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Municipal Stormwater Management Plan



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Cinnaminson Township**

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**Stormwater Management Plan
For
Cinnaminson Township
Burlington County, New Jersey**

I. Introduction

The following Municipal Separate Stormwater System (MS4) stormwater plan was prepared by Remington, Vernick & Arango Engineers for Cinnaminson Township. The NJDEP "Sample Municipal Stormwater Management Plan" was used as a basis for preparation of the plan, as modified to provide specific information germane to the Cinnaminson Township.

This **Municipal Stormwater Management Plan (MSWMP)** documents the strategy for Cinnaminson Township to address stormwater-related impacts. The creation of this plan is required by N.J.A.C.7:14A-25 (Municipal Stormwater Regulations). Accordingly, this plan contains all of the required elements described in N.J.A.C.7:8 (Stormwater Management Regulations).

The plan contained herein addresses groundwater recharge, stormwater quantity and stormwater quality impacts by incorporating stormwater design and performance standards for new major development; defined as projects that disturb one or more acre of land. These standards are intended to minimize the adverse impact of stormwater runoff on water quality/quantity and the loss of groundwater recharge that provides base flow in receiving water bodies.

In addition, this plan describes long-term operation and maintenance measures for existing and future stormwater facilities. Included in this plan is a buildout analysis with pollutant loading calculations based on existing zoning and developable lands (less environmentally-constrained lands). The 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 is a mitigation strategy for when a variance or exemption of the design and performance standards are sought. As part of the mitigation section of the stormwater plan, specific stormwater management measures are identified to lessen the impact of existing development.

II. Goals

The goals of this MSWMP are as follows:

- 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, bridges and other in-stream structures;
- Maintain groundwater recharge;
- 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, protect public health, safeguard fish and aquatic life and scenic and ecological values, enhance the domestic, municipal, recreational, industrial and other uses of water
- Protect public safety through the proper design and operation of stormwater basins.

In order to achieve the goals for stormwater control set forth in its MSWMP and adopted stormwater ordinance, Cinnaminson Township has identified the following stormwater management techniques:

- Implementation of one or more stormwater management Best Management Practices (BMPs) as necessary to achieve the performance standards for stormwater runoff quantity and rate, groundwater recharge, erosion control and stormwater runoff quality per the NJ Stormwater Rule (NJAC 7:8) and established through the Township's stormwater ordinance.
- Compliance with the stormwater runoff quantity and rate, groundwater recharge, erosion control, and stormwater runoff quality standards established through N J AC 7 8 1 1 et. seq and the Township's stormwater ordinance shall be accomplished to the maximum extent practicable through the use of nonstructural BMPs before relying on structural BMPs.
- Nonstructural BMPs are also known as Low Impact Development (LID) techniques. Nonstructural BMPs shall include both environmentally sensitive site design and source controls that prevent pollutants from being placed on the site or from being exposed to stormwater.
- Source control plans shall be developed based upon physical site conditions and the origin, nature and the anticipated quantity or amount of potential pollutants.

- Structural BMPs where necessary shall be integrated with nonstructural stormwater management strategies and proper maintenance plans.
- When using structural BMPs, multiple stormwater management measures smaller in size and distributed spatially throughout the land development site shall be used wherever possible to achieve the performance standards for water quality quantity and groundwater recharge established through the Township's stormwater ordinance before relying on a single larger stormwater management measure to achieve these performance standards.

III. Stormwater Discussion

Land development can dramatically alter the hydrologic cycle 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.

In addition, 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 reduces 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 destroy habitat from 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.

IV. Background

Cinnaminson Township is comprised of approximately 8.01 square miles in area (approximately 0.5 acres of which is under the Delaware River, and is located within the southwest corner of Burlington County. Cinnaminson is bordered by the Delaware River to the north, Riverton and Palmyra to the north and west, the Pennsauken Creek along its western boundary, Moorestown Township along its southeast boundary, and Delran Township along its northeast boundary.

Portions of the Township are along tidally-influenced waterways, including the Delaware River and portions of the Pennsauken Creek and Pompeston Creek. Major projects along these waterways are and will be subject to NJDEP Waterfront Development permitting (in addition to freshwater permitting as required).

According to US Census Data, Township population has actually declined since 1970, with figures of 16,692, 16,072, 14,583 and 14,595 for years 1970, 1980, 1990, and 2000, respectively. Per review of available mapping (see 2002 Existing Conditions aerial map, **Appendix A** of report), the Township is predominantly developed (excluding environmentally-constrained lands including wetlands and water bodies). Per Burlington County demographics for Cinnaminson Township, predominant land uses in 1990, by land area, were Residential (35.6%), Commercial (8.1%), Transportation and utilities (14.6%), Wooded (10.9%), agricultural and vacant (13.2%), and commercial (8.1%). **Refer to Section VIII for development calculations.**

There are several surface water bodies within Cinnaminson Township, including the following:

- Delaware River along the northern boundary;
- Pennsauken Creek (and its North Branch) along the southwest boundary;
- Pompeston Creek, which traverses the eastern portion of the Township; and
- The Headwaters of Swede's Run, a stream near the Township's northeastern border with Delran Township.

All of the streams are tributaries of, and flow to, the Delaware River. In addition, approximately 2/3 of the Township is located within the Pompeston creek watershed, which is currently the subject of a Regional Water study. Per our attendance of a 12/8/04 'kickoff' meeting with Rutgers (who is performing the study), it will be completed by late-2006.

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. The 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.

Per review of the NJDEP's Integrated Water Quality Monitoring and Assessment Report (Year 2004, 305(b) and 303(d) (Integrated List)), the following water bodies are impaired within Cinnaminson Township:

Station	Location	Impairment Description
AN0177	Pompeston Creek at Rte. 130	Benthic Macroinvertebrates

Other AMNET stations (AN0181, Pennsauken Creek near NJ Route 73 and AN0185, Pennsauken Creek near Fork Landing Road) are not listed as impaired per NJDEP data.

In addition to the above-referenced impairments, it should also be noted that Total Maximum Daily Limits (TMDL's) have been adopted for the Delaware River, to which several tributaries flow from Cinnaminson Township.

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. It should be noted that as part of the Township's Municipal Separate Storm Sewer (MS4) regulations, existing inlets and outfalls will be inspected and repairs/maintenance will be made. At that time, existing water quantity and erosion problems (if any) will be assessed and abated to the maximum extent practicable.

Future major development will comply with the new NJDEP Stormwater design standards (NJAC 7:8), including the average annual recharge (retain increase in 2-year design storm) requirement.

V. **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/quantity and loss of groundwater recharge in receiving water bodies. This will be implemented by adoption of the NJDEP Model Stormwater ordinance (**Township Ordinance 2006-6, see Appendix B**), as amended for use and enforcement within Cinnaminson Township.

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).

Stormwater management measures will be operated and maintained in accordance with the General Maintenance requirements outlined within the Township's stormwater ordinance, including but not limited to the following requirements:

- A. The design engineer shall prepare a maintenance plan for the stormwater management measures incorporated into the design of a major development.
- B. The maintenance plan shall contain specific preventative maintenance tasks and schedules; cost estimates, including estimated cost of sediment, debris, or trash removal; and the name, address, and telephone number of the person or persons responsible for preventative and corrective maintenance (including replacement).
- C. Preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measure(s), including repairs or replacement to the structure; removal of sediment, debris, or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; and repair or replacement of non-vegetated linings.
- D. The person responsible for maintenance shall maintain a detailed log of all preventative and corrective maintenance for the structural stormwater management measures incorporated into the design of the development, including a record of all inspections and copies of all maintenance-related work orders.

- E. The person responsible for maintenance shall evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed.
- F. The person responsible for maintenance shall retain and make available, upon request by any public entity with administrative, health, environmental, or safety authority over the site, the maintenance plan and the documentation required by Sections 10.B.6 and 10.B.7 of the Township's stormwater ordinance.
- G. In the event that the stormwater management facility becomes a danger to public safety or public health, or if it is in need of maintenance or repair, the municipality shall so notify the responsible person in writing. If the responsible person fails or refuses to perform such maintenance and repair, the municipality or County may immediately proceed to do so and shall bill the cost thereof to the responsible person.

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

VI. Plan Consistency

The Township is not within a Regional Stormwater Management Planning Area and no TMDLs 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 TMDLs. If any RSWMPs or TMDLs are developed in the future, this Municipal Stormwater Management Plan will be updated to be consistent. As indicated previously, a Regional watershed plan is being developed for the Pompeston Creek watershed. However, per a 10/6/04 conversation with Sandy Blick, NJDEP Watershed Mgmt, no regional plans have been adopted. **As indicated previously, however, the Regional Plan currently being developed for the Pompeston Creek watershed. Once adopted, watershed-specific amendments to the Township plan will be necessary.**

The Municipal Stormwater Management Plan is consistent with the Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21. The municipality will utilize the most current update of the RSIS in the storm water management review of residential areas. This Municipal Stormwater Management Plan will be updated to be consistent with any future updates to 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 Standards. During construction, Township inspectors will observe on-site soil erosion and sediment control measures and report any inconsistencies to the Burlington County Soil Conservation District.

VII. Nonstructural Stormwater Management Strategies

Non-structural stormwater strategies for design of **new** developments, or redevelopment, as defined per the NJDEP Stormwater design Regulations (NJAC -5.3(b)), include the following objectives:

- A. Protection of areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss.
- B. Minimizing impervious surfaces and breakup or disconnecting the flow of runoff over impervious surfaces.
- C. Maximum protection of natural drainage features and vegetation.
- D. Minimizing the decrease in the "time of concentration" from pre-construction conditions to post-construction conditions.
- E. Minimizing land disturbance during clearing and grading.
- F. Minimizing soil compaction.
- G. Providing low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers and pesticides.
- H. Providing vegetated open channel conveyance systems discharging into and through stable vegetative areas.
- I. Providing other source controls to prevent or minimize erosion or discharges.

It should be noted that, per review of the Existing Conditions and Development Constraints Maps within **Appendix A** of this report, that there is less than one (1) square mile of undeveloped, unconstrained land within Cinnaminson Township. As such, Cinnaminson Township is exempt from the requirement to evaluate the extent to which the Township's Master Plan implements the non-structural strategies referenced above. **See Section VIII of this plan for calculations**

However, Cinnaminson Township has adopted the NJDEP model stormwater control ordinance, as amended for use and enforcement within the Township. This ordinance includes methodologies for incorporating non-structural stormwater strategies identified above, in design, "to the maximum extent practicable".

If an applicant (or his/her Engineer) contends that it is not feasible for engineering, environmental, or safety reasons to incorporate any nonstructural stormwater management strategies identified in (b) below into the design of a particular project, the applicant will identify the strategy and provide a basis for the contention. It is understood that any project requiring NJDEP Land Use Regulation Program permitting or approvals will also be subject to a similar stormwater review by the appropriate agency.

VIII. Land Use/Build-Out Analysis

An assessment of buildable land was performed for Township property using 2002 NJDEP GIS aerial mapping of developed and wetlands areas, including assumed intermediate freshwater wetlands development buffers of 50 feet. Developed, developable and non-developable areas were estimated as follows:

<u>Land Cover</u>	<u>Total area (square miles)</u>
Developed lands	6.20
Wetlands/buffers and floodplain	1.41
Partially Developed land	0.35
Undeveloped land	0.05
	Total 8.01

As stated previously, since there is less of one (1) square mile of vacant or developable lands, outside of environmentally-constrained areas remaining in the Township, Cinnaminson is exempt from the requirement to perform a build-out analysis of the municipality.

IX. Mitigation Plans

Mitigation plans may be provided for a proposed development(s) that is granted a variance or exemption from the stormwater management design and performance standards. Mitigation projects can be identified in the plan under three (3) categories: Groundwater Recharge; Water Quality; and Water Quantity.

It should be noted that Rutgers University is completing a Regional Stormwater Management Plan for the Pompeston Creek Watershed, including identifying prospective mitigation projects. At least some projects within the watershed will likely be within the Township's portion of the watershed.

At the discretion of the Township, a mitigation plan using forthcoming information may be added to its Stormwater Management Plan at a future date when it is available.

X. Stream Corridor Protection Plan (Optional)

It should be noted that there are no Special Water Resource protection areas designated Category One (NJAC 7:9B) or upstream perennial or intermittent streams of said waters within Cinnaminson Township.

If such water bodies are found or designated at a later date, future major development within 300 feet of said waters will be regulated in accordance with NJAC 7:8-5.5(h) as outlined in the Township's ordinance.

Appendix A -- Mapping

Figure 1 – U.S.G.S. Quadrangle/ Hydrologic Units (HUC14s)

Figure 2 – Wellhead Protection Areas/Groundwater Recharge Areas

Figure 3 – Zoning Districts

Figure 4 – Wetlands

Figure 5 – Soils

Figure 6 – Floodprone Areas

Figure 7 – Aerial Photo of Existing Conditions

Figure 8 – Development Constraints Map

Appendix B – Model Stormwater Ordinance