CITY OF VINELAND

Stormwater

Management Plan

CITY OF VINELAND
Engineering Division
March 31, 2005
October 31, 2005 (revised)

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Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for the City of Vineland ("the City") 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 acres 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 will be included in this plan based upon existing zoning and land available for development. The plan also addresses the review and update of existing ordinances, the City 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.

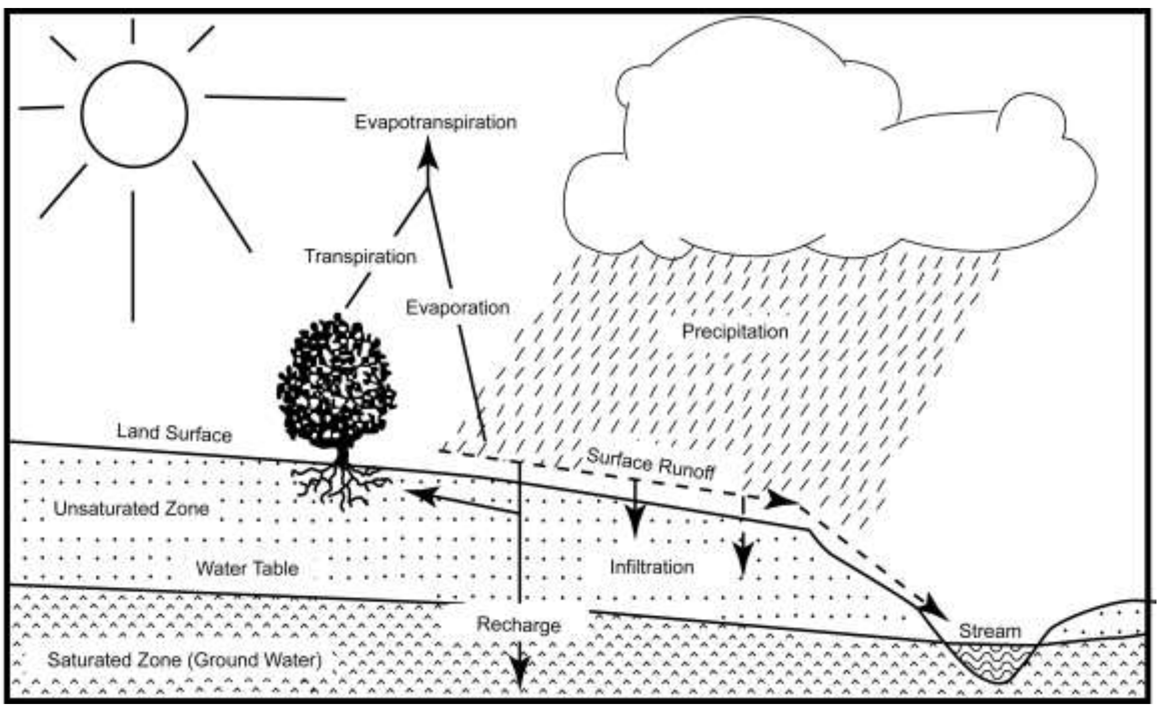
Stormwater Discussion

Land development can dramatically alter the hydrologic cycle (See Figure A) 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.

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.

Figure A: Groundwater Recharge in the Hydrologic Cycle



Source: New Jersey Geological Survey Report GSR-32.

Background

Vineland was originally a 1 square mile Borough until it merged with Landis Township in 1952 to become a city. The City encompasses a 69 square mile area in Cumberland County, New Jersey. Because of its large area, the City of Vineland is diverse in nature in that it has a collection of urban, rural, industrial and business settings. In recent years, the City has been under significant development pressure. This development is occurring as both in-fill and virgin development. The population of the City has increased from 53,753 in 1980, to 54,780 in 1990, to 56,271 in 2000. This population increase has resulted in considerable demand for new development; changes in the landscape have most likely increased stormwater runoff volumes and pollutant loads to the waterways of the municipality. Figure C-2 illustrates the waterways in the City. Figure C-3 depicts the City 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 macro invertebrates 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 macro invertebrate community dynamics. The major river that borders the City to the west is the Maurice River.

There are six (6) major tributaries that flow through the City to this major river. In addition to the AMNET data, the NJDEP and other regulatory agencies collect water quality chemical data on the streams in the state. 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.

The integrated list is available from the NJDEP website at www.nj.gov/dep/wmm/sgwqt/wat/index.html. Specific data on biological monitoring (AMNET data) is available from the NJDEP web site at www.state.nj.us/dep/wmm/bfbm. Additional data can be found on the United States Geological Survey (USGS) site at www.water.usgs.gov.

In addition to water quality problems, the City has exhibited minor water quantity problems including flooding, stream bank erosion, and diminished base flow in its streams. Some of the culverts associated with road crossings in the City are undersized. During severe storm events, these undersized culverts do not have adequate capacity, thereby causing a backwater effect and flooding upstream.

Design and Performance Standards

The City 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 design standards adopted by the City will meet the regulations of the Pinelands Commission N.J.A.C. 7:50-6.84, for those lands within the Pinelands Area. The ordinances will be submitted to the county for review and approval by October 2005. During construction, Consulting Engineers or City inspectors will observe the construction of the project to ensure that the stormwater management measures are constructed and function as designed. By way of Ordinance #2004-7, the City requires a certification from the project engineer for drainage basins. This certification is relative to the construction and functionality of newly constructed drainage basins.

Plan Consistency

The City is not within a Regional Stormwater Management Planning Area and no TMDLs have been developed for waters within the City; 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 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 City’s Stormwater Management Ordinance will require all new development and redevelopment plans to comply with New Jersey’s Soil Erosion and Sediment Control Standards. During construction, City inspectors will observe on-site soil erosion and sediment control measures and report any inconsistencies to the local Soil Conservation District.

The Municipal Stormwater Management Plan is consistent with the Pinelands Comprehensive Management Plan (CMP). Any future amendments to the CMP shall be incorporated into the Municipal Stormwater Management Plan.

Nonstructural Stormwater Management Strategies

The City is currently reviewing the master plan and ordinances, and will provide a list of the sections in the City 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 county review agency for review and approval by October 2005. A copy will be sent to the Department of Environmental Protection at the time of completion.

The City has 13 types of residential districts. Each district has a maximum percent impervious surface allocation, ranging from 10 percent for the W6 District, which has a minimum lot size of 250,000 square feet for detached single-family homes, to 40 percent for the R1 District, which has a minimum lot size of 9,750 square feet for single-family homes. The City has 11 types of non-residential districts. Each of these districts has a maximum percent impervious surface allocation, ranging from 50 percent for the I-1 District to 90 percent for the B-1 District. The City is evaluating the maximum allowable impervious cover for each zone to determine whether a reduction or increase in impervious cover is appropriate. The City is also evaluating a maximum percent of disturbance for each zone. The City is considering an ordinance to mitigate any exceedance of the zone requirements. This mitigation effort will consider water quality, flooding, and groundwater recharge. A detailed description of how to develop a mitigation plan is included in this Municipal Stormwater Management Plan.

Land Use/Build-Out Analysis

Introduction:

Since there is more than one square mile of combined vacant and agricultural lands throughout the municipality, a land use/build-out analysis has been included within the MSWMP (as required by N.J.A.C. 7:8 and 7:14A-25).

The purpose of this analysis is to provide a tool to assess the impacts of continued land development within the municipality. As a municipality matures towards its full land use potential, development can tend to adversely impact both water quality and quantity. As lands are cleared and land uses intensified (e.g. constructing housing developments on previously farmed agricultural lands), detrimental impacts to water quality and quantity typically are manifested through stormwater runoff due to increases in both pollutant loadings and impervious surface coverages.

As land is developed and subsequently 'de-vegetated", there is a greater potential to accumulate and mobilize a variety of pollutants from such sources as the atmosphere, fertilizers, animal wastes, leakage/wear from transportation vehicles. Pollutants such as metals, suspended solids, hydrocarbons, pathogens, and nutrients are commonly associated with land development and therefore need to be closely monitored.

Increases in impervious surface coverage (via increases to building, roadway, sidewalk, driveway and parking lot surface areas; etc.) cause pollutants to more readily collect, mobilize and be transported to downstream receiving waters and ecosystems. It also causes greater potential for soil erosion and migration.

As a result of the above, downstream receiving waterbodies and ecosystems become impaired as flooding events are increased and intensified from the new impervious surface areas. Water quality is further degraded as increased stormwater pollutant loads enter the waterbodies and alter the chemical, physical and biological integrity of the receiving waters.

Therefore to better protect the public health and safeguard downstream waterbodies and aquatic life, the land use/build-out analysis is the first step in assisting the municipality in understanding the magnitude of these impacts and developing strategies to minimize, manage and/or mitigate these impacts through by such means as additional stormwater management control techniques, changes in construction practices and even changes to the land use zoning.

1. Process:

   The land use/build-out analysis is conducted assuming full development under existing zoning for each HUC14 drainage area within the municipality. The analysis attempts to quantify the projected increases in pollutant loadings and impervious surface coverage so that the municipality can then use these values to project impacts to water quality and quantity and develop strategies to minimize, manage and/or mitigate the impacts.

   The steps used to prepare the land use/build-out analysis are as follows:

   a. Identify and characterize the HUC14 watersheds within the municipality.

      Using the NJDEP's GIS mapping data for HUC14s, the 16 HUC14s drainage areas within Vineland were identified, their boundaries delineated (see Figure 12), and the results saved within a GIS feature layer.

Then through the use of ESRI's ArcGIS mapping software, the total land areas for each of the HUC14 watersheds were determined (and summarized in Table 1 below) based on the delineated watershed's digital feature attributes.

Table 1: HUC14 Drainage Areas

HUC14 ID	HUC14 Sub-Watershed Name	Area (acres)
02040206130040	Scotland Run (below Delsea Drive)	180.49
02040206140010	MauriceR(BlkwtrBr to/incl WillowGroveLk)	1,287.26
02040206140020	Burnt Mill Branch / Hudson Branch	2,456.21
02040206140040	Blackwater Branch (above/incl Pine Br)	2,374.05
02040206140050	Blackwater Branch (below Pine Branch)	2,881.78
02040206140060	Maurice R (Sherman Ave to Blackwater Br)	4,102.42
02040206140070	Parvin Branch / Tarkiln Branch	5,714.55
02040206160030	Maurice River(Union Lake to Sherman Ave)	994.95
02040206170010	Hankins Pond trib (Millville)	1,836.97
02040206180010	Panther Branch (Menantico Creek)	1,960.47
02040206180020	Cedar Branch (Menantico Creek)	2,687.17
02040206180030	Menantico Creek (above Rt 552)	5,394.05
02040206180040	Berryman Branch (Menantico Creek)	3,841.15
02040206180050	Menantico Creek (below Rt 552)	1,976.84
02040206190010	Manumuskin River (above/incl BigNealBr)	2,915.93
02040206190020	Manumuskin River (Rt 49 to Big Neal Br)	3,542.68
	Total:	44,146.97

It should be noted that two additional HUC14s #02040206140030 (Green Branch / Endless Branch) and #02040206150070 [Muddy Run (below Landis Ave)] were not incorporated into this analysis since their land areas were insignificant (with areas less than 0.02 acres within the municipality).

b. Identify the City's land use zones.

Using the municipality's GIS mapping data of their land use zoning districts (see both Figure 3 and Attachment 2 for an overview of these zones), the zones were overlaid over the HUC14 drainage areas to identify and delineate the land use zones within each individual HUC14 drainage area.

c. Identify and calculate all existing impervious land cover within each HUC14 watershed.

The existing impervious land covers were determined using aerial mapping techniques and the NJDEP's 2002 aerial orthophotographs. The amounts of impervious land cover within each HUC14 were then calculated by zone (see Figures 15A-15P and Attachment 1).

d. Identify and calculate all existing constrained lands within each HUC14 drainage area.

Using a combination of the NJDEP's and the municipality's GIS mapping data, the lands constrained from future development (including such lands identified as surficial waterbodies, wetland areas, Category One resource protection areas and their associated 300 foot buffers) were identified and merged into a GIS feature layer (see Figure 5).

This layer was then overlaid on the both the HUC14 and the municipal land use zoning feature layers and the amount of constrained lands within each HUC14 were then calculated by zone (see Figures 15A-15P and Attachment 1).

e. Identify and calculate all existing dedicated park lands and open space areas within each HUC14 drainage area.

   Using a combination of the NJDEP's and the municipality's GIS mapping data, the open space and recreational lands protected by the NJDEP and therefore constrained from future development (including such parcels as parks, forests, historical sites, and natural and wildlife management areas) were identified and merged into a GIS feature layer (see Figure 5).

   This layer was then overlaid on the both the HUC14 and the municipal land use zoning feature layers and the amount of protected open space and recreational lands within each HUC14 were then calculated by zone (see Figures 15A-15P and Attachment 1).

f. Identify and calculate any other protected lands within each HUC14 drainage area that would be restricted from future development.

   No such lands were identified within the municipality (although such lands may be added to the analysis in the future as needed).

g. Calculate the land areas available for development and redevelopment within each HUC14 watershed.

   The remaining land areas available for development and redevelopment were then calculated by subtracting the existing impervious, constrained land, open space and recreational land, and other protected land coverages from the total amount of available land coverage within each zone of each HUC14 (see Attachment 1).

   In essence the lands available for development consist of agricultural, wooded and/or barren lands while the lands available for redevelopment consist of the eligible lands containing existing residential, commercial and industrially zoned parcels.

h. Calculate the potential additional impervious surface coverage assuming full development.

   Using the maximum impervious surface coverage percentages specified within the municipal ordinance, the potential additional impervious surface coverage was calculated by multiplying lands areas available for development and redevelopment by the maximum impervious surface coverage.

i. Estimate non-point source pollutant load for each HUC14 drainage area.

   Non-point source pollutant loads were calculated for each HUC14 using the land use pollutant loads published in the NJDEP Stormwater BMP Manual 2004 (see Table 2 below) multiplied by the amount of potential maximum developable land areas within each municipality.

   For purposes of his analysis, the pollutants were limited to total phosphorus, total nitrogen and total suspended solids. However the analysis can be expanded in the future to include other contaminants of concern.

Table 2: Pollutant Loads by Land Cover

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

Source: NJDEP Stormwater BMP Manual 2004 (Appendix C, Table C-2).

2. Results:

   The results of the land use/build-out analysis are detailed in Attachment 1 and summarized below in Table 3 (for the potential maximum pollutant loadings) and Table 4 (for the potential increased impervious surface coverages).

Table 3: Land Use/Build-Out Non-point Source Summary

HUC14 ID	HUC14 Sub-Watershed Name	Area (acres)	TP (lbs/yr)	TN (lbs/yr)	TSS (lbs/yr)
02040206130040	Scotland Run (below Delsea Drive)	180.49	98.8	970.7	24,394
02040206140010	MauriceR(BlkwtrBr to/incl WillowGroveLk)	1,287.26	490.7	6,009.4	110,865
02040206140020	Burnt Mill Branch / Hudson Branch	2,456.21	3,075.4	30,149.4	462,559
02040206140040	Blackwater Branch (above/incl Pine Br)	2,374.05	2,764.6	25,443.7	461,037
02040206140050	Blackwater Branch (below Pine Branch)	2,881.78	3,600.2	38,381.9	413,094
02040206140060	Maurice R (Sherman Ave to Blackwater Br)	4,102.42	3,950.8	43,325.7	453,094
02040206140070	Parvin Branch / Tarkiln Branch	5,714.55	6,825.3	73,076.8	705,639
02040206160030	Maurice River(Union Lake to Sherman Ave)	994.95	1,472.4	15,622.7	149,645
02040206170010	Hankins Pond trib (Millville)	1,836.97	2,231.6	23,233.4	290,884
02040206180010	Panther Branch (Menantico Creek)	1,960.47	2,274.5	17,765.6	511,748
02040206180020	Cedar Branch (Menantico Creek)	2,687.17	3,220.2	31,281.6	461,564
02040206180030	Menantico Creek (above Rt 552)	5,394.05	4,798.7	49,546.5	715,216
02040206180040	Berryman Branch (Menantico Creek)	3,841.15	2,976.7	32,053.9	466,420
02040206180050	Menantico Creek (below Rt 552)	1,976.84	190.2	5,705.7	76,076
02040206190010	Manumuskin River (above/incl BigNealBr)	2,915.93	1,008.3	9,585.0	232,105
02040206190020	Manumuskin River (Rt 49 to Big Neal Br)	3,542.68	154.8	4,643.5	61,913
	Total:	44,146.97	39,133.2	406,795.5	5,596,253

TP = Total phosphorous
TSS = Total nitrogen
TSS = Total suspended solids

Table 4: Land Use/Build-Out Calculation Summary

HUC14 ID	HUC14 Sub-Watershed Name	Total Area (acres)	Existing Imperv. Area (acres)	Build-Out Imperv. Area (acres)	Imperv Increase
02040206130040	Scotland Run (below Delsea Drive)	180.49	6.14	24.49	398.9%
02040206140010	MauriceR(BlkwtrBr to/incl WillowGroveLk)	1,287.26	64.72	199.69	308.5%
02040206140020	Burnt Mill Branch / Hudson Branch	2,456.21	199.65	643.87	322.5%
02040206140040	Blackwater Branch (above/incl Pine Br)	2,374.05	291.10	490.56	168.5%
02040206140050	Blackwater Branch (below Pine Branch)	2,881.78	327.80	895.51	273.2%
02040206140060	Maurice R (Sherman Ave to Blackwater Br)	4,102.42	655.46	1,162.97	177.4%
02040206140070	Parvin Branch / Tarkiln Branch	5,714.55	905.89	1,499.28	165.5%
02040206160030	Maurice River(Union Lake to Sherman Ave)	994.95	74.92	446.87	596.4%
02040206170010	Hankins Pond trib (Millville)	1,836.97	224.52	539.84	240.4%
02040206180010	Panther Branch (Menantico Creek)	1,960.47	77.89	213.75	274.4%
02040206180020	Cedar Branch (Menantico Creek)	2,687.17	276.93	522.61	188.7%
02040206180030	Menantico Creek (above Rt 552)	5,394.05	394.15	851.26	216.0%
02040206180040	Berryman Branch (Menantico Creek)	3,841.15	204.02	690.20	338.3%
02040206180050	Menantico Creek (below Rt 552)	1,976.84	3.77	190.59	5,058.3%
02040206190010	Manumuskin River (above/incl BigNealBr)	2,915.93	53.81	166.49	309.4%
02040206190020	Manumuskin River (Rt 49 to Big Neal Br)	3,542.68	23.05	154.78	671.6%
	Total:	44,146.97	3783.82	8,692.76	229.7%

Imperv. = Impervious
Develop. = Developable

As would be expected, full build-out conditions will cause increases in both pollutant loadings and impervious surface areas throughout the municipality, with the amount of impervious surface coverage expected to double at maximum build-out.

3. Conclusions:

Although the scope of the land use/build-out analysis was limited to total phosphorous, nitrogen and suspended solids, it is evident that stormwater pollutant loadings under full build-out land development conditions shall only cause further degradation of water quality within receiving waterbodies.

In addition with the amount of impervious surface coverage expected to double under build-out conditions, stormwater management strategies should be established to reduce the potential for increased flood frequencies, volumes and soil erosion concerns that accompany dramatic increases in such impervious coverages.

However the development potential for 8,693 acres of new impervious surface coverage suggests that petroleum hydrocarbons and other contaminants related to oil and grease may become future water quality concerns.

This analysis is the first step in understanding the impacts that future development will have on water quality and quantity. The municipality should therefore be proactive in developing strategies to minimize, manage and/or mitigate these impacts through such mechanisms as additional stormwater management control techniques and possible changes to the land use zoning.

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Glossary of Terms

AMNET: ....Ambient Biomonitoring Network

AMs: ....Additional Measures

BMPs: ....Best Management Practices

EDPA: ....Effective Date of Permit Authorization

GIS: ....Geographic Information System

HUC: ....Hydrologic Unit Code

MS4: ....Municipal Separate Storm Sewer System

MSRP: ....Municipal Stormwater Regulation Program

MSWMP: ....Municipal Stormwater Management Plan

NJAC: ....New Jersey Administrative Code

NJDEP: ....New Jersey Department of Environmental Protection

NJPDES: ....New Jersey Pollutant Discharge Elimination System

NJIS: ....New Jersey Impairment Score

NJRSIS: ....New Jersey Residential Site Improvement Standards

OMs: ....Optional Measures

RSWMP: ....Regional Stormwater Management Plans

SBRs: ....Statewide Basic Requirements

TMDL: ....Total Maximum Daily Load

WMA: ....Water Management Area

USEPA: ....United States Environmental Protection Agency

USGS: ....United States Geological Survey

Mitigation Plans

Mitigation plans will be required for proposed developments that are granted a variance from the stormwater management design and performance standards. Proposed developments within the Pinelands Area shall not be granted variances of this type, hence no mitigation plans shall be accepted for such developments. The following are suggested options for the mitigation.

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 measures to compensate for the deficit from the performance standards resulting from the proposed project.

Groundwater Recharge

- Retrofit existing sub-standard basins to provide additional annual groundwater recharge.

Water Quality

- Retrofit an existing stormwater management facility to provide the removal of 80 percent of total suspended solids.

Water Quantity

- Install stormwater management measures in open space areas to reduce the peak flow from upstream development

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.

Water Quality

- Re-establish a vegetative buffer (minimum 50 foot wide) along the shoreline of various ponds / lakes as a goose control measure and to filter stormwater runoff from the high goose traffic areas.

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. The amount of any such in lieu contribution shall be equivalent to the cost of implementing and maintaining the Stormwater management measures for which an exception is granted. The City must expend any contributions collected within 5 years of their receipt.

Figure C-2: City and Its Waterways

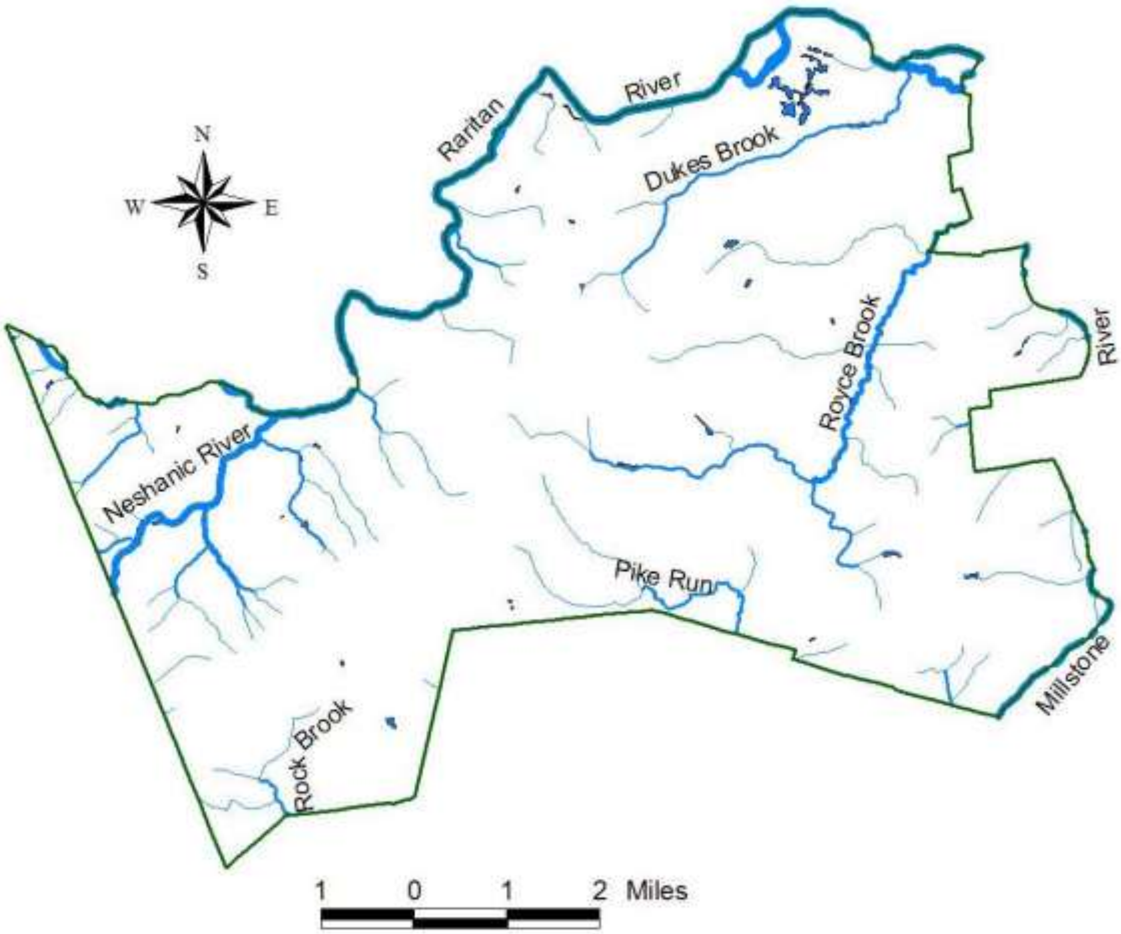

Figure C-3: City Boundary on USGS Quadrangles

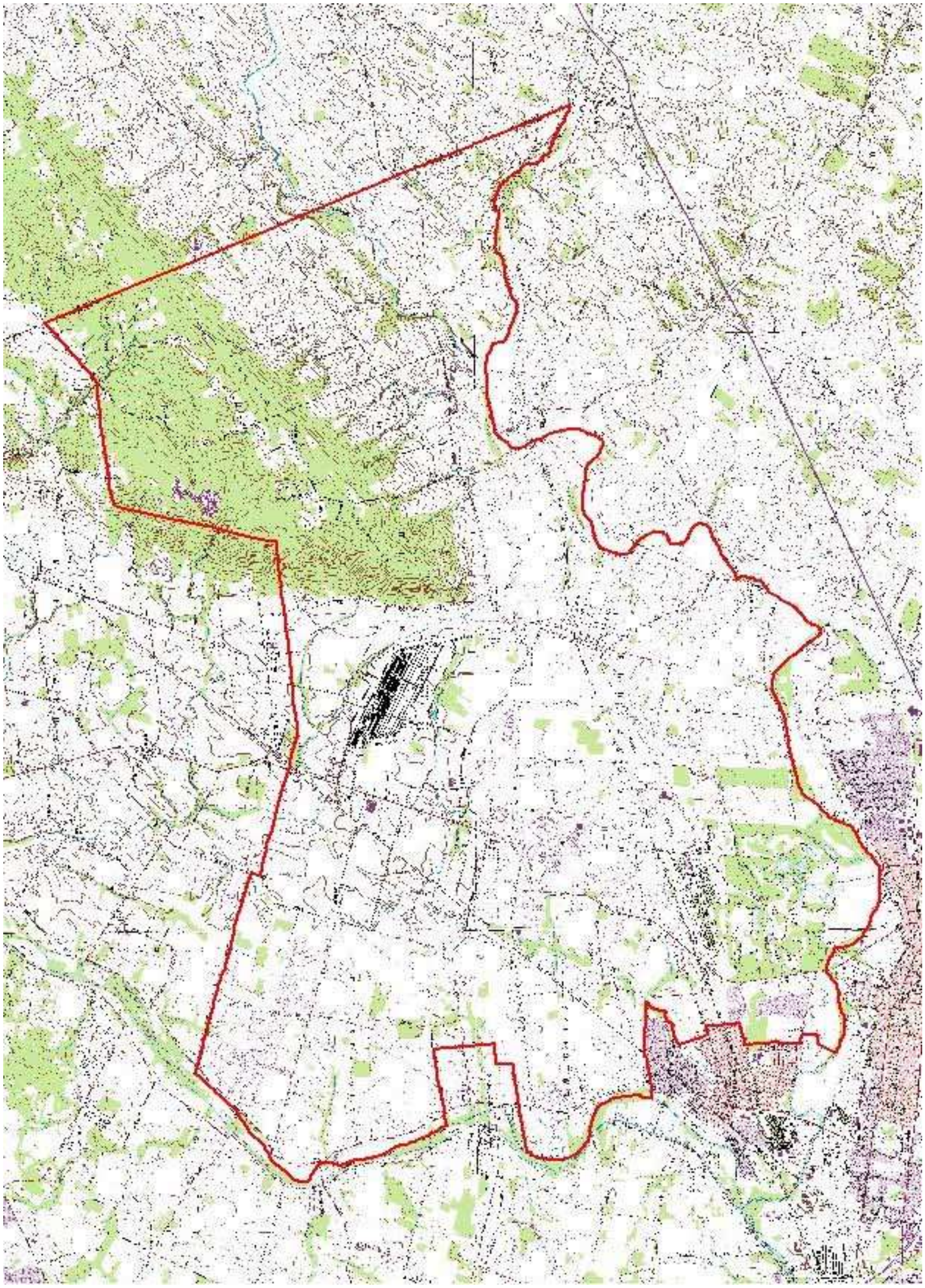

Figure C-4: Groundwater Recharge Areas in the City

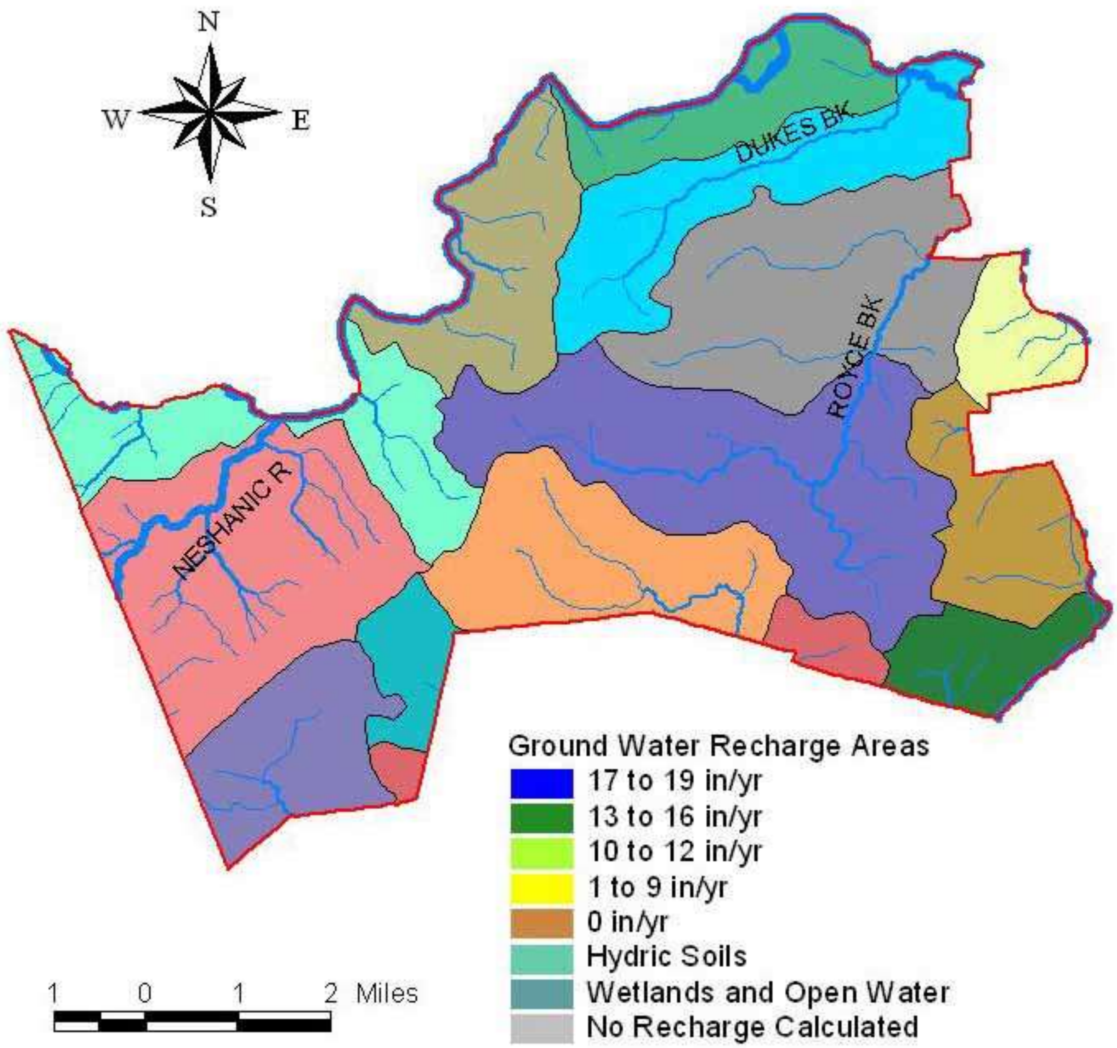

Figure C-5: Wellhead Protection Areas in the City

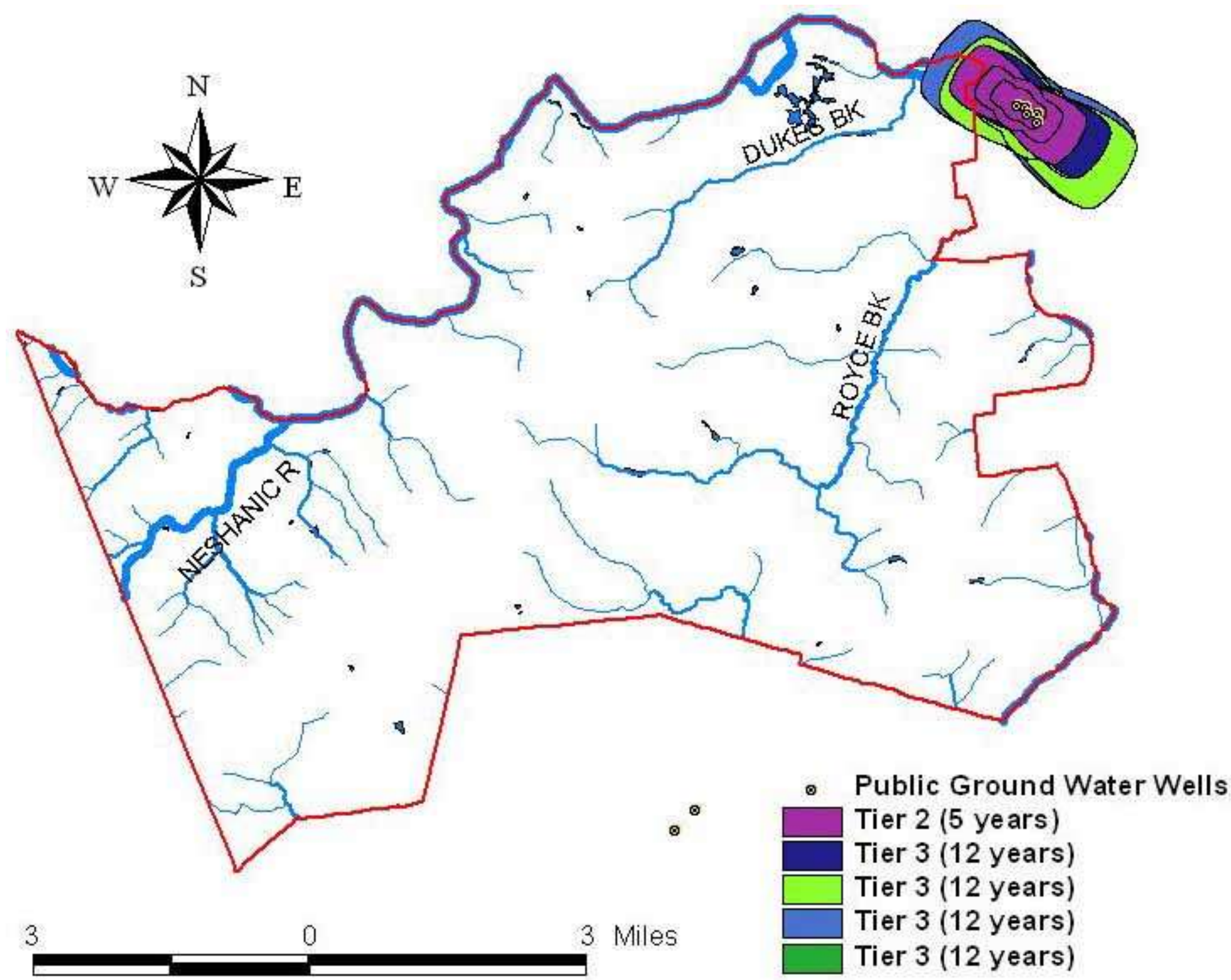

Figure C-6: City's Existing Land Use

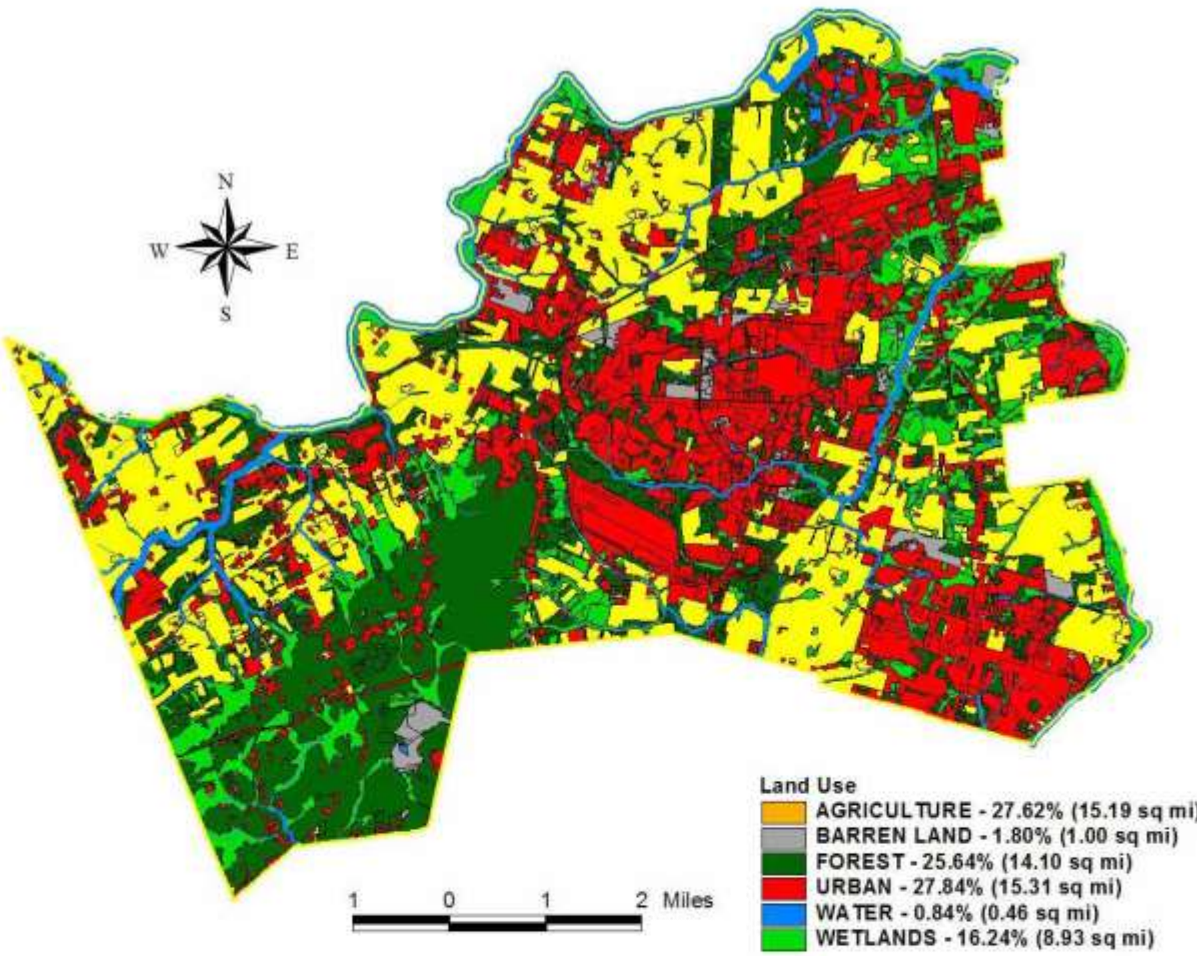

Figure C-7: Hydrologic Units (HUC14s) Within the City

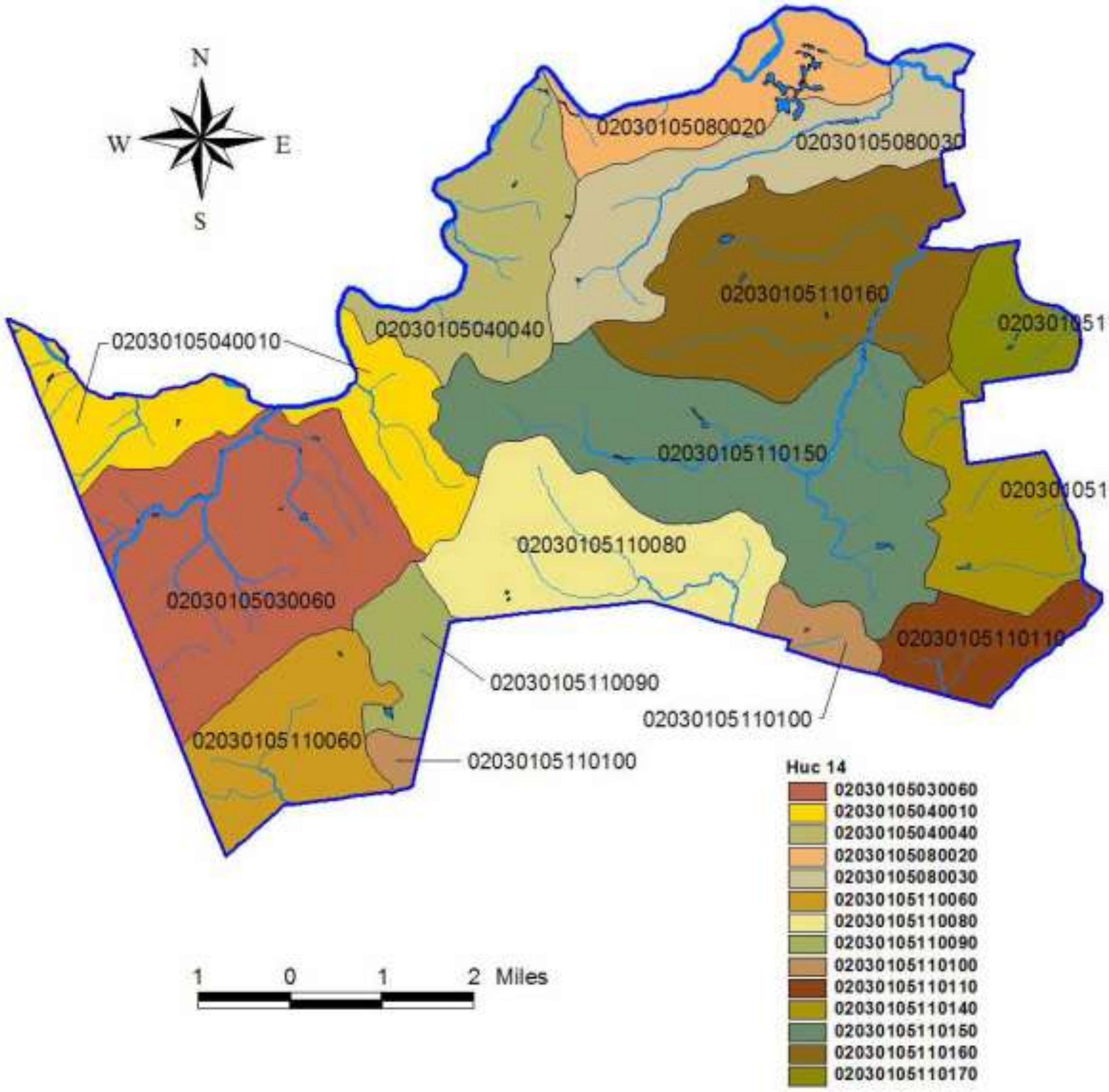

Figure C-8: Zoning Districts Within the City

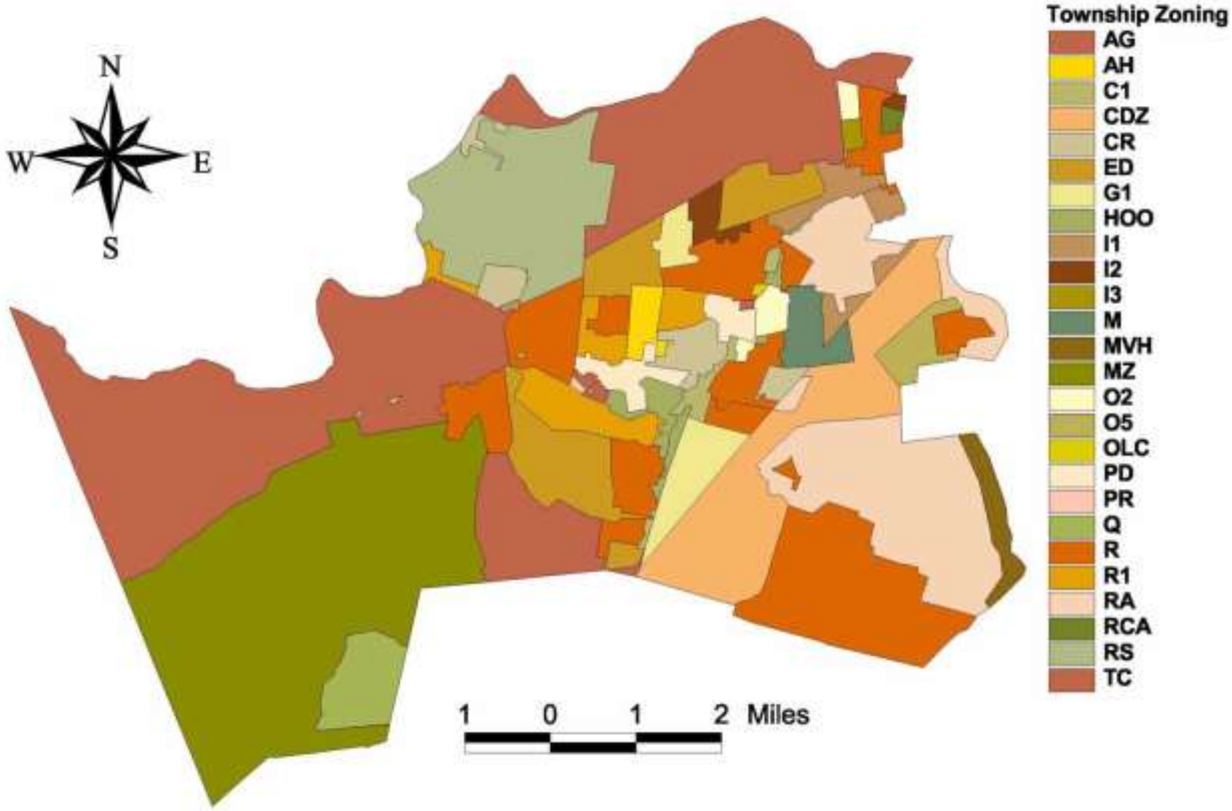

Figure C-9: Wetlands and Water Land Uses Within the City – Constrained Land

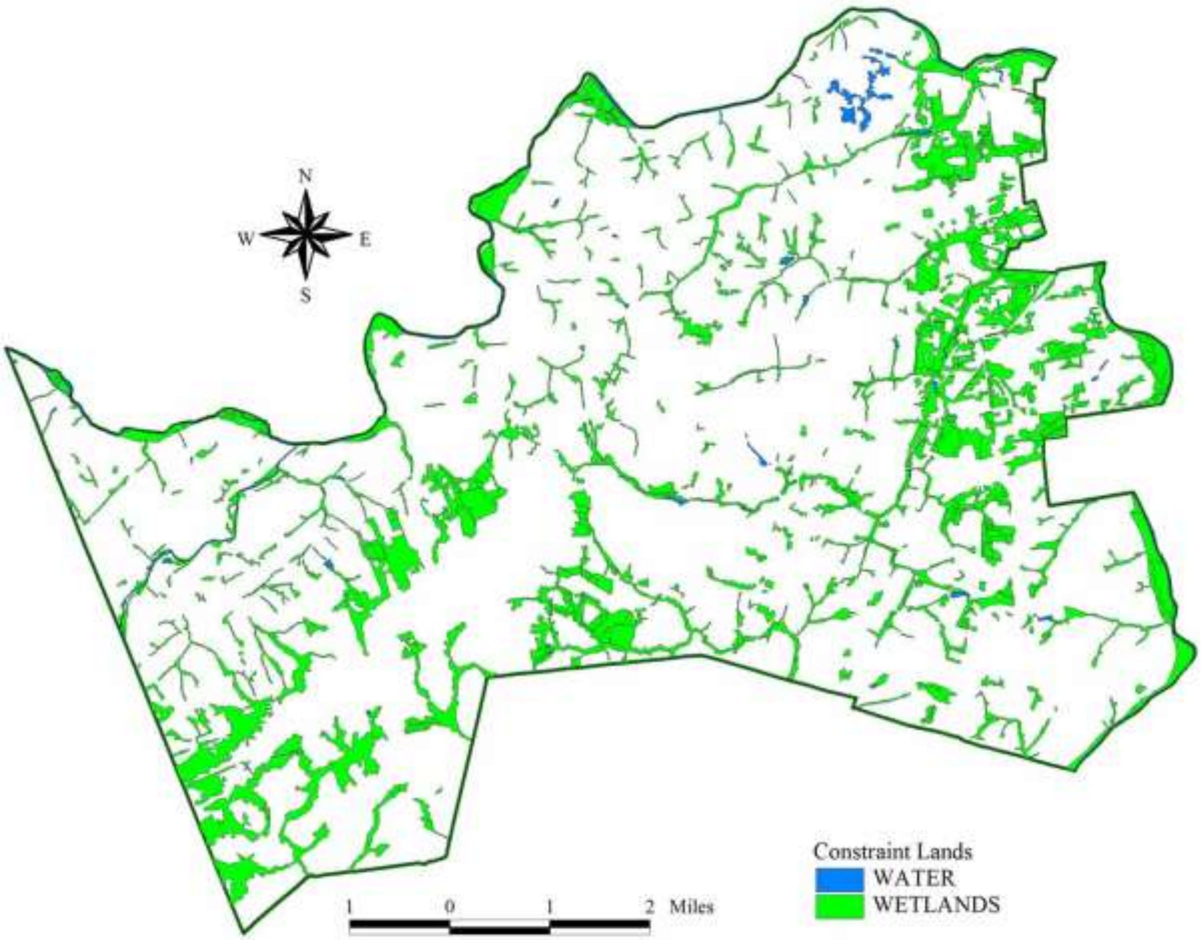

Table C-1: Build-Out Calculations for HUC14s

(under construction)

Table C-2: Pollutant Loads by Land Cover

(under construction)

Table C-3: Nonpoint Source Loads at Build-Out for HUC14's

(under construction)

Land Use/Build-Out Analysis

A detailed land use analysis for the City is being conducted. Figure C-6 illustrates the existing land use in the City based on 1995/97 GIS information from NJDEP. Figure C-7 illustrates the HUC14s within the City. The City zoning map is shown in Figure C-8. Figure C-9 illustrates the constrained lands within the City. The build-out calculations for impervious cover will be shown in Table C-1 when the study is completed. As expected when developing agricultural and forest lands, the build-out in these HUC14s will result in a significant increase in impervious surfaces.

Table C-2 presents the pollutant loading coefficients by land cover. The pollutant loads at full build-out are presented in Table C-3.