected and maintained, the maximum permissible velocity is six feet per second.

[b] If chutes or drops are used for the principal or emergency spillways, they shall be designed according to standards in NRCS's Part 650 (Engineering Field Handbook) and National Engineering Handbook, Part 650 (Hydrology), Section 5, "Hydraulics;" Section 11, "Drop Spillways;" and Section 14, "Chute Spillways," incorporated herein by reference. The minimum capacity of a structural spillway shall be that required to pass the peak flow expected from the design storm.

[8] For excavated basins, provisions shall be made where needed for a principal spillway, emergency spillway, and embankment in accordance with the embankment and berm criteria described in this section.

[a] Where soil conditions and safe maintenance practices allow, side slopes of the excavated basin shall be stable and no steeper than three horizontal to one vertical.

[9] The material placed in the fill shall be free of detrimental amounts of sod, roots, frozen soil, stones more than six inches in diameter (except rock fills), and other objectionable material.

[a] Drain fill shall be kept from being contaminated by adjacent soil materials during placement by either placing it in a cleanly excavated trench, or by keeping the drain at least one foot above the adjacent earth fill.

[b] Selected drain fill and backfill material shall be placed around structures, pipe conduits, and anti-seep collars at about the same rate on all sides to prevent damage from unequal loading. Fill material shall be placed and spread beginning at the lowest point in the foundation, and then bringing it up in continuous horizontal layers thick enough that the required compaction can be obtained. The fill shall be constructed in continuous horizontal layers. If openings or sectionalized fills are required, the slope of the bonding surfaces between the embankment in place and the embankment to be placed shall not be steeper than the ratio of three horizontal to one vertical. The bonding surface shall be treated the same as that specified for the foundation to insure a good bond with the new fill.

[c] The distribution and gradation of materials shall be such that no lenses, pockets, streaks, or layers of material shall differ substantially in texture or gradation from the surrounding material. If it is necessary to use materials of varying texture and gradation, the more impervious material shall be placed in the center and upstream parts of the fill. If zoned fills of substantially differing materials are specified, the zones shall be placed according to lines and grades shown on the drawings. The complete work shall conform to the lines, grades, and elevations shown in the drawings or as staked in the field.

[d] The moisture content of the fill material shall be adequate for obtaining the required compaction. Material that is too wet shall be dried to meet this requirement, and material

that is too dry shall be wetted and mixed until the requirement is met. Construction equipment shall be operated over each layer of fill to insure that the required compaction is obtained. Special equipment shall be used if needed to obtain the required compaction. If a minimum required density is specified, each layer of fill shall be compacted as necessary to obtain that density.

[e] Fill adjacent to structures, pipe conduits, and drain fill or anti-seep collars shall be compacted to a density equivalent to that of the surrounding fill by hand tamping, or by using manually directed power tampers or plate vibrators. Fill adjacent to concrete structures shall not be compacted until the concrete has had time to gain enough strength to support the load.

[10] All permanent and temporary stabilization should be applied pursuant to the Standards for Soil Erosion and Sediment Control in New Jersey, N.J.A.C. 2:90.

[11] In a principal spillway, pipe materials shall conform to the appropriate specifications. Anti-seep collars shall be made of materials compatible with that of the pipe and shall be installed according to the manufacturer's instructions. It may be firmly and uniformly bedded throughout its length, and shall be installed to the line and grade shown on the drawings.

[12] The mix design and testing of concrete shall be consistent with the size requirements of the job. Mix requirements or necessary strength shall be specified. The type of cement, air entrainment, slump, aggregate, or other properties shall be specified as necessary. All concrete is to consist of a workable mix that can be placed and finished in an acceptable manner. Necessary curing shall be specified. Reinforcing steel shall be placed as indicated on the plans and shall be held securely in place during concrete placement. Subgrades and forms shall be installed to line and grade, and the forms shall be mortar tight and unyielding as the concrete is placed.

[13] Foundation and embankment drains, if required, shall be placed to the line and grade shown on the drawings. Detailed requirements for drain material and any required pipe shall be shown in the drawing and specifications for the job.

[14] Concerning excavated basins, the compacted excavation shall conform to the lines, grades, and elevations shown on the drawings or as staked in the field.

[15] Concerning embankment and excavated berms, construction operations shall be carried out so that erosion and air and water pollution are minimized, and held within legal limits. All work shall be conducted in a skillful manner. The completed job shall present a workmanlike appearance.

[a] Measures and construction methods that enhance fish and wildlife values shall be incorporated as needed and practical. Ground cover to control erosion shall be established as needed and practical. Fencing shall be provided as needed.

(e) Detention facilities in flood hazard areas, as follows:

[1] Detention ~~***development***~~ ***BMPs*** must comply with all applicable regulations under the Flood Hazard Area Control Act, ~~***N.J.S.A. 58:16A-50 et seq***~~ ***Rules found at N.J.A.C. 7:13***.

(f) The following safety provisions shall apply to stormwater management basins and parts thereof.

[1] ***Refer to § 94-8:39H.***

~~***[1] Trash racks shall be installed at the intake to the outlet from the stormwater management basin to ensure proper functioning of the basin outlets.***~~

~~***[2] Bar spacing for trash racks shall be in accordance with Subsection J(4(a)[2] above.***~~

~~***[3] 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.***~~

~~***[4] Any outlet structure with an overflow grate must have the grate secured but removable for emergencies and maintenance. Grate spacing shall be no greater than two inches across the smallest dimension.***~~

~~***[5] Trash racks and overflow grates shall be constructed and installed to be rigid, durable, and corrosion resistant, and shall be designed to withstand a perpendicular live loading of 300 pounds per square foot.***~~

~~***[6] Every outlet structure of a basin shall have escape provisions in or on the structure. Escape provisions include the installation of permanent ladders, steps, rungs, or other features that provide easily accessible means of egress from the stormwater management basin. Free-standing outlet structures may be excluded at the discretion of the approving authority.***~~

~~***[7] Safety ledges shall be constructed on the slopes of all new retention basins, with a permanent pool of water deeper than 2 1/2 feet. Ledges shall be comprised of two steps, each four to six feet in width, one located approximately 2 1/2 feet below the permanent water surface and the second located 1 to 1 1/2 feet above the permanent water surface.***~~

~~*[8] In new stormwater management basins, maximum interior slopes for earthen dams, embankments, or berms shall not exceed three horizontal to one vertical.*~~

(5) Guidelines for the following stormwater management ***BMPs*** ~~*practices*~~ are found best in the Best Management Practices Manual, current edition. Refer also to § 94-8:39F.

(a) Bioretention systems;

(b) Constructed stormwater wetlands;

(c) Dry wells;

(d) Extended detention basins;

(e) Infiltration structures;

(f) Manufactured treatment devices;

(g) Pervious pavement;

(h) Sand filters;

(i) Vegetative filters; and

(j) Wet ponds.

(6) Detention basins shall be located in accordance with the following:

(a) Detention basins may either be constructed on a lot solely utilized for the purpose of the basin or on a lot dedicated for the purpose of open space or on a lot on which a dwelling is to be erected. If the basin is to be constructed on its own lot, the lot may vary from the bulk requirements of the zone in which it is located, however, a minimum of 20 feet of lot frontage on an improved street shall be provided. The lot shall be of sufficient size to contain the basin and all outfall structures entirely with a minimum distance of 25 feet from the top of the slope to any property line in any direction.

(b) If the basin is to be constructed on a lot on which a residential structure is to be erected, the basin and all associated drainage structures shall be construed a minimum of 25 feet from the top of the slope to any property line in any direction. In addition, a minimum of 40 feet shall be maintained from the top of the slope to any residential structure or accessory structure. Final plats shall provide for a twenty-five-foot wide drainage easement form the top of the slope around the basin and shall provide for a twenty-foot wide minimum access

to an improved street.

(c) Nonresidential developments. Detention basins shall be constructed so as to take advantage of natural features as to the greatest extent possible. Maintenance access shall be provided to the basin from either the surrounding right-of-way or from within the site driveway or parking areas. Basins shall not be screened from view from the developed portions of the site.

K. Maintenance requirements.

(1) The maintenance of stormwater management measures shall comply with the Stormwater Control Ordinance found at § 94-8.39.

(2) The maintenance of the basins and associated structures shall be clearly identified within the homeowners' association documents submitted to the Board's Attorney for review.

(3) Single-family homeowners' association. Where a detention basin is constructed within common areas or single-family residential developments, the maintenance of the basin and that of all drainage structures and collection systems outside of rights-of-way dedicated and accepted by the Borough shall be the sole responsibility of the single-family homeowners' association.

(4) Multifamily association. Where detention basins are constructed within common areas of multifamily residential developments, the maintenance of the basin and that of all drainage structures and collection systems outside of rights-of-way dedicated and accepted by the Borough, shall be the sole responsibility of the multifamily association.

(5) Nonresidential detention basins. All nonresidential detention basins shall be maintained by the property owner. In the event that the basin also controls stormwater from off-site runoff from Borough owned property rights-of-way and/or easements, the owner of the property may request that the Borough maintain the basin only if a pro-rated cash contribution has been deposited with the Borough as calculated in § 94-8.39F(2)(b).

APPENDIX C

§ 94-8.39 **Stormwater control.**
[Amended 7-14-1997 by Ord. No. 735; 7-7-1998 by Ord. No. 736; 11-2-1998 by Ord. No. 755; 11-7-2005 by Ord. No. 861]

A. Scope and purpose.

(1) Policy statement. ~~***Flood control, groundwater recharge, and pollutant reduction through nonstructural or***~~

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

Flood control, groundwater recharge, and pollutant reduction shall be achieved through the use of stormwater management measures, including green infrastructure Best Management Practices (GI BMPs) and nonstructural stormwater management strategies. GI BMPs and low impact development (LID) should be utilized to meet the goal of maintaining natural hydrology to reduce stormwater runoff volume, reduce erosion, encourage infiltration and groundwater recharge, and reduce pollution. GI BMPs and LID should be developed based upon physical site conditions and the origin, nature and the anticipated quantity, or amount, of potential pollutants. Multiple stormwater management BMPs may be necessary to achieve the established performance standards for water quality, quantity, and groundwater recharge.

(2) Purpose. It is the purpose of this section to establish minimum stormwater management requirements and controls for "development" and "major development," as defined in Subsection **B**.

(3) Applicability.

(a) This section shall be applicable to all development which:

[1] Require a Development ***Permit*** as defined in § 94 of the Code of the Borough of Shrewsbury and meet or exceed the following stormwater thresholds:

i. Residential development where the total lot disturbance, including new building and lot coverage, soil disturbance and/or regrading, exceeds ~~***20,000 square feet in the R-1 or R-2 Zone Districts or***~~ 5,000 square feet in ~~***other***~~ **all residential** zone districts ***shall be subject to quantity control standards***; and/or

~~***ii. Residential or non-residential development where new impervious surface exceeds 10,000 square feet; and/or***~~

~~*i*~~ii. Nonresidential development ***or redevelopment, exceeding ¼ acres of disturbance, and/or*** where lot coverage as a result of development shall exceed eighty (80%) percent of the maximum permitted in the zone.

[2] Aspects of residential major developments that are not preempted by the Residential Site Improvement Standards at N.J.A.C. 5:21; and

[3] Nonresidential Major Developments; and

[4] Any development which requires a Development Permit, which does not meet the stormwater management thresholds outlined in Section (A)(3)(a) and does not meet the definition of Major Development, but ***increases lot coverage by*** ~~***disturbs***~~ more than 2,000 square feet ~~***of lot area with coverage or regrading***~~, shall comply with the runoff quantity ***standards*** set forth in Section (D)(20).

(b) This section shall also be applicable to all major developments undertaken by the Borough of Shrewsbury.

(4) Compatibility with other permit and ordinance requirements. Development approvals issued for subdivisions and site plans pursuant to this section 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 chapter shall be held to be the minimum requirements for the promotion of the public health, safety, and general welfare. This section 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 chapter 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.

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

CAFRA CENTERS, CORES OR NODES

Those areas within boundaries incorporated by reference or revised by the Department in accordance with N.J.A.C. 7:7-13.16.

CAFRA PLANNING MAP

~~***The geographic depiction of the boundaries for Coastal Planning Areas, CAFRA Centers, CAFRA Cores and CAFRA Nodes in accordance with N.J.A.C. 7:7-13.16.***~~

The map used by the Department to identify the location of Coastal Planning Areas, CAFRA centers, CAFRA cores, and CAFRA nodes. The CAFRA Planning Map is available on the Department's Geographic Information System (GIS).

COMMUNITY BASIN

An infiltration system, sand filter designed to infiltrate, standard constructed wetland, or wet pond, established in accordance with N.J.A.C. 7:8-4.2(c)14, that is designed and constructed in accordance with the New Jersey Stormwater Best Management Practices Manual, or an alternate design, approved in accordance with N.J.A.C. 7:8-5.2(g), for an infiltration system, sand filter designed to infiltrate, standard constructed wetland, or wet pond and that complies with the requirements of this chapter.

COMPACTION

The increase in soil bulk density.

CONTRIBUTORY DRAINAGE AREA

The area from which stormwater runoff drains to a stormwater management measure, not including the area of the stormwater management measure itself.

CORE

A pedestrian-oriented area of commercial and civic uses serving the surrounding municipality, generally including housing and access to public transportation.

COUNTY REVIEW AGENCY

An agency designated by the County ***Commissioners*** ~~***Board of Chosen Freeholders***~~ to review municipal stormwater management plans and implementing ordinance(s). The county review agency may either be: (1) A county planning agency; or (2) 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

The New Jersey Department of Environmental Protection.

DESIGNATED CENTER

A state development and redevelopment plan center as designated by the State Planning Commission such as urban, regional, town, village, or hamlet.

DESIGN ENGINEER

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

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

DISTURBANCE

The placement or reconstruction of impervious surface or motor vehicle surface, or exposure and/or movement of soil or bedrock or clearing, cutting, or removing of vegetation. Milling and repaving is not considered disturbance for the purposes of this definition.

DRAINAGE AREA

A geographic area within which stormwater, sediments, or dissolved materials drain to a particular receiving water body or to a particular point along a receiving water body.

EMPOWERMENT NEIGHBORHOOD

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.

ENVIRONMENTALLY CONSTRAINED AREA

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

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 wellhead 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.

EROSION

The detachment and movement of soil or rock fragments by water, wind, ice or gravity.

GREEN INFRASTRUCTURE

A stormwater management measure that manages stormwater close to its source by:

1. Treating stormwater runoff through infiltration into subsoil;
2. Treating stormwater runoff through filtration by vegetation or soil; or
3. Storing stormwater runoff for reuse.

"HUC 14" OR "HYDROLOGIC UNIT CODE 14"

An area within which water drains to a particular receiving surface water body, also known as a subwatershed, which is identified by a 14-digit hydrologic unit boundary designation, delineated within New Jersey by the United States Geological Survey.

IMPERVIOUS SURFACE

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

INFILTRATION

The process by which water seeps into the soil from precipitation.

LEAD PLANNING AGENCY

One or more public entities having stormwater management planning authority designated by the regional stormwater management planning committee pursuant to N.J.A.C. 7:8-3.2, that serves as the primary representative of the committee.

MAJOR DEVELOPMENT

An individual "development," as well as multiple developments that individually or collectively result in:

1. The disturbance of one or more acres of land since February 2, 2004;

2. The creation of one-quarter acre or more of "regulated impervious surface" since February 2, 2004;

3. The creation of one-quarter acre or more of "regulated motor vehicle surface" since March 2, 2021 {or the effective date of this ordinance, whichever is earlier); or

4. A combination of 2 and 3 above that totals an area of one-quarter acre or more. The same surface shall not be counted twice when determining if the combination area equals one-quarter acre or more.

Major development includes all developments that are part of a common plan of development or sale (for example, phased residential development) that collectively or individually meet any one or more of paragraphs 1, 2, 3, or 4 above. Projects undertaken by any government agency that 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.”

MOTOR VEHICLE

All land vehicles propelled other than by muscular power, such as automobiles, motorcycles, autocycles, and low speed vehicles. For the purposes of this definition, motor vehicle does not include farm equipment, snowmobiles, all-terrain vehicles, motorized wheelchairs, go-carts, gas buggies, golf carts, ski-slope grooming machines, or vehicles that run only on rails or tracks.

MOTOR VEHICLE SURFACE

means any pervious or impervious surface that is intended to be used by “motor vehicles” and/or aircraft, and is directly exposed to precipitation including, but not limited to, driveways, parking areas, parking garages, roads, racetracks, and runways.

MUNICIPALITY

Borough of Shrewsbury.

NEW JERSEY STORMWATER BEST MANAGEMENT PRACTICES (BMP) MANUAL OR BMP MANUAL

The manual maintained by the Department providing, in part, design specifications, removal rates, calculation methods, and soil testing procedures approved by the Department as being capable of contributing to the achievement of the stormwater management standards specified in this chapter. The BMP Manual is periodically amended by the Department as necessary to provide design specifications on additional best management practices and new information on already included practices reflecting the best available current information regarding the particular practice and the Department’s determination as to the ability of that best management practice to contribute to compliance with the standards contained in this chapter. Alternative stormwater management measures, removal rates, or calculation methods may be utilized, subject to any limitations specified in this chapter, provided the design engineer demonstrates to the municipality, in accordance with Section IV.F. of this ordinance and N.J.A.C. 7:8-5.2(g), that the proposed measure and its design will contribute to achievement of the design and performance standards established by this chapter.

NODE

An area designated by the State Planning Commission concentrating facilities and activities which are not organized in a compact form.

NUTRIENT

A chemical element or compound, such as nitrogen or phosphorus, which is essential to and promotes the development of organisms.

PERSON

Any individual, corporation, company, partnership, firm, association, ***interstate or Federal agency***, Borough of Shrewsbury, or political subdivision of this state subject to municipal jurisdiction pursuant to the Municipal Land Use Law, N.J.S.A. 40:55D-1 et seq.

POLLUTANT

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

RECHARGE

The amount of water from precipitation that infiltrates into the ground and is not evapotranspired.

REGULATED IMPERVIOUS SURFACE

Means any of the following, alone or in combination:

1. A net increase of impervious surface;
2. The total area of impervious surface collected by a new stormwater conveyance system (for the purpose of this definition, a "new stormwater conveyance system" is a stormwater conveyance system that is constructed where one did not exist immediately prior to its construction or an existing system for which a new discharge location is created);
3. The total area of impervious surface proposed to be newly collected by an existing stormwater conveyance system; and/or
4. The total area of impervious surface collected by an existing stormwater conveyance system where the capacity of that conveyance system is increased.

"REGULATED MOTOR VEHICLE SURFACE"

Means any of the following, alone or in combination:

1. The total area of motor vehicle surface that is currently receiving water;
2. A net increase in motor vehicle surface; and/or quality treatment either by vegetation or soil, by an existing stormwater management measure, or by treatment at a wastewater treatment plant, where the water quality treatment will be modified or removed.

SEDIMENT

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

The lot or lots upon which a major development is to occur or has occurred.

SOIL

All unconsolidated mineral and organic material of any origin.

STATE DEVELOPMENT AND REDEVELOPMENT PLAN METROPOLITAN PLANNING AREA (PA1)

An area delineated on the State Plan Policy Map and adopted by the State Planning Commission that is intended to be the focus for much of the state's future redevelopment and revitalization efforts.

STATE PLAN POLICY MAP

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

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

STORMWATER MANAGEMENT *BMP* ~~*BASIN*~~

An excavation or embankment and related areas designed to retain stormwater runoff. A stormwater management ***BMP*** ~~***basin***~~ may either be normally dry (that is, a detention basin or infiltration ***system*** ~~***basin***~~), retain water in a permanent pool (a retention basin), or be planted mainly with wetland vegetation (most constructed stormwater wetlands).

STORMWATER MANAGEMENT MEASURE

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 nonstormwater discharges into stormwater conveyances.

STORMWATER RUNOFF

Water flow on the surface of the ground or in storm sewers, resulting from precipitation.

STORMWATER MANAGEMENT PLANNING AGENCY

A public body authorized by legislation to prepare stormwater management plans.

STORMWATER MANAGEMENT PLANNING AREA

The geographic area for which a stormwater management planning agency is authorized to prepare stormwater management plans, or a specific portion of that area identified in a stormwater management plan prepared by that agency.

TIDAL FLOOD HAZARD AREA

A flood hazard area in which the flood elevation resulting from the ***2-*** ~~***two-***~~, 10-, or 100-year storm, as applicable, is governed by tidal flooding from the Atlantic Ocean. Flooding in a tidal flood hazard area may be contributed to, or influenced by, stormwater runoff from inland areas, but the depth of flooding generated by the tidal rise and fall of the Atlantic Ocean is greater than flooding from any fluvial sources. In some situations, depending upon the extent of the storm surge from a particular storm event, a flood hazard area may be tidal in the 100-year storm, but fluvial in more frequent storm events.

URBAN COORDINATING COUNCIL EMPOWERMENT NEIGHBORHOOD

A neighborhood given priority access to state resources through the New Jersey Redevelopment Authority.

URBAN ENTERPRISE ZONES

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

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.

WATER CONTROL STRUCTURE

A structure within, or adjacent to, a water, which intentionally or coincidentally alters the hydraulic capacity, the flood elevation resulting from the two-, 10-, or 100-year storm, flood hazard area limit, and/or floodway limit of the water. Examples of a water control structure may include a bridge, culvert, dam, embankment, ford (if above grade), retaining wall, and weir.

WATERS OF THE STATE

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

WETLANDS or WETLAND

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."

C. General standards.

(1) Design and performance standards for stormwater management measures.

(a) Stormwater management measures for major development shall be ***designed to provide*** ~~***developed to meet***~~ the erosion control, groundwater recharge, stormwater runoff quantity ***control***, and stormwater runoff quality ***treatment as follows:*** ~~***standards in Subsection D. To the maximum extent practicable, these standards shall be met by incorporating nonstructural stormwater management strategies into the design. If these strategies alone are not sufficient to meet these standards, structural stormwater management measures necessary to meet these standards shall be incorporated into the design. In any event, the stormwater management measures shall be designed as follows:***~~

1. The minimum standards for erosion control are those established under the Soil and Sediment Control Act, N.J.S.A. 4:24-39 et seq., and implementing rules at N.J.A.C. 2:90.

2. The minimum standards for groundwater recharge, stormwater quality, and stormwater runoff quantity shall be met by incorporating green infrastructure.

(b) The standards in this ~~***section***~~ ***Ordinance*** apply only to new major development ***or developments meeting applicability standards in section A(3)*** 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.

D. Stormwater management requirements for major development.

(1) The development shall incorporate a maintenance plan for the stormwater management measures incorporated into the design of a major development in accordance with Subsection ~~***J***~~ ***I***.

(2) Stormwater management measures shall avoid adverse impacts of concentrated flow on habitat for threatened and endangered species as documented in the Department' 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).

(3) The following linear development projects are exempt from the groundwater recharge, stormwater runoff quantity, and stormwater runoff quality requirements of Subsection **D(17)** and **(19)**:

(a) The construction of an underground utility line provided that the disturbed areas are revegetated upon completion;

(b) The construction of an aboveground utility line provided that the existing conditions are maintained to the maximum extent practicable; and

(c) 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.

(4) A waiver from strict compliance from the groundwater recharge, stormwater runoff quantity, and stormwater runoff quality requirements of Subsection **D(17)** and **(19)** may be obtained for the enlargement of an existing public roadway or railroad; or the construction or enlargement of a public pedestrian access, provided that the following conditions are met:

(a) The applicant demonstrates that there is a public need for the project that cannot be accomplished by any other means;

(b) The applicant demonstrates through an alternatives analysis, that through the use of nonstructural and structural stormwater management strategies and measures, the option selected complies with the requirements of Subsection **D(17)** and **(19)** to the maximum extent practicable;

(c) The applicant demonstrates that, in order to meet the requirements of Subsection **D(17)** and **(19)**, existing structures currently in use, such as homes and buildings, would need to be condemned; and

(d) The applicant demonstrates that it does not own or have other rights to areas, including the potential to obtain through condemnation lands not falling under Subsection **D(4)(c)** above within the upstream drainage area of the receiving stream, that would provide additional opportunities to mitigate the requirements of Subsection **D(17)** and **(19)** that were not achievable on-site.

(5) Tables 1 through 3 below summarize the ability of stormwater best management practices identified and described in the New Jersey Stormwater Best Management Practices Manual to satisfy the green infrastructure, groundwater recharge, stormwater runoff quality and stormwater runoff quantity standards specified in Section D (15), (16), (17) and (20). When designed in accordance with the most current version of the New Jersey Stormwater Best Management Practices Manual, the stormwater management measures found at N.J.A.C. 7:8-5.2 (f) Tables 5-1, 5-2 and 5-3 and listed below in Tables 1, 2 and 3 are presumed to be capable of providing stormwater controls for the design and performance standards as outlined in the tables below. Upon amendments of the New Jersey Stormwater Best Management Practices to reflect additions or deletions of BMPs meeting these standards, or changes in the presumed performance of BMPs designed in accordance with the New Jersey Stormwater BMP Manual, the Department shall publish in the New Jersey Registers a notice of administrative change revising the applicable table. The most current version of the BMP Manual can be found on the Department's website at:

https://njstormwater.org/bmp_manual2.htm.

(6) Where the BMP tables in the NJ Stormwater Management Rule are different due to updates or amendments with the tables in this ordinance the BMP Tables in the Stormwater Management rule at N.J.A.C. 7:8-5.2(f) shall take precedence.

Table 1
Green Infrastructure BMPs for Groundwater Recharge, Stormwater Runoff Quality, and/or Stormwater Runoff Quantity

Best Management Practice	Stormwater Runoff Quality TSS Removal Rate (percent)	Stormwater Runoff Quantity	Groundwater Recharge	Minimum Separation from Seasonal High Water Table (feet)
Cistern	0	Yes	No	--
Dry Well[a]	0	No	Yes	2
Grass Swale	50 or less	No	No	2[e] 1[f]
Green Roof	0	Yes	No	--
Manufactured Treatment Device[a] [g]	50 or 80	No	No	Dependent upon the device
Pervious Paving System[a]	80	Yes	Yes[b] No[c]	2[b] 1[c]
Small-Scale Bioretention Basin[a]	80 or 90	Yes	Yes[b] No[c]	2[b] 1[c]
Small-Scale Infiltration Basin[a]	80	Yes	Yes	2
Small-Scale Sand Filter	80	Yes	Yes	2
Vegetative Filter Strip	60-80	No	No	--

(Notes corresponding to annotations [a] through [g] are found after Table 3)

Table 2
Green Infrastructure BMPs for Stormwater Runoff Quantity
(or for Groundwater Recharge and/or Stormwater Runoff Quality
with a Waiver or Variance from N.J.A.C. 7:8-5.3)

Best Management Practice	Stormwater Runoff Quality TSS Removal Rate (percent)	Stormwater Runoff Quantity	Groundwater Recharge	Minimum Separation from Seasonal High Water Table (feet)
Bioretention System	80 or 90	Yes	Yes[(b)] No[(c)]	2[(b)] 1[(c)]
Infiltration Basin	80	Yes	Yes	2
Sand Filter[(b)]	80	Yes	Yes	2
Standard Constructed Wetland	90	Yes	No	N/A
Wet Pond[(d)]	50-90	Yes	No	N/A

(Notes corresponding to annotations [(b)] through [(d)] are found after Table 3)

Table 3
BMPs for Groundwater Recharge, Stormwater Runoff Quality, and/or Stormwater Runoff Quantity only with a Waiver or Variance from N.J.A.C. 7:8-5.3

Best Management Practice	Stormwater Runoff Quality TSS Removal Rate (percent)	Stormwater Runoff Quantity	Groundwater Recharge	Minimum Separation from Seasonal High Water Table (feet)
Blue Roof	0	Yes	No	N/A
Extended Detention Basin	40-60	Yes	No	1
Manufactured Treatment Device[(h)]	50 or 80	No	No	Dependent upon the device
Sand Filter[(c)]	80	Yes	No	1
Subsurface Gravel Wetland	90	No	No	1
Wet Pond	50-90	Yes	No	N/A

Notes to Tables 1, 2, and 3:
(a) subject to the applicable contributory drainage area limitation specified at 94-8.39-4.O.2;
(b) designed to infiltrate into the subsoil;
(c) designed with underdrains;
(d) designed to maintain at least a 10-foot wide area of native vegetation along at least 50 percent of the shoreline and to include a stormwater runoff retention component designed to capture stormwater runoff for beneficial reuse, such as irrigation;
(e) designed with a slope of less than two percent;
(f) designed with a slope of equal to or greater than two percent;
(g) manufactured treatment devices that meet the definition of green infrastructure at Section II;
(h) manufactured treatment devices that do not meet the definition of green infrastructure at Section II.

(7) An alternative stormwater management measure, alternative removal rate, and/or alternative method to calculate the removal rate may be used if the design engineer demonstrates the capability of the proposed alternative stormwater management measure and/or the validity of the alternative rate or method to the municipality. A copy of any approved alternative stormwater management measure, alternative removal rate, and/or alternative method to calculate the removal rate shall be provided to the Department in accordance with Section D(2). Alternative stormwater management measures may be used to satisfy the requirements at Section D(15) only if the measures meet the definition of green infrastructure at Section B. Alternative stormwater management

measures that function in a similar manner to a BMP listed at Section (D)(15)(2) are subject to the contributory drainage area limitation specified at Section (15)(2) for that similarly functioning BMP. Alternative stormwater management measures approved in accordance with this subsection that do not function in a similar manner to any BMP listed at Section (15)(2) shall have a contributory drainage area less than or equal to 2.5 acres, except for alternative stormwater management measures that function similarly to cisterns, grass swales, green roofs, standard constructed wetlands, vegetative filter strips, and wet ponds, which are not subject to a contributory drainage area limitation. Alternative measures that function similarly to standard constructed wetlands or wet ponds shall not be used for compliance with the stormwater runoff quality standard unless a variance in accordance with N.J.A.C. 7:8-4.6 or a waiver from strict compliance in accordance with Section 4.D is granted from Section (D)(15).

(8) Whenever the stormwater management design includes one or more BMPs that will infiltrate stormwater into subsoil, 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 or other subsurface structures within the zone of influence of the groundwater mound, or interference with the proper functioning of the stormwater management measure itself.

(9) Design standards for stormwater management measures are as follows:

1. Stormwater management measures shall be designed to take into account the existing site conditions, including, but not limited to, 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. 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 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 the width of the diameter of the orifice or one-third 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 (H)(2);

3. 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. Stormwater management BMPs shall be designed to meet the minimum safety standards for stormwater management BMPs at Section (H); and

5. The size of the orifice at the intake to the outlet from the stormwater management BMP shall be a minimum of two and one-half inches in diameter.

(10) 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. Manufactured treatment devices that do not meet the definition of green infrastructure at Section B may be used only under the circumstances described at Section (15)(4).

(11) Any application for a new agricultural development that meets the definition of major development at Section B shall be submitted to the Soil Conservation District for review and approval in accordance with the requirements at Section D (15), (16), (17) and (20)and any applicable Soil Conservation District guidelines for stormwater runoff quantity and erosion control. For purposes of this subsection, "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 manufacture of agriculturally related products.

(12) If there is more than one drainage area, the groundwater recharge, stormwater runoff quality, and stormwater runoff quantity standards at Section D (16), (17) and (20)shall be met in each drainage area, unless the runoff from the drainage areas converge onsite and no adverse environmental impact would occur as a result of compliance with any one or more of the individual standards being determined utilizing a weighted average of the results achieved for that individual standard across the affected drainage areas.

(13) Any stormwater management measure authorized under the municipal stormwater management plan or ordinance shall be reflected in a deed notice recorded in the the Office of the Monmouth County Clerk. A form of deed notice shall be submitted to the municipality for approval prior to filing. The deed notice shall contain a description of the stormwater management measure(s) used to meet the green infrastructure, groundwater recharge, stormwater runoff quality, and stormwater runoff quantity standards at Section D (15), (16), (17) and (20) and shall identify the location of the stormwater management measure(s) in NAD 1983 State Plane New Jersey FIPS 2900 US Feet or Latitude and Longitude in decimal degrees. The deed notice shall also reference the maintenance plan required to be recorded upon the deed pursuant to Section (J). Prior to the commencement of construction, proof that the above required deed notice has been filed shall be submitted to the municipality. Proof that the required information has been recorded on the deed shall be in the form of either a copy of the complete recorded document or a receipt from the clerk or other proof of recordation provided by the recording office. However, if the initial proof provided to the municipality is not a copy of the complete recorded document, a copy of the complete recorded document shall be provided to the municipality within 180 calendar days of the authorization granted by the municipality.

(14) A stormwater management measure approved under the municipal stormwater management plan or ordinance may be altered or replaced with the approval of the municipality, if the municipality determines that the proposed alteration or replacement meets the design and performance standards pursuant to Section D of this ordinance and provides the same level of stormwater management as the previously approved stormwater management measure that is being altered or replaced. If an alteration or replacement is approved, a revised deed notice shall be submitted to the municipality for approval and subsequently recorded with the Office of the Monmouth County Clerk and shall contain a description and location of the stormwater management measure, as well as reference to the maintenance plan, in accordance with Section 13 above. Prior to the commencement of construction, proof that the above required deed notice has been filed shall be submitted to the municipality in accordance with Section 13 above.

(15) Green Infrastructure Standards

1. This subsection specifies the types of green infrastructure BMPs that may be used to satisfy the groundwater recharge, stormwater runoff quality, and stormwater runoff quantity standards.

2. To satisfy the groundwater recharge and stormwater runoff quality standards at Section (D)(16) and (17), the design engineer shall utilize green infrastructure BMPs identified in Table 1 at Section (D)(6). and/or an alternative stormwater management measure approved in accordance with Section (D)(7). The following green infrastructure BMPs are subject to the following maximum contributory drainage area limitations:

Best Management Practice	Maximum Contributory Drainage Area
Dry Well	1 acre
Manufactured Treatment Device	2.5 acres
Pervious Pavement Systems	Area of additional inflow cannot exceed three times the area occupied by the BMP

Small-scale Bioretention Systems	2.5 acres
Small-scale Infiltration Basin	2.5 acres
Small-scale Sand Filter	2.5 acres

3. To satisfy the stormwater runoff quantity standards at Section (D)(20), the design engineer shall utilize BMPs from Table 1 or from Table 2 and/or an alternative stormwater management measure approved in accordance with Section (D)(7).

4. If a variance in accordance with N.J.A.C. 7:8-4.6 or a waiver from strict compliance in accordance with Section (D)(4) is granted from the requirements of this subsection, then BMPs from Table 1, 2, or 3, and/or an alternative stormwater management measure approved in accordance with Section (D)(7) may be used to meet the groundwater recharge, stormwater runoff quality, and stormwater runoff quantity standards at Section D (16), (17) and (20).

5. For separate or combined storm sewer improvement projects, such as sewer separation, undertaken by a government agency or public utility (for example, a sewerage company), the requirements of this subsection shall only apply to areas owned in fee simple by the government agency or utility, and areas within a right-of-way or easement held or controlled by the government agency or utility; the entity shall not be required to obtain additional property or property rights to fully satisfy the requirements of this subsection. Regardless of the amount of area of a separate or combined storm sewer improvement project subject to the green infrastructure requirements of this subsection, each project shall fully comply with the applicable groundwater recharge, stormwater runoff quality control, and stormwater runoff quantity standards at Section D (16), (17) and (20) unless the project is granted a waiver from strict compliance in accordance with Section D(4).

(16) Groundwater Recharge Standards

1. This subsection contains the minimum design and performance standards for groundwater recharge as follows:

2. The design engineer shall, using the assumptions and factors for stormwater runoff and groundwater recharge calculations at Section E, either:

   i. Demonstrate through hydrologic and hydraulic analysis that the site and its stormwater management measures maintain 100 percent of the average annual pre-construction groundwater recharge volume for the site; or

   ii. 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.

3. This groundwater recharge requirement does not apply to projects within the "urban redevelopment area," or to projects subject to 4 below.

4. The following types of stormwater shall not be recharged:

   i. 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

ii. 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.

(17) Stormwater Runoff Quality Standards

1. This subsection contains the minimum design and performance standards to control stormwater runoff quality impacts of major development. Stormwater runoff quality standards are applicable when the major development results in an increase of one-quarter acre or more of regulated motor vehicle surface.
2. Stormwater management measures shall be designed to reduce the post-construction load of total suspended solids (TSS) in stormwater runoff generated from the water quality design storm as follows:

    i. Eighty percent TSS removal of the anticipated load, expressed as an annual average shall be achieved for the stormwater runoff from the net increase of motor vehicle surface.

    ii. If the surface is considered regulated motor vehicle surface because the water quality treatment for an area of motor vehicle surface that is currently receiving water quality treatment either by vegetation or soil, by an existing stormwater management measure, or by treatment at a wastewater treatment plant is to be modified or removed, the project shall maintain or increase the existing TSS removal of the anticipated load expressed as an annual average.

3. 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 Pollutant Discharge Elimination System (NJPDES) rules, N.J.A.C. 7:14A, or in a discharge specifically exempt under a NJPDES permit from this requirement. Every major development, including any that discharge into a combined sewer system, shall comply with 2 above, unless the major development is itself subject to a NJPDES permit with a numeric effluent limitation for TSS or the NJPDES permit to which the major development is subject exempts the development from a numeric effluent limitation for TSS.

4. 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 4, below. The calculation of the volume of runoff may take into account the implementation of stormwater management measures.

Table 4 - Water Quality Design Storm Distribution

Time (Minutes)	Cumulative Rainfall (Inches)	Time (Minutes)	Cumulative Rainfall (Inches)	Time (Minutes)	Cumulative Rainfall (Inches)
1	0.00166	41	0.1728	81	1.0906
2	0.00332	42	0.1796	82	1.0972
3	0.00498	43	0.1864	83	1.1038
4	0.00664	44	0.1932	84	1.1104
5	0.00830	45	0.2000	85	1.1170
6	0.00996	46	0.2117	86	1.1236
7	0.01162	47	0.2233	87	1.1302
8	0.01328	48	0.2350	88	1.1368
9	0.01494	49	0.2466	89	1.1434
10	0.01660	50	0.2583	90	1.1500
11	0.01828	51	0.2783	91	1.1550
12	0.01996	52	0.2983	92	1.1600
13	0.02164	53	0.3183	93	1.1650
14	0.02332	54	0.3383	94	1.1700
15	0.02500	55	0.3583	95	1.1750
16	0.03000	56	0.4116	96	1.1800
17	0.03500	57	0.4650	97	1.1850
18	0.04000	58	0.5183	98	1.1900
19	0.04500	59	0.5717	99	1.1950
20	0.05000	60	0.6250	100	1.2000
21	0.05500	61	0.6783	101	1.2050
22	0.06000	62	0.7317	102	1.2100
23	0.06500	63	0.7850	103	1.2150
24	0.07000	64	0.8384	104	1.2200
25	0.07500	65	0.8917	105	1.2250
26	0.08000	66	0.9117	106	1.2267
27	0.08500	67	0.9317	107	1.2284
28	0.09000	68	0.9517	108	1.2300
29	0.09500	69	0.9717	109	1.2317
30	0.10000	70	0.9917	110	1.2334
31	0.10660	71	1.0034	111	1.2351
32	0.11320	72	1.0150	112	1.2367
33	0.11980	73	1.0267	113	1.2384
34	0.12640	74	1.0383	114	1.2400
35	0.13300	75	1.0500	115	1.2417
36	0.13960	76	1.0568	116	1.2434
37	0.14620	77	1.0636	117	1.2450
38	0.15280	78	1.0704	118	1.2467
39	0.15940	79	1.0772	119	1.2483
40	0.16600	80	1.0840	120	1.2500

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

   R = A + B – (A x B) / 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.

6. 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 green infrastructure BMPs that optimize nutrient removal while still achieving the performance standards in Section D (16), (17) and (20).
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. The Flood Hazard Area Control Act Rules at N.J.A.C. 7:13-4.1(c)1 establish 300-foot riparian zones along Category One waters, as designated in the Surface Water Quality Standards at N.J.A.C. 7:9B, and certain upstream tributaries to Category One waters. A person shall not undertake a major development that is located within or discharges into a 300-foot riparian zone without prior authorization from the Department under N.J.A.C. 7:13.
9. Pursuant to the Flood Hazard Area Control Act Rules at N.J.A.C. 7:13-11.2(j)3.i, runoff from the water quality design storm that is discharged within a 300-foot riparian zone shall be treated in accordance with this subsection to reduce the post-construction load of total suspended solids by 95 percent of the anticipated load from the developed site, expressed as an annual average.
10. This stormwater runoff quality standards do not apply to the construction of one individual single-family dwelling, provided that it is not part of a larger development or subdivision that has received preliminary or final site plan approval prior to December 3, 2018, and that the motor vehicle surfaces are made of permeable material(s) such as gravel, dirt, and/or shells.

~~***(18) Nonstructural stormwater management strategies.***~~

~~***(a) To the maximum extent practicable, the standards in Subsection D(17) and (19) shall be met by incorporating nonstructural stormwater management strategies set forth at Subsection D(18) 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 Subsection D(18)(b) below into the design of a particular project, the applicant shall identify the strategy considered and provide a basis for the contention.***~~

~~***(b) Nonstructural stormwater management strategies incorporated into site design shall:***~~

~~***[1] Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment***~~

~~*loss;*~~

~~*[2] Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces;*~~

~~*[3] Maximize the protection of natural drainage features and vegetation;*~~

~~*[4] Minimize the decrease in the "time of concentration" from preconstruction 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;*~~

~~*[5] Minimize land disturbance including clearing and grading;*~~

~~*[6] Minimize soil compaction;*~~

~~*[7] Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides;*~~

~~*[8] Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas;*~~

~~*[9] 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. Such source controls include, but are not limited to:*~~

~~*[a] Site design features that help to prevent accumulation of trash and debris in drainage systems, including features that satisfy Subsection D(18)(c) below;*~~

~~*[b] Site design features that help to prevent discharge of trash and debris from drainage systems;*~~

~~*[c] Site design features that help to prevent and/or contain spills or other harmful accumulations of pollutants at industrial or commercial developments; and*~~

~~*[d] 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.*~~

(18) Solid and Floatable Materials Controls

~~*(c)*~~***(a)*** ~~*Site design features identified under Subsection D(5)(b)[9][b] above shall comply with the following standard to control passage of solid and floatable materials through storm drain inlets. For purposes of this subsection, "solid and floatable materials" means sediment, debris, trash, and other floating, suspended, or settleable solids. For exemptions to this standard see Subsection D(18)(c)(a)[3] [2]below.*~~ ***Site design features identified under Section D(5)(b)[9][b] above, or alternative designs in accordance with Section D(5)(b)[9][c] above, to prevent discharge of trash and debris from drainage systems shall comply with the following standard to control passage of solid and floatable materials through storm drain inlets. For purposes of this paragraph, "solid and floatable materials" means sediment, debris, trash, and other floating, suspended, or settleable solids. For exemptions to this standard see Section VII.A.2 below.***

[1] Design engineers shall use either of the following grates whenever they use a grate in pavement or another

ground surface to collect stormwater from that surface into a storm drain or surface water body under that grate:

[a] The New Jersey Department of Transportation (NJDOT) bicycle safe grate, which is described in Chapter 2.4 of the NJDOT Bicycle Compatible Roadways and Bikeways Planning and Design Guidelines ~~***(April 1996)***~~; or

[b] A different grate, if each individual clear space in that grate has an area of no more than 7.0 square inches, or is no greater than 0.5 inch across the smallest dimension.

[c] Examples of grates subject to this standard include grates in grate inlets, the grate portion (non-curb-opening portion) of combination inlets, grates on storm sewer manholes, ditch grates, trench grates, and grates of spacer bars in slotted drains. Examples of ground surfaces include surfaces of roads (including bridges), driveways, parking areas, bikeways, plazas, sidewalks, lawns, fields, open channels, and stormwater basin floors.

~~[2]~~ [d] ~~***Whenever design engineers use a curb-opening inlet, the clear space in that curb opening (or each individual***~~ ***For curb opening inlets, including curb opening inlets in combination inlets the clear space in that curb opening, or each individual clear space,*** if the curb opening has two or more clear spaces shall have an area of no more than 7.0 square inches, or be no greater than 2.0 inches across the smallest dimension.

~~[3]~~ [2] This standard does not apply:

[a] Where each individual clear space in the curb opening in existing curb-opening inlet does not have an area of more than nine (9.0) square inches;

[b] Where the municipality agrees that the standards would cause inadequate hydraulic performance that could not practicably be overcome by using additional or larger storm drain inlets;

[c] Where flows from the water quality design storm as specified in N.J.A.C. 7:8 are conveyed through any device (e.g., end of pipe netting facility, manufactured treatment device, or a catch basin hood) that is designed, at a minimum, to prevent delivery of all solid and floatable materials that could not pass through one of the following:

[i] A rectangular space four and five-eighths (4.625) inches long and one and one-half (1.5) inches wide (this option does not apply for outfall netting facilities); or

[ii] A bar screen having a bar spacing of 0.5 inches.

Note that these exemptions do not authorize any infringement of requirements in the Residential Site Improvement Standards for bicycle safe grates in new residential development (N.J.A.C. 5:21-4.18(b)2 and 7.4(b)1).

[d] Where flows are conveyed through a trash rack that has parallel bars with one inch (1 inch) spacing between the bars, to the elevation of the Water Quality Design Storm as specified in N.J.A.C. 7:8; or

[e] Where the New Jersey Department of Environmental Protection determines, pursuant to the New Jersey Register of Historic Places Rules at N.J.A.C. 7:4- 7.2(c), that action to meet this standard is an undertaking that constitutes an encroachment or will damage or destroy the New Jersey Register listed historic property.

~~*[a] Where the review agency determines that this standard would cause inadequate hydraulic performance that could not practicably be overcome by using additional or larger storm drain inlets that meet these standards;*~~

~~*[b] Where flows from the water quality design storm as specified in N.J.A.C. 7:8 Subsection D(17)(a) are conveyed through any device (e.g., end of pipe netting facility, manufactured treatment device, or a catch basin hood) that is designed, at a minimum, to prevent delivery of all solid and floatable materials that could not pass through one of the following:*~~

~~*[i] A rectangular space 4 5/8 inches long and 1 1/2 inches wide (This option does not apply for outfall netting facilities.); or*~~

~~*[ii] A bar screen having a bar spacing of 0.5 inch.*~~

~~*[c] Where flows are conveyed through a trash rack that has parallel bars with one inch spacing between the bars, to the elevation of the water quality design storm as specified in N.J.A.C. 7:8 Subsection D(17)(a); or*~~

~~*[d] Where the New Jersey Department of Environmental Protection determines, pursuant to the New Jersey Register of Historic Places Rules at N.J.A.C. 7:4 7.2(c), that action to meet this standard is an undertaking that constitutes an encroachment or will damage or destroy the New Jersey Register listed historic property.*~~

(d) ~~*Any land area used as a nonstructural stormwater management measure to meet the performance standards in Subsection D(17) and (19) 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.*~~

~~*(e) Guidance for nonstructural stormwater management strategies is available in the New Jersey Stormwater Best Management Practices Manual. The BMP Manual may be obtained from the address identified in Subsection G, or found on the Department's website at www.njstormwater.org.*~~

(19) Erosion control, groundwater recharge and runoff quantity standards. ***(Reserved)***

~~*(a) This subsection 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.*~~

~~*[1] 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.*~~

~~*[2] The minimum design and performance standards for groundwater recharge are as follows:*~~

~~*[a] The design engineer shall, using the assumptions and factors for stormwater runoff and groundwater recharge calculations at Subsection E, either:*~~

~~*[i] Demonstrate through hydrologic and hydraulic analysis that the site and its stormwater management measures maintain 100% of the average annual preconstruction groundwater recharge volume for the site; or*~~

~~*[ii] Demonstrate through hydrologic and hydraulic analysis that the increase of stormwater runoff volume from preconstruction to post-construction for the two-year storm is infiltrated.*~~

~~*[b] This groundwater recharge requirement does not apply to projects within the "urban redevelopment area," or to projects subject to Subsection D(19)(a)[2][c] below.*~~

~~*[c] The following types of stormwater shall not be recharged:*~~

~~*[i] 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*~~

~~*[ii] 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.*~~

~~*[d] 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.*~~

~~*[3] In order to control stormwater runoff quantity impacts, the design engineer shall, using the assumptions and factors for stormwater runoff calculations at Subsection E, complete one of the following:*~~

~~*[a] Demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the two-, ten-, and one hundred-year storm events do not exceed, at any point in time, the preconstruction runoff hydrographs for the same storm events;*~~

~~*[b] Demonstrate through hydrologic and hydraulic analysis that there is no increase, as compared to the preconstruction condition, in the peak runoff rates of stormwater leaving the site for the two-, ten-, and one-hundred-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;*~~

~~*[c] Design stormwater management measures so that the post-construction peak runoff rates for the two-, ten-, and one-hundred-year storm events are 50%, 75% and 80%, 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*~~

~~*[d] In tidal flood hazard areas, stormwater runoff quantity analysis in accordance with D(19)(a)[3][a],[b] and [c] above shall only be applied if the increased volume of stormwater runoff could increase flood damages below the point of discharge.*~~

~~*(b) Any application for a new agricultural development that meets the definition of major development at Subsection B 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.*~~

(20) Stormwater Runoff Quantity Standards

1. This subsection contains the minimum design and performance standards to control stormwater runoff quantity impacts of development.
2. In order to control stormwater runoff quantity impacts, the design engineer shall, using the assumptions and factors for stormwater runoff calculations at Section V, complete one of the following:

    i. 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;

    ii. 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;

    iii. 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 pre-construction 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; or

    iv. In tidal flood hazard areas, stormwater runoff quantity analysis in accordance with 2.i, ii and iii above is required unless the design engineer demonstrates through hydrologic and hydraulic analysis that the increased volume, change in timing, or increased rate of the stormwater runoff, or any combination of the three will not result in additional flood damage below the point of discharge of the major development. No analysis is required if the stormwater is discharged directly into any ocean, bay, inlet, or the reach of any watercourse between its confluence with an ocean, bay, or inlet and downstream of the first water control structure.

    v. Design of infiltration BMP meeting the minimum standards prescribed by the NJDEP Stormwater Best Management Practices Manuel, including requisite soil testing, to capture and recharge roof runoff from an area equivalent to the overall impervious surfaces onsite in excess of the maximum lot coverage permitted in the zone where the property lies. The infiltration BMP shall be designed using a ***two (2)*** ~~*twenty*~~ year return frequency design

3. The stormwater runoff quantity standards shall be applied at the site's boundary to each abutting lot, roadway, watercourse, or receiving storm sewer system.

E. Calculation of stormwater runoff and groundwater recharge.

(1) Stormwater runoff shall be calculated in accordance with the following:

(a) The design engineer shall calculate runoff using one of the following methods:

[1] The USDA Natural Resources Conservation Service (NRCS) methodology, including the NRCS Runoff Equation and Dimensionless Unit Hydrograph, as described in Chapters 7, 9, 10, 15 and 16 Part 630, Hydrology National Engineering Handbook, incorporated herein by reference as amended and supplemented. This methodology is additionally described in Technical Release 55 - Urban Hydrology for Small Watersheds (TR-55), dated June 1986, incorporated herein by reference as amended and supplemented. Information regarding the methodology is available from the Natural Resources Conservation Service website at:

https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1044171.pdf

or at United States Department of Agriculture Natural Resources Conservation Service, 220 Davison Avenue, Somerset, New Jersey 08873; or

[2] The Rational Method for peak flow and the Modified Rational Method for hydrograph computations. The rational and modified rational methods are described in "Appendix A-9 Modified Rational Method" in the Standards for Soil Erosion and Sediment Control in New Jersey, January 2014. This document is available from the State Soil Conservation Committee or any of the Soil Conservation Districts listed at N.J.A.C. 2:90-1.3(a)3. The location, address, and telephone number for each Soil Conservation District is available from the State Soil Conservation Committee, PO Box 330, Trenton, New Jersey 08625. The document is also available at:

http://www.nj.gov/agriculture/divisions/anr/pdf/2014NJSoilErosionControlStandardsComplete.pdf.

(b) For the purpose of calculating runoff coefficients and groundwater recharge, there is a presumption that the preconstruction 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 Subsection **E(1)(a)[1]** and the Rational and Modified Rational Methods at Subsection **E(1)(a)[2]**. 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).

(c) In computing preconstruction 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 preconstruction stormwater runoff rates and volumes.

(d) 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.

(e) 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.

(2) Groundwater recharge may be calculated in accordance with the following:

(a) The New Jersey Geological Survey Report GSR-32, A Method for Evaluating Groundwater-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 the New Jersey Geological Survey website at:

https://www.nj.gov/dep/njgs/pricelst/gsreport/gsr32.pdf

or at New Jersey Geological and Water Survey, 29 Arctic Parkway, PO Box 420 Mail Code 29-01, Trenton, New Jersey 08625-0420.

~~*F. Standards for structural stormwater management measures.*~~

~~*(1) Standards for structural stormwater management measures are as follows:*~~

~~*(a) 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).*~~

~~*(b) 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 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 1/3 the width of the diameter of the orifice or 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 Subsection H(4).*~~

~~*(c) 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.*~~

~~*(d) At the intake to the outlet from the stormwater management basin, the orifice size shall be a minimum of 2 1/2 inches in diameter.*~~

~~*(e) Stormwater management basins shall be designed to meet the minimum safety standards for stormwater management basins at Subsection H.*~~

~~*(2) 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*~~

~~*Subsection D of this section.*~~

~~*(3) Manufactured treatment devices may be used to meet the requirements of Subsection D of this section, provided the pollutant removal rates are verified by the New Jersey Corporation for Advanced Technology and certified by the Department.*~~

F. ~~*G.*~~ Sources for technical guidance.

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

~~*(a) 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.*~~

~~*(b) The New Jersey Department of Environmental Protection Stormwater Management Facilities Maintenance Manual, as amended.*~~

~~*(2) Additional technical guidance for stormwater management measures can be obtained from the following:*~~

~~*(a) 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;*~~

~~*(b) The Rutgers Cooperative Extension Service, 732-932-9306; and*~~

~~*(c) 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.*~~

(1) ~~*(d)*~~ Technical guidance for stormwater management measures can be found in the documents listed below, which are available to download from the Department's website at:

http://www.nj.gov/dep/stormwater/bmp_manual2.htm.

(a) Guidelines for stormwater management measures are contained in the New Jersey Stormwater Best Management Practices Manual, as amended and supplemented. Information is provided on stormwater management measures such as, but not limited to, those listed in Table 1, 2, and 3.

(b) ~~*(e)*~~ Additional maintenance guidance is available on the Department's website at:

https://www.njstormwater.org/maintenance_guidance.htm.

(2) Submissions required for review by the Department should be mailed to:

The Division of Water Quality, New Jersey Department of Environmental Protection, Mail Code 401-02B, PO Box 420, Trenton, New Jersey 08625-0420.

G. ~~H.~~ Safety standards for stormwater management basins.

(1) This subsection sets forth requirements to protect public safety through the proper design and operation of stormwater management basins. This subsection applies to any new stormwater management basin.

NOTE: The provisions of this section are not intended to preempt more stringent municipal or county safety requirements for new or existing stormwater management basins. Municipal and county stormwater management plans and ordinances may, pursuant to their authority, require existing stormwater management basins to be retrofitted to meet one or more of the safety standards in Subsection ***~~H~~ G*(2)(a), (b)** and (c)for trash racks, overflow grates, and escape provisions at outlet structures.

(2) Requirements for trash racks, overflow grates and escape provisions.

(a) 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:

[1] The trash rack shall have parallel bars, with no greater than six-inch spacing between the bars.

[2] The trash rack shall be designed so as not to adversely affect the hydraulic performance of the outlet pipe or structure.

[3] 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.

[4] 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 pounds per square foot.

(b) 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:

[1] The overflow grate shall be secured to the outlet structure but removable for emergencies and maintenance.

[2] The overflow grate spacing shall be no less than two inches across the smallest dimension.

[3] 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 pounds per square foot.

(c) ***Stormwater management BMPs shall include escape provisions.*** For purposes of this Subsection ***~~H~~ G*(2(c), "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:

[1] If a stormwater management ~~***basin***~~ ***BMPs*** has an outlet structure, escape provisions shall be incorporated in or on the structure. With the prior approval of the reviewing agency identified in Subsection ~~***H***~~ ***G*****(3)**, a freestanding outlet structure may be exempted from this requirement.

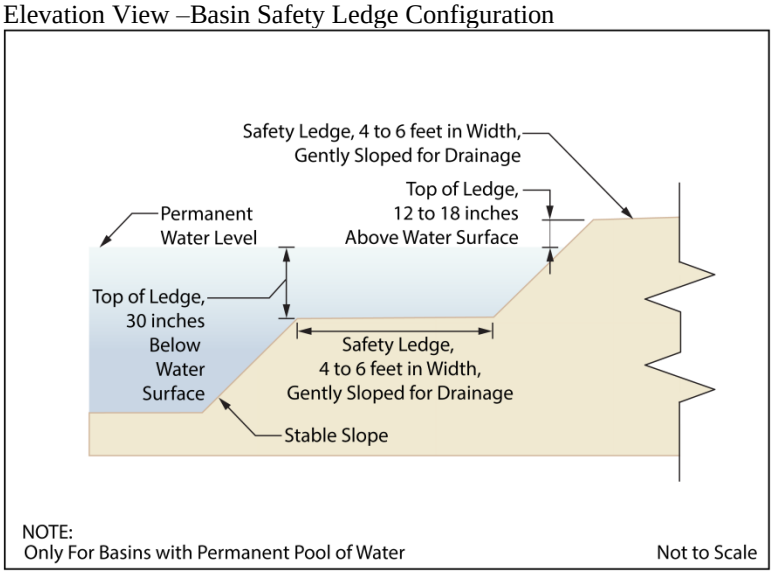
[2] Safety ledges shall be constructed on the slopes of all new stormwater management basins having a permanent pool of water deeper than 2 1/2 feet. Such safety ledges shall be comprised of two steps. Each step shall be four to six feet in width. One step shall be located approximately 2 1/2 feet below the permanent water surface, and the second step shall be located one to 1 1/2 feet above the permanent water surface. See Subsection ~~***H***~~ ***G*****(4)** for an illustration of safety ledges in a stormwater management basin.

[3] In new stormwater management ~~***basins***~~ ***BMPs***, the maximum interior slope for an earthen dam, embankment, or berm shall not be steeper than three horizontal to one vertical.

(3) Variance or exemption from safety standards. 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.

(4) Illustration of safety ledges in a new stormwater management basin.

Elevation View –Basin Safety Ledge Configuration



H. ~~***I.***~~ Requirements for a site development stormwater plan.

(1) Submission of site development stormwater plan.

(a) Whenever an applicant seeks municipal approval of a development subject to this chapter, the applicant shall submit all of the required components of the Checklist for the Site Development Stormwater Plan at Subsection ~~**I**~~ ***H*****(3)** below as part of the submission of the applicant's application for subdivision or site plan approval.

(b) The applicant shall demonstrate that the project meets the standards set forth in this section.

(c) The applicant shall submit six copies of the materials listed in the checklist for site development stormwater plans in accordance with Subsection ~~I~~ ***H*(3)** of this section.

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

(3) Checklist requirements.

(a) 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 one inch equals 200 feet or greater, showing two-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 One waters, wetlands and floodplains 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 man-made 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 groundwater 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 Subsections **C** through **F** 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 post-development conditions for the design storms specified in Section D of this ordinance.

[b] When the proposed stormwater management control measures ~~***(e.g., infiltration basins)***~~ depend~~s~~ on the hydrologic properties of soils or requires certain separation from seasonal high water tides, then a soils report shall be submitted. The soils report shall be based on onsite boring logs or soil pit profiles. The number and location of required soil borings or soil pits shall be determined based on what is needed to determine the suitability and distribution of soils present at the location of the control measure.

[7] Maintenance and repair plan. The design and planning of the stormwater management facility shall meet the maintenance requirements of Subsection ***I*** ~~***J***~~.

[8] Waiver from submission requirements. The municipal official or board reviewing an application under this section may, in consultation with the Municipal Engineer, waive submission of any of the requirements in Subsection ~~***I***~~ ***H*****(3)(a)[1]** through **[6]** of this section 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.

I. ~~***J.***~~ Maintenance and repair.

(1) Applicability. Projects subject to review as in Subsection **A(3)** of this section shall comply with the requirements of Subsection ~~***J***~~ ***I*****(2)** and **(3)**.

(2) General maintenance.

(a) The design engineer shall prepare a maintenance plan for the stormwater management measures incorporated into the design of a major development.

(b) 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.

(c) 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. ***The individual property owner may be assigned incidental tasks, such as weeding of a green infrastructure BMP, provided the individual agrees to assume these tasks; however, the***

individual cannot be legally responsible for all of the maintenance required.

(d) If the person responsible for maintenance identified under Subsection ~~***J***~~ ***I*(2)(b)** above is not a public agency, the maintenance plan and any future revisions based on Subsection ~~***J***~~ ***I*(2)(g)** below shall be recorded upon the deed of record for each property on which the maintenance described in the maintenance plan must be undertaken.

(e) 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.

(f) ~~***The person responsible for maintenance identified under Subsection J(2)(b) 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.***~~

The party responsible for maintenance identified under Section I(2)(b) above shall perform all of the following requirements:

i. 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;

ii. evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed; and

iii. 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 Section I(2)(e) and (2)(f) above.

(g) ~~***The person responsible for maintenance identified under Subsection J(2)(b) above shall evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed.***~~

The requirements of Section Section I(2)(c) and (2)(d) do not apply to stormwater management facilities that are dedicated to and accepted by the municipality or another governmental agency, subject to all applicable municipal stormwater general permit conditions, as issued by the Department.

(h) ~~***The person responsible for maintenance identified under Subsection J I(2)(b) 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 Subsection J I(2)(f) and (g) above.***~~

If the maintenance plan Identifies a person other than the property owner (for example, a developer, a public agency or homeowners' association) as having the responsibility for maintenance, the plan shall include documentation of such person's or entity's agreement to assume this responsibility, or of the owner's obligation to dedicate a stormwater management facility to such person under an applicable ordinance or regulation.

~~*(i) The requirements of Subsection J(2)(c) and (d) do not apply to stormwater management facilities that are dedicated to and accepted by the municipality or another governmental agency.*~~

(i) ~~*(j)*~~ 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 or repair, the municipality shall so notify the responsible person in writing. Upon receipt of that notice, the responsible person shall have 14 days to effect maintenance and repair of the facility in a manner that is approved by the municipal engineer or his designee. The municipality, in its discretion, may extend the time allowed for effecting maintenance and repair for good cause. If the responsible person fails or refuses to perform such maintenance and repair, the municipality or County may immediately proceed to do so and shall bill the cost thereof to the responsible person.

(3) 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.