

BOROUGH OF GIBBSBORO

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MUNICIPAL STORMWATER MANAGEMENT PLAN

For the

BOROUGH OF GIBBSBORO
Camden County, New Jersey

(KEI #24-237680304)

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Date



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Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for the Borough of Gibbsboro ("the Borough") 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 a "Major development", which means an individual "development," as well as multiple developments that individually or collectively result in:

1. The disturbance of one or more acres of land since February 2, 2004;
2. The creation of one-quarter acre or more of "regulated impervious surface" since February 2, 2004;
3. The creation of one-quarter acre or more of "regulated motor vehicle surface" since March 2, 2021 *{or the effective date of this ordinance, whichever is earlier}*; or
4. A combination of 2 and 3 above that totals an area of one-quarter acre or more. The same surface shall not be counted twice when determining if the combination area equals 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 baseflow in receiving water bodies. The plan describes long-term operation and maintenance measures for existing and future stormwater facilities.

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 outlines safety standards for stormwater infrastructure to be implemented to protect public safety. The plan also makes recommendations for revisions to the existing stormwater management maintenance and inspection ordinance.

Stormwater Discussion

Land development can dramatically alter the hydrologic cycle (See Figure C-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.

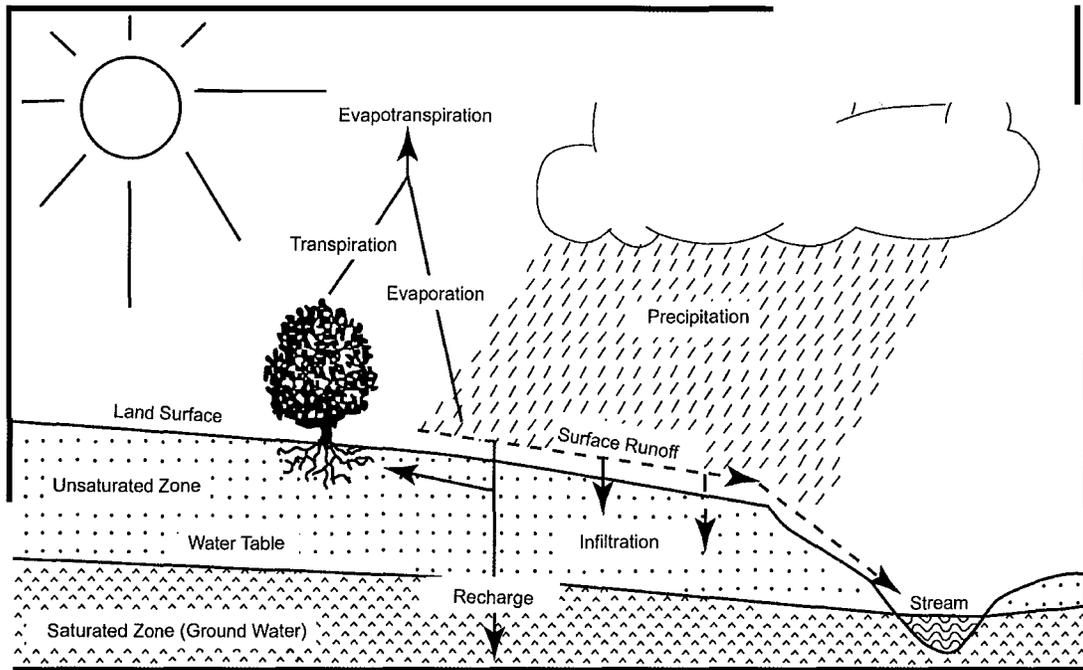


Figure C-1: Groundwater Recharge in the Hydrologic Cycle

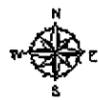
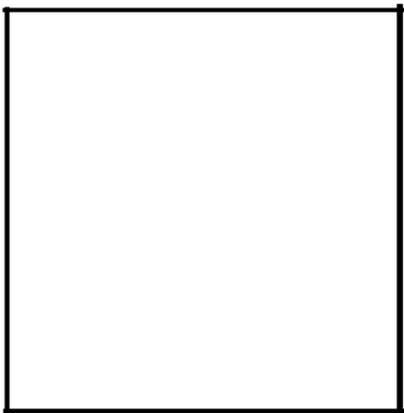
Source: New Jersey Geological Survey Report GSR-32.

Gibbsboro Boro, New Jersey
Showing Growth in Developed Use Areas
from 1986 to 1995 / 97



FIGURE 2
Aerial Map of the Borough

1000 0 1000 2000 Feet



The yellow outlined areas delineate areas that were developed as of 1986.

The solid yellow areas have been developed between 1986 and 1995/97.

The total areg of impervious surface (buildings, sidewalks, driveways, parking lots, etc.) is about 187 acres.

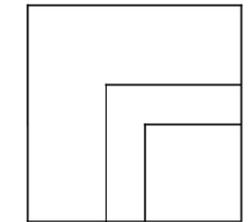
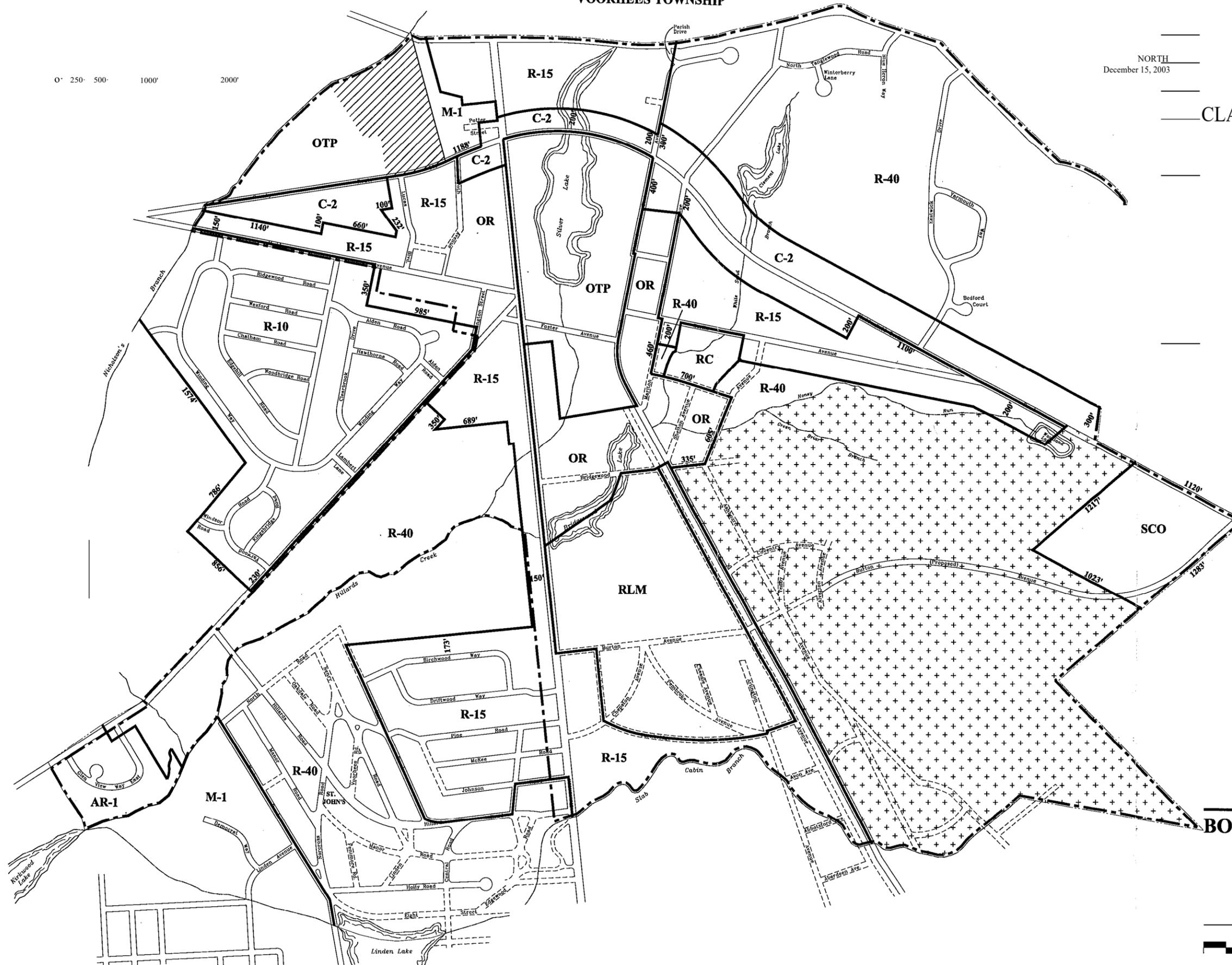
About 5 acres of this total were added since 1986. The total area of impervious surface constitutes 13% of the total (1,462) acres in the municipality.

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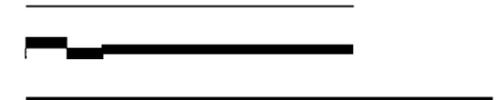
0' 250' 500' 1000' 2000'

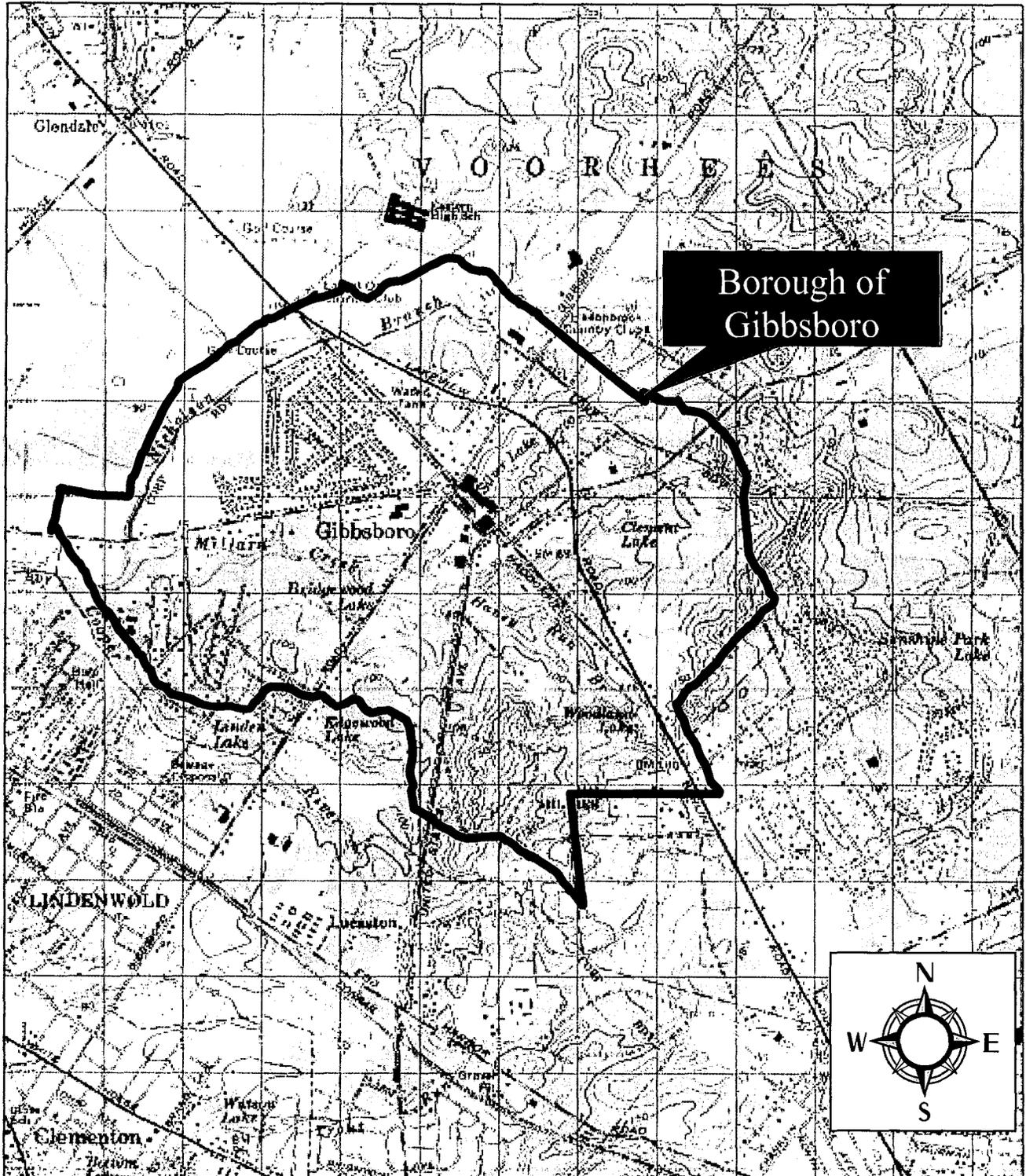
NORTH
December 15, 2003

CLAJRKJE o CATON o HJIN'fZ



BOROUGH of GIBBSBORO





BOROUGH OF GIBBSBORO

(Borough occupies Clementon Quadrangle)

Figure 3

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

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

Background

The Borough of Gibbsboro is approximately 2.2 square miles in size and is located in the higher elevations of Camden County, New Jersey. The Borough of Gibbsboro has implemented a very conservative approach to land development, land and wetlands preservation and wildlife preservation over the last 15 years. Planning efforts include the following detailed elements outlined in the municipal Master Plan.

- Open Space Element
- Housing Element
- Recreation Element

While the population of Gibbsboro has increased over the past 10 years, the Borough has been able to purchase, acquire and preserve over 100 acres of open space (both wetlands and uplands). While the Borough has recently experienced the pressure of suburban sprawl, the efforts of the Zoning and Planning Boards have been to minimize significant development through low density zoning and open space preservation. Figure 1 illustrates the current zoning map of the Borough, while Figure 2 illustrates an aerial view of those areas of the Borough that have been recently developed.

The Borough of Gibbsboro is unique in that the area topography offers high panoramic view of the County of Camden and the Philadelphia skyline. The municipal wetlands play host to one of the most endangered species of freshwater wetlands known as "swamp pink". The higher elevations of the municipality contain highly erodible soils, while the wetlands areas contain impermeable fine sands and silts. The Borough is graced by a number of streams and waterways which are shown in Figure 3. The streams are known as Hilliards Creek, White Sands Branch, Haney Run, Green Brier Branch and the Slab Cabin Branch. Lakes in the Borough include Silver Lake, Bridgewood Lake and Clement Lake. All streams corridors within the Borough are required (by ordinance) to have a 25 feet wide buffer added to the stream corridor that is established from the top of the bank of the stream as a result of any site plan, subdivision or Zoning Board application.

It is important to note that five (5) major County roadways traverse the Borough and contribute significant surface runoff to the streams and creeks within the Borough. The Development Section of the municipality, which is located between Haddon Avenue and Kirkwood Road, is the largest contributor of surface runoff in terms of non-point source pollution in the Borough.

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 the 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. While the streams and creeks in the Borough are not specifically monitored for benthic macroinvertebrates, all of the waterways from the Borough eventually drain to the Cooper River and the Delaware River. These major water ways are monitored in the Amnet program. According to the New Jersey Department of Environmental Protection data base, the Cooper and Delaware Rivers are located in watershed Management area #19. 8.9% of the sites monitored in Area #19 are non-impaired, while 76.8% are moderately impaired, and the remaining sites are severely impaired. It has been noted in the report that the removal of the numerous sanitary sewer treatment plants along the Cooper River, together with the establishment of the Camden County Municipal Utilities Authority, has led to the improvement of the water quality in the Cooper and Delaware Rivers. Since the Borough of Gibbsboro is located at the headwaters of the Cooper River watershed, it is important that all contaminants, including non-point source pollution, be eliminated from the creeks and streams in the Borough.

In addition to maintaining a good water quality monitoring program, the Borough must address any water quantity problems that may exist including flooding, stream bank erosion, and diminished base flow in its streams. Since the Borough has a significant amount of open space, and is located primarily on the headwaters of the Cooper River basin, the Borough does not have any significant problems with property or roadway flooding. During severe storm events, the following areas of the Borough are known to cause erosion and/or stream bank flooding:

- Berlin Road - from the driveway at Brookside Apartments to the Berlin Road Pump Station
- Haney Run - soil erosion at headwaters of creek
- Hilliards Creek- severe sedimentation at intersection of Hilliards Road
- Old Egg Harbor Road from the baird Track to Eastwick road

The higher elevations of Gibbsboro contain soils that are highly permeable. Recent developments along County Route No. 561 and Berlin Road have been constructed with stormwater management retention and detention basins, which have substantially reduced the rate of runoff from the developed sites and, therefore, reduced the rate of non-point source pollution to the White Sands Branch Creek.

Design and Performance Standards

The Borough currently utilizes Chapter 152 of the Gibbsboro Ordinance Code Book to address stormwater management maintenance and inspection.

The Borough will revise Chapter 152 and 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 24 months of the effective date of the Stormwater Management Rules. At the present time, the Borough has design standards for the construction of stormwater management basins that are contained in Section 145-26 thru 29 and 181 - 48 of the Municipal Code. These two sections will be modified to include the language that is necessary in order for the Borough to comply with the new stormwater regulations.

During construction of all new proposed development projects, Borough inspectors will observe the construction of each project to ensure that the stormwater management measures are constructed and function as designed.

Plan Consistency

The Borough is not within a Regional Stormwater Management Planning Area and no TMDLs have been developed for waters within the Borough; therefore this plan does not need to be consistent with any regional stormwater management plans (RSWMPs) nor any Total Maximum Daily Containment Loads 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 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 Borough'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, Borough inspectors will observe on-site soil erosion -and sediment control measures and report any inconsistencies to the local Soil Conservation District.

Green Infrastructure Stormwater Management Strategies

Flood control, groundwater recharge, and pollutant reduction shall be achieved through the use of stormwater management measures, including green infrastructure Best Management Practices (GI BMPs) and nonstructural stormwater management strategies. GI BMPs and low impact development (LID) should be utilized to meet the goal of maintaining natural hydrology to reduce stormwater runoff volume, reduce erosion, encourage infiltration and groundwater recharge, and reduce pollution. GI BMPs and LID should be developed based upon physical site conditions and the origin, nature and the anticipated quantity, or amount, of potential pollutants. Multiple stormwater management BMPs may be necessary to achieve the established performance standards for water quality, quantity, and groundwater recharge

Tables 1 through 3 below summarize the ability of stormwater best management practices identified and described in the New Jersey Stormwater Best Management Practices Manual to satisfy the green infrastructure, groundwater recharge, stormwater runoff quality and stormwater runoff quantity standards specified in Section IV.O, P, Q and R. When designed in accordance with the most current version of the New Jersey Stormwater Best Management Practices Manual, the stormwater management measures found at N.J.A.C. 7:8-5.2 (f) Tables 5-1, 5-2 and 5-3 and listed below in Tables 1, 2 and 3 are presumed to be capable of providing stormwater controls for the design and performance standards as outlined in the tables below. Upon amendments of the New Jersey Stormwater Best Management Practices to reflect additions or deletions of BMPs meeting these standards, or changes in the presumed performance of BMPs designed in accordance with the New Jersey Stormwater BMP Manual, the Department shall publish in the New Jersey Registers a notice of administrative change revising the applicable table. The most current version of the BMP Manual can be found on the Department's website at:

https://njstormwater.org/bmp_manual2.htm.

Where the BMP tables in the NJ Stormwater Management Rule are different due to updates or amendments with the tables in this ordinance the BMP Tables in the Stormwater Management rule at N.J.A.C. 7:8-5.2(f) shall take precedence.

Best Management Practice	Stormwater Runoff Quality TSS Removal Rate (percent)	Stormwater Runoff Quantity	Groundwater Recharge	Minimum Separation from Seasonal High Water Table (feet)
Cistern	0	Yes	No	--
Dry Well ^(a)	0	No	Yes	2
Grass Swale	50 or less	No	No	2 ^(e) 1 ^(f)
Green Roof	0	Yes	No	--
Manufactured Treatment Device ^{(a) (g)}	50 or 80	No	No	Dependent upon the device
Pervious Paving System ^(a)	80	Yes	Yes ^(b) No ^(c)	2 ^(b) 1 ^(c)
Small-Scale Bioretention Basin ^(a)	80 or 90	Yes	Yes ^(b) No ^(c)	2 ^(b) 1 ^(c)
Small-Scale Infiltration Basin ^(a)	80	Yes	Yes	2
Small-Scale Sand Filter	80	Yes	Yes	2
Vegetative Filter Strip	60-80	No	No	--

. (Notes corresponding to annotations (a) through (g) are found under Table 3)

Best Management Practice	Stormwater Runoff Quality TSS Removal Rate (percent)	Stormwater Runoff Quantity	Groundwater Recharge	Minimum Separation from Seasonal High Water Table (feet)
Bioretention System	80 or 90	Yes	Yes ^(b) No ^(c)	2 ^(b) 1 ^(c)
Infiltration Basin	80	Yes	Yes	2
Sand Filter ^(b)	80	Yes	Yes	2
Standard Constructed Wetland	90	Yes	No	N/A
Wet Pond ^(d)	50-90	Yes	No	N/A

(Notes corresponding to annotations (a) through (g) are found under Table 3)

Table 3 BMPs for Groundwater Recharge, Stormwater Runoff Quality, and/or Stormwater Runoff Quantity only with a Waiver or Variance from N.J.A.C. 7:8-5.3				
Best Management Practice	Stormwater Runoff Quality TSS Removal Rate (percent)	Stormwater Runoff Quantity	Groundwater Recharge	Minimum Separation from Seasonal High Water Table (feet)
Blue Roof	0	Yes	No	N/A
Extended Detention Basin	40-60	Yes	No	1
Manufactured Treatment Device ^(h)	50 or 80	No	No	Dependent upon the device
Sand Filter ^(c)	80	Yes	No	1
Subsurface Gravel Wetland	90	No	No	1
Wet Pond	50-90	Yes	No	N/A

Notes to Tables 1, 2, and 3:

- (a) subject to the applicable contributory drainage area limitation specified at Section IV.O.2;
- (b) designed to infiltrate into the subsoil;
- (c) designed with underdrains;
- (d) designed to maintain at least a 10-foot wide area of native vegetation along at least 50 percent of the shoreline and to include a stormwater runoff retention component designed to capture stormwater runoff for beneficial reuse, such as irrigation;
- (e) designed with a slope of less than two percent;
- (f) designed with a slope of equal to or greater than two percent;
- (g) manufactured treatment devices that meet the definition of green infrastructure at Section II;
- (h) manufactured treatment devices that do not meet the definition of green infrastructure at Section II.

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. Presented is a hierarchy of options.

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.

Groundwater Recharge

- Construct stormwater management basin on school property to eliminate erosion and encourage recharge.

Water Quality

- Retrofit the existing stormwater management facility at Heritage Village to create a properly designed wet pond and to provide the removal of 80 percent of total suspended solids from the development runoff.
- Retrofit the existing basin on Eastwick Drive to provide the removal of 80 percent of total suspended solids and to construct a water quality forebay.
- Construct concrete curbing and inlets along Berlin Road along Brookside Apartments property frontage.
- Provide street sweeping throughout the Development Section of the Borough.
- Retrofit the Hidden Woods retention basins to detention basins or wet ponds.

Water Quantity

- Construct stormwater management basin on school property's to eliminate erosion and encourage recharge.

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.