

DECEMBER, 2005

**Municipal Stormwater
Management Plan**
for
Lower Township

Prepared By

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**REMINGTON
VERNICK
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Municipal Stormwater
Management Plan
Lower Township
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Municipal Stormwater Management Plan
For
Lower Township
Cape May County, New Jersey

I. Introduction

The following Municipal Separate Stormwater System (MS4) stormwater plan was prepared by Remington, Vernick & Walberg Engineers for Lower 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 Lower Township.

The majority of Township-specific and natural resource information presented in this document is cited from the following sources:

1. NJDEP Geographic Information System (GIS) Mapping and data.
2. Information from Cape May County website posted regarding the ongoing Cox Hall Creek restoration study, funded by a \$100,000 NJDEP grant and spearheaded by the Cox Hall Creek Focus Group and Cape May County.
3. Burlington County Guidance Supplement to the New Jersey Stormwater Best Management Practices Manual, dated February, 2005, by the Burlington County Bridge Commission.

This **Municipal Stormwater Management Plan (MSWMP)** documents the strategy for Lower 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.

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. Preventative and corrective maintenance strategies are included 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.

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

Lower Township has a total area of approximately 31.1 square miles, including approximately 28.2 square miles of land and 2.9 square miles of water.

Lower Township borders Middle Township, Wildwood City, Wildwood Crest Borough, Cape May City, West Cape May Borough, Cape May Point Borough, the Delaware Bay, and the Atlantic Ocean.

The Township contains several towns within its western portion, most notably North Cape May and the Villas, both along the Delaware Bay, as well as Erma (immediately west of Route 9). Both Route 9 and the Garden State Parkway terminate within the Township.

In addition, the Cape May County Airport and a portion of the Cape May County Park South are located within the northwest portion of the Township.

The permanent population has increased since 1960, with the peak population increase occurring between (1960-1990), from (6,332-20,820), respectively. 2005 population was estimated at 23,881 and a 2020 permanent population of 26,288 is forecast by the County.

Similarly, larger summer populations are recorded and forecast by the County for lower, including a recorded 2005 summer population of 88,626 and a forecast 2020 summer population of 96,844.

As indicated on the enclosed USGS, wetlands and development constrained mapping (Appendix A of Report), most developed or developable land within the Township is situated west of the Garden State Parkway. East of the Parkway is tidal waters, back bays and coastal wetlands, including but not limited to the Atlantic Ocean, the Intracoastal Waterway, a portion of Sunset Lake, the Upper Thorofare and various smaller waterways and channels.

As indicated on the USGS maps, there are eight (8) recorded subwatersheds (HUC-14's) with the Township. These subwatersheds are part of three (3) watersheds as designated by the US Geologic Service (USGS), and monitored by the USEPA and NJDEP:

is

<u>USGS Number</u>	<u>Watershed</u>	<u>Description</u>
02040204	Delaware Bay	Southwestern corner of the Township, Bayside
02040302	Great Egg Harbor	Eastern portion of Township, including coastal waters as described above.
02040206	Cohansey-Maurice	Western portion of Township, including Cox Hall Creek and Majority of development within the 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.

It should be noted that there are no water monitoring (i.e., AMNET) stations located with Lower Township. The nearest AMNET station is situated approximately ½ mile north of Lower, within Middle Township. As such, there is no public State monitoring data regarding surface water quality within Lower.

It should be noted however, that there is an ongoing assessment and Westlands Restoration Feasibility Study of Cox Hall Creek and the surrounding subwatershed, as funded by an NJDEP grant. This study is being spearheaded by the Cox Hall Creek focus group in conjunction with the NJDEP, including members of the County Planning Department, the County Mosquito Commission and the Lower MUA (LTMUA).

According to study information posted on-line by the County, Cox Hall Creek is a complex drainage system in Lower Township, Cape May County with numerous tributaries. It is affected by development surrounding its perimeter and its Delaware Bay outfall exhibits a seasonal contravention of bacterial standards, as well as elevated levels of ammonia, total phosphate, organic nitrogen, and nitrates.

Local residents and visitors use adjacent Delaware Bay beaches for swimming and other recreational activities. Horseshoe crabs use the beaches for annual nesting and the area is on the seasonal flyway for numerous migrating birds. The outfall also has the potential to impact nearby shellfish beds. When the outfall is closed the site becomes eutrophic. There are at least ten storm water outfall pipes that empty into the creek and many more that bring storm water into this micro watershed. The goal of this project is to develop baseline data and modeling which will result in the development of potential restoration scenarios.

V. Design and Performance Standards

The Township will adopt 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 (**Appendix B**), as amended for use and enforcement within Lower 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). The ordinances will be submitted to the county for review and approval in 2006 (i.e., within 24 months of the effective date of the Stormwater Management Rules).

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

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.

VI. Plan Consistency

The Township is not within a Regional Stormwater Management Planning Area, therefore this plan does not need to be consistent with any regional stormwater management plans (RSWMPs). As indicated previously, Total Maximum Daily Loads have been established for the Delaware River between Trenton and the Delaware Bay; as such future development must comply with the established TMDL's as appropriate.

If any RSWMPs or (new) TMDLs are developed in the future, this Municipal Stormwater Management Plan will be updated to be consistent.

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 Cape-Atlantic Soil Conservation District (CACD).

Finally, any specific stormwater recommendations that may result from the Cox Hall Creek study may be added to the Township's stormwater plan at a later date.

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.

As indicated previously, Lower Township will adopt 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" for future major development projects. As such, the proposed Master Plan (existing Master Plan plus Municipal Stormwater Plan and ordinance, when approved) will adequately address non-structural stormwater management strategies.

Also included in **Appendix C** of Lower's Stormwater management plan is a review of the Township's existing ordinances for allowing use of non-structural stormwater management strategies using the "Municipal Regulations Checklist" from Appendix B of the New Jersey Stormwater Best Management Practices (BMP) Manual, dated February, 2004. As indicated, the Township's existing codes and Master Plan are compliant with many of the non-structural strategies.

(Note: This review is ongoing and will be completed by the operative date (deadline) of February 2, 2006).

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.

Once the ordinance text is finalized, it will be submitted to the Cape May County Planning Board for review and approval by April, 2006. A copy will be sent to the Department of Environmental Protection at the time of submission.

VIII. Land Use/Build-Out Analysis

There are four steps to preparing a build-out analysis that satisfies the requirements for the municipal stormwater management plan:

1. Determine the total land area within each of the HUC14s of the municipality.
2. Determine the area of constrained lands within each HUC14 of the municipality.
3. Determine the land available for development by simply subtracting the constrained lands from the total land area for each HUC14. In essence, the land available for development is the agricultural, forest and/or barren lands available within each HUC14. Existing residential, commercial, and industrial areas are also eligible for redevelopment and should be considered as land available for development.
4. For each HUC14, complete a build-out analysis by using the municipal zoning map and applicable ordinances to determine the acreage of new development. Once the build-out acreage of each land use is determined for each HUC14, nonpoint source loadings can be determined for the build-out scenario.

(This buildout will be performed prior to Operative (due) Date of February 2, 2006)

IX.

Mitigation Plans (OPTIONAL, IF DESIRED BY LOWER TOWNSHIP)

The following mitigation-related information is excerpted from the **Burlington County Guidance Supplement to the New Jersey Stormwater Best Management Practices Manual**:

A mitigation program must be offered by a municipality in order to allow developers to meet on-site development requirements at an off-site location. Without such a plan, a municipality **cannot** grant a waiver or exemption from the strict stormwater recharge, quality and quantity regulations promulgated by the NJDEP.

Municipal stormwater management plans, unless alternative mitigation strategies and requirements are included, must incorporate design and performance strategies that are at least as stringent as those developed in the adopted Stormwater Management Rules, N.J.A.C. 7:8 (New Jersey Stormwater Best Management Practices Manual, 2004). These design and performance strategies impact three areas:

1. Maintaining groundwater recharge from a proposed development;
2. Minimizing a proposed development's negative impact on local and regional flooding; and
3. Minimizing a proposed development's impact on water quality.

The first and preferred option for stormwater mitigation is the identification and implementation of projects within the impacted watershed that will compensate for the non-compliant stormwater improvements at a 1:1 ratio.

The "impacted watershed" is defined as the area contributing directly to the site, or, if permitted by the regulating agency, the confines of the same HUC- 14. The project may be within the same HUC-14 rather than the contributing area only if the regulating agency finds that the mitigation project will equally protect public health, safety and welfare, the environment, and public and private property.

The third and least preferable option for stormwater mitigation is for the applicant to fund a stormwater project identified by the municipality.

However, with this option, the municipality, and not the applicant, is responsible for design, property acquisition, construction bidding, construction, construction management, short-term (in addition to long-term) maintenance, and follow-up study.

The municipality may allow a developer to provide funding or partial funding to the municipality 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.

(Mitigation plans will be incorporated into the final stormwater plan if/as desired by the Township)

X. Stream Corridor Protection Plan (Optional)

There are no Special Water Resource protection areas designated Category One (NJAC 7:9B) or upstream perennial or intermittent streams of said waters within Lower 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 model stormwater 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

Figure 4 – Wetlands

Figure 5 – Soils

Figure 6 – Floodprone Areas

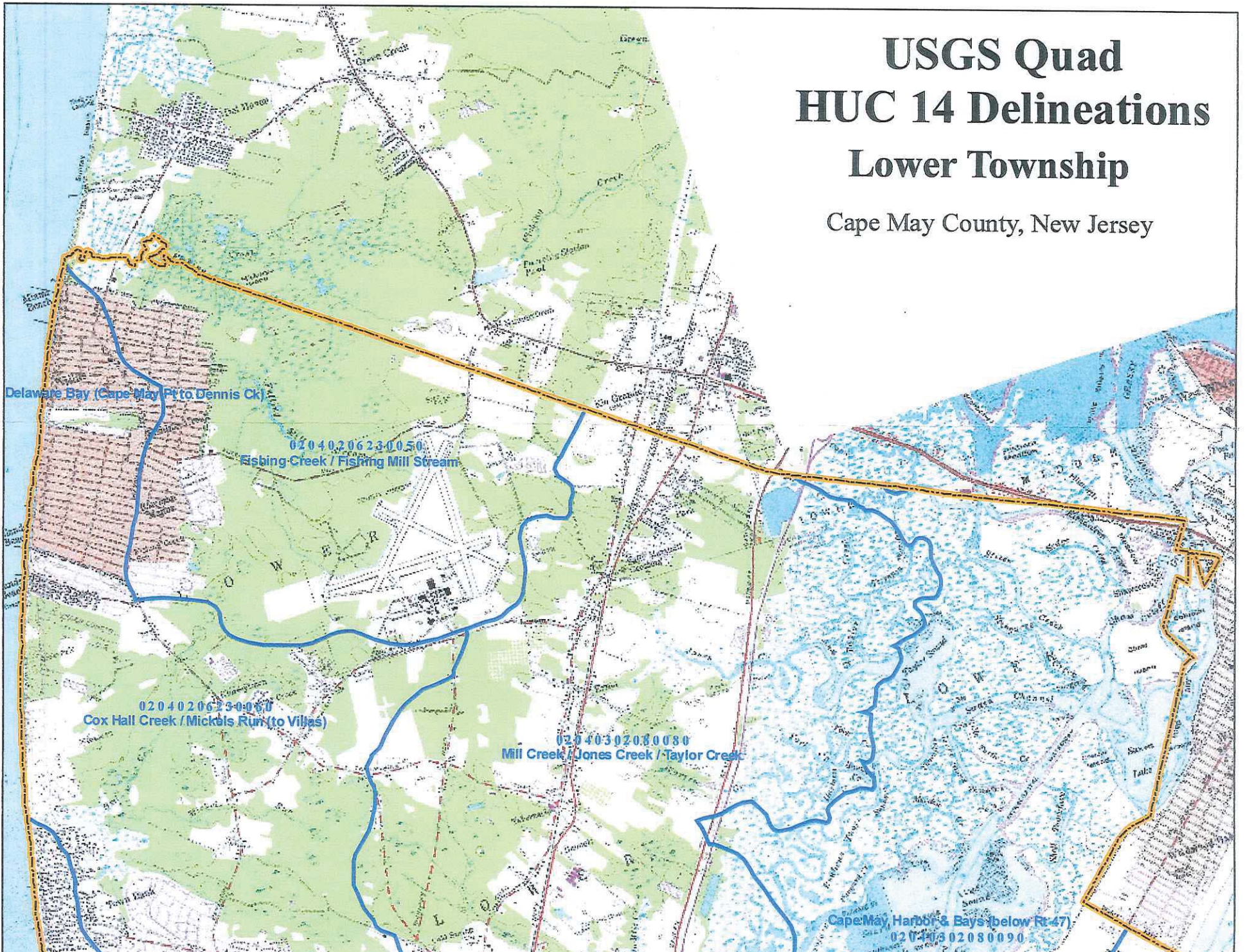
Figure 7 – Aerial Photo of Existing Conditions

Figure 8 – Development Constraints Map

Figure 9 – Developable Land

USGS Quad HUC 14 Delineations Lower Township

Cape May County, New Jersey

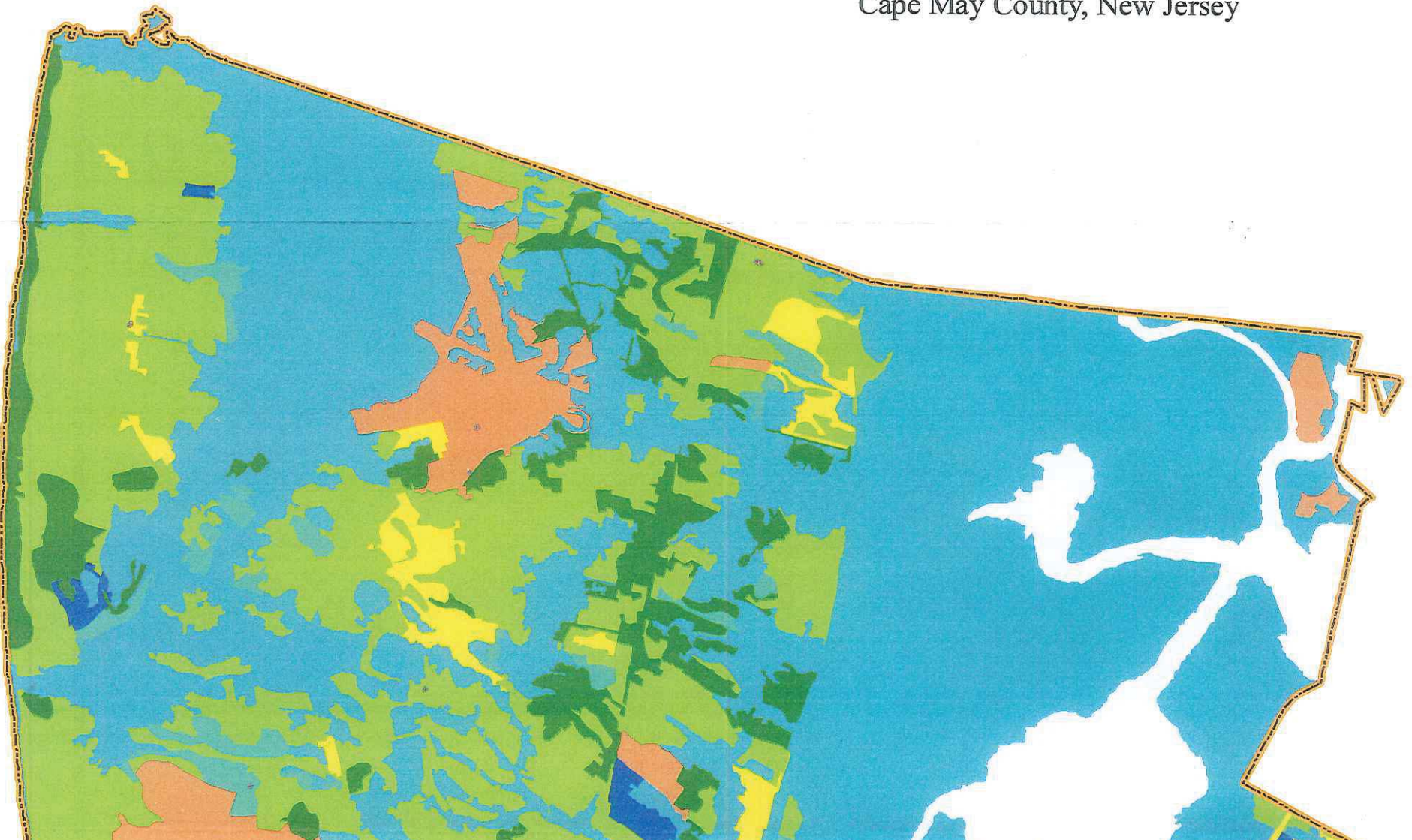




Well Head Protection Areas Groundwater Recharge Values

Lower Township

Cape May County, New Jersey



REVISIONS		
4-23-2004	ORAG F. REMINGTON	23924
9-25-2005	ORAG F. REMINGTON	23924
12-8-2005	ORAG F. REMINGTON	23924
4-6-2006	ORAG F. REMINGTON	23924

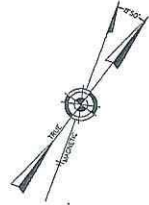
NOTE:
APPROXIMATE MEAN HIGH WATER LINE AS TAKEN FROM LOWER TOWNSHIP TAX MAP.

ZONING DESIGNATIONS

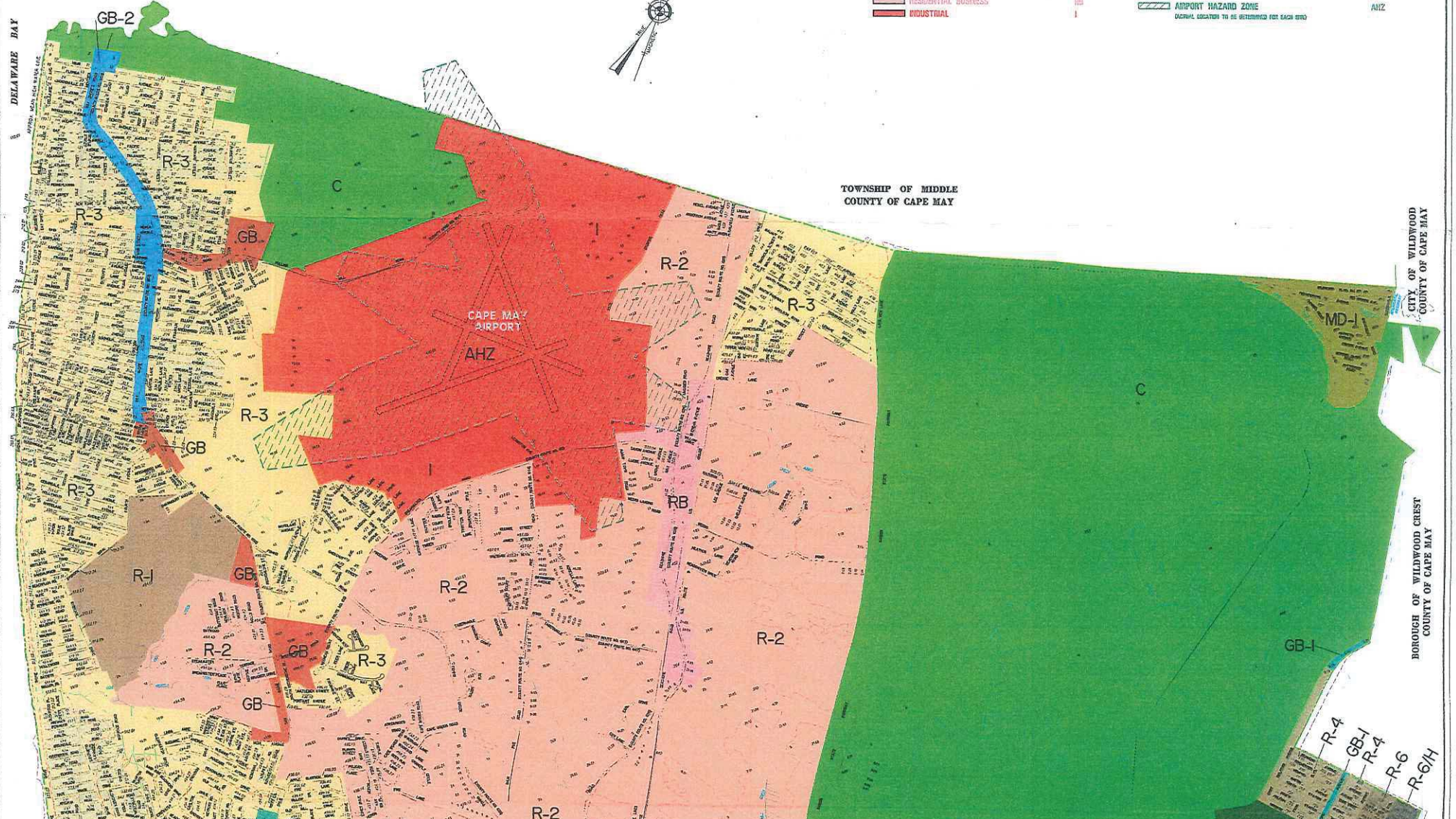
LAST REVISION: MARCH 9, 2006
BASE MAP REVISION: 9-23-2004

	R-1		GB
	R-2		GB-1
	R-3		GB-2
	R-4		MD
	R-5		MD-1
	R-6		MGB
	R-6/H		MH
	RB		C
	I		AHZ

GENERAL LOCATION TO BE DETERMINED FOR EACH ZONE



DELAWARE BAY



TOWNSHIP OF MIDDLE
COUNTY OF CAPE MAY

CITY OF WILDWOOD
COUNTY OF CAPE MAY

BOROUGH OF WILDWOOD CREST
COUNTY OF CAPE MAY