

# **MUNICIPAL STORMWATER MANAGEMENT PLAN**

**Borough of Shrewsbury**

**Monmouth County, New Jersey**

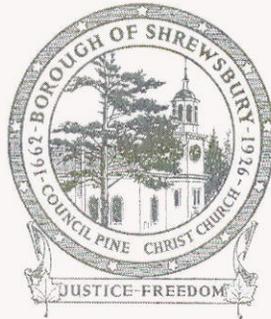
Adopted March 15, 2006

**Mayor Emilia Siciliano**

**Donald Burden**

**Terel Cooperhouse**

**Marlene Hotaling**



**Kevin Murphy**

**John McGuire**

**William Moss**

**Municipal Stormwater Management Plan**  
**Borough of Shrewsbury, Monmouth County, New Jersey**  
**Adopted March 15, 2006**

**Table of Contents**

I.	Introduction.....	1
II.	Key Goals .....	2
III.	Stormwater Discussion .....	4
IV.	Background.....	6
V.	Borough Waterways .....	14
VI.	Design and Performance Standards .....	18
VII.	Plan Consistency.....	22
VIII.	Nonstructural Stormwater Management Strategies .....	25
IX.	Land Use/Build-Out Analysis.....	28
X.	Mitigation Plans.....	31

**List of Figures**

<b>Figure 1</b>	Groundwater Recharge In The Hydrologic Cycle.....	5
<b>Figure 2</b>	Borough Of Shrewsbury.....	7
<b>Figure 3</b>	Borough Of Shrewsbury – NAD-83 USGS Quadrangles 40073-C8-TF-024 .....	8
<b>Figure 4</b>	Soils And Hydric Soils .....	9
<b>Figure 5</b>	Borough Of Shrewsbury - Wetlands .....	12
<b>Figure 6</b>	Borough Of Shrewsbury - Groundwater Recharge Areas .....	13
<b>Figure 7</b>	Borough Of Shrewsbury - Waterways.....	15
<b>Figure 8</b>	Master Plan.....	27
<b>Figure 9</b>	Monmouth County Planning Board Projections.....	29
<b>Figure 10</b>	Borough Of Shrewsbury - Hydrologic Units (HUC14's).....	33

## I. INTRODUCTION

Pursuant to the requirements of N.J.A.C. 7:14A-25 *Municipal Stormwater Regulations* the Borough of Shrewsbury, Monmouth County, New Jersey is required to adopt a Municipal Stormwater Management Plan (MSWMP), which outlines the strategy for the Borough of Shrewsbury (“Borough”) to address stormwater-related impacts. This plan contains the required elements described in N.J.A.C. 7:8 *Stormwater Management Rules*, and 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 (1) or more acre of land or increase impervious surface by one-quarter acre or more.

The standards incorporated herein are intended to minimize the adverse impacts of stormwater runoff related to water quality and flood control, along with the loss of groundwater recharge which provides baseflow in receiving water bodies. The plan also describes long-term operation and maintenance measures for existing and future stormwater management facilities.

The key elements incorporated into the Borough of Shrewsbury MSWMP include a “build-out” analysis based upon existing zoning and land available for development. Also included in the Borough’s MSWMP is a review and update of existing stormwater control ordinances, the Borough Master Plan, and other planning documents to allow for project designs that include low impact development techniques.

The final element 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 Management Plan, specific stormwater management measures are identified to mitigate the impacts of development.

## II. KEY GOALS

The Borough of Shrewsbury Municipal Stormwater Management Plan (MSWMP) has been prepared to meet the following key goals:

- A. To minimize the potential for flood damage to life and property.
- B. To minimize and effectively mitigate any increase in stormwater runoff from any new development or redevelopment proposals.
- C. To minimize or prevent the erosion of soil from any land development or construction activity.
- D. To assure the adequacy and hydraulic function of existing and proposed culverts and bridges, and other in-stream flow control or flood control appurtenances.
- E. To encourage through planning and design guidelines, the recharge of stormwater runoff to groundwaters to the extent as may be practical based upon soil and groundwater conditions.
- F. To prevent, to the greatest extent feasible, any increase in non-point source pollution.
- G. To maintain the integrity of Borough stream channels for their biological functions as well as for drainage by enhancing water quality and minimizing silt laden runoff.
- H. To minimize the presence of pollutants in stormwater runoff from new and existing development in an effort 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.
- I. To protect the public through the proper design and operation of stormwater management facilities.
- J. To re-open and preserve the economic resources of shellfish beds within the Shrewsbury River through runoff water quality enhancement.
- K. To reduce sedimentation of stream channels and tributaries of the Shrewsbury River through runoff water quality enhancement; and reduction of stream bank and stream channel erosion through soil erosion control and runoff quantity control.
- L. To promote the conservation of open space and natural resources, and prevent degradation of the environment through improper uses and/or intensities of land.

- M. To encourage coordination of municipal regulations and requirements with those of Monmouth County, the State of New Jersey and Federal Agencies which plan and/or regulate environmentally sensitive lands within the Borough, such as flood hazard areas, wetlands, and other environmentally sensitive areas.
- N. The regulation of stormwater management activities to ensure compliance with current and future Total Maximum Daily Loads of Pollutants (TMDL's) as determined by the NJDEP for receiving waterbodies.
- O. To promote the use of low impact development and redevelopment techniques to preserve environmental features.

To achieve these goals and objectives, this document outlines specific stormwater design and performance standards for development and re-development proposals within the Borough of Shrewsbury. Additionally, the MSWMP mandates certain stormwater management mitigation strategies to address impacts from existing development.

Preventative maintenance and corrective strategies are included in the MSWMP to ensure long-term effectiveness of stormwater management facilities. The plan also outlines safety standards for stormwater infrastructure to be implemented to protect public safety.

### III. STORMWATER DISCUSSION

The grading, altering or development of land can dramatically affect the hydrologic cycle of a site, and ultimately an entire watershed as depicted in Figure 1. 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 or alteration of a property's geophysical characteristics may replace this vegetation with lawn or impervious cover, thereby reducing the site's evapotranspiration and infiltration characteristics. The clearing and re-grading of a site may also remove natural depressions that temporarily store rainfall and reduce the amount of stormwater runoff to receiving water bodies.

Construction activities may also compact the soil layers and diminish a property's infiltration capacity, resulting in increased volumes and rates of stormwater runoff from the site to surface waters.

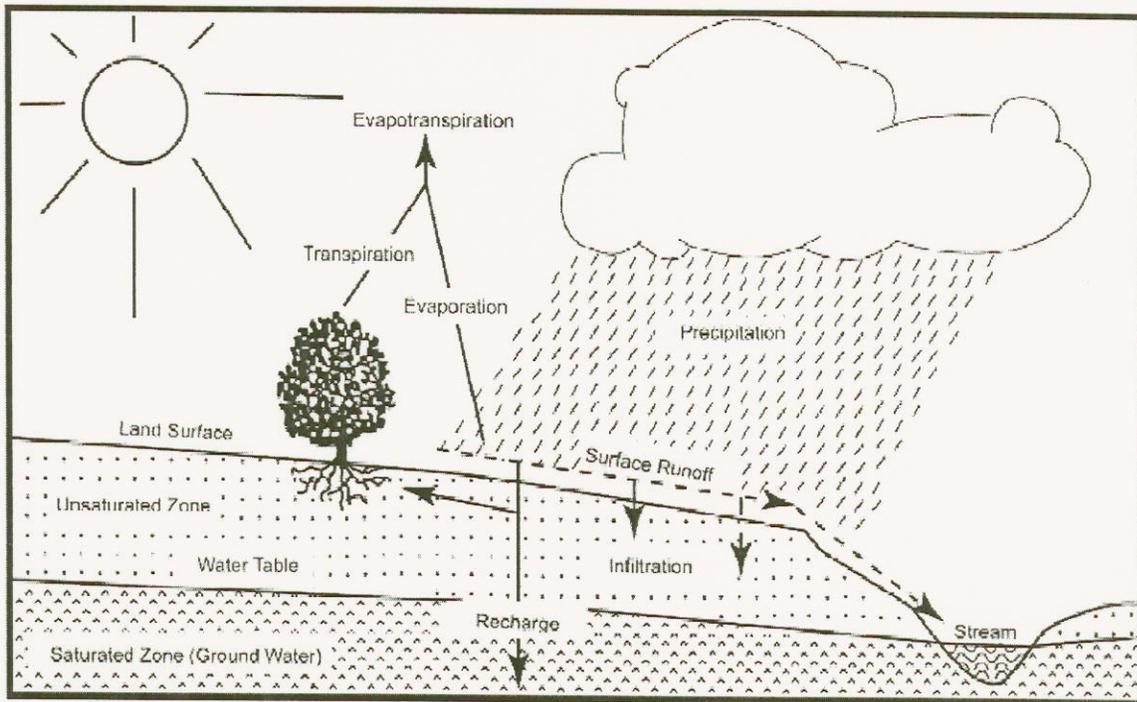
Impervious areas, which are connected to each other through gutters, channels, and storm sewers, convey runoff more rapidly than natural areas. This shortening of the transport, or travel time, increases the rainfall-runoff response of the drainage area, causing the floodwaters in downstream waterways to reach a rate of flow more rapidly and higher in magnitude than natural or pre-development conditions.

These increases typically create new, and aggravate existing downstream flooding and soil erosion issues and ultimately result in sedimentation of stream channels. The filtration of runoff and removal of pollutants, typically provided by surface and channel vegetation, is eliminated by the installation of storm sewers that discharge runoff directly into a stream corridor.

Increases in impervious area also decrease opportunities for infiltration which reduces the stream base flow and groundwater recharge levels. Reduced base flows and increased peak flows result in greater fluctuations between normal and peak flow rates, which may result in stream channel erosion. Reduced base flows can also negatively impact the hydrology of adjacent wetlands and the health of biological communities that depend on base flows. Finally, erosion and sedimentation can destroy habitat from which some species cannot adapt.

In addition to increases in runoff peaks, volumes, and loss of groundwater recharge, land development often results in the accumulation of pollutants on the land surface, which is subsequently mobilized and transported to streams by storm sewers. New impervious surfaces and cleared areas created by development can accumulate a variety of pollutants from the atmosphere, fertilizers, animal wastes, and leakage and wear from vehicles. Pollutants can include metals, suspended solids, hydrocarbons, pathogens, and nutrients.

**FIGURE 1**  
**Groundwater Recharge in the Hydrologic Cycle**



Source: New Jersey Geological Survey Report GSR-32.

In addition to increased pollutant loading, land development or re-development may adversely impact water quality and stream biota in more subtle ways, such as stormwater falling on impervious surfaces or stored in detention or retention basins can become heated and raise the temperature of the downstream waterway, adversely affecting cold water fish species such as trout. Development activities may also remove trees along stream banks that normally provide shading, stabilization, and leaf litter that falls into streams and becomes food for the aquatic community.

Given the complexity and magnitude of hydrologic impacts associated with a development or redevelopment of land, or other alteration of physical characteristics of the topography of the lands of the Borough, this MSWMP outlines specific measures required to minimize such impacts.

## IV. BACKGROUND

In 1667, Shrewsbury was incorporated on the Second meeting of the Colonial Assembly, and was one of three (3) original townships in Monmouth County. Shrewsbury's first major industry was farming, most notably apple orchards. The Borough of Shrewsbury as it exists today was formed in 1926, and encompasses a 2.2 square mile land area in Monmouth County, New Jersey. The Borough's Historic Four Corners at the intersection of Sycamore Avenue and Broad Street is a National Historic District, which includes the Wardell House, the Allen House and Christ Church being listed on the State and National Registers of Historic Places. Fifty historic structures lie within the Borough dating from 1667 to the early 1900's.

The population of the Borough has increased from 2,962 in 1980, to 3,590 in 2000 resulting in the development of vacant lands and re-development of existing land uses. A need for age-restricted housing has also resulted in new development of vacant tracts within the Borough. The resulting changes in the landscape have likely resulted in increased stormwater runoff volumes and pollutant loads to the waterways of the municipality. Figures 2 and 3 depict the Borough of Shrewsbury municipal boundary on Aerial and USGS quadrangle maps.

The Atlantic Ocean moderates the Borough's temperate-humid climate. The Borough also receives an average of 44 inches of precipitation annually, with an average of 9.9 wet days per month. Snowfalls of four inches or more generally take place on an average of 3.5 times per winter.

Shrewsbury lies in the Outer Coastal Plain Province, specifically within the Red Bank-Tinton Sand formation. The Red Bank sand formation is dark gray-brown micaceous sandy clay that in its upper part becomes yellow reddish brown. In New Jersey, the Tinton sand formation is the youngest of the Cretaceous formations. The greenish-brown glauconite sands and clays are well hardened, forming the waterfall at Tinton Falls.

Shrewsbury's soils are generally found to be acidic. Soil conditions vary from the Freehold Soils generally found in the northwest sector of the Borough, to extremely acidic, poorly drained soils found in the southern portion of the Borough, as indicated on Figure 4. The four predominant soil types in the Borough are the following:

1. Holmdel sandy loam (HnA), which covers a large area in the east/southeast section of the Borough;
2. Freehold sandy loam (FrB, FUB & FrC), which covers an area in the central part from west to east, as well as sporadically in southwest and northeast areas of the Borough;
3. Colemanton loam (Cm), which appears in a thin band in the southern of the Borough; and
4. Kresson loam (KvA), which can be found in the southern part of the Borough.

The highest point within the Borough is 83 feet above sea level at the northwest corner of the Borough near the intersection of Shrewsbury Avenue and Patterson Avenue (the area that drains to Simmons Pond). The lowest point is sea level which is located at Parkers Creek in the southeast corner of the Borough. The range of elevations (from 83 feet to 0 feet) over a distance of about one mile in the Borough includes no large topographical features that strongly influence developments.

The Borough consists of two (2) types of wetlands, estuarine and freshwater. Parkers Creek is framed by estuarine wetlands which are composed of salt and brackish marshes and are home to myriad life forms. The food chain within these wetlands starts, at the bottom, with microscopic plankton which are fed upon by grass shrimp, and in turn become the food of many species of finfish such as fluke. The salt marsh is a nursery and feeding habitat for important food fishes and is an integral part of the ecological food chain. Clams, mussels, shrimp, and crabs also inhabit these wetland areas.

Additionally, estuarine wetland areas provide food and cover for migrating and breeding waterfowl. The Borough lies within the Atlantic Flyway, which is the traditional migratory bird route for hundreds of species of birds. Areas along Parkers Creek provide habitat for migratory waterfowl, songbirds and birds of prey. The Shrewsbury River is a Category 1 waterbody which has a significant hard clam and soft clam resource which is a source of nourishment for the birds. The clam beds are currently closed to commercial harvesting due to waterway impairment and the increased temperature of runoff. Upon re-opening, they shall enhance the economic value of the Shrewsbury River. The grasses and plants that grow in these marshes help to remove pollution from the water.

Freshwater wetlands are areas of freshwater marshes, bogs or swamps. Such wetlands lie scattered throughout Shrewsbury, as shown in Figure 5. Some of the larger expanses of these wetlands lie in tracts owned by the Borough north of Buttonwood Drive and also along the stream corridor that connects the wet-basins on Azalea Farms to Parkers Creek, as well as its tributary along Shrewsbury Chase and Strauss Drive. Other large wetland areas lie at Thornbrooke, Parker Park ball field (Patterson Avenue), Glorney Street, west of the Conrail tracks and south of Riordan Place, across the stream behind the homes on the south side of James Street, on Sunnybank Drive, along the northern boundary of The Grove, and along the stream which flows behind the Shrewsbury Borough School. Freshwater wetlands also exist on the Shrewsbury Meadows tract on Avenue at the Common and to the rear of some homes along Winding Brook Way and Blades Run Drive. Freshwater marshes are of great ecological value and support basic elements of the food chain which end with the important predators such as fish, turtles and mammals. The marshes serve as refuge for wintering and migratory populations of songbirds and waterfowl. Freshwater wetlands can serve as important predators such as fish, turtles and mammals. The marshes serve as refuge for wintering and migratory populations of songbirds and waterfowl. Fresh water wetlands can serve as important aquifer recharge areas.

The increase in impervious cover as a result of development of the Borough has likely decreased the amount of groundwater recharge thereby decreasing base flows in streams during dry weather periods. Lower base flows can have a negative impact on instream habitat during the summer months. In addition, lower base flows result in an increased temperature of waters which are conveyed to receiving waterbodies thereby negatively impacting the shellfish beds within the Shrewsbury River. A map of the groundwater recharge areas are shown in Figure 6. The Borough of Shrewsbury does not contain any wellhead protection areas, the location of which are required as part of the MSWMP.

## V. BOROUGH WATERWAYS

The Borough lies within the Navesink-Shrewsbury River Drainage Basin having all surface water flow to Parkers Creek or to Little Silver Creek. Runoff then flows through Little Silver, and ultimately into the Shrewsbury River. The four (4) streams that transect the Borough divide Shrewsbury into smaller watersheds, as illustrated in Figure 7.

A Southern Branch of Parkers Creek (Lafetras Brook) originates in the section of Tinton Falls which lies to the east of the Garden State Parkway, to the west of Hope Road, and to the north of Tinton Avenue. The Northern Branch of Parkers Creek (Cameron Creek) also originates in Tinton Falls but just to the east of Hope Road and South of Sycamore Avenue. Cameron Creek flows under Shrewsbury Avenue just north of Shrewsbury Township and receives runoff from the north along the west side of the Conrail tracks. It continues through the Thornbrooke development, drains to the east side of the Conrail tracks and enters a pond, which was once dammed and surrounded with ornamental brick and fieldstone. The second pond on the property, which appears on the National Wetland Inventory Maps, has been silted in as a result of nearby development and lies just west of NJ State Highway Route 35.

The stream is conveyed under Broad Street just south of the Monmouth County Eastern Branch Library and subsequently serves as the border between the residential properties on Winding Brook Way and Blades Run Drive, and the commercial properties along Avenue at The Commons. These two streams converge at the cul-de-sac at the southern end of Blades Run Drive and become Parkers Creek.

The other two main streams in the Borough originate in the area east of Shrewsbury Avenue and merge to become Little Silver Creek. The more southerly of these two unnamed streams starts at Shrewsbury Avenue in the area of North Gilbert Street. It flows south of Obre Place and the Shrewsbury Borough School, under NJ State Highway Route 35 just north of the firehouse, meanders through the Buttonwood Conservation Area and then turns north and passes between Sickles Place and Garden Road. It continues along the east side of Robert Graham Athletic Field (commonly know as Sickles Field) until it merges with the northern tributary to Little Silver Creek.

The more northerly tributary of Little Silver Creek, unofficially referred to as Little Silver Brook, originates in the area of Shrewsbury that drains into Simmons Pond, just to the southeast of the intersection of Patterson and Shrewsbury Avenues. The stream flows from the pond under the Conrail tracks. Part of its easterly flow through the Borough is channeled. Also, during an earlier period of construction in the Borough, when less was known of streams and their drainage patterns, it was piped for some of its distance (underneath the parking lot and buildings which are called The Grove West across from The Grove on NJ State Highway Route 35). This stream is piped under NJ State Highway Route 35 and the detention basins of The Grove empty into it. A drainage ditch collecting water from the northern side of White Road and running behind the properties of North Monroe also feeds into this stream, which divides Country View Estates from Heritage Green. The detention basins of Heritage Green drain into it as well. It then flows through Borough owned property marking the northern boundary of Sickles Park.

These two northerly streams converge just before passing under the NJ Transit tracks between the end of Garden Road and the Borough Public Works site and then become Little Silver Creek.

Nonpoint source pollution is the main cause of nutrient enrichment in the Borough's streams. Due to the increase in nutrients, algae and weeds become abundant reducing oxygen, harming aquatic life and causing the accelerated aging of the streams. This progression is affecting the ponds on Sunnybank Drive, on the Thornbrooke development, between Winding Brook Way and Avenue Of The Common, and the wet basins that collect stormwater runoff on the Ester W. Hymer Nature Preserve. Sediment laden runoff exacerbates this condition by facilitating the siltation of stream beds resulting in poor hydraulic conveyance characteristics.

Parkers Creek, on the southerly border of the Borough, and its tributaries are included in a Regional Stormwater Management Study for the Parkers Creek Watershed currently being undertaken jointly by the Freehold Soil Conservation District and the Monmouth County Planning Board. The NJDEP and other regulatory agencies collect water quality chemical data on the streams in the state. The Shrewsbury Environmental Commission periodically collects water quality data of the Borough streams. The MSWMP will be updated as this information becomes available.

A TMDL is the amount of a pollutant that can be accepted by a water body without causing an exceedance of water quality standards or interfering with the ability to use a water body for one or more of its designated uses. The allowable load is allocated to the various sources of the pollutant, such as stormwater and wastewater discharges, which require an NJPDES permit to discharge, and nonpoint 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 New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d)) (Integrated List) is required by the federal Clean Water Act to be prepared biennially and is a valuable source of water quality information. This combined report presents the extent to which New Jersey waters are attaining water quality standards, and identifies waters that are impaired. Sublist 5 of the Integrated List constitutes the list of waters impaired or threatened by pollutants, for which one or more TMDLs are needed.

The following waterway(s) of the Borough appear on Sublist 5:

Appendix I B Sublist 5 of the 2004 Integrated List (By Waterbody/Parameter) With Priority Ranking						
Region	WMA	Station Name/Waterbody	Site ID #	Impairment	Priority	Data Source
Atlantic Coast	12	Parker Creek Branch-Tidal	40, R04	Dissolved Oxygen	Medium	WILMINGTON CO PD, NJDEP Coastal Monitoring

Parkers Creek is ranked as a medium priority, on Appendix I-B of Sublist 5, with impairment noted for dissolved oxygen, which indicates that a TMDL shall be required to enhance water quality requirements.

Appendix 1-C of Sublist 5, which is re-printed in pertinent part below, indicates those waterbodies for which a TMDL is required by 2006. Parkers Creek does not appear on this list, therefore, no immediate action is required.

### Appendix 1-C

State of New Jersey's  
2004 Integrated Water Quality monitoring and Assessment Report  
June 22, 2004

TMDLs or other responses to be completed by 2006:

Atlantic Coastal Region:			
WMA 12			
Site ID	Station Name	Non-Attainment Parameter(s)	Response(s) by 2006:
01407750	Shark River near Neptune	Phosphorus	TP TMDL
Wreck Pond	Wreck Pond-12	Fecal coliform	Fecal TMDL

A TMDL for the Parkers Creek watershed will be prepared by NJDEP and assigned at a date in the future. Thus, the required TMDL shall subsequently be incorporated into the Borough of Shrewsbury MSWMP as a plan amendment.

## VI. DESIGN AND PERFORMANCE STANDARDS

The Borough of Shrewsbury shall adopt the design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8-5 to minimize the adverse impact of stormwater runoff on water quality 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*. The ordinances will be submitted to the county for review and approval within twelve (12) months of the adoption of the Stormwater Management Plan.

Chapter 94 of the Shrewsbury Administrative Code, entitled *Zoning and Land Development*, has been amended to incorporate nonstructural stormwater management strategies into basic design guidelines. Changes were made to the following articles of Chapter 94 to incorporate these challenges:

### **Article V. General Provisions and Regulations**

**Section 94-5.9: Building Requirements; Subsection C.2:** The maximum coverage of a lot by buildings shall be as set forth in the Schedule of Zoning District Regulations and expressed as the percentage of total building area to land area wherein the land area is the area of the lot less any area over which construction of buildings or roadways is prohibited because of riparian lands, lakes, ponds, tidelands, tidal wetlands, freshwater wetlands or wetland buffer areas.

**Section 94-5.13: Preservation of Natural Features:** Wherever feasible, all of the following shall be preserved in their natural state: Jurisdictional Freshwater Wetlands as defined by the New Jersey Wetlands Act of 1970 and the Freshwater Wetlands Act of 1987 and delineated on wetlands maps prepared by the New Jersey Department of Environmental Protection and as defined by the New Jersey Department of Environmental Protection Coastal Management Development Policies and contained in the New Jersey Administrative Code and wetlands and wetland (hydric) soils as regulated by the United States Army Corps of Engineers.

**Section 94-5.24. Wetlands Permit:** No building, structure or use shall be permitted within areas defined as freshwater wetlands or buffer zones by the New Jersey Wetlands Act of 1970 and the Freshwater Wetlands Act of 1987 and delineated on the wetlands maps prepared by the New Jersey Department of Environmental Protection or delineated in accordance with regulations promulgated under the Act, except in accordance with a permit issued under the Act.

**Section 94-5.27. Floodplain Management:** Within a flood hazard area designated pursuant to Article X, §94-10.13B, and regulated pursuant to §94-10.13, the following design standards shall apply to developments requiring a floodplain encroachment permit:

**Subsection C - Utilities; (2):** New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into the system.

**Subsection D - Subdivision Applications; (3):** All subdivision applications shall be designed to have adequate drainage provided to reduce exposure to flood damage.

**Subsection D - Subdivision Applications; (4):** Base flood elevation data shall be provided for all minor and major subdivision applications and for all other proposed development which is greater than one (1) acre.

**Subsection D - Subdivision Applications; (5):** In reviewing subdivision applications, §94-5.13 "Preservation of natural features" shall be enforced.

**Subsection G – Additional Conditions; (5):** All fill and other earthwork must be carried out according to the Freehold Soil Conservation District and NJDEP regulatory requirements.

**Subsection H - Floodways; (3):** The construction, alteration, enlargement or rebuilding of any structure in a floodway is prohibited.

**Article VI. Development Application Procedures and Plat Details**

**Section 94-6.4. Applications For Development Requiring Planning Board Or Board Of Adjustment Action; Subsection F.7:** Adequate provision has been made for the collection and disposal of stormwater runoff and the proposed drainage facilities have been approved by the Board Engineer.

## **Article VIII. Design Standards and Improvement Specifications**

**Section 94-8.9. Clearing And Grading; Subsection G:** Lot and site grading. Lots and sites shall be graded to ensure proper drainage and to prevent the collection of stormwater. Said grading shall be performed in a manner which will minimize the damage to or destruction of trees growing on the land. Topsoil shall be provided and/or redistributed on the surface as cover and shall be stabilized by seeding or planting. Grading plans shall be submitted with the preliminary and final site plans or subdivision plans, and any departure from these plans must be approved in accordance with the requirements of this chapter for the modification of improvements. Grading shall be designed to prevent or minimize drainage to structures or improvements when major storms, exceeding the design basis of the storm drainage system, occur.

**Section 94-8.9. Clearing And Grading; Subsection G.3:** The minimum slope for lawns shall be two percent ( 2%) and, for smooth hard-finished surfaces, other than roadways, one percent (1%).

**Section 94-8.11. Curbs And Gutters; Subsection A:** Curbing shall be constructed in accordance with RSIS requirements for all major subdivisions. In the case of minor subdivisions, the municipal appraising authority shall require certain improvements, if deemed necessary, in accordance with RSIS standards.

**Section 94-8.14. Easements; Subsection A:** Drainage easements shall be required in accordance with RSIS standards for all residential developments.

**Section 94-8.26. Off-street Parking; Subsection A.12:** Residential developments shall provide sufficient off-street parking facilities as required by RSIS Standards.

**Section 94-8.38. Storm Drainage Facilities:** This section has been amended to support the Borough policy for flood control, groundwater recharge and pollutant reduction:

**Subsection A:** Flood control, groundwater recharge, and pollutant reduction through nonstructural or low impact techniques shall be explored before relying on structural BMPs. Structural BMPs should be integrated with nonstructural stormwater management measures and proper maintenance plans. Nonstructural measures include both environmentally sensitive site design and source controls that prevent pollutants from being placed on the site. Source control plans should be developed based upon physical site conditions and the origin, nature, and the anticipated loading of potential pollutants. Multiple stormwater management BMPs may be necessary to achieve the established performance standards for water quality, quantity, and groundwater recharge.

The Borough encourages environmentally sensitive site design and low impact development techniques which do not inhibit low impervious coverage.

The ordinance, in great detail, defines the purpose, applicability of the policy, compatibility with other permit and ordinance requirements; and addresses design and performance standards for stormwater management measures; stormwater management requirements for major development; nonstructural stormwater management strategies; erosion control, groundwater runoff and groundwater recharge; standards for structural stormwater management measures; sources for technical guidance; safety standards for trash racks, overflow gates and escape provisions; variance or exception from safety standards; requirement of site development stormwater plan; maintenance plan for the stormwater measures; and provides a checklist of requirements and a section defining terms used.

**Section 94-8.40. Street Design And Construction; Subsection G.3:** In residential subdivisions, the design of streets shall be in accordance with the standards contained in RSIS as currently amended.

During construction, Borough personnel, along with inspectors from the Freehold Soil Conservation District, shall observe the construction of the project to ensure that the stormwater management measures are constructed and function as designed. In addition, prior to major development approval, the Borough shall require a long term maintenance plan for all stormwater management facilities proposed, and shall further require the posting of escrow monies and or maintenance bonds, where appropriate to ensure the long term maintenance and proper function of all facilities constructed.

The Borough shall also ensure the continued long-term maintenance of stormwater management facilities through the requirement of filing annual reports by responsible parties, and posting of maintenance trust and escrow funds.

Applicants are required to integrate structured and non-structural Stormwater management strategies as outlined in the NJDEP BMP Manual. The applicants shall have the ability to select the mitigation strategy contained in the BMP manual that is best suited for their specific application. The Borough reserves the right to review and recommend alternate strategies to meet the intent of the Stormwater control ordinance and MSWMP.

## VII. PLAN CONSISTENCY

The Borough of Shrewsbury is in the Freehold Soil Conservation District Regional Stormwater Management Planning Area (Monmouth County). The Borough has been advised that a Regional Stormwater Management Study of the Parkers Creek Watershed is in progress. If necessary, the MSWMP will be updated to be consistent with a future Regional Stormwater Management Plan (RSWMP) which may result from the ongoing study.

Shrewsbury's Stormwater Management Ordinances require all development and redevelopment plans to comply with New Jersey's Soil Erosion and Sediment Control Standards. During construction, Borough inspectors will observe on-site soil erosion and sediment control measures and report any inconsistencies with the Freehold Soil Conservation District.

Shrewsbury's Stormwater Management Plan is consistent with the Borough of Shrewsbury Master Plan as revised February 2004 and is consistent with the Residential Site Improvement Standards (RSIS), N.J.A.C. 5:21. The Borough will utilize the most current update of the RSIS in the stormwater review of residential areas. The MSWMP will be updated to be consistent with any future updates to the RSIS.

In addition to the above, the Borough Environmental Commission has established and implemented a Water Quality Monitoring Program, which shall be executed in concert with the Municipality's obligation to perform routine outfall monitoring. The data collected by the Environmental Commission shall be incorporated herein as relevant data becomes available.

The Borough has implemented certain planning strategies as part of its ongoing Master Plan process, including those outlined below:

- Planning in the Borough of Shrewsbury will include a variety of residential and nonresidential uses which will be compatible with existing development patterns and in accordance with constraints of environmental features which are a major physiographic aspect of the Borough.
- Consider and evaluate innovative development proposals which would enhance and protect environmental features, minimize energy uses and encourage development densities consistent with existing patterns of development.
- The Planning Board in conjunction with other boards and agencies will continue to review development proposals in terms of natural and environmental resources including floodplains, wetlands, wetland buffer areas, intermittent streams and surface drainage areas, and areas suitable for public and quasi-public recreation activities.
- Encourage establishment of reasonable lot coverage for building, parking lots and other impervious surfaces and ensure open space and buffers on all development sites.
- Encourage wooded, landscaped and grass buffer areas along Route 35, Newman Springs Road (County Route 520) and Shrewsbury Avenue.

In terms of open space, the 1978 Master Plan recommended that a green belt system be initiated along stream corridors to link parks and schools sites to other open space and wetland areas. The plan provided for green belts along Parker's Creek and its tributaries and along Little Silver Creek and its tributaries. The green belt along Parker's Creek is now nearly complete. The Master Plan incorporates conservation areas including the NJDEP designated wetlands along Parker's Creek in the vicinity of Blade's Run Drive and also delineates flood hazard areas. The flood hazard areas are comparable to the green belt areas which were included in the 1978 Master Plan and it is recommended that these flood hazard areas be protected from development. Environmental regulations at the state and federal levels should be adhered to relative to the flood hazard areas and to NJDEP designated saline and freshwater wetlands.

The New Jersey Department of Environmental Protection, Division of Coastal Resources, Coastal Resources and Development Policies (N.J.A.C. 7:7E-1.1 et. seq.) designate the following special areas which are physiographically applicable to Shrewsbury Borough: Natural Waters Edge – Floodplains, which are defined as flood hazard areas by the Flood Hazard Area Control Act (N.J.S.A. 58:16A-50) or by the Federal Emergency Management with the Federal Executive Order 11988 on Floodplain safeguarding waterfront resources within the state. Development is discouraged in these areas by State and Federal policies. The CAFRA policy on wetlands which are defined as lands inundated or saturated by surface or ground water at a frequency and duration sufficient to support a prevalence of vegetation adapted for life in saturated soil conditions, also applies to Shrewsbury Borough. In general, development of all kinds is prohibited in the wetlands areas unless the proposed development can meet certain criteria. These include developments which required water access or are water oriented, have no prudent or feasible alternative on a non-wetland site, will result in minimum feasible alterations or impairment of the wetland, and will result in minimum feasible alterations or impairment of the natural contour or the natural vegetation of the wetlands. Related to the wetlands area are the CAFRA definition and policies concerning wetlands buffers which are all lands within 300 feet of wetlands as defined by CAFRA. Development is prohibited in a wetlands buffer area unless it can be demonstrated that the proposed development will not have a significant adverse impact on the wetlands and on the natural ecotone between the wetlands and the surrounding upland.

CAFRA also regulates intermittent stream corridors. Intermittent streams do occur within the Borough of Shrewsbury along the tributaries and low-lying areas feeding into Parker's Creek and Little Silver Creek. Natural drainage areas can be protected as part of the site plans and subdivision review process, and protection of these areas is encouraged.

While the area east of Broad Street is included within the CAFRA region, the policies established by CAFRA and the NJDEP in conjunction with Federal agencies are important to the Borough for areas west of Broad Street also. Stream corridor areas in the vicinity of Meadow Drive, the Elementary School and north of Shrewsbury Plaza Shopping Center should be protected and preserved to the greatest extent possible since they are an important visual and natural resources within the Borough. These areas also provide a very important function of allowing Stormwater to travel overland and recharge soils while reducing the need for expensive subsurface piped drainage systems.

The Parks, Recreation, Conservation and Open Space Plan Element is a very important long-term planning goal and objective since many of the sensitive environmental areas along stream corridors, particularly Parker's Creek, have not yet been developed. Historically, these areas are not advantageous to development due to the severe problems of surface and subsurface drainage and flooding, wet subsoils, etc. These areas do, however, form an important visual, aesthetic and physiographic role in the future development of the Borough. The present character of development in Shrewsbury Borough has occurred in part as a result of these key natural resources features.

## VIII. NONSTRUCTURAL STORMWATER MANAGEMENT STRATEGIES

The Borough of Shrewsbury has reviewed the master plan and ordinances, and has provided a list of the sections in the Shrewsbury Administrative Code land use and zoning ordinances that are to be modified to incorporate nonstructural stormwater management strategies. Once the ordinance texts are completed, they will be submitted to the Monmouth County Planning Board for review and approval within twelve (12) months of the adoption of the Stormwater Management Plan. A copy will be sent to the Department of Environmental Protection at the time of submission.

### Borough Ordinance 837

On June 24, 2004, The Shrewsbury Borough Council voted unanimously to adopt Ordinance 837, thereby creating a new zoning district, *Planned Senior Citizen Development* (PSC-3), for the 39.6 acres bordering Parkers Creek. Of the 39.6 acres, only 19 acres are deemed developable based on the New Jersey Department of Environmental Protection maps and studies of field surveys, Natural Inventory maps prepared by the Shrewsbury Environmental Commission and **Section 94-5.13 Preservation of Natural Features** and **Section 94-5.27 Floodplain Management**. The PSC-3 Zoning District is limited to single family detached dwellings with a minimum lot area of 6,600 square feet with a maximum building coverage of 30% and a maximum total of impervious coverage of 35%. Pursuant to the ordinance, all on-site and off-site drainage facilities shall be provided in accordance with Borough requirements and regulations.

Impervious Coverage is defined in **Section 94-2.3 Definitions** as any natural or manmade surface which does not permit infiltration of water and which causes surface runoff. All buildings, parking areas, driveways, roads, sidewalks, and any areas in concrete and asphalt shall be considered an "impervious surface" within this definition. Porous asphalt and concrete shall be deemed to be an impervious surface. In addition areas determined by the Borough Engineer to be impervious within this definition will also be classed as "impervious surface" coverage

The Borough has 10 residential zoning districts with varying minimum lot size requirements. Each district has a maximum percent impervious surface allocation of 20 percent for detached single-family residences with minimum lot sizes ranging from 6,000 to 45,000 square feet; 40 percent for a planned age restricted cluster development, which has a minimum lot size of five acres and 35 percent for a planned age-restricted development with minimum lot area of 6,600 square feet. The Borough has six types of non-residential districts: general business, shopping / office center, highway commercial, professional offices, office parks, office / business service. Each district has a designated percentage of lot coverage for impervious surface: 60 percent to 65 percent for a maximum lot coverage ranging from 20,000 square feet for the general business district to 88,000 square feet for an office park district.

The Borough continues to evaluate the maximum allowable impervious cover in each zone. If a developer is granted a variance to exceed the maximum allowable impervious cover, the applicant must mitigate the impact of the additional impervious surfaces through the use of mitigation strategies in compliance with the BMP Manual.

The mitigation effort must address water quality, flooding and groundwater recharge as described in **Section 94-8.38 Storm Drainage Facilities**.

The Planning Board shall continue to encourage the use of low impact design techniques, along with non-structural stormwater management strategies to meet the goals of this Plan. Applicants are required to utilize mitigation strategies which are incorporated in the NJDEP Best Management Practices (BMP) Manual for innovative stormwater design strategies to advance this goal.

The BMP Manual is hereby incorporated herein by reference.

## **IX. LAND USE / BUILD-OUT ANALYSIS**

The Borough has endorsed the Monmouth County Planning Board Projections of May 2004 for the Borough of Shrewsbury of Developable Land by Composite Zone, Potential Development, and Population & Employment Projections for 2025 and has incorporated the Monmouth County Planning Board detailed land use and potential development analysis for the years 2005 and 2025 in the Shrewsbury 2004 Cross Acceptance Report.

The County's municipal population projections for the years 2005 and 2025 were based on the 2000 Census and 1995 statistics of the last developable land of 39.6 acres (Block 70.2, Lot 6) as shown in Figure 9. The Potential Development Projections for 2025 of 3,716 were based on a 2.97 person per household ratio.

As evidenced by Figure 9, the Borough of Shrewsbury has less than one square mile of vacant or developable land, thus a Build Out analysis is not required pursuant to the requirements of N.J.A.C. 7:14A-25 *Municipal Stormwater Regulations*.

**FIGURE 9**

**Monmouth County Planning Board Projections  
Shrewsbury Borough**

Date: Jan. 10, 2005

**Developable Land By Composite Zone**

	Conser- vation Recreation	Single Family Residential	Multi-family Residential	Mixed-Use	Commercial	Office Business	Research Office Warehouse Laboratory	Industrial	Total
1995 Acres of Developable Land	0.0	79.7	0.0	3.9	6.0	0.0	4.5	11.2	105.3

**Potential Development**

	Conser- vation Recreation Residential Units	Conser- vation Recreation Comm. Square Feet	Single Family Residential Units	Multi-family Residential Units	Mixed-Use Multi-family Residential Units	Mixed-Use Comm. Square Feet	Office Business Square Feet	Research Office Warehouse Laboratory Square Feet	Industrial Square Feet
Entire Municipality at Build-out	0	0	122	0	2	25659	0	58832	172955
Entire Municipality at Horizon	0	0	75	0	2	25659	0	58832	4290

Horizon Year: 2025  
Horizon Period: 30  
Person Per Household Ratio: 2.97

**Population & Employment Projections**

	1995 CA Estimate	2000 Census	Model Additional	2025 Projection	Projections
Population	-	3590	191	3781	2025 Population Projection = 3781
95 Cross Accepted Employment	3924	-	292	4216	2025 Employment Projection = 4216 2000 Employment Projection = 3973

**FIGURE 9**

Monmouth County Planning Board Projections  
Shrewsbury Borough

Additional Impervious Cover by Composite Zone

Municipality	Composite Zone Categories (in Acres)							Total Area (Acres)	
	Conservation Recreation	Single Family Residential	Multi-family Residential	Mixed-Use	Commercial	Office Business	Research Office Warehouse Laboratory		Industrial
Shrewsbury Borough	0.0	22.1	0.2	2.4	3.6	0.0	2.7	7.3	38.3

Date: Jan. 10, 2005

Municipal Development Projection Factors

dwelling units		square feet			
Sing. Fam.	Multi-fam.	Commerc.	Office	Industrial	Cons/Com
2.5	1	53101	14233	143	10

Date: Jan. 10, 2005

Source: 7 year annual average trend for the time period 1997-2003 was calculated for each municipality based on the MCPB database of subdivision and site plan approvals.

Note: The 7-Year Single Family trend of 2 du/year was replaced by a factor of 2.5 du/yr to account for PSC-3 development, along with routine development.

Employment Projections Factors

emp/1000sf use group	Cnsv Cm	Mx CM	Comm	Off-Bus	ROWL	Ind
1		1	1	3	3	2
*	M	M	M	B	B	F

Source: Chapter 94, Substantive Rules of the New Jersey Council on Affordable Housing for the Period Beginning Dec. 20, 2004

\*Note: Neither the COAH Use Groups nor the ITE Trip Generation Handbook had an employment factor for a use similar to Conservation/Recreation Commercial. After a cursory review of ConRec applications in Monmouth County, a factor of 1 emp./1000 sf was determined to be acceptable.

## X. MITIGATION PLANS

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

### Mitigation Project Criteria

1. The mitigation project must be implemented in the same drainage area as the proposed development. The project must provide additional groundwater recharge benefits, or protection from stormwater runoff quality and quantity from previously developed property that does not currently meet the design and performance standards outlined in the Municipal Stormwater Management Plan. The developer must ensure the long-term maintenance of the project, including the maintenance requirements under Chapters 8 and 9 of the NJDEP *Stormwater BMP Manual*.
  - a. The applicant can select one of the following projects listed to compensate for the deficit from the performance standards resulting from the proposed project. More detailed information on the projects can be obtained from the Borough Engineer. Listed below are specific projects that can be used to address the mitigation requirement.

#### Water Quality

- i. Desilting and De-Snagging of Little Silver Creek between Broad Street and White Street.
- ii. Retro-fitting of existing storm sewer inlets, where non-point source pollution can be identified, with Pre-Treatment Devices certified by the NJDEP for 80% TSS Removal.
- iii. Stabilization of Stream Bank Erosion along Little Silver Creek between Broad Street and White Street.
- iv. De-Silting of Little Silver Creek culvert beneath Conrail RR tracks at the Little Silver Boundary.
- v. Retro-fitting of existing outfall points along Parkers Creek and Little Silver Creek to bring the conduit outlet protection up to current standards outlined in the Standards For Soil Erosion and Sediment Control in New Jersey regulations.
- vi. Completion of Greenbelt along Parkers Creek.

#### Water Quantity

- vii. Replacement of undersized culvert and Outlet Control Structure along Parkers Creek tributary at the point which it crosses beneath Trafalgar Place.

2. If a suitable site cannot be located in the same drainage area as the proposed development, as discussed in Option 1, the mitigation project may provide mitigation that is not equivalent to the impacts for which the variance or exemption is sought, but that addresses the same issue. For example, if a variance is given because the 80 percent TSS requirement is not met, the selected project may address water quality impacts due to a fecal impairment. Listed below are specific projects that can be used to address the mitigation option.

### **Water Quality**

- i. Desilting of existing borough waterways or storm sewers in need of same.
- ii. Completion of the Greenbelt along Parkers Creek.
- iii. Retro-fitting of municipally-owned outfalls with compliant conduit outlet protection measures.
- iv. Repair of roadside erosion or stream bank erosion in any areas identified as in need of repair.
- v. Retro-fitting of municipally-owned storm sewer inlets with approved pre-treatment devices at locations where measurable benefits can be demonstrated. In cases of privately owned storm sewer re-fits, written consent of property owner must be obtained.
- vi. Installation of vehicle washwater collection and treatment system at Borough of Shrewsbury DPW facility.

### **Water Quantity**

- i. Installation of additional storm sewers and recharge system along Haddon Avenue to relieve existing flooding conditions.
- ii. Installation of stormwater control measures along Monroe Avenue to relieve existing flooding.

The municipality may allow a developer to provide funding or partial funding to the municipality for an environmental enhancement project that has been identified in a Municipal Stormwater Management Plan, or towards the development of a Regional Stormwater Management Plan. The funding must be equal to or greater than the cost to implement the mitigation outlined above, including costs associated with purchasing the property or easement for mitigation, and the cost associated with the long-term maintenance requirements of the mitigation measure.