

STORMWATER CHECKLIST
(Part 1)

**Stormwater Management Information Required to Be Submitted to
Commission and Municipality for Review**

The following checklist identifies the stormwater management standards that an applicant must address to complete an application with the Pinelands Commission and the concerned municipality (each “Item #” is cross-referenced in the attached Reference Guide).

Note that the stormwater management standards need not be addressed if either:

- The proposed development is minor residential development, resulting in less than five lots or dwelling units, *and* the development does not involve the construction of any new roads; *OR*
- The development proposed is minor non-residential development, *and* the development does not involve the grading, clearing or disturbance of an area in excess of 5,000 square feet within any five-year period.

<u>Item #</u>	<u>Addressed</u>	<u>Description</u>
1.	<input type="checkbox"/>	Calculations demonstrating that the proposed development meets one of the following three stormwater runoff rate standards:
	<input type="checkbox"/>	Post-development hydrographs for the 2, 10 and 100-year storms of 24-hour duration will not exceed the predevelopment runoff hydrographs at any point in time [N.J.A.C. 7:50-6.84(a)6ii(1)].
	<input type="checkbox"/>	No increase in pre-development rates from the 2, 10 and 100 year storms will occur. In addition, any increase in stormwater volume for these storms will not increase flood damage at or downstream of the parcel [N.J.A.C. 7:50-6.84(a)6ii(2)].
	<input type="checkbox"/>	The peak post-development runoff from the 2, 10 and 100-year storms will be 50%, 75% and 80% respectively of the pre-development peak rates for the same storms [N.J.A.C. 7:50-6.84(a)6ii(3)].
2.	<input type="checkbox"/>	Calculations demonstrating that the total runoff volume generated from the net increase in impervious surfaces by a 10-year storm of 24-hour duration will be retained and infiltrated on site.
3.	<input type="checkbox"/>	Information (soil logs) demonstrating that the lowest point of infiltration of each structural stormwater management measure (e.g. swales, basins, drywells) will meet the two foot separation to

<u>Item #</u>	<u>Addressed</u>	<u>Description</u>
		the seasonal high water table (SHWT) standard.
4.	<input type="checkbox"/>	Information demonstrating that the proposed stormwater design will meet the wetland, required buffer to wetlands and surface water protection standards.
5.	<input type="checkbox"/>	Information demonstrating that the soil suitability (permeability rate) standard will be met for all stormwater infiltration facilities (e.g. swales, basins, drywells).
6.	<input type="checkbox"/>	If the development includes High Pollutant Loading Areas (HPLAs) such as gas stations or vehicle maintenance facilities, information which demonstrates that the HPLA standards will be met is submitted.
7.	<input type="checkbox"/>	The groundwater mounding standards will be met.
8.	<input type="checkbox"/>	Information demonstrating that all of the following low impact stormwater design standards will be met (as applicable – see Reference Guide):
	<input type="checkbox"/>	Pretreatment of stormwater, prior to entering infiltration measures, has been incorporated into the design.
	<input type="checkbox"/>	The design utilizes multiple, smaller stormwater management measures dispersed spatially throughout the site.
	<input type="checkbox"/>	The design incorporates non-structural stormwater management strategies identified in the NJDEP stormwater regulations to the maximum extent practical. A written description of each of these strategies must be provided. Alternatively, the results of the NJDEP's NSPS Spreadsheet or Low Impact Design (LID) Checklist may be submitted.

STORMWATER CHECKLIST
(PART 2)

Additional Stormwater Management Information Required to Be Submitted to Municipality for Review

The following checklist identifies certain stormwater management standards that an applicant must address with the municipality (each “Item #” is cross-referenced in the attached Reference Guide). Note that there may be additional information that is required by a municipal ordinance that is not identified in this Pinelands Commission Checklist and Reference Guide.

<u>Item #</u>	<u>Addressed</u>	<u>Description</u>
9.	<input type="checkbox"/>	No direct discharge of stormwater to farm fields will occur to the maximum extent practical.
10.	<input type="checkbox"/>	The Total Suspended Solids (TSS) load in the stormwater will be reduced by 80%.
11.	<input type="checkbox"/>	Stormwater management measures have been designed to reduce the nutrient load in the stormwater runoff from the post-developed site to the maximum extent practical.
12.	<input type="checkbox"/>	The development will meet the groundwater recharge standards.
13.	<input type="checkbox"/>	The stormwater management plan addresses stormwater facilities construction and as-built requirement standards.
14.	<input type="checkbox"/>	The proposed stormwater management measures meet structural design standards.
15.	<input type="checkbox"/>	The development meets stormwater facility safety standards.
16.	<input type="checkbox"/>	A stormwater facilities maintenance plan is provided.

REFERENCE GUIDE

Each Item # identified in Part 1 and Part 2 (the Checklists) corresponds to the Item # in this Reference Guide.

Item #1. The CMP [NJAC 7:50-6.84(a)6ii] provides that stormwater management runoff rate standards may be met through one of the following three options:

I. Demonstrate 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 [(NJAC 7:50-6.84(a)6ii(1)); or

II. Demonstrate that under post-developed site conditions [(NJAC 7:50-6.84(a)6ii(2))]:

- 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; 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 [(NJAC 7:50-6.84(a)6ii(3))]. 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 parcel where development is not currently proposed, provided that such areas:

- a.** Are protected from future development by imposition of a conservation easement, deed restriction, or other acceptable legal measures; or
- b.** Are subject to review under these standards if they are proposed for any degree of development in the future.

► WHAT TO SUBMIT TO THE COMMISSION AND MUNICIPALITY:

___ A stormwater management plan prepared as follows:

- a.** Runoff rates and volumes calculated in accordance with TR-55 and which utilizes an appropriate hydrograph. An alternative method may be utilized, provided that

- information is submitted which demonstrates that the methods of the alternative method are at least as protective as the NRCS methodology.
- b. Stormwater runoff calculated by separately calculating then combining runoff from pervious and directly connected impervious areas within each drainage area.
 - c. Calculations of runoff from unconnected impervious surfaces, based on the Two-Step Method described in the NJDEP's BMP Manual.
 - d. Rainfall data in the stormwater calculations 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. Pre-development runoff CN values have been assumed to be woods in good condition, or follow standard criteria noted in the NJDEP Stormwater Regulations (N.J.A.C. 7:8 5.6(a)2) as follows:
 - 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. Another land cover may be used to calculate runoff coefficients if 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 the design engineer can document the character and extent of such land cover through the use of photographs, affidavits, and/or other acceptable land use records. If more than one land cover 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. All pre-developed land covers shall be assumed to be in good hydrologic condition and, if cultivated, shall be assumed to have conservation treatment.
 - Where tailwater will affect the hydraulic performance of a stormwater management measure, the design engineer shall include such effects in the measure's design.
 - f. 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 that affect pre-developed site stormwater runoff rates and/or volumes.
 - g. Calculations submitted for the purposes of demonstrating consistency with the stormwater volume and rate standards of the CMP shall not include any credit for infiltration in any stormwater BMP during the 2, 10 or 100-year storm events.

- h. Pre and post-development drainage areas maps have been provided which identify the concentration pathways. The maps and calculations include all applicable off-site and on-site areas.
- i. Tc and CN calculations have been provided.
- j. Information is provided for each stormwater management measure which demonstrates how each was designed in accordance with the guidance provided by the NJDEP's BMP Manual.

___ Identify which of the three above noted stormwater rate provisions is being addressed to meet the stormwater runoff standards [NJAC 7:50-6.84(a)6ii(1, 2 or 3)].

___ A written narrative to accompany the above calculations describing the method that was utilized to complete the calculations and that includes the size of each drainage area, the pre-development runoff rates of each drainage area, the post-development runoff rates and volumes generated, the routed rates and volume of runoff for each storm event.

___ If proposing to demonstrate compliance utilizing NJAC 7:50-6.84(a)6ii(1), applicants must provide copies of all pre- and post-development hydrographs.

___ If proposing to demonstrate compliance utilizing NJAC 7:50-6.84(a)6ii(2), applicants must provide a build-out analysis for each of the affected drainage areas. When performing this analysis for pre-developed site conditions, all off-site development levels must reflect existing conditions. When performing this analysis for post-developed site conditions, all off-site development levels must reflect full development of the affected drainage area in accordance with current zoning and land use ordinances.

___ If proposing to address the stormwater runoff rate standards utilizing NJAC 7:50-6.84(a)6ii(3), applicants must provide the post development runoff rate reductions for the 2, 10 and 100 year storms (minimum reductions of 50%, 75% and 80%, respectively). If portions of the parcel are not included in the rate calculations because they will remain vacant, the applicant must either:

- a. Indicate whether a recorded deed restriction will be imposed on that portion of the site not to be developed, or
- b. Provide a note on the plans indicating that any development proposed in these areas in the future must meet the stormwater standards in place at that time.

Item #2. The total runoff volume generated from the net increase in impervious surfaces by a ten (10) year, twenty-four (24) hour storm shall be retained and infiltrated onsite [NJAC 7:50-6.84(a)6iii(1)].

► WHAT TO SUBMIT TO THE COMMISSION AND MUNICIPALITY:

___ A written description of the amount of pre-and post development impervious area as defined by Table 2-2a in TR-55 within each drainage area

along with a calculation of the required volume of stormwater that must be retained to meet this standard.

___ Volume tables for each stormwater management measure that includes the volume retained to the elevation of the lowest outlet.

___ Information which demonstrates compliance with volume infiltration and retention standard. The submitted report must demonstrate that the proposed retention/infiltration facilities can retain and infiltrate the volume generated from the net increase in impervious surfaces by a ten (10) year, twenty-four (24) hour storm.

Item #3. Stormwater infiltration facilities must 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 [NJAC 7:50-6.84(a)6iii(1)].

► WHAT TO SUBMIT TO THE COMMISSION AND MUNICIPALITY:

___ A plan depicting the location of all soil tests.

___ Soil log descriptions for the requisite number of test pits in the vicinity of the stormwater facilities in accordance with the following:

- a. A minimum of two (2) soil test pits must be excavated within the footprint of any proposed infiltration facility to determine the suitability and distribution of soil types present at the site.
- b. Placement of the test pits must be within twenty (20) feet of the facility perimeter, located along the longest axis bisecting the facility.
- c. For facilities larger than ten thousand (10,000) square feet in area, a minimum of one (1) additional soil test pit must be conducted within each additional area of ten thousand (10,000) square feet.
- d. The additional test pit(s) must be placed approximately equidistant to other test pits, so as to provide adequate characterization of the subsurface material.
- e. In all cases, where soil and/or groundwater properties vary significantly, additional test pits must be excavated in order to accurately characterize the subsurface conditions below the proposed infiltration facility.
- f. Soil test pits must 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 facility, whichever is greater.
- g. A soil test pit log must be prepared for each soil test pit and provide the following:
 - 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 notation 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;
- 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;
- 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 elevation of observed seepage or saturation.

Item #4. There will be no direct discharge of stormwater runoff from any point or nonpoint source to any wetland, wetland transition area (wetland buffer) or surface water body. In addition, stormwater runoff shall not be directed in such a way as to increase the volume and rate of discharge into any surface water body from that which existed prior to development of the parcel.

► WHAT TO SUBMIT:

___ A development plan depicting wetlands boundaries, wetlands transition areas (buffers) and surface water bodies, and the location of all discharges of stormwater runoff from structural facilities and non-structural stormwater management measures.

___ If there is an existing discharge to wetlands, provide calculations which demonstrate that the stormwater volume and rate of runoff will not increase after development.

Item #5. Stormwater infiltration facilities shall be sited in suitable soils verified by testing of undisturbed soil samples collected in the field, performed under direct supervision of a Professional Engineer, to meet the following [NJAC 7:50-6.84(a)6iv(2)]:

- I.** To have permeability rates of between 1 and 20 inches per hour;
- II.** A safety factor of two shall be applied to the design of the infiltration basin when performing any mounding (Item #7, below) and drain time analysis;
- III.** 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;

IV. If the maximum permeability rate of 20 inches per hour cannot be met but will be exceeded, stormwater must first be routed through a bioretention system prior to infiltration or soil replacement may be proposed; and

V. If the soils are slower than one (1) inch per hour and the soils cannot be replaced with suitable soils, the infiltration facility may be required to be relocated.

► WHAT TO SUBMIT TO THE COMMISSION AND MUNICIPALITY:

___ Results of permeability testing of undisturbed soil samples from the field taken below the bottom elevation of each stormwater management measure. Permeability tests must follow the methodologies outlined in the municipal land use ordinances.

___ 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 NJAC 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.

___ A plan containing cross section detail(s) of all stormwater BMPs alongside soil profile descriptions (to scale).

Item #6. The High Pollutant Loading Area (HPLA) standards apply where the proposed development includes areas that are defined as HPLAs in NJDEP stormwater regulations (NJAC 7:8-5.4(a)2iii(1)). HPLAs include areas in industrial and commercial development where solvents, and/or petroleum products are loaded, unloaded, stored or applied; areas where pesticides are loaded, unloaded, or stored; areas where hazardous materials are expected to be present in greater than ‘reportable quantities’ as defined by the USEPA at CFR 302.4; areas where recharge would be inconsistent with NJDEP approved remedial action work plan or landfill closure plan; areas of high risk for spills of toxic materials such as gas stations and vehicle maintenance facilities and areas of industrial stormwater exposed to “source material.”

Where stormwater runoff is exposed to high pollutant source material, the stormwater management plan shall demonstrate the following design criteria are met [NJAC 7:50-6.84(a)6iii(2)]:

- I. The extent of the areas described as HPLAs have been minimized on the development site to the maximum extent practicable;
- II. The stormwater runoff from the areas described as HPLAs are 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 as HPLAs and the remainder of the site will be minimized;
- III. The amount of precipitation falling directly on the areas described as HPLAs are minimized to the maximum extent practicable by means of a canopy, roof or other similar structure that reduces the generation of stormwater runoff;
- IV. The stormwater runoff from, or co-mingled with, the areas described as HPLAs for the Water Quality Design Storm, 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 which shall be hydraulically disconnected by a minimum of 2 feet of vertical separation from the seasonal high water table and shall be designed to achieve 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 IV. above, the stormwater runoff from the areas described in I. and II. above shall be conveyed through an oil/grease separator or other equivalent manufactured filtering device to remove the petroleum hydrocarbons. The applicant must provide the Commission with sufficient data to demonstrate acceptable performance of the device.

► WHAT TO SUBMIT TO THE COMMISSION AND MUNICIPALITY:

- ___ A plan clearly identifying the areas on-site that are HPLAs.
- ___ A description in writing or on the plans that identifies the actions taken to minimize these areas.
- ___ Documentation that demonstrates how the stormwater from the HPLA on the site will meet the 90% TSS removal standard (refer to Item #10, below and Appendix 1).

Item #7. Groundwater mounds resulting from the infiltration of stormwater shall not cause stormwater or groundwater to breakout to the land surface or cause adverse impacts to adjacent water bodies, wetlands or subsurface structures including, but not limited to, basements and septic systems [NJAC 7:50-6.84(a)6iv(3)].

► AT A MINIMUM, SUBMIT THE FOLLOWING TO THE MUNICIPALITY:

___ A groundwater mounding analysis which considers the maximum design storm and, if the stormwater recharge facility is located near wetlands, the effects of any Radius of Influence (ROI) of the recharge facility on the wetlands. The analysis must provide specific conclusions as to whether each proposed recharge facility will cause stormwater or groundwater to breakout to the land surface or cause adverse impacts to adjacent water bodies, wetlands or subsurface structures including, but not limited to, basements and septic systems. The Professional Engineer's Groundwater Mounding Analysis Certification found in Appendix 2 may be utilized. Please note that if an applicant elects to submit the Certification, the municipality may require a more detailed analysis.

Item #8. To the maximize extent practical, stormwater management measures shall be designed to limit site disturbance, maximize stormwater management efficiencies, maintain or improve aesthetic conditions and incorporate pretreatment as a means of extending the functional life and increasing pollutant removal capacity of structural management facilities. The use of stormwater management measures that are using natural, non-wetland wooded depressions, or multiple infiltration facilities that are smaller in size, and distributed spatially throughout a parcel, rather than the use of a single larger structural stormwater management measure, shall be required to the maximum extent practical [NJAC 7:50-6.84(a)6iv(4)].

For all major development greater than one acre of disturbance or new impervious surface exceeding ¼ acre, the following nine (9) nonstructural NJDEP BMPs for stormwater management must be addressed to the maximum extent practical [NJAC 7:8-5.3]:

- I.** Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;
- II.** Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces;
- III.** Maximize the protection of natural drainage features and vegetation;
- IV.** Minimize the decrease in the pre-development time of concentration;
- V.** Minimize land disturbance including clearing and grading;
- VI.** Minimize soil compaction and all other soil disturbance;
- VII.** Provide low-maintenance landscaping that provides for the retention and planting of native plants and minimizes the use of lawns, fertilizers and pesticides, in accordance with NJAC 7:50-6.24;
- VIII.** Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas; and
- IX.** 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:

- a. Site design features that help to prevent accumulation of trash and debris in drainage systems;
- b. Site design features that help to prevent discharge of trash and debris from drainage systems;
- c. Site design features that help to prevent and/or contain spills or other harmful accumulations of pollutants at industrial or commercial developments; and
- d. 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.

The NJDEP stormwater management rules require that any land area used as a nonstructural stormwater management measure shall be dedicated to a government agency, subjected to a conservation restriction filed with the appropriate County Clerk's office, or subject to an equivalent restriction that ensures that measure is maintained in perpetuity.

► WHAT TO SUBMIT TO THE COMMISSION AND MUNICIPALITY:

___ A description of the specific measures taken in the design of the site that limits site disturbance, maximizes stormwater management efficiencies, maintains or improves aesthetic conditions, incorporates pretreatment as a means of extending the functional life and increasing pollutant removal capacity of structural management facilities, uses natural non-wetland, wooded depressions or multiple infiltration facilities, and shows them distributed spatially throughout a parcel.

___ A written description of how the proposed development will incorporate the nine (9) nonstructural strategies (see above, I through IX) to the maximum extent practical. Alternatively, the following may be submitted:

___ The results of calculations utilizing the NJDEP's Non-Structural Point System (NSPS) spreadsheet that can be downloaded at www.state.nj.us/dep/stormwater may be submitted. (*Note that this does not apply to linear development.*)

___ For linear development or development that does not "pass" the NSPS spreadsheet, a copy of the NJDEP's Low Impact Design (LID) Checklist may be submitted in an attempt to demonstrate whether the low impact design standards will be met to the maximum extent practical.

___ If the NJDEP point system does not show that the nine (9) non-structural strategies are being used sufficiently or if one or more of the nine (9) nonstructural strategies will not be implemented to the maximum extent practical, a detailed rationale must be provided in

writing which establishes a basis for the contention that maximal use of the strategy is not practicable on the site.

___ A plan which specifically identifies all proposed LID strategies including all areas of vegetated conveyance.

___ A description of how all non-structural strategies will be preserved and maintained in perpetuity pursuant to N.J.A.C. 7:8-5.3(c).

Note: One of the techniques that has been advocated to meet the low impact stormwater design standards is to reduce the number of units. The Pinelands Commission does not advocate this approach.

Item #9. There will be no direct discharge of stormwater to farmland to the maximum extent practical [NJAC 7:50-6.84(a)6ii(5)].

► AT A MINIMUM, SUBMIT THE FOLLOWING TO THE MUNICIPALITY:

___ A development plan which identifies any agricultural uses present on adjacent parcels, and includes the location of all discharges of stormwater runoff from structural facilities and non-structural measures. The plan must demonstrate that no direct discharge of stormwater is occurring onto farmland to the maximum extent practical.

Item #10. 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 [NJAC 7:8-5.5].

► AT A MINIMUM, SUBMIT THE FOLLOWING TO THE MUNICIPALITY:

___ If NJDEP BMPs are utilized in the following calculations (“a” or “b”) for the accepted TSS removal, refer to Appendix 1 of this reference guide.

___ If the BMP measures utilized are not those noted in Appendix 1, refer to (c) below.

___ Total Suspended Solids (TSS) Reduction Calculations: Total Suspended Solids (TSS) Reduction Calculations for the parcel are to be completed as follows:

- a 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:

$R = A + B - (A \times B) / 100$, 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.

- b 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.
- c Alternative stormwater management measures, removal rates and methods of calculating removal rates may be used if the design engineer provides documentation acceptable to the municipality which demonstrates the suitability of these alternate measures, methods and rates. Any alternative stormwater management measure, removal rate or method of calculating the removal rate shall be subject to approval in writing by municipality 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; and
 - The New Jersey Pinelands Commission, PO Box 7, New Lisbon, NJ, 08064.

Item #11. 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 [NJAC 7:8-5.5(e)].

▶ AT A MINIMUM, SUBMIT THE FOLLOWING TO THE MUNICIPALITY:

___ A written description of how this standard will be met (refer to Table 4.2 in the NJDEP BMP Manual for guidance).

Item #12. Retain and recharge 100% of sites' average annual groundwater recharge volume [NJAC 7:8-5.4(a)2].

▶ AT A MINIMUM, SUBMIT THE FOLLOWING TO THE MUNICIPALITY:

___ One of the following must be provided:

- a. Calculations using the NJDEP Groundwater Recharge Spreadsheet (NJGRS), available in the NJ BMP Manual, Chapter 6 at http://www.njstormwater.org/bmp_manual2.htm;
- b. Calculations using the New Jersey Geological Survey Report GSR-32: A method for evaluating Groundwater Recharge Areas in New Jersey. Available at <http://www.njgeology.org/geodata/dgs99-2.htm>;
- c. Calculate and recharge the difference in runoff volume between 2 yr storms, pre and post development; and
- d. An alternate method, if approved by the municipal engineer.

Item #13. Stormwater management facility construction and as-built requirement standards [NJAC 7:50-6.84(a)6iv(5) and NJAC 7:50-6.84(a)6v].

► AT A MINIMUM, SUBMIT THE FOLLOWING TO THE MUNICIPALITY:

___ An plan with notes that pertain to the following:

- An as-built basin plan will be submitted to the municipal engineer;
- Specifically demonstrate how the proposed construction will conform with the construction measures outlined in the local land use ordinances and the CMP;
- Detail how the as-built basin permeability testing requirements will be met; and
- If the applicant proposes to utilize light grading equipment when grading lawn areas in order to help meet the low impact design standards of the local land use ordinances and the CMP, the plans must include a note stating so.

___ After construction, an as-built plan for all stormwater management facilities.

___ The results of replicate post-development field permeability tests taken within each constructed infiltration measure.

Item #14. Structural design standards. Stormwater management measures shall be designed as follows [NJAC 7:8-5.7]:

- I.** The New Jersey Department of Environmental Protection’s Best Management Practices (BMP) Manual shall be utilized for technical guidance;
- II.** 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);
- III.** The establishment of attractive landscaping in and around the basin that mimics the existing vegetation and incorporates native Pinelands plants, including, but not limited to, the species listed in NJAC 7:50-6.25 and 6.26;
- IV.** Stormwater infiltration BMPs, 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; and
- V.** 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 NJAC 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.

► AT A MINIMUM, SUBMIT THE FOLLOWING TO THE MUNICIPALITY:

___ The plan must be designed in accordance with the above requirements.

Item #15. The following safety standards for structural stormwater management facilities and measures must be addressed [NJAC 7:8-6.2]:

I. If a structural stormwater management measure has an outlet structure, escape provisions shall be incorporated in or on the structure. Escape provisions include the permanent installation of ladders, steps, rungs, or other features that provide readily accessible means of ingress and egress from the outlet structure;

II. 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:

- a. 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;
- b. The trash rack shall not adversely affect the hydraulic performance of either the outlet structure opening it is protecting or the overall outlet structure;
- c. The trash rack shall have sufficient net open area under clean conditions to limit the peak design storm velocity through it to a maximum of 2.5 feet per second; and
- d. The trash rack shall be constructed and installed to be rigid, durable, and corrosion resistant, and shall be designed to withstand a perpendicular live loading of 300 pounds per square foot.

III. An overflow grate is a device intended to protect the opening in the top of a stormwater management measure outlet structure. If an outlet structure has an overflow grate, such grate shall meet the following requirements:

- a. The overflow grate spacing shall be no more than two (2) inches across the smallest dimension; and
- b. 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.

IV. 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); and

V. 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 (2.5) 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.

► AT A MINIMUM, SUBMIT THE FOLLOWING TO THE MUNICIPALITY:

___ The plan must be designed in accordance with NJAC 7:8-6.2.

Item #16. The General Inspection, Maintenance and Repair Plan shall contain the following [NJAC 7:50-6.84(a)6vii]:

- 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;
- 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;
- VI.** Reporting records for maintenance;
- VII.** A description of the financing that will ensure the inspection, maintenance and repair of all stormwater management BMPs;
- VIII.** The plan must address existing tree and vegetation protection during construction;
- IX.** A statement that an inspection, maintenance and repair report will be updated and submitted annually to the municipality;
- X.** A description of all preservation measures and maintenance procedures for all non-structural stormwater management measures; and
- XI.** A description of all stormwater management measure easements designed to facilitate inspections and maintenance as necessary.

Nonstructural stormwater management strategies protection - The local land use ordinances and the CMP provide that development be designed to meet the nonstructural stormwater management strategy standards of N.J.A.C. 7:8-5.3. These standards require

that any land area used as a nonstructural stormwater management measure shall be dedicated to a government agency, subjected to a conservation restriction filed with the appropriate County Clerk's office, or equivalent restriction that ensures that measure is maintained in perpetuity. Any maintenance plan must specify which of these methods will be employed, and how the protection will be implemented [NJAC 7:8-5.3(c)].

Maintenance requirements - The NJDEP regulations provide that the responsibility for maintenance of stormwater management measures 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 [NJAC 7:8-5.8].

► AT A MINIMUM, SUBMIT THE FOLLOWING TO THE MUNICIPALITY:

- ___ A maintenance plan that contains all of the above required information.
 - ___ Copies of all proposed deed restrictions for any land area used as a nonstructural stormwater management measure.
 - ___ Copies of all proposed easements.
-

APPENDIX 1

Pollutant Removal Rates for BMPs¹			
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)		
Wet Pond / Retention Basin	50-90 (final rate based upon pool volume and detention time; see NJ BMP Manual)	50	30

¹ Source: 7:8-5.5(c) and New Jersey BMP Manual Chapter 4.

APPENDIX 2

**PROFESSIONAL ENGINEER'S
GROUNDWATER MOUNDING ANALYSIS CERTIFICATION***

Submitted to
STATE OF NEW JERSEY
PINELANDS COMMISSION
PO BOX 359
NEW LISBON, NJ 08064

Part A. General Information

Pinelands Application Number: _____
Project Location: _____
Municipality: _____
Block(s): _____, Lot(s): _____

1. Facility Location: *Either* latitude and longitude for the approximate center each stormwater infiltration facility, *or electronic map, or site plan.*
Facility a. _____
Facility b. _____
Facility c. _____
Facility d. _____
Facility e. _____

Part B. Professional Engineer's Certification

I hereby certify that, pursuant to the requirements of the Pinelands Comprehensive Management Plan (N.J.A.C 7:50-6.84(a)6.iv.(3)), I have performed a groundwater mounding analysis for each of the stormwater infiltration facilities identified in Part A, above, for the purpose of assessing the hydraulic impacts on the water table from infiltrating stormwater runoff from the maximum design storm. I further certify that the infiltration of stormwater runoff from the maximum design storm at each of these infiltration facilities will not cause stormwater or groundwater to breakout to the land surface or cause any changes to the hydrology of adjacent water bodies, wetlands or cause adverse impacts to subsurface structures, including, but not limited to basements and septic systems. In performing this analysis, I utilized the following methods:

[Specify mounding analysis method(s)]

(Signature and seal)

(License Number)

(Name –Type or Print)

(Date)

** This is a sample certification. The language in this sample certification may be modified/ revised provided the intent of the certification is not changed.*