

BOROUGH OF CHATHAM
MORRIS COUNTY, NEW JERSEY

STORMWATER MANAGEMENT PLAN



MARCH 2021

PREPARED FOR:
BOROUGH OF CHATHAM
MORRIS COUNTY, NEW JERSEY

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Introduction

On January 5, 2004 the New Jersey Department of Environmental Protection (NJDEP) adopted the Phase II Municipal Stormwater Regulation Program for the State of New Jersey. These regulations appeared in the February 2, 2004 New Jersey Register. Under these regulations, four New Jersey Pollutant Discharge Elimination System (NJDPES) General Permits were issued. Two of these General Permits, Tier A and Tier B Municipal Stormwater Permits, require New Jersey municipalities to begin a five year process implementing various measures to improve surface water quality within the State of New Jersey. New Jersey's regulations are a direct result of the United States Environmental Protection Agency National Pollutant Discharge Elimination System (NPDES) Phase H Regulations published on December 8, 1999. There are a number of Statewide Basic Requirements (SBRs) under New Jersey's Tier A Municipal Stormwater Permit including, but not limited to, the following:

- *Post-Construction Stormwater Management in New Development and Redevelopment*
- *Local Public Education*
- *Improper Disposal of Waste*
- *Solids and Floatable Controls*
- *Maintenance Yard Operations*
- *Employee Training*

As part of the SBR for Post-Construction Stormwater Management in New Development and Redevelopment, municipalities must prepare and adopt a Municipal Stormwater Management Plan (MSWMP). This MSWMP documents the strategy for the Borough of Chatham (the Borough) to address stormwater-related impacts from new development and redevelopment. The creation of this Plan is required by the Municipal Stormwater Regulations, published at N.J.A.C. 7:14A-25. This Plan contains all of the required elements described in the Stormwater Management Rules, published at N.J.A.C. 7:8. The Plan addresses groundwater recharge, stormwater quantity, and stormwater quality impacts of new development and redevelopment by incorporating stormwater design and performance standards for new major development, defined as projects that disturb one or more acre of land, or increase impervious surface by one-quarter acre or more. These standards are intended to minimize the adverse impact of stormwater runoff on water quality and water quantity, and the loss of groundwater recharge that provides baseflow in receiving water bodies.

The Plan also addresses long-term operation and maintenance measures for existing and future stormwater facilities. The final component of this Plan is a mitigation strategy for when a variance or exemption of the design and performance standards is sought. As part of the *Mitigation Plans* section, specific stormwater management measures will be identified to lessen the impact of existing development. Neither a "build-out" analysis, nor review of the Borough Master Plan has been included in this Plan, as the Borough has a combined total of less than one square mile of vacant or agricultural lands, and thus is not required to provide this information.

Goals

The general goals of this MSWMP are to present an overview of the Borough's waterways and to establish a framework for compliance with the Municipal Stormwater Regulations. The specific goals of this Plan are to:

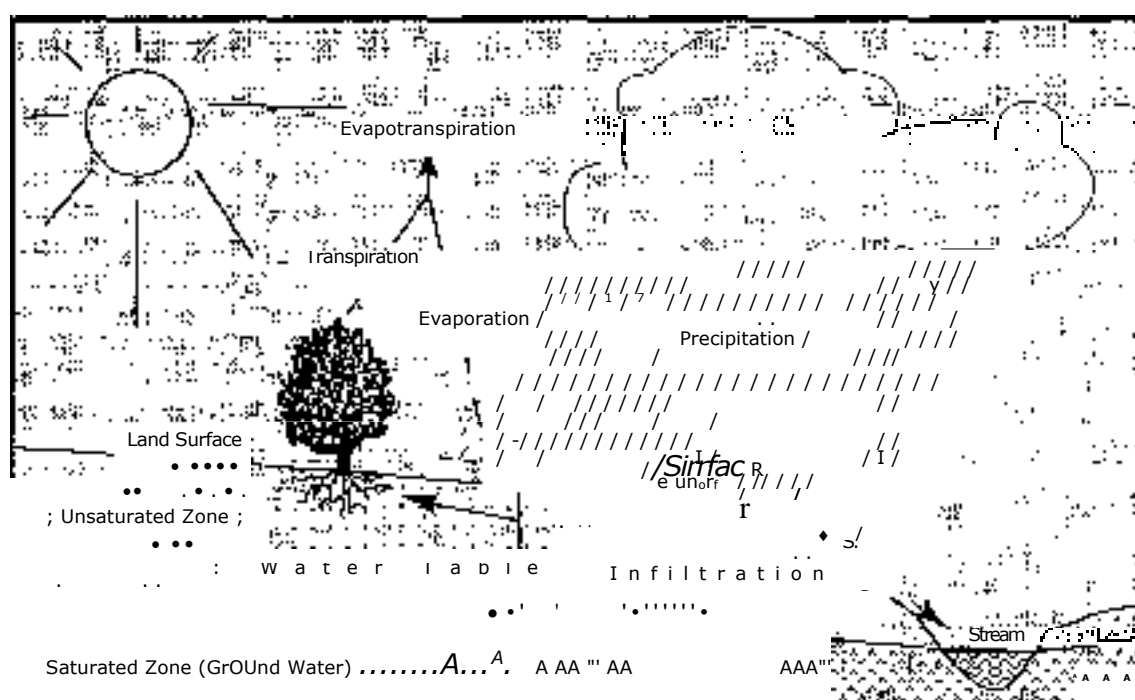
- reduce flood damage, including damage to life and property;
- minimize, to the extent practical, any increase in stormwater runoff from any new development or redevelopment,
- reduce soil erosion from any development or construction project;
- assure the adequacy of existing and proposed culverts and bridges, and other in-stream structures;
- maintain groundwater recharge where feasible;
- prevent, to the greatest extent feasible, an increase in nonpoint pollution;
- maintain the integrity of stream channels for their biological functions, as well as for drainage;
- minimize pollutants in stormwater runoff from new and existing development to restore, enhance, and maintain the chemical, physical, and biological integrity of the waters of the State, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, and other uses of water; and
- protect public safety through the proper design and operation of stormwater basins.

To achieve these goals, this Plan outlines specific stormwater design and performance standards for new development and redevelopment. Additionally, the Plan proposes stormwater management controls to address impacts from existing development. Preventative and corrective maintenance strategies are included in the Plan to ensure long-term effectiveness of stormwater management facilities. The Plan also outlines safety standards for stormwater infrastructure to be implemented to protect public safety.

Stormwater Fundamentals

Land development can dramatically alter the hydrologic cycle (see figure below) of a site and, ultimately, an entire watershed. Prior to development, native vegetation can either directly intercept precipitation or extract that portion of the precipitation that has infiltrated into the ground and return it to the atmosphere through evapotranspiration. Development can remove this beneficial vegetation and replace it with lawn or impervious cover, reducing the site's evapotranspiration and infiltration rates. Clearing and grading a site can remove depressions that store rainfall, and construction activities may also compact the soil and diminish its infiltration ability, resulting in increased volumes and rates of stormwater runoff from the site.

Groundwater Recharge in the Hydrologic Cycle



Source: New Jersey Geological Survey Report GSR-32.

Impervious areas that are connected to each other through gutters, channels, and storm sewers typically transport runoff more quickly than naturally vegetated areas. This decrease of the transport time accelerates the rainfall-runoff response of the drainage area, causing flow in downstream waterways to peak more quickly and higher than in natural conditions. These increases can create new, and aggravate existing, downstream flooding and erosion problems and increase the quantity of sediment in the waterway. Additionally, storm sewers that discharge runoff directly into a stream eliminate filtration of runoff, and the associated removal of pollutants, by surface and channel vegetation. Increases in impervious area can also decrease opportunities for infiltration which, in turn, reduces stream baseflow and groundwater recharge. Reduced baseflows and increased peak flows produce greater fluctuations between normal and storm flow rates, which can increase channel erosion. Reduced baseflows can also negatively

impact the hydrology of adjacent wetlands and the health of biological communities that depend on baseflows. Finally, erosion and sedimentation can destroy habitat from which some species cannot adapt.

In addition to increases in stormwater runoff peak flows, volumes, and the loss of groundwater recharge, land development often results in the accumulation of pollutants on the land surface that stormwater runoff can mobilize and transport to streams. New impervious surfaces and cleared areas created by development can accumulate a variety of pollutants from the atmosphere, fertilizers, animal wastes, and leakage from vehicles. Pollutants can include metals, suspended solids, hydrocarbons, pathogens, and nutrients.

Land development can also adversely affect water quality and stream biota in more subtle ways. For example, stormwater falling on impervious surfaces or stored in detention or retention basins can become heated and raise the temperature of the downstream waterway, adversely affecting cold water fish species such as trout. Development also may remove trees along stream banks that normally provide shading, channel stabilization, and leaf litter that falls into streams and becomes food for the aquatic community.

Borough of Chatham Waterways

The Borough of Chatham encompasses 2.35 square miles in the southeastern corner of Morris County, New Jersey. The Borough is an established community and has experienced a rather steady population since the early 1960's. The population of the Borough has fluctuated recently from 8,537 in 1980, to 8,007 in 1990, to 8,460 in 2000. The Borough experienced the biggest population increase between 1940 and 1960 when the population increased from 4,888 to 9,517. This population increase, combined with business and commercial development, has resulted in some changes in the landscape, which likely resulted in increased stormwater runoff volumes and pollutant loads to the waterways of the Borough. Refer to Figure 1 for the Borough zoning map, Figure 2 illustrates the existing land use within the Borough, and Figures 7 and 8 identify the major waterways in the Borough.

The NJDEP has established an Ambient Biomonitoring Network (AMNET) to document the health of the State's waterways. There are over 800 AMNET sites throughout the State of New Jersey. These sites are sampled for benthic macroinvertebrates by NJDEP on a five-year cycle. Streams are classified as non-impaired, moderately impaired, or severely impaired based on the AMNET data. This data is used to generate a New Jersey Impairment Score (NJIS), which is based on a number of biometrics related to benthic macroinvertebrate community dynamics.

The Passaic River, which is located along the eastern border of the Borough, is the most significant waterway in the Borough. The Passaic River runs south to north, touching the Borough first at Stanley Park and leaving at the Madison-Chatham sewerage plant. From Stanley Park to the Main Street Bridge the River has a relatively large drop in elevation, but thereafter the change in elevation is more gradual. The Passaic River in Chatham is classified as moderately impaired based on the AMNET data.

Two small tributary waterways to the Passaic River are located in the Borough. The two waterways, Day's Brook and Harmon's Brook, are both located in the north-east section of the Borough, and do not have AMNET classifications. The only standing body of water in the Borough is the Milton Avenue pond, which was constructed by the Borough in about 1963.

In addition to the AMNET data, the NJDEP and other regulatory agencies collect water quality chemical data on the streams in the State. This data shows that the instream fecal coliform concentrations of the Passaic River frequently exceed the State's criteria. Accordingly, the NJDEP has developed a Total Maximum Daily Load (TMDL) for fecal coliform for the Passaic River.

A TMDL is the amount of a pollutant that can be accepted by a waterbody without causing an exceedance of water quality standards or interfering with the ability to use a waterbody for one or more of its designated uses. The allowable load is allocated to the various sources of the pollutant, such as stormwater and wastewater discharges, which require an NJPDES permit to

discharge, and nonpoint sources, which include stormwater runoff from agricultural areas and residential areas, along with a margin of safety. Provisions may also be made for future sources in the form of reserve capacity. An implementation plan is developed to identify how the various sources will be reduced to the designated allocations.

The TMDL for Fecal Coliform in the Northeast Water Region (which includes the Passaic River) indicates that a 96% reduction on overall nonpoint source loads is necessary to achieve the target conditions for fecal coliform concentrations. The TMDL identified the general sources of fecal coliform in the Northeast Water Region as malfunctioning or older, improperly sized septic systems; failing sewage conveyance systems; improper garbage storage and disposal; Canada geese; pet waste; stormwater basins which act as an accumulation point for fecal matter; direct stormwater discharge to waterbodies; and farms, zoos, and livestock. Specific items listed for the Passaic River near Chatham include: geese, wildlife, failing septic (not applicable to Chatham), pets, detention basins, and landfills (not applicable to Chatham). Implementation strategies may include adoption of ordinances addressing wildlife and pet waste, retrofitting stormwater systems, and other stormwater best management practices (BMPs).

The New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d)) (Integrated List) is required by the federal Clean Water Act to be prepared biennially and is a valuable source of water quality information. This combined report presents the extent to which New Jersey waters are attaining water quality standards, and identifies waters that are impaired. Sublist 5 of the Integrated List constitutes the list of waters impaired or threatened by pollutants, for which one or more TMDLs are needed. The Passaic River near Chatham is on Sublist 5 as being impaired due to high arsenic, cadmium, copper, lead, mercury, phosphorous, silver, zinc, cyanide, total suspended solids, and benthic macroinvertebrate levels.

The Borough of Chatham is a highly developed community with buildings and paved areas covering a significant portion of the land area; therefore, land available to absorb precipitation is reduced, and the amount of runoff is increased. Accordingly, in addition to water quality problems, the Borough has exhibited water quantity problems including flooding, stream bank erosion, and diminished base flow in its streams. The primary mode of stormwater conveyance in the northern part of the Borough near Main Street is through a subsurface storm drainage system consisting of catch basins, inlets, manholes, storm drains, and culverts which was built in the 1930s and 1940s. Stormwater runoff is collected by the catch basins and inlets and transported through the storm drains and culverts to a location where the stormwater discharges to the various waterways in the Borough. In the remainder of the Borough, stormwater runoff flows primarily along the streets by gutter flow, until it is collected by a central storm drain. Many of the storm drains and culverts associated with the drainage system in the Borough are undersized. During severe storm events, these undersized culverts do not have adequate capacity, thereby causing a backwater effect and flooding upstream. In addition, the catch basins and inlets are not adequate to intercept stormwater runoff flowing across many intersections.

Historical information indicates that the arch bridge under Main Street near Lafayette Avenue is an area of concern, as the size of the bridge may not be adequate for a 25-year storm event. The

majority of the storm sewers in the western portion of the Borough, between Chatham Street and the railroad tracks, also do not have adequate capacity to carry a 25-year storm event.

Flooding has been noted in the south-west portion of the Borough, between Dellwood Avenue and Washington Avenue. The Day's Brook has also exhibited problems related to its capacity. The Brook erodes private property in various areas along its length. This is due to poor slope protection on the stream banks combined with high channel velocities related to increased runoff, which causes the erosion.

A significant portion of the culverts were designed for much different hydrologic conditions (i.e., less impervious area) than presently exists in the Borough. As the imperviousness increased in the Borough, the peak and volumes of stream flows correspondingly increased. The increased amount of water resulted in stream bank erosion, which resulted in unstable areas at roadway/bridge crossings, and degraded stream habitats.

Several maps associated with the hydrologic conditions in the Borough are contained in this Plan. A map of the groundwater recharge areas in the Borough is shown on Figure 3, wellhead protection areas are shown on Figure 4, and a map depicting soils within the Borough is shown on Figure 5. In addition, a map of the Hydrological Unit Codes 14 (HUC14s) is included on Figure 6. HUC14s are sub-watersheds which are generally identified with a 12 or 14 digit code. The Flood Insurance Rate Map (FIRM) for the Borough of Chatham, which is produced by the Federal Emergency Management Agency (FEMA) and depicts the floodplains in the Borough, is also included.

Design and Performance Standards

The Borough will adopt a Stormwater Control Ordinance which will incorporate the design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8-5. This ordinance will be used to minimize the adverse impact of stormwater runoff with respect to water quality, water quantity, and loss of groundwater recharge in receiving water bodies. In order to ensure adequate long-term operation and maintenance of stormwater management measures in the Borough, the design and performance standards will include the requirements for maintenance of stormwater management measures consistent with the stormwater management rules at N.J.A.C. 7:8-5.8 (Maintenance Requirements). The design and performance standards will also include the requirements for safety standards consistent with N.J.A.C. 7:8-6 (Safety Standards for Stormwater Management Basins). This ordinance will be submitted to Morris County for review and approval prior to adoption. A draft copy of the Stormwater Control Ordinance for Chatham Borough is included in Appendix A.

It should be noted that according to the NJAC 7:8, development and redevelopment in the Borough of Chatham may be exempt from the groundwater recharge requirements of the new Stormwater Management Rules. The groundwater recharge requirement does not apply to projects within an "urban redevelopment area". The urban redevelopment area is defined, among other criteria, as previously developed portions of areas delineated on the State Plan Policy Map (SPPM) as the Metropolitan Planning Area 1 (PA1) designated centers, in which the Borough is located. Despite this, development and redevelopment projects in the Borough will be encouraged to implement groundwater recharge where feasible.

Along with implementing the ordinances to address stormwater management design, maintenance, and safety, Borough inspectors (or their representatives) will observe the construction of projects to ensure that the stormwater management measures are constructed and function as designed.

Plan Consistency

There is currently not a Regional Stormwater Management Plan specifically for the Passaic River, however, as noted in the *Borough of Chatham Waterways* section, a TMDL have been developed for the Passaic River. This MSWMP will be consistent with the goals of the TMDL. The primary stormwater related goals of the TMDL are to reduce fecal coliform sources related to geese and other wildlife; pet waste; and stormwater basins which act as an accumulation point for fecal matter. In order to help achieve these goals, the Borough will adopt new or revised ordinances related to wildlife feeding and pet waste. The Borough's Stormwater Control Ordinance will address requirements for operation and maintenance of stormwater basins associated with development and redevelopment, and the Borough will also be required to conduct cleaning and maintenance of municipal stormwater facilities. If any RSWMPs or new TMDLs are developed in the future, this Municipal Stormwater Management Plan will be updated to be consistent with any new criteria.

This Municipal Stormwater Management Plan is consistent with the Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21. The Borough will utilize the most current update of the RSIS in the stormwater management review of residential areas. This MSWMP will be updated to be consistent with any future updates to the RSIS.

The Borough's Stormwater Control Ordinance will require all new development and redevelopment plans to comply with New Jersey's Soil Erosion and Sediment Control Standards. Borough inspectors (or their representatives) will observe on-site soil erosion and sediment control measures during construction and report any inconsistencies to the local Soil Conservation District.

Nonstructural Stormwater Management Strategies / Low Impact Development Techniques

Land development can have severe adverse stormwater impacts, particularly if the land is converted from woods, meadow, or other natural condition to a highly disturbed area with large percentages of impervious and non-native vegetated covers. Such impacts typically include an increase in stormwater runoff volume, rate, velocity, and pollutants and a corresponding decrease in the quality of runoff and stream flow. Frequently, management of these impacts has focused on collecting and conveying the runoff from the entire site through a structural conveyance system to a centralized facility (e.g., detention basin, wet pond) where it is stored and treated prior to discharge downstream. In effect, such practices first allow the adverse runoff impacts to occur throughout the site and then provide remedial and/or restorative measures immediately prior to releasing the runoff downstream.

Since the 1960s, the range of remedial measures provided in centralized stormwater management facilities has increased from merely 100-year peak flow attenuation, to the range of peak flow, volume, and nonpoint source pollutant controls required by New Jersey's current Stormwater Management Rules at N.J.A.C. 7:8. This has required modifications to established methods of runoff computation and the development of alternative treatment methods to be used in centralized facilities.

However, with the increasing emphasis on nonpoint source pollution and concerns over the environmental impacts of land development, it has become necessary to develop effective alternatives to the centralized conveyance and treatment strategy that has been the basis for much of the stormwater management systems and programs in the State. New strategies must be developed to minimize and even prevent adverse stormwater runoff impacts from occurring and then to provide necessary treatment closer to the origin of those impacts. Such strategies, known collectively as Low Impact Development or LID, seek to reduce and/or prevent adverse runoff impacts through sound site planning and both nonstructural and structural techniques that preserve or closely mimic the site's natural or pre-developed hydrologic response to precipitation. Rather than responding to the rainfall-runoff process like centralized structural facilities, low impact development techniques interact with the process, controlling stormwater runoff and pollutants closer to the source and providing site design measures that can significantly reduce the overall impact of land development on stormwater runoff. As such, low impact development promotes the concept of designing with nature.

Effective low impact development includes the use of both nonstructural and structural stormwater management measures that are a subset of a larger group of practices and facilities known as Best Management Practices or BMPs. The BMPs utilized in low impact development, known as LID-BMPs, focus first on minimizing both the quantitative and qualitative changes to a site's pre-developed hydrology through nonstructural practices and then providing treatment as necessary through a network of structural facilities distributed throughout the site. In doing so, low impact development places an emphasis on nonstructural stormwater management measures, seeking to maximize their use prior to utilizing structural BMPs.

Nonstructural BMPs used in low impact development seek to reduce stormwater runoff impacts through sound site planning and design. Nonstructural LID-BMPs include such practices as minimizing site disturbance, preserving important site features, reducing and disconnecting impervious cover, flattening slopes, utilizing native vegetation, minimizing turf grass lawns, and maintaining natural drainage features and characteristics. Structural BMPs used to control and treat runoff are also considered LID-BMPs if they perform these functions close to the runoff's source. As such, they are typically smaller in size than standard structural BMPs. Structural LID-BMPs include various types of basins, filters, surfaces, and devices located on individual lots in a residential development or throughout a commercial, industrial, or institutional development site in areas not typically suited for larger, centralized structural facilities.

Finally, low impact development promotes the view of rainwater as a resource to be preserved and protected, not a nuisance to be eliminated. For example, with low impact development, roof runoff can be captured and stored in rain barrels for plant watering or other uses. Runoff can also be directed to small on lot bioretention or infiltration basins, also known as rain gardens, to provide both runoff treatment and landscape enhancements.

Unfortunately, low impact development techniques and strategies are considered by some to be applicable only to land development sites with limited impervious cover. However, it has been clearly demonstrated that low impact development techniques can be applied to virtually any development site, regardless of impervious coverage, to produce enhanced site designs and "lower" stormwater impacts.

The use of nonstructural and structural LID-BMPs can be a significant improvement over the more centralized approach to stormwater management traditionally used in New Jersey. Even in those instances where centralized structural BMPs are still required to fully provide downstream areas with effective pollution, erosion, and flood protection, LID-BMPs can help to reduce the number and/or size of such facilities, further reducing site disturbance. And, in certain instances, it may be possible to satisfy all stormwater management requirements through the use of nonstructural LID-BMPs alone, thereby eliminating the need for any structural BMPs. In all instances, specific site and downstream conditions must be evaluated to determine the range of standard and low impact development BMPs that can be utilized at a land development site.

It is also important to note that, since low impact development typically relies on an array of nonstructural and relatively small structural BMPs distributed throughout a land development site, ownership and maintenance of the various BMPs may be similarly distributed over an array of property owners. As such, it is vital to have public understanding of and support for the various LID-BMPs officially authorized for use in a particular municipality. Such understanding and support must include an appreciation for the role that the LID-BMPs play in the site's or watershed's stormwater management program and a commitment to preserve and maintain them.

The use of both nonstructural and structural BMPs in low impact development is governed by certain principles, objectives and requirements. It should be noted that, while consideration of nonstructural stormwater management techniques at land development sites is required by the NJDEP Stormwater Management Rules at N.J.A.C. 7:8, the NJDEP believes that effective, state-wide use of such practices can be best achieved through municipal master plans and land

development ordinances that mandate specific LID goals and authorize the use of specific LID-BMPs.

Nonstructural Stormwater Management Strategies

Effective low impact development includes the use of both nonstructural and structural stormwater management measures known as LID-BMPs. Of the two, nonstructural LID-BMPs play a particularly important role. The NJDEP Stormwater Management Rules at N.J.A.C. 7:8 require in Section 5.2(a) that the design of any development that disturbs at least 1 acre of land or increases impervious surface by at least $\frac{1}{4}$ acre must incorporate nonstructural stormwater management strategies "to the maximum extent practicable." Such a development is defined in the Rules as a "major development." As such, nonstructural LID-BMPs are to be given preference over structural BMPs. Where it is not possible to fully comply with the Stormwater Management Rules solely with nonstructural LID-BMPs, they should then be used in conjunction with LID and standard structural BMPs to meet the Rules' requirements.

More precisely, to achieve the Rules' design and performance standards, Subchapter 5 of the NJDEP Stormwater Management Rules requires the maximum practical use of the following nine nonstructural strategies at all major developments:

1. Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss.
2. Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces.
3. Maximize the protection of natural drainage features and vegetation.
4. Minimize the decrease in the pre-construction "time of concentration."
5. Minimize land disturbance including clearing and grading.
6. Minimize soil compaction.
7. Provide low maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers, and pesticides.
8. Provide vegetated open-channel conveyance systems discharge into and through stable vegetated areas.
9. Provide preventative source controls.

In addition, Subchapter 5 further requires an applicant seeking approval for a major development to specifically identify which and how these nine nonstructural strategies have been incorporated into the development's design. Finally, for each of those nonstructural strategies that were not able to be incorporated into the development's design due to engineering, environmental, or safety reasons, the applicant must provide a basis for this contention.

While the nonstructural stormwater management strategies listed above represents a wide range of both objectives and practices, Strategies 1 through 8 can be directly addressed through the use of specific nonstructural LID-BMPs that can be grouped into four general categories:

1. Vegetation and Landscaping;

2. Minimizing Site Disturbance;
3. Impervious Area Management; and
4. Time of Concentration Modifications.

Listed below are examples of LID techniques that should be considered by the Borough. Although the Borough is not required to complete a thorough review and revision to its master plan and land use and zoning ordinances (because it has less than one (1) square mile of vacant or agricultural lands, per NJAC 7:8-4.2.10), these items should be considered for incorporation into the Borough's Master Plan and/or ordinances. This list represents a sample of site planning and structural and nonstructural stormwater management strategies that can be used to reduce and/or prevent adverse stormwater runoff impacts.

Buffers — The use of buffer areas is encouraged along all lot and street lines separating residential uses from arterial and collector streets, separating a nonresidential use from either a residential use or residential zoning district line, and along all street lines where loading and storage areas can be seen from the street. Landscape requirements for these buffer areas should consider the use of native vegetation which requires less fertilization and watering than nonnative species. Buffer areas can be utilized for stormwater management by disconnecting impervious surfaces and treating runoff from these impervious surfaces.

Cluster Development - cluster development is encouraged to preserve land for public and agricultural purposes, to prevent development on environmentally sensitive areas, and to aid in reducing the cost of providing streets, utilities and services in residential developments. This cluster option is an excellent tool for reducing impervious roads and driveways. The option allows for smaller lots with smaller front and side yard setbacks than traditional development options. It also minimizes the disturbance of large tracts of land, which is a key nonstructural stormwater management strategy. The use of native vegetation, which requires less fertilization and watering than non-native ornamental plants, is encouraged. The use of mulched or stone paths, to decrease the impervious area, is encouraged.

Curb and Gutters — the use of curb cuts or flush curbs with curb stops is encouraged to allow vegetated swales to be used for stormwater conveyance and to allow the disconnection of impervious areas.

Drainage - the use of natural vegetated swales in lieu of inlets and pipes is encouraged wherever possible.

Driveways and Accessways - The use of pervious paving materials to minimize stormwater runoff and promote groundwater recharge is encouraged.

Natural Features - natural features, such as trees, brooks, swamps, hilltops, and views, should be preserved whenever possible, and that care should be taken to preserve selected trees to enhance soil stability and landscaped treatment of the area.

Off-street Parking and Loading Areas - flush curb with curb stop, or curbing with curb cuts is encouraged to allow for the discharge of impervious areas into landscaped areas for stormwater management. The use of natural vegetated swales for the water quality design storm, with overflow for larger storm events into storm sewers should be considered. Pervious paving should be utilized in overflow parking areas.

Sidewalks - sidewalks should be designed to discharge stormwater to neighboring lawns where feasible to disconnect these impervious surfaces, or the use permeable paving materials should be considered where appropriate.

Soil Erosion and Sediment Control — in addition to the New Jersey Soil Erosion and Sediment Control Standards follow general design principles, including: whenever possible, retain and protect natural vegetation; minimize and retain water runoff to facilitate groundwater recharge; and, install diversions, sediment basins, and similar required structures prior to any on-site grading or disturbance.

More information regarding low impact development can be found in the New Jersey Stormwater Best Management Practices Manual, specifically *Chapter 2, Low Impact Development Techniques*. This manual is available at www.njstormwater.org.

Land Use/Build-Out Analysis

The Borough of Chatham occupies 2.35 square miles. Based on the 2000 Borough of Chatham Master Plan, there are 300 acres, or 0.47 square miles, of vacant land in the Borough. According to NJAC 7:8-4.2.10, if a municipality has a combined total of less than one square mile of vacant or agricultural lands, the land use/build-out analysis is not required as part of the MSWMP. Accordingly, the land use/build-out analysis is not included in this MSWMP. Given that Chatham Borough is an established community with a rather steady population and land use, the pollutant loads for total suspended solids, total nitrogen, and total phosphorous in the waterways will be similar when comparing the existing conditions to a full build-out scenario.

Mitigation Plans

A mitigation plan is provided for a proposed development that is granted a variance or exemption (by the Planning Board) from the design and performance standards of a municipal stormwater management plan. The mitigation requirements should offer a hierarchy of options that clearly offset the effect of groundwater recharge, stormwater quantity control, and/or stormwater quality control that was created by granting the variance or exemption. The applicant, in consultation with the Borough Engineer, and with approval of the Board, may choose from a list of specific projects which will be listed in the final MSWMP in order to compensate for the deficit from the performance standards resulting from the proposed project.

The mitigation project must be implemented in the same drainage area as the proposed development. The project must provide additional groundwater recharge benefits, or protection from stormwater runoff quality and quantity from previously developed property that does not currently meet the design and performance standards outlined in the Municipal Stormwater Management Plan. The developer must ensure the long-term maintenance of the project, including the maintenance requirements under Chapters 8 and 9 of the NJDEP Stormwater BMP

Manual. If a suitable site cannot be located in the same drainage area as the proposed development, the mitigation project may provide mitigation that is not equivalent to the impacts for which the variance or exemption is sought, but that addresses the same issue. For example, if a variance is given because the 80 percent TSS requirement is not met, the selected project may address water quality impacts due to a fecal impairment.

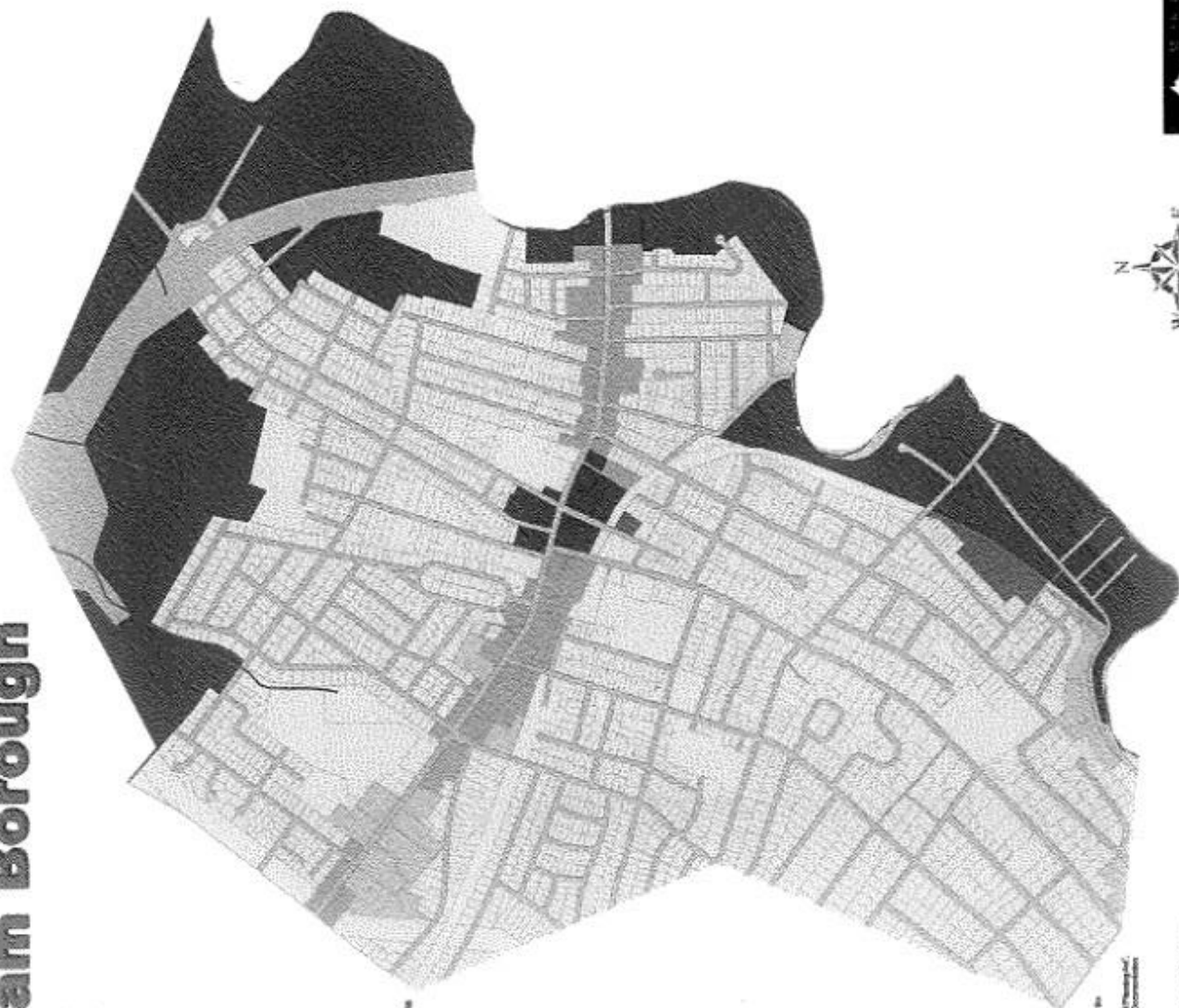
It is important for the Borough to have sufficient information on each project, including size of the project, permit requirements, land ownership, and estimated project costs (i.e., permitting fees, engineering costs, construction costs, and maintenance costs). The Borough is in the process of compiling a list of potential mitigation projects. The projects will be evaluated in sufficient detail in order for the Borough to, at a minimum, provide the information listed above. The projects will also be evaluated with respect to the requirements of the proposed design and performance standards. A list and description of the mitigation projects will be included in the final version of the MSWMP due by April 2006.



Figures

Zoning Districts Within the Chatham Borough

FIG. 1



- Categorized Zoning**
- Large Lot Single Family
 - Medium Lot Single Family
 - Small Lot Single Family
 - Low Density Multi-Family
 - Medium Density Multi-Family
 - High Density Multi-Family
 - Professional
 - Commercial/Industrial
 - Public/Institutional
 - Mixed Use
- Hyfronch Preservation Area
Municipal Boundary
Streams

Source:

The zoning districts shown on this map were derived from the 2007 Comprehensive Zoning Ordinance. The map is intended to provide a general overview of the zoning districts within the Chatham Borough. It is not intended to be used as a legal document. For more information, please contact the Chatham Borough Planning Department. The map is based on the 2007 Comprehensive Zoning Ordinance, which was adopted by the Chatham Borough Council on June 1, 2007. The map is not a legal document and should not be used for legal purposes. The map is intended to provide a general overview of the zoning districts within the Chatham Borough. It is not intended to be used as a legal document. For more information, please contact the Chatham Borough Planning Department.



FIG. 2

Land Use Land Cover Chatham Borough



Land Use/Land Cover

- AGRICULTURE
- FOREST
- URBAN
- WETLANDS
- WATER
- BARREN LAND

SOURCE:
The data for this map were derived from the following sources:
1. The National Wetlands Inventory (NWI) data for the Chatham Borough area.
2. The National Forest Inventory (NFI) data for the Chatham Borough area.
3. The National Agriculture Inventory (NAI) data for the Chatham Borough area.
4. The National Urban Inventory (NUI) data for the Chatham Borough area.
5. The National Water Inventory (NWI) data for the Chatham Borough area.
6. The National Barren Land Inventory (NBLI) data for the Chatham Borough area.



0.9 Miles

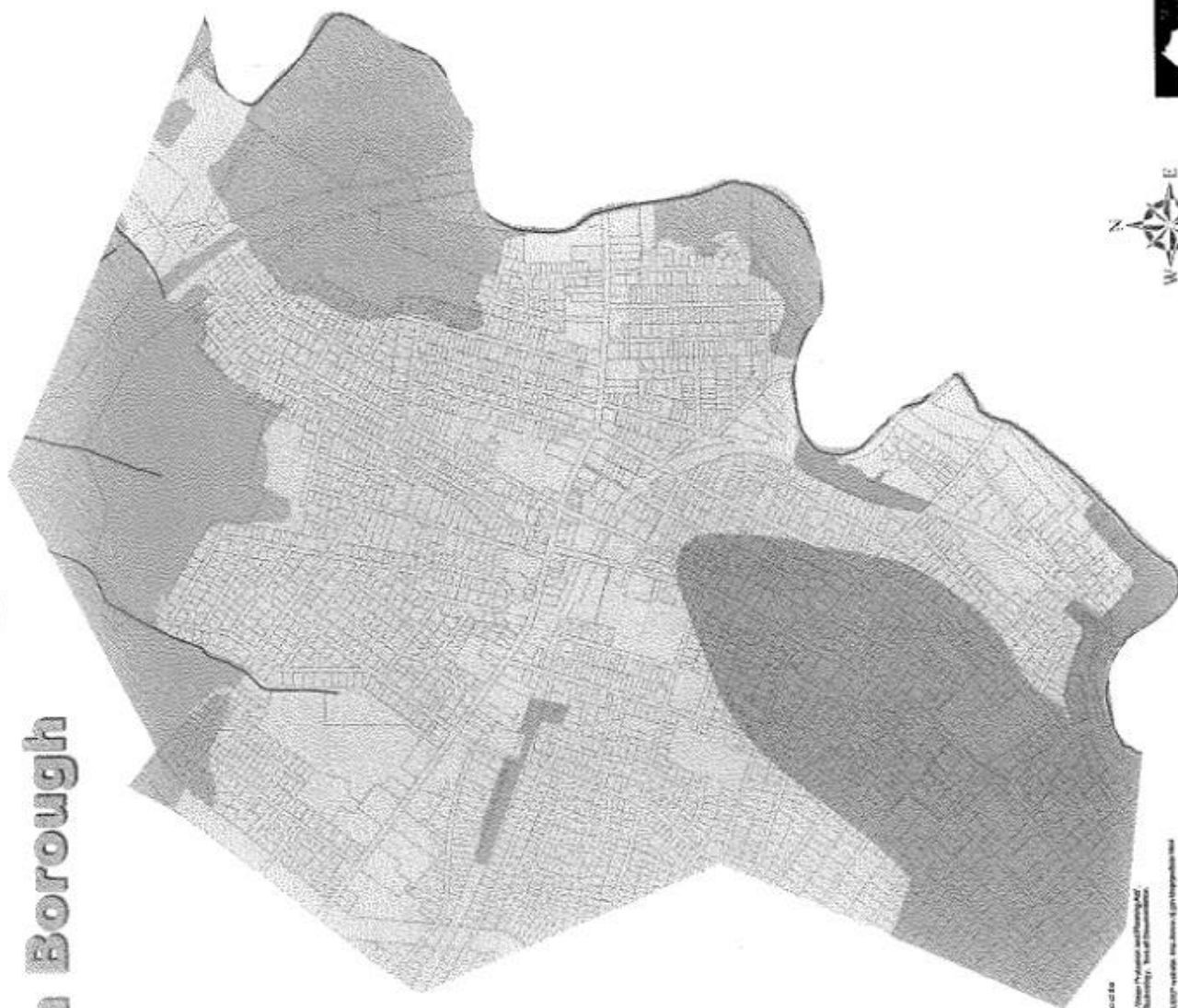
0.45

0



FIG. 3

Groundwater Recharge Areas Chatham Borough



Groundwater Recharge

- 17+ in/yr
- 12 to 16 in/yr
- 10 to 12 in/yr
- 1 to 6 in/yr
- 0 in/yr
- Hydraulic Fractures Area
- Streams

Source: The map was prepared by the New York State Department of Environmental Conservation, Division of Water, based on data provided by the New York State Department of Environmental Conservation, Division of Water, and the New York State Department of Environmental Conservation, Division of Water.

The map is a general representation of the groundwater recharge areas and should not be used for legal purposes. The map is not a guarantee of the accuracy of the information presented.

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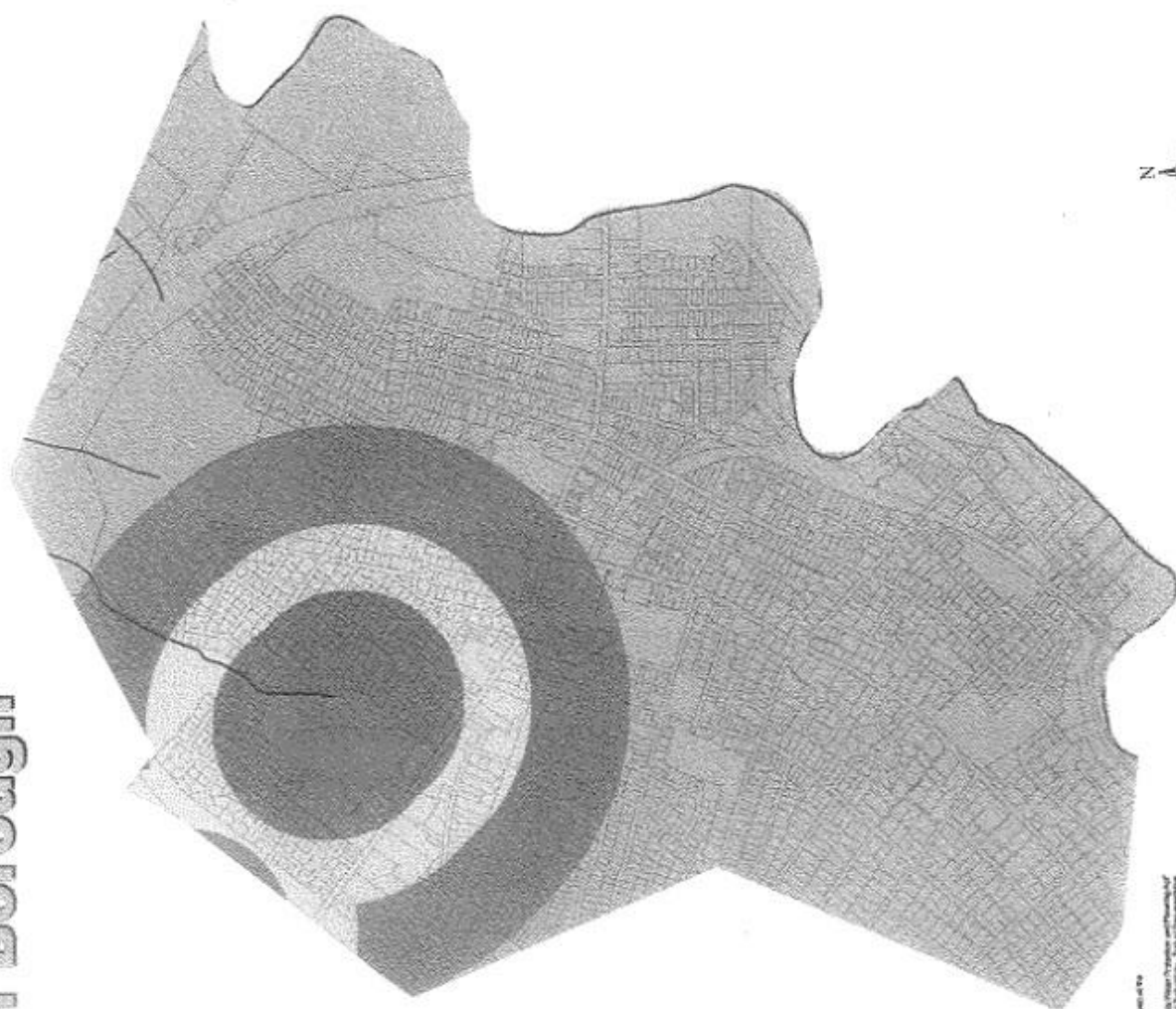
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Wellhead Protection Areas Chatham Borough

FIG. 4



Southwest Protection Areas

10

2

11

1

1

Methods: Bone mineral density

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1. **Introduction**
 2. **Background**
 3. **Methodology**
 4. **Results**
 5. **Conclusion**
 6. **References**

100

The success and monetary benefits of programs participating in the OGE Division at the Warren County Department of Public Safety, Communications and Technology.

The reader may wish to submit a short, one-page note indicating how the *SLP*® activities they desire are being incorporated into their curriculum.



USGS Soil Survey of Chatham Borough

FIG. 5



[illegible]

LEGEND

- [illegible]

NATIONAL BLACK INTERSTATE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
BOROUGH OF
CHATHAM,
NEW JERSEY
ANDRES COUNTY
BASE AND COVER

COMMUNITY - PANEL NUMBER
340338 0001 B
MAP REVISED
JULY 19, 2004

Appendix A

Borough of Chatham **Stormwater Control Ordinance**

ORDINANCE #21-05

BOROUGH OF CHATHAM PROPOSED AMENDMENTS TO LAND USE ORDINANCE CHAPTER 165 ARTICLE XIV STORMWATER MANAGEMENT AND CONTROL

165-110 Scope and Purpose:

A. Policy Statement

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

B. Purpose

The purpose of this ordinance is to establish minimum stormwater management requirements and controls for “major development” and “minor development” as defined below in Section II.

C. Applicability

1. This ordinance shall be applicable to the following developments:
 - a. Non-residential major and minor developments; and
 - b. Aspects of residential major and minor developments that are not preempted 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 the Borough of Chatham.

D. Compatibility with Other Permit and Ordinance Requirements

Development approvals issued pursuant to this ordinance are to be considered an integral part of development approvals 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.

E. General Requirement

1. Any Application for a building permit shall include sufficient information to carry out the intent and purpose of this section, which shall be administered by the Borough Engineer.
2. Applications for land disturbance that qualify as “Major Development” will be required to meet these standards as an application in front of the Planning Board.
3. Control of water quality in surface water, soil erosion, transport of sediment, and nonpoint source pollution related to development activities shall be demonstrated and promote natural and nonstructural management approaches and which maximize prevention of stormwater impacts whenever possible.

165-111. Definitions:

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.

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

“Compaction” means the increase in soil bulk density.

“Contributory drainage area” means the area from which stormwater runoff drains to a stormwater management measure, not including the area of the stormwater management measure itself.

“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 Commissioners to review municipal stormwater management plans and implement ordinance(s). The county review agency may either be:

1. A county planning agency or

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

“Department” means the State 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, 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 land, development means: any activity that requires a State permit, any activity reviewed by the County Agricultural Board (CAB) and the State Agricultural Development Committee (SADC), and municipal review of any activity not exempted by the Right to Farm Act, N.J.S.A 4:1C-1 *et seq.*

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

“Drainage area” 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 constrained area” means the following areas where the physical alteration of the land is in some way restricted, either through regulation, easement, deed restriction or ownership such as: wetlands, floodplains, threatened and endangered species sites or designated habitats, and parks and preserves. Habitats of endangered or threatened species are identified using the Department's Landscape Project as approved by the Department's Endangered and Nongame Species Program.

“Environmentally critical area” means an area or feature which is of significant environmental value, including, but not limited to: stream corridors, natural heritage priority sites, habitats 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 Neighborhoods” means neighborhoods 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.

“Green infrastructure” means a stormwater management measure that manages stormwater close to its source by:

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

"HUC 14" or "hydrologic unit code 14" means an area within which water drains to a particular receiving surface water body, also known as a sub-watershed, which is identified by a 14-digit hydrologic unit boundary designation, delineated within New Jersey by the United States Geological Survey.

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

“Impervious surface (new)” means any of the following, alone, or in combination:

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

“Infiltration” is the process by which water seeps into the soil from precipitation.

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

“Low Impact Development Techniques” means utilizing strategies and measures that manage stormwater runoff quantity and quality to supplement or replace structural stormwater measures. Examples include minimize site disturbance, preserve natural vegetation and drainage features, reduce and disconnect impervious cover, reduce ground slopes, reduce turf grass, enhance water absorption and filtration.

“Major development” means an individual “development,” as well as multiple developments that individually or collectively result in:

1. The disturbance of one or more acres of land since February 2, 2004;
2. The creation of one-quarter acre or more of new “impervious surface” since February 2, 2004;
3. The creation of one-quarter acre or more of new “motor vehicle surface” since March 2, 2021; or
4. A combination of 2 and 3 above that totals an area of one-quarter acre or more. The same surface shall not be counted twice when determining if the combination area equals one-quarter acre or more.

Major development includes all developments that are part of a common plan of development or sale (for example, phased residential development) that collectively or individually meet any one or more of paragraphs 1, 2, 3, or 4 above. Projects undertaken by any government agency that otherwise meet the definition of “major development”, but which do not require approval under the Municipal Land Use Law, N.J.S.A. 40:55D-1 et seq., are also considered “major development.”

“Minor development” means any development that results in an increase in impervious surface of 400 square feet but does not meet the definition of Major Development.

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

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

“Municipality” means any city, borough, town, township, or village.

“New Jersey Stormwater Best Management Practices (BMP) Manual” or “BMP Manual” means the manual maintained by the Department providing, in part, design specifications, removal rates, calculation methods, and soil testing procedures approved by the Department as being capable of contributing to the achievement of the stormwater management standards specified in this chapter. The BMP Manual is periodically amended by the Department as necessary to provide design specifications on additional best management practices and new information on already included practices reflecting the best available current information regarding the particular practice and the Department’s determination as to the ability of that best management practice to contribute to compliance with the standards contained in this chapter. Alternative stormwater management measures, removal rates, or calculation methods may be utilized, subject to any limitations specified in this chapter, provided the design engineer

demonstrates to the municipality, in accordance with 165-114.F. of this ordinance and N.J.A.C. 7:8-5.2(g), that the proposed measure and its design will contribute to achievement of the design and performance standards established by this chapter.

“Node” 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, political subdivision of this State and any state, interstate, or Federal agency.

“Pollutant” means any dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, refuse, oil, grease, sewage sludge, munitions, chemical wastes, biological materials, medical wastes, radioactive substances (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. §§ 2011 *et seq.*), thermal waste, wrecked or discarded equipment, rock, sand, 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 non-hazardous pollutants.

“Recharge” means the amount of water from precipitation that infiltrates through the soil and into the groundwater.

“Redevelopment” means development activity that results in the creation, addition, or replacement of impervious surface area on an already improved lot such as expansion of building footprint, addition to building, and replacement of impervious surface area that is not part of routine maintenance activity.

“Regulated motor vehicle surface” means any of the following, alone, or in combination:

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

“Routine Maintenance” means periodic programmatic preservation activity such as driveway or parking lot sealing, milling and repaving work, roof, deck, or patio repairs, but does not include replacement of roof framing of existing structures or complete reconstruction of impervious surfaces.

“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 or minor 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 management BMP” means an excavation or embankment and related areas designed to retain stormwater runoff. A stormwater management BMP may either be normally dry (that is, a detention basin or infiltration system), 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 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.

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

“Stormwater management planning agency” means a public body authorized by legislation to prepare stormwater management plans.

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

“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.

“Water control structure” means a structure within, or adjacent to, water, which intentionally or coincidentally alters the hydraulic capacity, the flood elevation resulting

from the 2-, 10-, or 100-year storm flood hazard area limit, and/or floodway limit of the water. Examples of a water control structure may include a bridge, culvert, dam, embankment, ford (if above grade), retaining wall, and weir.

“Waters of the State” means the ocean and its estuaries, all springs, streams, wetlands, and bodies of surface or groundwater, 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, the prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation.

165-112. Design and Performance Standards for Stormwater Management Measures

- A. Stormwater management measures for major development shall be designed to provide erosion control, groundwater recharge, stormwater runoff quantity control, and stormwater runoff quality treatment as follows:
 - 1. The minimum standards for erosion control are those established under the Soil and Sediment Control Act, N.J.S.A. 4:24-39 et seq., and implementing rules at N.J.A.C. 2:90.
 - 2. The minimum standards for groundwater recharge, stormwater quality, and stormwater runoff quantity shall be met by incorporating green infrastructure.
- B. The standards in this 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 N.J.A.C. 7:8-5 et seq.

165-113. Stormwater Management Requirements for Minor Development

- A. Stormwater management measures for minor development shall be subject to review by the Borough Engineer to assure that all stormwater runoff created by the development are adequately controlled and that such runoff does not cause an adverse impact on adjoining private or public property. In such cases where an adverse impact is not expected, the stormwater runoff from development shall be safely directed to a storm sewer, gutter, swale, or other suitable stormwater runoff conveyance measure. If the Borough Engineer determines that the development will impact an adjoining property, stormwater runoff quantity controls may be required.
- B. The above requirements shall also apply to those major developments that are granted

waivers in accordance with this ordinance of the stormwater runoff quantity control requirements for major developments contained in this ordinance.

165-114. 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 165-119.
- B. Stormwater management measures shall avoid adverse impacts of concentrated flow on habitat for threatened and endangered species as documented in the Department's 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 muhlenbergi* (bog turtle).
- C. The following linear development projects are exempt from the groundwater recharge, stormwater runoff quality, and stormwater runoff quantity requirements of Section 165-114.P, Q and R:
 - 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 green infrastructure, groundwater recharge, stormwater runoff quality, and stormwater runoff quantity requirements of 165-114.O, P, Q and R 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 stormwater management measures, the option selected complies with the requirements of Section 165-114.O, P, Q and R to the maximum extent practicable;
 - 3. The applicant demonstrates that, to meet the requirements of Section 165-114.O, P, Q and R, 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 165-114.D.3 above within the upstream drainage area of the receiving stream, that would provide additional opportunities to mitigate the requirements of Section 165-114.O, P, Q and R that were not achievable onsite.
- E. Tables 1 through 3 below summarize the ability of stormwater best management practices identified and described in the New Jersey Stormwater Best Management Practices Manual to satisfy the green

infrastructure, groundwater recharge, stormwater runoff quality and stormwater runoff quantity standards specified in Section 165-114O, P, Q and R. When designed in accordance with the most current version of the New Jersey Stormwater Best Management Practices Manual, the stormwater management measures found at N.J.A.C. 7:8-5.2 (f) Tables 5-1, 5-2 and 5-3 and listed below in Tables 1, 2 and 3 are presumed to be capable of providing stormwater controls for the design and performance standards as outlined in the tables below. Upon amendments of the New Jersey Stormwater Best Management Practices Manual to reflect additions or deletions of BMPs meeting these standards, or changes in the presumed performance of BMPs designed in accordance with the New Jersey Stormwater BMP Manual, the Department shall publish in the New Jersey Registers a notice of administrative change revising the applicable table. The most current version of the BMP Manual can be found on the Department's website at: https://njstormwater.org/bmp_manual2.htm

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

<u>Table 1</u> <u>Green Infrastructure BMPs for Groundwater Recharge, Stormwater Runoff Quality, and/or Stormwater Runoff Quantity</u>				
<u>Best Management Practice</u>	<u>Stormwater Runoff Quality TSS Removal Rate (percent)</u>	<u>Stormwater Runoff Quantity</u>	<u>Groundwater Recharge</u>	<u>Minimum Separation from Seasonal High Water Table (feet)</u>
<u>Cistern</u>	<u>0</u>	<u>No</u>	<u>No</u>	<u>--</u>
<u>Dry Well^(a)</u>	<u>0</u>	<u>Yes</u>	<u>Yes</u>	<u>2</u>
<u>Grass Swale</u>	<u>50 or less</u>	<u>No</u>	<u>No</u>	<u>$\frac{2^{(e)}}{1^{(f)}}$</u>
<u>Green Roof</u>	<u>0</u>	<u>Yes</u>	<u>No</u>	<u>--</u>
<u>Manufactured Treatment Device^{(a) (g)}</u>	<u>50 or 80</u>	<u>No</u>	<u>No</u>	<u>Dependent upon the device</u>
<u>Pervious Paving System^(a)</u>	<u>80</u>	<u>Yes</u>	<u>$\frac{Yes^{(b)}}{No^{(c)}}$</u>	<u>$\frac{2^{(b)}}{1^{(c)}}$</u>

<u>Small-Scale Bioretention Basin^(a)</u>	<u>80 or 90</u>	<u>Yes</u>	<u>Yes^(b)</u> <u>No^(c)</u>	<u>2^(b)</u> <u>1^(c)</u>
<u>Small-Scale Infiltration Basin^(a)</u>	<u>80</u>	<u>Yes</u>	<u>Yes</u>	<u>2</u>
<u>Small-Scale Sand Filter</u>	<u>80</u>	<u>Yes</u>	<u>Yes</u>	<u>2</u>
<u>Vegetative Filter Strip</u>	<u>60-80</u>	<u>No</u>	<u>No</u>	<u>--</u>

(Notes corresponding to annotations ^(a) through ^(g) are found on Page D-15)

<u>Table 2</u> <u>Green Infrastructure BMPs for Stormwater Runoff Quantity</u> <u>(or for Groundwater Recharge and/or Stormwater Runoff Quality</u> <u>with a Waiver or Variance from N.J.A.C. 7:8-5.3)</u>				
<u>Best Management Practice</u>	<u>Stormwater Runoff Quality TSS Removal Rate (percent)</u>	<u>Stormwater Runoff Quantity</u>	<u>Groundwater Recharge</u>	<u>Minimum Separation from Seasonal High Water Table (feet)</u>
<u>Bioretention System</u>	<u>80 or 90</u>	<u>Yes</u>	<u>Yes^(b)</u> <u>No^(c)</u>	<u>2^(b)</u> <u>1^(c)</u>
<u>Infiltration Basin</u>	<u>80</u>	<u>Yes</u>	<u>Yes</u>	<u>2</u>
<u>Sand Filter^(b)</u>	<u>80</u>	<u>Yes</u>	<u>Yes</u>	<u>2</u>
<u>Standard Constructed Wetland</u>	<u>90</u>	<u>Yes</u>	<u>No</u>	<u>N/A</u>
<u>Wet Pond^(d)</u>	<u>50-90</u>	<u>Yes</u>	<u>No</u>	<u>N/A</u>

(Notes corresponding to annotations ^(b) through ^(d) are found on Page D-15)

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

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

Notes to Tables 1, 2, and 3:

- (a) subject to the applicable contributory drainage area limitation specified at Section 165-114.O.2;
- (b) designed to infiltrate into the subsoil;
- (c) designed with underdrains;
- (d) designed to maintain at least a 10-foot wide area of native vegetation along at least 50 percent of the shoreline and to include a stormwater runoff retention component designed to capture stormwater runoff for beneficial reuse, such as irrigation;
- (e) designed with a slope of less than two percent;
- (f) designed with a slope of equal to or greater than two percent;
- (g) manufactured treatment devices that meet the definition of green infrastructure at Section 165-111;
- (h) manufactured treatment devices that do not meet the definition of green infrastructure at Section 165-111.

- G. An alternative stormwater management measure, alternative removal rate, and/or alternative method to calculate the removal rate may be used if the design engineer demonstrates the capability of the proposed alternative stormwater management measure and/or the validity of the alternative rate or method to the municipality. A copy of any approved alternative stormwater management measure, alternative removal rate, and/or alternative method to calculate the removal rate shall be provided to the Department in accordance with best management practices. Alternative stormwater management measures may be used to satisfy the requirements at Section 165-14O only if the measures meet the definition of green infrastructure at Section 165-112. Alternative stormwater management measures that function in a similar manner to a BMP listed at Section 165-114 O.2 are subject to the contributory drainage area limitation specified at Section 165-114 O.2 for that similarly functioning BMP. Alternative stormwater management measures approved in accordance with this subsection that do not function in a similar manner to any BMP listed at Section 165-114 O.2 shall have a contributory drainage area less than or equal to 2.5 acres, except for alternative stormwater management measures that function similarly to cisterns, grass swales, green roofs, standard constructed wetlands, vegetative filter strips, and wet ponds, which are not subject to a contributory drainage area limitation. Alternative measures that function similarly to standard constructed wetlands, or wet ponds, shall not be used for compliance with the stormwater runoff quality standard unless a variance in accordance with N.J.A.C. 7:8-4.6 or a waiver is granted.
- H. Whenever the stormwater management design includes one or more BMPs that will infiltrate stormwater into subsoil, the design engineer shall assess the hydraulic impact on the groundwater table and design the site, to avoid adverse hydraulic impacts. Potential adverse hydraulic impacts include, but are not limited to, exacerbating a naturally or seasonally high water table, so as to cause surficial ponding, flooding of basements, or interference with the proper operation of subsurface sewage disposal systems or other subsurface structures within the zone of influence of the groundwater mound, or interference with the proper functioning of the stormwater management measure itself.
- I. Design standards for stormwater management measures are as follows:
1. Stormwater management measures shall be designed to take into account the existing site conditions, including, but not limited to, environmentally critical areas, wetlands, flood-prone areas, slopes, depth to seasonal high-water table, soil type, permeability, and texture, drainage area and drainage patterns, and the presence of solution-prone carbonate rocks (limestone);
 2. Stormwater management measures shall be designed to minimize maintenance, facilitate maintenance and repairs, and ensure proper functioning. Trash racks shall be installed at the intake to the outlet structure, as appropriate, and shall have parallel bars with one inch spacing between the bars to the elevation of the water quality design storm. For elevations higher than the water quality design storm, the parallel bars at the outlet structure shall be spaced no greater than one-third the width of the diameter of the orifice or one-third the width of the weir, with a minimum spacing between bars of one inch and a maximum spacing between bars of six inches. In addition, the design of trash racks must comply with the requirements of Section 165-118.C;

3. Stormwater management measures shall be designed, constructed, and installed to be strong, durable, and corrosion resistant. Measures that are consistent with the relevant portions of the Residential Site Improvement Standards at N.J.A.C. 5:21-7.3, 7.4, and 7.5 shall be deemed to meet this requirement;
 4. Stormwater management BMPs shall be designed to meet the minimum safety standards for stormwater management BMPs at Section 165-118; and
 5. The size of the orifice at the intake to the outlet from the stormwater management BMP shall be a minimum of two and one-half inches in diameter.
- J. Manufactured treatment devices may be used to meet the requirements of this subchapter, provided the pollutant removal rates are verified by the New Jersey Corporation for Advanced Technology and certified by the Department. Manufactured treatment devices that do not meet the definition of green infrastructure at Section II may be used only under the circumstances specified.
- K. Any application for a new agricultural development that meets the definition of major development at Section 165-112 shall be submitted to the Soil Conservation District for review and approval in accordance with the requirements and any applicable Soil Conservation District guidelines for stormwater runoff quantity and erosion control. For purposes of this subsection, "agricultural development" means land uses normally associated with the production of food, fiber, and livestock for sale. Such uses do not include the development of land for the processing or sale of food and the manufacture of agriculturally related products.
- L. If there is more than one drainage area, the groundwater recharge, stormwater runoff quality, and stormwater runoff quantity standards shall be met in each drainage area, unless the runoff from the drainage areas converge onsite and no adverse environmental impact would occur as a result of compliance with any one or more of the individual standards being determined utilizing a weighted average of the results achieved for that individual standard across the affected drainage areas.
- M. Any stormwater management measure authorized under the municipal stormwater management plan or ordinance shall be reflected in a deed notice recorded in the { *Office of the Morris County Clerk or the registrar of deeds and mortgages of the county in which the development, project, project site, or mitigation area containing the stormwater management measure is located, as appropriate, to the municipality* }.
- A form of deed notice shall be submitted to the Borough for approval prior to filing. The deed notice shall contain a description of the stormwater management measure(s) used to meet the green infrastructure, groundwater recharge, stormwater runoff quality, and stormwater runoff quantity standards and shall identify the location of the stormwater management measure(s) in NAD 1983 State Plane New Jersey FIPS 2900 US Feet or Latitude and Longitude in decimal degrees. The deed notice shall also reference the maintenance plan required to be recorded upon the deed pursuant to this Ordinance. Prior to the commencement of construction, proof that the above required deed notice has been filed shall be submitted to the Borough of Chatham. Proof that the required information has been recorded on the deed shall be in the form of either a copy of the complete recorded document or a receipt from the clerk or other proof of recordation provided by the recording office. However, if the initial proof provided to the municipality is not a copy of the complete recorded document, a copy of the complete

recorded document shall be provided within 180 calendar days of the authorization granted by the Borough.

- N. A stormwater management measure approved under the municipal stormwater management plan or ordinance may be altered or replaced with the approval of the Borough if the Borough determines that the proposed alteration or replacement meets the design and performance standards pursuant to this ordinance and provides the same level of stormwater management as the previously approved stormwater management measure that is being altered or replaced. If an alteration or replacement is approved, a revised deed notice shall be submitted to the Borough for approval and subsequently recorded with the { *Office of the Morris County Clerk or the registrar of deeds and mortgages, as applies* } and shall contain a description and location of the stormwater management measure, as well as reference to the maintenance plan, in accordance with M above. Prior to the commencement of construction, proof that the above required deed notice has been filed shall be submitted to the Borough in accordance with M above.

O. Green Infrastructure Standards

1. This subsection specifies the types of green infrastructure BMPs that may be used to satisfy the groundwater recharge, stormwater runoff quality, and stormwater runoff quantity standards.
2. To satisfy the groundwater recharge and stormwater runoff quality standards, the design engineer shall utilize green infrastructure BMPs identified in Table 1 and/or an alternative approved stormwater management measure the following green infrastructure BMPs are subject to the following maximum contributory drainage area limitations:

<u>Best Management Practice</u>	<u>Maximum Contributory Drainage Area</u>
<u>Dry Well</u>	<u>1 acre</u>
<u>Manufactured Treatment Device</u>	<u>2.5 acres</u>
<u>Pervious Pavement Systems</u>	<u>Area of additional inflow cannot exceed three times the area occupied by the BMP</u>
<u>Small-scale Bioretention Systems</u>	<u>2.5 acres</u>
<u>Small-scale Infiltration Basin</u>	<u>2.5 acres</u>
<u>Small-scale Sand Filter</u>	<u>2.5 acres</u>

3. To satisfy the stormwater runoff quantity standards, the design engineer shall utilize BMPs from Table 1 or from Table 2 and/or an alternative stormwater management measure approved in accordance with this Section.
4. If a variance in accordance with N.J.A.C. 7:8-4.6 or a waiver from strict compliance in accordance is granted from the requirements of this subsection, then BMPs from

Table 1, 2, or 3, and/or an approved alternative stormwater management measure may be used to meet the groundwater recharge, stormwater runoff quality, and stormwater runoff quantity standards.

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

P. Groundwater Recharge Standards

1. This subsection contains the minimum design and performance standards for groundwater recharge as follows:
2. The design engineer shall, using the assumptions and factors for stormwater runoff and groundwater recharge calculations at Section 165-115, either:
 - i. Demonstrate through hydrologic and hydraulic analysis that the site and its stormwater management measures maintain 100 percent of the average annual pre-construction groundwater recharge volume for the site; or
 - ii. Demonstrate through hydrologic and hydraulic analysis that the increase of stormwater runoff volume from pre-construction to post-construction for the 2-year storm is infiltrated.
3. This groundwater recharge requirement does not apply to projects within the “urban redevelopment area,” or to projects subject to 4 below.
4. The following types of stormwater shall not be recharged:
 - i. Stormwater from areas of high pollutant loading. High pollutant loading areas are areas in industrial and commercial developments where solvents and/or petroleum products are loaded/unloaded, stored, or applied, areas where pesticides are loaded/unloaded or stored, areas where hazardous materials are expected to be present in greater than “reportable quantities” as defined by the United States Environmental Protection Agency (EPA) at 40 CFR 302.4, areas where recharge would be inconsistent with Department approved remedial action work plans or landfill closure plans and areas with high risk for spills of toxic materials, such as gas stations and vehicle maintenance facilities; and
 - ii. Industrial stormwater exposed to “source material.” “Source material” means any material(s) or machinery, located at an industrial facility, that is directly or indirectly related to process, manufacturing, or other industrial activities, which could be a source of pollutants in any industrial stormwater discharge to

groundwater. Source materials include, but are not limited to, raw materials, intermediate products, final products, waste materials, by-products, industrial machinery and fuels, and lubricants, solvents, and detergents that are related to process, manufacturing, or other industrial activities that are exposed to stormwater.

Q. Stormwater Runoff Quality Standards

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

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

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

Where

R = total TSS Percent Load Removal from application of both BMPs, and

A = the TSS Percent Removal Rate applicable to the first BMP

B = the TSS Percent Removal Rate applicable to the second BMP

6. Stormwater management measures shall also be designed to reduce, to the maximum extent feasible, the post-construction nutrient load of the anticipated load from the

developed site in stormwater runoff generated from the water quality design storm. In achieving reduction of nutrients to the maximum extent feasible, the design of the site shall include green infrastructure BMPs that optimize nutrient removal while still achieving the performance standards.

7. In accordance with the definition of FW1 at N.J.A.C. 7:9B-1.4, stormwater management measures shall be designed to prevent any increase in stormwater runoff to waters classified as FW1.
8. The Flood Hazard Area Control Act Rules at N.J.A.C. 7:13-4.1(c)1 establish 300-foot riparian zones along Category One waters, as designated in the Surface Water Quality Standards at N.J.A.C. 7:9B, and certain upstream tributaries to Category One waters. A person shall not undertake a major development that is located within or discharges into a 300-foot riparian zone without prior authorization from the Department under N.J.A.C. 7:13.
9. Pursuant to the Flood Hazard Area Control Act Rules at N.J.A.C. 7:13-11.2(j)3. i, runoff from the water quality design storm that is discharged within a 300-foot riparian zone shall be treated in accordance with this subsection to reduce the post-construction load of total suspended solids by 95 percent of the anticipated load from the developed site, expressed as an annual average.
10. This stormwater runoff quality standards do not apply to the construction of one individual single-family dwelling, provided it is not part of a larger development or subdivision that has received preliminary or final site plan approval prior to December 3, 2018, and that the motor vehicle surfaces are made of permeable material(s) such as gravel, dirt, and/or shells.

R. Stormwater Runoff Quantity Standards

1. This subsection contains the minimum design and performance standards to control stormwater runoff quantity impacts of major development.
2. To control stormwater runoff quantity impacts, the design engineer shall, using the assumptions and factors for stormwater runoff calculations, complete one of the following:
 - i. Demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the 2-, 10-, and 100-year storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events;
 - ii. Demonstrate through hydrologic and hydraulic analysis that there is no increase, as compared to the pre-construction condition, in the peak runoff rates of stormwater leaving the site for the 2-, 10- and 100-year storm events and that the increased volume or change in timing of stormwater runoff will not increase flood damage at or downstream of the site. This analysis shall include the analysis of impacts of existing land uses and projected land uses assuming full development under existing zoning and land use ordinances in the drainage area;
 - iii. Design stormwater management measures so that the post-construction peak runoff rates for the 2-, 10- and 100-year storm events are 50, 75 and 80 percent, respectively, of the pre-construction peak runoff rates. The percentages apply only to the post-construction stormwater runoff that is attributable to the portion of the site on which the proposed development or project is to be constructed; or

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

165-115. 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:
 - i. The USDA Natural Resources Conservation Service (NRCS) methodology, including the NRCS Runoff Equation and Dimensionless Unit Hydrograph, as described in Chapters 7, 9, 10, 15 and 16 Part 630, Hydrology National Engineering Handbook, incorporated herein by reference as amended and supplemented. This methodology is additionally described in *Technical Release 55 - Urban Hydrology for Small Watersheds* (TR-55), dated June 1986, incorporated herein by reference as amended and supplemented. Information regarding the methodology is available from the Natural Resources Conservation Service website at:

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

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

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

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

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 above at Section 165-115.A.1.i and the Rational and Modified Rational Methods at Section 165-115.A.1.ii. 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 has existed on the site during the five years immediately prior to the time of application, the land cover with the lowest runoff potential shall be used for the computations. In addition, there is the presumption that the site is in good hydrologic condition (if the

land use type is pasture, lawn, or park), with good cover (if the land use type is woods), or with good hydrologic condition and conservation treatment (if the land use 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* or 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 consider the effects of tailwater in the design of structural stormwater management measures.

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

The New Jersey Geological Survey Report GSR-32, A Method for Evaluating Groundwater Recharge Areas in New Jersey, incorporated herein by reference as amended and supplemented. Information regarding the methodology is available from the New Jersey Stormwater Best Management Practices Manual; at the New Jersey Geological Survey website at:

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

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

165-116. Solids and Floatable Materials Control Standards:

- A. Site design features identified under Section 165-114.F above, or alternative designs in accordance with Section 165-114.G above, to prevent discharge of trash and debris from drainage systems shall comply with the following standard to control passage of solid and floatable materials through storm drain inlets. For purposes of this paragraph, “solid and floatable materials” means sediment, debris, trash, and other floating, suspended, or settleable solids. For exemptions to this standard see Section 165-116.A.2 below.
 1. Design engineers shall use one of the following grates whenever they use a grate in pavement or another ground surface to collect stormwater from that surface into a storm drain or surface water body under that grate:

- i. The New Jersey Department of Transportation (NJDOT) bicycle safe grate, which is described in Chapter 2.4 of the NJDOT Bicycle Compatible Roadways and Bikeways Planning and Design Guidelines; or
- ii. A different grate, if each individual clear space in that grate has an area of no more than seven (7.0) square inches or is no greater than 0.5 inches across the smallest dimension.

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

- iii. For curb-opening inlets, including curb-opening inlets in combination inlets, the clear space in that curb opening, or each individual clear space if the curb opening has two or more clear spaces, shall have an area of no more than seven (7.0) square inches, or be no greater than two (2.0) inches across the smallest dimension.

2. The standard in A.1. above does not apply:

- i. Where each individual clear space in the curb opening in existing curb-opening inlet does not have an area of more than nine (9.0) square inches;
- ii. Where the municipality agrees that the standards would cause inadequate hydraulic performance that could not practicably be overcome by using additional or larger storm drain inlets;
- iii. Where flows from the water quality design storm as specified in N.J.A.C. 7:8 are conveyed through any device (e.g., end of pipe netting facility, manufactured treatment device, or a catch basin hood) that is designed, at a minimum, to prevent delivery of all solid and floatable materials that could not pass through one of the following:
 - a. A rectangular space four and five-eighths (4.625) inches long and one and one-half (1.5) inches wide (this option does not apply for outfall netting facilities); or
 - b. A bar screen having a bar spacing of 0.5 inches.

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

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

- v. 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.

165-117. 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 BMPs. This section applies to any new stormwater management BMP.
- B. The provisions of this section are not intended to preempt more stringent municipal or county safety requirements for new or existing stormwater management BMPs. Municipal and county stormwater management plans and ordinances may, pursuant to their authority, require existing stormwater management BMPs to be retrofitted to meet one or more of the safety standards for trash racks, overflow grates, and escape provisions at outlet structures.
- C. 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 BMP to ensure proper functioning of the BMP outlets in accordance with the following:
 - i. The trash rack shall have parallel bars, with no greater than six-inch spacing between the bars;
 - ii. The trash rack shall be designed so as not to adversely affect the hydraulic performance of the outlet pipe or structure;
 - iii. The average velocity of flow through a clean trash rack is not to exceed 2.5 feet per second under the full range of stage and discharge. Velocity is to be computed based on the net area of opening through the rack; and
 - iv. The trash rack shall be constructed of rigid, durable, and corrosion resistant material and designed to withstand a perpendicular live loading of 300 pounds per square foot.
 - 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:
 - i. The overflow grate shall be secured to the outlet structure but removable for emergencies and maintenance.
 - ii. The overflow grate spacing shall be no less than two inches across the smallest dimension.

- iii. The overflow grate shall be constructed and installed to be rigid, durable, and corrosion resistant, and shall be designed to withstand a perpendicular live loading of 300 pounds per square foot.

3. Stormwater management BMPs shall include escape provisions as follows:

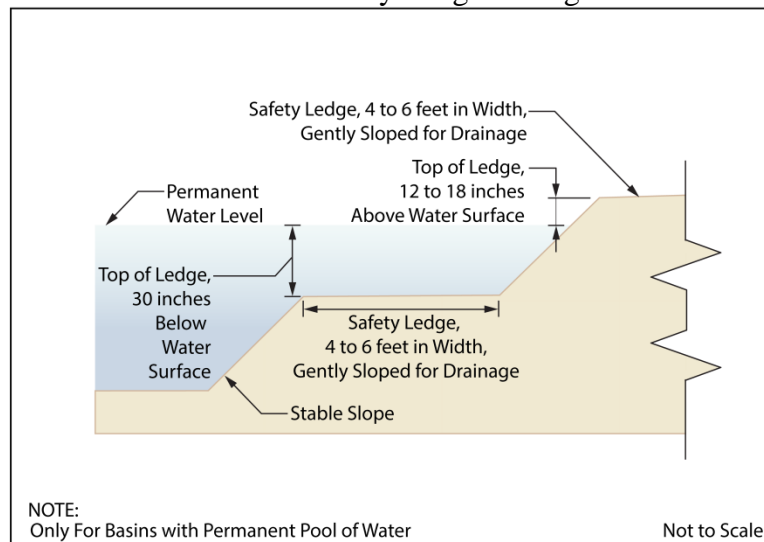
- i. If a stormwater management BMP has an outlet structure, escape provisions shall be incorporated in or on the structure. Escape provisions include the installation of permanent ladders, steps, rungs, or other features that provide easily accessible means of egress from stormwater management BMPs. With the prior approval of the Borough, a free-standing outlet structure may be exempted from this requirement;
- ii. Safety ledges shall be constructed on the slopes of all new stormwater management BMPs having a permanent pool of water deeper than two and one-half feet. 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 VIII.E for an illustration of safety ledges in a stormwater management BMP; and
- iii. In new stormwater management BMPs, the maximum interior slope for an earthen dam, embankment, or berm shall not be steeper than three horizontals to one vertical.

D. Variance or Exemption from Safety Standard

A variance or exemption from the safety standards for stormwater management BMPs may be granted only upon a written finding by the Borough that the variance or exemption will not constitute a threat to public safety.

E. Safety Ledge Illustration

Elevation View –Basin Safety Ledge Configuration



165-118. Requirements for a Site Development Stormwater Plan for Major Developments:

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 the required components of the Checklist for the Site Development Stormwater Plan at Section 165-118.C below as part of the submission of the application for approval.
2. The applicant shall demonstrate that the project meets the standards set forth in this ordinance.
3. The applicant shall submit need 14 copies of the materials listed in the checklist for site development stormwater plans in accordance with this ordinance.

B. Site Development Stormwater Plan Approval

The applicant's Site Development project shall be reviewed as a part of the review process by the Borough board or official from which Borough approval is sought. That Borough board or official shall consult the Borough's review engineer to determine if all the checklist requirements have been satisfied and to determine if the project meets the standards set forth in this ordinance.

C. Submission of Site Development Stormwater Plan

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 surroundings should be submitted. 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 opportunities or constraints for development.

3. Project Description and Site Plans

A map (or maps) at the scale of the topographical base map indicating the location of existing and proposed buildings roads, parking areas, utilities, structural facilities for stormwater management and sediment control, and other permanent structures. The map(s) shall also clearly show areas where alterations will occur in the natural terrain and cover, including lawns and other landscaping, and seasonal high groundwater elevations. A written description of the site plan and justification for proposed changes in natural conditions shall also be provided.

4. Land Use Planning and Source Control Plan

This plan shall provide a demonstration of how the goals and standards of Sections III through V 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:

- i. Total area to be disturbed, 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.
- ii. 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

- i. Comprehensive hydrologic and hydraulic design calculations for the pre-development and post-development conditions for the design storms specified in Section IV of this ordinance.
- ii. When the proposed stormwater management control measures depend on the hydrologic properties of soils or require certain separation from the seasonal high-water table, 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 165-119.

8. Waiver from Submission Requirements

The Borough official or board reviewing an application under this ordinance may, in consultation with the Borough's review engineer, waive submission of any of the requirements in Section 165-118.C.1 through 165-118.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.

165-119. Maintenance and Repair:

A. Applicability

Projects subject to review as in Section 165-111.C of this ordinance shall comply with the requirements.

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, e-mail address, and telephone number of the person or persons responsible for preventative and corrective maintenance (including replacement). The plan shall contain information on BMP location, design, ownership, maintenance tasks and frequencies, and other details as specified in Chapter 8 of the NJ BMP Manual, as well as the tasks specific to the type of BMP, as described in the applicable chapter containing design specifics.
3. If the maintenance plan identifies a person other than the property owner (for example, a developer, a public agency or homeowners' association) as having responsibility for maintenance, the plan shall include documentation of such person's or entity's agreement to assume this responsibility, or of the owner's obligation to dedicate a stormwater management facility to such person under an applicable ordinance or regulation.
4. Responsibility for maintenance shall not be assigned or transferred to the owner or tenant of an individual property in a residential development or project unless such owner or tenant owns or leases the entire residential development or project. The

individual property owner may be assigned incidental tasks, such as weeding of a green infrastructure BMP, provided the individual agrees to assume these tasks; however, the individual cannot be legally responsible for all the maintenance required.

5. If the party responsible for maintenance identified under Section 165-119.B.3 above is not a public agency, the maintenance plan and any future revisions based on Section 165-119.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.
6. Preventative and corrective maintenance shall be performed to maintain the functional parameters (storage volume, infiltration rates, inflow/outflow capacity, etc.) of the stormwater management measure, including, but not limited to, repairs or replacement to the structure; removal of sediment, debris, or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; and repair or replacement of non-vegetated linings.
7. The party responsible for maintenance identified under Section 165-119.B.3 above shall perform all of the following requirements:
 - i. maintain a detailed log of all preventative and corrective maintenance for the structural stormwater management measures incorporated into the design of the development, including a record of all inspections and copies of all maintenance-related work orders;
 - ii. evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed; and
 - iii. retain and make available, upon request by any public entity with administrative, health, environmental, or safety authority over the site, the maintenance plan and the documentation required by Section 165-119.B.6 and B.7 above.
8. The requirements of Section 165-119.B.3 and B.4 do not apply to stormwater management facilities that are dedicated to and accepted by the Borough or another governmental agency, subject to all applicable municipal stormwater general permit conditions, as issued by the Department.
9. In the event the stormwater management facility becomes a danger to public safety or public health, or if it is in need of maintenance or repair, the Borough 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 Borough engineer or his/her designee. The Borough, 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 Borough or County may immediately proceed to do so and shall bill the cost thereof to the responsible person. Nonpayment of such bill may result in a lien on the property.

- C. Nothing in this subsection shall preclude the Borough 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

165-120. Sources for Technical Guidance:

- A. Technical guidance for stormwater management measures can be found in the documents listed below, which are available to download from the Department's website at:

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

1. Guidelines for stormwater management measures are contained in the New Jersey Stormwater Best Management Practices Manual, as amended and supplemented. Information is provided on stormwater management measures such as, but not limited to, those listed in Tables 1, 2, and 3.
2. Additional maintenance guidance is available on the Department's website at:

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

- B. Submissions required for review by the Department should be mailed to:

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

165-121. Penalties:

- A. Any person who violates any provision of this article shall, upon conviction thereof in the Joint Court, be punishable by imposition of the penalties set forth in § **165-173** and Chapter **1**, § **1-14**.
- B. Each instance of engaging in a separate regulated activity in violation of this article shall be deemed a separate offense.
- C. In addition, the Borough of Chatham may institute civil action for injunctive or other relief to enforce the provisions of this article.

165-122. Severability:

Each section, subsection, sentence, clause, and phrase of this Ordinance is declared to be an independent section, subsection, sentence, clause and phrase, and the finding or holding of any such portion of this Ordinance to be unconstitutional, void, or ineffective for any cause, or reason, shall not affect any other portion of this Ordinance.

165-123. Effective Date:

This Ordinance shall be in full force and effect from and after its adoption and any publication as required by law.

Introduced: February 22, 2021
Adopted: March 08, 2021