ATTACHMENT 1

Township of Cherry Hill
Sample Stormwater Ordinance

Cherry Hill Model Stormwater Ordinance

This ordinance is provided within the Stormwater Management Plan as a requirement of NJAC 7:8-4.1 (c)12. This Model Ordinance is the basic New Jersey Department of Environmental Protection Sample Ordinance with Section 7 specifically added for Cherry Hill Township. This Ordinance should be used in the forthcoming months in the development of additional specific municipal stormwater control ordinances and design and performance standards specific to Cherry Hill Township. This ordinance does not include a section on fees. The costs of reviewing development applications under this ordinance can be defrayed by fees charged for review of subdivisions and site plans under NJSA 40:55D-8.b.

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Section 1: Scope and Purpose

A. Policy Statement

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

B. Purpose

It is the purpose of this ordinance to establish minimum stormwater management requirements and controls for "major development," as defined in Section 2.

C. 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 at N.J.A.C. 5:21.

2. This ordinance shall also be applicable to all major developments undertaken by Cherry Hill Township.

D. 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.

Section 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.

"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 Department 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.

"Department" means the New Jersey Department 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 Department's Landscape Project as approved by the Department's 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.

"Municipality" means any city, borough, town, township, or village.

"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, Cherry Hill Township, 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.

"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, resulting from precipitation.

"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.

Section 3: General Standards

A. Design and Performance Standards for Stormwater Management Measures

1. 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 Section 4. 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.

2. The standards in this ordinance apply only to new major development and are intended to minimize the impact of stormwater runoff on water quality and water quantity in receiving water bodies and maintain groundwater recharge. The standards do not apply to new major development to the extent that alternative design and performance standards are applicable under a regional stormwater management plan or Water Quality Management Plan adopted in accordance with Department rules.

Note: Alternative standards shall provide at least as much protection from stormwater-related loss of groundwater recharge, stormwater quantity and water quality impacts of major development projects as would be provided under the standards in N.J.A.C. 7:8-5.

Section 4: Stormwater Management Requirements for Major Development

A. The development shall incorporate a maintenance plan for the stormwater management measures incorporated into the design of a major development in accordance with Section 10.

B. Stormwater management measures shall avoid adverse impacts of concentrated flow on habitat for threatened and endangered species as documented in the Department' Landscape Project or Natural Heritage Database established under N.J.S.A. 13:1B-15.147 through 15.150, particularly *Helonias bullata* (swamp pink) and/or *Clemmys muhlnebergi* (bog turtle).

C. The following linear development projects are exempt from the groundwater recharge, stormwater runoff quantity, and stormwater runoff quality requirements of Sections 4.F and 4.G:

1. The construction of an underground utility line provided that the disturbed areas are revegetated upon completion;

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

3. 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.

D. A waiver from strict compliance from the groundwater recharge, stormwater runoff quantity, and stormwater runoff quality requirements of Sections 4.F and 4.G 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:

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

2. The applicant demonstrates through an alternatives analysis, that through the use of nonstructural and structural stormwater management strategies and measures, the option selected complies with the requirements of Sections 4.F and 4.G to the maximum extent practicable;

3. The applicant demonstrates that, in order to meet the requirements of Sections 4.F and 4.G, existing structures currently in use, such as homes and buildings, would need to be condemned; and

4. 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 D.3 above within the upstream drainage area of the receiving stream, that would provide additional opportunities to mitigate the requirements of Sections 4.F and 4.G that were not achievable on-site.

E. Nonstructural Stormwater Management Strategies

1. To the maximum extent practicable, the standards in Sections 4.F and 4.G shall be met by incorporating nonstructural stormwater management strategies set forth at Section 4.E 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;

f. Minimize soil compaction;

g. Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides;

h. Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas;

i. Provide other source controls to prevent or minimize the use or exposure of pollutants at the site, in order to prevent or minimize the release of those pollutants into stormwater runoff. Such source controls include, but are not limited to:

(1) Site design features that help to prevent accumulation of trash and debris in drainage systems, including features that satisfy Section 4.E.3. below;

(2) Site design features that help to prevent discharge of trash and debris from drainage systems;

(3) Site design features that help to prevent and/or contain spills or other harmful accumulations of pollutants at industrial or commercial developments; and

(4) 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 Section 4.E.2.i.(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 Section 4.E.3.c below.

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

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

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

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

b. Whenever design engineers use a curb-opening inlet, the clear space in that curb opening (or each individual clear space, if the curb opening has two or more clear spaces) shall have an area of no more than seven (7.0) square inches, or be no greater than two (2.0) inches across the smallest dimension.

c. This standard does not apply:

(1) Where the review agency determines that this standard would cause inadequate hydraulic performance that could not practicably be overcome by using additional or larger storm drain inlets that meet these standards;

(2) Where flows from the water quality design storm as specified in Section 4.G.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.

(3) 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 4.G.1; or

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

4. Any land area used as a nonstructural stormwater management measure to meet the performance standards in Sections 4.F and 4.G 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 Manual. The BMP Manual may be obtained from the address identified in Section 7, or found on the Department's website at www.njstormwater.org.

F. 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.

b. The minimum design and performance standards for groundwater recharge are as follows:

(1) The design engineer shall, using the assumptions and factors for stormwater runoff and groundwater recharge calculations at Section 5, 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.

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

(3) The following types of stormwater shall not be recharged:

(a) Stormwater from areas of high pollutant loading. High pollutant loading areas are areas in industrial and commercial developments where solvents and/or petroleum products are loaded/unloaded, stored, or applied, areas where pesticides are loaded/unloaded or stored; areas where hazardous materials are expected to be present in greater than "reportable quantities" as defined by the United States Environmental Protection Agency (EPA) at 40 CFR 302.4; areas where recharge would be inconsistent with Department approved remedial action work plan or landfill closure plan and areas with high risks for spills of toxic materials, such as gas stations and vehicle maintenance facilities; and

(b) Industrial stormwater exposed to "source material." "Source material" means any material(s) or machinery, located at an industrial facility, that is directly or indirectly related to process, manufacturing or other industrial activities, which could be a source of pollutants in any industrial stormwater discharge to groundwater. Source materials include, but are not limited to, raw materials; intermediate products; final products; waste materials; by-products; industrial machinery and fuels, and lubricants, solvents, and detergents that are related to process, manufacturing, or other industrial activities that are exposed to stormwater.

(4) 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.

c. In order to control stormwater runoff quantity impacts, the design engineer shall, using the assumptions and factors for stormwater runoff calculations at Section 5, complete one of the following:

(1) Demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the two, 10, and 100-year storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events;

(2) 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 two, 10, and 100-year storm events and that the increased volume or change in timing of stormwater runoff will not increase flood damage at or downstream of the site. This analysis shall include the analysis of impacts of existing land uses and projected land uses assuming full development under existing zoning and land use ordinances in the drainage area;

(3) Design stormwater management measures so that the post-construction peak runoff rates for the 2, 10 and 100 year storm events are 50, 75 and 80 percent, respectively, of the pre-construction peak runoff rates. The percentages apply only to the post-construction stormwater runoff that is attributable to the portion of the site on which

the proposed development or project is to be constructed. The percentages shall not be applied to post-construction stormwater runoff into tidal flood hazard areas if the increased volume of stormwater runoff will not increase flood damages below the point of discharge; or

(4) In tidal flood hazard areas, stormwater runoff quantity analysis in accordance with (1), (2) and (3) above shall only be applied if the increased volume of stormwater runoff could increase flood damages below the point of discharge.

2. Any application for a new agricultural development that meets the definition of major development at Section 2 shall be submitted to the appropriate Soil Conservation District for review and approval in accordance with the requirements of this section and any applicable Soil Conservation District guidelines for stormwater runoff quantity and erosion control. For the purposes of this section, "agricultural development" means land uses normally associated with the production of food, fiber and livestock for sale. Such uses do not include the development of land for the processing or sale of food and the manufacturing of agriculturally related products.

G. 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 (NJPDES) rules, N.J.A.C. 7:14A, or in a discharge specifically exempt under a NJPDES 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. 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 may be obtained from the address identified in Section 7, or found on the Department's website at www.njstormwater.org. The BMP Manual and other sources of technical guidance are listed in Section 7. TSS reduction 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 Department 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 6.C
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 Sections 4.F and 4.G.

6. Additional information and examples are contained in the New Jersey Stormwater Best Management Practices Manual, which may be obtained from the address identified in Section 7.

7. In accordance with the definition of FW1 at N.J.A.C. 7:9B-1.4, stormwater management measures shall be designed to prevent any increase in stormwater runoff to waters classified as FW1.

8. Special water resource protection areas 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:

      (1) 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 Department.

   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:

      (1) Stabilization measures shall not be placed within 150 feet of the Category One waterway;

      (2) Stormwater associated with discharges allowed by this section shall achieve a 95 percent TSS post-construction removal rate;

      (3) Temperature shall be addressed to ensure no impact on the receiving waterway;

(4) 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;

(5) A conceptual project design meeting shall be held with the appropriate Department staff and Soil Conservation District staff to identify necessary stabilization measures; and

(6) All encroachments proposed under this section shall be subject to review and approval by the Department.

d. A stream corridor protection plan may be developed by a regional stormwater management planning committee as an element of a regional stormwater management plan, or by a municipality through an adopted municipal stormwater management plan. If a stream corridor protection plan for a waterway subject to Section 4.G(8) has been approved by the Department of Environmental Protection, then the provisions of the plan shall be the applicable special water resource protection area requirements for that waterway. A stream corridor protection plan for a waterway subject to G.8 shall maintain or enhance the current functional value and overall condition of the special water resource protection area as defined in G.8.a.(1) above. In no case shall a stream corridor protection plan allow the reduction of the Special Water Resource Protection Area to less than 150 feet as measured perpendicular to the waterway subject to this subsection.

e. Paragraph G.8 does 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.

Section 5: Calculation of Stormwater Runoff and Groundwater Recharge

A. Stormwater runoff shall be calculated in accordance with the following:

1. The design engineer shall calculate runoff using one of the following methods:

a. The USDA Natural Resources Conservation Service (NRCS) 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 and the Modified Rational Method for hydrograph computations.

2. 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 NRCS methodology at Section 5.A.1.a and the Rational and Modified Rational Methods at Section 5.A.1.b. 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).

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, that may reduce pre-construction stormwater runoff rates and volumes.

4. In computing stormwater runoff from all design storms, the design engineer shall consider the relative stormwater runoff rates and/or volumes of pervious and impervious surfaces separately to accurately compute the rates and volume of stormwater runoff from the site. To calculate runoff from unconnected impervious cover, urban impervious area modifications as described in the NRCS Technical Release 55 – Urban Hydrology for Small Watersheds and other methods may be employed.

5. 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.

B. Groundwater recharge may be calculated in accordance with the following:

1. 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; at http://www.state.nj.us/dep/njgs/; or at New Jersey Geological Survey, 29 Arctic Parkway, P.O. Box 427 Trenton, New Jersey 08625-0427; (609) 984-6587.

Section 6: Standards for Structural Stormwater Management Measures

A. Standards for structural stormwater management measures are as follows:

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 8.D.

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 deemed to meet this requirement.

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 at Section 8.

B. 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 Section 4 of this ordinance.

C. Manufactured treatment devices may be used to meet the requirements of Section 4 of this ordinance, provided the pollutant removal rates are verified by the New Jersey Corporation for Advanced Technology and certified by the Department.

Section 7: Standards for Cherry Hill Township

A. Mitigation Plan, Variance or Exemption from Stormwater Design Standards

1. A variance or exemption from the design standards for stormwater management basins may be granted only upon a finding by the Township of Cherry Hill Planning or Zoning Board that the variance or exemption will be mitigated by the construction of a stormwater project within the same subdrainage area (HUC-14). The mitigation project must provide the additional groundwater recharge benefits or protection from water quality (TSS removal) or quantity (rate of flow reduction) to compensate for the deficit from the design and performance standards resulting from the proposed project. The proposed project must meet the design and performance standards set forth in this stormwater ordinance.

2. If a suitable site cannot be located in the same sub-drainage area as the proposed development, as in Item 1 above, the mitigation project may provide mitigation that is not equivalent to the impacts for which the exemption is sought, but that addresses the same issue. For example, if an exemption is given because the peak rate if reduction of 50% for the 2 year storm cannot be met, the selected project may address reducing the orifice size at an existing stormwater management basin. As another example, if an exemption is given because the removal of 80 percent of the Total Suspended Solids cannot be met, the selected project may provide a natural vegetated buffer around a lake edge to discourage the geese population and address water quality impacts due to fecal impairment.

3. Construction of real mitigation projects to offset the deficit from the design and performance standards resulting from the proposed project through Item 1 or 2 above is recommended. However, the Cherry Hill Planning or Zoning Board may allow a developer to provide full funding or partial funding to the Township for a project listed in the Stormwater Management Plan. Partial funding or full funding must equal or exceed the value of providing the stormwater design on the

development site. The value of full funding will include the value to implement the project, including costs to purchase property, easements and long term property maintenance.

2. In order to be granted a variance or exemption a development must demonstrate that the design standard cannot be met due to unusual circumstances on the existing property. Variances or exemptions are not recommended for properties that are currently open space or have not been previously developed.

3. In order to be granted a variance or exemption, the applicant will be required to perform a preliminary stormwater management design and cost analysis of the stormwater system that would be required to meet the recharge, water quality (TSS removal) and water quantity (peak rate of reduction) stormwater management requirements of this ordinance. This analysis will be utilized to determine and select the mitigation project to be constructed by the applicant.

4. The developer must ensure the long term maintenance of the project, including the maintenance requirements under Chapters 8 and 9 of the NJDEP BMP Manual.

B. Mitigation Projects

Variances or exemptions are to be granted only upon the condition that the applicant provides a mitigation project of equal value within the same sub-watershed as delineated by the HUC 14. The selection of the mitigation project are to be under the review and approval of the Planning or Zoning Board Engineer. The mitigation projects proposed within the Township of Cherry Hill are listed in the Stormwater Management Plan and the list of mitigation projects will be updated and maintained by the Director of Public Works and the person responsible for the New Jersey Department of Environmental Protection NJPDES Municipal Separate Storm Sewer (MS4) Permit.

The Mitigation Projects fall into the following basic categories:

1. Stormwater Outfall Retrofit

Provide retrofit measures at existing stormwater outfalls within the same HUC14 under the guidance of the Public Works Director:

a. Outlet Structure Modifications (for example, repair of outfall condition though installation of drop manhole, upgraded outfall structure, rip-rap apron, or scour hole)

b. Installation of in-line or end-of-pipe Best Management Practice (BMP) as approved by the NJDEP to treat stormwater draining into an existing outfall. The approved treatment devices can be found on njstormwater.org

2. River, Stream or Lake Bank Stabilization

Stabilization projects to reduce the total suspended solids:

a. Stabilization of eroded river, creek or lake banks where public or private property or structures are threatened.

b. Stabilization of eroded river, creek or lake banks to reduce sediment deposition and improve water quality.

3. Stormwater Basin Retrofit

Stormwater Basin retrofit Projects to provide water quality and recharge measures within the same HUC14. The retrofit of existing basins may be accomplished through a variety and/or combination of one or more of the following options:

a. Outlet Structure Modifications
b. Regrading and Planting
c. Elimination of Low Flow Channels
d. Installation of in-line or end-of-pipe Best Management Practice (BMP) as approved by the NJDEP to treat stormwater draining into an existing outfall. The approved treatment devices can be found on njstormwater.org.

4. Stormwater Outfall Restoration

Mitigation of Existing Stormwater Outfalls within the same HUC14 under the guidance of the Cherry Hill Township Engineer and Engineering Department. The retrofit of existing outfalls may be accomplished through a variety and/or combination of options to meet the mitigation costs required. Review of each existing outfall condition should be reviewed with the Township before selecting one or more of the following options:

a. Replacement of failed outfall structure with outlet protection
b. Replacement with installation of drop manhole to set outfall structure at invert of stream channel with outlet protection
c. Installation of in-line or end-of-pipe Best Management Practice (BMP) as approved by the NJDEP to pretreat stormwater before the outfall structure
d. Disconnect outfall from receiving waterway to eliminate erosion condition. Permitted only with detailed hydrologic analysis and stability analysis of the receiving area.

5. Lake and Pond Management

a. Provide a comprehensive management plan and maintenance schedule for a publicly held lakes or ponds within Cherry Hill Township.
b. Provide a lake edge stabilization project through the use of native plants and erosion control.
c. Provide a geese management plan through the vegetation of lake edge to reduce the fecal impairment of the lake or pond.

C Underground Detention Basins. Underground detention facilities are not recommended as a design solution for residential development. The Township of Cherry Hill will not accept maintenance responsibility for underground stormwater detention facilities or stormwater outflow control structures located within stormwater inlets within the public right-of-way. Exemptions from the runoff quantity design and performance standards may be offset through the mitigation process by the construction of a mitigation project of equal value within the same sub-watershed HUC-14 to meet the same design standard.

Section 8: Sources for Technical Guidance

A. Technical guidance for stormwater management measures can be found in the documents listed at 1 and 2 below, which are available from Maps and Publications, New Jersey Department of Environmental Protection, 428 East State Street, P.O. Box 420, Trenton, New Jersey, 08625; telephone (609) 777-1038.

1. 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.

2. The New Jersey Department of Environmental Protection Stormwater Management Facilities Maintenance Manual, as amended.

B. Additional technical guidance for stormwater management measures can be obtained from the following:

1. 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;

2. The Rutgers Cooperative Extension Service, 732-932-9306; and

3. 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.

Section 9: Safety Standards for Stormwater Management Basins

A. 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.

B. Requirements for Trash Racks, Overflow Grates and Escape Provisions

1. 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:

a. The trash rack shall have parallel bars, with no greater than six inch spacing between the bars.

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

c. 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.

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 lbs/ft sq.

2. 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:

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

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

c. 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.

3. For purposes of this paragraph 3, 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:

a. If a stormwater management basin has an outlet structure, escape provisions shall be incorporated in or on the structure. With the prior approval of the reviewing agency identified in Section 8.C a free-standing outlet structure may be exempted from this requirement.

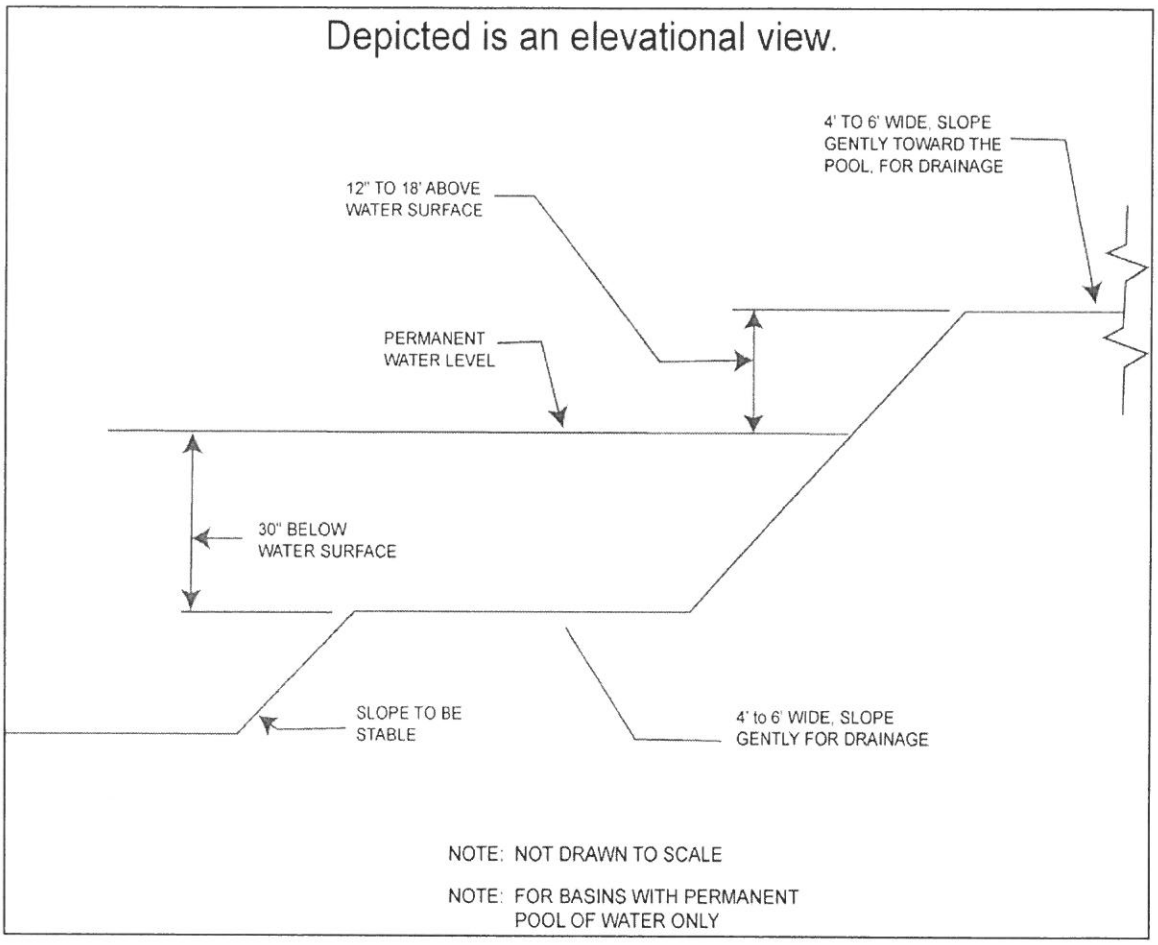
b. Safety ledges shall be constructed on the slopes of all new stormwater management basins having a permanent pool of water deeper than two and one-half feet. Such safety ledges shall be comprised of two steps. Each step shall be four to six feet in width. One step shall be located approximately two 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.D for an illustration of safety ledges in a stormwater management basin.

c. 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.

C. Variance or Exemption from Safety Standards

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

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



Section 10: Requirements for a Site Development Stormwater Plan

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 at Section 9.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 15 copies of the materials listed in the checklist for site development stormwater plans in accordance with Section 9.C of this ordinance.

B. Site Development Stormwater Plan Approval

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

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 Sections 3 through 6 are being met. The focus of this plan shall be to describe how the site is being developed to meet the objective of controlling groundwater recharge, stormwater quality and stormwater quantity problems at the source by land management and source controls whenever possible.

5. Stormwater Management Facilities Map

The following information, illustrated on a map of the same scale as the topographic base map, shall be included:

a. Total area to be paved or built upon, proposed surface contours, land area to be occupied by the stormwater management facilities and the type of vegetation thereon, and details of the proposed plan to control and dispose of stormwater.

b. Details of all stormwater management facility designs, during and after construction, including discharge provisions, discharge capacity for each outlet at different levels of detention and emergency spillway provisions with maximum discharge capacity of each spillway.

6. Calculations

a. Comprehensive hydrologic and hydraulic design calculations for the pre-development and post-development conditions for the design storms specified in Section 4 of this ordinance.

b. When the proposed stormwater management control measures (e.g., infiltration basins) depends 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 and Repair Plan

The design and planning of the stormwater management facility shall meet the maintenance requirements of Section 10.

8. Waiver from Submission Requirements

The municipal official or board reviewing an application under this ordinance may, in consultation with the municipal engineer, waive submission of any of the requirements in Sections 9.C.1 through 9.C.6 of this ordinance 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.

Section 11: Maintenance and Repair

A. Applicability

1. Projects subject to review as in Section 1.C of this ordinance shall comply with the requirements of Sections 10.B and 10.C.

B. General Maintenance

1. The design engineer shall prepare 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 10.B.2 above is not a public agency, the maintenance plan and any future revisions based on Section 10.B.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 nonvegetated linings.

6. The person responsible for maintenance identified under Section 10.B.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 10.B.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 10.B.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 10.B.6 and 10.B.7 above.

9. The requirements of Sections 10.B.3 and 10.B.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.

B. 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.

Section 12: Penalties

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 following penalties: [*Cherry Hill to Specify*].

Section 13: Effective Date

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.

Section 14: Severability

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.

ATTACHMENT 2

Sample Stream Buffer Ordinance

STREAM BUFFER CONSERVATION ZONE
MODEL ORDINANCE

I. LEGISLATIVE INTENT

In recognition of the fact that natural features contribute to the welfare of residents, the following regulation shave been enacted to provide reasonable controls governing the restoration, conservation, disturbance, and management of existing stream buffers for all perennial and intermittent streams and all lakes and ponds in the municipality by establishing designated Stream Buffer Conservation Zones. For the purposes of this ordinance the following definitions shall apply:

Stream – a natural watercourse containing flowing water for at least part of the year.

Perennial stream – a stream that flows continuously throughout the year in most years.

Intermittent stream – a stream that does not always have water in it, that has a drainage area of 50 acres or greater, or is portrayed as a dashed line on a USDA Soil Survey Map of the most recent edition, whichever is more restrictive.

In addition, the specific purposes and intent of this article are to:

A. Reduce the amount of nutrients, sediment, organic matter pesticides, and other harmful substances that reach watercourses, wetlands, subsurface, and surface waterbodies by using scientifically-proven processes including filtration, deposition, absorption, adsorption, plant uptake, biodegradation, denitrification and by improving infiltration, encouraging sheet flow, and stabilizing concentrated flows.

B. Improve and maintain the safety, reliability and adequacy of the water supply for domestic, agricultural, commercial, industrial and recreational uses along with sustaining diverse populations of aquatic flora and fauna.

C. Regulate the land use, siting and engineering of all development to be consistent with the intent and objectives of this ordinance, accepted conservation practices, and to work within the carrying capacity of existing natural resources.

D. Assist in the implementation of pertinent state laws concerning erosion and sediment control practices.

E. Conserve the natural features important to land and water resources (e.g. headwater areas, groundwater recharge zones, floodway, floodplain, springs, streams, wetlands, woodlands, prime wildlife habitats) and other features constituting high recreational value or containing amenities that exist on developed and undeveloped land.

F. Work with floodplain, steep slope, and other ordinances that regulate environmentally sensitive areas to minimize hazards to life, property, and stream features

G. Conserve natural, scenic, and recreation areas within and adjacent to stream areas for the community's benefit

II. DEFINITIONS, ESTABLISHMENT, AND WIDTH DETERMINATION OF THE STREAM BUFFER CONSERVATION ZONE

A. Definition – The **Stream Buffer Conservation Zone** is defined as:
   1. Areas surrounding municipally designated surface water bodies, including creeks, lakes and intermittent watercourses that intercept surface water runoff, wastewater, subsurface flow, and/or deep groundwater flows from upland sources and function to remove or buffer the effects of associated nutrients, sediment, organic matter, pesticides, or other pollutants prior to entry into surface waters. This area may also provide wildlife habitat, control water temperature, attenuate flood flow, and provide opportunities for passive recreation. This buffer area may or may not contain trees and other native vegetation at the time of ordinance enactment.

B. Establishment
   1. The establishment of the Stream Buffer Conservation Zone applies to the following areas which are identified on the municipal stream buffer map:
      i. Lands adjacent to municipally designated streams within the municipality
      ii. Lands adjacent to municipally designated intermittent water courses within the municipality
      iii. Lands at the margins of municipally designated lakes
   2. The measurement of the Stream Buffer Conservation Zone shall extend a minimum of 75 feet from each defined edge of an identified watercourse or surface water body at bankfull flow or level, or shall equal the extent of the 100 year floodplain, whichever is greater. The District will consist of two distinct zones designated as:
      i. Zone One: This zone will begin at each edge of an identified waterway (which can include wetlands and intermittent watercourses) and occupy a margin of land with a minimum width of 25 feet measured horizontally on a line perpendicular to the edge of water at bankfull flow.
      ii. Where steep slopes (in excess of 25 percent) are located within 25 feet of a municipally designated watercourse, Zone One shall extend the entire distance of this sloped area. If the distance of this sloped area is greater than 75 feet, there will be no requirement for the establishment of Zone Two. If the distance is less than 7 feet, the width of Zone Two will be

adjusted so that the total buffer width (Zone One and Zone Two) will be 75 feet maximum.

3. Zone Two: This zone will begin at the outer edge of Zone One and occupy a minimum width of 50 feet in addition to Zone One.
    i. Where the 100-year floodplain extends greater than 75 feet from the waterway, Zone One shall remain a minimum of 25 feet wide, and Zone Two shall extend from the outer edge of Zone One to the outer edge of the 100-year floodplain.
    ii. Width Determination. The developer, applicant, or designated representative shall be responsible for the initial width determination of the stream buffer and identifying this area on any plan that is submitted to the municipality for subdivision, land development, or other improvements that require plan submissions or permits. This initial determination shall be subject to review and approval by the municipal engineer, governing body, or its appointed representative.

III. USES PERMITTED IN THE STREAM BUFFER CONSERVATION ZONE

The following uses are permitted, either by right or after review and approval by the municipality in the Stream Buffer Conservation Zone. However, within any buffer, no construction, development, use, activity, or encroachment shall be permitted unless the activity is described in the Stream Buffer Management Plan, as outlined in Section 8(A)(1).

A. Zone One

1. Uses Permitted by Right

   Open space uses that are primarily passive in character shall be permitted to extend into the area defined as Zone One, including:
    i. Wildlife sanctuaries, nature preserves, forest preserves, fishing areas, passive areas of public and private parklands, and reforestation in compliance with the guidelines of the Stream Buffer Management Plan
    ii. Streambank stabilization in compliance with the guidelines of the Stream Buffer Management Plan
2. Uses Requiring Municipal Review and Approval
    i. New agricultural uses
    ii. Buffer crossings by farm vehicles and livestock, roads, railroads, centralized sewer and/or water lines, and public utility transmission lines provided that any disturbance is at a minimum, offset by buffer improvements identified in the Stream Bank Management Plan.
    iii. Centralized sewer and/or water lines and public utility transmission lines running along the buffer, provided that any disturbance is, at a minimum, offset by buffer improvements identified in the Stream Buffer Management Plan. These lines shall be located as far from Zone One as practical.
    iv. Selective cutting of trees when removal is consistent with approved standards in the Stream Buffer Management Plan

v. Areas such as camps, campgrounds, picnic areas and golf courses. Active recreation areas such as ballfields, playgrounds, and courts provided these uses are designed in a manner that will not permit concentrated flow.

vi. Naturalized stormwater basins in compliance with the guidelines in the Stream Buffer Management Plan. The entire basin shall be located a minimum of 50 feet from the defined edge of the identified watercourses.

IV. USES SPECIFICALLY PROHIBITED IN THE STREAM BUFFER CONSERVATION AREA

Any use or activity not authorized within Section 3 shall be prohibited within the Stream Buffer Conservation Zone. By way of example, the following activities and facilities are specifically prohibited:

A. Clear cutting of trees and other vegetation

B. Selective cutting of trees and/or the clearing of other vegetation within Zone One, except where such clearing is necessary to prepare land for a use permitted under Section 3.A. and where the effects of these actions are mitigated by revegetation, as specified under Section 8.

C. Selective cutting of trees and/or the clearing of other vegetation within Zone Two, except where such clearing is necessary to prepare land for a use permitted by Section 3.B. and where the effects of these actions are mitigated by revegetation, as specified under Section 8.

D. Removal of trees in excess of selective cutting, except where such removal is necessary as a means to eliminate dead, diseased, or hazardous tree stands that jeopardize public safety or as part of a reforestation project, provided that the removal is in compliance with a Stream Buffer Management Plan approved by the municipal engineer, governing body, or its appointed representative.

E. Removal or disturbance of vegetation in a manner that is inconsistent with erosion control and buffer protection.

F. Storage of any hazardous or noxious materials.

G. Use of fertilizers, pesticides, herbicides, and/or other chemicals in excess of prescribed industry standards or the recommendations of the Camden County Conservation District.

H. Roads or driveways, except where permitted as buffer crossings in compliance with Sections 3.A.2.(a) or 3.B.2.(b).

I. Motor or wheeled vehicle traffic in any area not designed to accommodate adequately the type and volume.

J. Parking Lots

K. Any type of permanent structure, including fences, except structures needed for a use permitted in Section 3.

L. Subsurface sewage disposal areas.

M. Sod farming

V. NONCONFORMING STRUCTURES AND USES IN THE STREAM BUFFER CONSERVATION ZONE

Nonconforming structures and uses of land within the Stream Buffer Conservation Zone shall be regulated under the provisions of Article __ of the Cherry Hill Township Zoning Ordinance (existing nonconformance regulations). The following additional regulations also shall apply:

A. Existing nonconforming structures or uses within Zones One or Two that are not permitted under Section 3 may be continued but shall not have the existing building footprint or uses expanded or enlarged.

B. Discontinued nonconforming uses may be resumed any time within one year from such discontinuance but not thereafter when showing clear indications of abandonment. No change or resumption shall be permitted that is more detrimental to the Stream Buffer Conservation Zone, as measured against the intent and objectives under Section 1, than the existing or former nonconforming use.

C. This one year time frame shall not apply to agricultural uses which are following prescribed BMPs for crop rotation.

VI. BOUNDARY INTERPREATION AND APPEALS PROCEDURE

A. When a landowner or applicant disputes the Zone (One or Two) boundaries of the stream buffer or the defined edge of a watercourse, surface water body, the landowner or applicant shall submit evidence to the municipality that describes the boundary, presents the landowner or applicant's proposed boundary, and presents all justification for the proposed boundary change.

B. The municipal engineer, governing body or appointed representative shall evaluate all material submitted and shall make a written determination within 45 days, a copy of which shall be submitted to (the governing body, municipal planning board), and landowner or applicant.

C. Any party aggrieved by any such determination or other decision or determination under this section may appeal to the (municipality) under the provisions of this ordinance. The party contesting the location of the district boundary shall have the burden of proof in case of any such appeal.

VII. INSPECTION OF STREAM BUFFER CONSERVATION ZONE

A. Lands within or adjacent to an identified Stream Buffer Conservation Zone will be inspected by the municipal representative when:
    1. A subdivision or land development plan is submitted
    2. (A building permit is requested)
    3. A change or resumption of nonconforming use is proposed

B. The district may also be inspected periodically by the municipal representatives for compliance with an approved restoration plan, excessive or potentially problemative erosion or at any time when the presence of an unauthorized activity or structure is brought to the attention of municipal officials.

VIII. MANAGEMENT OF THE STREAM BUFFER CONSERVATION ZONE

A. Stream Buffer Management Plan – Within any municipally indentified buffer area, no construction, development, use, activity, or encroachment shall be permitted unless the effects of such development are accompanied by implementation of an approved Stream Buffer Management Plan, as specified within the Subdivision and Land Development Ordinance.
    1. The landowner or developer shall submit to the municipal engineer, governing body, or its appointed representative, a Stream Buffer Management Plan prepared by a landscape architect, professional engineer or other qualified professional which fully evaluates the effects of any proposed uses on the Stream Buffer Conservation Zone. The Stream Buffer Management Plan shall identify the existing conditions (vegetation, 100-year floodplain, soils, slopes, etc.), all proposed activities, and all proposed management techniques, including any measures necessary to offset disturbances to the Stream Buffer Conservation Zone. The plan shall be approved by the municipal engineer, governing body, or appointed representative as part of the subdivision and land development process.

IX. VEGETATION SELECTION

To function properly, dominant vegetation in the Stream Buffer Management Plan shall be selected from a list of plants most suited to the stream buffer. Plants not included on the lists may be permitted by the municipal engineer, governing body, or its appointed representative when evidence is provided from qualified sources certifying their suitability. The municipality may require species suitability to be verified by qualified experts in the

Camden County Conservation District, Natural Resources Conservation Service, NJDEP, the U.S. Fish and Wildlife Service, or state and federal forest agencies.

A. In Zone One, dominant vegetation shall be composed of a variety of native stream tree, shrub species, tall grasses and appropriate plantings necessary for streambank stabilization.

B. In Zone Two, dominant vegetation shall be composed of stream trees and shrubs, with an emphasis on native species and appropriate plantings necessary to stabilize the soil.

C. Disturbed areas shall be revegetated with stream buffer plants, in compliance with an approved Stream Buffer Management Plan.

D. Areas that cannot be revegetated shall be restored in compliance with an approved Stream Buffer Management Plan.

ATTACHMENT 3

Restoration of Urban Streams Practical Evaluation of Options for 319(h) Funded Projects

Restoration of Urban Streams:
Practical Evaluation of Options for 319(h) Funded Projects

Fred Kelly
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USDA-NRCS

March 2001

Introduction

As population grows, and development spreads, the impacts on our water resources become critical. Ground water supplies are depleted for human use and polluted by nitrates, pathogens, and pesticides. In areas that have been impacted by development, surface water resources often are subjected to extreme risks from stormwater runoff. The change of land cover from woods and fields to one dominated by impervious pavement, rooftops, and turfgrass leads to runoff of greater volume, velocity, and pollutant load. Surface water supplies are depleted for human use and polluted from runoff containing nutrients, sediment, pesticides, pathogens, road salts, hydrocarbons, metals, organic matter, elevated temperatures, and other constituents. In other words, the urban stream is dramatically impacted by man's activities.

Urban streams can be an asset to a community. However, flooding, channelization, erosion, and pollution often pose significant threats to the stream corridor and adjacent areas. Too often, urban streams become receiving points for a myriad of wastes and become an environmental risk.

Problems with these streams often arise from changes in the natural stream corridor characteristics brought about by urbanization. Historically, structures such as concrete channels were typically constructed to stabilize streambanks and protect properties.

Consequently, recent years have seen a swing toward stream corridor *restoration* projects to try and mitigate some of the degradation that has occurred. There are a number of obvious advantages to returning a stream closer to its natural state: cooler water temperatures, improved quality of incoming runoff, improved riparian habitat,

stable streambanks, restoration of riffle-pool sequences enhancing fish and other aquatic habitats, and improved aesthetics. This improvement can be reflected economically in improved property values in areas near the stream corridor, and additional recreational activities made possible by the improvement.

A prominent vehicle to get urban stream restoration started is the DWM 319(h) grants program. Through this program, enough money is made available on a competitive basis to get 'action now' water quality restoration work underway. These funded projects can be considered a 'seed' to lead to other work in other portions of the given stream. When viewed as such, it becomes more crucial to fund the best planned projects. *In this context, what does* 'best' *mean?*

Simply put, it means projects that are conceived and submitted with the proper amount of background research done. This 'homework' done by the applicant should indicate that the proposal should be successful in terms of reference condition chosen, restoration measures chosen, maintenance program chosen, and monitoring program chosen.

The restoration proposal should be evaluated using some type of accepted methodology. This summary presents a number of evaluation guidelines for urban stream restoration proposals as it applies to the 319-h funding program.

Improvement of water quality, of course, is the overarching aim of the 319 program. Generally, the submission of a proposal will focus on stream restoration that will improve water quality using one of four approaches:

1. Improve the quality of stormwater entering the stream
2. Maximize the quality of the urban stream riparian corridor
3. Stabilize the urban stream banks
4. Improve habitat within the urban stream

Along with the restoration plan, critical data for any proposal are the <u>costs</u> to be incurred with the planning and implementation of the measures. These must be within reasonable limits for the type of restoration work planned.

In a perfect world, a restoration proposal would include all four factors. These four, when combined into a single restoration strategy, provide a sum that is far greater than the individual parts. By implementing actions that improve the inflow quality, riparian corridor, streambanks, *and* in-stream environment, the urban stream can become a valuable resource to the local community and an environmental success story. However, it should be understood that a well conceived proposal that addresses just one of these facets can still be an effective restoration measure - it all depends on the condition of the stream and the *targeted reference condition.*

The reference should be a portion of the same stream or one nearby in the same ecoregion that represents what the impaired reach once was. Some ecoregion reference stations have been established by the Division of Watershed Management that may be utilized as reference stations; however, other reference stations may be utilized which are representative of the stream being restored.

Additional information regarding Ecoregion Reference Stations can be obtained from the at the Bureau of Freshwater and Biological Monitoring website: www.state.nj.us/dep/watershedmgt or at (609) 292-0427.

The restoration measures should be planned with an eye toward the corridor, bank, and channel conditions of the reference reach. The reference condition should be described as part of the restoration proposal. This description should include the reference stream name, ecoregion, and reach location. Documentation of the reference riparian corridor, streambank, and channel conditions also help the proposal evaluation process.

1. Improving the Inflow Stormwater Quality

The first and most important factor to consider when evaluating an urban stream restoration strategy is the very nature of the stormwater that is reaching the stream. Where is the storm runoff coming from? What are the likely pollutants in the runoff? What methods are available to reduce the pollutant load to the stream? These questions must be answered before planning work in the urban stream corridor itself. Guidance on pollutant characteristics of urban stormwater and appropriate Best Management Practices (BMPs) can be found in detail within the New Jersey manual, Best Management Practices for Control of Nonpoint Source Pollution from Stormwater. Principles and practices found within the proposal should be consistent with those in the manual.

2. Maximizing Riparian Corridor Quality

A well vegetated, healthy riparian corridor provides a number of beneficial functions to the urban stream. Some important ones are:

1. Reduces watershed imperviousness by imposing development limits adjacent to the stream.
2. Reduces flood impacts.
3. Filters pollutants from runoff flowing overland to the stream.
4. Provides wildlife habitat.
5. Protects stream bank from erosion.
6. Reduces stream warming.
7. Protects associated wetland ecosystems.
8. Provides large woody debris to the stream ecosystem.
9. Maintains infiltration of rainfall and contributes to stream baseflow.

How can one determine the relative quality of a riparian corridor? There are several factors that act as environmental indicators:

1. Width of the corridor
2. Plant community in the corridor
3. Soil stability in the corridor

Water quality indicators in the stream, including clarity, temperature, substrate makeup, and macroinvertebrate community, all are impacted positively by a healthy riparian corridor. However, often these in-stream conditions usually are more profoundly impacted by what's going on in the upstream watershed.

There are a number of sources of information that can be helpful when evaluating and restoring riparian corridor health. Portions of these are attached.

The USDA Natural Resources Conservation Service Stream Visual Assessment Protocol (SVAP) should be used to evaluate present stream corridor conditions. This protocol is easily used by consultants or citizen watershed groups with a modicum of training. It is attached to this summary. Others useful are:

1. USDA-NRCS Field Office Technical Guide. Standard 391, Riparian Forest Buffer; and Standard 393, Filter Strip.
2. The Federal Interagency Stream Restoration Working Group. Stream Corridor Restoration: Principles, Processes, and Practices
3. Illinois Dept. of Natural Resources. Field Manual of Urban Stream Restoration
4. Riley, Ann L. Restoring Streams in Cities
5. North Jersey RC&D. Riparian Buffer Evaluation Guide.

3. Ensuring Stability of the Streambanks

A stable, non-eroding streambank is indicated by a gradual sloping back from the waters edge, and vegetation or rock providing a protective layer over the soil. Little or no exposed bare soil is visible. An unstable streambank is often characterized by steeper slopes, often to the point of being vertical or overhanging. There may be exposed roots of trees and shrubs, and sections of exposed subsoil. (Tables 1 and 2) When left untreated, streambank erosion is a significant source of sediment to the stream environment, and a taker of valuable streamside property.

Many stream corridor restoration measures contain streambank stabilization as a central theme, usually employing a variety of bioengineering practices to accomplish this objective. Here, a critical consideration comes into play: *is the proposal for vegetating a bare, eroding bank, or is it for removal of undesirable species such as ailanthus and replacement with natives?* This latter concept must be evaluated to a higher resolution

than a simple stabilization measure. When considering removal of undesirables, the overriding concern is that the bank may already be stable, being adequately protected by the undesirable vegetation. Removal of this vegetation may create a serious erosion problem. Consequently, stream hydrology must be examined to ensure that the replacement vegetation and temporary stabilization measures will be adequate to keep the streambank stable.
Determinations of the following factors should be made to ensure that the proposed streambank stabilization measures will be successful:

1. Stream order
2. Channel and bank composition
3. Height and angle of eroded bank
4. Establish severity of erosion
5. Typical low flow water elevation
6. Typical high flow elevation
7. Bankfull velocity
8. Thalweg location (deepest part of channel)
9. Sunlight percentage reaching the streambank during the growing season

This information can be obtained from US Geological Service (USGS) streamflow gauging data, local records and in-field measurements.

The best sources of information to consult when performing this phase of evaluation are:

Standards for Soil Erosion and Sediment Control in New Jersey, 2000 Edition. Standard for Soil Bioengineering. (Attached to this summary)

USDA, NRCS Engineering Field Manual, Chapter 16. Streambank and Shoreline Stabilization. (portions attached)

Table 1: General Streambank Erosion Evaluation

Erosion Problem	Characteristics	Possible Solutions
General bank scour	Widespread erosion of streambank, extensive stretches of exposed soil	Bioengineering practices
Toe erosion and upper bank failure	Vertical or overhanging eroded streambanks, often on outside of a bend. Undercutting prevalent because of unstable toe	Bioengineering practices combined with rock toe stabilization
Local streambank scour	Isolated sections of unstable streambanks within otherwise stable reaches.	Bioengineering practices
Overbank runoff	Surface runoff coming from lawns, streets, parking lots, etc creating gully-like scars in the streambank	Surface runoff control: Diversions, drop structures Bioengineering practices

Reference: Guidelines for Streambank Restoration (adapted from Sotir, 1993)

Table 2. Guidance for Determining Degree of Erosion

Degree of Erosion	Characteristics
Stable to Mild	Little or no evidence of erosion: if eroding banks are present, they are small in extent (linear extent less than average bank height) and rates are modest (less than 0.5 foot per year); greater erosion may be tolerated at bends if it causes no associated problems.
Moderate	Extent of problem or rate of erosion exceeds criteria for stable, but is less than severe.
Severe	Erosion covers larger area of bank (linear extent greater than three times average bank height) and is occurring at a rate in excess of one foot per year or a rate that is unacceptable for safety, environmental, or economic reasons.

Reference: Guidelines for Streambank Restoration (Sotir, 1993)

4. Improving Quality of the In-Stream Habitat

Once the health of the riparian corridor and streambanks have been assured, attention can be turned to improving the quality of in-stream habitat. There are a great number of habitat improvement measures that can be economically installed using natural materials and volunteer labor. However, be advised that practically all would require a permit from the NJDEP.

Usually, habitat improvement consists of using large native rock, boulder or timber structures in a variety of configurations to alter the flow regime of a location within the channel of a perennial watercourse. The intent is often to create pools, riffles, and feeding or resting areas.

The best sources of information relating to habitat improvement are:

USDA Forest Service. Stream Habitat Improvement Handbook
Pennsylvania Fish and Boat Commission. Fish Habitat Improvement for Trout Streams
Government of Quebec, Canada. Guidelines for the Improvement and Restoration of Fish Habitat in Small Streams

Remember that all planned measures must be in compliance with New Jersey DEP, Division of Floodplain Management, Division of Fish and Game, and other possible regulations. Consult with the Land Use Regulation Program if there are any questions relating to a stream restoration measure.

Reasonable Costs for Restoration

All of the aforementioned notwithstanding, a proposal must have a reasonable price tag for the work to be undertaken. Stream restoration projects can vary widely in the planning and implementation, based on a number of variables: difficulty of design, locality, size and scope, materials chosen, etc. Consequently, it can be difficult to find comparative data to assess the reasonability of a proposal.

Nonetheless, following is data taken from the 1999 USDA-NRCS Cost Table for use with farm programs. These costs should be reasonable, having been derived from contractors, suppliers, and professional judgement. A 319 proposal's installation costs should be within 20% of the costs cited here.

Table 3. Average Costs per Unit for Stream Restoration Work

Practice	Component	Units	Unit average cost
Filter Strip	Site prep and seeding	Acre	$475.00
Riparian Forest Buffer	Site preparation	Acre	$75.00
	Tree planting	Acre	$800.00
	Tree shelters	Each	$3.00
	Seeding	Acre	$400.00
Fish Habitat Improvement	Stream boulder placement	Each	$50.00
	Log/wood frames	Linear foot	$3.00
	Rock riprap	Cubic yard	$50.00
Streambank Stabilization	Brush mattressing	Linear foot	$6.00
	Plant cuttings	Each	$0.50
	Fiber rolls	Linear foot	$12.00
	Live stakes	Each	$2.00
	Erosion control blanket	Square yard	$2.00
	Herbaceous plants	Each	$2.00

ATTACHMENT 4

NJAC 7:8
Subchapter 4
Municipal Stormwater Management Planning

SUBCHAPTER 4. MUNICIPAL STORMWATER MANAGEMENT PLANNING

7:8-4.1 Scope

This subchapter describes stormwater management planning and implementation at the municipal level, including plan elements, county review and technical assistance, the schedule for adoption of the plan and ordinances, and variance or exemption from design and performance standards for stormwater management measures.

7:8-4.2 Municipal stormwater management plan and elements

(a) A municipal stormwater management plan shall address stormwater-related water quality, groundwater recharge and water quantity impacts of major development, and may also address stormwater-related quality, water quantity and groundwater recharge impacts of existing land uses. For purposes of this subchapter, major development is limited to projects that ultimately disturb one or more acres of land.

(b) A municipal stormwater management plan and stormwater control ordinance(s) shall conform with applicable regional stormwater management plan(s).

(c) A municipal stormwater management plan shall, at a minimum:

1. Describe how the municipal stormwater management plan will achieve the goals of stormwater management planning set forth at N.J.A.C. 7:8-2.3;
2. Include maps showing water bodies based on Soil Surveys published by the U.S. Department of Agriculture; the U.S. Geological Survey Topographic Map, 7.5 minute quadrangle series; or other sources of information depicting water bodies in similar or greater detail;
3. Map groundwater recharge areas and well head protection areas based on maps prepared by the Department under N.J.S.A. 58:11A-13 or a municipal ordinance;
4. Describe how the municipal stormwater management plan incorporates design and performance standards in N.J.A.C. 7:8-5 or alternative design and performance standards adopted as a part of a regional stormwater management plan or water quality management plan;
5. Describe how adequate long-term operation as well as preventative and corrective maintenance (including replacement) of the selected stormwater management measures will be ensured;
6. Describe how the plan will ensure compliance with Safety Standards for Stormwater Management Basins at N.J.A.C. 8:8-6;
7. Describe how the municipal stormwater management plan is coordinated with the appropriate Soil Conservation District and any other stormwater management plans, including any adopted regional stormwater management plan, prepared by any stormwater management planning agency related to the river basins or drainage areas to which the plans and/or ordinances apply;
8. Evaluate the extent to which the municipality's entire master plan (including the land use plan element), official map and development regulations (including the zoning ordinance) implement the principles expressed in N.J.A.C. 7:8-5.3(b). This evaluation shall also be included (with updating as appropriate) in the reexamination report adopted under N.J.S.A. 40:55D-89;
9. Include a map of the municipality showing:
    i. Projected land uses assuming full development under existing zoning; and
    ii. The hydrologic unit code 14 (HUC 14) drainage areas as defined by the United States Geological Survey; and an estimate, for each HUC 14 drainage

area, of the total acreage in the municipality of impervious surface and associated future nonpoint source pollutant load assuming full build out of the projected land uses.

10. At the option of the municipality, document that is has a combined total of less than one square mile of vacant or agricultural lands rather than provide the information required in (c)8 and 9 above. Agricultural lands may be excluded if the development rights to these lands have been permanently purchased or restricted by covenant, easement or deed. Vacant or agricultural lands in environmentally constrained areas may be excluded if the documentation also includes an overlay map of these areas at the same scale as the map under (c)10i below.
    i. Documentation shall include an existing land use map at an appropriate scale to display the land uses of each parcel within the municipality. Such a map shall display the following land uses: residential (which may be divided into single family, two-to-four family, and other multi-family), commercial, industrial, agricultural, parkland, and other public uses, semipublic uses, and vacant land;
11. In order to grant a variance or exemption from t he design and performance standards in N.J.A.C. 7:8-5, include a mitigation plan that identifies what measures are necessary to offset the deficit created by granting the variance or exemption. The mitigation plan shall ensure that mitigation is completed within the drainage area and for the performance standard for which the variance or exemption was granted;
12. Include a copy of the recommended implementing stormwater control ordinance(s) requiring stormwater management measures; and
13. The municipal stormwater management plan may also include a stream corridor protection plan to address protection of areas adjacent to waterbodies.

7:8-4.3 Schedule for adoption of municipal stormwater management plan and ordinances

(a) A municipality shall adopt a municipal stormwater management plan as an integral part of its master plan and official map in accordance with the schedule in (a)1 or 2 below, whichever is sooner. The requirements in N.J.A.C. 7:8-4.2(c)8 and 9 are not operative until February 2, 2006.
    1. By the deadline established in a New Jersey Pollutant Discharge Elimination System permit obtained by the municipality for a municipal separate storm sewer system under N.J.A.C. 7:14A; or
    2. By the next reexamination of the master plan under N.J.S.A. 40:55D-89, if a grant for 90 percent of the costs for the preparation of the municipal stormwater management plan has been made available to a municipality by the Department;

(b) Within one year after the municipality adopts the municipal stormwater management plan, the municipality shall adopt stormwater control ordinance(s) to implement the adopted plan and shall submit the adopted municipal stormwater management plan and ordinance(s) to the county review agency for approval. The adopted municipal stormwater management plan and ordinance(s) shall not take effect without approval by the county review agency.

(c) The municipality shall amend the municipal stormwater management plan and stormwater control ordinance(s) as necessary and submit the amended plan and amended ordinance(s) to the county review agency for approval.

(d) The municipality shall reexamine the municipal stormwater management plan at each reexamination of the municipality's master plan in accordance with N.J.S.A. 40:55D-89.
(e) Within one year of the adoption of a regional stormwater management plan as an amendment to the Areawide Water Quality Management Plan, or an amendment thereto, each municipality within the regional stormwater management planning area shall amend their respective municipal stormwater management plans and stormwater control ordinance(s) to implement the regional stormwater management plan.

7:8-4.4 County review process

(a) A municipality shall submit a copy of the adopted stormwater management plan and stormwater control ordinance(s) to the county review agency and the Department.
(b) In reviewing the adopted municipal stormwater management plan and ordinance(s), the county review agency shall consider whether the plan and ordinance(s) conform with the requirements of this chapter.
(c) In accordance with N.J.S.A. 40:55D-97, it is the county review agency's responsibility to review and approve, conditionally approve (specifying the necessary amendments to the plan and ordinance(s)) or disapprove the adopted municipal stormwater management plan and ordinance(s) within 60 calendar days of receipt of the plan and ordinance(s). If the county review agency does not approve, conditionally approve, or disapprove the plan or ordinance(s) within 60 calendar days, the plan and ordinance(s) shall be deemed approved. The county review agency shall issue a written decision to the municipality, with a copy to the Department.
(d) A municipal stormwater management plan and ordinance(s) approved under (c) above shall take effect immediately. A municipal stormwater management plan and ordinance(s) conditionally approved under (c) above shall take effect upon adoption by the municipality of the amendments specified by the county review agency.
(e) Within 30 days of the effective date of the municipal stormwater management plan and ordinance(s) under (d) above, the municipality shall place the plan and ordinance(s) on its website and notify the Department, the Soil Conservation District and State Soil Conservation Committee, or:
    1. Submit a copy of the approved municipal stormwater management plan and ordinance(s) to the Department; and
    2. Provide notice of such approval to the Soil Conservation District and the State Soil Conservation Committee and, upon request, submit a copy of the approved plan and ordinance(s).

7:8-4.5 Reservation of rights

The Department reserves the right to review stormwater management plans and ordinances for compliance with this subchapter and make recommendations to correct any deficiencies.

7:8-4.6 Variance or exemption from the design and performance standards for stormwater management measures

A municipality may grant a variance or exemption from the design and performance standards for stormwater management measures set forth in its approved municipal stormwater management plan and stormwater control ordinance(s), provided the municipal plan includes a mitigation plan in accordance with N.J.A.C. 7:8-4.2(c)11 and the municipality submits a written report to the county review agency and the Department describing the variance or exemption and the required mitigation.

ATTACHMENT 5

New Jersey's Integrated List of Waterbodies, Sublist 1-5

Watershed Management Area 18

Lower Delaware

Sublist	Wtrshd Region	WMA	Station Name/Waterbody	Site ID	Parameters	Data Source
5	Lower Delaware	18	Alcyon Lake-18	Alcyon Lake	Phosphorus, Fish-Mercury	NJDEP Clean Lakes, NJDEP Fish Tissue Monitoring
4	Lower Delaware	18	Bell Lake-18	Bell Lake	Phosphorus	NJDEP Clean Lakes
1	Lower Delaware	18	Bellmawr Lake-18	Bellmawr Lake	Fecal Coliform	Camden Co HD
1	Lower Delaware	18	Bells Lake-18	Greenwood Park Bells Lake	Fecal Coliform	Gloucester Co HD
4	Lower Delaware	18	Bethel Lake-18	Bethel Lake	Phosphorus	NJDEP Clean Lakes
5	Lower Delaware	18	Big Timber Creek	Big Timber Creek	Fish-Mercury	NJDEP Fish Tissue Monitoring
4	Lower Delaware	18	Big Timber Creek N Br at Glendora	01467359	Fecal Coliform	NJDEP/USGS Data
5	Lower Delaware	18	Big Timber Creek N Br at Glendora	01467359	Phosphorus	NJDEP/USGS Data
1	Lower Delaware	18	Big Timber Creek N Br at Glendora	01467359	Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	NJDEP/USGS Data
5	Lower Delaware	18	Big Timber Creek N Br at Park Ave in Lindenwold	AN0661	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Big Timber Creek N Br at Rt 168 In Gloucester	AN0663	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Big Timber Creek S Br at Almonesson Rd in Blenheim	EWQ0659	Dissolved Oxygen, Total Suspended Solids	EWQ
1	Lower Delaware	18	Big Timber Creek S Br at Almonesson Rd in Blenheim	EWQ0659	Temperature, pH, Nitrate, Dissolved Solids, Unionized Ammonia	EWQ
5	Lower Delaware	18	Big Timber Creek S Br at Almonesson Rd in Blenheim	EWQ0659	Phosphorus	EWQ
4	Lower Delaware	18	Big Timber Creek S Br at Blackwood Terrace	01467329, 18-BIG-1	Fecal Coliform	NJDEP/USGS Data, Metal Recon
5	Lower Delaware	18	Big Timber Creek S Br at Blackwood Terrace	01467329, 18-BIG-1	Phosphorus	NJDEP/USGS Data, Metal Recon
3	Lower Delaware	18	Big Timber Creek S Br at Blackwood Terrace	01467329, 18-BIG-1	Arsenic, Cadmium, Lead, Mercury	NJDEP/USGS Data, Metal Recon
1	Lower Delaware	18	Big Timber Creek S Br at Blackwood Terrace	01467329, 18-BIG-1	Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Chromium, Copper, Nickel, Selenium, Zinc	NJDEP/USGS Data, Metal Recon
4	Lower Delaware	18	Big Timber Creek S Br at Glenloch	01467327	Fecal Coliform	NJDEP/USGS Data
3	Lower Delaware	18	Big Timber Creek S Br at Glenloch	01467327	Arsenic, Lead, Mercury, Silver	NJDEP/USGS Data

Sublist	Wtrshd Region	WMA	Station Name/Waterbody	Site ID	Parameters	Data Source
1	Lower Delaware	18	Big Timber Creek S Br at Glenloch	01467327	Phosphorus, Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Cadmium, Chromium, Copper, Nickel, Selenium, Zinc	NJDEP/USGS Data
1	Lower Delaware	18	Big Timber Creek S Br at Turnersville	01467325	Phosphorus, Fecal Coliform, Temperature, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Chromium, Copper, Nickel, Selenium, Zinc	NJDEP/USGS Data
3	Lower Delaware	18	Big Timber Creek S Br at Turnersville	01467325	pH, Unionized Ammonia, Arsenic, Cadmium, Lead, Mercury, Silver	NJDEP/USGS Data
5	Lower Delaware	18	Big Timber Creek S Br at Turnersville - Sicklerville Rd in Washington	AN0658	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Big Timber Creek S Br UNK Trib at Ganttown Rd in Washington	AN0656	Benthic Macroinvertebrates	NJDEP AMNET
4	Lower Delaware	18	Blackwood Lake-18	Blackwood Lake	Phosphorus	NJDEP Clean Lakes
3	Lower Delaware	18	Chestnut Branch at Lambs Rd in Mantua	AN0670	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Chestnut Branch at Mantua Blvd in Mantua	AN0671	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Clementon Lake-18	Clementon Lake	Fish-Mercury	NJDEP Fish Tissue Monitoring
4	Lower Delaware	18	Cooper River at Haddonfield	01467150, 01467140, 18-CO-4	Fecal Coliform	NJDEP/USGS Data, Metal Recon
5	Lower Delaware	18	Cooper River at Haddonfield	01467150, 01467140, 18-CO-4	Phosphorus, Arsenic, Lead, Tetrachloroethylene	NJDEP/USGS Data, Metal Recon
3	Lower Delaware	18	Cooper River at Haddonfield	01467150, 01467140, 18-CO-4	Cadmium, Mercury	NJDEP/USGS Data, Metal Recon
1	Lower Delaware	18	Cooper River at Haddonfield	01467150, 01467140, 18-CO-4	Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Chromium, Copper, Nickel, Selenium, Zinc	NJDEP/USGS Data, Metal Recon
5	Lower Delaware	18	Cooper River at Hopkins Pond	Cooper River at Hopkins Pond	Fish-PCB, Fish-Dioxin	NJDEP Fish Tissue Monitoring
5	Lower Delaware	18	Cooper River at Kaighn Ave in Camden	1467191	Phosphorus, pH	EWQ
1	Lower Delaware	18	Cooper River at Kaighn Ave in Camden	01467191	Temperature, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	EWQ
4	Lower Delaware	18	Cooper River at Lindenwold	01467120	Fecal Coliform	NJDEP/USGS Data

Sublist	Wtrshd Region	WMA	Station Name/Waterbody	Site ID	Parameters	Data Source
5	Lower Delaware	18	Cooper River at Lindenwold	01467120	Phosphorus	NJDEP/USGS Data
5	Lower Delaware	18	Cooper River at Rt 130 at Camden	18-CO-1	Arsenic, Lead, Mercury, Tetrachloroethylene	NJDEP Metal Recon
3	Lower Delaware	18	Cooper River at Rt 130 at Camden	18-CO-1	Cadmium, Mercury	NJDEP Metal Recon
1	Lower Delaware	18	Cooper River at Rt 130 at Camden	18-CO-1	Chromium, Copper, Nickel, Selenium, Zinc	NJDEP Metal Recon
3	Lower Delaware	18	Cooper River Lake-18	Cooper River Lake	Phosphorus	NJDEP Clean Lakes, NJDEP Fish Tissue Monitoring
5	Lower Delaware	18	Cooper River Lake-18	Cooper River Lake	Fish-PCB, Fish-Dioxin	NJDEP Clean Lakes, NJDEP Fish Tissue Monitoring
4	Lower Delaware	18	Cooper River N Br at Kresson	01467155, 18-CO-2	Fecal Coliform	NJDEP/USGS Data, Metal Recon
5	Lower Delaware	18	Cooper River N Br at Kresson	01467155, 18-CO-2	Phosphorus, Dissolved Oxygen, pH, Arsenic	NJDEP/USGS Data, Metal Recon
3	Lower Delaware	18	Cooper River N Br at Kresson	01467155, 18-CO-2	Cadmium, Mercury	NJDEP/USGS Data, Metal Recon
1	Lower Delaware	18	Cooper River N Br at Kresson	01467155, 18-CO-2	Temperature, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Chromium, Copper, Lead, Nickel, Selenium, Zinc	NJDEP/USGS Data, Metal Recon
3	Lower Delaware	18	Cooper River N Br at Kresson Rd in Voorhees	AN0186	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Cooper River N Br at River Dr in Cherry Hill	AN0188	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Cooper River N Br at Springdale Rd in Cherry Hill	AN0187	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Cooper River S Br at Evesham Rd in Cherry Hill	AN0190	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Cooper River S Br at Gibbsboro Rd in Gibbsboro	AN0189	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Cooper River S Br at Rt 41 in Cherry Hill	AN0191	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Cooper River, spillway below Evans Pond	Cooper River, spillway below Evans Pond	Fish-PCB, Fish-Dioxin	NJDEP Fish Tissue Monitoring
5	Lower Delaware	18	Edwards Run at Jefferson	01475090	Phosphorus , Fecal Coliform	NJDEP/USGS Data
1	Lower Delaware	18	Edwards Run at Jefferson	01475090	Temperature, Dissolved Oxygen, pH, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	NJDEP/USGS Data
5	Lower Delaware	18	Edwards Run at Jessups Mill Rd in Mantua	AN0674	Benthic Macroinvertebrates	NJDEP AMNET

Sublist	Wtrshd Region	WMA	Station Name/Waterbody	Site ID	Parameters	Data Source
3	Lower Delaware	18	Edwards Run at Pitman - Jefferson Rd in Harrison	AN0673	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Evans Lake-18	Evans Lake	Phosphorus	NJDEP Clean Lakes
5	Lower Delaware	18	Evans Pond-18	Evans Pond	Fish-PCB, Fish-Dioxin	NJDEP Fish Tissue Monitoring
1	Lower Delaware	18	Gilman Lake-18	Lake Gilman	Fecal Coliform	Gloucester Co HD
3	Lower Delaware	18	Greenwich Lake-18	Greenwich Lake	Phosphorus	NJDEP Clean Lakes
5	Lower Delaware	18	Grenloch Lake-18	Grenloch Lake	Phosphorus	NJDEP Clean Lakes
3	Lower Delaware	18	Haddon Lake-18	Haddon Lake	Phosphorus	NJDEP Clean Lakes
4	Lower Delaware	18	Harrisonville Lake-18	Harrisonville Lake	Phosphorus	NJDEP Clean Lakes
1	Lower Delaware	18	Hurff Lake	Hurff Lake	Fecal Coliform	Gloucester Co HD
1	Lower Delaware	18	Kandle Lake-18	Lake Kandle	Fecal Coliform	Gloucester Co HD
4	Lower Delaware	18	Kirkwood Lake-18	Kirkwood Lake	Phosphorus	NJDEP Clean Lakes
5	Lower Delaware	18	Lake Silvestro	Lake Silvestro	Fecal Coliform	Gloucester Co HD
5	Lower Delaware	18	Linden Lake-18	Linden Lake	Fish-Mercury	NJDEP Fish Tissue Monitoring
5	Lower Delaware	18	Little Timber Creek	Little Timber Creek	Fish-Mercury	NJDEP Fish Tissue Monitoring
3	Lower Delaware	18	Little Timber Creek at Devon Rd in Bellmawr	AN0666	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Little Timber Creek at Paulsboro Rd in Logan	AN0678	Benthic Macroinvertebrates	NJDEP AMNET
1	Lower Delaware	18	Mantua Creek at Greentree Rd in Glassboro	AN0668	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Mantua Creek at Lambs Rd in Mantua	AN0669	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Mantua Creek at Mantua Ave in Wenonah	AN0672	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Mantua Creek at Rt 45 in W. Deptford	01475045	Phosphorus	EWQ
1	Lower Delaware	18	Mantua Creek at Rt 45 in W. Deptford	01475045	Temperature, Dissolved Oxygen, pH, Nitrate, Dissolved Oxygen, Total Suspended Solids, Unionized Ammonia	EWQ
5	Lower Delaware	18	Marlton Lake-18	Marlton Lake	Fish-Mercury	NJDEP Fish Tissue Monitoring
3	Lower Delaware	18	Mason Run at Chews Landing Rd in Lindenwold	AN0662	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Narriticon Lake-18	Narriticon Lake	Phosphorus	NJDEP Clean Lakes
5	Lower Delaware	18	Newton Creek	Newton Creek	Copper, Zinc	304(l)
5	Lower Delaware	18	Newton Creek at Rt 168 in W Collingswood	EWQ0653	pH, Phosphorus	EWQ

Sublist	Wtrshd Region	WMA	Station Name/Waterbody	Site ID	Parameters	Data Source
3	Lower Delaware	18	Swedes Run at Rt 130 in Delran	EWQ0176	Dissolved Oxygen	EWQ
1	Lower Delaware	18	Swedes Run at Rt 130 in Delran	EWQ0176	Phosphorus, Temperature, pH, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	EWQ
5	Lower Delaware	18	Swedes Run at Rt 130 in Delran	AN0176	Benthic Macroinvertebrates	NJDEP AMNET
5	Lower Delaware	18	Toms Dam Branch at Peter Cheeseman Rd in Gloucester	AN0658A	Benthic Macroinvertebrates	NJDEP AMNET
3	Lower Delaware	18	Turners Run at Last Bridge Crossing in Washington	AN0657	Benthic Macroinvertebrates	NJDEP AMNET
1	Lower Delaware	18	Washington Lake-18	Washington Township Lake	Fecal Coliform	Gloucester Co HD
1	Lower Delaware	18	Wenonah Lake-18	Wenonah Lake Playground	Fecal Coliform	Gloucester Co HD
5	Lower Delaware	18	Woodbury Creek at Rt 45, Woodbury Ck Park in Woodbury	01474730	pH	EWQ
3	Lower Delaware	18	Woodbury Creek at Rt 45, Woodbury Creek Park in Woodbury	01474730	Phosphorus	EWQ
1	Lower Delaware	18	Woodbury Creek at Rt 45, Woodbury Creek Park, in Woodbury	01474730	Temperature, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia	EWQ
4	Lower Delaware	18	Woodbury Lake-18	Woodbury Lake	Phosphorus	NJDEP Clean Lakes