

TOWNSHIP OF BURLINGTON

ORDINANCE

06-OR-020

**ORDINANCE AMENDING THE ZONING ORDINANCE OF THE TOWNSHIP OF
BURLINGTON, COUNTY OF BURLINGTON, STATE OF
NEW JERSEY, AND SPECIFICALLY SECTION 19:12-8 (DRAINAGE)**

WHEREAS, Section 19:12-8 of the Zoning Ordinance of the Township of Burlington contains requirements related to the regulation of surface (stormwater) drainage; and

WHEREAS, the recently enacted NJDEP Stormwater Management Rules (NJAC 7:8) requires municipalities, through their Municipal Stormwater General Permits, to adopt an ordinance establishing minimum stormwater management standards and controls for "major development"; and

WHEREAS, the existing ordinance does not meet these minimum standards;

BE IT ORDAINED by the Township Council of the Township of Burlington, County of Burlington and State of New Jersey as follows:

Section 1. Section 19:12-8 is hereby deleted in its entirety and replaced with new Section 19:12-8 entitled "Stormwater Management", which is attached hereto.

Section 2. All Ordinances or parts of Ordinances inconsistent with the provisions hereof, are hereby repealed insofar as said inconsistency exists.

Section 3. This Ordinance shall take effect immediately upon final passage and approval by the county review agency, or sixty (60) days from the receipt of the ordinance by the county review agency if the county review agency should fail to act.

19:12-8 STORMWATER MANAGEMENT

19:12-8.1: GENERAL.

A. Statutory Authority

The Municipal Land Use Law, N.J.S.A. 40:44D-1 et seq., the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq., and the NJDEP Stormwater Management Rules, N.J.A.C. 7:8, provide the statutory authority for this ordinance.

B. Policy Statement

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

C. Purpose

It is the purpose of this ordinance to:

1. Establish minimum stormwater management requirements and controls for “major development,” as defined in Section 19:12-8.2, or any improvements which may create an adverse drainage impact.
2. Assure the stormwater management design and methodology for new development and redevelopment is consistent with the goals, strategies, and design and performance standards set forth in the Burlington Township Municipal Stormwater Management Plan, which was adopted by Resolution of the Township Planning Board.

D. Applicability

1. This ordinance shall be applicable to all site plans and subdivisions for the following major developments that require preliminary or final site plan or subdivision review:
 - a. Non-residential major developments; and
 - b. Aspects of residential major developments that are not pre-empted by the Residential Site Improvement Standards N.J.A.C. 5:21.

2. This ordinance shall also be applicable to all major developments undertaken by Burlington Township.
3. This ordinance shall also be applicable to any improvements requiring a Planning or Zoning Board Approval or Use Permit and which will result in an overall net increase in stormwater peak runoff rates or volumes, which in the opinion of the Reviewing Board Engineer or Township Engineer, may create an adverse impact due to existing site conditions; the absence of drainage facilities; or a lack of capacity within the existing stormwater management system to which runoff is being conveyed.

E. Compatibility with Other Permit and Ordinance Requirements

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 code, rule, act, or ordinance. In their interpretation and application, the provisions of this ordinance shall be held to be the minimum requirements for the promotion of the public health, safety, and general welfare. This ordinance is not intended to interfere with, abrogate, or annul any other ordinances, rule or regulation, statute, or other provision of law except that, where any provision of this ordinance imposes restrictions different from those imposed by any other ordinance, rule or regulation, or other provision of law, the more restrictive provisions or higher standards shall control.

19:12-8.2: DEFINITIONS.

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

“Best Management Practices (BMP’s)” means stormwater management measures that are intended to reduce, control and/or treat stormwater runoff impacts through sound site planning and design.

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

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

“Compaction” means the increase in soil bulk density.

“Core” means a pedestrian-oriented area of commercial and civic uses serving the surrounding municipality, generally including housing and access to public transportation.

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

A county planning agency; or

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

“N.J.D.E.P.” means the New Jersey N.J.D.E.P. of Environmental Protection.

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

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

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

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

“Environmentally critical areas” means an area or feature which is of significant environmental value, including but not limited to: stream corridors; natural heritage priority sites; habitat of endangered or threatened species; large areas of contiguous open space or upland forest; steep slopes; and well head protection and groundwater recharge areas. Habitats of endangered or threatened species are identified using the N.J.D.E.P. Landscape Project as approved by the N.J.D.E.P. Endangered and Nongame Species Program.

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

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

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

- “Infiltration” is the process by which water seeps into the soil from precipitation.
- “Major development” means any “development” that provides for ultimately disturbing one or more acres of land. Disturbance for the purpose of this rule is the placement of impervious surface or exposure and/or movement of soil or bedrock or clearing, cutting, or removing of vegetation.
- “Maximum Extent Practicable” means the implementation of BMP’s for a particular site when considering various factors to include physical conditions, economic viability, project size and location within the watershed; and such other factors as may be considered by the Reviewing Board.
- “Municipality” means any city, borough, town, township, or village.
- “N.J.D.E.P.” means the New Jersey Department of Environmental Protection.
- “Node” means an area designated by the State Planning Commission concentrating facilities and activities which are not organized in a compact form.
- “Nutrient” means a chemical element or compound, such as nitrogen or phosphorus, which is essential to and promotes the development of organisms.
- “Person” means any individual, corporation, company, partnership, firm, association, Township of Burlington, or political subdivision of this State subject to municipal jurisdiction pursuant to the Municipal Land Use Law, N.J.S.A. 40:55D-1 et seq.
- “Pollutant” means any dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, refuse, oil, grease, sewage sludge, munitions, chemical wastes, biological materials, medical wastes, radioactive substance (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.), thermal waste, wrecked or discarded equipment, rock, sand, cellar dirt, industrial, municipal, agricultural, and construction waste or runoff, or other residue discharged directly or indirectly to the land, ground waters or surface waters of the State, or to a domestic treatment works. “Pollutant” includes both hazardous and nonhazardous pollutants.
- “Recharge” means the amount of water from precipitation that infiltrates into the ground and is not evapotranspired.
- “Reviewing Board Engineer” means the duly appointed Zoning Board or Planning Board Engineer.
- “Sediment” means solid material, mineral or organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water or gravity as a product of erosion.
- “Site” means the lot or lots upon which a major development is to occur or has occurred.
- “Soil” means all unconsolidated mineral and organic material of any origin.
- “State Development and Redevelopment Plan Metropolitan Planning Area (PA1)” means an area delineated on the State Plan Policy Map and adopted by the State Planning Commission that is intended to be the focus for much of the state’s future redevelopment and revitalization efforts.

- “State Plan Policy Map” is defined as the geographic application of the State Development and Redevelopment Plan’s goals and statewide policies, and the official map of these goals and policies.
- “Stormwater” means water resulting from precipitation (including rain and snow) that runs off the land’s surface, is transmitted to the subsurface, or is captured by separate storm sewers or other sewage or drainage facilities, or conveyed by snow removal equipment.
- “Stormwater runoff” means water flow on the surface of the ground or in storm sewers,
- “Stormwater management basin” means an excavation or embankment and related areas designed to retain stormwater runoff. A stormwater management basin may either be normally dry (that is, a detention basin or infiltration basin), retain water in a permanent pool (a retention basin), or be planted mainly with wetland vegetation (most constructed stormwater wetlands).
- “Stormwater management measure” means any structural or nonstructural strategy, practice, technology, process, program, or other method intended to control or reduce stormwater runoff and associated pollutants, or to induce or control the infiltration or groundwater recharge of stormwater or to eliminate illicit or illegal non-stormwater discharges into stormwater conveyances.
- “Tidal Flood Hazard Area” means a flood hazard area, which may be influenced by stormwater runoff from inland areas, but which is primarily caused by the Atlantic Ocean.
- “Urban Coordinating Council Empowerment Neighborhood” means a neighborhood given priority access to State resources through the New Jersey Redevelopment Authority.
- “Urban Enterprise Zones” means a zone designated by the New Jersey Enterprise Zone Authority pursuant to the New Jersey Urban Enterprise Zones Act, N.J.S.A. 52:27H-60 et. seq.
- “Urban Redevelopment Area” is defined as previously developed portions of areas:
- (1) Delineated on the State Plan Policy Map (SPPM) as the Metropolitan Planning Area (PA1), Designated Centers, Cores or Nodes;
 - (2) Designated as CAFRA Centers, Cores or Nodes;
 - (3) Designated as Urban Enterprise Zones; and
 - (4) Designated as Urban Coordinating Council Empowerment Neighborhoods.
- “Waters of the State” means the ocean and its estuaries, all springs, streams, wetlands, and bodies of surface or ground water, whether natural or artificial, within the boundaries of the State of New Jersey or subject to its jurisdiction.
- “Wetlands” or “wetland” means an area that is inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation.

19:12-8.3: GENERAL STANDARDS.

A. Design and Performance Standards for Stormwater Management Measures

1. All developments shall be required to provide for surface drainage within the limits of the project to insure that it will not create a burden to the ultimate users of the property or create an adverse off-site effect. All streets shall be provided with catch basins and pipes where the same may be necessary for proper surface drainage. The stormwater management system shall be adequate to convey and/or store runoff and natural drainage water which originates within the development boundaries and that which also originates beyond the development boundaries but which passes through the development. Calculations shall be based upon the maximum potential development as permitted under this Ordinance. No stormwater runoff or natural drainage water shall be so diverted as to overload existing drainage systems or create flooding or the need for additional drainage structures on adjacent lands without proper and approved provisions being made for managing these conditions. Stormwater management measures for non-major development projects may be required, at the discretion of the Reviewing Board Engineer or Township Engineer, to incorporate any of the strategies and to meet the standards set forth in this ordinance, depending on the specific impact of project.
2. Stormwater management measures for major development shall be developed to meet the erosion control, groundwater recharge, stormwater runoff quantity, and stormwater runoff quality standards in this ordinance. To the maximum extent practicable, these standards shall be met by incorporating nonstructural stormwater management strategies into the design. If these strategies alone are not sufficient to meet these standards, structural stormwater management measures necessary to meet these standards shall be incorporated into the design.
3. Development shall use the best available technology to minimize off-site stormwater runoff, increase on-site infiltration, simulate natural drainage systems, and minimize off-site discharge of pollutants to ground and surface water and encourage natural filtration functions. Best Available Technology may include bioretention systems, constructed wetlands, extended detention basins, infiltration basins, sand filters, vegetative filters, porous pavement, wet ponds, or manufactured treatment devices.

B. Stormwater Management Requirements for Major Development

1. The development shall incorporate a maintenance plan for the stormwater management measures incorporated into the design of a major development in accordance with Section 19:12-8.5.D of this ordinance.

2. Stormwater management measures shall avoid adverse impacts of concentrated flow on habitat for threatened and endangered species as documented in the N.J.D.E.P. Landscape Project or Natural Heritage Database established under N.J.S.A. 13:1B-15.147 through 15.150, particularly *Helonias bullata* (swamp pink) and/or *Clemmys muhlnebergi* (bog turtle).
3. The following linear development projects are exempt from the groundwater recharge, stormwater runoff quantity, and stormwater runoff quality requirements of Section 19:12-8.4 of this ordinance:
 - a. The construction of an underground utility line provided that the disturbed areas are revegetated upon completion;
 - b. The construction of an aboveground utility line provided that the existing conditions are maintained to the maximum extent practicable; and
 - c. The construction of a public pedestrian access, such as a sidewalk or trail with a maximum width of 14 feet, provided that the access is made of permeable material.
4. A waiver from strict compliance from the groundwater recharge, stormwater runoff quantity, and/or stormwater runoff quality requirements of Section 19:12-8.4 may be obtained for the enlargement of an existing public roadway or railroad; or the construction or enlargement of a public pedestrian access, provided that the following conditions are met:
 - a. The applicant demonstrates that there is a public need for the project that cannot be accomplished by any other means;
 - b. The applicant demonstrates through an alternatives analysis, that through the use of nonstructural and structural stormwater management strategies and measures, the option selected complies with the intent of this ordinance to the maximum extent practicable;
 - c. The applicant demonstrates that, in order to meet the requirements of this ordinance, existing structures currently in use, such as homes and buildings, would need to be condemned; and
 - d. The applicant demonstrates that it does not own or have other rights to areas, including the potential to obtain through condemnation lands not falling under Paragraph (c) above, within the upstream drainage area of the receiving stream, which would provide additional opportunities to mitigate those requirement(s) that were not achievable on-site.
 - e. The applicant demonstrates that implementing the stormwater management measures would present an adverse to health, safety, or the environment.

5. A waiver from strict compliance from the groundwater recharge, stormwater runoff quantity, and/or stormwater runoff quality requirements of Section 19:12-8.4 may be granted by the Reviewing Board contingent upon the Developer entering into an Agreement with Burlington Township to complete, at no cost to the Township, one or more of the mitigation projects described in Chapter 9 Mitigation Plan of the adopted Municipal Stormwater Management Plan.

C. Nonstructural Stormwater Management Strategies

1. To the maximum extent practicable, the standards in Section 19:12-8.4 shall be met by incorporating nonstructural stormwater management strategies as contained herein into the design. The applicant shall identify the nonstructural measures incorporated into the design of the project. If the applicant contends that it is not feasible for engineering, environmental, or safety reasons to incorporate any nonstructural stormwater management measures identified in Paragraph 2 below into the design of a particular project, the applicant shall identify the strategy considered and provide a basis for the contention.
2. Nonstructural stormwater management strategies incorporated into site design shall:
 - a. Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;
 - b. Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces;
 - c. Maximize the protection of natural drainage features and vegetation;
 - d. Minimize the decrease in the "time of concentration" from pre-construction to post construction. "Time of concentration" is defined as the time it takes for runoff to travel from the hydraulically most distant point of the watershed to the point of interest within a watershed;
 - e. Minimize land disturbance, including clearing and grading, and soil compaction;
 - f. Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides;
 - g. Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas;

- h. Provide other source controls to prevent or minimize the use or exposure of pollutants at the site, in order to prevent or minimize the release of those pollutants into stormwater runoff. Such source controls include, but are not limited to:
 - i. Site design features that help to prevent accumulation of trash and debris in drainage systems, including features that satisfy Paragraph 3 below;
 - 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. When establishing vegetation after land disturbance, applying fertilizer in accordance with the requirements established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq., and implementing rules.
- 3. Site design features identified under Paragraph 2 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 Paragraph (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:
 - i. The New Jersey Department of Transportation (N.J.D.O.T.) bicycle safe grate, which is described in Chapter 2.4 of the N.J.D.O.T. Bicycle Compatible Roadways and Bikeways Planning and Design Guidelines (April 1996); or
 - ii. 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. Design engineers shall use either of the following curb pieces in conjunction with curb inlets:
 - i. A Type “N”- Eco curb piece as manufactured by Campbell Foundry, or approved equivalent, shall be utilized for all new curb inlets.
 - ii. A different curb piece, if 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 (7.0) square inches, or be no greater than two (2.0) inches across the smallest dimension.
 - iii. Curb pieces for existing inlets on site shall be either replaced in accordance with b.i. or b.ii above, or retrofitted with an eco-inlet cover as manufactured by LMT-Mercer Group, or approved equivalent.

All curb pieces shall be permanently labeled with the following wording: “*Dump No Waste – Drains to Waterways*”.

- c. These standards may not apply in the following situations:
 - i. 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;
 - ii. Where flows from the water quality design storm as specified in Section 19:12-8.4.B.1 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.
 - iii. 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 Section 19:12-8.4.B.1; or
 - iv. Where the New Jersey Department of Environmental Protection determines, pursuant to the New Jersey Register of Historic Places Rules at N.J.A.C. 7:4-7.2(c), that action to meet this standard is an undertaking that constitutes an encroachment or will damage or destroy the listed historic property.

4. Any land area used as a nonstructural stormwater management measure to meet the performance standards in Section 19:12-8.4 shall be dedicated to a government agency, subjected to a conservation restriction filed with the appropriate County Clerk's office, or subject to an approved equivalent restriction that ensures that measure or an equivalent stormwater management measure approved by the reviewing agency is maintained in perpetuity.
5. Guidance for nonstructural stormwater management strategies is available in the New Jersey Stormwater Best Management Practices (BMP) Manual. The BMP Manual and other sources of guidance are listed in Section 19:12-8.4.E.

19:12-8.4: DESIGN AND PERFORMANCE STANDARDS.

A. Erosion Control, Groundwater Recharge and Runoff Quantity Standards

1. This subsection contains minimum design and performance standards to control erosion, encourage and control infiltration and groundwater recharge, and control stormwater runoff quantity impacts of major development.
 - a. The minimum design and performance standards for erosion control are those established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq. and implementing rules. Erosion control measures shall be consistent with the requirements of the Burlington County Conservation District and the N.J.D.E.P.
 - b. The minimum design and performance standards for groundwater recharge are as follows:
 - i. The design engineer shall, using the assumptions and factors for stormwater runoff and groundwater recharge calculations in this section, either:
 - a. Demonstrate through hydrologic and hydraulic analysis that the site and its stormwater management measures maintain 100 percent of the average annual pre-construction groundwater recharge volume for the site; or
 - b. Demonstrate through hydrologic and hydraulic analysis that the increase of stormwater runoff volume from pre-construction to post-construction for the 2-year storm is infiltrated.

- c. This groundwater recharge requirement does not apply to projects within an “urban redevelopment area,” or to projects subject to Paragraph (d) below.
- d. The following types of stormwater shall not be recharged:
 - i. Stormwater from areas of high pollutant loading. High pollutant loading areas are areas in industrial and commercial developments where solvents and/or petroleum products are loaded/unloaded, stored, or applied, areas where pesticides are loaded/unloaded or stored; areas where hazardous materials are expected to be present in greater than “reportable quantities” as defined by the United States Environmental Protection Agency (E.P.A.) at 40 CFR 302.4; areas where recharge would be inconsistent with N.J.D.E.P. approved remedial action work plan or landfill closure plan and areas with high risks for spills of toxic materials, such as gas stations and vehicle maintenance facilities; and
 - ii. Industrial stormwater exposed to “source material.” “Source material” means any material(s) or machinery, located at an industrial facility, 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 exposed to stormwater.
- e. The design engineer shall assess the hydraulic impact on the groundwater table and design the site so as to avoid adverse hydraulic impacts. Potential adverse hydraulic impacts include, but are not limited to, exacerbating a naturally or seasonally high water table so as to cause surficial ponding, flooding of basements, or interference with the proper operation of subsurface sewage disposal systems and other subsurface structures in the vicinity or downgradient of the groundwater recharge area. Groundwater mounding calculations are required to be submitted, unless waived by the Reviewing Board Engineer.
- f. In order to control stormwater runoff quantity impacts, the design engineer shall, using the assumptions and factors for stormwater runoff calculations in this section, complete one of the following:
 - i. Demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the 2, 10, and 100-year frequency storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events;

- ii. Demonstrate through hydrologic and hydraulic analysis that there is no increase, as compared to the pre-construction condition, in the peak runoff rates of stormwater leaving the site for the 2, 10, and 100-year frequency storm events and that the increased volume or change in timing of stormwater runoff will not increase flood damage at or downstream of the site. This analysis shall include the analysis of impacts of existing land uses and projected land uses assuming full development under existing zoning and land use ordinances in the drainage area;
- iii. Design stormwater management measures so that the post-construction peak runoff rates for the 2, 10 and 100 year frequency storm events are 50, 75 and 80 percent, respectively, of the pre-construction peak runoff rates. The percentages apply only to the post-construction stormwater runoff that is attributable to the portion of the site on which the proposed development or project is to be constructed. Off-site runoff from areas not under development may be computed at 100 percent of the pre-project rate. The percentages shall not be applied to post-construction stormwater runoff directly into tidal flood hazard areas if the increased volume of stormwater runoff will not increase flood damages below the point of discharge; or
- iv. In tidal flood hazard areas, stormwater runoff quantity analysis in accordance with (i), (ii) and (iii) above shall only be applied if the increased volume of stormwater runoff could increase flood damages below the point of discharge.

B. Stormwater Runoff Quality Standards

1. Stormwater management measures shall be designed to reduce the post-construction load of total suspended solids (TSS) in stormwater runoff by 80 percent of the anticipated load from the developed site, expressed as an annual average. Stormwater management measures shall only be required for water quality control if an additional 1/4 acre of impervious surface is being proposed on a development site. The requirement to reduce TSS does not apply to any stormwater runoff in a discharge regulated under a numeric effluent limitation for TSS imposed under the New Jersey Pollution Discharge Elimination System (N.J.P.D.E.S.) rules, N.J.A.C. 7:14A, or in a discharge specifically exempt under a N.J.P.D.E.S. permit from this requirement. The water quality design storm is 1.25 inches of rainfall in two hours. Water quality calculations shall take into account the distribution of rain from the water quality design storm, as reflected in Table 1 below. The calculation of the volume of runoff may take into account the implementation of non-structural and structural stormwater management measures.

Table 1: Water Quality Design Storm Distribution			
Time (Minutes)	Cumulative Rainfall (Inches)	Time (Minutes)	Cumulative Rainfall (Inches)
0	0.0000	65	0.8917
5	0.0083	70	0.9917
10	0.0166	75	1.0500
15	0.0250	80	1.0840
20	0.0500	85	1.1170
25	0.0750	90	1.1500
30	0.1000	95	1.1750
35	0.1330	100	1.2000
40	0.1660	105	1.2250
45	0.2000	110	1.2334
50	0.2583	115	1.2417
55	0.3583	120	1.2500
60	0.6250		

2. For purposes of TSS reduction calculations, Table 2 below presents the presumed removal rates for certain BMPs designed in accordance with the New Jersey Stormwater Best Management Practices Manual. The BMP Manual and other sources of technical guidance are listed in Section 19:12-8.4.E. TSS reductions shall be calculated based on the removal rates for the BMPs in Table 2 below. Alternative removal rates and methods of calculating removal rates may be used if the design engineer provides documentation demonstrating the capability of these alternative rates and methods to the review agency. A copy of any approved alternative rate or method of calculating the removal rate shall be provided to the N.J.D.E.P. at the following address: Division of Watershed Management, New Jersey Department of Environmental Protection, PO Box 418 Trenton, New Jersey, 08625-0418.

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

$$R = A + B - (AXB)/100$$

Where

R = total TSS percent load removal from application of both BMPs, and

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

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

Table 2: TSS Removal Rates for BMPs	
Best Management Practice	TSS Percent Removal Rate
Bioretention Systems	90
Constructed Stormwater Wetland	90
Extended Detention Basin	40-60
Infiltration Structure	80
Manufactured Treatment Device	See Section D.7
Sand Filter	80
Vegetative Filter Strip	60-80
Wet Pond	50-90

4. If there is more than one onsite drainage area, the 80 percent TSS removal rate shall apply to each drainage area, unless the runoff from the subareas converge on site in which case the removal rate can be demonstrated through a calculation using a weighted average.
5. Stormwater management measures shall also be designed to reduce, to the maximum extent feasible, the post-construction nutrient load of the anticipated load from the developed site in stormwater runoff generated from the water quality design storm. In achieving reduction of nutrients to the maximum extent feasible, the design of the site shall include nonstructural strategies and structural measures that optimize nutrient removal while still achieving the performance standards in this section.

6. In accordance with the definition of FW1 at N.J.A.C. 7:9B-1.4, stormwater management measures shall be designed to prevent any increase in stormwater runoff to waters classified as FW1.
7. Special Water Resource Protection Areas (S.W.R.P.A.) shall be established along all waters designated Category One at N.J.A.C. 7:9B, and perennial or intermittent streams that drain into or upstream of the Category One waters as shown on the USGS Quadrangle Maps or in the County Soil Surveys, within the associated HUC14 drainage area. These areas shall be established for the protection of water quality, aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, and exceptional fisheries significance of those established Category One waters. These areas shall be designated and protected as follows:
 - a. The applicant shall preserve and maintain a special water resource protection area in accordance with one of the following:
 - i. A 300-foot special water resource protection area shall be provided on each side of the waterway, measured perpendicular to the waterway from the top of the bank outwards or from the centerline of the waterway where the bank is not defined, consisting of existing vegetation or vegetation allowed to follow natural succession is provided. (2) Encroachment within the designated special water resource protection area under Subsection (1) above shall only be allowed where previous development or disturbance has occurred (for example, active agricultural use, parking area or maintained lawn area). The encroachment shall only be allowed where applicant demonstrates that the functional value and overall condition of the special water resource protection area will be maintained to the maximum extent practicable. In no case shall the remaining special water resource protection area be reduced to less than 150 feet as measured perpendicular to the top of bank of the waterway or centerline of the waterway where the bank is undefined. All encroachments proposed under this subparagraph shall be subject to review and approval by the N.J.D.E.P.
 - b. All stormwater shall be discharged outside of and flow through the special water resource protection area and shall comply with the Standard for Off-Site Stability in the “Standards For Soil Erosion and Sediment Control in New Jersey,” established under the Soil Erosion and Sediment Control Act , N.J.S.A. 4:24-39 et seq.

- c. If stormwater discharged outside of and flowing through the special water resource protection area cannot comply with the Standard For Off-Site Stability in the “Standards for Soil Erosion and Sediment Control in New Jersey,” established under the Soil Erosion and Sediment Control Act , N.J.S.A. 4:24-39 et seq., then the stabilization measures in accordance with the requirements of the above standards may be placed within the special water resource protection area, provided that:
 - i. Stabilization measures shall not be placed within 150 feet of the Category One waterway;
 - ii. Stormwater associated with discharges allowed by this section shall achieve a 95 percent TSS post-construction removal rate;
 - iii. Temperature shall be addressed to ensure no impact on the receiving waterway;
 - iv. The encroachment shall only be allowed where the applicant demonstrates that the functional value and overall condition of the special water resource protection area will be maintained to the maximum extent practicable;
 - v. A conceptual project design meeting shall be held with the appropriate N.J.D.E.P. staff and Soil Conservation District staff to identify necessary stabilization measures; and
 - vi. All encroachments proposed under this section shall be subject to review and approval by the N.J.D.E.P..
- d. S.W.R.P.A. requirements shall not apply to the construction of one individual single family dwelling that is not part of a larger development on a lot receiving preliminary or final subdivision approval on or before February 2, 2004, provided that the construction begins on or before February 2, 2009.

C. Calculation of Stormwater Runoff and Groundwater Recharge

- 1. The design engineer shall calculate stormwater runoff using one of the following methods:
 - a. The U.S.D.A. Natural Resources Conservation Service (N.R.C.S.) methodology, including the NRCS Runoff Equation and Dimensionless Unit Hydrograph, as described in the NRCS National Engineering Handbook Section 4 – Hydrology and Technical Release 55 – Urban Hydrology for Small Watersheds; or
 - b. The Rational Method for peak flow for drainage areas less than 320 acres and the Modified Rational Method for hydrograph computations for drainage areas less than 20 acres.

2. N.R.C.S. New Jersey 24-hour rainfall frequency data, effective September 1, 2005, in conjunction with the Delmarva Unit Hydrograph, shall be utilized for runoff computations.
3. In computing pre-construction stormwater runoff, the design engineer shall account for all significant land features and structures, such as ponds, wetlands, depressions, hedgerows, or culverts, which may reduce pre-construction stormwater runoff rates and volumes.
4. For the purpose of calculating runoff coefficients and groundwater recharge, there is a presumption that the pre-construction condition of a site or portion thereof is a wooded land use with “good” hydrologic condition. The term “runoff coefficient” applies to both the N.R.C.S. methodology and the Rational and Modified Rational Methods. A runoff coefficient or a groundwater recharge land cover for an existing condition may be used on all or a portion of the site if the design engineer verifies that the hydrologic condition has existed on the site or portion of the site for at least five years without interruption prior to the time of application. If more than one land cover have existed on the site during the five years immediately prior to the time of application, the land cover with the lowest runoff potential shall be used for the computations. In addition, there is the presumption that the site is in “good” hydrologic condition (if the land use type is pasture, lawn, or park), with “good” cover (if the land use type is woods), or with “good” hydrologic condition and conservation treatment (if the land use type is cultivation).
5. In computing stormwater runoff from all design storms, the design engineer shall consider the relative stormwater runoff rates and/or volumes of pervious and impervious surfaces separately to accurately compute the rates and volume of stormwater runoff from the site. To calculate runoff from unconnected impervious cover, urban impervious area modifications as described in the N.R.C.S. Technical Release 55 – Urban Hydrology for Small Watersheds and other methods may be employed.
6. If the invert of the outlet structure of a stormwater management measure is below the flood hazard design flood elevation as defined at N.J.A.C. 7:13, the design engineer shall take into account the effects of tailwater in the design of structural stormwater management measures.
7. The size of drainage areas shall include on-site and off-site drainage areas contributing runoff to the design point.
8. Design engineers shall use a consistent method to calculate peak rate of runoff and volume when computing runoff hydrographs.

9. Groundwater recharge shall be calculated in accordance with the New Jersey Geological Survey Report GSR-32 A Method for Evaluating Ground-Water Recharge Areas in New Jersey, incorporated herein by reference as amended and supplemented. Information regarding the methodology is available from the New Jersey Stormwater Best Management Practices Manual or at New Jersey Geological Survey, 29 Arctic Parkway, P.O. Box 427 Trenton, New Jersey 08625-0427; (609) 984-6587.

D. Standards for Structural Stormwater Management Measures

1. Structural stormwater management measures shall be designed to take into account the existing site conditions, including, for example, environmentally critical areas, wetlands; flood-prone areas; slopes; depth to seasonal high water table; soil type, permeability and texture; drainage area and drainage patterns; and the presence of solution-prone carbonate rocks (limestone).
2. Structural stormwater management measures shall be designed to minimize maintenance, facilitate maintenance and repairs, and ensure proper functioning. Trash racks shall be installed at the intake to the outlet structure as appropriate, and shall have parallel bars with one-inch (1") spacing between the bars to the elevation of the water quality design storm. For elevations higher than the water quality design storm, the parallel bars at the outlet structure shall be spaced no greater than one-third (1/3) the width of the diameter of the orifice or one-third (1/3) the width of the weir, with a minimum spacing between bars of one-inch and a maximum spacing between bars of six inches. In addition, the design of trash racks must comply with the requirements of Section 19:12-8.4.F of this ordinance.
3. Structural stormwater management measures shall be designed, constructed, and installed to be strong, durable, and corrosion resistant. Measures that are consistent with the relevant portions of the Residential Site Improvement Standards at N.J.A.C. 5:21-7.3, 7.4, and 7.5 shall be acceptable.
4. At the intake to the outlet from the stormwater management basin, the orifice size shall be a minimum of two and one-half inches in diameter.
5. Stormwater management basins shall be designed to meet the minimum safety standards for stormwater management basins found in Section 19:12-8.4.F of this ordinance.
6. Stormwater management measure guidelines are available in the New Jersey Stormwater Best Management Practices Manual. Other stormwater management measures may be utilized provided the design engineer demonstrates that the proposed measure and its design will accomplish the required water quantity, groundwater recharge and water quality design and performance standards established by this ordinance.

7. Manufactured treatment devices may be used to meet the water quality (TSS removal) requirements of this ordinance, provided the pollutant removal rates are verified by the New Jersey Corporation for Advanced Technology (N.J.C.A.T.) and certified by the N.J.D.E.P.
8. Backfill for pipes and drainage structures shall be free of deleterious substances, stumps, brush, weeds, roots, sod, rubbish, garbage and matter that may decay. Backfill to a height of two feet (2') above the top of pipes, culverts and other structures shall be free of stones or rock fragments larger than two inches (2") in greatest dimension. Backfill shall also be free of large rocks or lumps that, in the opinion of the Reviewing Board Engineer, may create voids or prevent proper compaction. The Reviewing Board Engineer may require the Developer to provide a professional certification as to the suitability of the on-site material for use as backfill. In those cases, where such suitability does not exist, the Developer may use borrow material, if said material is approved by the design engineer, and a certification as to suitability is provided to the Reviewing Board Engineer. All excavation and backfill shall meet the requirements of Section 19:13-8 Subsurface Structure Excavation of the Township Land Development Ordinance.

E. Sources for Technical Guidance

1. Technical guidance for stormwater management measures can be found in the documents listed in Paragraphs (a) and (b) below, which are available from Maps and Publications, New Jersey N.J.D.E.P. of Environmental Protection, 428 East State Street, P.O. Box 420, Trenton, New Jersey, 08625; telephone (609) 777-1038.
 - a. Guidelines for stormwater management measures are contained in the New Jersey Stormwater Best Management Practices Manual, as amended. Information is provided on stormwater management measures such as: bioretention systems, constructed stormwater wetlands, dry wells, extended detention basins, infiltration structures, manufactured treatment devices, pervious paving, sand filters, vegetative filter strips, and wet ponds.
 - b. The New Jersey Department of Environmental Protection Stormwater Management Facilities Maintenance Manual, as amended.

2. Additional technical guidance for stormwater management measures can be obtained from the following:
 - a. The "Standards for Soil Erosion and Sediment Control in New Jersey" promulgated by the State Soil Conservation Committee and incorporated into N.J.A.C. 2:90. Copies of these standards may be obtained by contacting the State Soil Conservation Committee or any of the Soil Conservation Districts listed in N.J.A.C. 2:90-1.3(a)4. The location, address, and telephone number of each Soil Conservation District may be obtained from the State Soil Conservation Committee, P.O. Box 330, Trenton, New Jersey 08625; (609) 292-5540;
 - b. The Rutgers Cooperative Extension Service, 732-932-9306; and
 - c. The Soil Conservation Districts listed in N.J.A.C. 2:90-1.3(a)4. The location, address, and telephone number of each Soil Conservation District may be obtained from the State Soil Conservation Committee, P.O. Box 330, Trenton, New Jersey, 08625, (609) 292-5540.

F. Safety Standards for Stormwater Management Basins

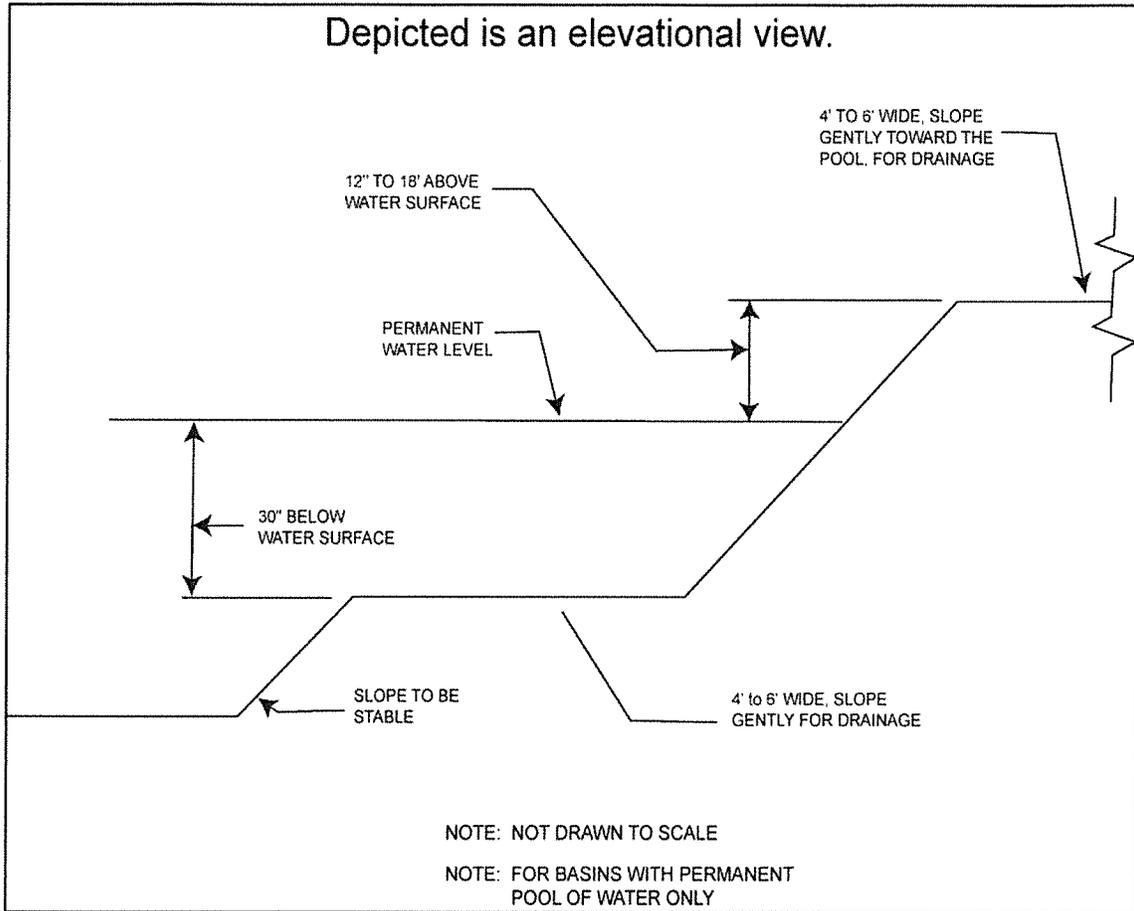
1. This section sets forth requirements to protect public safety through the proper design and operation of stormwater management basins. This section applies to any new stormwater management basin.
2. Requirements for Trash Racks, Overflow Grates and Escape Provisions
 - a. A trash rack is a device designed to catch trash and debris and prevent the clogging of outlet structures. Trash racks shall be installed at the intake to the outlet from the stormwater management basin to ensure proper functioning of the basin outlets in accordance with the following:
 - i. The trash rack shall have parallel bars, with no greater than six inch spacing between the bars.
 - ii. The trash rack shall be designed so as not to adversely affect the hydraulic performance of the outlet pipe or structure.
 - iii. The average velocity of flow through a clean trash rack is not to exceed 2.5 feet per second under the full range of stage and discharge. Velocity is to be computed on the basis of the net area of opening through the rack.
 - 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 lbs/ft sq.

- b. An overflow grate is designed to prevent obstruction of the overflow structure. If an outlet structure has an overflow grate, such grate shall meet the following requirements:
 - 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 less than two inches across the smallest dimension.
 - 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 300 lbs./ft sq. The use of “stream flow” type grates is preferred.
- c. For purposes of this paragraph, escape provisions means the permanent installation of ladders, steps, rungs, or other features that provide easily accessible means of egress from stormwater management basins. Stormwater management basins shall include escape provisions as follows:
 - i. If a stormwater management basin has an outlet structure, escape provisions shall be incorporated in or on the structure.
 - ii. Safety ledges shall be constructed on the slopes of all new stormwater management basins having a permanent pool of water deeper than two and one-half feet. Such safety ledges shall be comprised of two steps. Each step shall be four to six feet in width. One step shall be located approximately two and one-half feet below the permanent water surface, and the second step shall be located one to one and one-half feet above the permanent water surface. See Section 8.4.F below for an illustration of safety ledges in a stormwater management basin.
 - iii. In new stormwater management basins, the maximum interior slope for an earthen dam, embankment, or berm shall not be steeper than 3 horizontal to 1 vertical.

3. Waiver or Exemption from Safety Standards

- a. A waiver or exemption from the safety standards for stormwater management basins may be granted only upon a written finding by the appropriate reviewing agency (municipality, county or N.J.D.E.P.) that the variance or exemption will not constitute a threat to public safety.

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



G. Runoff Conveyance System Design

1. Pipe Design

- a. All storm sewer pipes shall be rubber-gasketed circular reinforced concrete pipe (R.C.P.) or elliptical reinforced concrete pipe (E.R.C.P.), meeting the requirements of A.S.T.M. C76 or C507, respectively. Subject to the approval of the Reviewing Board Engineer, alternate pipe materials such as corrugated metal (C.M.P.), high-density polyethylene (H.D.P.E.), ductile iron (D.I.P.), polyvinyl chloride (P.V.C.), or corrugated polyethylene (C.P.P.) may be utilized. The use of alternate pipe materials shall be at the sole discretion of the Reviewing Board Engineer and may require the submission of manufacturer's data and specifications, bedding and backfill requirements, installation instructions and applicable approvals of the alternate materials for use by other agencies such as NJDEP or NJDOT.
- b. Joint design and joint materials for circular concrete pipe and elliptical concrete pipe shall conform to A.S.T.M. C443 and C877, respectively.
- c. All concrete pipes shall be minimum Class III unless loading conditions or pipe cover call for a higher-class pipe.
- d. Minimum depth of cover for Class III concrete pipe with a diameter of 27" or less is two (2) feet. For Class III concrete pipe with a diameter of 30" or greater, the minimum cover may be reduced to one (1) foot. Depth of cover shall be measured from the top of pipe to the bottom of the overlying pavement section or finished grade, if no pavement exists or is proposed. Minimum depth of cover for Class IV and Class V pipe shall be in accordance with that designated by the American Concrete Pipe Association.
- e. Design engineers shall determine pipe size based on design runoff, conduit entrance conditions, and hydraulic capacity.
- f. No pipes shall be sized to less than 15 inches in diameter with the following exceptions:
 - i. Cross-drains to a single inlet may be sized to a minimum of 12 inches diameter.
 - ii. Roof drains may be sized to a minimum of 6 inches diameter.
 - iii. Sump pump laterals and collector pipes may be sized to a minimum of 4 inches diameter.

- g. Design engineers shall use Manning's Equation to determine hydraulic capacity for pipes or open-channel flow. The hydraulic capacity is termed "Q" and is expressed as discharge in cubic feet per second as follows:

$$Q = (1.486/n) * A * R^{2/3} * S^{1/2}$$

Where

n = Manning's roughness coefficient

A = cross-sectional area of flow in square feet

R = hydraulic radius in feet, $R = A/P$, where P is equal to the wetted perimeter, measured in feet, and defined as the length of the line of contact between the flowing water and the channel

S = slope of the pipe/culvert in feet per foot

The Manning roughness coefficient for concrete pipe shall be 0.015. For pipe other than R.C.P., the coefficient used by the design engineer shall be consistent with N.J.A.C. 5:21-7.1 or other authoritative source.

- h. Velocities at design flow shall be a minimum of 2.5 feet per second with the pipe flowing at 1/4 full, but not more than the velocity that will cause erosion damage to the conduit, in accordance with manufacturer's specifications.
- i. All pipes shall terminate with a precast concrete headwall with wingwalls, conforming to Township standards. Where design discharge velocities exceed 5.0 feet per second, a high-velocity headwall conforming to Township standards shall be provided. Flared-end sections are not permitted, unless authorized by the Reviewing Board Engineer.
- j. All pipes and culverts shall be designed to convey the peak runoff rates resulting from a 25-year frequency storm with the following exception:
- i. Culverts with an upstream drainage area of 50 acres or more shall be designed to accommodate the 100-year frequency storm in accordance with Flood Hazard Area Control Regulations.
- k. Design engineers shall base culvert capacity on inlet/outlet analysis, as specified in *Hydraulic Design of Highway Culverts*, Hydraulic Design Series (H.D.S.) No. 5, Report No. FHWA-IP-85-15, U.S.D.O.T., F.H.A., September 1985, incorporated herein by reference.
- l. Continuous profiles for each reach of pipe shall be plotted, along with the location of the hydraulic gradient and such information as pipe size and type, slope of pipe, design capacity and velocity at design capacity.

- m. Hydraulic gradient calculations of all pipe and drainage structures shall be submitted to the Reviewing Board Engineer. The hydraulic design of all pipes is based on the assumption that the hydraulic gradient will match the inside top of the pipe when the system is under maximum design flow. When pipe sizes change the inside tops of the pipes shall be matched. In addition, the design of all pipes shall consider the hydraulic impact of any waterbody that may be present at the point-of-discharge. Where a pipe discharges to a waterbody (to include any approved stormwater management basin or device), which has a 100-year flood elevation above the invert of said discharge pipe, the tailwater effect of said waterbody shall be considered in the hydraulic gradient calculations. In no instance shall the calculated elevation of the hydraulic gradient be less than one (1) foot below the top-of-grate elevation of any drainage inlet, catch basin or manhole.
- n. Time-of-concentration calculations shall be provided for all pipe runs; otherwise a time of concentration of 6 minutes shall be utilized.
- o. Safety grates are required for all discharge pipes 24" diameter or greater. The design of the grate shall conform to Township standards.
- p. Pipes constructed through or under a berm shall be capable of withstanding external loading without yielding, cracking or buckling. Flexible pipe strength shall not be less than necessary to support the design load with a maximum of 5% deflection. All pipe joints shall be watertight.
- q. No pipe or structure shall be placed on private property unless the owner of the land is to own or operate the pipe/structure, or an easement is obtained from the property owner. All easements shall be a minimum of 20 feet wide unless the depth, soil conditions, or additional utilities require wider.

2. Design of Inlets, Catch Basins, Manholes, and Outlets

- a. Design engineers shall design inlets, catch basins, manholes and outlet structures in accordance with New Jersey N.J.D.E.P. of Transportation's *Standard Specifications for Road and Bridge Construction (1989)* and shall also conform to Township standards. In the event of a conflict, the more stringent standard, as determined by the Reviewing Board Engineer, shall govern.
- b. Inlet spacing depends on inlet capacity. Sufficient inlets shall be located so that the peak rate of surface runoff shall not exceed the collection capacity of the inlet assuming a hydraulic head of two (2) inches. Maximum distance between inlets shall be 400 feet. In areas where pipe is to be installed without the need for inlets, manholes shall be provided for access at maximum intervals of 400 feet.

- c. Precast concrete structures shall conform to all applicable A.S.T.M standards.
- d. All structures constructed of concrete block shall be coated with two coats of Portland cement mortar on the inside and outside surfaces.
- e. The use of masonry brick (clay or shale) is prohibited.
- f. All structures shall be flush with the finished grade. Grade adjustments of less than eight (8) inches shall be accomplished using pre-cast concrete or metal grade rings. Concrete block may also be used, if approved by the Reviewing Board Engineer.
- g. Frames and covers shall be cast iron construction, conforming to A.S.T.M. A48, and shall be suitable for H-20 loading capacity.
- h. Channels should be constructed as a smooth continuation of the pipe to provide smooth, unobstructed flow through the structure. Completed channels shall be U-shaped with a minimum height of three-fourths of the diameter of the pipe.
- i. Benches shall provide good footing for workmen and a place where tools can be laid. Permissible slope of benches is 4%-8%.

3. Open Channel Design

- a. Open ditches or channels will be permitted when the design capacity requires a pipe larger than 60" diameter, unless disapproved by the Reviewing Board Engineer. Hydraulic capacity and design velocity shall be calculated based on a 25-year frequency storm, utilizing Manning's equation as stipulated in G.1.g of this Section. The Manning's roughness coefficient used by the design engineer shall be consistent with N.J.A.C. 5:21-7.1 or other authoritative source. Where permitted, open channel design should be based on the following:

<u>Channel Material</u>	<u>Allowable Velocity</u>
Fine Sand and Firm Loam	2.5 – 3.5 fps
Stiff Clay and Hard Pan	3.75 – 6.0 fps
Concrete Lined Ditch	15 fps

- b. In no case shall the design velocity of an open channel for a 25-year frequency storm be less than 0.5 feet/ second.
- c. Minimum freeboard of one (1) foot, as calculated for a 25-year frequency storm, should be provided on all channels.

- d. The channel should be designed to conform, wherever possible, to the adjacent ground conditions and elevations.
- e. Continuous profiles for each reach of open channel shall be plotted along with adjacent average ground and the hydraulic information pertinent to each reach within the system. This information shall include the type of channel lining, the Manning roughness coefficient, the width of the channel bottom, the side slopes, the water depth, the design capacity, and the velocity at the design capacity.
- f. Open channels shall have a maximum side slope of three (3) horizontal to one (1) vertical and shall have adequate slope protection as required by the Soil Erosion and Sediment Control Section of this Ordinance.

H. Detention Basins and Other Stormwater Facilities

- 1. Detention and all other stormwater facilities shall conform to the N.J.D.E.P. Stormwater Management Rules, N.J.A.C. 7:8-3.4. When applicable, design engineers shall also adhere to the stormwater design requirements in the following rules:
 - a. Dam Safety Standards, N.J.A.C. 7:20;
 - b. Soil Erosion and Sediment Control Standards, N.J.A.C. 2:90-1;
 - c. Flood Hazard Area Regulations, N.J.A.C. 7:13-1.1;
 - d. Freshwater Wetlands Protection Act Rules, N.J.A.C. 7:7A;
 - e. Residential Site Improvement Standards, N.J.A.C. 5:21-7.
- 2. Design engineers shall design basins and other stormwater management facilities to accommodate site runoff generated from the 2, 10, and 100-year frequency storm events as routed to the basin, considered individually, unless the basin is classified as a dam, in which case the facility must comply with the Dam Safety Standards, N.J.A.C. 7:20. Runoff greater than that resulting from the 100-year frequency, 24-hour storm may be passed over an approved emergency spillway.
- 3. These design storms shall be defined as either a 24-hour storm using Type III modified rainfall distribution when using N.R.C.S. methodology, or the design storm resulting in the greatest storage volume to achieve the required outflow using a design method such as the Modified Rational Method.

4. Design engineers shall locate basins and other stormwater facilities so as to not interfere with or adversely affect existing surface waters on or adjacent to the site. Excavation for detention facilities shall be designed to be the maximum practical distance above seasonal high groundwater elevation. Detention basins shall be designed to completely empty after a rainstorm occurs, and have standing water for a short period of time during a storm.
5. In the case of a “wet” pond, storage may only be presumed to be available above the elevation of seasonal high groundwater.
6. If the facility is designed as an “infiltration” basin, the bottom of the basin shall be a minimum of two (2) feet above the elevation of seasonal high groundwater, to include potential mounding effects.
7. Basins and other stormwater facilities, which are designed with a positive outflow, shall discharge into a stable outlet structure, weather natural or manmade. Stability calculations based on the 100-year storm outflow shall be submitted to the County Soil Conservation District.
8. The general design of all detention basins and other stormwater facilities (i.e., wet ponds, infiltration basin, bioretention basins, etc.) shall conform with the criteria set forth in the N.J.D.E.P. Best Management Practices Manual, as amended, and N.J.A.C. 5:21-7.8, with the following additional requirements:
 - a. Infiltration basins shall be constructed with an infiltration trench along the bottom of the basin. The trench shall be a minimum of three (3) foot wide and three (3) feet deep and shall be lined (bottom and both sides) with an approved filter fabric and filled with coarse aggregate. It shall extend for the full length of the basin bottom in its longest dimension.
 - b. “Wet” ponds shall be designed with a minimum pool depth of four (4) feet. If required by the Reviewing Board Engineer, “wet” ponds shall be provided with an aerator and a water service to allow for replenishing the pond during extended periods of dry weather.
 - c. Any basin or other stormwater management facility located within 400 feet of a residential dwelling or public road, which will pond water to a depth greater than 18”, is required to be completely enclosed with a minimum four (4) high fence with lockable gate in accordance with Section 17:4 of the Burlington Township General Ordinances.
 - d. An emergency spillway shall be provided for all stormwater management basins. The spillway shall be designed to safely convey the calculated basin inflow resulting from a 100-year frequency storm. The minimum elevation of the top of the basin beam shall be designed to be one foot or greater than the water surface elevation in the basin when runoff from the 100-year frequency storm passes over the emergency spillway. Potential settlement shall be considered in this design.

- e. For the purpose of calculating runoff curve numbers, the surface area of any stormwater management basin below the elevation of the 100-year frequency storm shall be considered to be impervious.

19:12-8.5: SUBMISSION REQUIRED.

A. Submission of Site Development Stormwater Plan

1. Whenever an applicant seeks municipal approval of a development subject to this ordinance, the applicant shall submit all of the required components of the Checklist for the Site Development Stormwater Plan in Paragraph C below as part of the submission of the applicant's application for subdivision or site plan approval.
2. The applicant shall demonstrate that the project meets the standards set forth in this ordinance.
3. The applicant shall submit five (5) copies of the materials listed in the checklist for site development stormwater plans in accordance with Paragraph C below.

B. Site Development Stormwater Plan Approval; Conditions of Approval

1. The applicant's Site Development project shall be reviewed as a part of the subdivision or site plan review process by the Reviewing Board Engineer 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.
2. Any stormwater facility approved as part of a site plan or subdivision application shall be constructed and completed prior to the issuance of a Certificate of Occupancy (C.O.).

C. Checklist Requirements

The following information shall be required:

1. Topographic Base Map - The reviewing engineer may require upstream tributary drainage system information as necessary. It is recommended that the topographic base map of the site be submitted which extends a minimum of 200 feet beyond the limits of the proposed development, at a scale of 1"=200' or greater, showing 2-foot contour intervals. The map as appropriate may indicate the following: existing surface water drainage, shorelines, steep slopes, soils, erodible soils, perennial or intermittent streams that drain into or upstream of the Category One waters, wetlands and flood plains along with their appropriate buffer strips, marshlands and other wetlands, pervious or vegetative surfaces, existing man-made structures, roads, bearing and distances of property lines, and significant natural and manmade features not otherwise shown.

2. Environmental Site Analysis - A written and graphic description of the natural and man-made features of the site and its environs. This description should include a discussion of soil conditions, slopes, wetlands, waterways and vegetation on the site. Particular attention should be given to unique, unusual, or environmentally sensitive features and to those that provide particular opportunities or constraints for development.
3. Project Description and Site Plan(s) - A map (or maps) at the scale of the topographical base map indicating the location of existing and proposed buildings, roads, parking areas, utilities, structural facilities for stormwater management and sediment control, and other permanent structures. The map(s) shall also clearly show areas where alterations occur in the natural terrain and cover, including lawns and other landscaping, and seasonal high ground water elevations. A written description of the site plan and justification of proposed changes in natural conditions may also be provided.
4. Land Use Planning and Source Control Plan - This plan shall provide a demonstration of how the goals and standards of this ordinance are being met. The focus of this plan shall be to describe how the site is being developed to meet the objective of controlling groundwater recharge, stormwater quality and stormwater quantity problems at the source by land management and source controls whenever possible.
5. Stormwater Management Facilities Map - The following information, illustrated on a map of the same scale as the topographic base map, shall be included:
 - a. Total area to be paved or built upon, proposed surface contours, land area to be occupied by the stormwater management facilities and the type of vegetation thereon, and details of the proposed plan to control and dispose of stormwater.
 - b. Details of all stormwater management facility designs, during and after construction, including discharge provisions, discharge capacity for each outlet at different levels of detention and emergency spillway provisions with maximum discharge capacity of each spillway.

6. Calculations - Comprehensive hydrologic design calculations for the pre-development and post-development conditions for the design storms specified in Section 19:12-8.4 of this ordinance. When the proposed stormwater management control measures (e.g., infiltration basins, wet ponds) depend on the hydrologic properties of soils, then a soils report shall be submitted. The soils report shall be based on onsite boring logs or soil pit profiles. The number and location of required soil borings or soil pits shall be determined based on what is needed to determine the suitability and distribution of soils present at the location of the control measure.
7. Maintenance Plan - The design and planning of the stormwater management facility shall meet the maintenance requirements of Section D below.
8. Waiver from Submission Requirements - The municipal official or board reviewing an application under this ordinance may, in consultation with the Reviewing Board Engineer, waive any of the submission requirements of this section when it can be demonstrated that the information requested is impossible to obtain or it would create a hardship on the applicant to obtain and its absence will not materially affect the review process.

D. Maintenance Plan Required

1. The design engineer shall submit a maintenance plan for the stormwater management measures incorporated into the design of a major development.
2. The maintenance plan shall contain specific preventative maintenance tasks and schedules; cost estimates, including estimated cost of sediment, debris, or trash removal; and the name, address, and telephone number of the person or persons responsible for preventative and corrective maintenance (including replacement). Maintenance guidelines for stormwater management measures are available in the New Jersey Stormwater Best Management Practices Manual. If the maintenance plan identifies a person other than the developer (for example, a public agency or homeowners' association) as having the responsibility for maintenance, the plan shall include documentation of such person's agreement to assume this responsibility, or of the developer's obligation to dedicate a stormwater management facility to such person under an applicable ordinance or regulation.
3. Responsibility for maintenance shall not be assigned or transferred to the owner or tenant of an individual property in a residential development or project, unless such owner or tenant owns or leases the entire residential development or project.

4. If the person responsible for maintenance identified under Section D.2 above is not a public agency, the maintenance plan and any future revisions based on Section D.7 below shall be recorded upon the deed of record for each property on which the maintenance described in the maintenance plan must be undertaken.
5. Preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measure, including repairs or replacement to the structure; removal of sediment, debris, or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; and repair or replacement of non-vegetated linings.
6. The person responsible for maintenance identified under Section D.2 above shall maintain a detailed log of all preventative and corrective maintenance for the structural stormwater management measures incorporated into the design of the development, including a record of all inspections and copies of all maintenance-related work orders.
7. The person responsible for maintenance identified under Section D.2 above shall evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed.
8. The person responsible for maintenance identified under Section D.2 above shall retain and make available, upon request by any public entity with administrative, health, environmental, or safety authority over the site, the maintenance plan and the documentation required by Sections D.6 and D.7 above.
9. The requirements of Sections D.3 and D.4 do not apply to stormwater management facilities that are dedicated to and accepted by the municipality or another governmental agency.
10. In the event that the stormwater management facility becomes a danger to public safety or public health, or if it is in need of maintenance or repair, the Municipality shall so notify the responsible person in writing. Upon receipt of that notice, the responsible person shall have fourteen (14) days to effect maintenance and repair of the facility in a manner that is approved by the municipal engineer or his designee. The municipality, in its discretion, may extend the time allowed for effecting maintenance and repair for good cause. If the responsible person fails or refuses to perform such maintenance and repair, the municipality or County may immediately proceed to do so and shall bill the cost thereof to the responsible person.
11. Nothing in this section shall preclude the municipality in which the major development is located from requiring the posting of a performance or maintenance guarantee in accordance with N.J.S.A. 40:55D-53.

19:12-8.6: APPLICABLE REGULATIONS.

A. Grading and Drainage

1. All lots developed under the provisions of this ordinance shall be graded to secure proper drainage away from all buildings and to prevent the collection of storm water in pools and to avoid concentration of storm water from each lot to adjacent lots. Water shall not flow across adjacent property lines unless approved by the Reviewing Board Engineer and a cross-drainage easement is provided.
2. The minimum slope for paved surfaces shall be 1%.
3. The following minimum requirements apply to grading of lawn areas:
 - a. Provide a minimum six (6) inch drop in the first 20 feet from the building.
 - b. Overland grades throughout the site shall be a minimum of 2%.
 - c. Grades for swales shall be a minimum of 1%.
 - d. Maximum slopes shall be 3 horizontal : 1 vertical.
4. All work shall be in accordance with the established design standards of Burlington Township and specifically Section 19:12-13 Grading and Filling of the Township Land Development Ordinance.

B. Flooding

1. Land subject to periodic or occasional flooding shall not be designed for residential occupancy nor for any other purpose that may endanger life or property. Such land within a lot shall be considered for open spaces, yards, or other similar uses in accordance with flood plain regulations.

C. Storm Drainage Connection

1. All applications for development shall as a condition of approval provide a deed of restriction which prohibits the elimination of excess storm water drainage on the side through the use of sump pumps or otherwise into the streets or sanitary sewer system. Where the Reviewing Board determines that on-site retainage is inadequate to prevent the above from occurring, the Reviewing Board may require that the applicant provide an underdrain system, dry well or similar approved device on the lot or lots involved to channel the storm water flow to an existing or proposed storm sewer system.

D. Easements

1. Where a development is traversed by a watercourse, surface of underground drainage way or drainage system, channel, or stream, there shall be provided and dedicated a drainage right-of-way easement to the Township conforming substantially with the metes and bounds of such watercourse, and such further width or construction, or both, as will be adequate to accommodate expected storm water runoff in the future based upon reasonable growth potential in the Township and, in addition thereto, a minimum of fifteen (15) feet beyond the bank top on both sides for access to the drainage right-of-way and meeting any minimum widths and locations shown on any adopted official map or master plan or as required under this section or Section 19:12-9 Easements of the Township land Development Ordinance.
2. Easements or right-of-way shall be required in accordance with Section 19:12-9 where storm drains are installed outside streets.

E. Storm Drainage Connection

1. All applications for development shall as a condition of approval provide a deed of restriction which prohibits the elimination of excess storm water drainage on the side through the use of sump pumps or otherwise into the streets or sanitary sewer system. Where the Reviewing Board determines that on-site retainage is inadequate to prevent the above from occurring, the Reviewing Board may require that the applicant provide an underdrain system, dry well or similar approved device on the lot or lots involved to channel the storm water flow to an existing or proposed storm sewer system.

F. Deck Construction Specifications

1. All decks shall be constructed so as to allow a minimum of four percent pervious area uniformly distributed between adjacent floor boards shall be ¼ inch. The ground beneath the entirety of the deck shall be excavated to a depth of no less than 12 inches and a completely pervious surface of 1-1/2 inch stone shall be constructed within the entire excavated area. Stone shall be a minimum of 12 inches deep with the top of the stone being flush with the adjacent ground surface. A means of drainage relief shall be provided to allow any overflow from the stone area to drain to the nearest yard swale or other point of drainage relief. Provisions shall also be made to prevent ground water seepage from the stone area into adjacent basements or crawlspaces. This type of deck shall not be considered impervious. The construction in all other aspects shall conform to all applicable ordinances, codes and standards.

19:12-8.7: PENALTIES

- A. Any person who erects, constructs, alters, repairs, converts, maintains, or uses any building, structure or land in violation of this ordinance shall be subject to the General Penalty Provisions of Section 1:9 and/or Section 19:15-7.3 of the Ordinances of the Township of Burlington.

19:12-8.8: EFFECTIVE DATE.

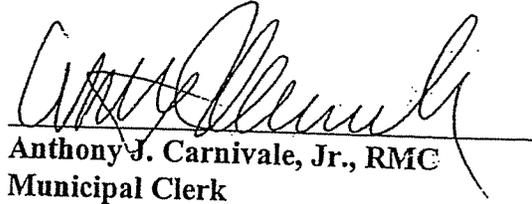
- A. This ordinance shall take effect immediately upon the approval by the county review agency, or sixty (60) days from the receipt of the ordinance by the county review agency if the county review agency should fail to act.

19:12-8.9: SEVERABILITY

- A. If the provisions of any section, subsection, paragraph, subdivision, or clause of this ordinance shall be judged invalid by a court of competent jurisdiction, such order of judgment shall not affect or invalidate the remainder of any section, subsection, paragraph, subdivision, or clause of this ordinance.

CERTIFICATION

I, Anthony J. Carnivale, Jr., Municipal Clerk, do hereby certify that the attached is a true and exact copy of an Ordinance adopted by the Township Council at the meeting held on May 23, 2006 which is being submitted this 23rd day of May 2006, to the Honorable Stephen M. George, Mayor of the Township of Burlington, for his action in conformity to the requirements of N.J.S.A. 40:69A-41.

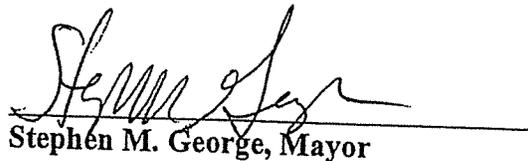

Anthony J. Carnivale, Jr., RMC
Municipal Clerk

APPROVAL

I, Stephen M. George, Mayor of the Township of Burlington, acknowledge receipt of Ordinance # 06-OR-020 entitled:

**ORDINANCE AMENDING THE ZONING ORDINANCE
OF THE TOWNSHIP OF BURLINGTON, COUNTY
OF BURLINGTON, STATE OF NEW JERSEY, AND
SPECIFICALLY SECTION 19:12-8 (DRAINAGE)**

on May 23, 2006, which was passed by the Township Council on May 23, 2006. In accordance with my responsibilities under the Charter, I on this 23rd day of May 2006, do approve the Ordinance entitled above.


Stephen M. George, Mayor