

Municipal Stormwater Management Plan

For

**Clinton Township
Hunterdon County, New Jersey**

**NJPDES #: NJG0151475
PI ID #: 171667**

**March 2005
Adopted: April 12, 2005
Revised: 6-20-06**

TABLE OF CONTENTS

	Page
1. List of Figures in Appendix B	3
2. Introduction	4
3. MSWMP Goals	4-5
4. Stormwater Discussion	5-6
5. Background	6-10
6. Design and Performance Standards	10
7. Plan Consistency	10-11
8. Nonstructural Stormwater Management Strategies	12-15
9. Land Use/Build-Out Analysis	15-16
10. Mitigation Plans	17
Appendix A – Copy of Clinton Township’s NJPDES Tier A Municipal Stormwater General Permit NJG0151475	18-19
Appendix B – Figures	20-30

List of Figures in Appendix B

Figure 1 – Hydrologic Cycle

Figure 2 – Streams and Rivers

Figure 3 – USGS Map

Figure 4 – HUC14 Drainage Areas

Figure 5 – 100-Year Frequency Floodplain

Figure 6 – Land use/Land Cover

Figure 7 – Zoning

Figure 8 – Aerial Photo and Parcel Lines

Figure 9 – Average Annual Groundwater Recharge Rates

Figure 10 – Well Head Protection Areas

Figure 11 – Wetlands

Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for Clinton Township (“the Township”) to address stormwater related impacts. The creation of this plan is required by N.J.A.C. 7:14A-25, Municipal Stormwater Regulations. This plan contains all of the required elements described in N.J.A.C. 7:8 Stormwater Management Rules. The plan addresses groundwater recharge, stormwater quantity and stormwater quality impacts by incorporating stormwater design and performance standards for new major development. 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 describes long-term operation and maintenance measures for existing and future stormwater facilities.

A “build-out” analysis has been provided in the MSWMP with two summary tables. The build-out analysis is based upon existing zoning and land available for development. This plan also addresses the review and update of existing ordinances, the Township Master Plan and other planning documents to allow for project designs that include low impact development techniques. The final component of this plan includes a mitigation strategy for when a variance or exemption of the design and performance standards is sought. As part of the mitigation section of the stormwater plan, specific stormwater management measures are identified to lessen the impact of existing development.

MSWMP Goals

The goals of this MSWMP 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;
- 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;
- Prevent, to the greatest extent feasible, any increase in non-point pollution;
- Maintain the integrity of stream channels for their biological functions and drainage capabilities;
- Minimize pollutants in stormwater 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. Additionally, the plan proposes stormwater management controls to address impacts from existing development. Preventive 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 Discussion

Land development can dramatically alter the hydrologic cycle (see Figure 1) of a site and ultimately, an entire watershed. Prior to development, native vegetation can either directly intercept precipitation or draw that portion 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. Construction activities may also compact the soil and diminish its infiltration ability, resulting in increased volumes and rates of stormwater runoff from the site. Impervious areas that are connected to each other through gutters, channels, and storm sewers can transport runoff more quickly than natural areas. This shortening of the transport or travel time, quickens the rainfall-runoff response of the drainage area, causing flow in downstream waterways to peak faster and higher than natural conditions. These increases can create new, and aggravate existing, downstream flooding and erosion problems and increase the quantity of sediment in the channel. Filtration of runoff and removal of pollutants by surface and channel vegetation is eliminated by storm sewers that discharge runoff directly into a stream. Increases in impervious area can also decrease opportunities for infiltration which, in turn, reduce stream base flow and groundwater recharge. Reduced base flows and increased peak flows produce greater fluctuations between normal and storm flow rates, which can increase channel erosion. Reduced base flows can also negatively impact the hydrology of adjacent wetlands and the health of biological communities that depend on base flows. Finally, erosion and sedimentation can create disruption to habitat to which some species cannot adapt.

In addition to increases in runoff peaks, volumes and loss of groundwater recharge, land development often results in the accumulation of pollutants on the land surface that 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 and wear from vehicles. Pollutants can include metals, suspended solids, hydrocarbons, pathogens and nutrients.

In addition to increased pollutant loading, land development can 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 can remove trees along stream banks that normally provide

shading, stabilization and leaf litter that falls into streams and becomes food for the aquatic community.

The development in headwaters areas, such as Clinton Township, can have downstream impacts related to increased flooding, higher levels of stream bank erosion and elevated levels of pollutants in the streams. Management of stormwater on a local level will provide regional benefits.

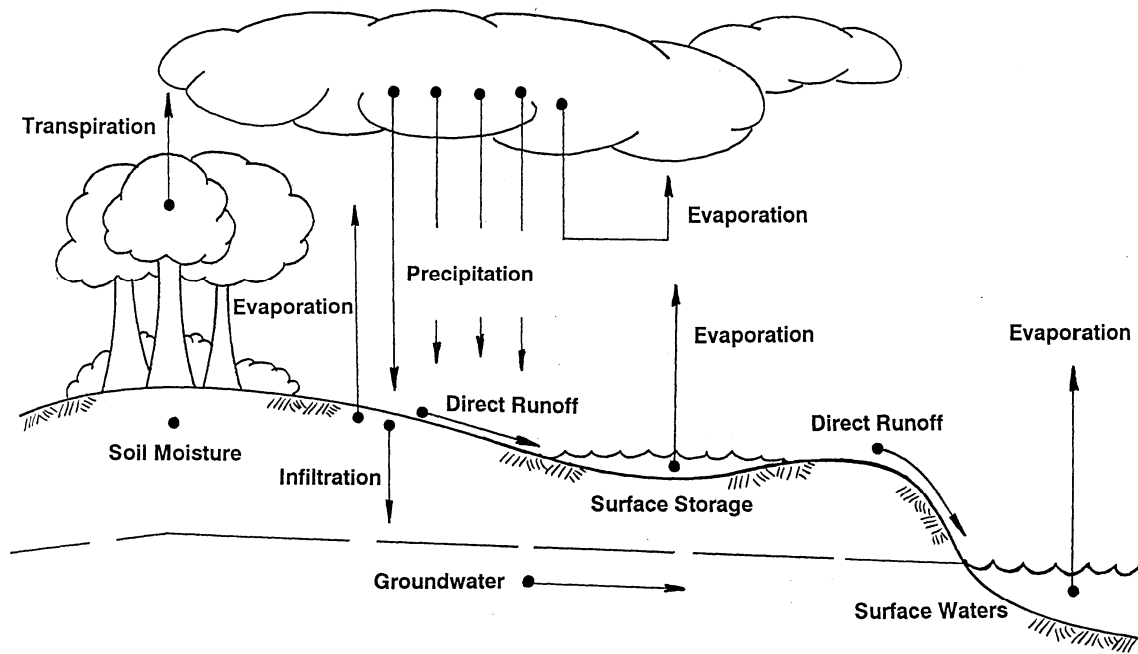


Figure 1 – Hydrologic Cycle

Background

The Township encompasses 33 square miles in the north-central part of Hunterdon County and was primarily known for its farm communities in the past. The Township was founded in 1841 well after the American Revolution, although the area attracted people well before even the European settlers came. It attracted people because of the Lenape Path, known as the Lower Minisink Trail, which connected the Delaware and Raritan Rivers. It remained a quiet rural area until the 1950's when a severe drought proposed the use of Round Valley as a reservoir. In addition to Round Valley Reservoir attracting people, the fact that the Lenape Path became U.S. Route 22 after World War I did as well.

Although the lands in the Township are lightly developed, there are two town areas: Lebanon Borough, located within the center of the Township (although it is its own municipality), and Annandale, located in the western portion of the Township.

Clinton Township has made efforts at preserving open space for future generations. With aggressive planning and 5-acre zoning in the central portion of the Township, the rural

character will be retained. Private land owners have been supporting these efforts, and Township residents, present and future, are most grateful for these acts of vision.

Clinton Township is bounded on its western side by the South Branch of the Raritan River. The Prescott Brook, the South Branch of the Rockaway Creek and the Beaver Brook as well as their tributaries are classified as Category 1 waterways. Defined by NJDEP as "waters that are classified as Category 1 for the protection from measurable changes in water quality characteristics because of their clarity, color, scenic setting, other characteristics of aesthetic value, exceptional ecological significance (i.e., habitat for threatened/endangered species such as wood turtle, bog turtle), exceptional recreational species, exceptional water supply, or exceptional fisheries resource (i.e., trout production)." These exceptional streams are trout production streams. Streams and rivers within the Township are shown in Figure 2 and the topography of the Township is shown in Figure 3.

According to the 2000 census, the Township has 12,957 residents. The population rose approximately 19.79 percent since the 1990 census. This population increase is more than the overall state increase of 8.9 percent and the County increase of 13.19 percent over the same period.

The Township is bordered along its west side by the South Branch of the Raritan River. It is located in Watershed Management Area (WMA) 8 – North and South Branch Raritan River. The Township contains portions of twelve Hydrologic Unit Code (HUC) areas:

Table 1 – HUC14 Areas	
HUC14 Area	Watershed
02030105010070	S. Branch Raritan River
02030105010080	S. Branch Raritan River
02030105020040	S. Branch Raritan River
02030105020050	S. Branch Raritan River
02030105020070	S. Branch Raritan River
02030105020080	S. Branch Raritan River
02030105020090	S. Branch Raritan River
02030105040020	S. Branch Raritan River
02030105040030	S. Branch Raritan River
02030105050080	Lamington River
02030105050090	Lamington River
02030105050100	Lamington River

These HUC14 areas are shown in Figure 4.

The New Jersey Department of Environmental Protection (NJDEP) has established an Ambient Bio-monitoring Network (AMNET) to document the health of the state's waterways. There are over 800 AMNET sites throughout New Jersey. These sites are sampled for benthic macro-invertebrates by NJDEP on a five-year cycle. Streams are classified as non-impaired, moderately impaired, or severely impaired based on the

AMNET data. The data is used to generate a New Jersey Impairment Score (NJIS), which is based on a number of biometrics related to benthic macro-invertebrate community dynamics. Benthic macro-invertebrates are defined as organisms which have no backbone and which dwell on the bottom of waterways. They are a general indicator of water quality in a stream.

There are two AMNET sites within or bordering Clinton Township as follows:

Table 2 – AMNET Site Locations	
Site Number	Location
AN0323	Beaver Brook at Herman Thau Road – Non Impaired
AN0367	South Branch Rockaway Creek at Windy Acres Farm – Non Impaired

Based on the AMNET data, neither of the waterbodies within the Township is impaired.

In addition to the AMNET data, the NJDEP and other regulatory agencies, collect water quality chemical data on the streams in the state. These data show that the instream total phosphorus concentrations, temperature, pH and cadmium of the Spruce Run Reservoir exceed the allowed amounts. These data also show that the instream total mercury of the Round Valley Reservoir exceeds the allowed amounts. This means that the reservoirs are impaired waterways and the NJDEP is required to develop Total Maximum Daily Loads (TMDLs) for these pollutants. The other waterways within Clinton Township, however, do not require TMDLs for their pollutants. For any impaired waterbody, NJDEP is required to adopt standards (Total Maximum Daily Loads) for the pollutants in such waterbody. When the TMDLs are established the Township will evaluate them to determine what, if any, action is required at the planning level. There have been no TMDLs established within Clinton Township to date.

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 a New Jersey Pollution Discharge Elimination System (NJPDES) permit to discharge, and non-point source, which includes 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. Implementation strategies may include improved stormwater treatment plants, adoption of ordinances, reforestation of stream corridors, retrofitting stormwater systems, and other 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.

As with the NJDEP, the South Branch Watershed Association (SBWA) also collects water samples for the purposes of gathering data. The SBWA is a not-for-profit organization dedicated to protecting the environment in the watershed of the South Branch Raritan River. The SBWA has volunteers perform biological monitoring for the streams within the watershed. Their website can be visited at www.sbwa.org. The SBWA provided the following New Jersey Impairment Score (NJIS) rating data for three sites within Clinton Township.

Site/Year	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04
Hamden Road	21	27	24	24	30	30	30	24	24	21	27
Clinton Sewerage Treatment Plant	27	30	27	24	24	21	15	18	15	24	21
Rowland Mills					30	21	15	21	21	12	27

Another association that collects water samples for gathering data is the Upper Raritan Watershed Association (URWA). Their website can be visited at www.urwa.org. Founded in 1959, the URWA is a non-profit organization that tries to protect and preserve the natural resources of the Upper Raritan watershed region. The Association has worked to increase environmental awareness and has seen that changes in the countryside and municipalities are guided by sound and reasonable environmental principals. URWA's mission is accomplished through advocacy, scientific research and education. As does the SBWA, the URWA also has volunteers perform monitoring for the South Branch of the Rockaway Creek as well as the other streams within its watershed. The URWA provided the following NJIS rating data for two sites within Clinton Township.

Site/Year	2004
South of Overbrook Drive (Site #11)	21
NJ Dept. of Fish, Game, and Wildlife (Site #12)	30

A NJIS score of 24-30 indicates an impairment status of non-impaired, a score of 9-21 indicates an impairment status of moderately impaired and a score of 0-6 indicates an impairment status of severely impaired.

The URWA also provided the following chemical data for the site located South of Overbrook Drive (Site #11):

MARCH 2004 SAMPLING

WET CHEM	Results	Unit	Det. Limit	Procedure	Lower Limit	Upper Limit	Analysis Date	Dilution

Alkalinity - Carbonate	<5.0	mg/l	5.0	2320B	--	--	03/26/2004	1.0
Fecal Coliform	156	CFU/100m	0.0	SM 19 9222D	--	--	03/25/2004 07:55 PM	1.0
Hardness	62.0	mg/l	5.0	2340C	--	--	03/30/2004	1.0
Ammonia	<0.1	mg/l	0.1	350.1	--	--	04/07/2004	1.0
Nitrate	0.87	mg/l	0.1	353.2	--	--	03/26/2004 07:07 PM	1.0
Ortho Phosphate	<0.03	mg/l	0.03	365.2	--	--	03/26/2004 01:45 PM	1.0
Total Phosphorus	0.036	mg/l	0.03	365.2	--	--	04/02/2004	1.0
Total Coliform	4300	CFU/100m	0.0	SM 19 9222B	--	--	03/25/2004 07:55 PM	1.0
Total Organic Carbon	2.0	mg/l	1.0	415.1	--	--	03/26/2004	1.0
Total Dissolved Solids	134	mg/l	10.0	160.1	--	--	03/30/2004	1.0
Total Suspended Solids	<10.0	mg/l	10.0	160.2	--	--	03/29/2004	1.0

JUNE 2004 SAMPLING

METALS	Results	Unit	Det. Limit	Procedure	Lower Limit	Upper Limit	Analysis Date	Dilution
Calcium	16800	ug/l	38.4	200.7	--	--	07/12/2004	1.0
Hardness	67.1	mg/l	0.2	200.7	--	--		1.0
Magnesium	6100	ug/l	31.9	200.7	--	--	07/12/2004	1.0
WET CHEM								
Alkalinity - Carbonate	52.3	mg/l	5.0	310.1	--	--	07/02/2004	1.0
Fecal Coliform	200	CFU/100m	0.0	SM 19 9222D	--	--	06/30/2004 05:50 PM	1.0
Ammonia	<0.1	mg/l	0.1	350.1	--	--	07/13/2004	1.0
Nitrate	0.95	mg/l	0.1	353.2	--	--	07/01/2004 08:20 PM	1.0
Ortho Phosphate	<0.03	mg/l	0.03	365.2	--	--	07/01/2004 01:10 PM	1.0
Total Phosphorus	0.03	mg/l	0.03	365.2	--	--	07/06/2004	1.0
Total Coliform	12300	CFU/100m	0.0	SM 19 9222B	--	--	06/30/2004 05:50 PM	1.0
Total Organic Carbon	1.5	mg/l	1.0	415.1	--	--	07/08/2004	1.0
Total Dissolved Solids	155	mg/l	10.0	160.1	--	--	07/07/2004	1.0

Total Suspended Solids	<10.0	mg/l	10.0	160.2	--	--	07/02/2004	1.0
------------------------	-------	------	------	-------	----	----	------------	-----

In addition to water quality problems, the Township has occasional flooding problems. More recently developed areas of the Township are sometimes subject to street and nuisance flooding caused by locally intense downpours. Older development in the floodplains of major streams, such as the Prescott Brook, the South Branch of the Rockaway Creek and the Beaver Brook, are subject to more serious flooding during larger regional rainfall events. The 100-year floodplain, shown in Figure 5, depicts the floodplains within the Township.

The United States Geological Survey (USGS), operates a Flood Information System for municipalities within the state. The Flood Information System consists of a network of stream and precipitation gauges throughout the state. Information from these gauges is automatically transmitted to a central location via telephone, radio and satellite. The information is then processed and appropriate actions are taken. These actions include notifying municipal police, fire and emergency management personnel with flood potential and water level information.

There are several stream and precipitation gauges near Clinton Township. There are stream gauges on the following streams:

- South Branch Raritan River at Gray Rock Road near Clinton NJ
- Rocky Run near Clinton NJ
- Spruce Run near Clinton NJ
- Mulhockaway Creek near Clinton NJ
- Spruce Run Reservoir at Clinton NJ
- Spruce Run at Clinton NJ
- South Branch Raritan River at Clinton NJ
- Beaver Brook at Annandale NJ
- Beaver Brook at Clinton NJ
- Lingerts Pout Stream at Clinton NJ
- Beaver Brook div 0.7 miles east of Clinton NJ

Information from these latter gauges is available on the United States Geological Survey (USGS) web site in real time (<http://waterdata.usgs.gov/nj/nwis>).

The Township has a moderate amount of developable land. The existing land use, based on 1995/1997 aerial photography, is shown in Figure 6. The existing zoning is shown in Figure 7. A current aerial photo with parcel lot lines overlain on it is shown in Figure 8. The Township is not within the State Plan Designation PA1 Metropolitan Planning Area. The State Planning Area Boundaries within Clinton Township are listed in the Natural Resources Inventory (NRI). They include the following designations: State Park (P), Suburban (PA 2), Fringe (PA 3), Environmentally Sensitive Rural (PA 4/5) and the Environmentally Sensitive (PA 5) Planning areas. Clinton Township is actively involved

in the cross acceptance process with Hunterdon County and the State. The Hunterdon County Board of Chosen Freeholders adopted a revised Planning Area Map on February 22, 2005 which shows the majority of the Township in Planning Area 5 with a small portion in Planning Area 3 encompassing Annandale and the area adjacent to the Town of Clinton. The County is submitting its report to the state planning commission, and the map changes will be the subject of the negotiation process over the next several months.

Groundwater recharge rates for native soils in the Township are generally between 1 and 23 inches annually. The average annual groundwater recharge rates are shown graphically in Figure 9. In many areas of Clinton Township, especially those underlain by Cambrian-Ordovician carbonate rocks, or the Triassic Stockton Formation or Triassic-Jurassic Passaic Formation; captured stormwater can quickly infiltrate into underlying water-supply aquifer systems. Because of the extent of fracturing and the nature of these rocks to store and transmit groundwater, these same areas of Clinton Township represent the best long-term water-supply resources for Township residents and businesses. Currently, the Town of Clinton withdraws groundwater from several wells widely distributed across the Township and this water is delivered to residents of the Township, town, and other neighboring municipalities. The existing residents and businesses, as well as many future residents and businesses are entirely reliant on Clinton Township's groundwater resources since surface-water resources are dedicated to downstream consumers. These vital groundwater resources are potentially highly vulnerable to impacts from contaminants within infiltrating stormwater and could either be removed from long-term reserves or require extensive/expensive remediation to continue their use.

Within areas of Clinton Township where stormwater can quickly infiltrate into underlying groundwater supplies, measures must be taken to ensure that contaminants such as but not limited to road salts, petroleum products, fertilizers, and pesticides are removed from stormwater prior to infiltration. Within wellhead protection areas, either those currently or in the future, designated by the NJDEP or those determined by the township, measures taken to remove contaminants must be ensured through the development and implementation of a monitoring program. Within wellhead protection areas designated as Tier 1 where the time of travel is less than 2 years, the monitoring program must include groundwater quality analyses.

Within the 15 percent of Clinton Township underlain by carbonate rocks and those areas within a 1000 feet of these rocks, measures must be taken to not only ensure water quality and infiltration, but also that the stormwater recharge measures do not cause sinkholes or failure of soils and foundations. Before approval of stormwater control measures, adequate testing must be conducted to evaluate the potential for sinkholes or soil failure. Furthermore, designs for these stormwater control measures should include appropriate structural support and filtration that unforeseen failures do not result in catastrophic impacts to groundwater quality or quantities.

According to the NJDEP, "A Well Head Protection Area (WHPA) in New Jersey is a map area calculated around a Public Community Water Supply (PCWS) well in New Jersey that delineates the horizontal extent of ground water captured by a well pumping at a

specific rate over a two-(Tier 1), five-(Tier 2), and twelve-(Tier 3) year period of time for unconfined wells.... The confined wells have a fifty foot radius delineated around each well serving as the well head protection area to be controlled by the water purveyor in accordance with Safe Drinking Water Regulations (see NJAC 7:10-11.7(b)1).”

As shown in Figure 10, portions of the Township are located in Tier 1, Tier 2 and Tier 3 well head protection areas.

WHPA delineations are conducted in response to the Safe Drinking Water Act Amendments of 1986 and 1996 as part of the Source Water Area Protection Program (SWAP). The delineations are the first step in defining the sources of water to a public supply well. Within these areas, potential contamination will be assessed and appropriate monitoring will be undertaken as subsequent phases of the NJDEP SWAP.

In addition to the rivers and streams that run through and along the Township, there are a number of wetland areas. These wetland areas, shown in Figure 11, provide flood storage, non-point pollutant removal and habitat for flora and fauna. Clinton Township is located in a sole source aquifer area.

Design and Performance Standards

The Township has adopted the design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8-5 to minimize the adverse impact of stormwater runoff on water quality and water quantity and loss of groundwater recharge in receiving water bodies. The stormwater management measures are to be consistent with the NJDEP BMP manual. The design and performance standards include the language for maintenance of stormwater management measures consistent with the stormwater management rules at N.J.A.C. 7:8-5-8 Maintenance Requirements, and language for safety standards consistent with N.J.A.C. 7:8-6 Safety Standards for Stormwater Management Basins. The ordinances will be submitted to the County for review and approval within 24 months of the effective date of the Stormwater Management Rules.

During construction, Township inspectors will observe the construction of each project to ensure that the stormwater management measures are constructed and function as designed.

Plan Consistency

The Township is not within a Regional Stormwater Management Planning Area and no TMDL’s have been developed for waters within the Township; therefore this plan does not need to be consistent with any regional stormwater management plans (RSWMPs) nor any TMDL’s. If any RSWMPs or TMDLs are developed in the future, this Municipal Stormwater Management Plan will be updated to be consistent. The Township is interested in participating in a Regional Stormwater Management Plan if and when a sponsor for development of that plan is established.

The Township is within the Raritan River Basin and much information on the basin and its characteristics has been developed as part of the Raritan Basin Watershed Management Plan. Additional information concerning this plan can be found at:

<http://www.raritanbasin.org>. The Township supports the Raritan Basin Watershed Management Plan. The following summarizes the plan and can be found at the following link under “Executive Summary Section A”:

http://www.raritanbasin.org/RBWMPlan/RBWMP_Plan.htm#_Toc29101502

- Protection and preservation of lands that play a critical role in the protection of Raritan Basin water resources, including headwaters streams.
- Maintenance and restoration of ground water recharge to ensure sufficient supplies for dry weather stream flow and public use, and to minimize stormwater runoff.
- Improved control of stormwater through watershed-based management plans, improved site design techniques and attention to the impacts of stormwater on stream stability and flooding.
- Management of water supply resources on a subwatershed, watershed and regional basis so that substantial levels of resources use are not exceeded, ensuring adequate water for both human and ecosystem uses.
- Restoration of streams and riparian areas that have been physically damaged by harmful land use and stormwater management practices, and protection of high-quality streams and riparian areas.
- Restoration and protection of ground and surface waters that are currently or prospectively impaired by excessive pollutant loads, through a combination of regulatory and non-regulatory programs affecting both point and nonpoint sources of pollutants.
- Understanding by residents, landowners, businesses and government decision-makers of the basic aspects of water resources and critical watershed management issues in the Raitan River Basin and tools to resolve them, so that they are moved to help solve these issues.

The Township supports the Raritan Basin Watershed Management Plan as the Plan’s strategy is similar in nature to the principles mandated by Phase II of the EPA Clean Water Act.

The Municipal Stormwater Management Plan is consistent with the Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21. The Township utilizes the most current update of the RSIS in the stormwater review of all projects. The Township ordinances require that all projects, both residential and non-residential, be designed in accordance with the Stormwater Design Standards of the Residential Site Improvement Standards. The Township will be exploring ways in which greater control can be achieved in order to address Total Suspended Solids (TSS) and other stormwater pollutants for non-residential projects. This Municipal Stormwater Management Plan will be updated to be consistent with any future updates of the RSIS.

The Township’s Stormwater Management Ordinance requires all new development and redevelopment plans to comply with New Jersey’s Soil Erosion and Sediment Control Act (NJSA 4:24-39 et seq.). During construction, Township inspectors and those from the

Hunterdon Soil Conservation District will observe on-site soil erosion and sediment control measures and report any inconsistencies to the local Soil Conservation District.

Nonstructural Stormwater Management Strategies

The Township has begun a review of the master plan and ordinances, and has provided a partial list of the sections in the Township land use and zoning ordinances that are to be modified to incorporate nonstructural stormwater management strategies. Below are a portion of the ordinances identified for revision. Once the ordinance texts are completed, they will be submitted to the county review agency for review and approval within 24 months of the effective date of the Stormwater Management Rules. A copy will be sent to the Department of Environmental Protection at the time of submission.

Chapter 165 of the Township Code, entitled Land Use Regulations, is being reviewed with regard to incorporating non-structural stormwater management strategies. Several changes are being made to the Articles of this Chapter to incorporate these strategies which will be consistent with the NJDEP Stormwater BMP Manual, April 2004.

Section 165-61C. Storm drains and culverts requires all streets shall be provided with sufficient catch basins, storm sewers, culverts, water-detention basins and other drainage appurtenances for the proper drainage of the area in the light of existing and future conditions. All such facilities shall be constructed in accordance with the standards and requirements set forth in the Township Road and Improvement Ordinance or such other specifications as may be required by the Township Engineer where special circumstances so require. Storm drainage features shall be based on a fifteen-year frequency curve or greater if required by the Township Engineer. In addition, the requirements of Article XXXV, Surface Water Management, of this chapter shall be met. This section will be amended to require that any stormwater management and drainage improvements must conform to the “Stormwater Design Standards” of the Residential Site Improvement Standards as described in this plan and provided in the Stormwater Management Ordinance.

Section 165-61H. Shade trees requires shade trees be located in the front yard approximately two feet outside the road right-of-way and in such a manner as not to interfere with sidewalks or utilities. The shade trees shall be of a type and species contained in section 165-63F(3)(c)[1] and approved by the Planning Board as canopy trees. Said shade trees shall be not less than two to 2 1/2 inches caliper in diameter, one foot above ground level. They shall be planted on a ratio of one tree per 50 feet of street frontage, but not fewer than two trees per lot. The distance between trees shall be at least 40 feet. All trees shall be balled and burlapped nursery stock. The burlap shall be removed from the trunk and top of the root ball and the trees shall be staked. A deer deterrent/protection wrap shall be installed on the trunks of all trees. The location of the trees shall be staked on the site and marked on the plan prior to installation of utilities, unless waived by the Planning Board where trees already exist. Existing trees shall be preserved as directed in accordance with the provisions of Article V of the Clinton Township Road and Improvement Ordinance. Notice of the planting schedule must be filed with the Planning Board Clerk and trees guaranteed for one year from date of planting. The road and

improvement ordinance recognizes that the preservation of mature trees and forested areas is a key strategy in the management of environmental resources. This complies with minimizing land disturbance, which is a nonstructural stormwater management strategy. This section currently requires the preservation of natural wood tracts and limits land disturbance for new construction. The landscape requirements for buffer areas in the existing section do not recommend the use of native vegetation. The language of this section will be amended to require the use of native vegetation, which requires less fertilization and watering than non-native species.

Section 165-610. Landscape and buffering requires developer to see section 165-63K for additional landscape and buffering requirements for subdivisions of five lots or more. This section will have language included to allow buffer areas to be used for stormwater management by disconnecting impervious surfaces and treating runoff from these impervious surfaces.

Section 165-63B. All sites shall be drained and graded so as to control surface runoff efficiently. Storm drainage shall be connected to existing facilities whenever possible. Surface waters exceeding a quantity of five cubic feet per second must be collected into a storm drain and not be allowed to run on the surface, unless a specific alternate design is approved by the Township Engineer. Storm drain design is to be based on a fifteen-year storm. Retention facilities may be required by the Township in cases where existing systems lack capacity or where needed to protect downstream properties. In addition, the requirements of Article XXXV, Surface Water Management, of this chapter shall be met. This section will be amended to require that any stormwater management and drainage improvements must conform to the “Stormwater Design Standards” of the Residential Site Improvement Standards as described in this plan and provided in the Stormwater Management Ordinance as well as strategies and standards as referenced in the NJDEP BMP Manual and NJAC 7:8.

Section 165-63F(4) & (5). Screening and buffering requires where parking is located in a front yard, the Planning Board may require construction of landscaped berms up to a height of five feet, with slopes at a ratio of not less than 2:1. It also requires where off-street parking and loading areas adjoin or face premises situated in a residential zone, the Planning Board may require the construction of a fence or wall not less than four feet nor more than six feet in height, maintained in good condition. The landscape requirements for these buffer areas in the existing section do not recommend the use of native vegetation. The language of this section will be amended to require the use of native vegetation, which requires less fertilization and watering than non-native species.

Section 165-63K. Landscape and buffering requirements requires the protection of existing woodland and encourage reforestation of nonagricultural land. This section also requires buffering of neighboring lands. The goal is to maintain and/or re-establish the traditional rural boundaries of tree lines, hedgerows, walls and fences. This section requires that natural features, such as trees, brooks, swamps, hilltops, and views, be preserved whenever possible, and that care be taken to preserve selected trees to enhance soil stability and landscaped treatment of the area. This section will be amended to expand trees to forested areas, to ensure that leaf litter and other beneficial aspects of the forest

are maintained in addition to the trees. This section will have language included to allow buffer areas to be used for stormwater management by disconnecting impervious surfaces and treating runoff from these impervious surfaces.

Section 165-71B(2)(a). Parking and circulation requires all off-street parking areas and internal roadways be paved, bounded by permanent curbing and constructed in accordance with applicable provisions of section 165-73, Roads and Improvements. This section will be amended to allow for flush curb with curb stops, or curbing with curb cuts to encourage developers to allow for the discharge of impervious areas into landscaped areas for stormwater management. Also, language will be added to allow for use of natural vegetated swales for the water quality design storm, with overflow for larger storm events into storm sewers. This section will be amended to allow the limited use of pervious paving for use in areas to provide overflow parking, vertical parking structures and shared parking. Additionally, language will be included to allow buffer areas to be used for stormwater management by disconnecting impervious surfaces and treating runoff from these impervious surfaces.

Section 165-73. Roads and Improvements describes the requirements for streets in the Township. This section will be amended to encourage developers to limit on-street parking to allow for narrower paved widths consistent with the RSIS. Language will be added to this section to reduce the minimum radius of cul-de-sac designs to be consistent with the RSIS. This section also requires that curbing be installed at all street intersections, where stormwater velocities exceed the soil erosion velocities specified in the “New Jersey Standards for Soil Erosion and Sediment Control”, and/or bordering streets or other areas where on street parking is permitted and/or likely to occur. This section will be amended to allow for curb cuts or flush curbs to allow vegetated swales to be used for stormwater conveyance and to allow the disconnection of impervious areas. This section also describes sidewalk requirements for the Township. Although sidewalks are not required along all streets, the Township can require them in areas where the probable volume of pedestrian traffic, the development’s location in relation to other populated areas and high vehicular traffic, pedestrian access to bus stops, schools, parks, and other public places, and the general type of improvement intended indicate the advisability of providing a pedestrianway. Sidewalks are to be a minimum of four feet wide and constructed of concrete. Language will be added to this section to require developers to design sidewalks to discharge stormwater to neighboring lawns where feasible to disconnect these impervious surfaces, or use permeable paving materials where appropriate.

Section 165-76. Stream Corridor Protection describes the purposes of protecting stream corridors. It states permitted activities and prohibited activities. This section will be amended to include reference to NJAC 7:8-3.3-8.(b)2 and NJAC 7:8-5.5(h) stating that improvements must conform with the stream corridor protection plan of New Jersey. The Township is currently looking at additional Stream Corridor Protection strategies including a multi-layered approach.

Section 165-138. Residential Cluster Development provides for a cluster development option 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 cluster option requires that certain percentages of the total tract be preserved as common open space. This language will be amended to promote the use of native vegetation, which requires less fertilization and watering than non-native ornamental plants.

Section 165-223. Stormwater Management requires the management of the increased rate and velocity of surface water runoff created by alterations in the ground cover and natural runoff patterns. This section will be amended to require that all drainage design shall be in accordance with the Stormwater Design Standards of the New Jersey Residential Site Improvement Standards (RSIS) N.J.A.C. 5:21-1 et seq. These design standards shall apply to all nonresidential projects as well as residential developments. This section will require that detention or retention basins or other stormwater facilities shall be required to hold stormwater runoff as required in the RSIS. A waiver of this requirement may be granted only when the applicant demonstrates that the impact from the additional runoff resulting from the proposed development will be negligible. This section will be amended to state that a waiver may be granted only on the condition that the applicant provides improvements chosen from the mitigation plan that will offset the deficiencies necessitating the waiver. This section will be amended to encourage the use of natural vegetated swales in lieu of inlets and pipes.

As a result of the municipality's Master Plan preparation and review in the past, there has been a substantial reduction in impervious coverage that is allowed in each zone. Therefore, a reduction in stormwater runoff was achieved while retaining a reasonable opportunity for development. Several changes may be made to Articles XIX through XXXIII of the Township Code which relate to the Zoning Districts. The Township has 6 types of residential districts. Each district has a maximum percent impervious surface allocation. The Township has 9 types of nonresidential districts. Each of these districts has a maximum percent impervious surface allocation. Although each zone has a maximum allowable percent impervious surface, the Township Code will be amended to remind developers that satisfying the percent impervious requirements does not relieve them of responsibility for complying with the Design and Performance Standards for Stormwater Management Measures. The Planning Board is evaluating the maximum allowable impervious cover for each zone to determine whether a reduction in impervious cover is appropriate. The Township is also evaluating a maximum percent of disturbance for each zone. Also, if a developer is given a variance to exceed the maximum allowable percent imperviousness, the developer must mitigate the impact of the additional impervious surfaces. This mitigation effort must address water quality, flooding, and groundwater recharge as described in the Design and Performance Standards for Stormwater Management Measures.

Land Use/Build-Out Analysis

Since the Township of Clinton has a combined total of more than one square mile of vacant lands, the Township is required to do a build-out analysis. A preliminary build-out analysis is being performed for the Township of Clinton as described below.

The first of two phases of the build out analysis is to construct a map that includes the municipal boundary, existing roads, surface water bodies, HUC-14 boundaries, impervious cover, existing development by land use types, groundwater recharge areas, and wellhead protection area layers. A majority of the layers described above are being taken directly from the website provided by the state of New Jersey, at <http://www.nj.gov/dep/gis/>. After constructing the map, the identification and delineation of land that cannot be developed because of legal restrictions, physical constraints, and environmental sensitivity are performed. Examples of the restrictions include lands in permanently preserved open space, public ownership, deed restrictions, utility easements, steep slopes, wetlands, floodplains, and Category 1 Waters with associated special resource protection areas. Since a portion of Clinton Township lies within the “Highlands” area, this is also a parameter used for identifying un-developable lands. Next, the identification and delineation of developable land under current zoning and land use regulations, as well as land that is vacant or not restricted as discussed above will be performed. The identification and delineation of the developed areas within the municipality that have significant redevelopment potential and that have not been developed to the maximum allowed will also be performed. For these undeveloped and underdeveloped areas, the maximum future development by projecting the largest number of housing units allowed in residential zones and the largest number of buildings and most intensive land uses in commercial and industrial zones will be determined.

The second phase of the build-out analysis quantifies the impact of the changes based on information provided by the maps. This includes calculations of percentage of impervious surfaces, number of housing units and their density, and remaining farmland and open space acreage. GIS can also assist in this computation by providing values for specific sets of layers such as the combination of the municipality, HUC14, and impervious area layers. This set of variables can provide the impervious cover for each HUC14 required by the Stormwater Management Rules. Values can be exported to other programs from GIS for more comprehensive computations, including the pollutant loading calculations also required by the regulations.

In simpler terms, all of the HUC-14’s within the municipality will be identified as well as the zones within each HUC-14. The area for each zone within each HUC-14 will be calculated. The existing impervious areas will be calculated in acres and in a percentage for each zone within each HUC-14. The same will be done for the wetlands/constrained areas. An area will then be calculated for the developable area within each zone for each HUC-14. A table will be created itemizing each calculation described above. The maximum allowable impervious coverage in a percentage will be applied to the developable area within each zone for each HUC-14. The result will be the “Build-Out Impervious” area for each zone within each HUC-14. One will then compare the build-

out impervious to the existing impervious within each zone for each HUC-14. Once the build-out analysis is completed, the tables and maps will be presented for review and approval.

Mitigation Plans

This mitigation plan is provided for a proposed development that is granted a variance or exemption from the stormwater management design and performance standards. Presented is a hierarchy of options.

Mitigation Project Criteria

1. The mitigation project must be implemented in the same drainage area as the proposed development. The project must provide additional 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.

- a. The applicant can select one or more of the following projects listed to compensate for the deficit from the performance standards resulting from the proposed project. More detailed information on the projects can be obtained from the Township Engineer. Listed below are specific projects that can be used to address the mitigation requirement.

Acquisition of Open Space especially in Well Head Protection Areas.

Retrofitting of Stormwater Inlets.

Labeling of Stormwater Inlets.

Mapping of Stormwater Inlet System.

Water Quality studies on streams to determine elevated levels of Mercury.

2. If a suitable site cannot be located in the same drainage area as the proposed development, as discussed in Option 1, 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 that impact aquatic life along a certain stream.

The Township may allow a developer to provide funding or partial funding to the Township for an environmental enhancement project that has been identified in a

Municipal Stormwater Management Plan, or towards the development of a Regional Stormwater Management Plan. The funding must be equal to or greater than the cost to implement the mitigation outlined above, including costs associated with purchasing the property or easement for mitigation, and the cost associated with the long-term maintenance requirements of the mitigation measure.

APPENDIX A

Copy of Clinton Township's NJPDES Tier A Municipal Stormwater General Permit NJG0151475

APPENDIX B

FIGURES