

# **Township of Stow Creek Municipal Stormwater Management Plan**

**June 2005**

**Prepared for:**

**Stow Creek Township  
Cumberland County, New Jersey  
474 Macanippuck Road  
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## Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for the Township of Stow Creek (“the Township”) to address stormwater-related impacts. The creation of this plan is required by N.J.A.C. 7:14A-25 Municipal Stormwater Regulations. This plan contains all of the required elements described in N.J.A.C. 7:8 Stormwater Management Rules. The plan addresses groundwater recharge, stormwater quantity, and stormwater quality impacts by incorporating stormwater design and performance standards for new major development, defined as projects that disturb one or more acre of land. These standards are intended to minimize the adverse impact of stormwater runoff on water quality and water quantity and the loss of groundwater recharge that provides baseflow in receiving water bodies. The plan describes long-term operation and maintenance measures for existing and future stormwater facilities.

A “build-out” analysis has not been included in this plan and will be submitted under separate cover.

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.

## 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.

To achieve these goals, this plan outlines specific stormwater design and performance standards for new development. Additionally, the plan proposes stormwater management controls to address impacts from existing development. Preventative and corrective maintenance strategies are included in the plan to ensure long-term effectiveness of stormwater management facilities.

The plan also outlines safety standards for stormwater infrastructure to be implemented to protect public safety.

### *Stormwater Discussion*

Land development can dramatically alter the hydrologic cycle (see Figure No. 1) of a site and, ultimately, an entire watershed. Prior to development, native vegetation can either directly intercept precipitation or draw that portion that has infiltrated into the ground and return it to the atmosphere through evapotranspiration. Development can remove this beneficial vegetation and replace it with lawn or impervious cover, reducing the site's evapotranspiration and infiltration rates. Clearing and grading a site can remove depressions that store rainfall. Construction activities may also compact the soil and diminish its infiltration ability, resulting in increased volumes and rates of stormwater runoff from the site.

Impervious areas that are connected to each other through gutters, channels, and storm sewers can transport runoff more quickly than natural areas. This shortening of the transport or travel time quickens the rainfall-runoff response of the drainage area, causing flow in downstream waterways to peak faster and higher than natural conditions. These increases can create new and aggravate existing downstream flooding and erosion problems and increase the quantity of sediment in the channel. Filtration of runoff and removal of pollutants by surface and channel vegetation is eliminated by storm sewers that discharge runoff directly into a stream.

Increases in impervious area can also decrease opportunities for infiltration, which in turn, 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.

Figure No. 1: Groundwater Recharge in the Hydrologic Cycle

Source: New Jersey Geological Survey Report GSR-32.

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

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

### **Background**

The Township encompasses ±18.79 square mile area in western Cumberland County, New Jersey. Lower Alloway Creek and Quinton Townships bound the Township to the north, Hopewell Township and Shiloh Borough to the east and Greenwich Township to the south.

The population of the Township has decreased from 1,437 in 1990 to 1,429 in 2000. However, the number of total housing units has increased from 489 in 1990 to 560 in 2000. The housing increase, along with changes in the landscape, have most likely increased stormwater runoff volumes and pollutant loads to the waterways of the municipality.

Figure No. 2 (see attached) illustrates the waterways in the Township. Figure No. 3 (see attached) depicts the Township boundary on the USGS quadrangle maps.

The New Jersey Department of Environmental Protection (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.

The two major rivers that border the Township to the north and south are Stow Creek and Raccoon Ditch, respectively. Raccoon Ditch is moderately impaired. The tributaries that flow through the Township to these major rivers are also moderately impaired based on AMNET data.

In addition to the AMNET data, the NJDEP and other regulatory agencies collect water quality chemical data on the streams in the state. There is no data for Stow Creek and Raccoon Ditch, which means that these rivers are non-impaired waterways and the NJDEP is not required to develop a Total Maximum Daily Load (TMDL) for these waterways.

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 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.

A map of the groundwater recharge areas is shown in Figure No. 4 (see attached). Wellhead protection areas, also required as part of the MSWMP, are shown in Figure No. 5 (see attached).

We recommend the Township adopt specific ordinances to protect wellhead protection areas to minimize the infiltration of pollutants into aquifers.

### **Design and Performance Standards**

The Township will adopt the design and performance standards for stormwater management measures as presented in N.J.A.C. 7:8-5 to minimize the adverse impact of stormwater runoff on water quality 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 4/1/06.

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

### **Plan Consistency**

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

The Municipal Stormwater Management Plan is consistent with the Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21. The municipality will utilize the most current update of the RSIS in the New Jersey Stormwater Best Management Practices Manual for stormwater management review of residential areas. This Municipal Stormwater Management Plan will be updated to be consistent with any future updates to the RSIS.

The Township's Stormwater Management Ordinance requires all new development and redevelopment plans to comply with New Jersey's Soil Erosion and Sediment Control Standards. During construction, Township inspectors will observe on-site soil erosion and sediment control measures and report any inconsistencies to the local Soil Conservation District.

### **Nonstructural Stormwater Management Strategies**

The Township has reviewed the master plan and ordinances, and has provided a list of the sections in the Township land use and zoning ordinances that are to be modified to incorporate nonstructural stormwater management strategies. These are the ordinances identified for

revision. Once the ordinance texts are completed, they will be submitted to the county review agency for review and approval within 4/1/06. A copy will be sent to the Department of Environmental Protection at the time of submission.

Article VII of the Township Code, entitled “Design and Performance Standards”, was reviewed with regard to incorporating nonstructural stormwater management strategies. We recommend the following strategies be incorporated into the code.

- 1) § 7.3: Bikeways describes standards for bikeways within the Township.

We recommend this section be amended to incorporate language to require bikeways to consist of mulch, stone or any pervious material to decrease the impervious area.

- 2) § 7.5: Buffers requires sufficient buffering along lot lines and street lines that separate a nonresidential use from either an existing residential use or residential zoning district.

We recommend this section amend the landscaping portion to require the use of native vegetation, which requires less fertilization and watering and to also include language to require the preservation of natural wood tracts and limits land disturbance for new construction.

We recommend this section be amended to incorporate language to allow buffer areas to be used for stormwater management by disconnecting impervious surfaces and treating runoff from these impervious surfaces.

We also recommend this section encourage the use of native vegetation in lieu of walls and fences.

- 3) § 7.7: Curbs and Gutter describe the curb and gutter requirements.

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.

- 4) § 7.8: Drainage details the design standards for drainage systems.

We recommend this section be amended to implement the use of natural vegetated swales in lieu of inlets and pipes.

- 5) § 7.16: Natural Features requires that natural features, such as trees, brooks, swamps, hilltops and views, be preserved whenever possible.

We recommend this section be amended to provide additional language to ensure that leaf litter and other beneficial aspects of the wooded areas are maintained in addition to the trees.

- 6) § 7.17: Non-Conforming Uses, Structures or Lots require a variance for existing single-family homes, nonresidential structures and mobile homes proposing additions that exceed 50% of its preexisting size.

We recommend language be added to address how the owner will mitigate the impact of the additional impervious surfaces unless the stormwater management plan for the development provided for these increases in impervious surfaces. This mitigation effort should address water quality, flooding, and groundwater recharge.

- 7) § 7.20: Off-Street Parking and Loading details off-street parking and loading requirements.

We recommend this section be amended to allow the use of pervious paving materials (i.e. porous concrete or porous asphalt) to minimize stormwater runoff and promote groundwater recharge.

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.

- 8) § 7.28: Shade Trees require that striping trees from a lot are prohibited.

We recommend this section be amended to require the use of native vegetation, which requires less fertilization and watering. The Township may want to consider providing a list of approved tree species.

- 9) § 7.29: Sidewalks describes the sidewalk requirements for the Township.

We recommend language be added to this section to require developers to design sidewalks to discharge stormwater to neighboring lawns where feasible to disconnect these impervious surfaces, and/or use permeable paving materials where appropriate.

- 10) § 7.35: Stormwater Runoff details the design standards for stormwater runoff systems.

We recommend this section be amended to implement the use of natural vegetated swales in lieu of inlets and pipes.

The Township has 2 residential districts and neither district has a maximum percent impervious surface for detached single-family homes. The Township also has 3 nonresidential districts. Each of these districts has a maximum percent impervious surface allocation, ranging from 5 percent for the FP District to 25 percent for the C District.

We recommend the Township Code be amended to remind developers that satisfying the percent impervious requirements do not relieve them of responsibility for complying with the Design and Performance Standards for Stormwater Management Measures.

If a developer is given a variance to exceed the maximum allowable percent imperviousness, the developer must mitigate the impact of the additional impervious surfaces. This mitigation effort must address water quality, flooding, and groundwater recharge.

### Land Use/Build-Out Analysis

A detailed land use analysis for the Township shall be submitted under separate cover.

### Mitigation Plans

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

The municipality should set up a trust fund to allow a developer to provide a fee to the municipality for an environmental enhancement project that has been identified by the governing body for Municipal Stormwater Management Planning, or towards the development of a Regional Stormwater Management Plan. The fee or amount of funding shall be determined by the governing body and include costs associated with purchasing the property or easement for mitigation, costs for the design, permitting, construction, inspection and contract administration, costs for operation and maintenance, and the cost associated with the long-term maintenance requirements of the mitigation measure.

## Figures

Figure No. 2: Township and Its Waterways

Figure No. 3: Township Boundary on USGS Quadrangle

Figure No. 4: Groundwater Recharge Areas

Figure No. 5: Wellhead Protection Areas

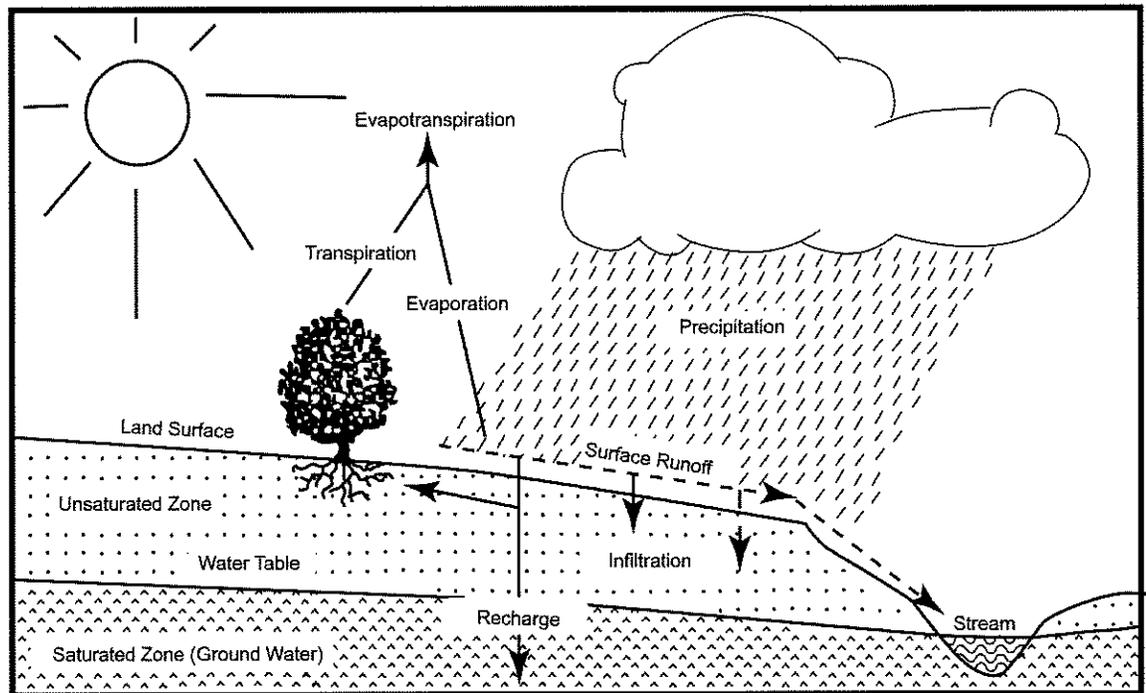
Figure No. 6: Existing Land Use

Figure No. 7: Hydrologic Unit (HUC14s)

Figure No. 8: Zoning Districts

Figure No. 9: Wetlands and Water Land Use (Constrained Land)

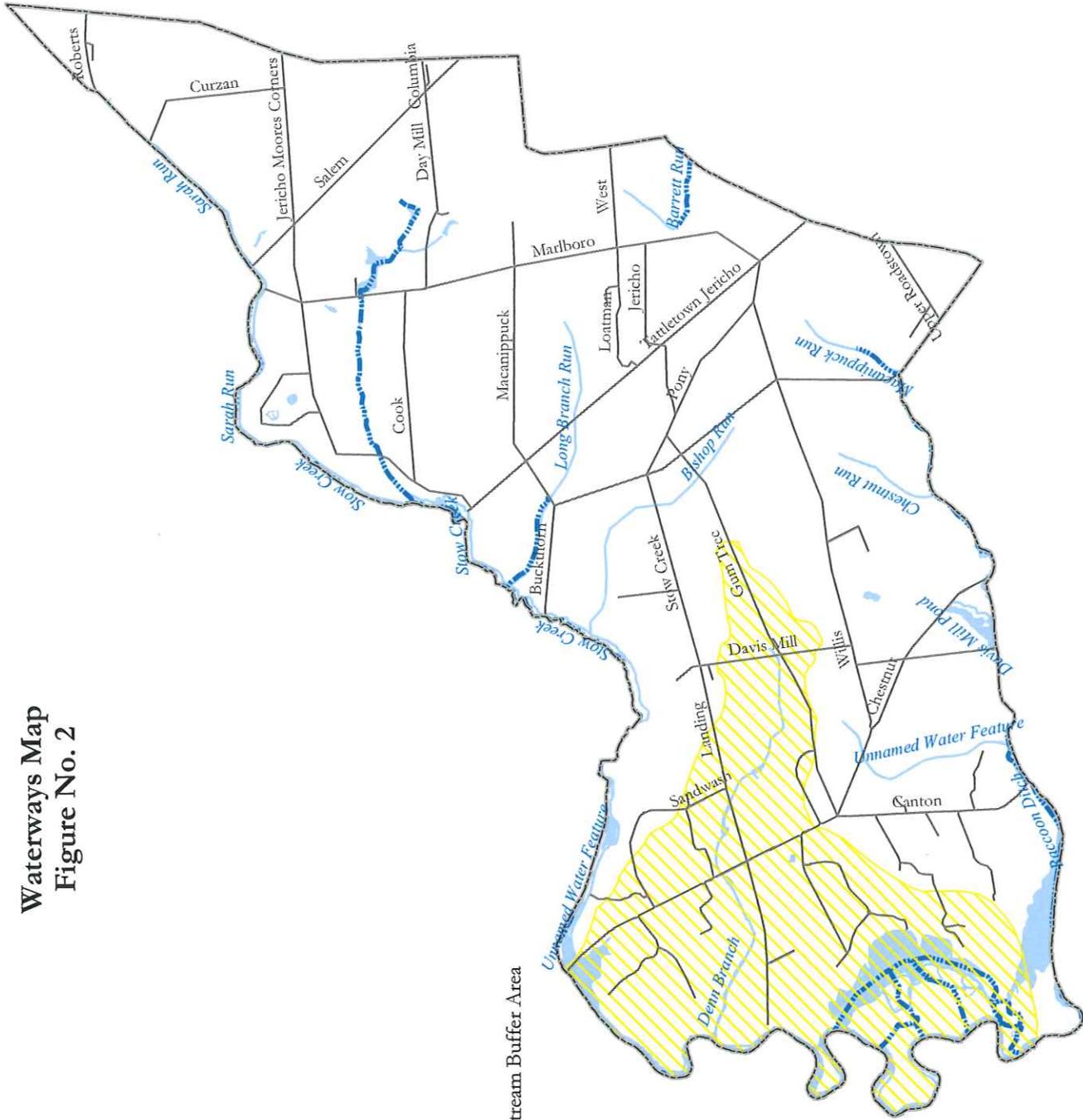
Figure No. 1: Groundwater Recharge in the Hydrologic Cycle



Use NJDEP iMap Service

<http://www.nj.gov/dep/gis/newmapping.htm>

Waterways Map  
Figure No. 2



- Legend**
- Municipal Boundary
  - Roadways
  - NJDEP Category One 300 Foot Stream Buffer Area
  - NJDEP 3rd Order Streams
  - Cumberland County Streams
  - Cumberland County Lakes

Stow Creek Township  
Cumberland County, NJ

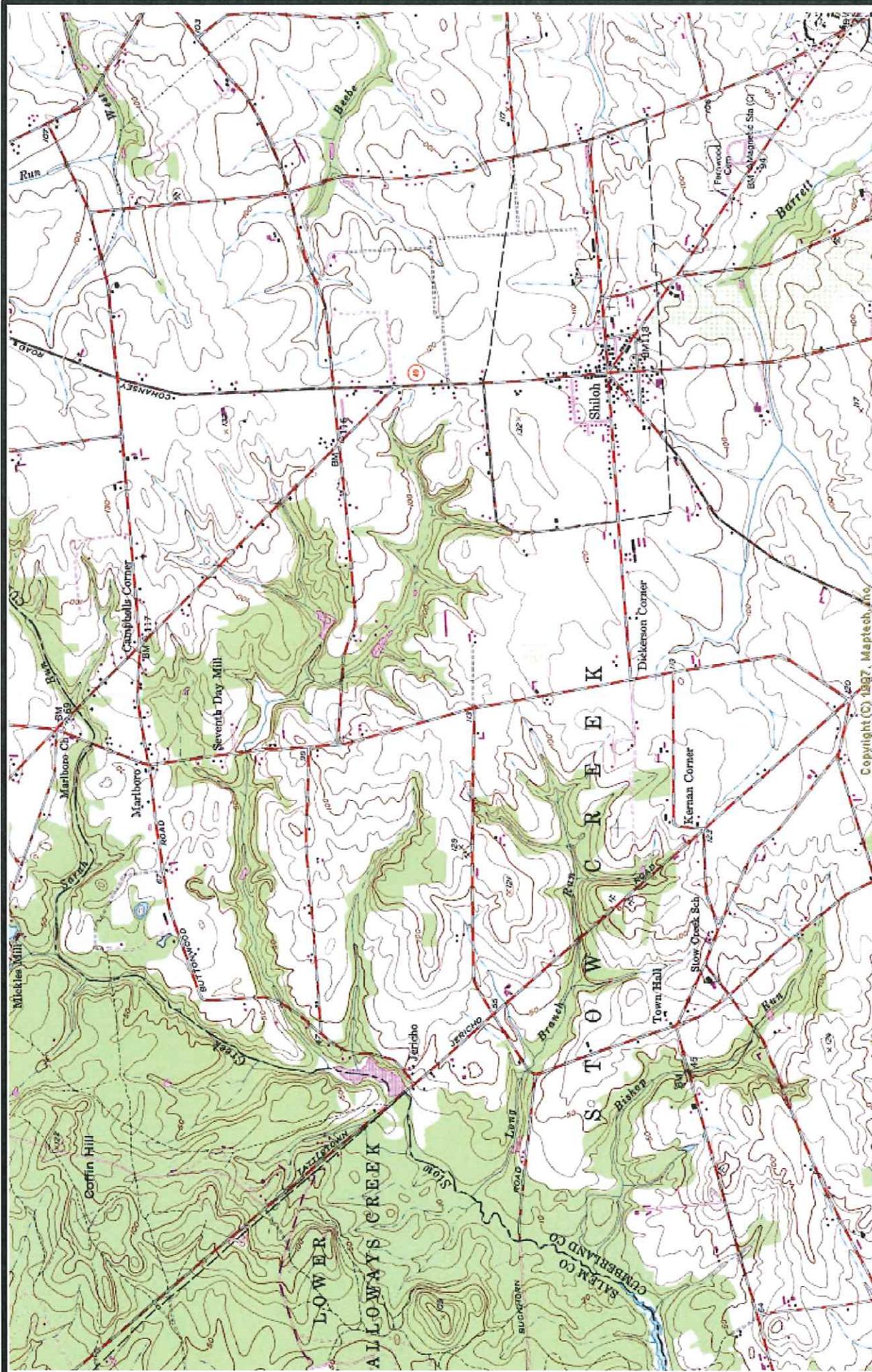


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**Stow Creek Township  
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**USGS Quadrangle Map  
Figure No. 3**

Shiloh Quadrangle

Not to Scale

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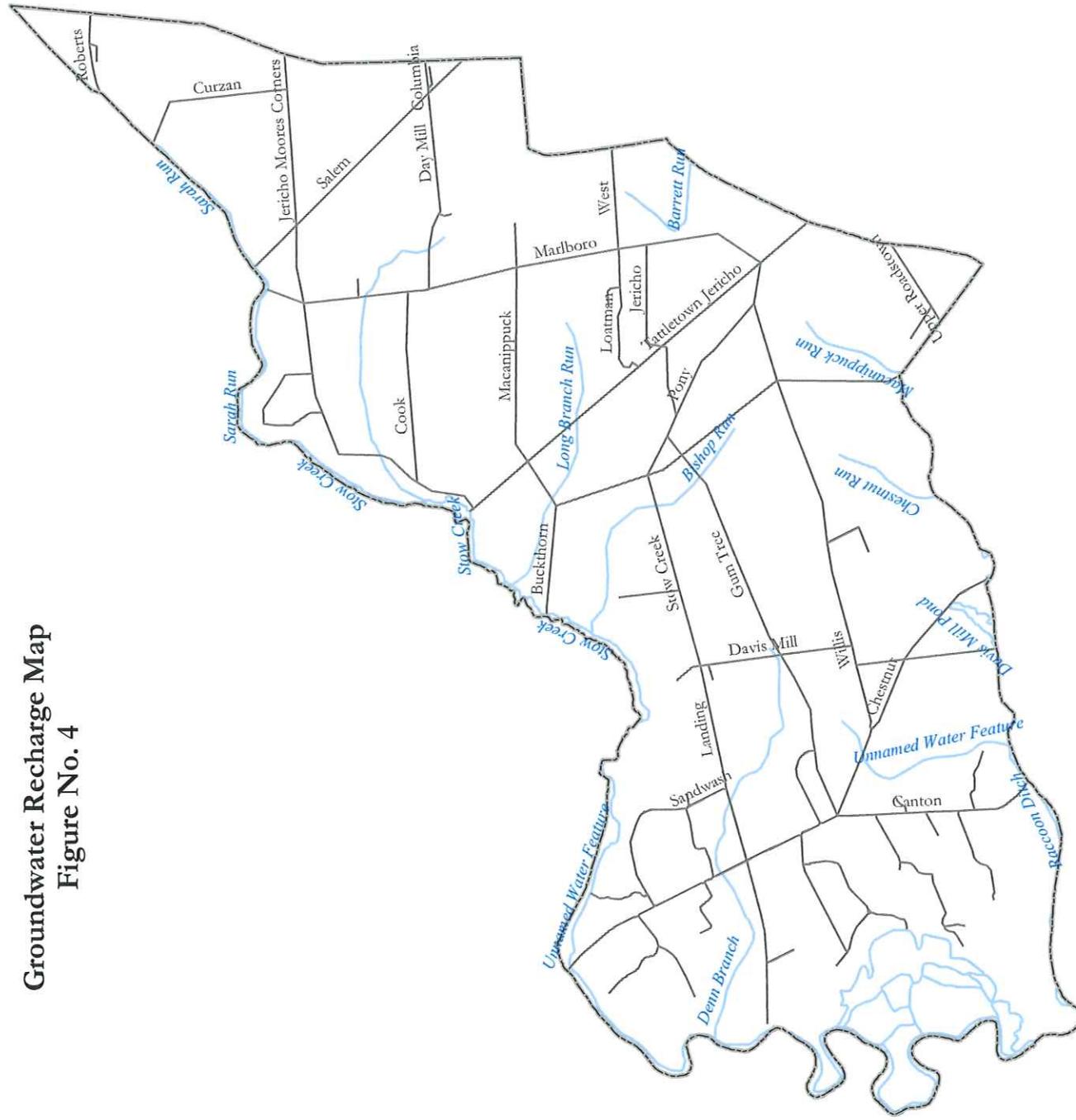
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Groundwater Recharge Map  
Figure No. 4



- Legend**
-  Municipal Boundary
  -  Roadways
  -  Cumberland County Streams



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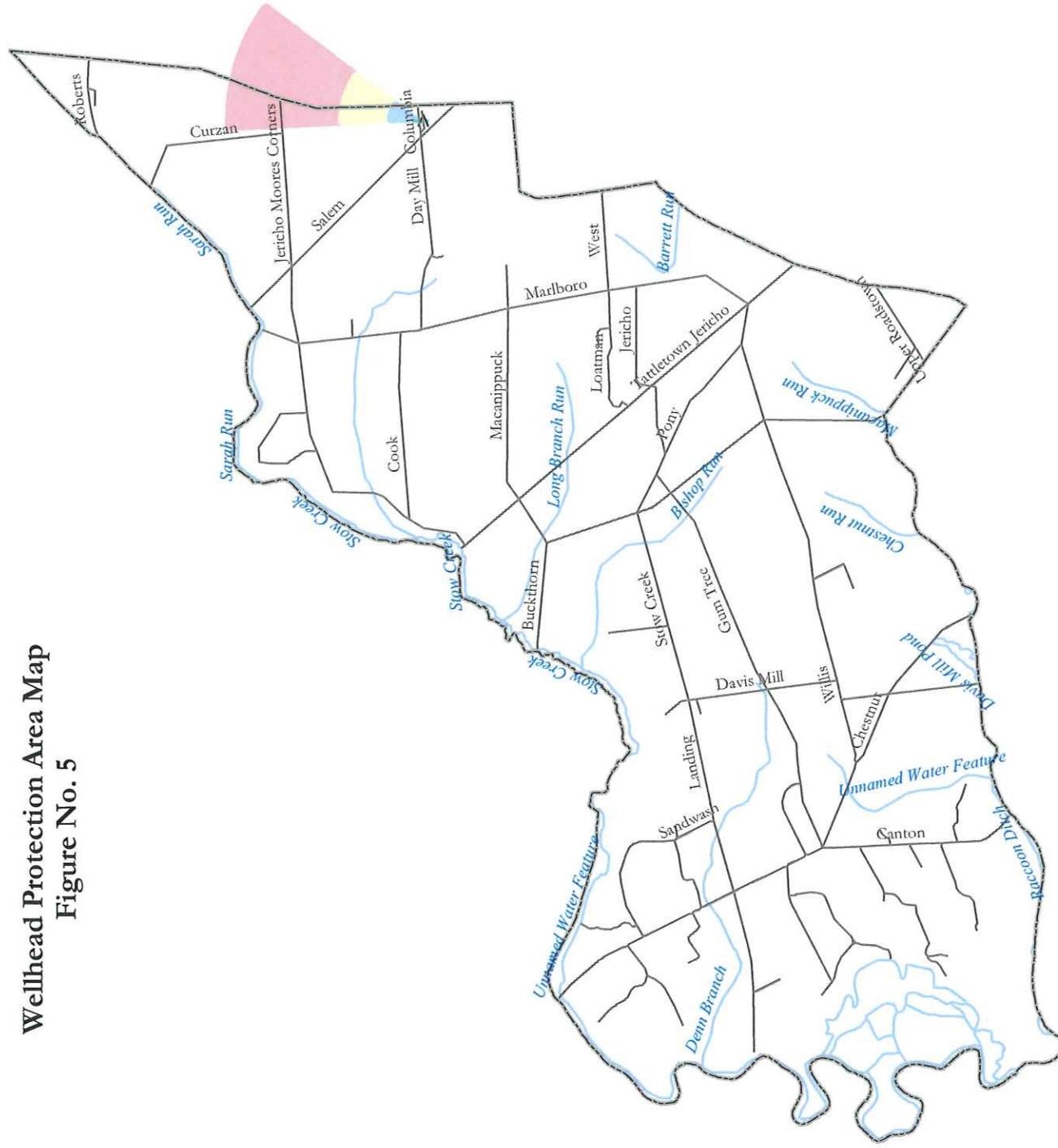
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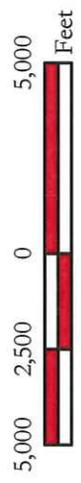
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Wellhead Protection Area Map  
Figure No. 5



- Legend**
- Municipal Boundary
  - Roadways
  - Public Groundwater Wells
- Wellhead Protection Area**
- Tier 1 (2 Year Capture)
  - Tier 2 (5 Year Capture)
  - Tier 3 (12 Year Capture)

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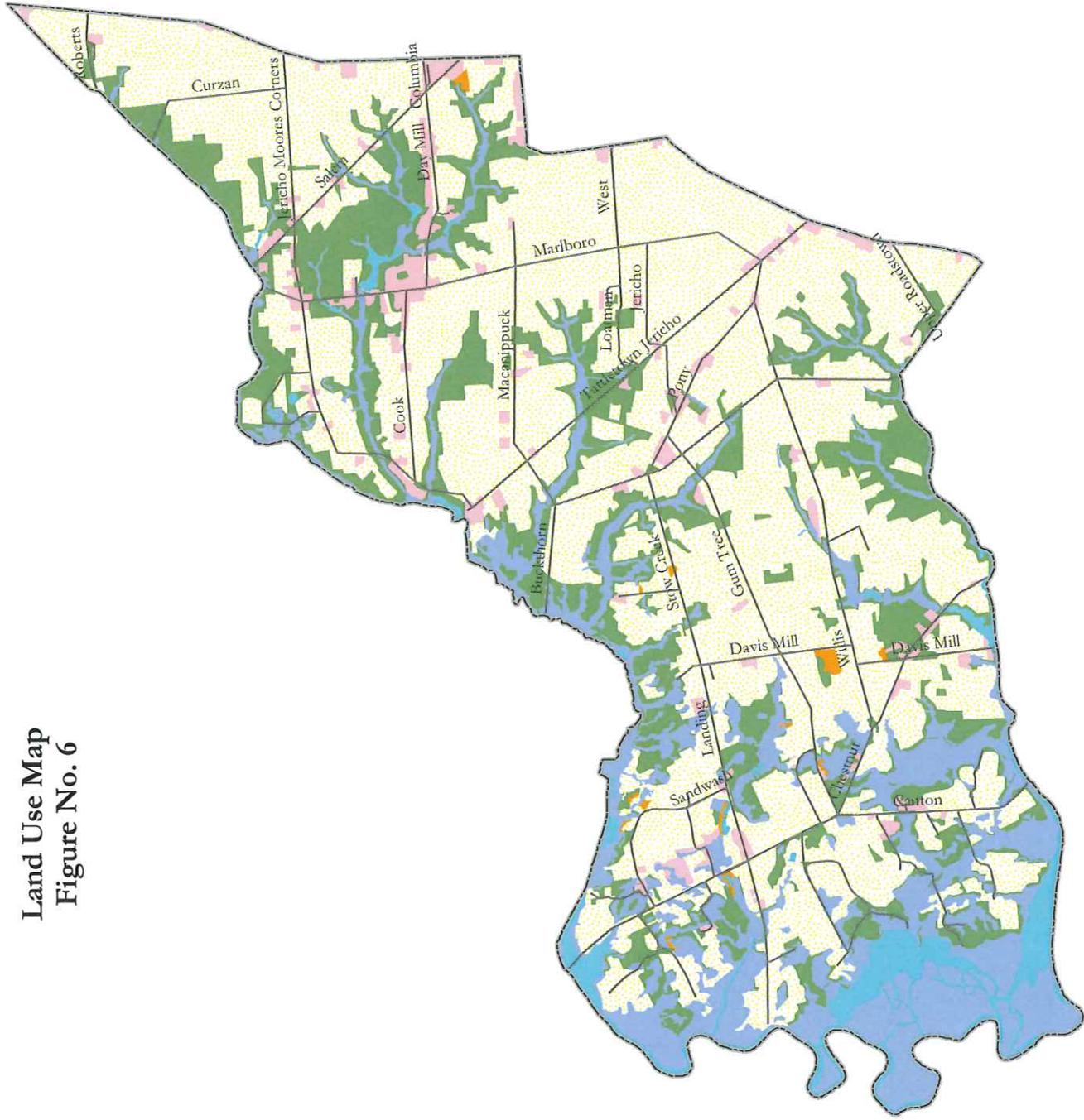


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Land Use Map  
Figure No. 6

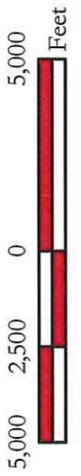


**Legend**

-  Municipal Boundary
-  Roadways

**NJDEP Existing Land Use**

-  Agriculture: 57.53% (10.81 sq mi)
-  Barren Land: 0.27% (0.05 sq mi)
-  Forest: 18.57% (3.49 sq mi)
-  Urban: 4.04% (0.76 sq mi)
-  Water: 3.78% (0.71 sq mi)
-  Wetlands: 15.81% (2.97 sq mi)

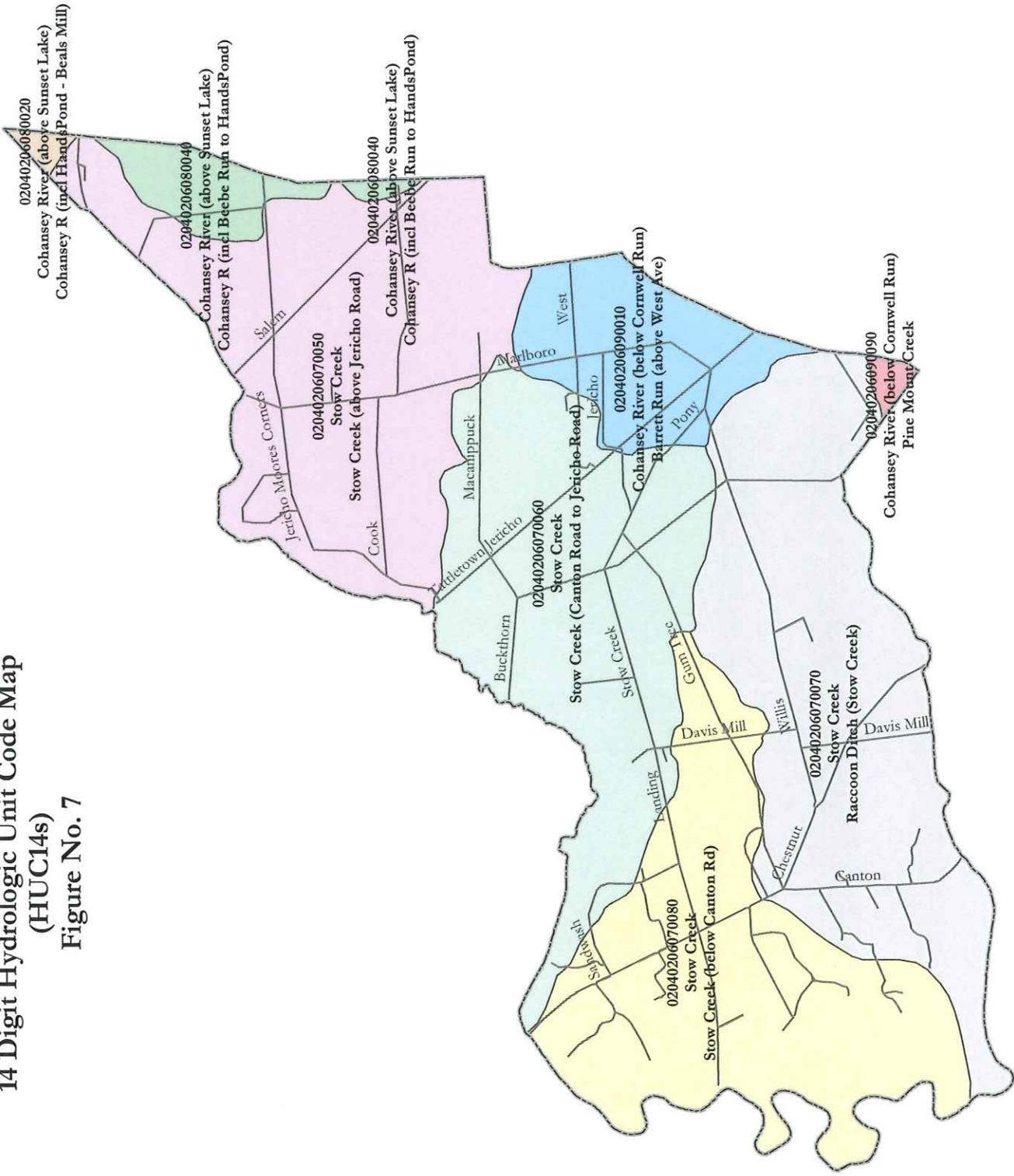


**Stow Creek Township  
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# 14 Digit Hydrologic Unit Code Map (HUC14s) Figure No. 7



## Legend

— Municipal Boundary

— Roadways

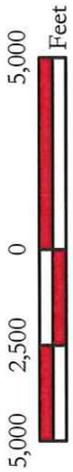
## NJDEP HUC14s

- 02040206070050
- 02040206070060
- 02040206070070
- 02040206070080
- 02040206080020
- 02040206080040
- 02040206090010
- 02040206090080
- 02040206090090

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## Stow Creek Township Cumberland County, NJ



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**Legend**

- A- Agriculture
- R- Residential
- HR- Historic Residential
- C- Commercial
- FP- Flood Plain



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**Zoning Districts Map  
 Figure No. 8**

Not to Scale

**Stow Creek Township  
 Cumberland County, NJ**

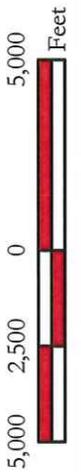
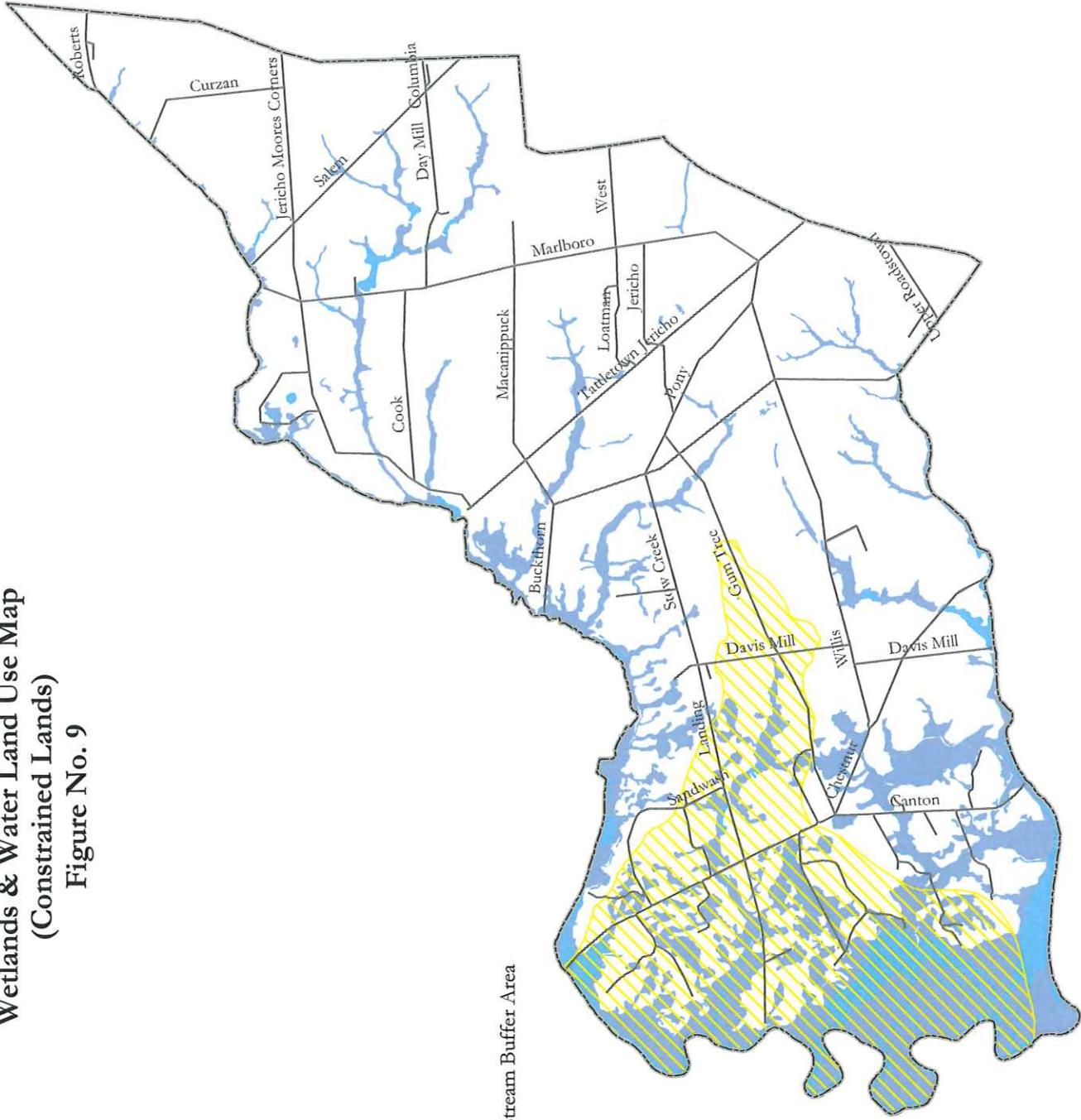
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# Wetlands & Water Land Use Map (Constrained Lands) Figure No. 9



- Legend**
- Municipal Boundary
  - Roadways
  - NJDEP Category One 300 Foot Stream Buffer Area
- NJDEP Existing Land Use**
- Water
  - Wetlands



Stow Creek Township  
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