

CHAPTER 8 - DESIGN STANDARDS

SECTION 8.1 -- Purpose

- A. The purpose of this Chapter is to provide design standards for improvements that are proposed or required as part of site plan, subdivision, variance, and other applications for development made pursuant to this Ordinance. These standards will apply to all matters that are not subject to the requirements of the New Jersey Site Improvement Standards.

SECTION 8.2 – New Jersey Residential Site Improvement Standards

- A. Residential subdivision, site plan and variance applications are subject to the New Jersey Residential Site Improvement Standards (RSIS), codified at *N.J.A.C. 5:21-1, et seq.* Applicants who wish to deviate from the RSIS must apply for exceptions or waivers pursuant to RSIS requirements. If recommended by the Planning Board Engineer, the Planning Board may apply the RSIS design specifications and other requirements to commercial or industrial major subdivision, site plan, variance, or other applications for development of non-residential projects.

SECTION 8.3 – Review Criteria

Subject to the requirements of the Residential Site Improvement Standards, and applying generally accepted design standards and principles, the following factors shall be considered in the review and development of all subdivision, site plan, variance, and other applications for development:

- A. **Site Design.** The design and layout of structures and improvements shall be reviewed so as to provide aesthetically pleasing design, efficient arrangement, and proper function. In the orientation and placement of structures and improvements the unique characteristics of the site shall be taken into account with consideration given to relating structures and improvements to the natural terrain and other site features, creating desirable focal points, preserving natural views, and respecting the established character of the neighborhood and areas reserved for public use. The development plan shall provide for a unified design with features that tie principal and accessory structures together and relate site features successfully and harmoniously to similar elements and surrounding buildings, using generally accepted design standards and principles in conformance with the requirements of this Ordinance and the Township Master Plan.
- B. **Circulation.** Proposed pedestrian and vehicular traffic movement within and adjacent to the site shall be reviewed applying generally accepted design standards and principles with particular emphasis on the provision and layout of properly designed parking areas, off-street loading and unloading areas, and the movement of people, goods and vehicles within and near the site. The Planning Board shall ensure that all parking spaces and driveways are useable, and safely and conveniently arranged. Access to the site from adjacent roads shall be designed so as to interfere as little as possible with traffic flow on these roads and to permit vehicles a rapid and safe entrance and exit to and from the site. Streets and driveways in a subdivision or other development must be of sufficient width and suitable grade and suitably located to accommodate prospective traffic and to provide access for firefighting and emergency equipment to buildings. New streets meeting all requirements of this Ordinance and other applicable laws must be coordinated with the official map, if any, and the circulation element of the master plan, if any, and oriented so as to permit, consistent with the reasonable utilization of land, the buildings constructed thereon to maximize solar gain. Streets wider

than 50 feet will not be required unless the street is an extension of an existing street at the greater width, or already has been shown on the master plan at the greater width, or already has been shown in greater width on the official map. The site also must conform to applicable State and County and municipal highway/road/street access management codes. Upon recommendation of its Engineer, the Planning Board may require a traffic study for any application for development.

C. **Off-Street Parking.** Any new or changed use, structure, or other development which is the subject of an application pursuant to this Ordinance must meet the following off-street parking requirements:

1. Parking Area Design standards:

- a. Parking spaces must be a minimum of 9 feet wide and 18 feet long.
- b. Parking areas must be no less than 50 feet from driveway intersection with public road or street.
- c. No parking spaces are allowed in a driveway, unless it is wide enough to prevent vehicles from backing into the travel lane.
- d. Curbing and guttering is required to ensure adequate drainage, delineate the borders of the parking area and separate parking spaces from driveways and aisles.
- e. Off-street parking for more than 2 vehicles must be designed so no vehicles will back into the street.
- f. Aisles within parking areas must meet the following minimum width requirements:
 - i. Parallel parking: 12 feet
 - ii. 30 degree or less angle parking: 12 feet
 - iii. 30 to 45 degree angle parking: 13 feet
 - iv. 34 to 60 angle degree parking: 18 feet
 - v. 60 to 90 degree angle parking: 25 feet
 - vi. Parking spaces, driveways, and aisles must be clearly marked. Areas must be designated for fire-fighting and emergency equipment and must be clearly marked as such.
- g. One-way internal circulation system is required in all parking areas having 20 or more parking spaces.
- h. Parking areas may not be located within side or rear yard setback areas, or within 10 feet of any street.
- i. At least 5 percent of the parking area must be landscaped along walkways, center islands and at the end of bays, in addition to the general landscaping requirement per site plan, subdivision or other development approval.

- j. Double-loaded parking bays having more than 20 parking spaces must provide a suitably landscaped strip, at least 10 feet wide between aisles. The strip should include a 4-foot walkway, unless walkways are provided elsewhere.
- k. New parking must not reduce the number of existing off-street parking spaces.
- l. Parking areas must be paved according to generally accepted standards and specifications.
- m. Two or more uses or structures may share a parking area if the total number of spaces provided equals or exceeds the combined total of all of the spaces that are required for each use or structure.
- n. Off-street parking must be on lot or contiguous to the lot and adjacent to the principal uses. For non-residential uses in commercial districts, parking may be up to 150 feet away, measured from the nearest point of the parking facility to the nearest point of the principal building.
- o. New off-street loading must not affect existing off-street loading in a way that would make it deficient for the uses served.
- p. Surface must be asphaltic or Portland cement concrete. Off-loading spaces must be designed so that no vehicles will back into public streets or internal access roads or a parking area.
- q. Loading areas must be located or screened so they can not be seen from adjacent land uses or from the public street and they must not encroach into any required yards.
- r. Parking lots containing fifty (50) or more spaces must provide a deceleration lane for traffic turning right into the driveway from the street. The deceleration lane must be at least two hundred (200) feet long and at least thirteen (13) feet wide. A minimum forty (40) foot curb radius will be used from the deceleration lane into the driveway. When a deceleration lane is used, the driveway angle may be less than seventy-five (75) degrees.
- s. Parking lots containing two hundred (200) or more parking spaces and adjacent to a road with a peak hour traffic volume exceeding one thousand (1,000) vehicles per hour, must provide an acceleration lane to improve traffic merging and sight conditions. The acceleration lane must be at least two hundred (feet long and thirteen (13) feet wide).
- t. Areas of ingress and egress, loading and unloading areas, major interior driveways, aisles and other areas likely to experience similar heavy traffic shall be constructed with (a): four (4") inches of compacted dense graded aggregate in accordance with Section 301, Soil Aggregate Base Coarse and Dense Graded Aggregate Base Coarse, of the New Jersey Department of Transportation Standard Specifications (NJDOTSS) for Road and Bridge Construction (2001) and amendments thereto and (b): with not less than five (5") inches of compacted base course of plant-mixed bituminous stabilized base course, NJDOT Mix I-2, constructed in layers not more than three (3") inches compacted thickness, or an equivalent, and prepared and constructed in accordance with Section 304, Bituminous Stabilized Base Coarse, Mix I-2 of the NJDOTSS for Roads and Bridge Construction (2001) and amendments thereto, and (c): a minimum two (2") inch thick compacted wearing surface of bituminous concrete surface coarse, NJDOT Mix I-5 or equivalent shall be constructed thereon in accordance with Section 404, Bituminous Concrete Surface Coarse, Mix I-5 of the NJDOTSS for Roads and Bridge Construction (2001) and amendments thereto.

- u. Parking space areas and other areas likely to experience light traffic shall be constructed with (a) four (4") inches of compacted dense graded aggregate constructed in accordance with Section 301, Soil Aggregate Base Coarse and Dense Graded Aggregate Base Coarse, of the NJDOTSS for Road and Bridge Construction (2001) and amendments thereto and (b) paved with not less than three (3") inches of compact base course of plant-mixed bituminous stabilized base course, NJDOT Mix I-2, or an equivalent, prepared and constructed in accordance with Section 304, Bituminous Stabilized Base Coarse of the NJDOTSS for Roads and Bridge Construction (2001) and amendments thereto, and (c) at least two (2") inches NJDOT Mix I-5 surface of bituminous concrete surface coarse or equivalent, shall be constructed thereon in accordance with Section 404, Bituminous Concrete Surface Coarse of the NJDOTSS (2001) and amendments thereto.

2. Minimum Parking Requirements:

- a. The number of parking spaces for each use shall be determined by the number of dwelling units, the amount of gross floor area as defined in this chapter or as otherwise noted. Where a particular function contains more than one use, the total parking requirements shall be the sum of the component parts. Where a use operates its own vehicle(s), which vehicle(s) will be parked or stored at the business, the parking or storing spaces required for the vehicle(s) shall be in addition to the minimum off-street parking requirements of this Chapter.

MINIMUM OFF STREET PARKING REQUIREMENTS

<u>USE</u>	<u>MINIMUM NUMBER OF SPACES [GROSS FLOOR AREA (GFA)]</u>
LAND USE	
RESIDENTIAL	See Uniform Site Improvement Standards
COMMERCIAL	
Auto/Truck Sales	1 per 50 square feet of showroom area & sales office
Bank	6 per teller window or 1 per 200 square feet of GFA, whichever is greater
Banquet/Catering Halls	1 per 3 seats
Bowling Alley	4 per alley
Car Wash	5 per washing lane
Day Care Center	1 per 600 feet plus 1 per employee
Dental or Medical Facility	1 per 200 square feet of GFA, but not less than 3 spaces per examination /treatment room
Drive Up Window Services	8 vehicles per lane with each lane designed to be separate from other on-site circulations and parking areas. There shall be one bypass lane

Funeral Home	10 plus 1 for each 50 square feet devoted to chapel or slumber rooms
Laundromats/Coin Operated Cleaning	1 per 4 cleaning units
Motels, Hotels, Transient Guest Homes	1.0 per rental unit
Nightclub	1 per 3 seats
Offices: General & Professional	1 per 200 square feet of gross floor area
Personal Service Office	1 per 150 square feet of GFA
Research Laboratories	1 per employee plus 10 percent
Restaurant	1 per 2 seats devoted to service
Retail Store, Service Business	1 per 200 square feet of gross leasable area
Services Stations Without Retail Store	4 for each service bay
Shopping Centers	5.5 per 1,000 square feet of gross leasable area
Theaters	1 per 4 seats
Veterinary Hospital	4 per examination room or doctor, whichever is Greater
Wholesale Store, Motor Vehicles Establishment, Furniture Store	1 per 400 square feet

COMMUNITY FACILITIES

Assembly Hall, Auditorium, Community Center	1 per 100 square feet of gross floor area or 1 per 4 seats, whichever is greater
Church, House of Worship	1 per 3 seats
College	1 per every 2 students plus 1 per dormitory bed
Elementary School, Junior High School	1.2 per classroom plus 1 per teacher and staff
High School	10 per classroom
Hospital	1.5 per bed

Library or Museum	1 per 300 square feet of gross floor area
Nursing Home, Institution for Aged	1 per 3 beds

INDUSTRIAL

Industrial/Manufacturing Use or Storage Warehouse	1 per employee plus 10 percent or 1 per 750 Square feet of gross floor area, whichever is greater
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RECREATIONAL FACILITIES

Skating Rinks	4 spaces for each 120 square feet of skating
Clubs, Golf Clubhouses, Commercial or Non-Commercial Uses	1 for each six person of rated capacity
Gold Course	4 per hole

D. **Drainage.** The drainage system should be adequate to convey the storm water and natural drainage water which originates not only within the developed lot's boundaries, but also that which originates from the total natural watershed surrounding the property in question.

1. The drainage system shall be designed to control the amount and rate of storm water runoff. A general principle for development design shall be to not increase the parcel's rate of stormwater runoff by the use of structural and non-structural measures.
2. Whenever possible, any development's drainage system shall be designed for the recharge of ground water and the retention of stormwater on-site.
3. Provisions shall be made to limit the amount of sedimentation and other pollutants that may enter a natural water course as a result of the development.
4. Where possible, a development's stormwater management design shall preserve stream channels, floodplains, and wetlands in their natural condition to act as buffers against flooding and pollution.
5. No stormwater run-off or natural drainage water shall be so diverted as to overload existing drainage systems, create flooding, or require the construction of additional drainage facilities in other private or public lands without proper and approved provisions being made for remedying these off-site or off-tract conditions.
6. For all developments, land subject to periodic or occasional flooding (floodplain areas) shall not be platted for residential occupancy nor for any other purpose which may endanger life or property or aggravate the flood hazard. Such land within a plat shall be considered for open land use.

7. All streets shall be provided with catch basins and pipes where necessary for proper surface drainage. Dry wells are specifically prohibited as alternatives to catch basins, or as a method of recharge.
8. The materials used for drainage facilities and appurtenances shall be in conformance with *N.J.A.C. 5:21-7.4*, as same may be revised from time to time, particularly with low points in the streets and no overland relief. Otherwise, such materials shall be in conformance with Standard Specifications for Road and Bridge Construction of the New Jersey Department of Transportation, and all addenda. The technique for calculations and design parameters shall be by the rational method for drainage sheds less than four acres and the Soil Conservation Service method for drainage sheds above four acres.
9. For storm sewer design, a 10-year to 25-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, engineers shall design facilities to accommodate, as a minimum, the following storm frequencies:
 - a. Ten-year storm drain systems where excess flow can continue downgrade in the street or parking lot and not exceed the gutter capacity. Also, ten-year storms shall be used at low points in storm drain systems with overland relief.
 - b. Twenty-five-year storm where flow in a storm drain is totally carried by pipe when conditions above do not apply.
 - c. Twenty-five-year storm for culvert design where the culvert will be located in streams shown as a blue line 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 100-year frequency storm in accordance with Flood Hazard Area Control Regulations, *N.J.A.C. 7:13*
 - 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 100-year storm in accordance with Flood Hazard Area Control Regulations, *N.J.A.C. 7:13*
10. Storm drain inlets installed as part of new development and redevelopment projects (public or private) that disturb one acre or more are subject to the requirements of this subparagraph 9. In addition, retrofitting of existing storm drain inlets to this standard is required where such inlets are in direct contact with repaving, repairing, reconstruction or alterations of facilities owned or operated by the Township. For exemptions to this standard see "Exemptions" below.
 - a. Grates in Pavement or Other Ground Surfaces:
 - i. Design engineers shall use either of the following grates whenever they use a grate in pavement or another ground surface to collect stormwater from that surface into a storm drain or surface water body under that grate:
 - (1) The New Jersey Department of Transportation (NJDOT) bicycle safe grate, which is described in Chapter 2.4 of the NJDOT Bicycle Compatible Roadways and Bikeways Planning and Design Guidelines (April 1996).

- (2) A different grate, if each individual clear space in that grate has an area of no more than seven (7.0) square inches, or is no grater than 0.5 inches across the smallest dimension. (In regard to whether the different grate must also be bicycle safe, the Residential Site Improvement Standards include requirements for bicycle-safe grates.)
 - ii. 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 or roads (including bridges), driveways, parking areas, bikeways, plazas, sidewalks, lawns, fields, open channels, and stormwater basin floors.
- b. Curb-Opening Inlets (Including Curb-Opening Inlets in Combination Inlets):
- i. Whenever design engineers use a curb-opening inlet, the curb opening shall be divided (except as provided below) by bars or other means into individual clear spaces. Each such clear space shall have an area of no more than seven (7.0) square inches, or be no greater than two (2.0) inches across the smallest dimension.
 - ii. At sag points, the curb opening may consist of one or more larger clear spaces if the review agency determines that such a curb opening is required for adequate hydraulic performance.
- c. Exemptions:
- i. Hydraulic Performance Exemptions:
 - (1) New Development and Redevelopment Projects. Where the review agency determines that this standard would cause inadequate hydraulic performance that could not practicably be overcome by using additional or larger storm drain inlets that meet these standards.
 - (2) Retrofitting of existing storm drain inlets. Where the review agency determines that this standard would cause inadequate hydraulic performance.
 - ii. Alternate Device Exemptions:
 - (1) 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:
 - (a) A rectangular space four and five-eighths inches long and one and one-half inches wide (this option does not apply for outfall netting facilities); or
 - (b) A bar screen having a bar spacing of 0.5 inches.
 - (2) Where flows are conveyed through a trash rack that has parallel bars with one-inch (1") spacing between the bars, to the elevation of the water quality design storm as specified in *N.J.A.C. 7:8*.

- iii. Note: The preceding 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(a)*).
11. Single Type “B” inlets shall not be designed to catch more than five and one-half cubic feet per second, regardless of head, but shall not be spaced greater than four hundred feet center to center. Discharge and collection systems shall not be designed for inlet head under any circumstances.
 12. Drainage structures that are located on State or County highway rights-of-way shall be approved by the State or County highway engineer’s office, and a letter from that office indicating such approval shall be directed to the Township Planning Board and shall be received prior to the final plat approval. Drainage structures proposed on a brook or stream with drainage area of one-half square mile, three hundred twenty area or greater shall be approved by the New Jersey Division of Water Policy and Supply, and a letter from the office shall be directed to the Planning Board Chair.
 13. All proposed developments abutting a brook or stream whose drainage area, up to and including the subdivision or other development, is greater than fifty acres shall be required to secure a flood hazard permit from the New Jersey Department of Environmental Protection, prior to the authorization of final approval. Furthermore, a copy of the permit shall be forwarded to the Planning Board and shall be attached to the final engineering plans of same.
 14. Road drainage. The use of swales for road drainage purposes may be permitted at the discretion of the Township Planning Board for all development projects, provided that road drainage for subdivision projects must be reviewed according to the following provisions: In the case of subdivisions of fewer than twenty lots, the minimum lot sizes must be greater than one acre, and the swale grade must not exceed six percent or less than one-half of one percent. In the case of subdivisions with more than twenty lots, swales may only be permitted along roads in which reverse frontage has been provided. Where these conditions are not met or where drainage conditions warrant, curbing and guttering shall be required along all existing and proposed streets. In minor subdivisions, curbing and guttering may be required where drainage or traffic conditions warrant or when the subdivision is in proximity to existing curbed and guttered areas.
 15. Land drainage. All surface drainage shall be piped unless the developer demonstrates that the use of swales is a more appropriate form of conveyance to the satisfaction of the Township Planning Board. The use of swales is discouraged where the adjacent lot sizes on the same tract are 25,000 square feet or less.
 16. Swales, where permitted, shall be designed according to the following standards:
 - a. Swales shall have a parabolic or trapezoidal shape.
 - b. Side slopes of a swale along a road shall not be steeper than 4:1 adjacent to the road and 2:1 on the slope away from the road. Side slopes of swales not along a road shall not exceed 3:1.
 - c. Trees, brush, and stumps, as well as other objectionable material are to be cleared and disposed of so as not to interfere with construction or proper functioning of the waterway.
 - d. Separate areas filled are to be compacted as needed to prevent unequal settlement that will cause damage in the completed waterway.

- e. Waterways and outlets shall be protected against erosion by vegetative means as soon after construction as practical before diversions or other channels are outletted into them. Seeding, fertilizing, mulching, and sodding shall be in accordance with the applicable standards as determined by the Soil Conservation Service of the State of New Jersey.
17. Storm sewer pipe shall be installed in accordance with proper engineering practices and shall be designed according to the following standards:
- a. The pipe shall be concrete or ductile iron pipe as required by the Planning Board engineer. Other pipe materials, in accordance with NJAC 5:21-7, are subject to approval by the Municipal Engineer.
 - b. All drainage pipes shall have a minimum diameter of fifteen inches unless otherwise approved by Municipal Engineer. The pipe shall be laid in straight alignment, between manholes. All transitions in slope, change of direction, or pipe size shall be confined to manholes, catch basins, or other accessible structure.
 - c. The size of the pipe, slope, and invert elevations shall be submitted on a final drainage plan.
 - d. In those areas where the groundwater elevation is such that roadway subbase instability could occur from same the Planning Board engineer shall reserve the right to require underdrains in addition to storm sewer conduit for the purpose of adequately under-draining the surrounding soil and stabilizing the affected subbase.
 - e. Slotted drainpipe shall not be permitted, unless approved by Municipal Engineer.
18. Any area occupied or to be occupied by a municipal watercourse, surface, or subsurface drainage way, channel or stream, must be established by easement to the Township. The width of the drainage easement shall be determined by the Township engineer based upon the width needed to accommodate future stormwater runoff and to allow sufficient area for maintenance or construction activities. A minimum width of all drainage easements shall be forty feet or twenty feet from the edge of the watercourse.
19. For Minimum Stormwater Management Requirements and Controls for Major Development in the Township of Pennsville please see Section 8.4
- E. **Lighting.** Adequate lighting shall be provided to ensure safe movement of persons and vehicles and for security purposes. Lighting standards shall be a type approved by the approving authority. Directional lights shall be arranged so as to minimize glare and reflection on adjacent properties. Street lighting shall be provided in accordance with the recommendations of the Planning Board engineer and as required by the Township Planning Board. Adequate lighting shall be provided at all intersections and along all roads classified as Township collectors. The developer shall pay to the Township the costs of operation of said street lights (as determined by the standard rates of the utility) until the street upon which said street lights are installed is accepted by the Township Committee as a public street. All subdivision, site plan, variance, and other applications for development must include plans for proposed exterior lighting, including location, type, pole height, and luminaire mounting height (all must be depicted in plan detail), radius of light and intensity in footcandles, and designed in accordance with the following and other generally accepted standards:

1. The style, light standard, and height of the light must be consistent with the architectural style of the principal building. Light height cannot exceed thirty-five (35) feet. Lights must be shielded to restrict maximum illumination apex to 150 degrees and to prevent glare to adjacent land uses.
2. There must be lighting along streets, parking areas, at all intersections, and at all building entrances/exits. Sidewalks must have low or mushroom-type lighting. Freestanding lights must be designed so as not to cause a roadside safety hazard.
3. No spotlight fixtures attached to building will be permitted except for security purposes in the rear of buildings.
4. Upon the recommendation of the Planning Board Engineer, the Planning Board will determine the appropriate intensity and type of lighting. To provide applicants with a guideline to prepare the plans for initial Planning Board submission and notes for consideration, the following lighting intensity values are proposed:

<u>Use</u>	<u>Average Footcandles</u>
High activity:	
Parking lots/walkways in business and similar areas	2 fc
Commercial loading areas	10 fc
Playgrounds (general)	5 fc
Medium Activity:	
Street lighting at intersections	1.2 fc
Street lighting at mid-block and similar locations	0.6 fc
Low Activity:	
Lighting along rural roads and similar locations	0.8 fc

5. In areas of “high activity” the Planning Board may require a reduction in lighting after certain hours.
 6. Streetlights in residential areas must be installed at either end of all curves with a radius less than 350 feet. Site Plan Lighting information must be provided on a designated lighting plan which is to be prepared in conjunction with a landscape plan to determine the correct location of canopy trees. All existing lights within 100 feet of the site in question, including location of all poles and luminaries must be shown on the lighting plan.
- F. **Buffering and Screening.** Buffering shall be located around the perimeter of the site to minimize headlights of vehicles, noise, light from structures, the movement of people and vehicles, and to shield activities from adjacent properties when necessary. Buffering may consist of fencing, evergreens, shrubs, bushes, deciduous trees or combinations thereof to achieve the design objectives. All buffering must meet generally accepted standards and specifications.
1. Buffering or screening is required along the entire perimeter of all development projects. Buffers also may be required to shield parking areas. When a commercial or industrial land use abuts an existing or proposed residential land use, a dense natural barrier or screen will be required. Screening also may be required around garbage areas, loading bays, and where interior roads run parallel with exterior roads.

2. Windbreaks are required where necessary to prevent wind-borne debris from leaving the site.
3. Fences used for screening must complement the architectural design of the principal buildings. Transparent fences will not be considered sufficient unless accompanied by landscaping. Opaque fences may be used only for screening, not for buffering. Landscaping techniques, such as terracing and creation of berms must be utilized for buffering and screening.

G. Landscaping; Trees. Every effort shall be made to preserve the landscape in its natural state or to improve existing site conditions in keeping with adjacent areas. Landscaping shall be provided as part of the overall project design and integrated into building arrangements, topography, parking and buffering requirements. Landscaping shall include trees, bushes, shrubs, ground cover, perennials, annuals and plants, and shall be designed according to generally accepted standards. A landscaping plan must be submitted with each development application. The landscaping plan must identify and locate existing and proposed trees, shrubs, bushes, plants and ground cover. It also must indicate proposed alterations to the terrain. Additionally, the following principles should be followed:

1. Landscaping must accent and complement buildings and promote with interior climate control.
2. The impact over time of proposed landscaping shall be considered so that shrubs or trees do not grow to block sight distances, especially at driveway entrances and in parking areas.
3. Factors to consider include species' texture, color, and shape as well as resistance to disease, litter, and maintenance requirements.
4. The preservation of existing trees and vegetation is encouraged. Trees greater than fifteen (15) inches in diameter shall be incorporated into the landscaping plan. The grade around exiting trees may not be varied more than six (6) inches unless properly designed trees wells are constructed.
5. The clearing of woodland shall be strictly controlled. The stripping of trees from a lot and the filling, or the alteration of the water table in wooded areas, shall be prohibited except if an extensive replacement tree planting program has been approved by the Township Planning Board. All development projects shall be designed to have minimal impact on existing woodland. The siting of structures shall be such as to preserve the maximum number of trees over fifteen inches in diameter and all trees over twenty-four inches in diameter.
6. Shade trees. In all development projects including major subdivisions, shade trees shall be provided along the frontage. Two trees properly planted, staked, and fertilized shall be provided for every one hundred feet of road frontage except if an equivalent number of trees are preserved within fifty feet of the right-of-way. All shade trees shall meet the following requirements:
 - a. Trees shall be a deciduous variety (oak, hard maple) native to the area and shall be approved by the Planning Board.
 - b. Trees shall be nursery grown and shall have a mini-caliper of one and one-half inches measured three feet above the ground.
 - c. Trees shall be planted where required by the Planning Board in a planting strip ten feet from the edge of the shoulder when the road has been designed according to the approved cross-sections.

- d. To prevent problems with underground utilities and impacts to the sidewalks, shade trees must be placed 5' – 10' behind sidewalk. Street trees shall be planted forty (40) to sixty (60) feet apart, parallel to the curb and directly outside any utility easements which border the project's ROW. A ten (10') foot wide shade tree easement shall be created if required by the Board. Trees shall not be placed in the grass strip between the curb and sidewalk.
 - e. Trees shall be balled and burlapped, nursery grown, free from insects and disease and true to species and variety.
- H. **Signs.** In addition to complying with all applicable zoning requirements, signs must be designed so as to be aesthetically pleasing, harmonious with other signs on the site, and located so as to achieve their purpose without constituting hazards to vehicles and pedestrians.
- I. **Utilities.** Sanitary waste disposal, water supply and solid waste disposal shall be reviewed to confirm conformity with public safety regulations. Storm water drainage and detention facilities, storm water management plans, and all applicable laws and regulations shall be reviewed and considered, particularly with respect to land designated as subject to flooding, to avoid danger to life or property. Particular emphasis shall be given to the adequacy of all existing utility systems, and the need for any on-site or off-site improvements. Adequate fire protection systems must be included in all plans. Solid waste disposal must be adequate to minimize infestation by vermin and rodents, and must conform to all applicable Township recycling ordinances and other applicable laws and regulations.
- 1. Plans must include depictions of all public services being connected to an approved public utilities systems. Development applicants must submit written approval from each serving utility to confirm compliance with this section.
 - 2. Applicants shall arrange with the serving utility for the underground installation of the utilities, distribution supply lines, and service connection. Service connections shall be made underground for all developments. Whenever the widening or extension of a street requires the replacement or relocation of utilities, such replacement or relocation shall be underground. Common trenches shall be utilized where appropriate according to generally accepted standards.
 - 3. Utility easements along rear or side property lines may be required. Such easements shall be at least twenty feet wide and, to the extent possible, be centered on or adjacent to rear or side lot lines.
- J. **Environmental Considerations.** Environmental elements relating to soil erosion, preservation of trees, protection of watercourses, topography, soil, and wildlife shall be reviewed and the design of the plan shall minimize any adverse impact on these elements. Whenever possible, the natural features of a site are to be preserved, floodplains respected, and excessive cut or fill avoided. In reviewing a development application, the Planning Board shall take into consideration the effect of the development upon all aspects of the environment as outlined in the Environmental Impact Statement requirements, as well as the sufficiency of applicant's proposal in the Environmental Impact Statement for dealing with any immediate or projected adverse effects. The reviewing authority may require, as a condition of approval or the application, that steps be taken to minimize all adverse environmental impacts during and after construction, and no final approval shall be issued until all such requirements shall have been complied with or compliance is guaranteed by a performance guarantee meeting the standards, requirements and procedures set forth in Section 9.3 of this ordinance.

- K. **Natural Features.** The important natural features of a site shall be preserved in the design of all development projects in accordance with generally accepted standards. Natural features that shall be protected include the natural terrain, wetlands, wooded area, vistas, natural drainage-ways, and lakes. A developer shall only be permitted to significantly alter or encroach on the existing natural features if the Planning Board is convinced that the alteration is the minimum necessary to allow the use of the land for the intended purpose and that there are no alternative to the development project design which would eliminate or mitigate any adverse impact on natural features.
- L. **Topsoil Protection.** No topsoil shall be removed from the site or used as spoil. Topsoil moved during the course of construction shall be redistributed within the development project so as to provide at least four inches of cover to all areas of the development project and shall be stabilized by seeding or planting.
- M. **Lot Configuration.**
1. Lot dimensions and area shall not be less than the requirements of the Zoning Ordinance unless approved by variance.
 2. Insofar as practical, side lot lines shall be at right angles to straight streets and radial to curved streets.
 3. Where additional right-of-way has been required to bring existing right-of-ways up to standard, lots shall begin at the proposed right-of-way line and all setbacks shall be measured from that line.
 4. For proper development of the land within the Township, lots shall have an average length no greater than two hundred fifty percent of the average width, except where the width exceeds three times the zoning requirements.
 5. Where there is a question as to the suitability of a lot or lots for their intended use due any failure to meet the above lot configuration standards, or due to factors such as poor drainage conditions or where percolation tests or test borings show the ground conditions to be inadequate for proper on-lot sewage treatment, the Planning Board may, after adequate investigation, withhold approval of such lots. If approval is withheld, the Planning Board shall specify the reasons for such denial in its memorializing resolution.
- N. **Monuments.** Monuments shall be installed in compliance with the requirements of the Map Filing Law (*N.J.S.A. 46:23-9.9, et seq.*). All lot corners shall be marked with a durable metal alloy pin.
- O. **All Improvements Within Municipal Boundaries.** No cul-de-sac or loop street, or any part thereof, or any building or site improvements for any site plan or subdivision project may extend from Pennsville Township into another municipality, or from another municipality into Pennsville Township. All streets and portions thereof, including cul-de-sac streets, loop streets, and portions of all other types of streets within Pennsville Township, must provide access only to lots that meet all applicable lot area, dimension and configuration requirements.

P. Private Storm Drain Inlet Retrofitting

1. **Purpose:** Requiring the retrofitting of existing storm drain inlets which are in direct contact with repaving, repairing, reconstruction, resurfacing, or alterations of facilities on private property, to prevent the discharge of solids and floatables (such as plastic bottles, cans, food wrappers and other litter) to the municipal separate storm sewer system(s) operated by the Township of Pennsville so as to protect public health, safety and welfare, and to prescribe penalties to the failure to comply.
2. **Definitions:** For the purpose of this ordinance the following terms, phrases, words and their derivations shall have the meanings stated herein unless their use in the text of this Chapter clearly demonstrates a different meaning. When not inconsistent with the context, words used in the present tense include the future, words used in the plural number include the singular number, and words used in the singular number, and words used in the singular number include the plural number. The word “shall” is always mandatory and not merely directory.
 - a. Municipal separate storm sewer system (MS4) – A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains) that is owned operated by the Township of Pennsville or other public body, and is designed and used for collecting and conveying stormwater.
 - b. Person – Any individual, corporation, company, partnership, firm, association, or political subdivision of this state subject to municipal jurisdiction.
 - c. Storm drain inlet – An opening in a storm drain used to collect stormwater runoff and includes, but is not limited to, a grate inlet, curb-opening inlet, slotted inlet, and combination inlet.
 - d. Waters of the state – Means the ocean and its estuaries, all springs, streams and bodies of surface or ground water, whether natural or artificial, within the boundaries of the State of New Jersey or subject to its jurisdiction.
3. **Prohibited Conduct:** No person in control of private property (except a residential lot with one single family house) shall authorize the repaving, repairing (excluding the repair of individual potholes), resurfacing (including top coating or chip sealing with asphalt emulsion or a thin base of hot bitumen), reconstructing or altering any surface that is in direct contact with an existing storm drain inlet on that property unless the storm drain inlet either:
 - a. Already meets the design standard below to control passage of solid and floatable materials; or
 - b. Is retrofitted or replaced to meet the standard in No. 4 below prior to the completion of the project.

4. **Design Standard:** Storm drain inlets identified in No. 3 above 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 5.c. below.

a. Design engineers shall use either of the following grates whenever they use a grate in pavement or another ground surface to collect stormwater from that surface into a storm drain or surface water body under that grate:

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

(2) A different grate, if each individual clear space in that grate has an area of no more than seven (7.0) square inches, or is no greater than 0.5 inches across the smallest dimension.

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.

b. Whenever design engineers use a curb-opening inlet, the clear space in that curb opening (or each individual clear space, if the curb opening has two or more clear spaces) shall have an area of no more than seven (7) square inches, or be no greater than two (2) inches across the smallest dimension.

c. This standard does not apply:

(1) Where the Township Engineer agrees that this standard would cause inadequate hydraulic performance that could not practicably be overcome by using additional or larger storm drain inlets that meet these standards.

(2) Where flows are conveyed through any device (e.g., end of pipe netting facility, manufactured treatment device, or a catch basin hood) that is designed, at a minimum, to prevent delivery of all solid and floatable materials that could not pass through one of the following:

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

(b) A bar screen having a bar spacing of 0.5 inches.

- (3) Where flows are conveyed through a trash rack that has parallel bars with one-inch (1”) spacing between the bars; or
 - (4) Where the New Jersey Department of Environmental Protection determines, pursuant to the New Jersey Register of Historic Places Rules at NJAC 7:4-7.2(c), that action to meet this standard is an undertaking that constitutes an encroachment or will damage or destroy the New Jersey Register listed historic property.
4. **Enforcement:** This Ordinance shall be enforced by the Township of Pennsville Zoning Officer and the Township Engineer.
5. **Penalties:** Any person(s) who is found to be in violation of the provisions of this Ordinance shall be subject to a fine not less than one hundred (\$100.00) dollars – no greater than five hundred (\$500.00) dollars for each storm drain inlet that is not retrofitted to meet the design standard.

Q. **Dumpsters – Enclosures.** Dumpsters must be surrounded by a masonry wall or vinyl fence which shall be at least 6 feet high and which structure shall have a self-closing gate for access (side or rear access door or doors optional). The enclosure shall be situated on a paved surface; and if it is constructed with chain link fencing, it shall have vinyl slatting to obscure the interior from passersby. In addition, steel bollards shall be placed in the interior of the enclosure, the exact location of which shall be determined by the Planning Board engineer.

SECTION 8.4 -- Minimum Stormwater Management Requirements and Controls for Major Development in the Township of Pennsville

A. **Definitions.** Unless specifically defined below, words or phrases used in this ordinance shall be interpreted so as to give them the meaning they have in common usage and to give this ordinance it’s most reasonable application. When used in this ordinance, the following terms shall have the meanings herein ascribed to them.

“Pennsville Township” means the Planning Board, Zoning Board of Adjustment or other board, agency or official of Pennsville Township with authority to approve or disapprove subdivisions, site plans, construction permits, building permits or other applications for development approval. For the purposes of reviewing development applications and ensuring compliance with the requirements of this ordinance, Pennsville Township may designate the municipal engineer or other qualified designee to act on behalf of Pennsville Township.

“Aquaculture” means the propagation, rearing and subsequent harvesting of aquatic organisms in controlled or selected environments, and their subsequent processing, packaging and marketing, including but not limited to, activities to intervene in the rearing process to increase production such as stocking, feeding, transplanting and providing for protection from predators.

“Certification” means either a written statement signed and sealed by a licensed New Jersey Professional Engineer attesting that a BMP design or stormwater management system conforms

to or meets a particular set of standards. Depending upon the context in which the term is use, the terms "certify" and "certified" shall be construed accordingly.

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

"Construction" means the construction, erection, reconstruction, alteration, conversion, demolition, removal or equipping of buildings, structures or components of a stormwater management system including but not limited to collection inlets, stormwater piping, swales and all other conveyance systems, and stormwater BMPs.

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

A county planning agency; or

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

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

“Design permeability” means the tested permeability rate with a factor of safety of two (2) applied to it (e.g., if the tested permeability rate of the soils is four (4) inches per hour, the design rate would be two (2) inches per hour).

“Development” means the change of or enlargement of any use or disturbance of any land, the performance of any building or mining operation, the division of land into two or more parcels, and the creation or termination of rights of access or riparian rights including, but not limited to:

1. A change in type of use of a structure or land;
2. A reconstruction, alteration of the size, or material change in the external appearance of a structure or land;
3. A material increase in the intensity of use of land, such as an increase in the number of businesses, manufacturing establishments, offices or dwelling units in a structure or on land;
4. Commencement of resource extraction or drilling or excavation on a parcel of land;
5. Demolition of a structure or removal of trees;
6. Commencement of forestry activities;
7. Deposit of refuse, solid or liquid waste or fill on a parcel of land;

8. In connection with the use of land, the making of any material change in noise levels, thermal conditions, or emissions of waste material; and

9. Alteration, either physically or chemically, of a shore, bank, or flood plain, seacoast, river, stream, lake, pond, wetlands or artificial body of water.

In the case of development on agricultural land, i.e. lands used for an agricultural use or purpose as defined at N.J.A.C. 7:50-2.11, development means: any activity that requires a State permit; any activity reviewed by the County Agricultural Boards (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.

“Development, major” means any “development” that provides for ultimately disturbing one or more acres of land. Disturbance for the purpose of this ordinance is the placement of impervious surface or exposure and/or movement of soil or bedrock or clearing, cutting or removing of vegetation.

“Development, minor” means all development other than major development.

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

“Environmentally critical area” means an area or feature which is of significant environmental value, including but not limited to: stream corridors; natural heritage priority sites; habitat of endangered or threatened animal species; threatened or endangered plants of the Pinelands pursuant to N.J.A.C. 7:5-6.27(a); large areas of contiguous open space or upland forest; steep slopes; and well head protection and groundwater recharge areas. T & E habitat constitutes habitat that is critical for the survival of a local population of threatened and endangered species or habitat that is identified using the Department’s Landscape Project as approved by the Department’s Endangered and Nongame Species Program, whichever is more inclusive.

“Exception” means the approval by the approving authority of a variance or other material departure from strict compliance with any section, part, phrase or provision of this ordinance. An exception may be granted only under certain specific, narrowly-defined conditions described herein.

“Extended detention basin” means a facility constructed through filling and/or excavation that provides temporary storage of stormwater runoff. It has an outlet structure that detains and attenuates runoff inflows and promotes the settlement of pollutants. An extended detention basin is normally designed as a multi-stage facility that provides runoff storage and attenuation for both stormwater quality and quantity management. The term “stormwater detention basin” shall have the same meaning as “extended detention basin.”

"Finished grade" means the elevation of the surface of the ground after completion of final grading, either via cutting, filling or a combination thereof.

"Grading" means modification of a land slope by cutting and filling with the native soil or redistribution of the native soil which is present at the site.

"Groundwater" means water below the land surface in a zone of saturation.

"Groundwater mounding analysis" means a test performed to demonstrate that the groundwater below a stormwater infiltration basin will not "mound up," encroach on the unsaturated zone, break the surface of the ground at the infiltration area or downslope, and create an overland flow situation.

"Heavy Equipment" means equipment, machinery, or vehicles that exert ground pressure in excess of eight (8) pounds per square inch.

"High Pollutant Loading Area" means an area in an industrial or commercial development site: where solvents and/or petroleum products are loaded/unloaded, stored, or applied; where pesticides are loaded/unloaded or stored; 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; where recharge would be inconsistent with NJDEP-approved remedial action work plan or landfill closure plan; and/or where a high risk exists for spills of toxic materials, such as gas stations and vehicle maintenance facilities. The term "HPLA" shall have the same meaning as "High Pollutant Loading Area."

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

"Infiltration" is the process by which precipitation enters the soil through its surface.

"In lieu contribution" means a monetary fee collected by Pennsville Township in lieu of requiring strict on-site compliance with the groundwater recharge, stormwater runoff quantity and/or stormwater runoff quality standards established in this ordinance.

"Install" means to assemble, construct, put in place or connect components of a stormwater management system.

"Mitigation" means acts necessary to prevent, limit, remedy or compensate for conditions that may result from those cases where an applicant has demonstrated the inability or impracticality of strict compliance with the stormwater management requirements set forth in N.J.A.C. 7:8, in an adopted regional stormwater management plan, or in a local ordinance which is as protective as N.J.A.C. 7:8, and an exception from strict compliance is granted by Pennsville Township.

"New Jersey Stormwater Best Management Practices Manual" means guidance developed by the New Jersey Department of Environmental Protection, in coordination with the New Jersey Department of Agriculture, the New Jersey Department of Community Affairs, the New Jersey Department of Transportation, municipal engineers, county engineers, consulting firms, contractors, and environmental organizations to address the standards in the New Jersey Stormwater Management Rules, N.J.A.C. 7:8. The BMP manual provides examples of ways to meet the standards contained in the rule. An applicant may demonstrate that other proposed management practices will also achieve the standards established in the rules. The manual, and notices regarding future versions of the manual, are available from the Division of Watershed Management, NJDEP,

PO Box 418, Trenton, New Jersey 08625; and on the NJDEP's website, www.njstormwater.org. The term "New Jersey BMP Manual" shall have the same meaning as "New Jersey Stormwater Best Management Practices Manual."

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

"NJPDES" means the New Jersey Pollutant Discharge Elimination System as set forth in N.J.S.A. 58:10A-1 et seq. and in N.J.A.C. 7:14A.

"NJPDES permit" means a permit issued by the NJDEP pursuant to the authority of the Water Pollution Control Act, N.J.S.A. 58:10A-1 et seq., and N.J.A.C. 7:14A for a discharge of pollutants.

"Nonpoint source" means:

1. Any human-made or human-induced activity, factor, or condition, other than a point source, from which pollutants are or may be discharged;
2. Any human-made or human-induced activity, factor, or condition, other than a point source, that may temporarily or permanently change any chemical, physical, biological, or radiological characteristic of waters of the State from what was or is the natural, pristine condition of such waters, or that may increase the degree of such change; or
3. Any activity, factor, or condition, other than a point source, that contributes or may contribute to water pollution.

The term "NPS" shall have the same meaning as "nonpoint source."

"Nonstructural BMP" means a stormwater management measure, strategy or combination of strategies that reduces adverse stormwater runoff impacts through sound site planning and design. Nonstructural BMPs include such practices as minimizing site disturbance, preserving important site features, reducing and disconnecting impervious cover, flattening slopes, utilizing native vegetation, minimizing turf grass lawns, maintaining natural drainage features and characteristics and controlling stormwater runoff and pollutants closer to the source. The term "Low Impact Development technique" shall have the same meaning as "nonstructural BMP."

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

"Permeability" means the rate at which water moves through a saturated unit area of soil or rock material at hydraulic gradient of one, determined as prescribed in N.J.A.C. 7:9A-6.2 (Tube Permeameter Test), N.J.A.C. 6.5 (Pit Bailing Test) or N.J.A.C. 6.6 (Piezometer Test). Alternative permeability test procedures may be accepted by the approving authority provided the test procedure attains saturation of surrounding soils, accounts for hydraulic head effects on infiltration rates, provides a permeability rate with units expressed in inches per hour and is accompanied by a published source reference. Examples of suitable sources include hydrogeology, geotechnical, or engineering text and design manuals, proceedings of American Society for Testing and Materials (ASTM) symposia, or peer-review journals. Neither a Soil Permeability Class Rating Test, as described in N.J.A.C. 7:9A-6.3, nor a Percolation Test, as described in N.J.A.C. 7:9A-6.4, are acceptable tests for establishing permeability values for the purpose of complying with this ordinance.

"Permeable" means having a permeability of one (1) inch per hour or faster. The terms "permeable soil," "permeable rock" and "permeable fill" shall be construed accordingly.

"Person" means any individual, corporation, company, partnership, firm, association, municipality 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.

"Pinelands Commission" or "Commission" means the Commission created pursuant Section 5 of the Pinelands Protection Act, N.J.S.A. 13:18A-5.

"Pinelands CMP" means the New Jersey Pinelands Comprehensive Management Plan (N.J.A.C. 7:50 1.1 et seq).

"Point source" means any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture.

"Pollutant" means any dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, refuse, oil, grease, sewage sludge, munitions, chemical wastes, biological materials, medical wastes, radioactive substances (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, suspended solids, 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.

"Professional Engineer" means a person licensed to practice Professional Engineering in the State of New Jersey pursuant to N.J.S.A. 48:8-27 et seq.

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

"Replicate" means one of two or more soil samples or tests taken at the same location (within five feet of each other) and depth, within the same soil horizon or substratum. In the case of fill material, replicate tests are tests performed on sub-samples of the same bulk sample packed to the same bulk density.

"Sand" means a particle size category consisting of mineral particles which are between 0.05 and 2.0 millimeters in equivalent spherical diameter. Also, a soil textural class having 85 percent or more of sand and a content of silt and clay such that the percentage of silt plus 1.5 times the percentage of clay does not exceed 15, as shown in Section 8.4.I.3.a (USDA Soil Textural Triangle).

"Seasonally high water table" means the upper limit of the shallowest zone of saturation which occurs in the soil, identified as prescribed in N.J.A.C. 7:9A-5.8.

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

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

“Soil” means all unconsolidated mineral and organic material of any origin which is not a rock substratum, including sediments below the biologically active and/or weathered zones.

“Source material” means any material(s) or machinery, located at an industrial facility, which 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.

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

“Stormwater infiltration BMP” means a basin or other facility constructed within permeable soils that provides temporary storage of stormwater runoff. An infiltration BMP does not normally have a structural outlet to discharge runoff from the stormwater quality design storm. Instead, outflow from an infiltration BMP is through the surrounding soil. The terms “infiltration measure” and “infiltration practice” shall have the same meaning as “stormwater infiltration basin.”

“Stormwater management measure” means any structural or nonstructural strategy, practice, technology, process, program, or other method intended to control or reduce stormwater runoff and associated pollutants, or to induce or control the infiltration or groundwater recharge of stormwater or to eliminate illicit or illegal non-stormwater discharges into stormwater conveyances. This includes, but is not limited to, structural and nonstructural stormwater Best Management Practices described in the New Jersey BMP Manual and designed to meet the standards for stormwater control contained within this ordinance. The terms “stormwater Best Management Practice” and “stormwater BMP” shall have the same meaning as “stormwater management measure.”

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

"Suitable soil" means unsaturated soil, above the seasonally high water table, which contains less than fifty percent (50%) by volume of coarse fragments and which has a tested permeability rate of between one (1) and twenty (20) inches per hour.

"Surface water" means any waters of the State which are not groundwater.

“Time of concentration” means the time it takes for runoff to travel from the hydraulically most distant point of the drainage area to the point of interest within a watershed.

“Total Suspended Solids” means the insoluble solid matter suspended in water and stormwater that is separable by laboratory filtration in accordance with the procedure contained in the "Standard Methods for the Examination of Water and Wastewater" prepared and published jointly by the American Public Health Association, American Water Works Association and the Water Pollution Control Federation. The term “TSS” shall have the same meaning as “Total Suspended Solids.”

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

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

"Water table" means the upper surface of a zone of saturation.

"Well" means a bored, drilled or driven shaft, or a dug hole, which extends below the seasonally high water table and which has a depth which is greater than its largest surface dimension.

“Wetlands” mean those lands which are inundated or saturated by water at a magnitude, duration and frequency sufficient to support the growth of hydrophytes. Wetlands include lands with poorly drained or very poorly drained soils as designated by the National Cooperative Soils Survey of the Soil Conservation Service of the United States Department of Agriculture. Wetlands include coastal wetlands and inland wetlands, including submerged lands. The "New Jersey Pinelands Commission Manual for Identifying and Delineating Pinelands Area Wetlands: A Pinelands Supplement to the Federal Manual for Identifying and Delineating Jurisdictional Wetlands," dated January, 1991, as amended, may be utilized in delineating the extent of wetlands based on the definitions of wetlands and wetlands soils contained in this section, N.J.A.C. 7:50 2.11, 6.4 and 6.5. The term “wetland” shall have the same meaning as “wetlands.”

“Wet pond” means a stormwater facility constructed through filling and/or excavation that provides both permanent and temporary storage of stormwater runoff. It has an outlet structure that creates a permanent pool and detains and attenuates runoff inflows and promotes the settling of pollutants. A stormwater retention basin can also be designed as a multi-stage facility that also provides extended detention for enhanced stormwater quality design storm treatment and runoff storage and attenuation for stormwater quantity management. The term “stormwater retention basin” shall have the same meaning as “wet pond.”

B. Scope and Purpose

1. Purpose.

- a) It is hereby determined that:
 - i. Land development projects and associated disturbance of vegetation and soil and changes in land cover, including increases in impervious cover, alter the hydrologic response of local watersheds and increase stormwater runoff rates and volumes. If inadequately or improperly managed, this stormwater runoff can deplete groundwater resources and increase flooding, stream channel erosion, and sediment transport and deposition.

- ii. This stormwater runoff contributes to increased quantities of waterborne pollutants.
 - iii. Increases of stormwater runoff, soil erosion and nonpoint source pollutants have occurred in the past as a result of land development, and contribute to the degradation of the water resources of Pennsville Township.
 - iv. Pennsville Township's natural resources are to be protected in accordance with New Jersey Stormwater Management Rules at N.J.A.C 7:8-1.1 et seq. and New Jersey's surface water quality antidegradation policies contained in the New Jersey Surface Water Quality Standards at N.J.A.C. 7:9B-1.1 et seq. Permitted uses shall maintain the ecological character and quality of Pennsville Township, including good water quality and natural rates and volumes of flow.
 - v. Increased stormwater rates and volumes and the sediments and pollutants associated with stormwater runoff from future development projects within Pennsville Township have the potential to adversely affect Pennsville Township's streams and water resources and the streams and water resources of downstream municipalities.
 - vi. Stormwater runoff, soil erosion and nonpoint source pollution can be controlled and minimized through the regulation of stormwater runoff from development sites.
 - vii. It is in the public interest to regulate the discharge of stormwater runoff from "major development" projects, as defined in Section 1 of this ordinance, conducted within Pennsville Township, as provided in this ordinance, in order to control and minimize increases in stormwater runoff rates and volumes, to maintain groundwater recharge, and to control and minimize soil erosion, stream channel erosion and nonpoint source pollution associated with stormwater runoff.
- b) Therefore, it is the purpose of this ordinance to establish minimum stormwater management requirements and controls for major development, consistent with the statewide stormwater requirements at N.J.A.C. 7:8, and the provisions of the adopted master plan and land use ordinances of Pennsville Township.

2. Goals and Techniques.

- a. Through this ordinance, Pennsville Township has established the following goals for stormwater control:
 - i. To reduce flood damage, including damage to life and property;
 - ii. To minimize any increase in stormwater runoff from new development;
 - iii. To reduce soil erosion from any development or construction project;
 - iv. To assure the adequacy of existing and proposed culverts and bridges, and other in-stream structures;
 - v. To maintain groundwater recharge;
 - vi. To minimize any increase in nonpoint pollution;

- vii. To maintain the integrity of stream channels for their biological functions, as well as for drainage;
 - viii. To restore, protect, maintain and enhance the quality of the streams and water resources of Pennsville Township.
 - ix. To minimize pollutants in stormwater runoff from new and existing development in order to restore, protect, enhance and maintain the chemical, physical and biological integrity of the surface and groundwaters of Pennsville Township, to protect public health and to enhance the domestic, municipal, recreational, industrial and other uses of water; and
 - x. To protect public safety through the proper design and operation of stormwater management basins.
- b. In order to achieve the goals for stormwater control set forth in this ordinance, Pennsville Township has identified the following management techniques:
- i. Implementation of multiple stormwater management Best Management Practices (BMPs) may be necessary to achieve the performance standards for stormwater runoff quantity and rate, groundwater recharge, erosion control, and stormwater runoff quality established through this ordinance.
 - ii. Compliance with the stormwater runoff quantity and rate, groundwater recharge, erosion control, and stormwater runoff quality standards established through N.J.A.C. 7:8-1.1 et seq., and this ordinance, shall be accomplished to the maximum extent practicable through the use of nonstructural BMPs, before relying on structural BMPs. Nonstructural BMPs are also known as Low Impact Development (LID) techniques.
 - iii. Nonstructural BMPs shall include both environmentally sensitive site design and source controls that prevent pollutants from being placed on the site or from being exposed to stormwater.
 - iv. Source control plans shall be developed based upon physical site conditions and the origin, nature and the anticipated quantity or amount of potential pollutants.
 - v. Structural BMPs, where necessary shall be integrated with nonstructural stormwater management strategies and proper maintenance plans.
 - vi. When using structural BMPs, multiple stormwater management measures, smaller in size and distributed spatially throughout the land development site, shall be used wherever possible to achieve the performance standards for water quality, quantity and groundwater recharge established through this ordinance before relying on a single, larger stormwater management measure to achieve these performance standards.

3. Applicability.

- a. This ordinance shall apply to:

- i. All site plans and subdivisions for major developments occurring within Pennsville Township that require preliminary or final site plan or subdivision review; and
 - ii. All major development projects undertaken by Pennsville Township shall comply with this ordinance.

- 4. Procedures. In addition to other development review procedures set forth in the Code of Pennsville Township, major developments located within Pennsville Township shall comply with the stormwater management requirements and specifications set forth in this ordinance. New agricultural development that meets the definition of major development in Section 8.4.A of this ordinance shall be submitted to the appropriate Soil Conservation District for review and approval in accordance with the requirements of N.J.A.C. 5.4(b) 7:8.

- 5. Compatibility with Other Permit and Ordinance Requirements.
 - a. Development approvals issued for subdivisions and site plans pursuant to this ordinance are to be considered an integral part of development approvals under the subdivision and site plan review process and do not relieve the applicant of the responsibility to secure required permits or approvals for activities regulated by any other applicable ordinance, code, rule, regulation, statute, act or other provision of law.
 - b. In their interpretation and application, the provisions of this ordinance shall be held to be the minimum requirements for the promotion of the public health, safety, and general welfare. This ordinance is not intended to interfere with, abrogate, or annul any other ordinances, rule or regulation, statute, or other provision of law except that, where any provision of this ordinance imposes restrictions different from those imposed by any other ordinance, rule or regulation, or other provision of law, the more restrictive or stringent provisions or higher standards shall control.
 - c. In the event that a regional stormwater management plan(s) is prepared and formally adopted pursuant to N.J.A.C. 7:8-1.1 et seq. for any drainage area(s) or watershed(s) of which Pennsville Township is a part, the stormwater provisions of such a plan(s) shall be adopted by Pennsville Township within one year of the adoption of a Regional Stormwater Management Plan (RSWMP) as an amendment to an Areawide Water Quality Management Plan.

C. Requirements for a Site Development Stormwater Plan.

- 1. Submission of Site Development Stormwater Plan.
 - a. Whenever an applicant seeks municipal approval of a site development that is subject to this ordinance, the applicant shall submit all of the required components of the Checklist for the Site Development Stormwater Plan at Section 8.4C.3 below as part of the applicant's application for subdivision or site plan approval. These required components are in addition to any other information required under any provisions of Pennsville Township's land use ordinance.
 - b. The applicant shall demonstrate that the site development project meets the standards set forth in this ordinance.

- c. The applicant shall submit three (3) copies of the materials listed in the checklist for site development stormwater plans in accordance with Section 8.4.C.3 of this ordinance.
2. Site Development Stormwater Plan Approval.
 - a. The applicant's site development stormwater plan shall be reviewed as a part of the subdivision or site plan review process by the municipal board or official from whom municipal approval is sought. That municipal board or official shall consult the engineer retained by the Planning and/or Zoning Board (as appropriate) to determine if all of the checklist requirements have been satisfied and to determine if the project meets the standards set forth in this ordinance.
3. Checklist Requirements. Any application for approval of a major development shall include at least the following information. All required engineering plans shall be submitted to the Pennsville Township in CAD Format 15 or higher, registered and rectified to NJ State Plane Feet NAD 83 or Shape Format NJ State Plan Feet NAD 83, and all other documents shall be submitted in both paper and commonly used electronic file formats such as pdf., word processing, database or spreadsheet files. Three (3) copies of each item shall be submitted. The municipality may choose to revise these criteria for consistency with their own software requirements.
 - a. Topographic Base Map. The applicant shall submit a topographic base map of the site which extends a minimum of two hundred (200_ feet beyond the limits of the proposed development, at a scale of one (1) inch = two hundred (200) feet or greater, showing one (1) foot contour intervals. The map shall indicate the following: existing surface water drainage, shorelines, steep slopes, soils, highly erodible soils, perennial or intermittent streams that drain into or upstream of any Category One Waters, wetlands and floodplains along with their appropriate buffer strips, marshlands and other wetlands, pervious or vegetative surfaces, existing surface and subsurface human-made structures, roads, bearing and distances of property lines, and significant natural and manmade features not otherwise shown. Pennsville Township may require upstream tributary drainage system information as necessary.
 - b. Environmental Site Analysis. The applicant shall submit a written description along with the drawings of the natural and human-made features of the site and its environs. This description should include:
 - i. A discussion of environmentally critical areas, 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 for or constraints on development; and
 - ii. Detailed soil and other environmental conditions on the portion of the site proposed for installation of any stormwater BMPs, including, at a minimum: soils report based on onsite soil tests; locations and spot elevations in plan view of test pits and permeability tests; permeability test data and calculations; and any other required soil data (e.g., mounding analyses results) correlated with location and elevation of each test site; cross-section of proposed stormwater BMP with side-by-side depiction of soil profile drawn to scale and seasonal high water table elevation identified; and any other information necessary to demonstrate the suitability of the specific proposed structural and nonstructural stormwater management measures relative to the environmental

conditions on the portion(s) of the site proposed for implementation of those measures.

- c. Project description and site plan(s). The applicant shall submit 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 will 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 for proposed changes in natural conditions shall also be provided.
- d. Land Use Planning and Source Control Plan.
 - i. The applicant shall submit a detailed Land Use Planning and Source Control Plan which provides a description of how the site will be developed to meet the erosion control, groundwater recharge and stormwater runoff quantity and quality standards at Section 8.4.D through use of nonstructural or low impact development techniques and source controls to the maximum extent practicable before relying on structural BMPs. The Land Use Planning and Source Control Plan shall include a detailed narrative and associated illustrative maps and/or plans that specifically address how each of the following nine (9) nonstructural strategies identified in Subchapter 5 of the NJDEP Stormwater Management Rules (N.J.A.C. 7:8-5) and set forth below (d.i.(a). through i.) will be implemented to the maximum extent practicable to meet the standards at Section 4 of this ordinance on the site. If one or more of the nine (9) nonstructural strategies will not be implemented on the site, the applicant shall provide a detailed rationale establishing a basis for the contention that use of the strategy is not practicable on the site.
 - (a) Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;
 - (b) Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces;
 - (c) Maximize the protection of natural drainage features and vegetation;
 - (d) Minimize the decrease in the pre-development “time of concentration”;
 - (e) Minimize land disturbance including clearing and grading;
 - (f) Minimize soil compaction and all other soil disturbance;
 - (g) Provide low-maintenance landscaping that provides for the retention and planting of native plants 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 other source controls to prevent or minimize the use or exposure of pollutants at the site in order to prevent or minimize the release of those pollutants into stormwater runoff. These source controls shall include, but are not limited to:
 - (i) Site design features that help to prevent accumulation of trash and debris in drainage systems;
 - (ii) Site design features that help to prevent discharge of trash and debris from drainage systems;
 - (iii) Site design features that help to prevent and/or contain spills or other harmful accumulations of pollutants at industrial or commercial developments; and
 - (iv) 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, when establishing vegetation after land disturbance.
 - ii. For sites where stormwater will be generated from “high pollutant loading areas” or where stormwater will be exposed to “source material,” as defined in Section 8.4.A of this ordinance, the applicant shall also demonstrate in the Land Use Planning and Source Control Plan that the requirements of Section 8.4.E have been met.
 - iii. The use of nonstructural strategies to meet the performance standards in Section 8.4.E of this ordinance is not required for development sites creating less than one (1) acre of disturbance. However, each application for major development and any other application where Pennsville Township otherwise requires a landscaping plan shall contain a landscaping or revegetation plan. In addition, the applicant shall demonstrate that, at a minimum, existing trees and vegetation on the development site will be preserved and protected according to the minimum standards established by provisions of the Pennsville Township Land Use Ordinance, Zoning Ordinance or by conditions of zoning or variance approval.
- e. Stormwater Management Facilities Map.
 - i. The applicant shall submit a map, at the same scale as the topographic base map, depicting the following information:
 - (a) The total area to be disturbed, paved and/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 manage and dispose of stormwater; and

- (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 (if applicable) and emergency spillway provisions with maximum discharge capacity of each spillway.
- f. Calculations (groundwater recharge and stormwater runoff rate, volume and quality). The applicant shall submit comprehensive hydrologic and hydraulic design calculations for the pre-development and post-development conditions for the design storms specified in Section 8.4.D. The standards for groundwater recharge and stormwater runoff rate, volume and quality required by Section 8.4.E shall be met using the methods, calculations and assumptions provided in Section 8.4.D.
- g. Inspection, Maintenance and Repair Plan. The applicant shall submit a detailed plan describing how the proposed stormwater management measure(s) shall meet the maintenance and repair requirements of Section 8.4.G of this ordinance. Said plan shall include, at a minimum, the following elements:
 - i. The frequency with which inspections will be made;
 - ii. The specific maintenance tasks and requirements for each proposed structural and nonstructural BMP;
 - iii. The name, address and telephone number for the entity responsible for implementation of the maintenance plan;
 - iv. The reporting requirements; and
 - v. Copies of the inspection and maintenance reporting sheets.
- h. Exception from submission requirements. An exception may be granted from submission of any of these required components (except g. above, Inspection, Maintenance, and Repair Plan) if its absence will not materially affect the review process. However, items required pursuant to the application requirements in the Pinelands CMP (N.J.A.C. 7:50-4.2(b))¹ shall be submitted to the NJ Pinelands Commission unless the Executive Director waives or modifies the application requirements.

D. Methodologies for the Calculation of Stormwater Runoff Rate and Volume, Stormwater Runoff Quality, and Groundwater Recharge.

1. Method of Calculating Stormwater Runoff Rate and Volume.

- a. In complying with the Stormwater Runoff Quantity and Rate Standards in Section 8.4.E.2, the design engineer shall calculate the stormwater runoff rate and volume using the USDA Natural Resources Conservation Service (NRCS) Runoff Equation, Runoff Curve Numbers, and Dimensionless Unit Hydrograph, as described in the NRCS National Engineering Handbook Part 630 – Hydrology and Technical Release 55 – Urban Hydrology for Small Watersheds as amended and supplemented or the Rational Method for peak flow and the

Modified Rational Method for hydrograph computations, so long as the Delmarva hydrograph is employed.

- b. In calculating stormwater runoff using the NRCS methodology, the design engineer shall separately calculate and then combine the runoff volumes from pervious and directly connected impervious surfaces within each drainage area within the parcel.
- c. Calculation of stormwater runoff from unconnected impervious surfaces shall be based, as applicable, upon the Two-Step method described in the current New Jersey Stormwater Best Management Practices Manual or the NRCS methodology.
- d. In calculating stormwater runoff using the NRCS methodology, the design engineer shall use appropriate 24-hour rainfall depths as developed for the project site by the National Oceanic and Atmospheric Administration, available online at <http://hdsc.nws.noaa.gov/hdsc/pfds/index.html>.
- e. When calculating stormwater runoff for pre-developed site conditions, the design engineer shall use the following criteria:
 - i. When selecting or calculating Runoff Curve Numbers (CNs) for pre-developed project site conditions, the project site's land cover shall be assumed to be woods in good condition. However, another land cover may be used to calculate runoff coefficients if:
 - (a) Such land cover has existed at the site or portion thereof without interruption for at least five (5) years immediately prior to the time of application; and
 - (b) The design engineer can document the character and extent of such land cover through the use of photographs, affidavits, and/or other acceptable land use records.
 - ii. If more than one land cover has existed on the site during the five (5) years immediately prior to the time of application, the land cover with the lowest runoff potential shall be used for the computations.
 - iii. All pre-developed land covers shall be assumed to be in good hydrologic condition and, if cultivated, shall be assumed to have conservation treatment.
 - iv. In calculating pre-developed site stormwater runoff, the design engineer shall include the effects of all land features and structures, such as ponds, wetlands, depressions, hedgerows, and culverts, which affect pre-developed site stormwater runoff rates and/or volumes.
 - v. Where tailwater will affect the hydraulic performance of a stormwater management measure, the design engineer shall include such effects in the measure's design.

2. Method of Calculating Stormwater Runoff Quality.

- a. In complying with the Stormwater Runoff Quality Standards in Section 8.4.E.6.a, the design engineer shall calculate the stormwater runoff rate and volume using the USDA Natural Resources Conservation Service (NRCS) Runoff Equation, Runoff Curve Numbers, and Dimensionless Unit Hydrograph, as described in the NRCS National Engineering Handbook Part 630 – Hydrology and Technical Release 55 – Urban Hydrology for Small Watersheds, as amended and supplemented or the Rational Method for peak flow and the Modified Rational Method for hydrograph computations, so long as the Delmarva hydrograph is employed.

- b. The design engineer shall also use the NJDEP Water Quality Design Storm, which is one and one-quarter (1.25) inches of rainfall falling in a nonlinear pattern in two (2) hours. Details of the Water Quality Design Storm are shown in Table 1.
- c. Calculation of runoff volumes, peak rates, and hydrographs for the Water Quality Design Storm may take into account the implementation of nonstructural and structural stormwater management measures.

Table 1: Water Quality Design Storm Distribution²

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

- d. Total Suspended Solids (TSS) reduction calculations.
 - i. If more than one stormwater BMP in series is necessary to achieve the required eighty percent (80%) TSS reduction for a site, the applicant shall utilize the following formula to calculate TSS reduction:

$$R = A + B - (A \times B) / 100, \text{ where:}$$

R = total TSS percent load removal from application of both BMPs;
A = the TSS percent removal rate applicable to the first BMP; and
B = the TSS percent removal rate applicable to the second BMP.

- ii. If there is more than one onsite drainage area, the eighty percent (80%) TSS removal rate shall apply to each drainage area, unless the runoff from the subareas converge on site, in which case the removal rate can be demonstrated through a calculation using a weighted average.
- e. TSS removal rates for stormwater BMPs.
- i. For purposes of TSS reduction calculations, Table 2 presents the presumed removal rates for certain BMPs designed in accordance with the New Jersey BMP Manual. The BMP Manual may be obtained from the address identified in Section 8.4.A or found on the NJDEP's website at www.njstormwater.org. TSS reduction shall be calculated based on the removal rates for the BMPs in Table 2
 - ii. Alternative stormwater management measures, removal rates and methods of calculating removal rates may be used if the design engineer provides documentation demonstrating the capability of these alternative rates and methods to Pennsville Township. Any alternative stormwater management measure, removal rate or method of calculating the removal rate shall be subject to approval by Pennsville Township and a copy shall be provided to the following:
 - The Division of Watershed Management, New Jersey Department of Environmental Protection, PO Box 418 Trenton, NJ, 08625-0418

Table 2: Pollutant Removal Rates for BMPs³			
Best Management Practice	TSS Percent Removal Rate	Total Phosphorus Percent Removal Rate	Total Nitrogen Percent Removal Rate
Bioretention Systems	90	60	30
Constructed Stormwater Wetland	90	50	30
Extended Detention Basin	40-60 (final rate based upon detention time; see New Jersey BMP Manual, Chap. 9)	20	20
Infiltration basin	80	60	50
Manufactured Treatment Device	Pollutant removal rates as certified by NJDEP; see Section III.	Pollutant removal rates as certified by NJDEP; see Section III.	Pollutant removal rates as certified by NJDEP; see Section III.
Pervious Paving Systems	80 (porous paving)	60	50
	80 (permeable pavers with storage bed)		
	0 - volume reduction only (permeable pavers without storage bed)	0 - volume reduction only (permeable pavers without storage bed)	0 - volume reduction only (permeable pavers without storage bed)
Sand Filter	80	50	35
Vegetative Filter Strip (For filter strips with multiple vegetated covers, the final TSS removal rate should be based upon a weighted average of the adopted rates shown in Table 2, based upon the relative flow lengths through each cover type.)	60 (turf grass)	30	30
	70 (native grasses, meadow and planted woods)		
	80 (indigenous woods)		

Table 2: Pollutant Removal Rates for BMPs³			
Wet Pond / Retention Basin	50-90 (final rate based upon pool volume and detention time; see NJ BMP Manual)	50	30

f. Nutrient removal rates for stormwater BMPs. For purposes of post-development nutrient load reduction calculations, Table 2 presents the presumed removal rates for certain BMPs designed in accordance with the New Jersey BMP Manual. If alternative stormwater BMPs are proposed, the applicant shall demonstrate that the selected BMPs will achieve the nutrient removal standard required in Section 8.4.E.6.

3. Methods of Calculating Groundwater Recharge.

- a. In complying with the groundwater recharge requirements in Section 8.4.E.3.a.i the design engineer may calculate groundwater recharge in accordance with the New Jersey Groundwater Recharge Spreadsheet (NJGRS) computer program incorporated herein by reference as amended and supplemented. Information regarding the methodology is available in Section 8.4.F.1 or from the New Jersey BMP Manual.
- b. Alternative groundwater recharge calculation methods to meet these requirements may be used upon approval by the municipal engineer.
- c. In complying with the groundwater recharge requirements in Section 8.4.E.3.a.ii, the design engineer shall:
 - i. Calculate stormwater runoff volumes in accordance with the USDA Natural Resources Conservation Service (NRCS) methodology, including the NRCS Runoff Equation and Runoff Curve Numbers, as described in the NRCS National Engineering Handbook Part 630 – Hydrology and Technical Release 55 – Urban Hydrology for Small Watersheds as amended and supplemented; and
 - ii. Use appropriate 2-year, 24-hour rainfall depths as developed for the project site by the National Oceanic and Atmospheric Administration, available online at <http://hdsc.nws.noaa.gov/hdsc/pfds/index.html>.
- d. When calculating groundwater recharge or stormwater runoff for pre-developed site conditions, the design engineer shall use the following criteria:
 - i. When selecting land covers or calculating Runoff Curve Numbers (CNs) for pre-developed project site conditions, the project site’s land cover shall be assumed to be woods. However, another land cover may be used to calculate runoff coefficients if:
 - (a) Such land cover has existed at the site or portion thereof without interruption for at least five (5) years immediately prior to the time of application; and
 - (b) The design engineer can document the character and extent of such land cover through the use of photographs, affidavits, and/or other acceptable land use records.
 - ii. If more than one land cover, other than woods, has existed on the site during the five (5) years immediately prior to the time of application, the land cover with the lowest runoff potential (including woods) shall be used for the computations.
 - iii. All pre-developed land covers shall be assumed to be in good hydrologic condition and, if cultivated, shall be assumed to have conservation treatment.

E. Stormwater Management Performance Standards for Major Development.

1. Nonstructural Stormwater Management Strategies.

- a. To the maximum extent practicable, the performance standards in this section for major development shall be met by incorporating the nine (9) nonstructural strategies identified in Subchapter 5 of the NJ Stormwater Management Rules (N.J.A.C. 7:8-5), and set forth in Section 8.4.C.3.d into the design. The applicant shall identify within the Land Use Planning and Source Control Plan required by Section 8.4.C.3.d of this ordinance how each of the nine (9) nonstructural measures will be incorporated into the design of the project to the maximum extent practicable.
- b. If the applicant contends that it is not practical for engineering, environmental or safety reasons to incorporate any of the nine (9) nonstructural strategies into the design of a particular project, the applicant shall provide a detailed rationale establishing a basis for the contention that use of the strategy is not practical on the site. This rationale shall be submitted in accordance with the Checklist Requirements established by Section 8.4.C to Pennsville Township. A determination by Pennsville Township that this rationale is inadequate or without merit shall result in a denial of the application unless one of the following conditions are met:
 - (a) The Land Use Planning and Source Control Plan is amended to include a description of how all nine (9) nonstructural measures will be implemented on the development site, and the amended Plan is approved by Pennsville Township;
 - (b) The Land Use Planning and Source Control Plan is amended to provide an alternative nonstructural strategy or measure that is not included in the list of nine (9) nonstructural measures, but still meets the performance standards in this section, and the amended Plan is approved by Pennsville Township; or
 - (c) The Land Use Planning and Source Control Plan is amended to provide an adequate rationale for the contention that use of the particular strategy is not practical on the site, and the amended Plan is approved by Pennsville Township.
- c. In addition to all other requirements of this section, each applicant shall demonstrate that, at a minimum, existing trees and vegetation on the development site will be preserved, protected and maintained according to the minimum standards established by provisions of the Pennsville Township Land Use Ordinance, Zoning Ordinance or by conditions of zoning or variance approval. Existing trees and vegetation shall be protected during construction activities in accordance with the “Standard for Tree Protection During Construction” provided in the NJ State Soil Conservation Committee Standards for Soil Erosion and Sediment Control in New Jersey, which is incorporated herein by reference as amended and supplemented.
- d. In addition to all other requirements of this section, each application for major development, and any other application where Pennsville Township otherwise requires a landscaping plan, shall contain a landscaping or revegetation plan.
- e. Any land area used as a nonstructural stormwater management measure to meet the performance standards in this section shall be dedicated to a government entity; shall be subjected to a conservation easement filed with the appropriate County Clerk’s office; or shall be subjected to an equivalent form of restriction approved by Pennsville Township that ensures that that measure, or equivalent stormwater management measure is maintained in perpetuity, as detailed in Section 7 of this ordinance.

- f. Guidance for nonstructural stormwater management strategies is available in the New Jersey BMP Manual, which may be obtained from the address identified in Section 8.4.A or found on the NJDEP's website at www.njstormwater.org.
- g. Exception for major development sites creating less than one (1) acre of disturbance. The use of nonstructural strategies to meet the performance standards in this section of this ordinance is not required for major development creating less than one (1) acre of disturbance. However, the following requirements shall be met:
 - (a) Each application for major development and any other application where Pennsville Township otherwise requires a landscaping plan shall contain a landscaping or revegetation plan;
 - (b) Each applicant shall demonstrate that, at a minimum, existing trees and vegetation on the development site will be preserved and protected according to the minimum standards established by provisions of the Pennsville Township Land Use Ordinance, Zoning Ordinance or by conditions of zoning or variance approval; and
 - (c) Existing trees and vegetation shall be protected during construction activities in accordance with the "Standard for Tree Protection During Construction" provided in the NJ State Soil Conservation Committee Standards for Soil Erosion and Sediment Control in New Jersey, which is incorporated herein by reference as amended and supplemented.

2. Stormwater Runoff Quantity and Rate Standards.

- a. There shall be no direct discharge of stormwater runoff from any point or nonpoint source to any surface waterbody. In addition, stormwater runoff shall not be directed in such a way as to increase the volume and/or rate of discharge into any surface water body from that which existed prior to development of the site.
- b. The design engineer, using the assumptions and factors for stormwater runoff and groundwater recharge calculations contained in Section 8.4.D, shall either:
 - (a) Demonstrate through hydrologic and hydraulic analysis that the post-developed stormwater runoff hydrographs from the project site for the 2, 10, and 100-Year storms do not exceed, at any point in time, the site's pre-developed runoff hydrographs for the same storms;
 - (b) Demonstrate through hydrologic and hydraulic analysis that under post-developed site conditions:
 - (a.) There is no increase in pre-developed stormwater runoff rates from the project site for the two (2), ten (10), and one hundred (100)-year storms; and
 - (b.) Any increased stormwater runoff volume or change in stormwater runoff timing for the two (2), ten (10), and one hundred (100)-year storms will not increase flood damage at or downstream of the project site. When performing this analysis for pre-developed site conditions, all off-site development levels shall reflect existing conditions. When performing this analysis for post-developed site conditions, all off-site development levels shall reflect full development in accordance with current zoning and land use ordinances; or
- iii. Demonstrate that the peak post-developed stormwater runoff rates from the project site for the two (2), ten (10) and one hundred (100) year storms are fifty, seventy-five and eighty percent (50%, 75% and 80%), respectively, of the site's peak pre-developed stormwater runoff rates for the same storms. Peak outflow rates from onsite stormwater measures for these storms shall be adjusted where necessary to account for the discharge

of increased stormwater runoff rates and/or volumes from project site areas not controlled by the onsite measures. These percentages do not have to be applied to those portions of the project site that are not proposed for development at the time of application, provided that such areas are:

- (a) Protected from future development by imposition of a conservation easement, deed restriction, or other acceptable legal measures; or
 - (b) Would be subject to review under these standards if they are proposed for any degree of development in the future.
- c. In tidal flood hazard areas, a stormwater runoff quantity analysis in accordance with 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.
 - d. The standards for stormwater runoff quantity and rate required by this section shall be met using the methods, calculations and assumptions provided in Section 8.4.D.
3. Groundwater Recharge Standards.
- a. For all major developments, with the exception of those described in Section 8.4.E.3.d, below, the design engineer, using the assumptions and factors for stormwater runoff and groundwater recharge calculations contained in Section 8.4.D, shall either:
 - i. Demonstrate through hydrologic and hydraulic analysis that the post-developed project site maintains 100 percent of the site's pre-developed average annual groundwater recharge volume; or
 - ii. Demonstrate through hydrologic and hydraulic analysis that any increase in the project site's stormwater runoff volume for the two (2) year, twenty four (24) hour storm from pre-developed to post-developed conditions is infiltrated on-site.
 - b. The design engineer shall assess the hydraulic impact on the groundwater table and design the project site and all site groundwater recharge measures so as to avoid adverse hydraulic impacts. Adverse hydraulic impacts include, but are not limited to: raising the groundwater table so as to cause surface ponding; flooding of basements and other subsurface structures and areas; preventing a stormwater infiltration basin from completely draining via infiltration within seventy-two (72) hours of a design storm event; and interference with the proper operation of subsurface sewage disposal systems and other surface and subsurface facilities in the vicinity of the groundwater recharge measure.
 - c. The standards for groundwater recharge required by this section shall be met using the methods, calculations and assumptions provided in Section 8.4.D.
 - d. Exceptions.
 - i. The preceding groundwater recharge standards shall not apply to sites that create less than one (1) acre of disturbance.
4. Erosion Control Standards. 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 its implementing regulations, N.J.A.C 2:90-1.1 through 1.4.

5. Stormwater Runoff Quality Standards.

- a. There shall be no direct discharge of stormwater runoff from any point or nonpoint source to any wetland, wetland transition area or surface waterbody.
- b. Stormwater management measures shall be designed to reduce the total suspended solids (TSS) load in the stormwater runoff from the post-developed site by eighty percent (80%) expressed as an annual average.
- c. Stormwater management measures shall also be designed to reduce the nutrient load in the stormwater runoff from the post-developed site by the maximum extent practicable. In achieving this reduction, the design of the development site shall include nonstructural and structural stormwater management measures that optimize nutrient removal while still achieving the groundwater recharge, runoff quantity and rate, and TSS removal standards in this section.
- d. The standards for stormwater runoff quality required by this section shall be met using the methods, calculations, assumptions and pollutant removal rates provided in Section 8.4.D.
- e. Exceptions.
 - i. The preceding stormwater runoff quality standards shall not apply to the following major development sites:
 - (a) Major development sites where less than one quarter (0.25) acre of additional impervious surface is proposed; or
 - (b) Major residential development sites that create less than one (1) acre of disturbance.
 - ii. The TSS reduction requirement in Section 8.4.E.6.b shall not apply to any stormwater runoff in a discharge regulated under a numeric effluent limitation for TSS imposed under the NJPDES rules (N.J.A.C. 7:14A) or in a discharge specifically exempt under a NJPDES permit from this requirement.
 - iii. The stormwater runoff quantity and rate standards in Section 8.4.E.2 shall still be met for all major development sites.

6. Additional stormwater quality standards for high pollutant loading areas and areas where stormwater runoff is exposed to source material.

- a. This subsection applies to the following areas of a major development as defined in Section 8.4.A of this ordinance:
 - i. High pollutant loading areas (HPLAs); and
 - ii. Areas where stormwater is exposed to “source material.”
- b. For a major development in areas described in a.i or a.ii above, in addition to the infiltration requirements specified in Section 8.4.E.2.b and the groundwater recharge requirements specified in Section 5.C8.4.E.3, the applicant shall demonstrate in the Land Use Planning and Source Control Plan required in Section 8.4.C.3 that the following requirements have been met:
 - i. The extent of the areas described in a.i. and a.ii. above have been minimized on the development site to the maximum extent practicable;
 - ii. The stormwater runoff from the areas described in a.i and a.ii above is segregated to the maximum extent practicable from the stormwater runoff generated from the remainder of the site such that co-mingling of the stormwater runoff from the areas described in a.i and a.ii above and the remainder of the site will be minimized;

- iii. The amount of precipitation falling directly on the areas described in a.i and a.ii above is minimized to the maximum extent practicable by means of a canopy, roof or other similar structure that reduces the generation of stormwater runoff; and
 - iv. The stormwater runoff from or co-mingled with the areas described in a.i and a.ii above for the Water Quality Design Storm, defined in Section 8.4.D.2. Table 1 shall be subject to pretreatment by one or more of the following stormwater BMPs, designed in accordance with the New Jersey BMP Manual to provide 90 % TSS removal:
 - (a) Bioretention system;
 - (b) Sand filter;
 - (c) Wet ponds with a minimum 80% TSS removal rate;
 - (d) Constructed stormwater wetlands; and/or
 - (e) Media filtration system manufactured treatment device with a minimum 80% TSS removal as verified by the New Jersey Corporation for Advanced Technology and as certified by NJDEP.
 - v. If the potential for contamination of stormwater runoff by petroleum products exists onsite, prior to being conveyed to the pretreatment BMP required in Section 8.4.E.6.b above, the stormwater runoff from the areas described in a.i and a.ii above shall be conveyed through an oil/grease separator or other equivalent manufactured filtering device to remove the petroleum hydrocarbons. The applicant shall provide the reviewing agency with sufficient data to demonstrate acceptable performance of the device.
7. Threatened and Endangered Species and Associated Habitat Standards. Stormwater management measures shall avoid adverse impacts of the development on habitat for threatened and endangered species, in accordance with N.J.A.C. 7:8-5.2(c).
8. Exceptions and Mitigation Requirements.
- a. Exceptions from strict compliance from the groundwater recharge, stormwater runoff quantity, and stormwater runoff quality requirements established by this ordinance may be granted, at the discretion of the Pennsville Township, provided that all of the following conditions are met:
 - i. The exception is consistent with that allowed by Pennsville Township;
 - ii. Pennsville Township has an adopted and effective municipal stormwater management plan in accordance with N.J.A.C. 7:8-4.4, which includes a mitigation plan in accordance with N.J.A.C. 7:8-4.2(c) 11. The mitigation plan shall identify what measures are necessary to offset the deficit created by granting the exception and the municipality shall submit a written report to the county review agency and the NJDEP describing the exception and the required mitigation. Guidance for developing municipal stormwater management plans, including mitigation plans, is available from the NJDEP, Division of Watershed Management and the New Jersey BMP Manual.
 - iii. The applicant demonstrates that mitigation, in addition to the requirements of mitigation plan discussed in b) above, will be provided consistent with one of the following options:
 - (a) Mitigation may be provided off-site, but within Pennsville Township and within the same drainage area as the development site, and shall meet or exceed the equivalent recharge, quality or quantity performance standard which is lacking on the development site due to the exception; or
 - (b) In lieu of the required mitigation, a monetary "in lieu contribution" may be provided by the applicant to Pennsville Township in accordance with the following:

- The amount of the in lieu contribution shall be determined by Pennsville Township, but the maximum in lieu contribution required shall be equivalent to the cost of implementing and maintaining the stormwater management measure(s) for which the exception is granted;
- The in lieu contribution shall be used to fund an off-site stormwater control mitigation project(s) located within Pennsville Township, within the same drainage area as the development site, and shall meet or exceed the equivalent recharge, quality or quantity performance standards which is lacking on the development site. Such mitigation project shall be identified by Pennsville Township in Pennsville Township's adopted municipal stormwater management plan. The stormwater control project to which the monetary contribution will be applied shall be identified by Pennsville Township at the time the exception is granted. The applicant shall amend the project description and site plan required in Section 8.4.C.3.c to incorporate a description of both the standards for which an on-site exception is being granted and of the selected off-site mitigation project.
- Pennsville Township shall expend the in lieu contribution to implement the selected off-site mitigation project within five (5) years from the date that payment is received. Should Pennsville Township fail to expend the in lieu contribution within the required timeframe, the mitigation option provided in Section 8.4.E.8.a.iii of this ordinance shall be void and Pennsville Township shall be prohibited from collecting in lieu contributions.

F. Design, Construction, and Safety Standards for Structural Stormwater Management Measures

1. General Design and Construction Standards

- a. Structural stormwater management measures shall be designed to meet the standards established in this section. These standards have been developed to protect public safety, conserve natural features, create an aesthetically pleasing site and promote proper onsite stormwater management.
- b. The following structural stormwater management measures may be utilized as part of a stormwater management system at a major land development in Pennsville Township; provided that the applicant demonstrates that they are designed, constructed and maintained so as to meet the standards and requirements established by this ordinance. If alternative stormwater management measures are proposed, the applicant shall demonstrate that the selected measures will achieve the standards established by this ordinance.
 - i. Bioretention systems;
 - ii. Constructed stormwater wetlands;
 - iii. Extended detention basins;
 - iv. Infiltration basins;
 - v. Vegetated filter strips;
 - vi. Infiltration basins and trenches;
 - vii. Wet ponds with suitable liners;
 - viii. Pervious paving systems; and
 - ix. Manufactured treatment devices, provided their pollutant removal rates are verified by the New Jersey Corporation for Advanced Technology and certified by the NJDEP.

- c. Structural stormwater management measures shall be designed to take into account the existing site conditions, including environmentally critical areas, wetlands, flood-prone areas, slopes, depth to seasonal high water table, soil type, permeability and texture, and drainage area and drainage patterns.
- d. Structural stormwater management measures shall be designed and constructed 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 7.8 shall be deemed to meet this requirement); to minimize and facilitate maintenance and repairs; and to ensure proper functioning.
- e. For all stormwater management measures at a development site, each applicant shall submit a detailed Inspection, Maintenance and Repair Plan consistent with the requirements of Section 8.4.F of this ordinance.
- f. To the maximum extent practicable, the design engineer shall design structural stormwater management measures on the development site in a manner that:
 - i. Limits site disturbance, maximizes stormwater management efficiencies, and maintains or improves aesthetic conditions;
 - ii. Utilizes multiple stormwater management measures, smaller in size and distributed spatially throughout the land development site, instead of a single larger structural stormwater management measure;
 - iii. Incorporates pretreatment measures. Pretreatment can extend the functional life and increase the pollutant removal capability of a structural stormwater management measure. Pretreatment measures may be designed in accordance with the New Jersey BMP Manual or other sources approved by the municipal engineer.
- g. Stormwater management basins shall be designed in a manner that complements and mimics the existing natural landscape, including but not limited to the following design strategies:
 - i. Use of natural, non-wetland wooded depressions for stormwater runoff storage; and
 - ii. Establishment of attractive landscaping in and around the basin that mimics the existing vegetation and incorporates native plants.
- h. Stormwater management basins shall be designed with gently sloping sides. The maximum allowable basin side slope shall be three (3) horizontal to one (1) vertical (3:1).
- i. Guidance on the design and construction of structural stormwater management measures may be found in the New Jersey BMP Manual. Other guidance sources may also be used upon approval by the municipal engineer.
- j. After all construction activities and required field testing have been completed on the development site, as-built plans depicting design and as-built elevations of all stormwater management measures shall be prepared by a Licensed Land Surveyor and submitted to the municipal engineer. Based upon the municipal engineer's review of the as-built plans, all corrections or remedial actions deemed by the municipal engineer to be necessary due to the failure to comply with the standards established by this ordinance and/or any reasons of public health or safety shall be completed by the applicant. In lieu of review by the municipal engineer, Pennsville Township reserves the right to engage a Professional Engineer to review the as-built plans. The applicant shall pay all costs associated with such review.

2. Design and Construction Standards for Stormwater Infiltration BMP's.
 - a. Stormwater infiltration BMP's, such as Bioretention systems with infiltration, dry wells, infiltration basins, pervious paving systems with storage beds, and sand filters with infiltration, shall be designed, constructed and maintained to completely drain the total runoff volume generated by the basin's maximum design storm within seventy-two (72) hours after a storm event. Runoff storage for greater times can render the BMP ineffective and may result in anaerobic conditions; odor and both water quality and mosquito breeding problems.
 - b. Stormwater infiltration BMPs shall be designed, constructed and maintained to provide a minimum separation of at least two (2) feet between the elevation of the lowest point of the bottom of the infiltration BMP and the seasonal high water table.
 - c. A stormwater infiltration BMP shall be sited in suitable soils verified by field testing to have permeability rates between one (1) and twenty (20) inches per hour. If such site soils do not exist or if the design engineer demonstrates that it is not practical for engineering, environmental or safety reasons to site the stormwater infiltration BMP(s) in such soils, then the stormwater infiltration BMP(s) may be sited in soils verified by field testing to have permeability rates in excess of twenty (20) inches per hour, provided that a bioretention system, designed, installed and maintained in accordance with the New Jersey BMP Manual, is installed to meet one of the following conditions:
 - i. The bioretention system is constructed as a separate measure designed to provide pretreatment of stormwater and to convey the pretreated stormwater into the infiltration BMP; or
 - ii. The bioretention system is integrated into and made part of the infiltration BMP and, as such, does not require an underdrain system. If this option is selected, the infiltration BMP shall be designed and constructed so that the maximum water depth in the bioretention system portion of the BMP during treatment of the stormwater quality design storm is twelve (12) inches in accordance with the New Jersey BMP Manual.
 - d. The minimum design permeability rate for the soil within a BMP that relies on infiltration shall be one-half (0.5) inch per hour. A factor of safety of two (2) shall be applied to the soil's field-tested permeability rate to determine the soil's design permeability rate. For example, if the field-tested permeability rate of the soil is four (4) inches per hour, its design permeability rate would be two (2) inches per hour). The minimum design permeability rate for the soil within a stormwater infiltration basin shall also be sufficient to achieve the minimum seventy-two (72) hour drain time described in 1. above. The maximum design permeability shall be ten (10) inches per hour.
 - e. A soil's field tested permeability rate shall be determined in accordance with the following:
 - i. The pre-development field test permeability rate shall be determined according to the methodologies provided in Section 8.4.I.3.c of this ordinance;
 - ii. The results of the required field permeability tests shall demonstrate a minimum tested infiltration rate of one (1) inch per hour;
 - iii. After all construction activities have been completed on the site and the finished grade has been established in the infiltration BMP, post-development field permeability tests shall also be conducted according to the methodologies provided in Section 8.4.I.3.c of this ordinance;

- iv. If the results of the post-development field permeability tests fail to achieve the minimum required design permeability rates in 5 above utilizing a factor of safety of two (2), the stormwater infiltration BMP shall be renovated and re-tested until such minimum required design permeability rates are achieved; and
 - v. The results of all field permeability tests shall be certified by a Professional Engineer and transmitted to the municipal engineer.
- f. To help ensure maintenance of the design permeability rate over time, a six (6) inch layer of K5 soil shall be placed on the bottom of a stormwater infiltration BMP. This soil layer shall meet the textural and permeability specifications of a K5 soil as provided at N.J.A.C. 7:9A, Appendix A, Figure 6, and be certified to meet these specifications by a Professional Engineer licensed in the State of New Jersey. The depth to the seasonal high water table shall be measured from the bottom of the K5 sand layer.
 - g. The design engineer shall assess the hydraulic impact on the groundwater table and design the project site and all stormwater infiltration basins so as to avoid adverse hydraulic impacts. Adverse hydraulic impacts include, but are not limited to: raising the groundwater table so as to cause surface ponding; flooding of basements and other subsurface structures and areas; preventing a stormwater infiltration basin from completely draining via infiltration within seventy-two (72) hours of a design storm event; and interference with the proper operation of subsurface sewage disposal systems and other surface and subsurface structures in the vicinity of the stormwater infiltration basin.
 - h. The design engineer shall conduct a mounding analysis, as defined in Section 8.4.A , of all stormwater infiltration BMPs. The mounding analysis shall be conducted in accordance with the requirements in Section 8.4.I.3.c.
 - i. Stormwater infiltration BMPs shall be constructed in accordance with the following:
 - i. To avoid sedimentation that may result in clogging and reduce the basin's permeability rate, stormwater infiltration basins shall be constructed according to the following:
 - (a) Unless the conditions in (ii) below are met, a stormwater infiltration basin shall not be placed into operation until its drainage area is completely stabilized. Instead, upstream runoff shall be diverted around the basin and into separate, temporary stormwater management facilities and sediment basins. Such temporary facilities and basins shall be installed and utilized for stormwater management and sediment control until stabilization is achieved in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey, which is incorporated herein by reference as amended and supplemented.
 - (b) If the design engineer determines that, for engineering, environmental or safety reasons, temporary stormwater management facilities and sediment basins cannot be constructed on the site, the stormwater infiltration basin may be placed into operation prior to the complete stabilization of its drainage area provided that the basin's bottom during this period is constructed at a depth at least two (2) feet higher than its final design elevation. All other infiltration BMP construction requirements in this section shall be followed. When the drainage area is completely stabilized, all accumulated sediment shall be removed from the infiltration BMP, which shall then be excavated to its final design elevation in accordance with the construction requirements of this section and the performance standards in Section 8.4.E.
 - ii. To avoid compaction of subgrade soils of BMP's that rely on infiltration, no heavy equipment such as backhoes, dump trucks or bulldozers shall be permitted to operate within the footprint

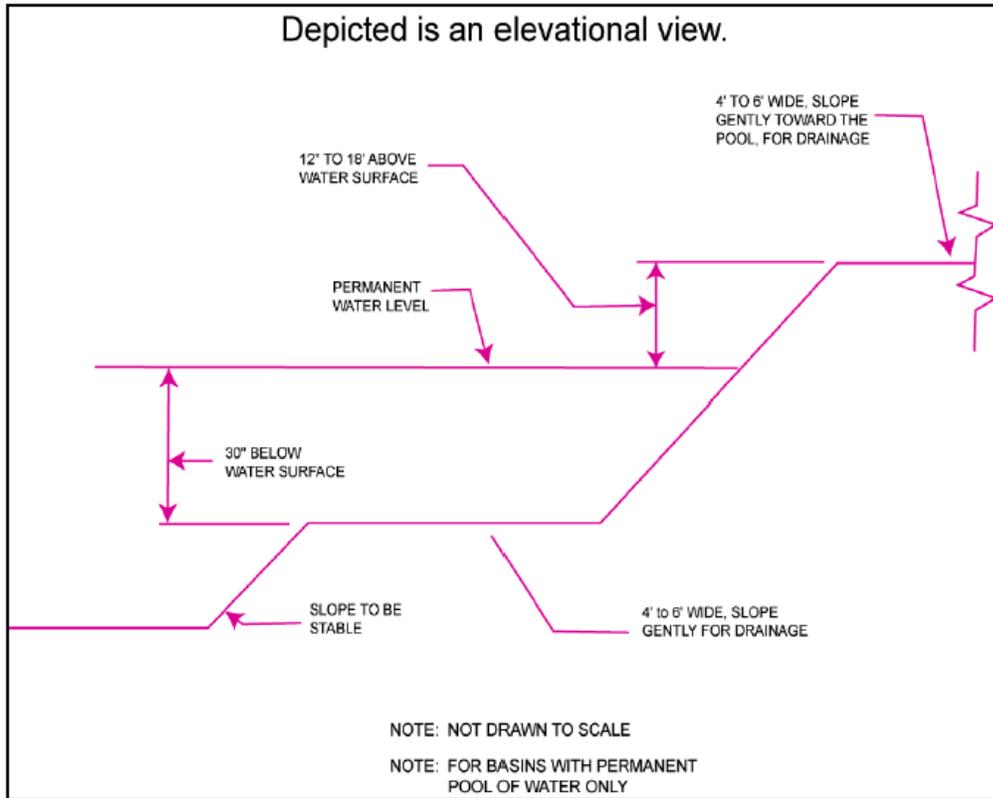
of the BMP. All excavation required to construct a stormwater infiltration BMP shall be performed by equipment placed outside the BMP. If this is not possible, the soils within the excavated area shall be renovated and tilled after construction is completed to reverse the effects of compaction. In addition, post-development soil permeability testing shall be performed in accordance with 2.e of this section.

- iii. Earthwork associated with stormwater infiltration BMP construction, including excavation, grading, cutting or filling, shall not be performed when soil moisture content is above the lower plastic limit.

3. Safety Standards for Structural Stormwater Management Measures

- a. If a structural stormwater management measure has an outlet structure, escape provisions shall be incorporated in or on the structure. Escape provisions means the permanent installation of ladders, steps, rungs, or other features that provide readily accessible means of ingress and egress from the outlet structure.
- b. A trash rack is a device intended to intercept runoff-borne trash and debris that might otherwise block the hydraulic openings in an outlet structure of a structural stormwater management measure. Trash racks shall be installed upstream of such outlet structure openings as necessary to ensure proper functioning of the structural stormwater management measure in accordance with the following:
 - i. The trash rack should be constructed primarily of bars aligned in the direction of flow with one (1) inch spacing between the bars to the elevation of the water quality design storm. For elevations higher than the water quality design storm, the bars shall be spaced no greater than one-third (1/3) the width of the hydraulic opening it is protecting or six inches, whichever is less. Transverse bars aligned perpendicular to flow should be sized and spaced as necessary for rack stability and strength.
 - ii. The trash rack shall not adversely affect the hydraulic performance of either the outlet structure opening it is protecting or the overall outlet structure.
 - iii. The trash rack shall have sufficient net open area under clean conditions to limit the peak design storm velocity through it to a maximum of 2.5 feet per second.
 - iv. 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.
- c. An overflow grate is a device intended to protect the opening in the top of a stormwater management measure outlet structure. If an outlet structure has an overflow grate, such grate shall meet the following requirements:
 - i. The overflow grate shall be secured to the outlet structure but removable for emergencies and maintenance;
 - ii. The overflow grate spacing shall be no more than two (2) inches across the smallest dimension; and
 - iii. 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 three hundred (300) pounds per square foot.
- d. The maximum side slope for an earthen dam, embankment, or berm shall not be steeper than three (3) horizontal to one (1) vertical (3:1).

- e. Safety ledges shall be constructed on the slopes of all new structural stormwater management measures having a permanent pool of water deeper than two and one-half feet. Such safety ledges shall be comprised of two steps. Each step shall be four (4) to six (6) feet in width. One step shall be located approximately two and one-half (2½) feet below the permanent water surface, and the second step shall be located one (1) to one and one-half (1½) feet above the permanent water surface. See a) below, for an illustration of safety ledges in a stormwater management basin.



Source: N.J.A.C. 7:8-6 Appendix A.

- i. Illustration of safety ledges.

G. Inspection, Maintenance and Repair of Stormwater Management Measures.

1. Applicability. Projects subject to review pursuant to Section 8.4.B.3 of this ordinance shall comply with the requirements of Sections G.2 and G.3 below.
2. General Inspection, Maintenance and Repair Plan.
 - a. The design engineer shall prepare an Inspection, Maintenance and Repair Plan for the stormwater management measures, including both structural and nonstructural measures incorporated into the design of a major development. This plan shall be submitted as part of the Checklist Requirements established in Section III.C. Inspection and maintenance guidelines for stormwater management measures are available in the New Jersey BMP Manual.
 - b. The Inspection, Maintenance and Repair Plan shall contain the following:
 - i. Accurate and comprehensive drawings of the site's stormwater management measures;
 - ii. Specific locations of each stormwater management measure identified by means of longitude and latitude as well as block and lot number;
 - iii. Specific preventative and corrective maintenance tasks and schedules for such tasks for each stormwater BMP;
 - iv. Cost estimates, including estimated cost of sediment, debris or trash removal; and
 - v. The name, address and telephone number of the person or persons responsible for regular inspections and preventative and corrective maintenance (including repair and replacement). If the responsible person or persons is a corporation, company, partnership, firm, association, municipality or political subdivision of this State, the name and telephone number of an appropriate contact person shall also be included.
 - c. The person responsible for inspection, maintenance and repair identified under Section G.2.B above shall maintain a detailed log of all preventative and corrective maintenance performed for the site's stormwater management measures, including a record of all inspections and copies of all maintenance-related work orders in the Inspection, Maintenance and Repair Plan. Said records and inspection reports shall be retained for a minimum of five (5) years.
 - d. If the Inspection, Maintenance and Repair Plan identifies a person other than the developer (for example, a public agency or homeowners' association) as having the responsibility for inspection and 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 measure to such person under an applicable ordinance or regulation.
 - e. If the person responsible for inspection, maintenance and repair identified under Section G.2.c above is not a public agency, the maintenance plan and any future revisions based on Section G.2.f below shall be recorded upon the deed of record for each property on which the maintenance described in the maintenance plan shall be undertaken.
 - f. The person responsible for inspection, maintenance and repair identified under Section G.2.b above shall evaluate the effectiveness of the Inspection, Maintenance and Repair Plan at least once per year and update the plan and the deed as needed.

- g. The person responsible for inspection, maintenance and repair identified under Section G.2.b above shall submit the updated Inspection, Maintenance and Repair Plan and the documentation required by Sections G.2.b and G.2.c above to Pennsville Township once per year.
 - h. The person responsible for inspection, maintenance and repair identified under Section G.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 Inspection, Maintenance and Repair Plan and the documentation required by Sections G.2.b and G.2.c above.
3. Responsibility for inspection, repair and maintenance shall not be assigned or transferred to the owner or tenant of an individual property in a residential development or project, unless such owner or tenant owns or leases the entire residential development or project.
 4. Preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measure, including, but not limited to: repairs or replacement to any associated appurtenance of the measure; removal of sediment, debris, or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; repair or replacement of linings; and restoration of infiltration function.
 5. Stormwater management measure easements shall be provided by the property owner as necessary for facility inspections and maintenance and preservation of stormwater runoff conveyance, infiltration, and detention areas and facilities. The purpose of the easement shall be specified in the maintenance agreement.
 6. In the event that the stormwater management measure becomes a public health nuisance or danger to public safety or public health, or if it is in need of maintenance or repair, Pennsville Township shall so notify the responsible person in writing. Upon receipt of that notice, the responsible person shall have fourteen (14) days to effect maintenance and repair of the facility in a manner that is approved by the municipal engineer or the municipal engineer's designee. Pennsville Township, at 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 within the allowable time, Pennsville Township may immediately proceed to do so with its own forces and equipment and/or through contractors. The costs and expenses of such maintenance and repair by Pennsville Township shall be entered on the tax roll as a special charge against the property and collected with any other taxes levied thereon for the year in which the maintenance and repair was performed.
 7. Requirements for Inspection, Maintenance and Repair of Stormwater BMP's that rely on infiltration. If a stormwater infiltration BMP is incorporated into the design of a major development, the applicant shall include the following requirements in its Inspection, Maintenance and Repair Plan:
 - a. Once per month (if needed): Mow side slopes, remove litter and debris, stabilize eroded banks, repair erosion at inflow structure(s);
 - b. After every storm exceeding one (1) inch of rainfall: Ensure that infiltration BMPs drain completely within seventy-two (72) hours after the storm event. If stored water fails to infiltrate seventy-two (72) hours after the end of the storm, corrective measures shall be taken. Raking or tilling by light equipment can assist in maintaining infiltration capacity and break up clogged surfaces;
 - c. Four times per year (quarterly): Inspect stormwater infiltration BMPs for clogging and excessive debris and sediment accumulation within the BMP, remove sediment (if needed) when completely dry;

- d. Two times per year: Inspect for signs of damage to structures, repair eroded areas, check for signs of petroleum contamination and remediate;
 - e. Once per year: Inspect BMPs for unwanted tree growth and remove if necessary, disc or otherwise aerate bottom of infiltration basin to a minimum depth of six (6) inches; and
 - f. After every storm exceeding one (1) inch of rainfall, inspect and, if necessary, remove and replace K5 sand layer and accumulated sediment, to restore original infiltration rate.
 - g. Additional guidance for the inspection, maintenance and repair of stormwater infiltration BMPs can be found in the New Jersey BMP Manual.
8. **Maintenance Guarantee.** The applicant shall provide a maintenance guarantee to ensure that all stormwater management measures required under the provisions of this ordinance will be maintained in perpetuity according to the specifications established herein. Conditioned upon Pennsville Township's approval, this may be accomplished by various mechanisms, including, but not limited to, the following:
- a. The applicant may be required to post a bond or other financial assurance mechanism in the amount Pennsville Township determines is needed to provide maintenance in perpetuity of all stormwater management measures;
 - b. Pennsville Township may collect an up-front fee from the applicant in the amount Pennsville Township determines is needed to provide maintenance in perpetuity of all stormwater management measures. This up-front fee shall be expended by Pennsville Township for the sole purpose of conducting maintenance activities (including repair and renovation, if needed) for all stormwater management measures required under the applicant's major development application approval. A guide to establish the up-front fee, as applied to stormwater basins, is calculated as follows:
 - i. \$50,000 for the first acre, or part thereof, of basin area, plus
 - ii. \$25,000 for each additional acre, or part thereof, of basin area in excess of one acre;
 - c. The applicant may dedicate all stormwater management measures to Pennsville Township, subsequent to which shall assume all maintenance responsibilities; or
 - d. The applicant may be required to deposit funds in escrow in the amount Pennsville Township determines is needed to provide maintenance in perpetuity of all stormwater management measures.

H. Penalties. Any person who erects, constructs, alters, repairs, converts, maintains, or uses any building, structure or land in violation of this ordinance shall upon conviction thereof by any court authorized by law to hear and determine the matter, be liable to a fine of not more than one thousand (\$1,000.00) dollars, or imprisonment for a term of not more than ninety (90) days, or both, as such court in its discretion may impose. Each day during or on which a violation occurs or continues shall be deemed a separate offense.

I. **Appendices.**

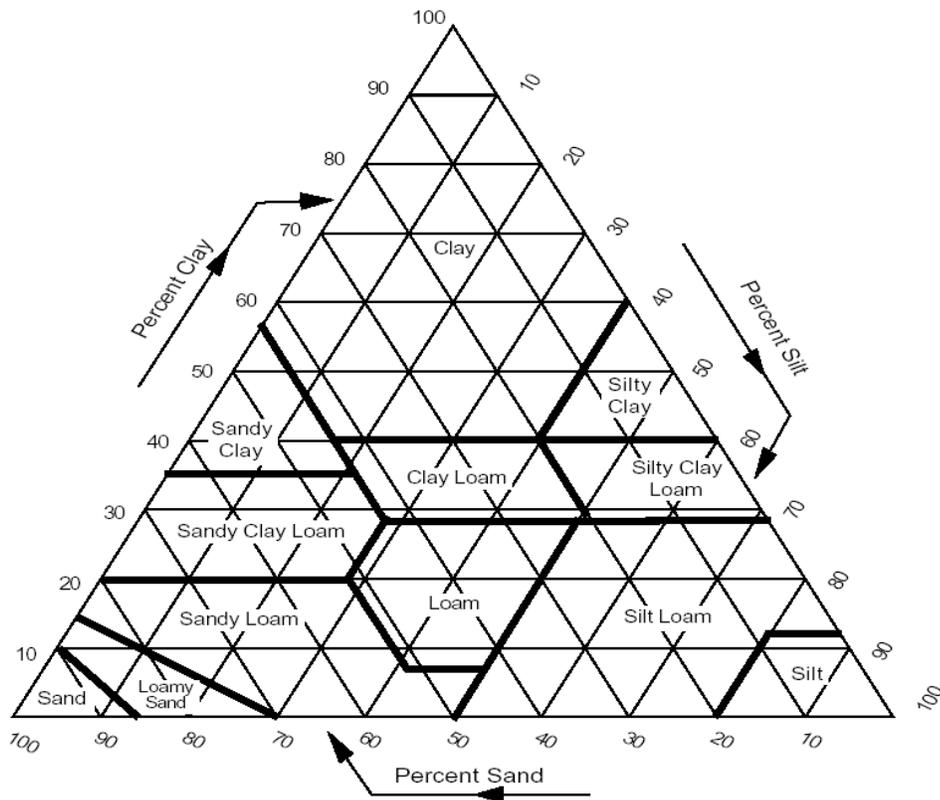
1. Methods for Calculating Groundwater Recharge.

- a. The New Jersey Geological Survey Report GSR-32: A Method for Evaluating Ground-Water Recharge Areas in New Jersey. Available at <http://www.njgeology.org/geodata/dgs99-2.htm>.
- b. The New Jersey Groundwater Recharge Spreadsheet (NJGRS). Available in the New Jersey BMP Manual, Chapter 6, at http://www.njstormwater.org/bmp_manual2.htm.

2. NJDEP Nonstructural Strategies Point System (Reserved).

3. Soils.

- a. USDA Soil Textural Triangle.



Source: US Department of Agriculture.

- b. Definitions. For the purposes of this appendix, the following terms shall have the meanings herein ascribed to them.

"A-horizon" means the uppermost mineral horizon in a normal soil profile. The upper part of the A-horizon is characterized by maximum accumulation of finely divided, dark colored organic residues, known as humus, which are intimately mixed with the mineral particles of the soil.

"Artesian zone of saturation" means a zone of saturation which exists immediately below a hydraulically restrictive horizon, and which has an upper surface that is at a pressure greater than atmospheric, either seasonally or throughout the year.

"Chroma" means the relative purity or strength of a color, a quantity which decreases with increasing grayness. Chroma is one of the three variables of soil color as defined in the Munsell system of classification.

"Clay" means a particle size category consisting of mineral particles which are smaller than 0.002 millimeters in equivalent spherical diameter. Also, a soil textural class having more than 40 percent clay, less than 45 percent sand, and less than 40 percent silt, as shown in Section 8.4.I.3 (USDA Soil Textural Triangle).

"Clay loam" means a soil textural class having 27 to 40 percent clay and 20 to 45 percent sand, as shown in Section 8.4.I.3 (USDA Soil Textural Triangle).

"Coarse fragment" means a rock fragment contained within the soil which is greater than two millimeters in equivalent spherical diameter or which is retained on a two millimeter sieve.

"County soil survey report" means a report prepared by the US Department of Agriculture, Natural Resources Conservation Service which includes maps showing the distribution of soil mapping units throughout a particular county together with narrative descriptions of the soil series shown and other information relating to the uses and properties of the various soil series.

"Direct supervision" means control over and direction of work carried out by others with full knowledge of and responsibility for such work.

"Equivalent spherical diameter" of a particle means the diameter of a sphere which has a volume equal to the volume of the particle.

"Excessively coarse horizon" means a horizon of limited thickness within the soil profile which provides inadequate removal of pollutants from stormwater due to a high coarse fragment content, excessively coarse texture and/or excessively rapid permeability.

"Excessively coarse substratum" means a substratum below the soil profile which extends beyond the depth of soil profile pits and borings and which provides inadequate removal of pollutants from stormwater due to a high coarse fragment content, excessively coarse texture and/or excessively rapid permeability.

"Extremely firm consistence" means a type of soil material whose moist aggregated mass crushes only under very strong pressure; cannot be crushed between the thumb and forefinger and shall be broken apart bit by bit.

"Firm consistence" means a type of soil material whose moist aggregated mass crushes under moderate pressure between the thumb and forefinger but resistance is distinctly noticeable.

"Hard consistence" means a type of soil material whose dry aggregated mass is moderately resistant to pressure; can be broken in the hands without difficulty but is barely breakable between the thumb and forefinger.

"Hue" means the dominant spectral color, one of the three variables of soil color defined within the Munsell system of classification.

"Hydraulically restrictive horizon" means a horizon within the soil profile which slows or prevents the downward or lateral movement of water and which is underlain by permeable soil horizons or substrata. Any soil horizon which has a saturated permeability less than one (1.0) inch per hour is hydraulically restrictive.

"Hydraulically restrictive substratum" means a substratum below the soil profile which slows or prevents the downward or lateral movement of water and which extends beyond the depth of profile pits or borings or to a massive substratum. A substratum which has a saturated permeability less than one (1.0) inch per hour is hydraulically restrictive.

"Loamy sand" means a soil textural class, as shown in Section 8.4.I.3 (USDA Soil Textural Triangle), that has a maximum of 85 to 90 percent (85-90%) sand with a percentage of silt plus one and a half (1.5) times the percentage of clay not in excess of fifteen (15); or a minimum of 70 to 85 percent (70-85%) sand with a percentage of silt plus one and a half (1.5) times the percentage of clay not in excess of thirty (30).

"Lower plastic limit" means the moisture content corresponding to the transition between the plastic and semi-solid states of soil consistency. This corresponds to the lowest soil moisture content at which the soil can be molded in the fingers to form a rod or wire, one-eighth (1/8) inches in thickness, without crumbling.

"Mottling" means a color pattern observed in soil consisting of blotches or spots of contrasting color. The term "mottle" refers to an individual blotch or spot. The terms "color variegation," "iron depletion" and "iron concentration" are equivalent to the term "mottling." Mottling due to redoximorphic reactions is an indication of seasonal or periodic and recurrent saturation.

"Munsell system" means a system of classifying soil color consisting of an alpha-numeric designation for hue, value and chroma, such as "7.5 YR 6/2," together with a descriptive color name, such as "strong brown."

"O-horizon" means a surface horizon, occurring above the A-horizon in some soils, which is composed primarily of undecomposed or partially decomposed plant remains which have not been incorporated into the mineral soil.

"Perched zone of saturation" means a zone of saturation which occurs immediately above a hydraulically restrictive horizon and which is underlain by permeable horizons or substrata which are not permanently or seasonally saturated.

"Piezometer" means a device consisting of a length of metal or plastic pipe, open at the bottom or perforated within a specified interval, and used for the determination of depth to water, permeability or hydraulic head within a specific soil horizon or substratum.

"Platy structure" is characterized by a soil aggregate which has one axis distinctly shorter than the other two and are oriented with the short axis vertical.

"Regional zone of saturation" means a zone of saturation which extends vertically without interruption below the depth of soil borings and profile pits.

"Sandy clay" means a soil textural class having 35 percent (35%) or more of clay and 45 percent (45%) or more of sand, as shown in Section 8.4.I.3 (USDA Soil Textural Triangle).

"Sandy loam" means a soil textural class, as shown in Section 8.4.I.3 (USDA Soil Textural Triangle), that has a maximum of 20 percent clay, and the percentage of silt plus twice the percentage of clay exceeds 30, and contains 52 percent or more sand; or less than 7 percent clay, less than 50 percent silt, and between 43 and 52 percent sand.

"Silt" means a particle size category consisting of mineral particles which are between 0.002 and 0.05 millimeters in equivalent spherical diameter. It also means a soil textural class having 80 percent or more of silt and 12 percent or less of clay, as shown in Section 8.4.I.3 (USDA Soil Textural Triangle).

"Silt loam" means a soil textural class having 50 percent or more of silt and 12 to 27 percent of clay; or 50 to 80 percent of silt and less than 12 percent of clay, as shown in Section 8.4.I.3 (USDA Soil Textural Triangle).

"Silty clay" means a soil textural class having 40 percent or more of clay and 40 percent or more of silt, as shown in Section 8.4.I.3 (USDA Soil Textural Triangle).

"Silty clay loam" means a soil textural class having 27 to 40 percent of clay and less than 20 percent of sand, as shown in Section 8.4.I.3 (USDA Soil Textural Triangle).

"Soil aggregate" means a naturally occurring unit of soil structure consisting of particles of sand, silt, clay, organic matter, and coarse fragments held together by the natural cohesion of the soil.

"Soil color" means the soil color name and Munsell color designation determined by comparison of the moist soil with color chips contained in a Munsell soil color book.

"Soil consistence" means the resistance of a soil aggregate or clod to being crushed between the fingers or broken by the hands. Terms for describing soil consistence described are in N.J.A.C. 7:9A-5.3(h).

"Soil horizon" means a layer within a soil profile differing from layers of soil above and below it in one or more of the soil morphological characteristics including color, texture, coarse fragment content, structure, consistence and mottling.

"Soil log" means a description of the soil profile which includes the depth, thickness, color, texture, coarse fragment content, mottling, structure and consistence of each soil horizon or substratum.

"Soil mapping unit" means an area outlined on a map in a County Soil Survey Report and marked with a letter symbol designating a soil phase, a complex of two or more soil phases, or some other descriptive term where no soil type has been identified.

"Soil phase" means a specific type of soil which is mapped by the Natural Resources Conservation Service and which belongs to a soil series described within the County Soil Survey Report.

"Soil profile" means a vertical cross-section of undisturbed soil showing the characteristic horizontal layers or horizons of the soil which have formed as a result of the combined effects of parent material, topography, climate, biological activity and time.

"Soil series" means a grouping of soil types possessing a specific range of soil profile characteristics which are described within the County Soil Survey Report. Each soil

series may consist of several "soil phases" which may differ in slope, texture of the surface horizon or stoniness.

"Soil structural class" means one of the shape classes of soil structure described in N.J.A.C. 7:9A-5.3(g).

"Soil structure" means the naturally occurring arrangement, within a soil horizon, of sand, silt and clay particles, coarse fragments and organic matter, which are held together in clusters or aggregates of similar shape and size.

"Soil test pit" means an excavation made for the purpose of exposing a soil profile which is to be described.

"Soil textural class" means one of the classes of soil texture defined within the USDA system of classification. (Soil Survey Manual, Agricultural Handbook No. 18, USDA Soil Conservation Service 1962.)

"Soil texture" means the relative proportions of sand, silt and clay in that portion of the soil which passes through a sieve with two millimeter openings.

"Static water level" means the depth below the ground surface or the elevation with respect to some reference level, of the water level observed within a soil profile pit or boring, or within a piezometer, after this level has stabilized or become relatively constant with the passage of time.

"Substratum" means a layer of soil or rock material present below the soil profile and extending beyond the depth of soil borings or profile pits.

"Unsuitable soil" means all soil other than suitable soil.

"USDA system of classification" means the system of classifying soil texture used by the United States Department of Agriculture which defines 12 soil textural classes based upon the weight percentages of sand, silt and clay in that portion of the soil which passes through a sieve with two millimeter (2 mm) openings. The soil textural classes are shown graphically on the USDA Soil Textural Triangle, as shown in Section 8.4.I.3.

"Value" means the relative lightness or intensity of a color, one of the three variables of soil color defined within the Munsell system of classification.

"Very firm consistence" is characterized by a moist soil which crushes under strong pressure; barely crushable between thumb and forefinger.

"Very hard consistence" is characterized by a dry soil which is resistant to pressure, can be broken in the hands only with difficulty; not breakable between the thumb and forefinger.

"Zone of saturation" means a layer within or below the soil profile which is saturated with ground water either seasonally or throughout the year. This includes both regional and perched zones.

- c. Methods for Assessing Soil Suitability for Infiltration Stormwater Management BMPs. The results of a subsurface investigation shall serve as the basis for the site selection and design of stormwater infiltration BMPs. The subsurface investigation shall include, but not be limited to, a series of soil test pits and soil permeability tests conducted in accordance with the following:
- i. All soil test pits and soil permeability results shall be performed under the direct supervision of a Professional Engineer. All soil logs and permeability test data shall be accompanied by a certification by a Professional Engineer. The results and location (horizontal and vertical) of all soil test pits and soil permeability tests, both passing and failing, shall be reported to Pennsville Township.
 - ii. During all subsurface investigations and soil test procedures, adequate safety measures shall be taken to prohibit unauthorized access to the excavations at all times. It is the responsibility of persons performing or witnessing subsurface investigations and soil permeability tests to comply with all applicable Federal, State and local laws and regulations governing occupational safety.
 - iii. A minimum of two (2) soil test pits shall be excavated within the footprint of any proposed infiltration BMP to determine the suitability and distribution of soil types present at the site. Placement of the test pits shall be within twenty (20) feet of the basin perimeter, located along the longest axis bisecting the BMP. For BMPs larger than ten thousand (10,000) square feet in area, a minimum of one (1) additional soil test pit shall be conducted within each additional area of ten thousand (10,000) square feet. The additional test pit(s) shall be placed approximately equidistant to other test pits, so as to provide adequate characterization of the subsurface material. In all cases, where soil and or groundwater properties vary significantly, additional test pits shall be excavated in order to accurately characterize the subsurface conditions below the proposed infiltration BMP. Soil test pits shall extend to a minimum depth of eight (8) feet below the lowest elevation of the basin bottom or to a depth that is at least two (2) times the maximum potential water depth in the proposed infiltration BMP, whichever is greater.
 - iv. A soil test pit log shall be prepared for each soil test pit. The test pit log shall, at a minimum, provide the elevation of the existing ground surface, the depth and thickness (in inches) of each soil horizon or substratum, the dominant matrix or background and mottle colors using the Munsell system of classification for hue, value and chroma, the appropriate textural class as shown on the USDA textural triangle, the volume percentage of coarse fragments (larger than two (2) millimeters in diameter), the abundance, size, and contrast of mottles, the soil structure, soil consistence, and soil moisture condition, using standard USDA classification terminology for each of these soil properties. Soil test pit logs shall identify the presence of any soil horizon, substratum or other feature that exhibits an in-place permeability rate less than one (1) inch per hour.
 - v. Each soil test pit log shall report the depth to seasonally high water level, either perched or regional, and the static water level based upon the presence of soil mottles or other

redoximorphic features, and observed seepage or saturation. Where redoximorphic features including soil mottles resulting from soil saturation are present, they shall be interpreted to represent the depth to the seasonal high water table unless soil saturation or seepage is observed at a higher level. When the determination of the seasonally high water table shall be made in ground previously disturbed by excavation, direct observation of the static water table during the months of January through April shall be the only method permitted.

- vi. Any soil horizon or substratum which exists immediately below a perched zone of saturation shall be deemed by rule to exhibit unacceptable permeability (less than one (1) inch per hour). The perched zone of saturation may be observed directly, inferred based upon soil morphology, or confirmed by performance of a hydraulic head test as defined at N.J.A.C. 7:9A-5.9.
- vii. Stormwater infiltration BMPs shall not be installed in soils that exhibit artesian groundwater conditions. A permeability test shall be conducted in all soils that immediately underlie a perched zone of saturation. Any zone of saturation which is present below a soil horizon which exhibits an in-place permeability of less than 0.2 inches per hour shall be considered an artesian zone of saturation unless a minimum one foot thick zone of unsaturated soil, free of mottling or other redoximorphic features and possessing a chroma of four or higher, exists immediately below the unsuitable soil.
- viii. A minimum of one (1) permeability test shall be performed at each soil test pit location. The soil permeability rate shall be determined using test methodology as prescribed in N.J.A.C. 7:9A-6.2 (Tube Permeameter Test), 6.5 (Pit Bailing Test) or 6.6 (Piezometer Test). When the tube permeameter test is used, a minimum of two replicate samples shall be taken and tested. Alternative permeability test procedures may be accepted by the approving authority provided the test procedure attains saturation of surrounding soils, accounts for hydraulic head effects on infiltration rates, provides a permeability rate with units expressed in inches per hour and is accompanied by a published source reference. Examples of suitable sources include hydrogeology, geotechnical or engineering text and design manuals, proceedings of American Society for Testing and Materials (ASTM) symposia, or peer-review journals. Neither a Soil Permeability Class Rating Test, as described in N.J.A.C. 7:9A-6.3, nor a Percolation Test, as described in N.J.A.C. 7:9A-6.4, are acceptable tests for establishing permeability values for the purpose of complying with this ordinance.
- ix. Soil permeability tests shall be conducted on the most hydraulically restrictive horizon or substratum to be left in place below the basin as follows. Where no soil replacement is proposed, the permeability tests shall be conducted on the most hydraulically restrictive horizon or substratum within four (4) feet of the lowest elevation of the basin bottom or to a depth equal to two (2) times the maximum potential water depth within the basin, whichever is greater. Where soil replacement is proposed, the permeability tests shall be conducted within the soil immediately below the depth of proposed soil replacement or within the most hydraulically restrictive horizon or substratum to a depth equal to two (2) times the maximum potential water depth within the basin, whichever is greater. Permeability tests may be performed on the most hydraulically restrictive soil horizons or substrata at depths greater than those identified above based upon the discretion of the design or testing engineer. The tested infiltration rate should then be divided by two (2) to establish the soil's design permeability rate. Such division will provide a 100% safety factor to the tested rate.
- x. The minimum acceptable "tested permeability rate" of any soil horizon or substratum shall be one (1) inch per hour. Soil materials that exhibit tested permeability rates slower than one (1) inch per hour shall be considered unsuitable for stormwater infiltration. The maximum

reportable “tested permeability rate” of any soil horizon or substratum shall be no greater than twenty (20) inches per hour regardless of the rate attained in the test procedure.

- xi. After all construction activities have been completed on the development site and the finished grade has been established in the infiltration BMP, a minimum of one permeability test shall be conducted within the most hydraulically restrictive soil horizon or substratum below the as-built BMP to ensure the performance of the infiltration BMP is as designed. Hand tools and manual permeability test procedures shall be used for the purpose of confirming BMP performance. In addition, the infiltration BMP shall be flooded with water sufficient to demonstrate the performance of the BMP. Test results shall be certified to the municipal engineer.
 - xii. A groundwater mounding analysis shall be provided for each stormwater infiltration BMP. The groundwater mounding analysis shall calculate the maximum height of the groundwater mound based upon the volume of the maximum design storm. The Professional Engineer conducting the analysis shall provide the municipal engineer with the methodology and supporting documentation for the mounding analysis used and shall certify to [Pennsville Township], based upon the analysis, that the groundwater mound will not cause stormwater or groundwater to breakout to the land surface or cause adverse impact to adjacent surface water bodies, wetlands or subsurface structures including but not limited to basements and septic systems. If there is more than one infiltration BMP proposed, the model shall indicate if and how the mounds will interact. The mounding analysis shall be calculated using the most restrictive soil horizon that will remain in place within the explored aquifer thickness unless alternative analyses is authorized by the municipal engineer. The mounding analysis shall be accompanied by a cross section of the infiltration BMP and surrounding topography and the mound analysis shall extend out to the point(s) at which the mound intersects with the preexisting maximum water table elevation.
 - xiii. The applicant shall demonstrate that stormwater infiltration BMPs meet the seventy-two (72) hour drain time requirement established in Section 8.4.G.7.b of this ordinance.
4. Pretreatment measures for infiltration BMPs. By reducing incoming velocities and capturing coarser sediments, pretreatment can extend the functional life and increase the pollutant removal capability of infiltration measures. Therefore, the installation of pretreatment measures is recommended for all development sites. Pretreatment measures may include, but are not limited to, the following:
- a. Vegetative filter strips;
 - b. Bioretention systems. Used in conjunction with a bioretention system, the infiltration basin takes the place of the standard underdrain;
 - c. Sand filters;
 - d. Grassed swales; and
 - e. Detention basins.
5. Collection and Conveyance.
- a. Bicycle-safe inlet grates. Site development plans that incorporate site design features that help 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.

- i. 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 seven (7) square inches, or is no greater than one half (0.5) inch across the smallest dimension. 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.
- ii. Whenever design engineers use a curb-opening inlet, the clear space in that curb opening (or each individual clear space, if the curb opening has two or more clear spaces) shall have an area of no more than seven (7) square inches, or be no greater than two (2) inches across the smallest dimension.
- iii. This standard does not apply:
 - (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 Section 8.4.C are conveyed through any device (e.g., end-of-pipe netting facility, manufactured treatment device, or a catch basin hood) that is designed, at a minimum, to prevent delivery of all solid and floatable materials that could not pass through one of the following:
 - A rectangular space four and five-eighths (4 and 5/8) inches long and one and one-half (1.5) inches wide (this option does not apply for outfall netting facilities); or
 - A bar screen having a bar spacing of one-half (0.5) inch.
 - (c) Where flows are conveyed through a trash rack that has parallel bars with one (1) inch spacing between the bars, to the elevation of the water quality design storm as specified in Section 8.4.C of this ordinance; or
 - (d) Where the NJDEP 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.
- b. Catch basins. Catch basins are storm drain inlets with or without sumps. Catch basins may provide pretreatment for other stormwater BMPs by capturing large sediments. The sediment and pollutant removal efficiency of catch basins depends on the size of the sump and the performance of routine maintenance to retain the available sediment storage space in the sump. Where catch basins with sumps are proposed, the minimum two feet separation between the bottom of the sump and seasonally high water table shall be provided.

- c. Open or perforated conveyance piping. Where adequate separation to the seasonal high water table exists, stormwater from the development site may be conveyed to a stormwater basin via a system of perforated pipes. These pipes may be made of PVC or corrugated metal and are available with perforations of varying size and spacing. Perforated pipe specifications shall be certified by a Professional Engineer. A Professional Engineer shall certify that perforated conveyance piping will not act to intercept the seasonal high water table and convey groundwater to the stormwater basin. All open or perforated stormwater conveyance systems shall be installed with a minimum separation of two (2) feet from the seasonal high water table.

J. Additional Sources for Technical Guidance.

1. NJDEP Technical Guidance Sources.

- a. New Jersey BMP Manual. Available from the Division of Watershed Management, New Jersey Department of Environmental Protection, PO Box 418, Trenton, New Jersey 08625; or online at <http://www.njstormwater.org>.
- b. NJDEP Stormwater Management Facilities Maintenance Manual. Available from the Division of Watershed Management, New Jersey Department of Environmental Protection, PO Box 418, Trenton, New Jersey 08625; or online at <http://njedl.rutgers.edu/ftp/PDFs/1188.pdf>

2. Additional Guidance Sources.

- a. New Jersey Pinelands Commission, PO Box 7, 15 Springfield Road, New Lisbon, New Jersey 08064; Phone: 609-894-7300; Website: <http://www.state.nj.us/pinelands>.
- b. State Soil Conservation Committee Standards for Soil Erosion and Sediment Control in New Jersey. Available from all State Soil Conservation Districts[, including Burlington County Soil Conservation District, Tiffany Square, Suite 100, 1289 Route 38, Hainesport, New Jersey 08036; Phone: 609-267-7410; Fax 609-267-3347; Website: <http://bscd.org>]
- c. State Soil Conservation Districts. New Jersey Department of Transportation, PO Box 600, Trenton, NJ 08625-0600; Phone: 609-530-3536; Website: <http://www.state.nj.us/transportation>.