



# **WALL TOWNSHIP**

## **STORMWATER MANAGEMENT PLAN**

**PREPARED FOR:**  
TOWNSHIP OF WALL  
2700 ALLAIRE ROAD  
WALL, MONMOUTH COUNTY, NEW JERSEY

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\*item follows the page number listed

## 1.0 INTRODUCTION

PMK Group (PMK) is pleased to present this Municipal Stormwater Management Plan (MSWMP) in accordance with the *Stormwater Management Rules (Rules, N.J.A.C. 7:8)*. This MSWMP documents the strategy for Wall Township (Township) to address stormwater-related impacts. The creation of this plan is required by the *Municipal Stormwater Regulations (N.J.A.C. 7:14A-25)* and contains all of the required elements described in the *Rules*. The plan 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 or increasing impervious surface by one quarter acre or more. These standards are intended to minimize the adverse impact of stormwater runoff on water quality and water quantity and the loss of groundwater recharge that provides base flow 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 included in this plan based upon existing zoning and land available for development. 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 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.

## 2.0 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, an increase in nonpoint pollution;
- maintain the integrity of stream channels for their biological functions, as well as for drainage;
- minimize pollutants in stormwater runoff from new and existing development to restore, enhance, and maintain the chemical, physical, and biological integrity of the waters of the state, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, and other uses of water; and
- protect public safety through the proper design and operation of stormwater basins.

Within Monmouth County's *Growth Management Guide*\*, the following goal relative to water resources was identified:

- provide all of Monmouth County with a safe and pollution-free water environment, and conserve valuable water-oriented resources.

\* This is the Monmouth County Master Plan

The following prioritized issues were noted in the *Issues List for Watershed Management Area 12*:

Water Quality

- improve water quality in the Shark River to upgrade shellfish classification to “Approved”
- control stormwater volumes to prevent impairment to regional beaches and shellfish areas;
- protect the quality of the Glendola Reservoir
- improve and protect water quality in Wreck Pond

Sedimentation

- dredge Shark River and Wreck Pond
- decrease sedimentation within the Shark River to improve boating conditions
- dredge Old Mill and Hurley Pond

Natural Resource Management (Habitat and Wetlands)

- designate certain areas of Shark River as a wildlife sanctuary
- preserve the floodplains that remain in their natural condition
- protect marshes associated with the Shark River

Public Awareness

- educate citizens about non-point source pollution

No additional goals relative to stormwater were identified in the *1999 Master Plan*.

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. The following represents how each of the goals listed above will specifically be achieved:

- Implement land use controls through non structural or low impact design techniques first, then structural BMPs if necessary. Minimization of stormwater discharges will be implemented and enforced by this Plan and Ordinance. Additionally, this Plan and Ordinance will serve to require minimization of any increase in runoff by requiring

demonstration of no increase in post construction runoff rates leaving the site and that an increased volume or change in timing of runoff will not increase flood damage at or downstream of the site for new development.

- The minimum design standards for erosion control are those established under the Soil Erosion and Sediment Control Act which this Plan and Ordinance has incorporated.
- The adequacy of existing and proposed culverts and bridges, and other in stream structures shall be assured by preventative and corrective maintenance strategies are included in the plan to ensure long-term effectiveness of stormwater management facilities.
- Groundwater recharge will be maintained by demonstrating that the average annual pre-construction recharge volume for a site is maintained or the increased volume from the pre-construction to post construction for the 2-year storm is infiltrated.
- Stormwater from areas of high pollutant loading are not to be recharged so as not to increase non point source pollution. In addition, there shall be no increase in stormwater runoff to waters classified as FW1 and impacts of concentrated flow to threatened and endangered species. Management measures to be enforced by the Township also include the reduction of the post construction nutrient load from the developed site to the maximum extent feasible.
- Special resource protection areas will also be required for all Category One waters.
- .The Plan also outlines safety standards for stormwater infrastructure to be implemented to protect public safety.
- Through the Township's NJPDES Municipal Stormwater Permit, management of stormwater from existing development will also be achieved by requiring the retrofit of existing structural facilities, eliminating illicit discharges, prevention or minimizing exposure of pollutants to stormwater and control of floatables.

### 3.0 STORMWATER DISCUSSION

#### 3.1 HYDROLOGIC CYCLE

The hydrologic cycle or water cycle (Figure 1) is the continuous circulation of water between the ocean, atmosphere and land. The driving force of this natural cycle is the sun. Water, stored in oceans, depressions, streams, rivers, waterbodies, vegetation and even land surface, continuously evaporates due to solar energy. This water vapor then condenses in the atmosphere to form clouds and fog. After water condenses, it precipitates, usually in the form of rain or snow, onto land surfaces and waterbodies. Precipitation falling on land surfaces is often intercepted by vegetation. Plants and trees transpire water vapor back into the atmosphere, as well as aid in the infiltration of water into the soil. The vaporization of water through transpiration and evaporation is called evapo-transpiration. Infiltrated water percolates through the soil as groundwater, while surface water flows overland. Groundwater and surface water flow to major waterbodies and eventually flows to the Earth's seas and oceans. This constant process of evapo-transpiration, condensation, precipitation, and infiltration comprises the hydrologic cycle.

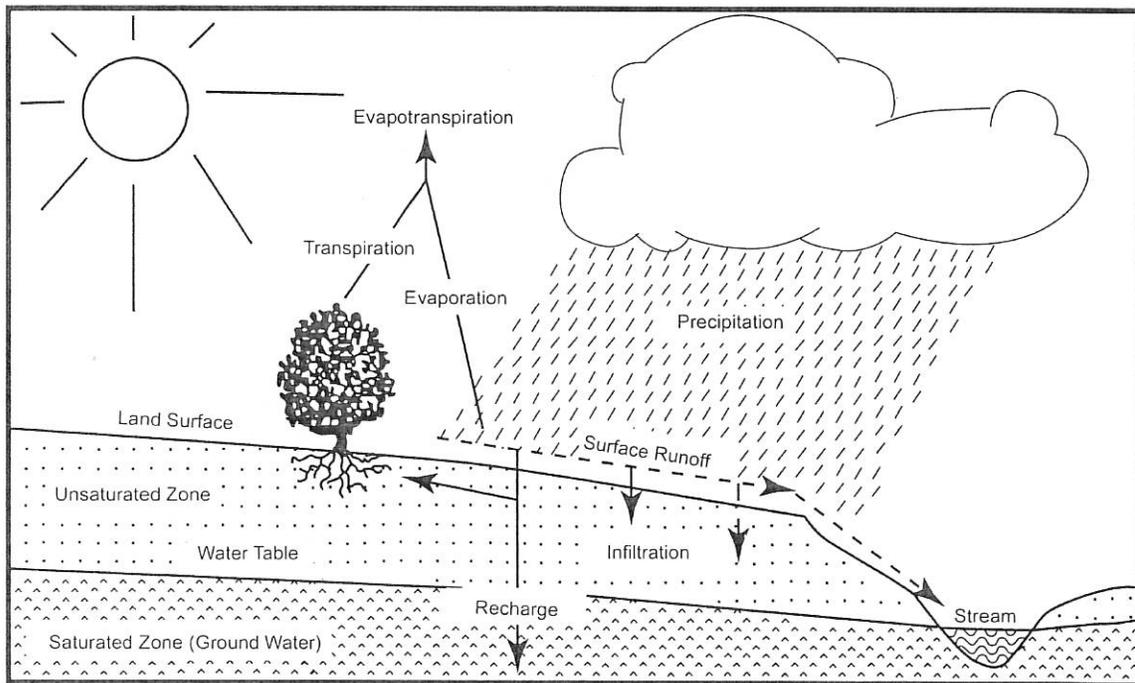


Figure 1: Groundwater Recharge in the Hydrologic Cycle

Source: New Jersey Geological Survey Report GSR-32

### **3.2 STORMWATER IMPACTS**

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.

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, 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.

Water quantity impacts combined with land development often adversely impacts stormwater quality. Impervious surfaces and cleared areas created by development collect pollutants from the atmosphere, fertilizers and pesticides, animal wastes, as well as pollutants from motor vehicle usage. Pollutants such as metals, suspended solids, hydrocarbons, pathogens, and nutrients collect and concentrate on impervious surfaces. During storm events, these pollutants are washed directly into storm sewer systems.

In addition to chemical and biological pollution, thermal pollution can occur when water travels over heated impervious surfaces or collects in stormwater impoundments that are not shielded from the sun. Thermal pollution can affect aquatic habitats, adversely impacting cold water fish

species such as trout. Removal of shade trees and stabilizing vegetation from stream banks also contributes to thermal pollution.

Proper stormwater management will help mitigate the negative impact of land development and its effect on stormwater. This MSWMP outlines the Township's plan to improve stormwater quality, decrease stormwater quantity, and increase groundwater recharge. By managing stormwater, the Township will improve the quality of aquatic ecosystems and restore some of the natural balance to the environment.

## 4.0 BACKGROUND

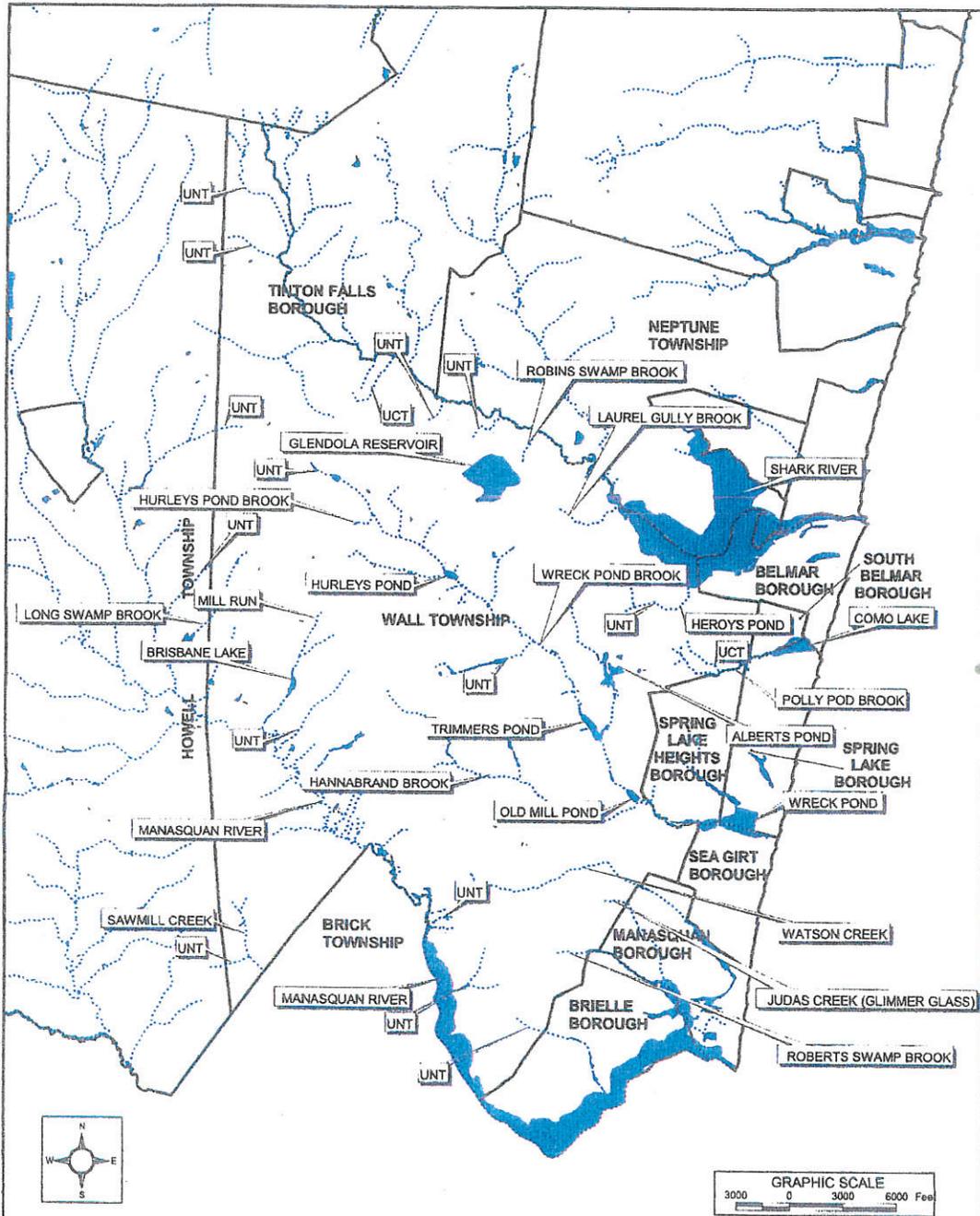
### 4.1 TOWNSHIP CHARACTERISTICS

The Township encompasses a 31 square mile area in Monmouth County, New Jersey. The Township is bordered to the east by the seashore communities of Belmar, Sea Girt, Spring Lake, Spring Lake Heights, Brielle and Manasquan; to the south by the Manasquan River and the Monmouth/Ocean County boundary; and to the north by the Shark River and the communities of Neptune, Colts Neck, and Tinton Falls; and to the west by Howell Township. According to the *1999 Master Plan*, approximately 70% of the Township is zoned for residential uses. The balance is zoned for various business and industrial uses (retail, commercial, office and light or general industry).

There are several major watercourses in the Township, including the Wreck Pond Brook, Shark River, Manasquan River and Glendola Reservoir. Figure 2, Township and its Waterways, illustrates the waterways in the Township.

Topography is variable throughout the Township. The *1999 Master Plan* indicates that there are 811 acres in the Township that exceed a 15% slope. The following areas are characterized by steep slopes: the site of a former resource extraction operation in the southeastern part of the Township, an area along the Manasquan River in Allaire State Park, and an area toward the northern border of the Township in the vicinity of the Shark River. Figure 3, USGS Topographic Map, depicts the Township boundary on USGS quadrangle maps.

Soils are highly variable throughout the Township. The soil classifications within the Township consist of Sassafras-Downer-Woodstown, Lakewood-Lakehurst-Evesboro-Klej, Sulfaquents-Sulfihemists-Hooksan and Humaquespts-Manahawkin. Sassafras-Downer-Woodstown soils are nearly level to steep, well drained loamy soils on the uplands. Lakewood-Lakehurst-Evesboro-Klej soils include nearly level to moderately sloped, somewhat poorly drained sandy soils on the upland areas. Sulfaquents-Sulfihemists-Hooksan soils are also nearly level and gently sloping, poorly drained mucky and sandy soils mostly on the coastal areas and tidal flats. Humaquespts-Manahawkin soils are nearly level, poorly drained mucky and sandy soils located in the floodplain and low lying areas of the Township. Infiltration rates vary throughout the Township from 9-19 inches/year.



**WALL TOWNSHIP and Its WATERWAYS**

**LEGEND**

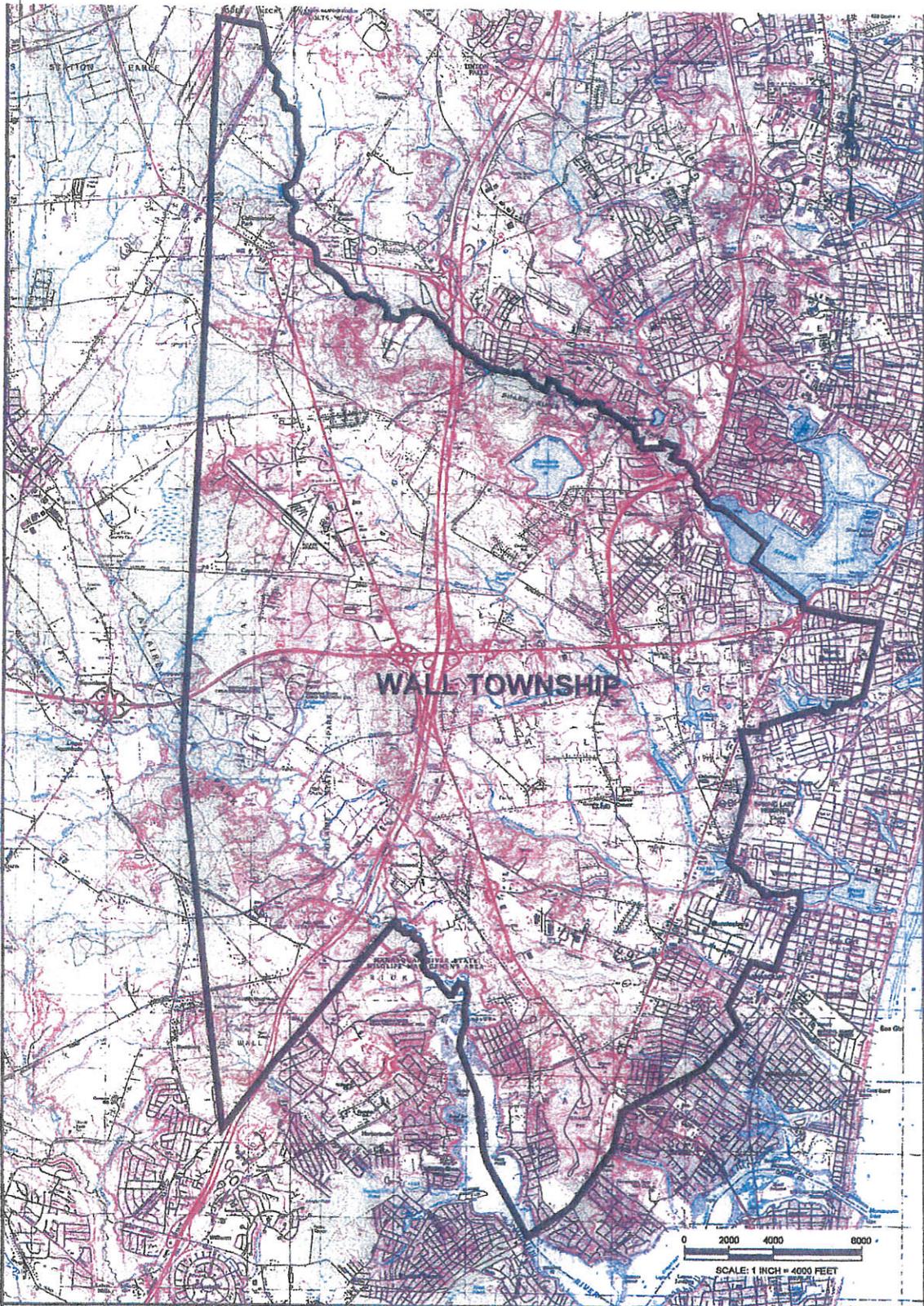
- MUNICIPAL BOUNDARY
- LAKES
- STREAMS
- UNT: UN-NAMED TRIBUTARY
- UCT: UN-CODED TRIBUTARY

SOURCE:  
NJDEP digital GIS data.

WALL TOWNSHIP  
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SOURCE: U.S.G.S. 7.5 MINUTE SERIES  
 POINT PLEASANT, ASBURY PARK,  
 FARMINGDALE & LAKEWOOD QUADRANGLES,  
 (1989).

WALL TOWNSHIP  
 2700 ALLAIRE ROAD  
 MONMOUTH COUNTY, NEW JERSEY

**USGS TOPOGRAPHIC MAP**

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	CONTRNO	DS	SCALE	AS NOTED
PROJECT NO:	051328-03		FIGURE	3

#### **4.1.1 Population and Housing Trends**

In recent years, the Township has been under significant development pressure. According to the *1999 Master Plan*, the population of the Township has more than doubled since 1960 (11,929 persons) to 25,261 persons in 2000. This population increase has resulted in considerable demand for new development; changes in the landscape have most likely increased stormwater runoff volumes and pollutant loads to the waterways of the municipality.

*Monmouth County At-A-Glance* information indicates that the population of the Township is projected to reach 28,421 persons in 2010 and 30,920 in 2020.

The number of housing units has also dramatically increased. According to *U.S. Census Bureau* data, there were 9,957 housing units in the Township in 2000, a 26% increase from 7,896 housing units in 1990.

*Monmouth County At-A-Glance* information indicates that the number of households in the Township has also increased at a fast rate. There were 6,533 households in 1980, 7,364 households in 1990 and 9,437 households in 2000. The *1999 Master Plan* indicates that the average household size is decreasing, following State and national trends.

#### **4.1.2 Land Use**

According to *Table 1* within the *1999 Master Plan*, 76.5 percent of the Township is comprised of residential parcels. The next largest portion of the Township, 12.3 percent, is comprised of vacant parcels. Commercial and industrial parcels occupy 5.1 percent and 0.9 percent of the Township's land, respectively. One and a half (1.5) percent is utilized for agricultural purposes.

#### **4.1.3 Water and Sewer Service**

The Wall Water Department provides potable water service to approximately 80% of the Township. The water supply source is eight (8) groundwater wells and the Manasquan River Reservoir. The remainder of the Township is serviced by New Jersey American Water Company, who maintains the Glendola Reservoir in the northeast corner of the Township.

The sanitary sewer collection systems within the Township are owned and operated by the Wall Sewer Department. Wastewater flows from the majority of the Township are treated at the

Southern Monmouth Regional Sewage Authority Treatment Plant. The western portion of the Township is served by the Manasquan River Regional Sewerage Authority, and an area in the northern part of Wall is served by the Township of Neptune Sewage Authority. Additionally, there are some areas of the Township served by individual septic systems. These areas consist of: Camerville Road section off of Hurley Pond Road, Herbertsville Road, Asbury Avenue, McGill Road and Meeting House Road.

#### **4.1.4 State Development and Redevelopment Plan**

The purpose of the *State Development and Redevelopment Plan (State Plan)* is to coordinate planning activities and establish State-wide planning objectives in the areas of land use, housing, economic development, transportation, natural resource conservation, agriculture and farmland retention, recreation, urban and suburban redevelopment, historic preservation, public facilities and services, and intergovernmental coordination. The *State Plan* designates planning areas that share common conditions with regard to development and environmental features:

- Areas for Growth: Metropolitan Planning Areas (PA-1), Suburban Planning Areas (PA-2) and Designated Centers in any planning area.
- Areas for Limited Growth: Fringe Planning Areas (PA-3), Rural Planning Areas (PA-4), and Environmentally Sensitive Planning Areas (PA-5). In these planning areas, planning should promote a balance of conservation and limited growth—environmental constraints affect development and preservation is encouraged in large contiguous tracts.
- Areas for Conservation: Fringe Planning Area (PA-3), Rural Planning Areas (PA-4), and Environmentally Sensitive Planning Areas (PA-5).

According to the *1999 Master Plan*, the eastern section of the Township is located in the Metropolitan Planning Area (PA-1), with most of the balance of the Township designated as a Suburban Planning Area (PA-2). Allaire State Park, the Manasquan Wildlife Management Area and Shark River County Park are identified as Parks. Some areas along the Shark River and in the north are designated as Environmentally Sensitive and the Glendola Reservoir is identified as a Critical Environmentally Sensitive Area.

#### **4.2 WATERWAYS**

The following watercourses are located in or immediately adjacent to the Township:

- Hannabrand Brook and its tributaries
- An unnamed tributary to Heroy's Pond
- Hurley's Pond Brook and its tributaries
- Judas Creek (Glimmer Glass)
- Laurel Gully Brook
- Long Swamp Brook
- Manasquan River and its tributaries
- Mill Run
- Tributaries to the Mingamahone Brook
- Polly Pod Brook and its tributaries
- Roberts Swamp Brook
- Robins Swamp Brook
- Sawmill Creek
- Shark River and its tributaries
- Watson Creek
- Wreck Pond Brook and its tributaries
- Un-named and/or un-coded tributaries

The following waterbodies are also located in the Township:

- Albert's Pond
- Brisbane Lake
- Glendola Reservoir
- Heroy's Pond
- Hurley's Pond
- Old Mill Pond
- Trimmers Pond
- Wreck Pond

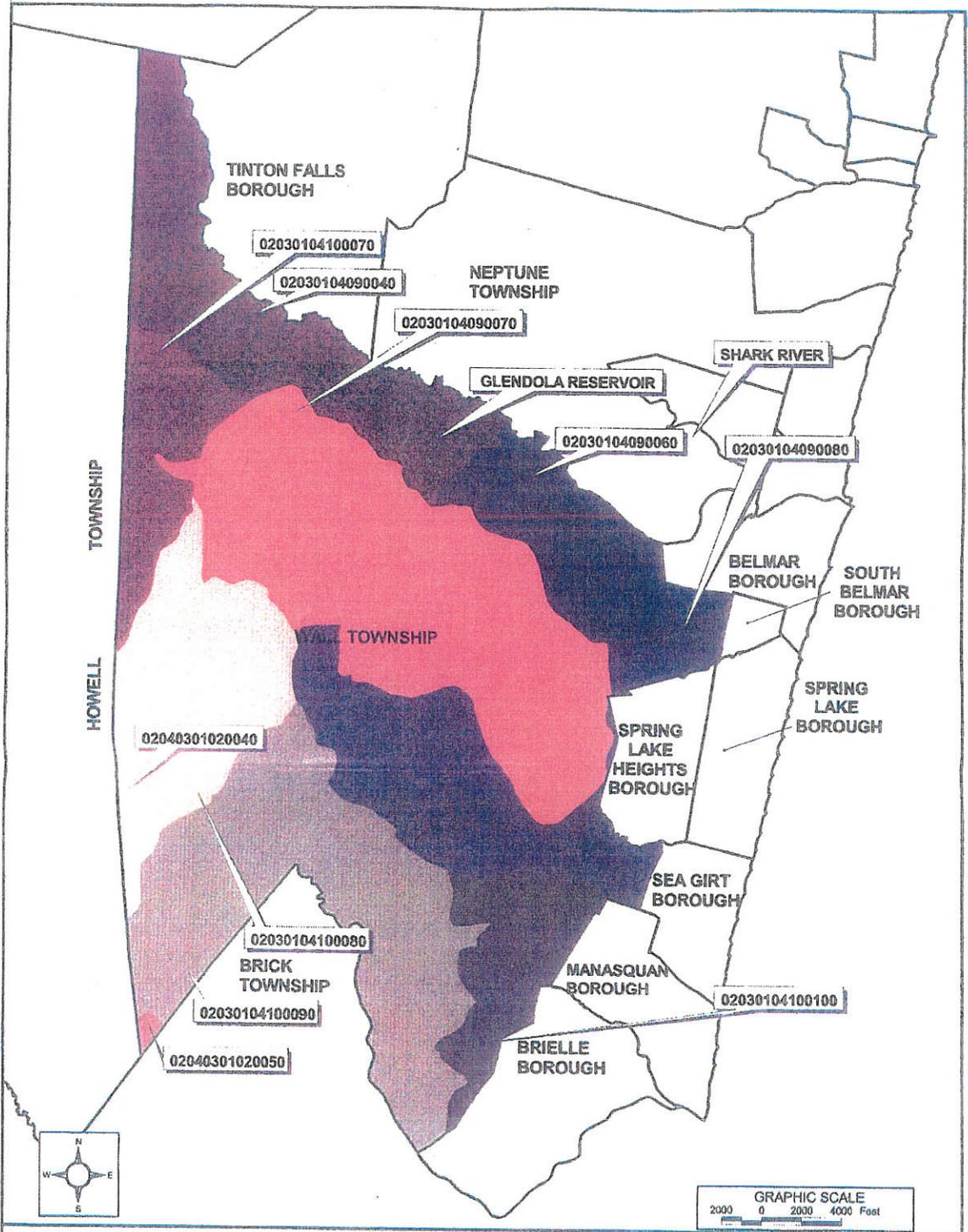
Figure 2, Township and its Waterways, illustrates the waterways in the Township.

The great majority of the Township is located within Watershed Management Area (WMA #12), subtitled Monmouth Watersheds. The small remainder is located in WMA #13, subtitled Barnegat Bay. A Watershed Management Area is subdivided into smaller drainage area units which are defined as HUC-14s. The term "HUC-14" is from the hydrologic unit code system developed by the United States Geological Service for delineating and identifying drainage areas. The system starts with the largest possible drainage areas and progressively smaller subdivisions of the drainage area are delineated and numbered in a nested fashion. A drainage area with a hydrologic unit code (HUC) designation with 14 numbers, or HUC-14, is one of several sub-watersheds of a larger watershed. There are portions of ten (10) HUC-14s within the Township:

- 02030104090040 – Shark River (above Remsen Mill gauge)
- 02030104090060 – Shark River (below Remsen Mill gauge)
- 02030104090070 – Wreck Pond Brook (above Route 35)
- 02030104090080 – Wreck Pond Brook (below Route 35)
- 02030104100070 – Mingamahone Brook (below Asbury Road)
- 02030104100080 – Manasquan River (74d07m30s to Squankum gauge)
- 02030104100090 – Manasquan River (Route 70 bridge to 74d07m30s)
- 02030104100100 – Manasquan River (below Route 70 bridge)
- 02040301020040 – Muddy Ford Brook
- 02040301020050 – Metedeconk River NB (confluence to Route 9)

Figure 4, Hydrologic Units (HUC-14s), illustrates the HUC-14s within the Township.

Special water resource protection areas are those areas within 300 feet of Category One (C-1) waters and their immediate tributaries. C-1 waters are waters that receive special protection under the *Surface Water Quality Standards* because of their clarity, color, scenic setting or other characteristics of aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, or exceptional fisheries resource(s). In addition, the special water resource protection area is required adjacent to those waters that drain to the C-1 water within the limits of the associated sub-watershed (HUC-14). The special water resource protection area is intended as a buffer between development and these special waters in order to protect both water quality and the attributes for which the waters have been designated. The NJDEP has determined that a buffer of 300 feet is necessary to achieve the



**HYDROLOGIC UNIT HUC14**

**LEGEND**

- MUNICIPAL BOUNDARY
- LAKES
- STREAMS
- 02030104090040
- 02030104090060
- 02030104090070
- 02030104090080
- 02030104100070
- 02030104100080
- 02030104100090
- 02030104100100
- 02040301020040
- 02040301020050

SOURCE:  
NJDEP digital GIS data.

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CERTIFICATE OF AUTHORIZATION #BCE-0282200

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Project No. 051328-03	Figure 4

intended goals. The following watercourses within the Township are categorized as Category One (C-1) by the NJDEP:

- Long Swamp Brook
- Several tributaries to the Manasquan River
- Mill Run
- Tributaries to the Mingamahone Brook

Please refer to Table 1 for a summary of watercourse information.

**TABLE 1: Watercourse Information**

Name of Watercourse	HUC-14(s)	Classification(s)
Hannabrand Brook	02030104090080	FW2-NT (C-2)
Unnamed tributary to Heroy's Pond	02030104090060	FW2-NT / SE1 (C-2)
Hurley's Pond Brook	02030104090070	FW2-NT (C-2)
Judas Creek (Glimmer Glass)	02030104100100	FW2-NT / SE1 (C-2)
Laurel Gully Brook	02030104090060	FW2-NT / SE1 (C-2)
Long Swamp Brook	02030104100070	FW2-NT (C-1)
Manasquan River	02030104100080	FW2-TM (C-2)
	02030104100090	FW2-NT/SE1 (C-2)
	02030104100100	FW2-TM (C-1) (trib.)
Mill Run	02030104100090	FW1-TM (trib.)
Tributaries to Mingamahone Brook	02030104100070	FW2-NT (C-1)
		FW2-TM (C-1)
Polly Pod Brook	02030104090080	FW2-TM (C-2)
Roberts Swamp Brook	02030104100100	FW2-NT / SE1 (C-2)
Robins Swamp Brook	02030104090040	FW2-TM / SE1 (C-2)
Sawmill Creek	02030104100090	FW2-NT / SE1 (C-2)
Shark River	02030104090040	FW2-NT (C-2)
	02030104090060	FW2-NT / SE1 (C-2)
Watson Creek	02030104100090	FW2-TM / SE1 (C-2)
	02030104100100	FW2-NT / SE1 (C-2)
Wreck Pond Brook	02030104090070	FW2-NT (C-2)
	02030104090080	

Legend:

FW1 – Those fresh waters that are to be maintained in their natural state of quality and not subjected to man-made wastewater discharges or increases in runoff from anthropogenic activities. These waters are set aside for posterity because of their clarity, color, scenic setting, other characteristic of aesthetic value, unique ecological significance, exceptional recreational significance, exceptional water supply significance, or exceptional fisheries resource(s).

FW2 – General surface water classification applied to those fresh waters that are not designated as FW1 or Pinelands waters.

NT (non trout) – means fresh waters that have not been designated in NJAC 7:9B-1.15(b) through (h) as trout production or trout maintenance waters.

TM – Trout maintenance.

SE1 – General surface water classification applied to saline waters of estuaries, where the designated uses are shellfish harvesting in accordance with N.J.A.C. 7:12; maintenance, migration and propagation of the natural and established biota; primary and secondary contact recreation; and any other reasonable uses.

C-1 (Category One) – means those waters designated for purposes of implementing the antidegradation policies set forth at N.J.A.C. 7:9B-1.5(d) for protection from measurable changes in water quality characteristics because of their clarity, color, scenic setting, other characteristics of aesthetic value, exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, or exceptional fisheries resource(s).

C-2 (Category Two) – waters means those waters not designated as Category One.

Trib. – Tributary

### 4.3 WATER QUALITY

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.

AMNET data from testing sites in Wall Township is available for the following waterbodies: Manasquan River, Shark River, Wreck Pond Brook, and Hannabrand Brook. The following are the watercourses with their AMNET testing locations and classifications:

- Manasquan River, Hospital Road, Wall Township – Non-Impaired
- Shark River, Shark River Road, Wall Township – Severely Impaired
- Shark River, Remsen Mill Road, Wall Township – Moderately Impaired
- Wreck Pond Brook, Old Mill Road, Wall Township – Severely Impaired
- Hannabrand Brook, Old Mill Road, Wall Township – Moderately Impaired

The following watercourse information was obtained from AMNET testing sites in Freehold and Howell Townships:

- Manasquan River headwaters, Turkey Swamp Road, Freehold Township – Moderately Impaired
- Manasquan River, Route 9, Howell Township – Moderately Impaired
- Manasquan River, West Farms Road, Howell Township – Moderately Impaired
- Manasquan River, Route 547, Howell Township – Moderately Impaired
- Mingamahone Brook, Cranbury Road, Howell Township – Moderately Impaired
- Mingamahone Brook, Route 524, Howell Township – Moderately Impaired

No AMNET data were available for the remaining waterbodies.

The Wreck Pond is a tidal pond located in the coastal portion of the Township of Wall and also surrounded by the Borough of Spring Lake, Spring Lake Heights and Sea Girt. The pond is the center of the Wreck Pond Watershed, which covers about 12 square miles and mostly located in

the Township of Wall. Wreck Pond has continued to be impaired with numerous study efforts undertaken to attempt to alleviate the water quality impairments.

The Township of Wall is assisting in the effort to improve the water quality in Wreck Pond watershed by remediating problems within its jurisdiction. The Township has completed two (2) years worth of weekly sampling dating from approximately 2005 and 2006. The Township has received two (2) grants from NJDEP for improvements to sites in the Wreck Pond Brook Watershed. These projects include 1.) Ridgewood Road water quality basins and 2.) Kellers Pond restoration.

NJDEP has also proposed plans to address the water quality problems in the Wreck Pond watershed by identifying and addressing non point source pollution in the watershed by undertaking the development of a Regional Stormwater Management Plan in partnership with the County of Monmouth and the municipalities in the watershed. Additionally, while the Regional Plan is being worked on, NJDEP identified early action projects that would benefit the Wreck Pond. These projects include installing manufactured treatment devices on 15 of the major outfalls that empty into the pond.

In addition to the AMNET data, the NJDEP and other regulatory agencies collect water quality chemical data on the streams in the state. 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. The *Integrated List* is composed of the following four (4) Sublists:

- Sublist 1: Attaining the water quality standard and no use is threatened.
- Sublist 3: Insufficient or no data and information to determine if any designated use is threatened.
- Sublist 4: Impaired or threatened for one or more designated uses but does not require the development of a TMDL.
- Sublist 5: The water quality standard is not attained. The waterway is impaired or threatened for one or more designated uses by a pollutant(s), and requires a Total Maximum Daily Load (TMDL).

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 Pollutant Discharge Elimination System (NJPDDES) permit to discharge, and nonpoint 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 BMPs.

The following watercourses, with their locations, sublist, and sublist constituents are listed on The *New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d)) (Integrated List)*:

<b>Watercourse</b>	<b>Location</b>	<b>Sublist</b>	<b>Sublist Constituents</b>
Hannabrand Brook	Old Mill Rd. near Spring Lake Hts.	1	Phosphorus, Temperature, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, and Unionized Ammonia.
Hannabrand Brook	Old Mill Rd. near Spring Lake Hts.	5	Fecal Coliform
Hannabrand Brook	Old Mill Road in Wall	3	Benthic Macroinvertebrates.
Manasquan River	Hospital Road in Wall	1	Benthic Macroinvertebrates
Manasquan River	Squankum – west of Wall Township	1	Temperature, pH, Dissolved Oxygen, Nitrate, Dissolved Solids, Total Suspended Solids, Unionized Ammonia, Chromium, Copper, Nickel, Selenium, and Zinc.
Manasquan River	Squankum – west of Wall	3	Arsenic, Cadmium, Mercury, and Silver

	Township		
Manasquan River	Squankum – west of Wall Township	4	Fecal Coliform
Manasquan River	Squankum – west of Wall Township	5	Phosphorus
Mingamahone Brook	at Route 524 in Howell Township	5	Benthic Macroinvertebrates
Mingamahone Brook	near Earle	5	pH and total suspended solids
Shark River	Remson Mill Road in Neptune	5	benthic macroinvertebrates
Shark River	Shark River Station Road in Wall	5	benthic macroinvertebrates
Shark River	entire reach	5	Dioxins & PCBs
Wreck Pond Brook	Allenwood Road In Wall	1	Phosphorus and Nitrate.
Wreck Pond Brook	Allenwood Road In Wall	3	pH and Total Suspended Solids
Wreck Pond Brook	Allenwood Road In Wall	4	Fecal Coliform
Wreck Pond Brook	Old Mill Road in Wall	5	benthic macroinvertebrates
Wreck Pond		5	Phosphorus

No data were available for the remaining waterways. *Detailed TMDL Reports* obtained from the USEPA website indicates that fecal coliform TMDLs have been approved/established by the EPA for the following watercourses:

- Manasquan River at Squankum
- Mingamahone Brook near Earle

- Shark River near Neptune City
- Wreck Pond Brook at Allenwood Road in Wall

The NJDEP Division of Watershed Management website indicates that TMDLs have also been approved for the following watercourses:

- Hannabrand Brook at Old Mill Road near Spring Lake Heights in Wall – Fecal coliform
- Manasquan River at Squankum – Phosphorus
- Shark River at Shark River Station Road – Phosphorus
- Shark River near Neptune – Phosphorus

#### 4.4 WATER QUANTITY

According to the *1999 Master Plan*, the following flooding issues were stated in the 1976 flood insurance study commissioned by the federal Department of Housing and Urban Development (HUD):

- The non-tidal sections of the Shark River, the Manasquan River, and Wreck Pond flow in wide, meandering channels. Flood storage provided along the rivers tend to reduce peak flow and increase the duration of the flooding.
- Watson Creek, Judas Creek, Roberts Swamp Brook, Polly Pod Brook, and Heroys Pond Brook flow in well-defined channels. Urbanization in their drainage areas has increased the runoff to the streams. In addition, flooding is aggravated by the accumulation of debris at bridges and culverts.
- Purchase and use of the area along Shark River and Manasquan River as parks has prevented development in the flood plain. This has probably reduced or prevented potential flood damages.

The two (2) areas in the Township that are currently problematic and historically prone to flooding; Robert Swamp Brook and the Old Mill Pond in the Wreck Pond Brook Watershed. The Robert Swamp Brook area is a localized watershed and has improved since an upstream development modified detention basins to accommodate additional storage as well as the NJDOT Route 70 circle reconfiguration which constructed additional basins. The Township continues to monitor the Robert Swamp Brook watershed during storm events. The Old Mill Pond area, located in the Wreck Pond watershed, is being studied further by the Township for

both water quality and water quantity issues. The adopted Stormwater Management Ordinance will aid in both water quality and quantity improvements by requiring major development to comply with the design standards.

#### **4.5 GROUNDWATER RECHARGE**

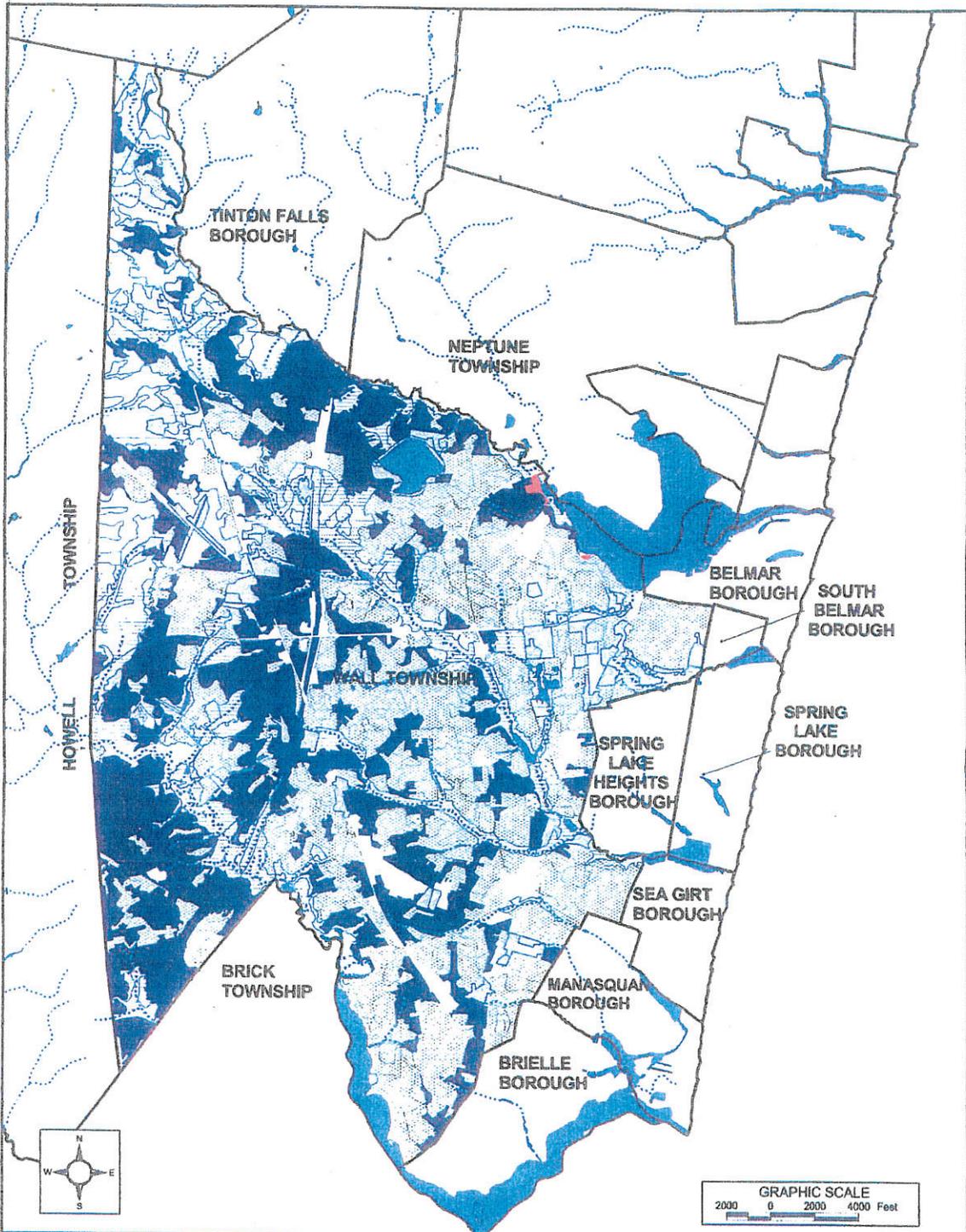
According to NJDEP digital GIS data, recharge rates in the Township are generally between 12 to 19 inches per year.

Please refer to Figure 5, Groundwater Recharge Areas.

#### **4.6 WELLHEAD PROTECTION AREAS**

Public community water systems either pipe water for human consumption to at least 15 service connections used by year-round residents, or regularly serve at least 25 year-round residents (e.g. municipality or subdivision). There are several mapped public community water supply wells or wellhead protection areas located in the Township. The Township is reviewing the need for a wellhead protection ordinance to protect water supply wells from development located in protection zones.

Figure 6, Wellhead Protection Areas, depicts the wells and wellhead protection areas in the Township.



**GROUND WATER RECHARGE AREAS**

**LEGEND**

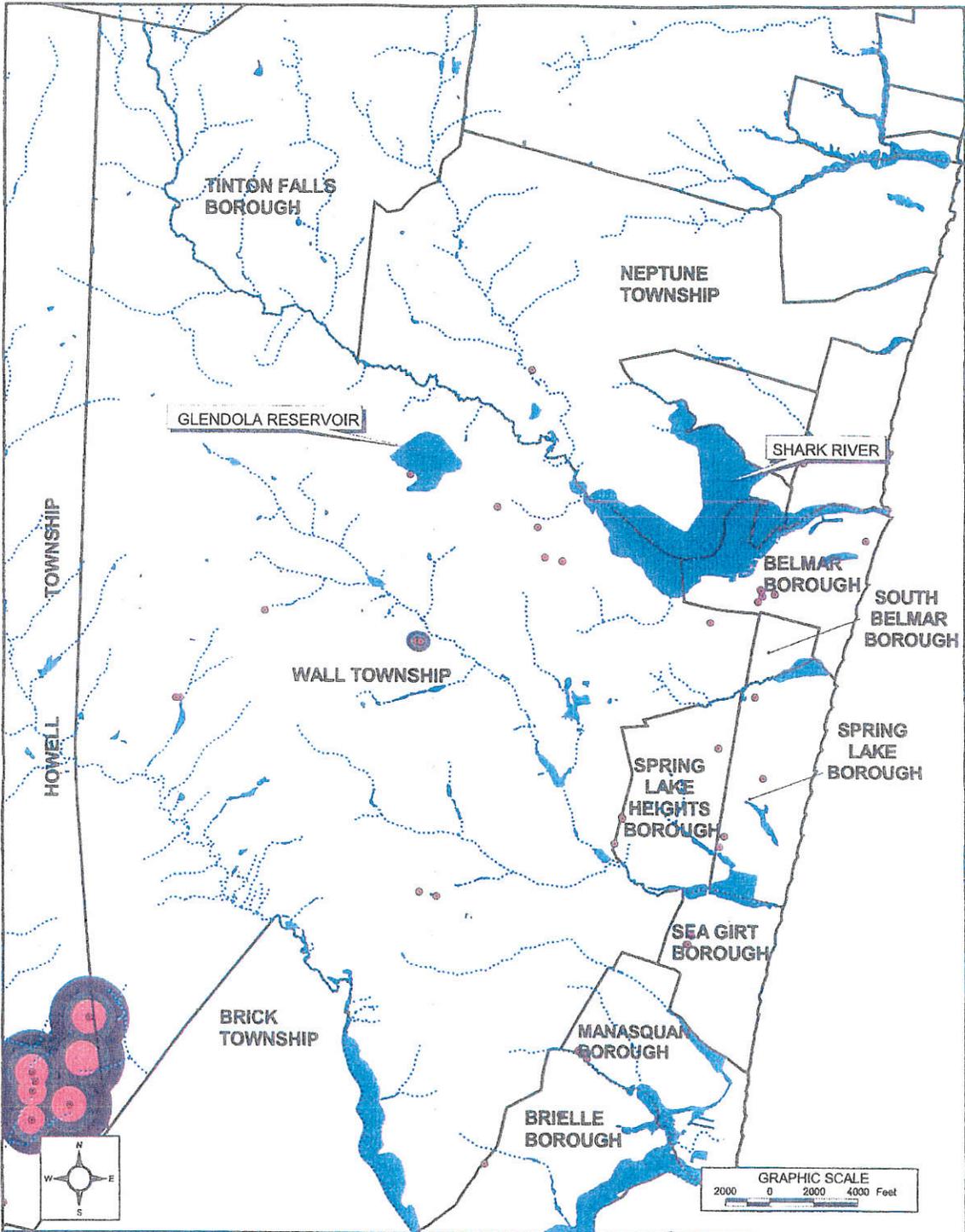
-  MUNICIPAL BOUNDARY
-  LAKES
-  STREAMS
-  16 TO 19 IN/YR
-  12 TO 15 IN /YR
-  9 TO 11 IN/YR
-  1 TO 8 IN/YR
-  0 IN/YR
-  HYDRIC SOILS
-  WETLAND & OPEN WATER

SOURCE:  
NJDEP digital GIS data.

WALL TOWNSHIP  
2700 ALLAIRE ROAD  
MONMOUTH COUNTY, NEW JERSEY

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CERTIFICATE OF AUTHORIZATION #14C0302700

Drawn By: TS	Date: 4/20/05
Checked By: DS	Scale: As Noted
Project No. 051328-03	Figure 5



**WELLHEAD PROTECTION AREAS**

**LEGEND**

- MUNICIPAL BOUNDARY
- LAKES
- STREAMS
- WELLS LOCATION
- TIER 1: TIME OF TRAVEL= 2 YEARS
- TIER 2: TIME OF TRAVEL= 5 YEARS
- TIER 3: TIME OF TRAVEL= 12 YEARS

SOURCE:  
NJDEP digital GIS data.

WALL TOWNSHIP  
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CERTIFICATE OF AUTHORIZATION #EJC-0202800

Drawn By: TS	Date: 4/20/05
Checked By: DS	Scale: As Noted
Project No. 051328-03	Figure 6

## **5.0 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 via the Township's Stormwater Control Ordinance in order to minimize the adverse impact of stormwater runoff on water quality and water quantity and loss of groundwater recharge in receiving water bodies. 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*.

Specifically, the Township shall require the design engineer to prepare a maintenance plan for the stormwater management measure that is proposed by the major development. This maintenance plan shall contain specific preventative and corrective maintenance tasks and schedules, cost estimates and responsible party contact information. Preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measure, including repairs and replacement, removal of sediment, debris and trash, restoration of erosion, snow and ice removal, fence repair or replacement, restoration of vegetation and repair or replacement of non vegetated linings. The person responsible for maintenance shall keep detailed logs and records of all inspections and work orders. The person responsible for maintenance shall evaluate the effectiveness of the maintenance measures contained in the maintenance plan at least once per year and make adjustments as necessary. In the event of non compliance, the Township will notify the responsible party in writing. The responsible party then has fourteen (14) days to conduct the required maintenance and/or repair sufficient to the Township. If the responsible party does not act, the Township can make repairs/conduct the maintenance and bill the cost of same to the responsible party. During construction, Township inspectors will perform periodic inspections of the construction of the project to ensure that the stormwater management measures are constructed and function as designed. The Township has the right to assess penalties for non compliance as specified in the Township of Wall Stormwater Control Ordinance.

Safety standards have also been adopted in the Township of Wall's Stormwater Control Ordinance. These standards are intended to protect the public safety through proper design and operation of new stormwater management basins. Trash racks are required to be installed at the intake to the outlet of the basin to ensure proper functioning. The trash rack shall meet

the specifications as detailed in the Township's Stormwater Control Ordinance. Additionally, all overflow grates designed to prevent obstruction of the overflow structure shall also be designed in accordance with the requirements contained in the Township's Stormwater Control Ordinance. Stormwater management basins shall also include escape provisions, which include the installation of ladders, steps, rungs, or other features that provide easily accessible means of egress from the basin. Safety ledges shall also be constructed on the slopes of all new basins having a permanent pool of water deeper than two and one half feet and shall be comprised of two steps. The design requirements for both the required escape provisions and safety ledges are contained in the Township's Stormwater Control Ordinance.

The Township reserves the right to require retrofit of existing stormwater management basins to meet any or all of the safety requirements.

## 6.0 PLAN CONSISTENCY

A regional stormwater project is underway for the Wreck Pond Brook watershed. The result of this project will be the Wreck Pond Brook Regional Stormwater Management Plan. NJDEP has provided a grant to Monmouth County to act as the lead agency for this project. A Regional Stormwater Management Committee has been formed to be involved in the planning process, characterization process and development and implementation of a priority list of projects. This Plan will address the stormwater problems throughout the watershed and provide regional BMP solutions to reduce fecal coliform impairments in order to enhance the recreational value of the lake and improve the quality of stormwater discharges from the lake into the Atlantic Ocean. The anticipated date of completion of the Regional Stormwater Management Plan is March, 2008. A coordinating effort by the Borough of Spring Lake has been undertaken to prepare an environmental study of the Wreck Pond area. The Township of Wall has also received NJDEP grant dollars to partner with the County, US Fish and Wildlife to manage stormwater runoff from industrial and commercial areas around the Allaire Airport, NJ Sand and Gravel and the headwater area which is severely eroded. Once the Plan is developed, this MSWMP will be updated to be consistent with same.

As stated in Section 4.3 of this Plan, eight (8) TMDLs have been approved for waters within the Township, but not yet adopted by NJDEP. Therefore, this plan shall be made consistent with the TMDLs in requiring reductions in nonpoint sources when they are adopted by NJDEP. The TMDLs, once completed, will identify fecal coliform controls, in addition to controls for other parameters in which a TMDL has been approved for, which will be incorporated into this SWMP and included in Wall Township's modified Municipal Stormwater Permit through the "additional measures" requirement of the permit. If additional TMDLs are developed in the future for waters within the Township, this MSWMP will be updated to be consistent with same.

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

As stated earlier in Section 4.1.4, State Development and Redevelopment Plan, the eastern section of the Township is located in the Metropolitan Planning Area, PA-1, with most of the balance of the Township designated as a Suburban Planning Area (PA-2).

Portions of the Township are located in the *Coastal Area Facilities Review Act (CAFRA)* zone. Therefore, any development within those areas must comply with *the Coastal Permit Program Rules* at *N.J.A.C. 7:7*.

During construction, Township inspectors will perform periodic inspections of on-site soil erosion and sediment control measures and report any inconsistencies to the Freehold Soil Conservation District. All new development and redevelopment projects within the Township shall comply with the standards for Soil Erosion and Sediment Control. The Township's Stormwater Ordinance requires that the minimum design & performance standards for erosion control, runoff quantity and off site stability be those that are established under the Soil Erosion and Sediment Control Act.

## **7.0 NONSTRUCTURAL STORMWATER MANAGEMENT STRATEGIES**

The *Master Plan* and *Ordinances* were reviewed with regard to incorporating nonstructural stormwater management strategies. Below is a list of recommended revisions to existing ordinances and new strategies that the Township should consider implementing in order to incorporate the NJDEP's nonstructural strategies for stormwater management.

### **7.1 MASTER PLAN REVIEW**

#### **7.1.1 Continuous Wildlife Corridors**

According to the *1999 Master Plan*, one of the objectives and principles of the Wall Township Land Use Plan is to encourage the development of continuous wildlife corridors (Page 6-3). Development of new homes and businesses in Wall has reduced the land area of wildlife habitat and created discontinuous habitat areas. As stated in the *Master Plan*, development regulations should encourage, where possible, contiguous forested areas or continuous corridors along streams and wetlands.

#### **7.1.2 Residential Site Improvement Standards (RSIS)**

Page 12-6 of the *1999 Master Plan* indicates that Wall Township may want to delete or modify its conflicting provisions of the Land Use and Development Regulations for consistency with the new *RSIS* standards. The Township should review the Land Use and Development Regulations for consistency with the *RSIS* and make necessary amendments. The Township should re-examine the *Master Plan* to incorporate additional low impact development techniques or amend it to include this SWMP.

### **7.2 ORDINANCE REVIEW**

Chapters 140 (Land Use and Development Regulations) and 188 (Soil Removal) of the Township Code were reviewed with regard to incorporating nonstructural stormwater management strategies. Several changes were made to this Chapter to incorporate these strategies.

#### **7.2.1 Chapter 188: Soil Removal**

This ordinance should be amended to state that all soil activities must comply with *New Jersey's Soil Erosion and Sediment Control Standards*.

### **7.2.2 Section 140-122: Removal of Trees**

Section 140-122D indicates that the Township shall consider the necessity to clear areas to be occupied by buildings, driveways, or recreation areas and within a distance of 15 feet around the perimeter of such buildings and areas depending on the tree species and conditions to be reasonably determined by the Planning Board. Further, Item F of this section indicates that trees may be removed in driveways and within 10 feet of each side of the driveway. Therefore, the current regulation complies with minimizing land disturbance, which is a nonstructural stormwater management strategy.

### **7.2.3 Section 140-216: Required Off-Street Parking Spaces**

Section 140-216 provides guidance on minimum parking space requirements for shopping centers. These requirements are generally based on gross floor area (GFA) or gross leasable area (GLA). The Low Impact Development Parking Space Ratios provided by the NJDEP indicate that ratios at shopping centers shall be less than 4.5 spaces per 1,000 square feet GFA. According to Section 140-216, only shopping centers with over 400,000 square feet GLA have a parking ratio of less than 4.5 parking spaces per 1,000 square feet GFA (4 spaces). The parking ratios should be reduced for shopping centers with less than 400,000 square feet GLA, where practical.

### **7.2.4 Section 140-218: General Requirements**

Section 140-218 details off-street parking requirements. This section states that the minimum size of parking spaces shall be nine (9) feet by nineteen (19) feet where spaces are provided with "looped" or "hairpin" stall markings, or ten (10) feet by nineteen (19) feet where spaces are provided with single-line stall markings. The minimum parking stall size should be reduced to 9 feet by 18 feet.

### **7.2.5 Section 140-233: Roadways and Driveways**

Section 140-233H(6)(b) requires that curbing be provided along both sides of all roadways and adjacent to the edge of all aisles, drives, and off-street parking areas. This section should be amended to allow for curb cuts or flush curbs with curb stops to allow vegetated swales to be used for stormwater conveyance and to allow the disconnection of impervious areas.

Section 140-22H(6)(b)(3)(d) states that the maximum curb depression width for single- and two-family dwellings shall be the driveway width plus four (4) feet, but not more than 25 feet. Therefore, the maximum driveway width is 21 feet. This section should be amended to reduce the minimum driveway width to 9 feet for one lane and 18 feet for two lanes. Additionally, this section should be amended to allow the use of pervious paving materials to minimize stormwater runoff and promote groundwater recharge.

Section 140-233H(8) requires the establishment of shade tree planting strips along roadways. This is in compliance with NJDEP recommendations/requirements.

#### **7.2.6 Section 140-236: Sidewalks**

Section 140-236D indicates that sidewalks may be constructed of concrete, brick or cement pavers. Pervious paving materials should be allowed, where practical.

#### **7.2.7 Section 140-240: Stormwater Management**

This section details stormwater management in the Township. Currently, this section does not require that all new development and redevelopment plans comply with *New Jersey's Soil Erosion and Sediment Control Standards*. Therefore, this section should be amended to state the same.

In addition, the following new section should be inserted; "Section 140-240.D. Developments and improvements meeting the definition of major development as provided under the Stormwater Control Ordinance shall comply with the requirements of that specific section."

#### **7.2.8 Section 140-241: General System Strategy**

Section 140-241E states that "a system emphasizing a natural as opposed to an engineered drainage strategy shall be encouraged. The applicability of a natural approach depends on such factors as site storage capacity, open channel hydraulic capacity, and maintenance needs and resources." This regulation is in compliance with the NJDEP's low impact development recommendations/requirements.

### **7.2.9 Section 140-243: Water Quality**

Section 140-243C states that the water quality design storm shall be controlled by best management practices (BMPs), which include BMPs contained in the New Jersey Stormwater Quantity/Quality Management Manual (February 1981). The referenced document is outdated; therefore, this section should be amended to reference the *New Jersey Stormwater Best Management Practices Manual, 2002, as revised*.

### **7.2.10 Section 140-244: System Design**

Section 140-244A provides open channel system design requirements. Section 140-244D2 indicates that development shall use the best available technology to accommodate stormwater management by natural drainage strategies. The use of vegetated channels, rather than the standard concrete curb and gutter configuration, can decrease flow velocity, and allow for stormwater filtration and re-infiltration. Triangular channels are not preferred due to the associated maintenance issues; parabolic or trapezoidal channels are preferred.

Section 5.3(b)8 of the *Rules* indicates that nonstructural stormwater management strategies incorporated into site design shall provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas. The Township currently allows the use of vegetated open channels. However, the current ordinance should be expanded to encourage the use of vegetated open channel conveyance instead of the standard curb and gutter design where practical. One design option is for vegetated channels that convey smaller storm events, and provide an overflow into a storm sewer for larger storm events.

### **7.2.11 Section 140-257: Stream Corridors**

This section should be amended to state: "The NJDEP *Flood Hazard Area Control Act Rules* (N.J.A.C. 7:13) contains detailed regulations regarding development in and maintenance of the flood plain and the watercourses that create them. All flood plain and watercourse activities must comply with the NJDEP regulations."

### **7.2.12 Section 140-262: Parking Area Design Criteria**

Section 140-262I states that "buffering shall be required when topographical or other barriers do not provide reasonable screening and there is a need to shield the site from adjacent properties and to minimize adverse impacts such as non-compatible land uses, noise, glaring light, and

traffic. Buffering shall provide a year-round visual screen in order to minimize adverse impacts from a site on the adjacent property or from adjacent areas. It may consist of fencing, evergreens, berms, rocks, boulders, mounds or combinations thereof to achieve the stated objectives.” The language of this section should be amended to require the use of native vegetation, which requires less fertilization and watering than non-native species, to the maximum extent practicable, before utilizing another means of screening, such as walls or berms. Additionally, language should be included to allow buffer areas to be used for stormwater management by disconnecting impervious surfaces and treating runoff from these impervious surfaces. The amount of landscaped areas used and designated as stormwater management areas should be kept within reason. Landscaped areas should not be 100% designated as stormwater management areas.

### **7.2.13 Section 140-274: Sidewalks**

Section 140-274D indicates that sidewalks may be constructed of “other paving materials” depending on the design of the development. Pervious paving materials should be allowed, where practical.

## **7.3 NEW ORDINANCES**

### **7.3.1 Minimization of Turf Grass Lawn Areas**

In order to minimize turf grass lawn areas, a new ordinance should be established to discourage enlargement of existing turf lawn areas without proper justification.

### **7.3.2 Forest Protection**

The *Old Mill Pond and Wreck Pond Conceptual Watershed Management Study*, prepared by the Wall Township Watershed Management Committee in March 1996, recommends that high quality forest cover shall be preserved and reforestation encouraged in all areas of the watershed. Additionally, the quality of the forest cover should also be improved in all areas of the watershed and forest cover should replace turf areas wherever practicable. As recommended in the *Study*, a new ordinance should be established which states “Land cover in the watershed management area shall retain and/or improve forest and understory cover as much as practicable. In no case, however, shall impervious surface area exceed 10 percent of a property, nor shall turf areas exceed an additional 10 percent. The remainder of the property

shall be forest and understory consisting of species common to the Wreck Pond Watershed Management Zone conserved or planted to a density not less than would be found in existing natural areas of the Management Zone. Reforestation efforts may follow existing plant succession patterns as long as the reforestation area is protected from mowing, cultivation, fertilization, tree harvest or other agricultural/landscaping practices". Mention of the Wreck Pond Management Zone should also be made in the *Master Plan*.

Additionally, an ordinance should be implemented that requires preservation of a certain percentage of the tree stand on forested development sites.

### **7.3.3 Streets and Sidewalks**

The *Old Mill Pond and Wreck Pond Conceptual Watershed Management Study* recommends that street widths in the watershed be reduced. Same should be stated in the Township Code. Additionally as recommended in the watershed, installation of sidewalks should be limited to one side of the street.

### **7.3.4 Buffers**

The *Old Mill Pond and Wreck Pond Conceptual Watershed Management Study* recommends a requirement to use buffers and vegetated filter strips to conserve existing woodlots and stream corridors in the watershed. These methods should be utilized where practical.

### **7.3.5 Wellhead Protection Areas**

In order to minimize the infiltration of pollutants into aquifers, a wellhead protection ordinance has been introduced and is being reviewed by the Township.

### **7.3.6 Parking Areas**

Landscaping islands should be required in parking lots. The vegetation shall be beneficial for stormwater quality, groundwater recharge, and/or stormwater quantity but not interfere with driver vision.

Section 140-214 prohibits the use of multi-level, underground, elevated or rooftop parking facilities. If these options are not available, the Township should encourage applicants to utilize

pervious paving materials, where practical, to reduce the amount of impervious cover. Another option would be to allow vehicle overhang into a vegetated area.

### **7.3.7 Unconnected Impervious Areas**

Disconnection of impervious areas can occur in both low density development and high density commercial development, provided sufficient vegetated area is available to accept dispersed stormwater flows. Areas for disconnection include parking lot or cul-de-sac islands, lawn areas and other vegetated areas.

Applicants should be required to disconnect impervious surfaces to promote pollutant removal and groundwater recharge, where practical.

### **7.3.8 Cluster Development**

Section 140-711 discusses the special obligations of condominium and cluster subdivision homeowners. Cluster development provides an 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 Township should encourage cluster development design options. The Township may want to require some of the following options:

- A certain percentage of the total tract shall be preserved as common open space for the residential area.
- A certain percentage of the green or common area shall be landscaped with trees and/or shrubs. Native vegetation, which requires less fertilization and watering than non-native ornamental plants, shall be used to the maximum extent practicable.
- The use of pervious paving materials for paths in open space (mulched or stone).

### **7.3.9 Stormwater Control Ordinance**

The Stormwater Control Ordinance, provided in Appendix 1, should be inserted into the appropriate section of Article XXXIII, Stormwater Management. The provided Stormwater Control Ordinance should be inserted in its entirety.

### **7.4 Wetlands**

Section 140-254 "Site Protection" of the Township Code requires wetlands to be preserved as undeveloped open space. Wetland systems exist throughout the Township, located along the Manasquan River, Hannabrand Brook and Wreck Pond Brook. Other extensive areas are located in the east-central sector of the Township and northern portion of the Township. An application for any land use development in the Township requires compliance with the Freshwater Wetlands Protection Act and requires evidence of required permits as a checklist item for site plan approval. It is not necessary to create a new Ordinance to protect wetlands areas in the Township.

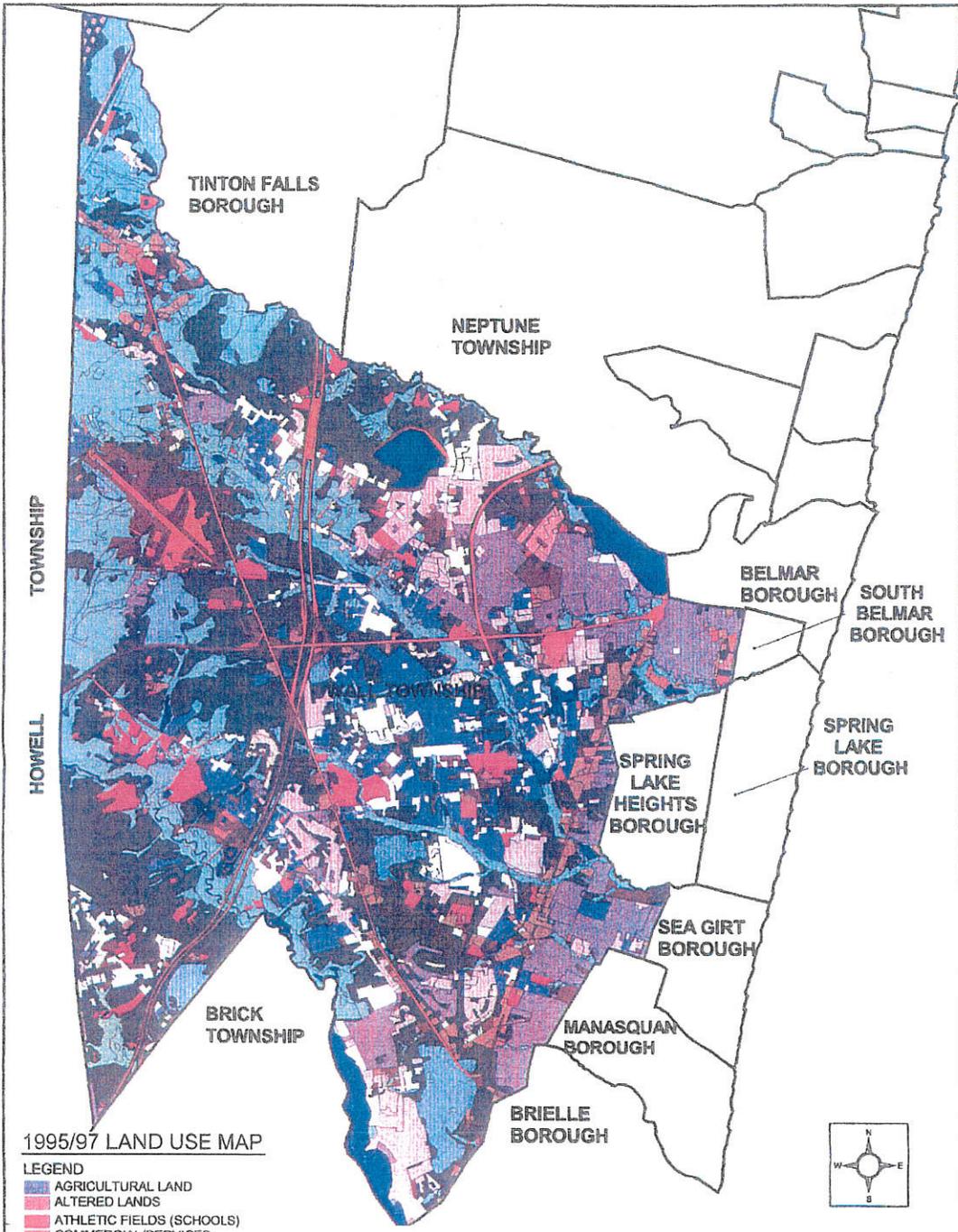
## 8.0 LAND USE / BUILD OUT ANALYSIS

A detailed land use build-out analysis for the Township Wall was conducted in order to determine the projected developable area and non-point source loads that satisfy the requirements outlined within the municipal storm water management plan. Utilizing the Township of Wall Zoning Map (12/95), NJDEP Hydrologic Unit HUC-14 map (12/99), and NJDEP Land Use map (1995/1997), the following methodology outlines the steps taken to prepare the build-out analysis:

1. Determined the total land area within each of the HUC14s of the municipality.
2. Determined the area of constrained lands within each HUC14 of the municipality.
3. Determined the land available for development by simply subtracting the constrained lands from the total land area for each HUC14.
4. For each HUC14, completed a build-out analysis by using the municipal zoning map and applicable ordinances to determine the acreage of new development.

Figure 7 illustrates the existing land use of the Township based on NJDEP 1995/1997 GIS data. Additionally, a Land Use Plan and an Existing Land Use Map can be found within the *1999 Master Plan*. The Zoning Map currently utilized by the Township is shown in Figure 8. Wetlands and floodplains are located throughout the Township. These lands are considered constrained by regulatory development restrictions. Figure 9 illustrates the constrained lands within the Township.

Table 2 calculates the total land area, existing impervious, total area of constrained land, and total area available for development for each zoning district within each municipal HUC-14 boundary. Table 4 represents the pollutant loading coefficients by land cover specified within the municipal storm water management plan, while Table 5 outlines percent (%) allowable impervious by Zoning District. The pollutant loads at full build-out are presented in Table 3, once again delineated by zoning district within HUC-14 boundaries. In summary, the highest pollutant loadings seem to come from the Wreck Pond Brook HUC 14 Zone.



**1995/97 LAND USE MAP**

**LEGEND**

- AGRICULTURAL LAND
- ALTERED LANDS
- ATHLETIC FIELDS (SCHOOLS)
- COMMERCIAL/SERVICES
- CONFINED FEEDING OPERATIONS
- FORESTED AREAS
- DECIDUOUS BRUSH/SHRUBLAND
- EXTRACTIVE MINING
- INDUSTRIAL
- MILITARY RESERVATIONS
- OTHER URBAN OR BUILT-UP LAND
- RECREATIONAL LAND
- RESIDENTIAL, HIGH DENSITY, MULTIPLE DWELLING
- RESIDENTIAL, RURAL, SINGLE UNIT
- RESIDENTIAL, SINGLE UNIT, LOW DENSITY
- RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY
- WATERBODIES AREAS
- TRANSITIONAL AREAS
- TRANSPORTATION/COMMUNICATIONS/UTILITIES
- UNDIFFERENTIATED BARREN LANDS
- WETLAND AREAS

SOURCE:  
1995/97 NJDEP digital data.



**WALL TOWNSHIP**  
2700 ALLAIRE ROAD  
MONMOUTH COUNTY, NEW JERSEY

 <small>CONSULTING &amp; ENVIRONMENTAL ENGINEERS</small> <small>65 Jackson Drive, Cranford, New Jersey 07016</small> <small>(201) 417-6100 * Fax: (201) 417-6145 * www.pmkgroup.com</small> <small>CERTIFICATE OF AUTHORIZATION #EAC00000000</small>	Drawn By: TS	Date: Rev: 1/30/08
	Checked By: DS	Scale: As Noted
Project No. 051328-03	Figure 7	

# ZONES

RESIDENTIAL		
RS-1	Rural Residential	5 Acres
RS-2	Rural Residential	5 Acres
RS-3	Rural Residential	5 Acres
RS-4	Single Family Residential	60,000 Sq. Ft.
RS-5	"	40,000 Sq. Ft.
RS-6	"	20,000 Sq. Ft.
RS-7	"	15,000 Sq. Ft.
RS-8	"	10,000 Sq. Ft.
RS-9	"	5,000 Sq. Ft.
RS-10	High Density Multi-Family	12 DU/Acre
RS-11	High Density Multi-Family	9 DU/Acre
RS-12	High Density Multi-Family	7 DU/Acre

BUSINESS		
BB-1	Highway Business	200,000 Sq. Ft.
BB-2	"	100,000 Sq. Ft.
BB-3	"	50,000 Sq. Ft.
BB-4	"	20,000 Sq. Ft.
BB-5	Neighborhood Business	20,000 Sq. Ft.

MOUNT LAUREL RESIDENTIAL		
ML-1	Multi-Family	8 DU/Acre
ML-2	Multi-Family	6 DU/Acre
ML-3	Multi-Family	4 DU/Acre
ML-4	Single Detached & Townhouses	18 DU/Acre
ML-5	Multi-Family	2 DU/Acre
ML-6	Multi-Family	7 DU/Acre
ML-7	Multi-Family	6 DU/Acre
ML-8	Multi-Family	5 DU/Acre
ML-9	Multi-Family	4 DU/Acre
ML-10	Multi-Family	3 DU/Acre
ML-11	Manufactured Housing	14 DU/Acre
ML-12	Manufactured Housing	7 DU/Acre
ML-13	Manufactured Housing	5 DU/Acre
ML-14	Manufactured Housing	4 DU/Acre
ML-15	Manufactured Housing	3 DU/Acre
ML-16	Manufactured Housing	2 DU/Acre
ML-17	Manufactured Housing	1 DU/Acre
ML-18	Manufactured Housing	1 DU/Acre
ML-19	Manufactured Housing	1 DU/Acre
ML-20	Manufactured Housing	1 DU/Acre
ML-21	Manufactured Housing	1 DU/Acre
ML-22	Manufactured Housing	1 DU/Acre
ML-23	Manufactured Housing	1 DU/Acre
ML-24	Manufactured Housing	1 DU/Acre
ML-25	Manufactured Housing	1 DU/Acre
ML-26	Manufactured Housing	1 DU/Acre
ML-27	Manufactured Housing	1 DU/Acre
ML-28	Manufactured Housing	1 DU/Acre
ML-29	Manufactured Housing	1 DU/Acre
ML-30	Manufactured Housing	1 DU/Acre
ML-31	Manufactured Housing	1 DU/Acre
ML-32	Manufactured Housing	1 DU/Acre
ML-33	Manufactured Housing	1 DU/Acre
ML-34	Manufactured Housing	1 DU/Acre
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ML-36	Manufactured Housing	1 DU/Acre
ML-37	Manufactured Housing	1 DU/Acre
ML-38	Manufactured Housing	1 DU/Acre
ML-39	Manufactured Housing	1 DU/Acre
ML-40	Manufactured Housing	1 DU/Acre
ML-41	Manufactured Housing	1 DU/Acre
ML-42	Manufactured Housing	1 DU/Acre
ML-43	Manufactured Housing	1 DU/Acre
ML-44	Manufactured Housing	1 DU/Acre
ML-45	Manufactured Housing	1 DU/Acre
ML-46	Manufactured Housing	1 DU/Acre
ML-47	Manufactured Housing	1 DU/Acre
ML-48	Manufactured Housing	1 DU/Acre
ML-49	Manufactured Housing	1 DU/Acre
ML-50	Manufactured Housing	1 DU/Acre
ML-51	Manufactured Housing	1 DU/Acre
ML-52	Manufactured Housing	1 DU/Acre
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ML-54	Manufactured Housing	1 DU/Acre
ML-55	Manufactured Housing	1 DU/Acre
ML-56	Manufactured Housing	1 DU/Acre
ML-57	Manufactured Housing	1 DU/Acre
ML-58	Manufactured Housing	1 DU/Acre
ML-59	Manufactured Housing	1 DU/Acre
ML-60	Manufactured Housing	1 DU/Acre
ML-61	Manufactured Housing	1 DU/Acre
ML-62	Manufactured Housing	1 DU/Acre
ML-63	Manufactured Housing	1 DU/Acre
ML-64	Manufactured Housing	1 DU/Acre
ML-65	Manufactured Housing	1 DU/Acre
ML-66	Manufactured Housing	1 DU/Acre
ML-67	Manufactured Housing	1 DU/Acre
ML-68	Manufactured Housing	1 DU/Acre
ML-69	Manufactured Housing	1 DU/Acre
ML-70	Manufactured Housing	1 DU/Acre
ML-71	Manufactured Housing	1 DU/Acre
ML-72	Manufactured Housing	1 DU/Acre
ML-73	Manufactured Housing	1 DU/Acre
ML-74	Manufactured Housing	1 DU/Acre
ML-75	Manufactured Housing	1 DU/Acre
ML-76	Manufactured Housing	1 DU/Acre
ML-77	Manufactured Housing	1 DU/Acre
ML-78	Manufactured Housing	1 DU/Acre
ML-79	Manufactured Housing	1 DU/Acre
ML-80	Manufactured Housing	1 DU/Acre
ML-81	Manufactured Housing	1 DU/Acre
ML-82	Manufactured Housing	1 DU/Acre
ML-83	Manufactured Housing	1 DU/Acre
ML-84	Manufactured Housing	1 DU/Acre
ML-85	Manufactured Housing	1 DU/Acre
ML-86	Manufactured Housing	1 DU/Acre
ML-87	Manufactured Housing	1 DU/Acre
ML-88	Manufactured Housing	1 DU/Acre
ML-89	Manufactured Housing	1 DU/Acre
ML-90	Manufactured Housing	1 DU/Acre
ML-91	Manufactured Housing	1 DU/Acre
ML-92	Manufactured Housing	1 DU/Acre
ML-93	Manufactured Housing	1 DU/Acre
ML-94	Manufactured Housing	1 DU/Acre
ML-95	Manufactured Housing	1 DU/Acre
ML-96	Manufactured Housing	1 DU/Acre
ML-97	Manufactured Housing	1 DU/Acre
ML-98	Manufactured Housing	1 DU/Acre
ML-99	Manufactured Housing	1 DU/Acre
ML-100	Manufactured Housing	1 DU/Acre

OFFICE BUSINESS		
OB-1	Office Business	50,000 Sq. Ft.
OB-2	Office Business	40,000 Sq. Ft.
OB-3	Office Business	30,000 Sq. Ft.
OB-4	Office Business	20,000 Sq. Ft.

COMMERCIAL RECREATION		
CR-1	Commercial Recreation	40 Acres
CR-2	Commercial Recreation	10 Acres

OFFICE RESEARCH		
OR-1	Office Research	10 Acres
OR-2	Office Research	5 Acres
OR-3	Office Research	2 Acres

OFFICE PARK		
OP-1	Office Park	10 Acres
OP-2	Office Park	2 Acres

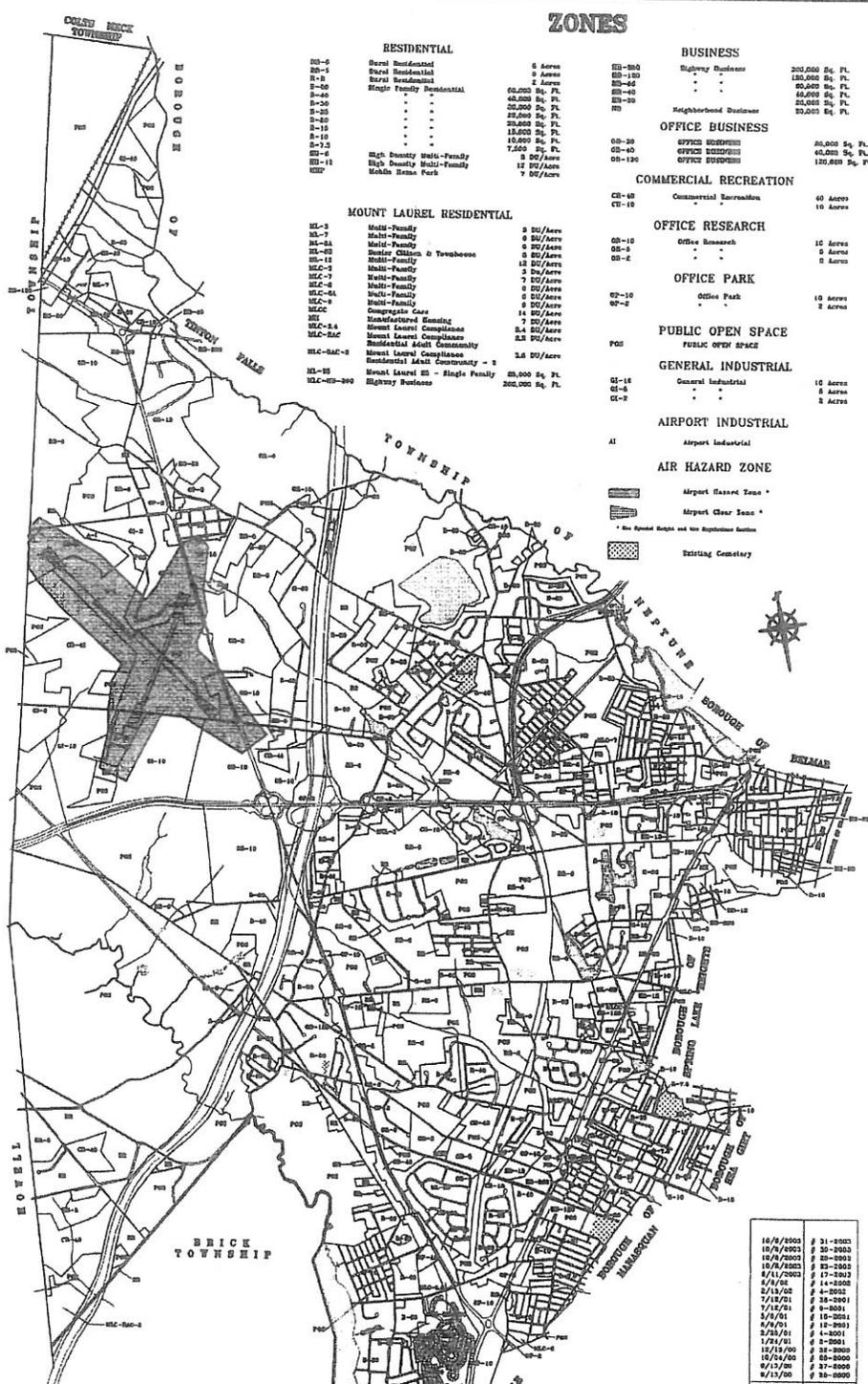
PUBLIC OPEN SPACE		
POS	Public Open Space	10 Acres

GENERAL INDUSTRIAL		
GI-1	General Industrial	10 Acres
GI-2	General Industrial	5 Acres
GI-3	General Industrial	2 Acres

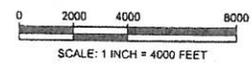
AIRPORT INDUSTRIAL		
AI	Airport Industrial	10 Acres

AIR HAZARD ZONE		
AHZ-1	Airport Hazard Zone	10 Acres
AHZ-2	Airport Hazard Zone	5 Acres

Airport Hazard Zone \*
   
 Airport Clear Zone \*
   
 \* See Airport Layout and Use Regulations Section
   
 Existing Cemetery



ADOPTION DATE	ORDINANCE NUMBER
10/6/2003	# 31-2003
10/6/2003	# 30-2003
10/6/2003	# 29-2003
10/6/2003	# 28-2003
8/11/2003	# 17-2003
8/6/02	# 14-2002
2/15/02	# 4-2002
7/12/01	# 25-2001
7/12/01	# 24-2001
7/12/01	# 23-2001
7/12/01	# 22-2001
7/12/01	# 21-2001
7/12/01	# 20-2001
7/12/01	# 19-2001
7/12/01	# 18-2001
7/12/01	# 17-2001
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7/12/01	# 12-2001
7/12/01	# 11-2001
7/12/01	# 10-2001
7/12/01	# 9-2001
7/12/01	# 8-2001
7/12/01	# 7-2001
7/12/01	# 6-2001
7/12/01	# 5-2001
7/12/01	# 4-2001
7/12/01	# 3-2001
7/12/01	# 2-2001
7/12/01	# 1-2001

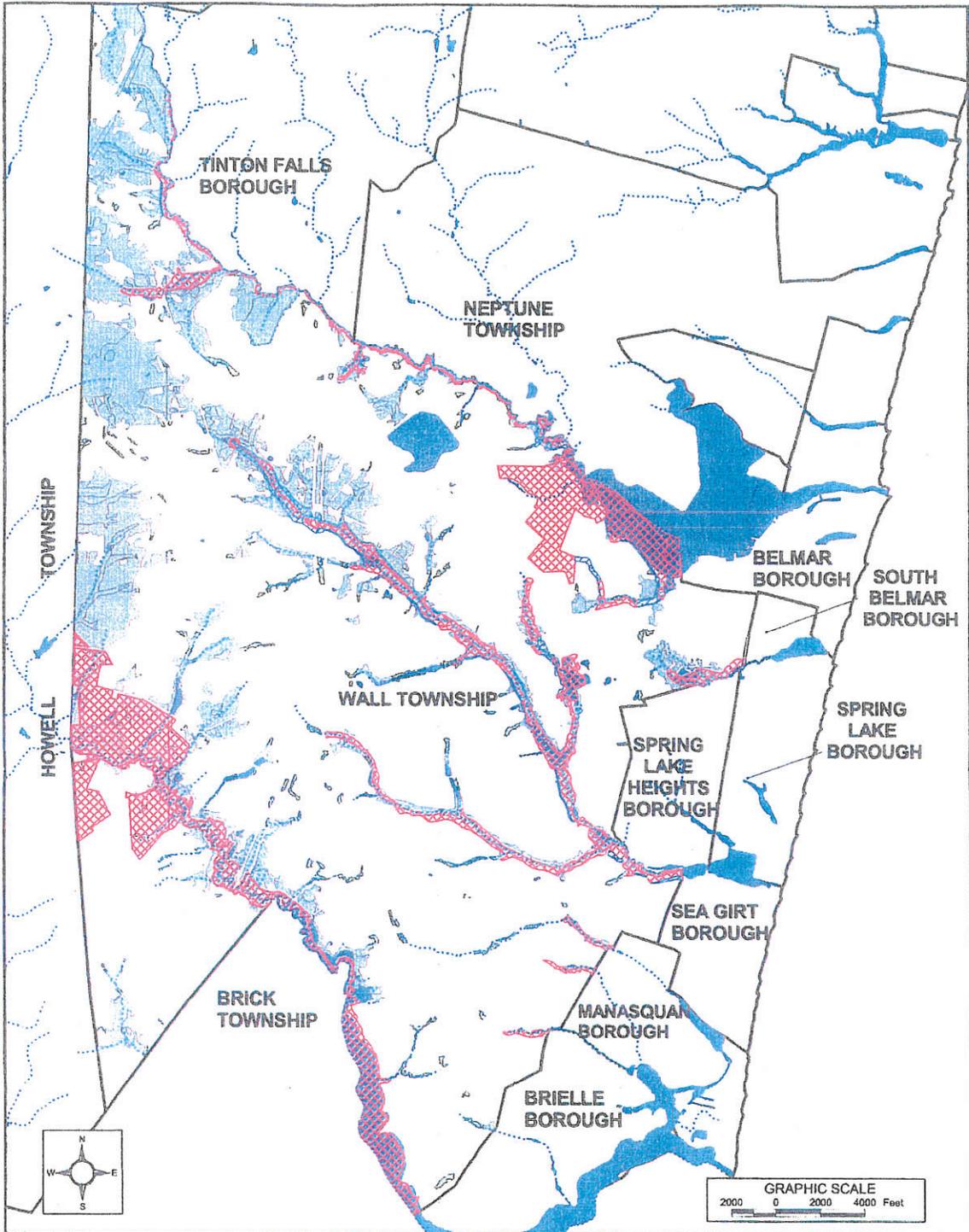


BASE MAP PREPARED BY: MONMOUTH COUNTY PLANNING DEPARTMENT, REVISED 4/87, 11/70, 4/73, 1/78, 8/79, 8/80, 4/82, REVISED BY TOWNPLAN ASSOCIATES 12/95

WALL TOWNSHIP  
 2700 ALLAIRE ROAD  
 MONMOUTH COUNTY, NEW JERSEY

## ZONING MAP

 <b>PMK Group</b> CONSULTING & ENVIRONMENTAL ENGINEERS 65 Jackson Drive, Cranford, New Jersey 07016 (908) 497-8900 • Fax: (908) 497-9134 • www.PMKGroup.com CERTIFICATE OF AUTHORIZATION #24543828008	DRAWN BY:	TS	DATE:	4/20/05
	CHECKED BY:	DS	SCALE:	AS NOTED
PROJECT NO:	051328-03	FIGURE:	8	



**CONSTRAINED LAND MAP**

**LEGEND**

- MUNICIPAL BOUNDARY
- LAKES
- STREAMS
- WETLAND AREAS
- 100 YEAR FLOODPLAIN
- 500 YEAR FLOODPLAIN

SOURCE:  
NJDEP digital GIS data

WALL TOWNSHIP  
2700 ALLAIRE ROAD  
MONMOUTH COUNTY, NEW JERSEY



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CERTIFICATE OF AUTHORIZATION B2AGJ2002600

Drawn By: TS	Date: 4/20/05
Checked By: DS	Scale: As Noted
Project No. 051328-03	Figure 9



TABLE 2 - AREA DELINEATION

Prepared For

Wall Township

HUC-14 and Zoning District	Total Area (acres)	Existing Impervious (%)	Existing Impervious (acres)	Wetlands/ Water Area (acres)	Developable Area (acres)	Allowable Impervious (%)	Build-Out Impervious (acres)
<b>HUC-14 and Zoning District</b>							
Commercial Recreational (CR-10)	25.68	58.2%	17.52	5.73	2.43	20%	0.49
General Industrial (GI-10)	134.67	20.8%	26.03	86.07	20.57	55%	11.31
Highway Business (HB-20)	13.20	39.1%	5.10	2.54	5.50	65%	3.58
Highway Business (HB-40)	51.45	84.9%	43.52	0.88	7.15	65%	4.65
Highway Business (HB-120)	21.12	52.4%	11.06	5.80	4.26	65%	2.77
Highway Business (HB-200)	66.62	53.1%	32.17	18.01	10.44	60%	6.28
Multi-Family (ML-7)	19.98	41.2%	8.24	4.59	7.15	40%	2.86
Office Park (OP-2)	13.22	46.5%	6.15	3.41	3.66	60%	2.20
Office Research (OR-10)	529.50	38.0%	201.22	216.35	111.93	55%	61.58
Public Open Space (POS)	895.43	86.3%	771.74	119.69	0.00	0%	0.00
Single Family Residential (R-30)	24.63	59.2%	14.57	4.59	5.47	25%	1.37
Single Family Residential (R-60)	259.51	42.8%	115.23	100.63	53.65	20%	10.73
Rural Residential (RR)	10.48	100.0%	10.48	0.00	0.00	15%	0.00
Rural Residential (RR-3)	474.61	52.2%	250.01	135.98	165.61	8%	11.14
<b>TOTALS</b>	<b>2,515.10</b>	<b>55%</b>	<b>1,384.20</b>	<b>703.08</b>	<b>417.82</b>	<b>28%</b>	<b>118.91</b>
<b>HUC-14 and Zoning District</b>							
Multi-Family (MLC-7)	1.70	100.0%	1.70	0.00	0.00	40%	0.00
Neighborhood Business (NB)	3.32	12.5%	0.41	2.07	0.84	65%	0.55
Office Park (OP-2)	39.32	91.6%	35.93	0.50	2.89	60%	1.61
Public Open Space (POS)	194.98	78.6%	152.83	15.85	69.49	0%	0.00
Rural Residential (RR-5)	7.15	100.0%	7.15	0.00	0.00	7%	0.00
Single Family Residential (R-7.5)	150.14	81.5%	122.43	14.48	13.23	40%	5.29
Single Family Residential (R-10)	58.75	62.7%	37.65	3.86	8.24	40%	3.30
Single Family Residential (R-15)	193.12	62.5%	120.90	6.84	5.18	35%	3.22
Single Family Residential (R-20)	190.04	78.7%	148.68	4.74	39.62	30%	11.88
Single Family Residential (R-30)	134.55	60.4%	81.26	6.27	20.12	25%	5.00
Single Family Residential (R-60)	77.75	80.5%	62.80	0.00	14.95	20%	2.57
<b>TOTALS</b>	<b>1,171.52</b>	<b>80%</b>	<b>837.72</b>	<b>55.82</b>	<b>177.28</b>	<b>19%</b>	<b>33.85</b>
<b>HUC-14 and Zoning District</b>							
Airport Industrial (AI)	311.31	28.1%	87.47	5.44	218.40	15%	32.75
Commercial Recreational (CR-40)	30.15	74.5%	22.45	0.00	7.70	40%	3.08
General Industrial (GI-2)	164.78	39.3%	64.82	0.00	99.97	65%	64.98
General Industrial (GI-10)	32.23	69.5%	22.41	0.00	5.82	58%	5.40
Mobile Home Park (MHP)	10.84	53.7%	5.82	0.00	5.02	50%	2.51
Multi-Family (ML-3)	13.61	9.5%	1.29	0.00	11.77	40%	4.71
Multi-Family (ML-5a)	95.46	56.3%	53.78	7.50	32.69	50%	16.34
Multi-Family (ML-5b)	25.86	61.7%	15.95	6.42	1.49	50%	0.77
Multi-Family (MLC-3)	3.35	100.0%	3.35	0.00	0.00	40%	0.00
Companion Care (MLC-C)	3.09	77.3%	2.38	0.00	0.70	45%	0.32
Office Research (OR-2)	162.94	47.9%	77.83	63.64	31.67	65%	20.59
Office Research (OR-10)	218.38	39.5%	86.23	15.55	116.60	55%	64.13
Office Park (OP-2)	240.39	21.3%	51.44	26.45	155.50	60%	93.30
Office Park (OP-10)	61.74	46.8%	28.92	28.27	4.57	50%	2.29
Public Open Space (POS)	378.97	27.3%	103.30	64.27	221.40	0%	0.00
Single Family Residential (R-7.5)	19.89	69.2%	13.75	5.33	0.80	40%	0.32
Single Family Residential (R-10)	129.22	96.4%	124.55	1.31	3.36	40%	1.34
Single Family Residential (R-15)	141.02	64.6%	91.12	12.81	36.89	35%	12.95
Single Family Residential (R-20)	175.98	65.3%	115.50	25.88	35.50	30%	10.65
Single Family Residential (R-30)	499.89	74.9%	374.62	48.84	66.43	25%	16.61
Single Family Residential (R-40)	44.36	68.8%	30.42	1.75	3.21	20%	0.64
Single Family Residential (R-60)	609.00	70.0%	426.30	156.89	23.09	20%	4.62
Rural Residential (RR)	55.27	13.6%	7.51	34.50	13.26	15%	1.89
Rural Residential (RR-5)	251.03	61.3%	153.88	58.92	38.18	7%	2.67
Rural Residential (RR-6)	990.50	68.7%	676.81	106.57	182.22	8%	10.93
<b>TOTALS</b>	<b>4,611.78</b>	<b>57%</b>	<b>2,627.01</b>	<b>564.44</b>	<b>1,320.33</b>	<b>23%</b>	<b>373.86</b>
<b>HUC-14 and Zoning District</b>							
Commercial Recreational (CR-40)	7.59	84.8%	6.44	0.00	1.15	40%	0.46
Highway Business (HB-40)	4.11	70.6%	2.90	1.21	0.00	65%	0.50
Highway Business (HB-60)	73.95	72.2%	53.38	11.34	9.25	60%	6.01
Highway Business (HB-120)	64.45	70.6%	45.51	14.19	4.75	65%	3.09
High Density Multi-Family (HD-12)	13.75	86.6%	11.81	0.00	1.84	60%	1.10
Manufactured Housing (MH)	11.93	70.7%	8.44	0.00	3.49	50%	1.75
Multi-Family (ML-12a)	12.83	76.9%	9.71	2.52	0.00	60%	0.00
Multi-Family (MLC-5a)	14.36	92.8%	13.33	0.00	1.03	50%	0.52
Companion Care (MLC-C)	7.96	91.2%	7.26	0.00	0.70	45%	0.32
Office Business (OB-20)	23.41	89.7%	21.01	0.00	2.40	65%	1.55
Office Research (OR-5)	45.16	81.0%	36.42	0.00	8.74	60%	5.24
Office Research (OR-10)	146.33	30.5%	44.86	0.00	101.87	55%	54.92
Office Park (OP-2)	47.71	35.0%	16.71	0.00	16.68	60%	10.01
Office Park (OP-10)	26.52	67.4%	17.87	0.00	8.65	50%	4.33
Public Open Space (POS)	468.33	78.4%	366.63	50.65	50.65	0%	0.00
Single Family Residential (R-7.5)	141.35	75.8%	107.12	21.60	13.23	40%	5.29
Single Family Residential (R-10)	79.78	78.7%	61.18	13.83	4.77	40%	1.91
Single Family Residential (R-15)	36.10	68.6%	24.52	11.58	0.00	35%	0.00
Single Family Residential (R-20)	73.30	65.4%	47.76	0.00	1.20	30%	0.36
Single Family Residential (R-30)	150.17	85.0%	127.60	16.82	5.75	25%	1.44
Single Family Residential (R-40)	192.66	33.2%	63.90	5.95	26.40	20%	5.28
Single Family Residential (R-60)	244.87	75.4%	184.70	4.64	55.53	20%	11.11
Rural Residential (RR)	89.14	84.7%	75.41	0.00	24.43	15%	3.60
Rural Residential (RR-5)	38.34	100.0%	38.34	0.00	0.00	7%	0.00
Rural Residential (RR-6)	405.42	81.5%	332.23	51.15	46.04	6%	2.78
<b>TOTALS</b>	<b>2,402.32</b>	<b>78%</b>	<b>1,828.28</b>	<b>184.86</b>	<b>398.36</b>	<b>31.44%</b>	<b>122.16</b>
<b>HUC-14 and Zoning District</b>							
Airport Industrial (AI)	91.27	58.32%	53.20	15.92	23.95	15%	3.59
Commercial Recreational (CR-40)	236.29	14.44%	33.24	101.06	95.90	43%	38.35
General Industrial (GI-2)	138.00	11.72%	16.17	45.53	75.60	63%	49.34
General Industrial (GI-5)	110.88	65.39%	72.50	20.31	18.07	65%	11.75
General Industrial (GI-10)	25.97	38.10%	9.78	0.00	15.69	55%	8.74
Highway Business (HB-20)	7.66	82.50%	6.31	0.00	2.67	60%	1.67
Office Park (OP-2)	58.67	45.41%	26.64	28.56	5.47	60%	3.28
Office Research (OR-10)	18.77	70.17%	13.17	0.00	5.60	55%	3.08
Public Open Space (POS)	171.49	69.10%	118.50	49.13	3.66	0%	0.00
Single Family Residential (R-15)	5.11	18.77%	1.01	0.00	4.10	35%	1.54
Rural Residential (RR)	25.09	1.20%	0.30	8.49	16.30	15%	2.45
Rural Residential (RR-6)	216.87	24.51%	53.18	154.74	9.05	5%	0.54
<b>TOTALS</b>	<b>1,688.78</b>	<b>38%</b>	<b>406.86</b>	<b>422.14</b>	<b>278.96</b>	<b>45%</b>	<b>124.42</b>
<b>HUC-14 and Zoning District</b>							
Airport Industrial (AI)	19.48	68.12%	13.27	3.65	2.56	15%	0.38
Commercial Recreational (CR-40)	42.47	33.93%	14.41	12.67	15.39	40%	6.16
General Industrial (GI-10)	315.54	48.10%	151.70	12.78	153.05	55%	84.18
Office Research (OR-10)	232.40	20.94%	48.57	2.45	191.28	55%	99.10
Public Open Space (POS)	1,332.34	45.94%	612.06	204.00	516.28	0%	0.00
Single Family Residential (R-20)	58.20	42.54%	24.62	5.93	25.32	30%	7.90
Rural Residential (RR)	46.40	68.69%	31.80	0.00	13.90	15%	2.09
Rural Residential (RR-6)	15.09	55.47%	8.37	6.72	0.00	8%	0.00
<b>TOTALS</b>	<b>2,061.95</b>	<b>44%</b>	<b>804.90</b>	<b>248.26</b>	<b>908.79</b>	<b>22%</b>	<b>206.41</b>

HUC-14 and Zoning District	Total Area (acres)	Existing Impervious (%)	Existing Impervious (acres)	Wetlands/ Water Area (acres)	Developable Area (acres)	Allowable Impervious (%)	Build-Out Impervious (acres)
<b>Commercial Recreation (CR-40)</b>	137.60	28.72%	39.52	37.25	61.83	40%	24.61
Mobile Home Park (MHP)	6.15	23.12%	1.43	0.00	6.25	50%	3.13
Multi-Family (MLC-2-3)	147.51	65.45%	96.61	0.00	0.00	25%	12.73
Highway Business (MLC-HB-200)	20.10	47.95%	9.64	0.00	10.00	40%	4.34
Mount Laurel Compliance Residential Adult Community (MLC-RAC)	9.21	92.28%	8.50	0.00	0.75	65%	0.49
Neighborhood Business (NB)	132.57	44.10%	58.67	1.00	73.57	50%	36.79
Office Business (OB-20)	5.88	68.54%	4.03	0.00	1.85	85%	1.26
Office Business (OB-40)	43.13	53.20%	22.97	1.17	18.99	65%	12.34
Office Business (OB-120)	3.66	15.84%	0.65	0.00	3.21	15%	2.08
Office Park (OP-2)	47.95	25.14%	10.57	2.27	29.21	80%	17.52
Office Research (OR-5)	74.64	74.92%	55.92	0.00	18.72	60%	11.23
Public Open Space (POS)	1,321.03	0.00%	0.00	12.48	816.62	0%	0.00
Single Family Residential (R-10)	119.82	65.17%	102.05	13.78	5.00	40%	1.00
Single Family Residential (R-20)	212.81	84.97%	180.90	10.91	21.10	30%	6.33
Single Family Residential (R-30)	334.91	54.00%	181.67	129.75	24.20	25%	6.67
Single Family Residential (R-40)	99.57	0.00%	0.00	5.35	80.22	20%	16.04
Single Family Residential (R-60)	205.94	77.43%	159.45	15.45	31.03	20%	6.21
Rural Residential (RR)	344.25	70.69%	243.39	4.61	96.59	15%	14.48
Rural Residential (RR-5)	67.27	45.48%	30.80	12.02	24.65	7%	1.73
Rural Residential (RR-8)	15.74	23.81%	3.76	0.00	7.83	0%	0.00
<b>TOTALS</b>	<b>3,358.14</b>	<b>57%</b>	<b>1,912.13</b>	<b>249.66</b>	<b>1,196.05</b>	<b>15%</b>	<b>164.04</b>
<b>Commercial Recreation (CR-40)</b>	34.28	38.86%	13.33	0.00	20.95	40%	8.36
Highway Business (HB-200)	6.05	67.87%	4.11	0.00	2.59	55%	1.66
Highway Business (HB-200)	34.45	71.41%	24.60	0.00	6.85	60%	5.91
High Density Multi-Family (HD-1-2)	14.02	78.92%	11.25	0.00	3.17	00%	1.50
Mount Laurel Compliance Residential Adult Community (MLC-RAC)	74.56	91.55%	68.20	1.50	12.29	50%	6.13
Office Park (OP-2)	55.32	0.29%	22.28	2.30	30.73	60%	18.44
Office Park (OP-10)	181.93	26.63%	48.34	1.07	114.62	50%	67.26
Office Research (OR-5)	33.56	32.93%	10.95	0.89	22.69	50%	13.22
Public Open Space (POS)	67.25	73.63%	49.45	1.23	16.67	0%	0.00
Single Family Residential (R-2-3)	131.39	73.75%	96.80	14.59	19.99	40%	8.00
Single Family Residential (R-10)	98.15	62.58%	61.09	0.52	16.58	40%	6.63
Single Family Residential (R-15)	32.18	93.54%	30.13	0.00	1.78	35%	0.41
Single Family Residential (R-20)	102.34	98.71%	99.95	2.00	0.29	30%	0.24
Single Family Residential (R-25)	95.66	61.54%	58.89	0.64	36.03	30%	10.81
Single Family Residential (R-30)	57.35	62.89%	35.84	1.56	8.31	25%	2.08
Single Family Residential (R-40)	26.68	54.75%	14.65	0.00	13.43	20%	2.68
Rural Residential (RR)	3.19	0.00%	0.00	0.00	3.19	15%	0.48
<b>TOTALS</b>	<b>1,034.67</b>	<b>65%</b>	<b>673.48</b>	<b>26.85</b>	<b>332.23</b>	<b>42%</b>	<b>144.29</b>
<b>Public Open Space (POS)</b>	124.43	0.00%	0.00	0.00	124.43	0%	0.00
Rural Residential (RR)	29.29	0.00%	0.00	0.00	29.29	15%	4.39
<b>TOTALS</b>	<b>153.72</b>	<b>0%</b>	<b>0.00</b>	<b>0.00</b>	<b>153.72</b>	<b>0%</b>	<b>4.39</b>
<b>Mount Laurel Compliance Residential Adult Community (MLC-RAC)</b>	37.00	91.77%	33.90	0.00	2.10	50%	1.05
<b>TOTALS</b>	<b>37.00</b>	<b>91%</b>	<b>33.90</b>	<b>0.00</b>	<b>2.10</b>	<b>50%</b>	<b>1.05</b>



HUC-14 and Zoning District		Developable Area (Acres)	TP (lb/acre/yr)	TP (lb/yr)	TN (lb/acre/yr)	TN (lb/yr)	TSS (lb/acre/yr)	TSS (lb/yr)
<b>Build-Out Zoning</b>								
Commercial Recreational (CR-40)	Commercial	61.82	2.1	129	22	1,353	200	12,304
Mobile Home Park (MHP)	High Density Residential	8.26	1.4	6	15	94	140	875
Multi-Family (ML-25)	Rural Residential	50.60	0.6	31	5	255	100	5,060
Multi-Family (ML-3.4)	Rural Residential	10.86	0.6	7	5	54	100	1,086
Highway Business (MLC-HB-200)	Commercial	0.75	2.1	2	22	17	200	150
Mount Laurel Compliance Residential Adult Community (MLC-RAC)	High Density Residential	73.87	1.4	103	15	1,104	140	10,306
Neighborhood Business (NB)	Commercial	4.08	2.1	9	22	89	200	816
Office Business (OB-20)	Industrial	1.85	1.5	3	16	30	200	370
Office Business (OB-40)	Industrial	18.99	1.5	28	16	300	200	3,798
Office Business (OB-120)	Industrial	3.21	1.5	5	16	51	200	642
Office Park (OP-2)	Industrial	29.21	1.5	44	16	467	200	5,842
Office Research (OR-5)	Industrial	16.72	1.5	25	18	300	200	3,744
Public Open Space (POS)	Forest	616.62	0.1	62	3	1,850	40	24,535
Single Family Residential (R-10)	Rural Residential	3.99	0.6	2	5	20	100	399
Single Family Residential (R-20)	Rural Residential	21.10	0.6	13	5	106	100	2,110
Single Family Residential (R-30)	Rural Residential	24.26	0.6	15	5	121	100	2,426
Single Family Residential (R-40)	Rural Residential	60.22	0.6	34	5	451	100	6,022
Single Family Residential (R-60)	Rural Residential	31.03	0.6	19	5	155	100	3,103
Rural Residential (RR)	Rural Residential	86.59	0.6	58	5	463	100	6,659
Rural Residential (RR-5)	Rural Residential	24.95	0.6	15	5	123	100	2,495
Rural Residential (RR-6)	Rural Residential	7.65	0.6	5	5	36	100	765
<b>TOTALS</b>		<b>1195</b>		<b>637</b>		<b>7468</b>		<b>89534</b>
<b>Build-Out Zoning - Forest</b>								
Commercial Recreational (CR-40)	Commercial	20.65	2.1	44	22	461	200	4,160
Highway Business (HB-120)	Commercial	2.59	2.1	5	22	57	200	516
Highway Business (HB-200)	Commercial	9.85	2.1	21	22	217	200	1,970
High Density Multi-Family (HD-12)	High Density Residential	3.17	1.4	4	15	48	140	464
Mount Laurel Compliance Residential Adult Community (MLC-RAC)	High Density Residential	12.29	1.4	17	15	184	140	1,716
Office Park (OP-2)	Industrial	30.73	1.5	46	18	402	200	5,146
Office Park (OP-10)	Industrial	114.52	1.5	172	19	1,832	200	22,904
Office Research (OR-5)	Industrial	22.09	1.5	33	16	353	200	4,418
Public Open Space (POS)	Forest	16.57	0.1	2	3	50	46	603
Single Family Residential (R-7.5)	Rural Residential	19.99	0.5	12	5	100	100	1,999
Single Family Residential (R-10)	Rural Residential	18.56	0.5	10	5	83	100	1,856
Single Family Residential (R-15)	Rural Residential	1.16	0.8	1	5	9	100	116
Single Family Residential (R-20)	Rural Residential	0.79	0.6	0	5	4	100	79
Single Family Residential (R-25)	Rural Residential	36.03	0.9	22	5	180	100	3,603
Single Family Residential (R-30)	Rural Residential	8.31	0.6	5	5	42	100	831
Single Family Residential (R-40)	Rural Residential	13.43	0.6	8	5	67	100	1,343
Rural Residential (RR)	Rural Residential	3.19	0.6	2	5	19	100	319
<b>TOTALS</b>		<b>332</b>		<b>404</b>		<b>4191</b>		<b>62519</b>
<b>Build-Out Zoning - Forest</b>								
Public Open Space (POS)	Forest	112.66	0.1	11	3	330	46	4,519
Rural Residential (RR-5)	Rural Residential	29.20	0.6	18	5	146	100	2,920
<b>TOTALS</b>		<b>142</b>		<b>29</b>		<b>476</b>		<b>7448</b>
<b>Build-Out Zoning - Forest</b>								
Mount Laurel Compliance Residential Adult Community (MLC-RAC-2)	High Density Residential	23.6	1	33.3	16	357	140	3,352
<b>TOTALS</b>		<b>24</b>		<b>33</b>		<b>357</b>		<b>3332</b>



PMK Project #05132B-03  
 Build-Out Calculations for Township of Wall HUC14s  
 Calculated By: JV  
 Date: July 06, 2005



Prepared For: Wall Township

TABLE 4- NONPOINT SOURCE LOADS

Land Cover	NONPOINT SOURCE LOADS		
	Total Phosphorus Load (lbs/acre/year)	Total Nitrogen Load (lbs/acre/year)	Total Suspended Solids Load (lbs/acre/yr)
High Density Residential	1.4	15	140
Rural Residential	0.6	5	100
Commercial	2.1	22	200
Industrial	1.5	16	200
Urban, Mixed Urban, Other Urban	1.0	10	120
Agricultural	1.3	10	300
Forest	0.1	3	40
Barrenland/Transitional Area	0.5	5	60

TABLE 5- ALLOWABLE IMPERVIOUS PERCENTAGE

Zoning District	Allowable Impervious Surface (percentage)
Airport Industrial (A-1)	15.0%
Commercial Recreational (CR-10)	20.0%
Commercial Recreational (CR-40)	40.0%
General Industrial (GI-2)	65.0%
General Industrial (GI-5)	65.0%
General Industrial (GI-10)	55.0%
Highway Business (HB-20)	65.0%
Highway Business (HB-40)	65.0%
Highway Business (HB-60)	65.0%
Highway Business (HB-120)	65.0%
Highway Business (HB-200)	60.0%
High Density Multi-Family (HD-8)	50.0%
High Density Multi-Family (HD-12)	60.0%
Manufactured Housing (MH)	50.0%
Mobile Home Park (MHP)	50.0%
Multi-Family (ML-3)	40.0%
Multi-Family (ML-7)	40.0%
Multi-Family (ML-8a)	50.0%
Multi-Family (ML-8b)	50.0%
Multi-Family (ML-12a)	60.0%
Multi-Family (ML-25)	25.0%
Congregate Care (MLC-C)	45.0%
Multi-Family (MLC-3.4)	40.0%
Multi-Family (MLC-3)	40.0%
Multi-Family (MLC-7)	40.0%
Multi-Family (MLC-8)	50.0%
Multi-Family (MLC-8a)	50.0%
Multi-Family (MLC-9)	50.0%
Highway Business (MLC-HB-200)	65.0%
Mount Laurel Compliance Residential Adult Community (MLC-RAC)	50.0%
Mount Laurel Compliance Residential Adult Community (MLC-RAC-2)	50.0%
Neighborhood Business (NB)	65.0%
Office Business (OB-20)	65.0%
Office Business (OB-40)	65.0%
Office Business (OB-120)	65.0%
Office Park (OP-2)	60.0%
Office Park (OP-10)	50.0%
Office Research (OR-2)	65.0%
Office Research (OR-5)	60.0%
Office Research (OR-10)	55.0%
Public Open Space (POS)	0.0%
Single Family Residential (R-7.5)	40.0%
Single Family Residential (R-10)	40.0%
Single Family Residential (R-15)	35.0%
Single Family Residential (R-20)	30.0%
Single Family Residential (R-25)	30.0%
Single Family Residential (R-30)	25.0%
Single Family Residential (R-40)	20.0%
Single Family Residential (R-80)	20.0%
Rural Residential (RR)	15.0%
Rural Residential (RR-5)	7.0%
Rural Residential (RR-6)	6.0%

## 9.0 MITIGATION PLAN

### 9.1 Mitigation Project Criteria

This mitigation plan is provided for proposed development or redevelopment projects that seek a variance or exemption from the Township Stormwater Control Ordinance or the Stormwater Management Rules at N.J.A.C 7:8 . The Stormwater Management rules, N.J.A.C. 7:8, establish design and performance standards for management of stormwater that address water quality, water quantity and recharge. These standards are to be met on the site of the proposed development and, to the maximum extent practicable, using nonstructural stormwater management strategies. Approval of the option to utilize a mitigation plan and choice of mitigation plan shall be under the sole discretion of the Township agency providing review (i.e. Board of Adjustment, Planning Board, Township Council and the Township Engineer). The Township has the discretion to require mitigation even if a waiver is granted by the NJDEP through a Land Use Permit.

A municipal mitigation plan must identify the measures necessary to offset the deficit created with respect to the design and performance standard(s) that would result from the grant of a variance or exemption at a project site. The plan must ensure that the mitigation is completed in the drainage area and for the performance standard(s) for which the variance or exemption was granted for a project. The waiver cannot be due to a condition created by the applicant. If the applicant can comply with the Stormwater Management rules through a reduction in the scope of the project, then it shall be determined that the applicant has created the condition and a waiver **cannot** be issued.

Any relief from this MSWMP or the *Rules* via a mitigation plan option shall utilize an option to provide equal or greater, quantifiable benefit than the specific relief being sought. For example, if a relief for stormwater quality is sought for a particular project, the necessary amount of stormwater quality improvements shall be accomplished via the mitigation plan. Calculations shall be provided indicating the parameter of relief being sought along with equal or greater benefit via the mitigation plan option. These calculations shall be reviewed and approved by the Township Engineer before being reviewed by the appropriate reviewing authority.

In general, the mitigation project must be implemented in the same drainage area as the proposed development. The mitigation must be addressed on site first to the maximum amount possible and remainder can be mitigated off site. The mitigation project must contribute to the

same sensitive receptor as the project and offset the same deficit created by the project. The applicant must ensure the long-term maintenance of the project, including the maintenance requirements under Chapters 8 and 9 of the *NJDEP Stormwater BMP Manual*. Additionally, a waiver from the Special Water Resource Protection Area performance standard of the Rules can not be issued and therefore not mitigated.

In order to select an appropriate mitigation project to respond to a requested waiver/exemption requires, an assessment of the impact that would result from the requested deviation from full compliance with the standard(s) in the drainage area affected by the proposed project is required. For example, a waiver for stormwater quantity requirements must focus on the impacts of increased runoff on flooding, considering both quantity and location. Stormwater quality mitigation must aim to prevent an increase in pollutant load to the waterbodies that would be affected by the waiver/exemption. Ground water recharge mitigation must seek to maintain the base flow and aquifer recharge in the area that would be affected by the waiver/exemption. For the purpose of this discussion, the term "sensitive receptor" is used to refer to a specific area or feature that would be sensitive to the impact assessed above

If a suitable site cannot be located in the same drainage area as the proposed development, a mitigation project may be recommended that is not within the same drainage area but does provide an equal relief. The applicant will be responsible to fund any required studies for drainage area specific mitigation projects and to complete the mitigation project.

In the case of mitigation plan options that do not address the variance or relief sought, the applicant may create a new mitigation option or provide a cash contribution to the Township of Wall which will be used by the Township for Township-wide drainage improvements and stormwater management improvement planning. The amount of the contribution shall be based on the relief being sought, the applicant's opinion on the cost impacts to meet this MSWMP and the *Rules*, and the discretion of the Township agency providing review, i.e. Board of Adjustment, Planning Board, Township Council and the Township Engineer.

In order to select an appropriate mitigation project to respond to a requested waiver/exemption requires an assessment of the impact that would result from the requested deviation from full compliance with the standard(s) in the drainage area affected by the proposed project is

required. Selection of an appropriate mitigation project for a requested waiver/exemption must adhere to the following requirements:

1. The project must be within the same area that would contribute to the receptor impacted by the project. *Note that depending on* the specific performance standard waived, the sensitive receptor and/or the contributory area to that receptor may be different. If there are no specific sensitive receptors that would be impacted as the result of the grant of the waiver/exemption, then the location of the mitigation project can be located anywhere within the municipality, and should be selected to provide the most benefit relative to an existing stormwater problem in the same category (quality, quantity or recharge).

2. Legal authorization must be obtained to construct the project at the location selected. This includes the maintenance and any access needs for the project in the future.

3. The project should be close to the location of the original project, and if possible, be located upstream at a similar distance from the identified sensitive receptor. This distance should not be based on actual location, but on a similar hydraulic distance to the sensitive receptor. For example, if the project for which a waiver is obtained discharges to a tributary, but the closest location discharges to the main branch, it may be more beneficial to identify a location discharging to the same tributary.

4. For ease of administration, if sensitive receptors are addressed, it is preferable to have one location that addresses any and all of the performance standards waived, rather than one location for each performance standard.

5. It must be demonstrated that implementation of the mitigation project will result in no adverse impacts to other properties.

6. Mitigation projects that address stormwater runoff quantity can provide storage for proposed increases in runoff volume, as opposed to a direct peak flow reduction.

Applicants may be allowed to fund analyses to identify potential mitigation projects that could be used to address deficits in complying with each of the performance standards. However, the

funding option shall only be allowed where the project requesting the waiver will have no measurable impact with respect to flooding, erosion, water quality degradation, etc. The funding option may also be appropriate in situations where the size of an individual project requesting a waiver/exemption is small or the degree of deficit in complying with the design and performance standard(s) is small. In such cases, the receipt of the financial contribution shall satisfy the mitigation obligation for the project.

The following information is required for each waiver granted from the performance standard(s).

- **Impact from noncompliance.** Provide a table quantifying what would be required for the project to achieve the standards, the extent to which this value will be achieved on site and the extent to which the value must be mitigated off site.

- **Narrative and supporting information regarding the need for the waiver including:**

The waiver cannot be due to a condition created by the applicant. If the applicant can comply with the Stormwater Management rules through a reduction in the scope of the project, the applicant has created the condition and a waiver **cannot** be issued. Demonstrate that the need for a waiver is not created by the applicant. Provide a discussion and supporting documentation of the site conditions peculiar to the subject property that prevent the construction of a stormwater management facility that would achieve full compliance with the design and performance standards. Site conditions may include soil type, the presence of karst geology, acid soils, a high groundwater table, unique conditions that would create an unsafe design, as well as conditions that may provide a detrimental impact to public health, welfare, and safety. Demonstration that the grant of the requested waiver/exemption would not result in an adverse impact that would not be compensated for by off site mitigation.

- **Sensitive Receptor:** Identify the sensitive receptor(s) related to the performance standard from which a waiver is sought. Demonstrate that the mitigation site contributes to the same sensitive receptor.

- **Design of the Mitigation Project:** Provide the design details of the mitigation project. This includes, but is not limited to, drawings, calculations, and other information needed to evaluate the mitigation project.

- **Responsible Party:** List the party or parties responsible for the construction and the maintenance of the mitigation project. Documentation must be provided to demonstrate that the responsible party is aware of, has authority to, and accepts the responsibility for construction and maintenance. Under no circumstance shall the responsible party be an individual single-family homeowner.

- **Maintenance:** Include a maintenance plan that addresses the maintenance criteria at N.J.A.C. 7:8-5.8. In addition, if the maintenance responsibility is being transferred to the municipality or another entity, the entity responsible for the cost of the maintenance must be identified. The municipality may provide the option for the applicant to convey the mitigation project to the municipality, if the applicant provides for the cost of maintenance in perpetuity.

- **Permits:** Obtain any and all necessary local, State or other applicable permits for the mitigation measure or project must be obtained prior to the municipal approval of the project for which mitigation is being provided.

- **Construction:** Demonstrate that the construction of the mitigation project coincides with the construction of the proposed project. A certificate of occupancy or final approval by the municipality for the project requiring mitigation cannot be issued until the mitigation project or measure receives final approval. Any mitigation projects proposed by the municipality to offset the stormwater impacts of that municipality's own projects must be completed within 6 months of the completion of the municipal project, in order to remain in compliance with their NJPDES General Permit.

Where the Department issues a permit that includes a stormwater management review and an associated waiver under the provisions of the specific permit, the municipality is not required to further consider the project under the provisions of the municipal mitigation plan. However, the municipality may choose to require mitigation for projects receiving a waiver from the Department.

The applicant shall mitigate a project selected by the Township in order to compensate for the deficit that would be created by the granting of a waiver/exemption for the proposed project. The applicant will be responsible for any State, Federal, County or local approvals required to implement the mitigation project. At the present time, no specific projects are defined.

However, the Township will develop a list of projects in the future. The future list of mitigation projects shall be maintained by the Township Engineer. The Township may also include possible mitigation options to implement recommended stormwater management for the Old Mill Pond and Wreck Pond to be consistent with the Monmouth County Watershed Study for these water bodies as well as for adopted fecal TMDLs.