

Township of Upper Stormwater Management Plan

**January 12, 2005
Revised November 16, 2006**

Prepared by:



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Introduction

This Municipal Stormwater Management Plan (MSWMP) documents the strategy for the Township of Upper (“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 been included in this plan based upon existing zoning and land available for development. The plan also addresses the review and update of existing ordinances, the Township Master Plan, and other planning documents to allow for project designs that include low impact development techniques. The final component of this plan is a mitigation strategy for when a variance or exemption of the design and performance standards is sought. As part of the mitigation section of the stormwater plan, specific stormwater management measures are identified to lessen the impact of existing development.

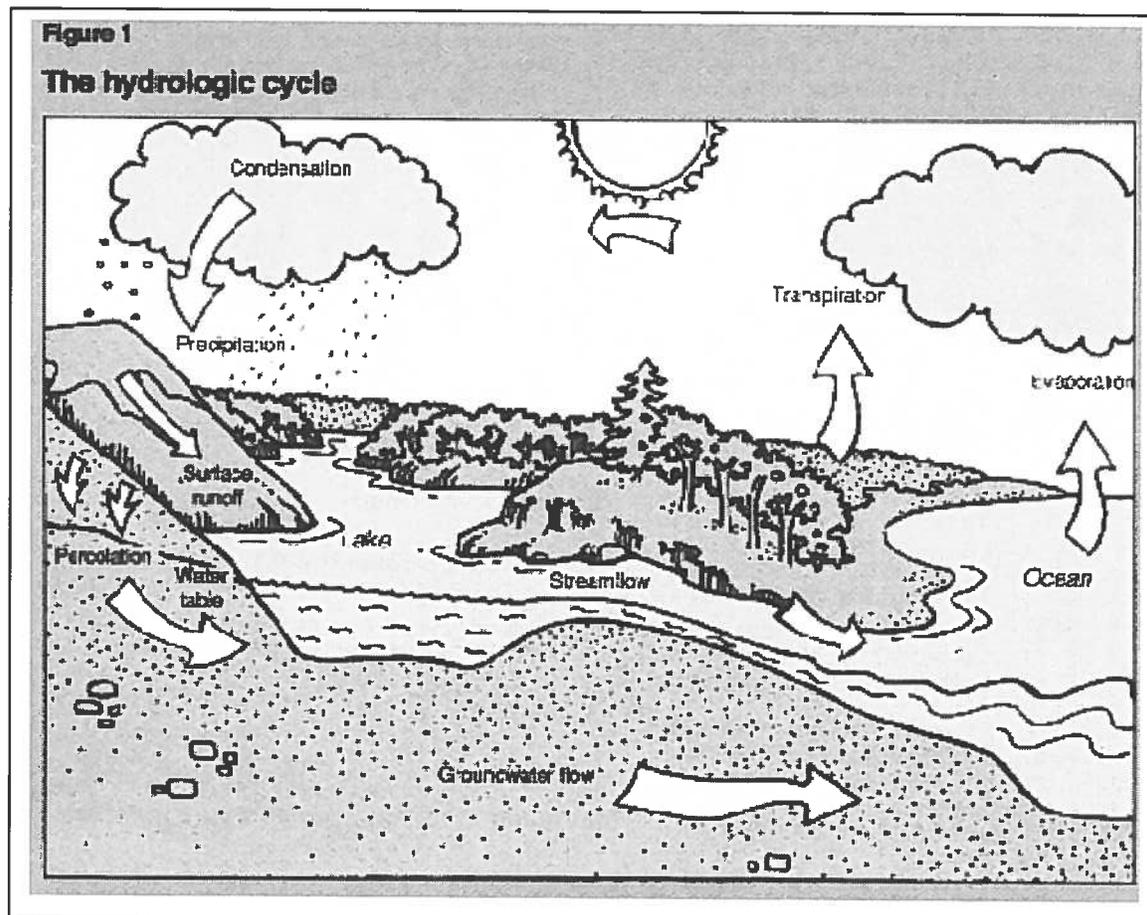
Goals

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 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.

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 Township encompasses 69 square mile area in Cape May County, New Jersey. In recent years, the Township has been under significant development pressure. The population of the Township has increased from 6,713 in 1980, to 10,681 in 1990, to 12,115 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 Township. Figure C-3 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 one major river that border the Township are to the north the Tuckahoe River is considered moderately impaired. One of the seven tributaries to the Tuckahoe River, Mill Creek, is also considered moderately impaired based on AMNET data.

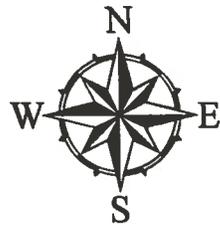
In addition to the AMNET data, the NJDEP and other regulatory agencies collect water quality chemical data on the streams in the state. The information

Town V

MAURICE RIVER TWP
CUMBERLAND
COUNTY

ESTELL MANOR

CORBIN CITY



DENNIS
TOWNSHIP

BOROUGH OF
WOODBINE

DENNI
TOWNSI

Legend

Roads

- COUNTY
- GRAVEL
- LOCAL
- PAPER
- PRIVATE
- RAILROAD
- STATE
- WATERSHED MANAGEMENT AREA
- upperstrm

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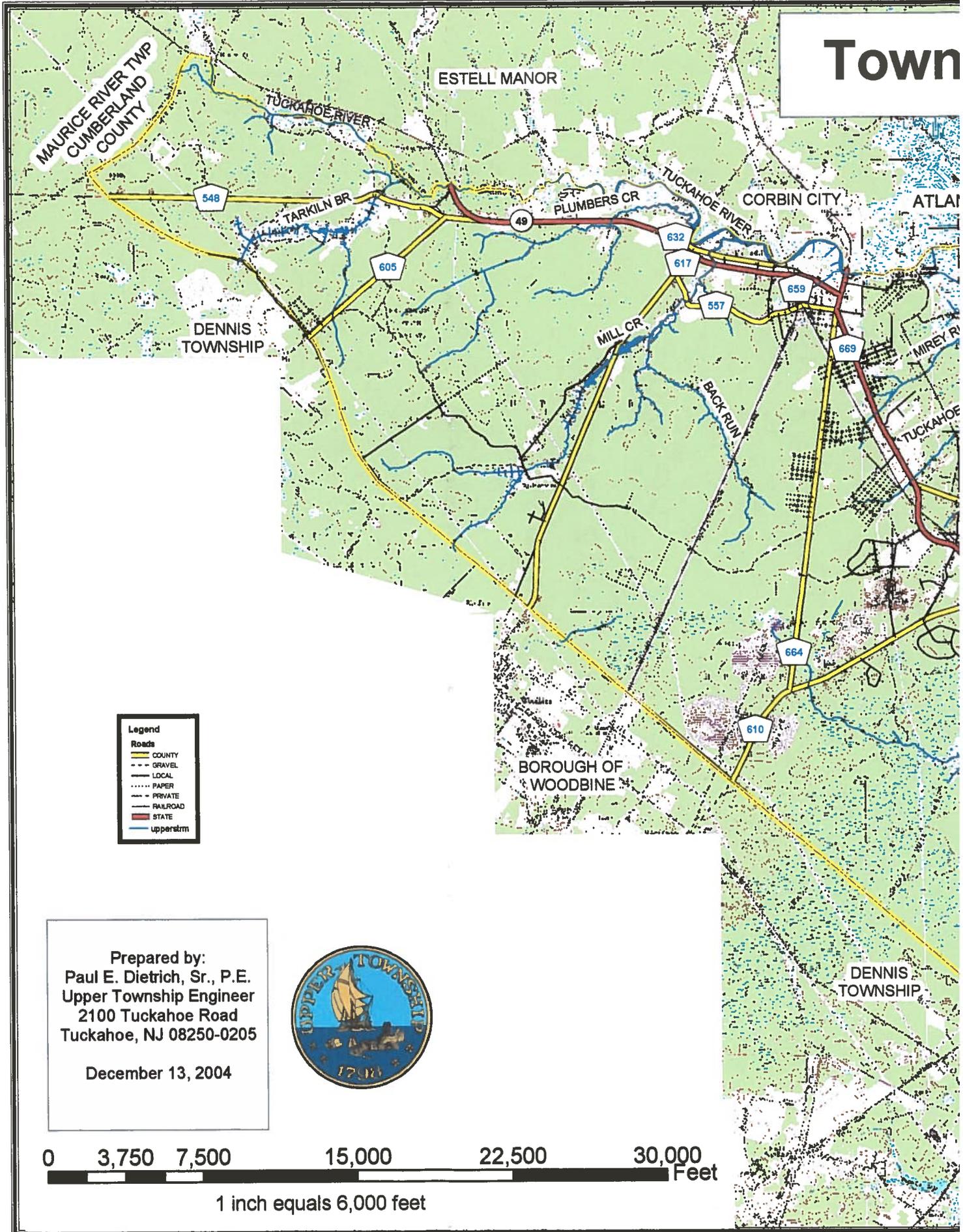


December 13, 2004



1 inch equals 6,000 feet

Town



Legend	
Roads	
	COUNTY
	GRAVEL
	LOCAL
	PAPER
	PRIVATE
	RAILROAD
	STATE
	upperstm

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0 3,750 7,500 15,000 22,500 30,000 Feet
1 inch equals 6,000 feet

collected has not identified any river or stream in the Township as being impaired waterways and therefore the NJDEP has not required the Township to develop a Total Maximum Daily Load (TMDL) for those 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.

The Town of Strathmere has the area of most concern during storm events for the occurrence of flooding. Strathmere frequently floods when high-tide cycles and coastal storms coincide. The Township has installed bladder valves on all outfalls extending into the bay. Other areas within the Township that have occurrences of tidal flooding include NJ State Highway Rt-50 & Tuckahoe Road at the Cedar Swamp Creek, along the wetland areas adjacent to Tyler Road and Butter Road.

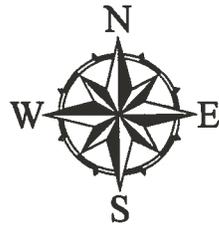
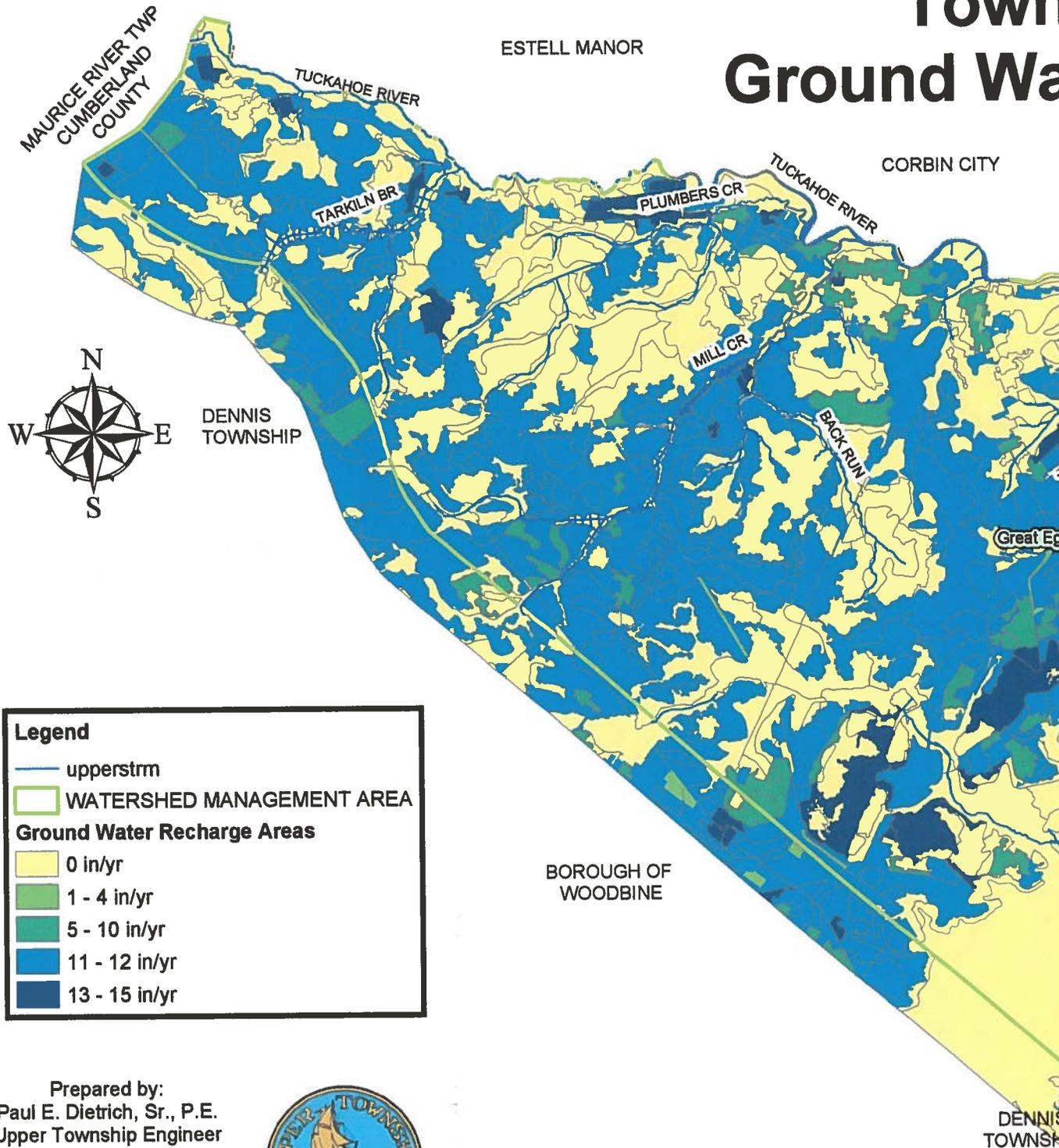
Other areas within the Township that experience minor flooding and ponding due to inadequate stormwater conveyance and retention facilities include Hope Corson Road & Rt-50 intersection, New Bridge Road and Roosevelt Blvd. & Old Tuckahoe Road.

A map of the groundwater recharge areas are shown in Figure C-4. Wellhead protection areas, also required as part of the MSWMP, are shown in Figure C-5.

Design and Performance Standards

The Township will adopt the design and performance standards for stormwater management measures as recommended in N.J.A.C. 7:8-5 and the Pinelands Commission N.J.A.C. 7:50-6.84 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 will include the

Town Ground Wa



Legend

- upperstrm
- WATERSHED MANAGEMENT AREA
- Ground Water Recharge Areas**
- 0 in/yr
- 1 - 4 in/yr
- 5 - 10 in/yr
- 11 - 12 in/yr
- 13 - 15 in/yr

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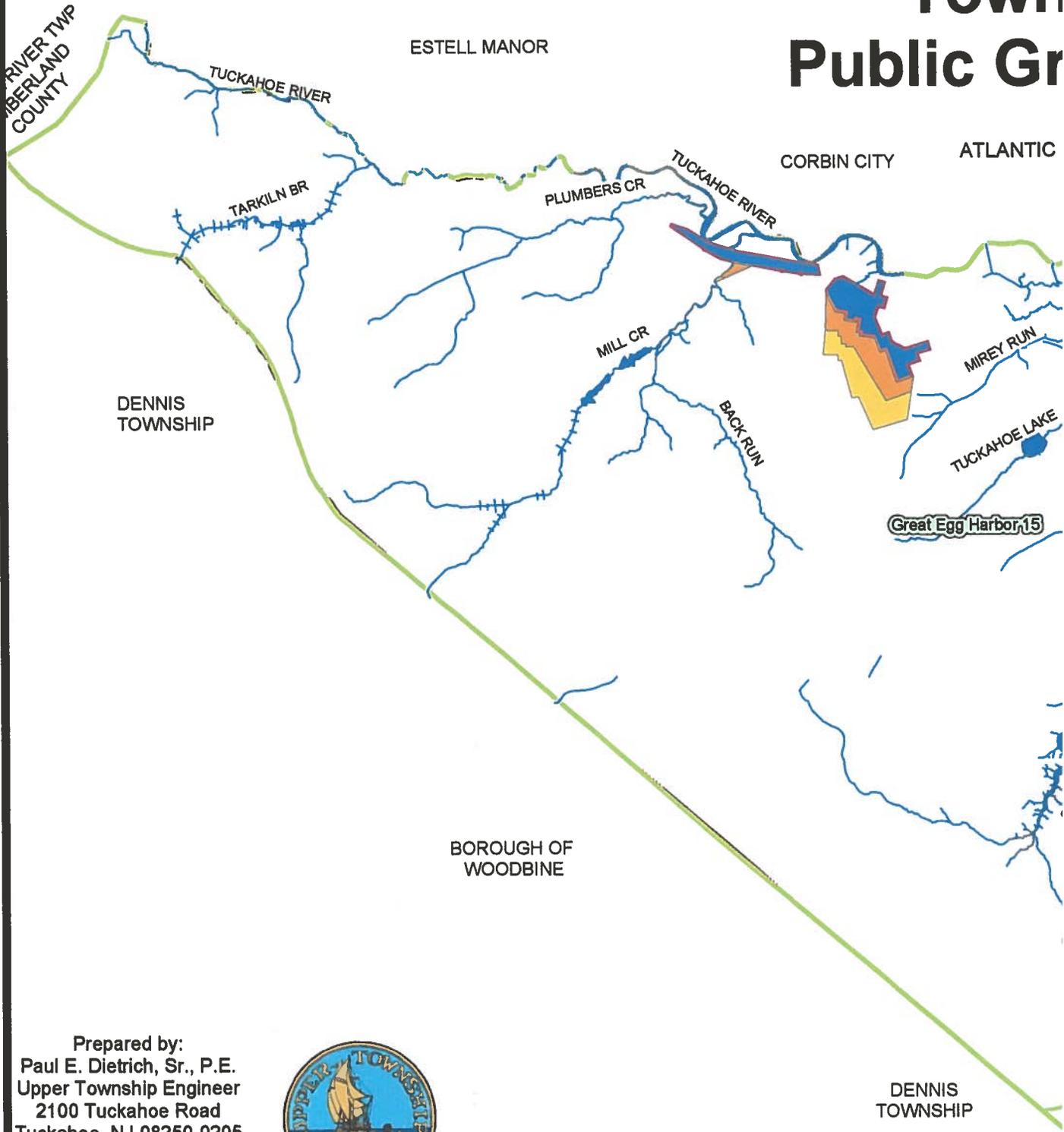


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1 inch equals 6,000 feet

Town Public Gr



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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, and as recommended by the Pinelands Commission N.J.A.C. 7:50-6.84 . The ordinances were submitted to the County Planning Board and the Pineland Commission for review and approval on May 2, 2006 and were adopted by Township Committee on June 12, 2006 (Ordinance 15-2006 amending Chapter 19-7.7).

During construction, Township representatives 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) N.J.A.C. 5:21. Additionally this plan and the adopted stormwater control ordinance are consistent with the Pinelands Comprehensive Management Plan (CMP).

This Municipal Stormwater Management Plan and stormwater control ordinances will be updated to be consistent with any future updates to the RSIS and/or CMP.

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 representatives 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 Chapter 19 and 20 of Township Code, and has developed a list of techniques that can be incorporated into the sections in the Township land use and zoning ordinances. The Township has adopted an ordinance that requires stormwater management systems to incorporate nonstructural strategies as part of proposed development projects.

The Township's ordinance requires drainage facilities to be constructed in accordance with the RSIS and N.J.A.C. 7:8-5. It is recommended that the Township include the NDEP's Low Impact Development Checklist from Appendix

A in the New Jersey Stormwater BMP Manual as a completeness item and be included in the Township Checklist in Section 19-9.

This plan encourages the following techniques in providing nonstructural stormwater strategies:

- Provide landscape buffering and open space requirements for residential and commercial development
- Provide groundwater recharge for rooftop runoff for single family construction
- Encourage construction of rain gardens along roads and islands in commercial parking lots
- Encourage vegetative filter strips before and after detention and infiltration basins
- Provide shallow roadside swales along roadways for conveyance of stormwater

Land Use/Build-Out Analysis

A detailed land use analysis for the Township was conducted. Figure C-6 illustrates the existing land use in the Township based on each Parcel Class as defined by the Township Tax Assessor. Figure C-7 illustrates the HUC14s within the Township. The Township zoning map is shown in Figure C-8. Figure C-9 illustrates the constrained lands within the Township.

The build-out calculations for impervious cover are shown in Table C-1 in the appendix. The build-out has not taken into account the various site specific bulk criteria such as lot frontage and depth and improved road frontage, therefore the actual amount of development that is expected will be less that what is shown in Table C-1. Table C-3 presents the pollutant loading coefficients by land cover (Source: NJDEP Stormwater BMP Manual, 2004). The pollutant loads at full build-out are presented in Table C-2 in the appendix.

Pollutant Loads by Land Cover

Table C-3

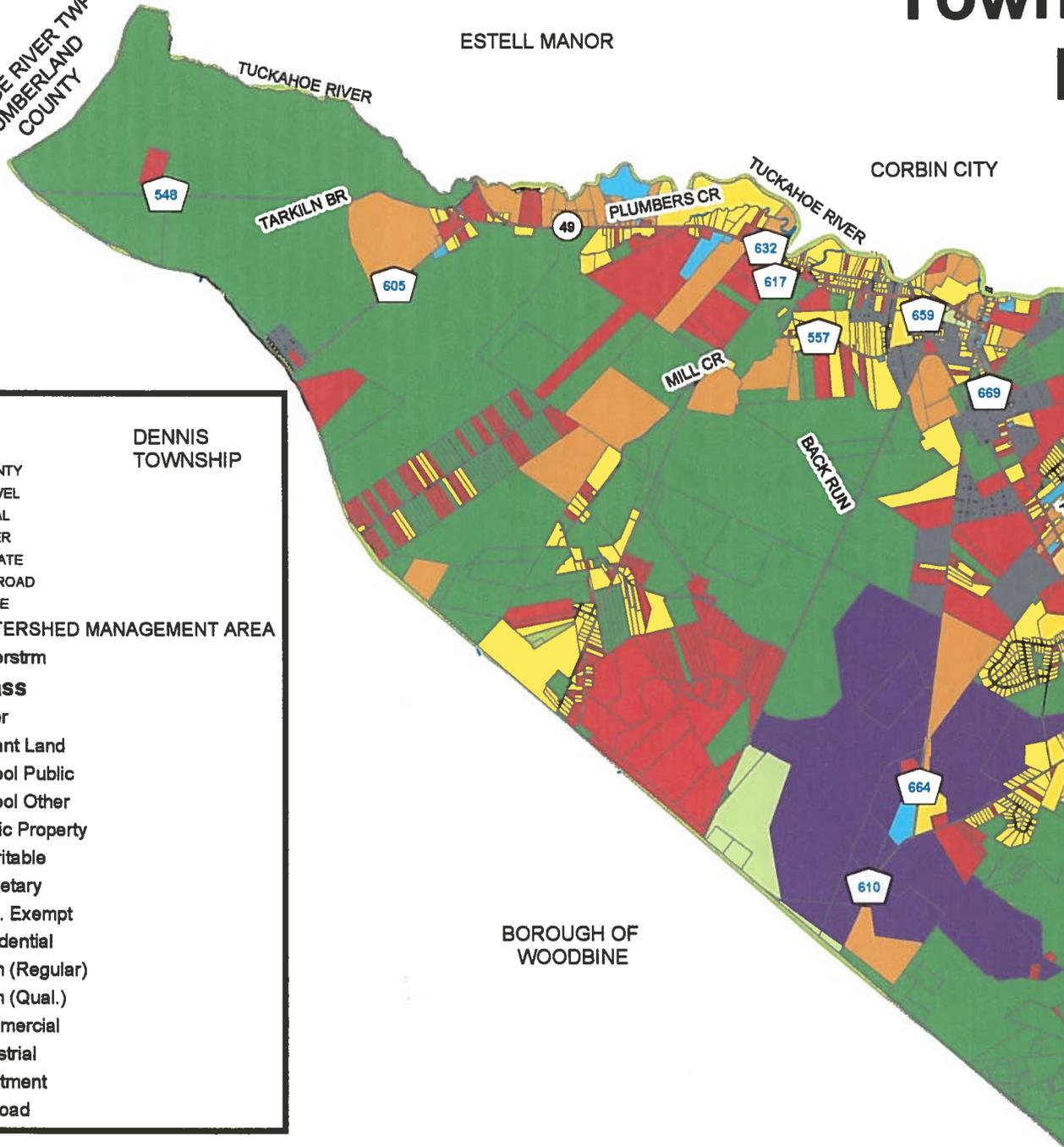
Land Cover	Total Phosphorus Load (lbs/acre/yr)	Total Nitrogen Load (lbs/acre/yr)	Total Suspended Solids Load (lbs/acre/yr)
High Density Residential (< 1 acre/unit)	1.4	15	140
Low Density, Rural Residential (>= 1 acre/unit)	0.6	5	100
Commercial	2.1	22	200
Industrial	1.5	16	200
Urban, Mixed Urban	1.0	10	120
Agricultural	1.3	10	300
Forest, water, wetlands	0.1	3	40
Barren Land	0.5	5	60

Town

MAURICE RIVER TWP
CUMBERLAND
COUNTY

ESTELL MANOR

CORBIN CITY



Legend

Roads

- COUNTY
- GRAVEL
- LOCAL
- PAPER
- PRIVATE
- RAILROAD
- STATE
- WATERSHED MANAGEMENT AREA
- upperstrm

PropClass

- Other
- Vacant Land
- School Public
- School Other
- Public Property
- Charitable
- Cemetary
- Misc. Exempt
- Residential
- Farm (Regular)
- Farm (Qual.)
- Commercial
- Industrial
- Apartment
- Railroad

DENNIS
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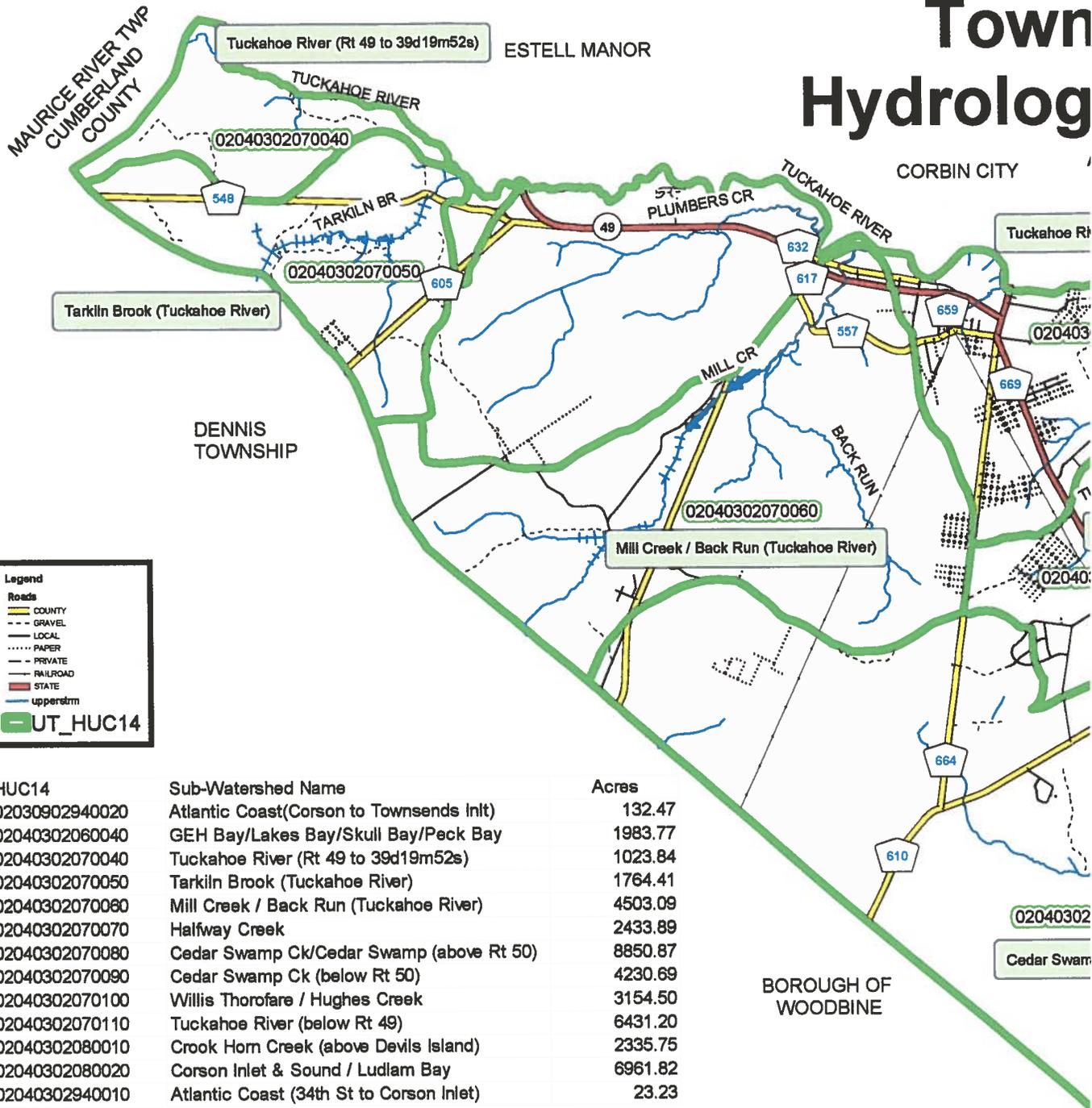


December 13, 2004



1 inch equals 6,000 feet

Town Hydrolog



Legend

- COUNTY
- GRAVEL
- LOCAL
- PAPER
- PRIVATE
- RAILROAD
- STATE
- upperstrm
- UT_HUC14

HUC14	Sub-Watershed Name	Acres
02030902940020	Atlantic Coast(Corson to Townsends Inlt)	132.47
02040302060040	GEH Bay/Lakes Bay/Skull Bay/Peck Bay	1983.77
02040302070040	Tuckahoe River (Rt 49 to 39d19m52s)	1023.84
02040302070050	Tarklin Brook (Tuckahoe River)	1764.41
02040302070060	Mill Creek / Back Run (Tuckahoe River)	4503.09
02040302070070	Halfway Creek	2433.89
02040302070080	Cedar Swamp Ck/Cedar Swamp (above Rt 50)	8850.87
02040302070090	Cedar Swamp Ck (below Rt 50)	4230.69
02040302070100	Willis Thorofare / Hughes Creek	3154.50
02040302070110	Tuckahoe River (below Rt 49)	6431.20
02040302080010	Crook Horn Creek (above Devils Island)	2335.75
02040302080020	Corson Inlet & Sound / Ludlam Bay	6961.82
02040302940010	Atlantic Coast (34th St to Corson Inlet)	23.23

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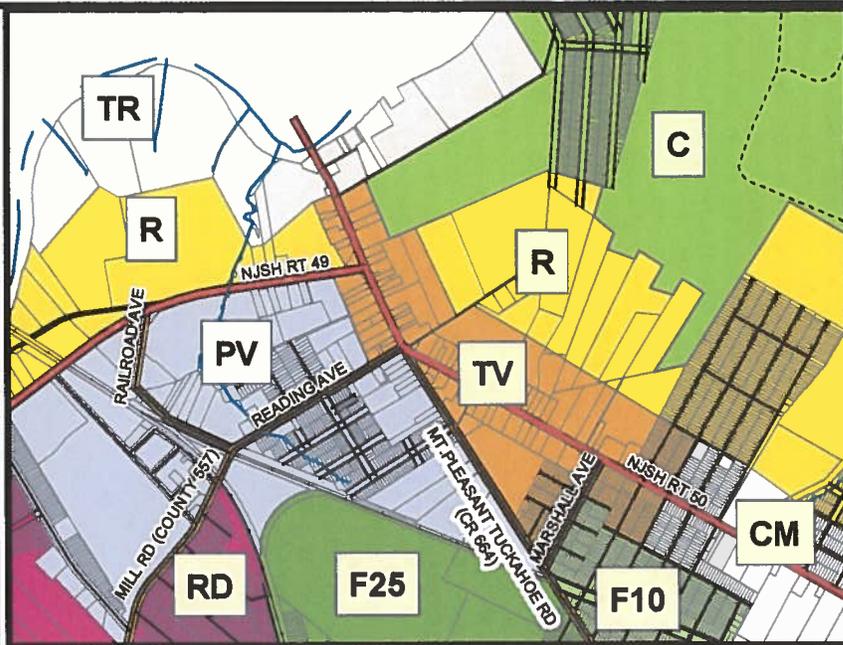
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DENNIS TOWNSHI

Township Zoning

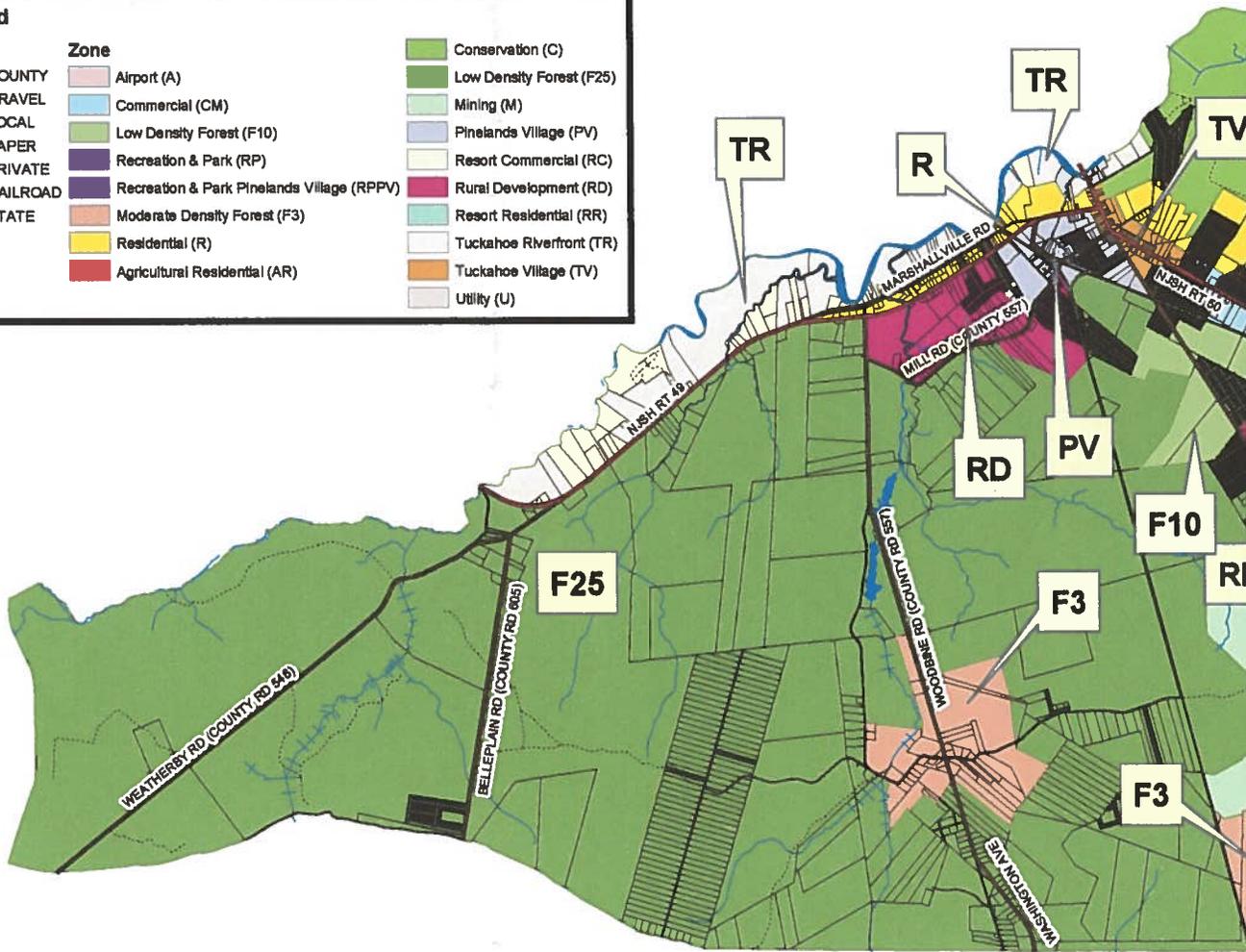
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January 12, 2004



Tuckahoe
 1 inch equals 1,600 feet

Legend	
Roads	Zone
— COUNTY	— Airport (A)
--- GRAVEL	— Commercial (CM)
— LOCAL	— Low Density Forest (F10)
— PAPER	— Recreation & Park (RP)
--- PRIVATE	— Recreation & Park Pinelands Village (RPPV)
— RAILROAD	— Moderate Density Forest (F3)
— STATE	— Residential (R)
	— Agricultural Residential (AR)
	— Conservation (C)
	— Low Density Forest (F25)
	— Mining (M)
	— Pinelands Village (PV)
	— Resort Commercial (RC)
	— Rural Development (RD)
	— Resort Residential (RR)
	— Tuckahoe Riverfront (TR)
	— Tuckahoe Village (TV)
	— Utility (U)



1 inch equals 1 miles

Town

MAURICE RIVER TWP
CUMBERLAND
COUNTY

ESTELL MANOR

CORBIN CITY

DENNIS
TOWNSHIP

BOROUGH OF
WOODBINE

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TOWNSHI

Legend

Roads

- COUNTY
- - - GRAVEL
- LOCAL
- PAPER
- - - PRIVATE
- RAILROAD
- STATE
- upperstrm
- WATERSHED MANAGEMENT AREA

Wetlands

- ARTIFICIAL LAKES
- ATLANTIC WHITE CEDAR WETLANDS
- COASTAL
- CONIFEROUS SCRUB/SHRUB WETLANDS
- CONIFEROUS WOODED WETLANDS
- DECIDUOUS SCRUB/SHRUB WETLANDS
- DECIDUOUS WOODED WETLANDS
- DISTURBED WETLANDS (MODIFIED)
- FRESHWATER TIDAL MARSHES
- HERBACEOUS WETLANDS
- MANAGED WETLANDS (MODIFIED)
- MIXED FORESTED WETLANDS (CONIFEROUS DOM.)
- MIXED FORESTED WETLANDS (DECIDUOUS DOM.)
- MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)
- MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)
- NATURAL LAKES
- SALINE MARSHES
- STREAMS AND CANALS
- TIDAL WATER
- UPLANDS
- WETLAND RIGHTS-OF-WAY (MODIFIED)

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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. For projects within the Pinelands Area any off-site mitigation must occur with the Pinelands Area.

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 Township Engineer. Listed below are specific projects that can be used to address the mitigation requirement.

Groundwater Recharge

- Clean and reconstruct Caledonia Drainage Swale and replace with stone pipe recharge trench.
- Middle School addition needs roof drain outlet to rain garden
- Elementary School roof drains and gutter tie into existing stormwater system

Water Quality

- Middle School addition needs roof drain outlet to rain garden
- Retrofit private and public stormwater inlets with oil-water separator devices that are located in Strathmere and located downstream of a gas station or industrial complex

Water Quantity

- Construct drainage facilities at intersection of Hope Corson Road and Rt-50. Purchase of ROW is required for this project. Cape May County Engineer to provide details of size of basin that is required.

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.

Monetary contributions can be made to the municipality in lieu of performing the off-site mitigation measures identified in the Stormwater Management Plan, with the amount of any such in lieu contribution being equivalent to the cost of implementing and maintaining the stormwater management measures for which an exception is granted. The municipality must expend any contributions collected within five (5) years of their receipt.

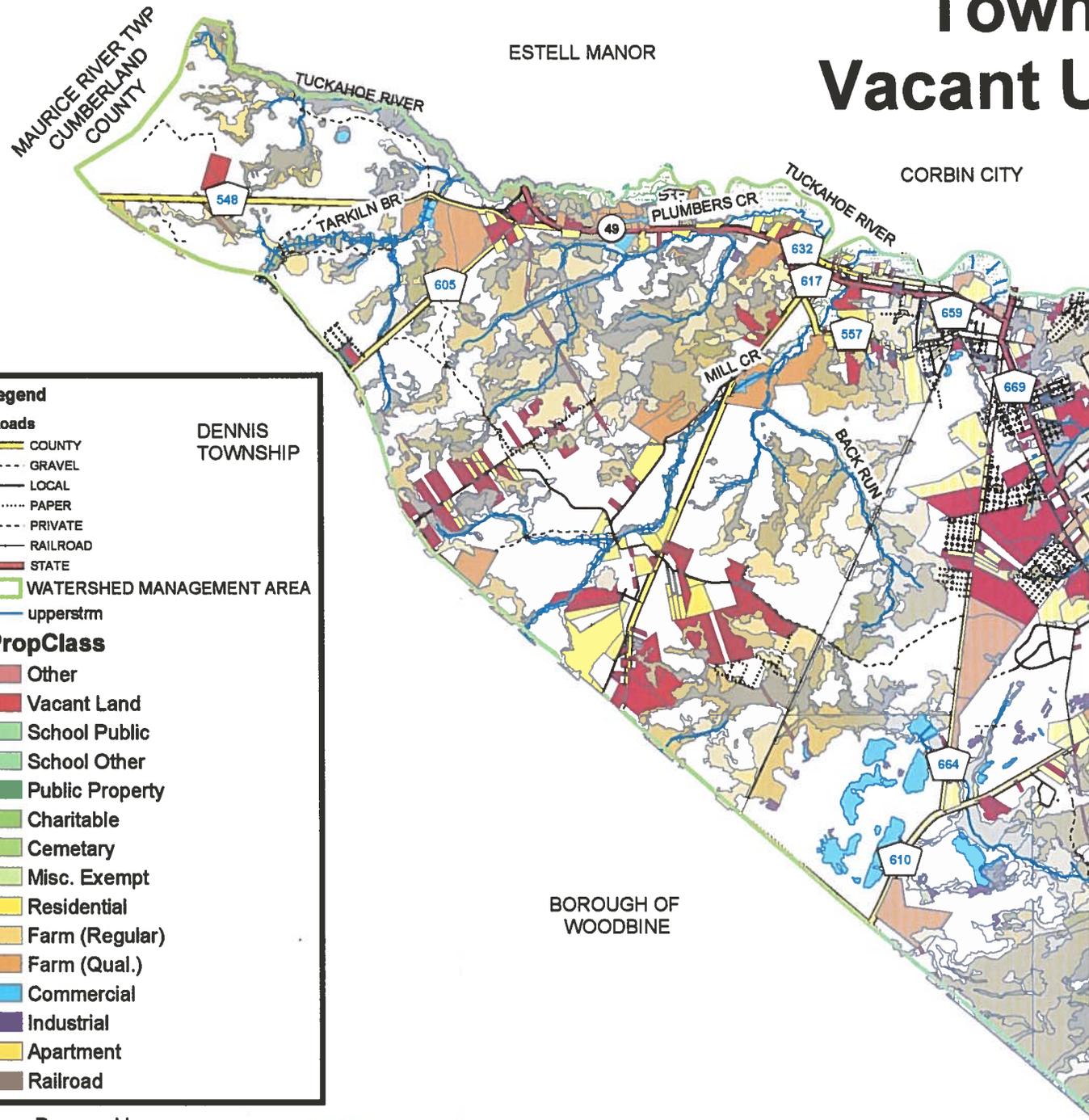
Water Quality

- Purchase wide track dozer (D-3)
- Construct vehicle washing station at Public Works Facility

APPENDIX

BUILD-OUT ANALYSIS

Town Vacant L



Legend

Roads

- COUNTY
- - - GRAVEL
- LOCAL
- PAPER
- - - PRIVATE
- RAILROAD
- STATE
- WATERSHED MANAGEMENT AREA
- upperstrm

PropClass

- Other
- Vacant Land
- School Public
- School Other
- Public Property
- Charitable
- Cemetary
- Misc. Exempt
- Residential
- Farm (Regular)
- Farm (Qual.)
- Commercial
- Industrial
- Apartment
- Railroad

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December 13, 2004



1 inch equals 6,000 feet

Build-out Conditions
Township of Upper

Impervious Coverage Limits
Table C-1

HUC14	Watershed/ Zone	Developable Area (Acres)	Allowable Impervious Coverage	Amount of Impervious (Acres)	Density (Res. - units/acre;		Residential Units	Commercial Building (SF)	No. Parking Spaces (req. based on 5 per 1000 sf)
					Comm. - Bldg. Cov.)	Commercial Building (SF)			
02030902940020	Atlantic Coast(Corson to Townsend's Inlt)								
	RC	1.10	60.0%	0.66	25%		11,944.60	59.72	
	RR	3.25 4.35	60.0%	1.95 2.61	0.09	35.38			
02040302060040	GEH Bay/Lakes Bay/Skull Bay/Peck Bay								
	C	1.07	10.0%	0.11	10.00	0.11			
	CM	4.51	60.0%	2.71	30%		58,953.25	294.77	
	R	25.12 30.70	60.0%	15.07 17.89	1.00	25.12			
02040302070040	Tuckahoe River (Rt 49 to 39d19m52s)								
	F25	83.17 83.17	0.5%	0.42 0.42	25.00	3.33			
02040302070050	Tarkiln Brook (Tuckahoe River)								
	F25	93.69	0.5%	0.47	25.00	3.75			

Build-out Conditions
Township of Upper

Impervious Coverage Limits
Table C-1

HUC14	Watershed/ Zone	Developable Area (Acres)	Allowable Impervious Coverage	Amount of Impervious (Acres)	Density (Res. - units/acre;		Residential Units	Commercial Building (SF)	No. Parking Spaces (req. based on 5 per 1000 sf)
					Comm. - Bldg. Cov.)				
		93.69		0.47					
	Mill Creek / Back Run (Tuckahoe River)								
02040302070060	F10	60.77	2.0%	1.22	10.00		6.08		
	F25	502.37	0.5%	2.51	25.00		20.09		
	F3	75.86	5.0%	3.79	3.50		21.67		
	PV	0.00	10.0%	0.00	1.00		0.00		
	R	13.40	60.0%	8.04	1.00		13.40		
	RD	88.86	5.0%	4.44	4.00		22.21		
	TR	6.88	40.0%	2.75	2.00		3.44		
		748.15		22.76					
	Halfway Creek								
02040302070070	C	0.00	10.0%	0.00	10.00		0.00		
	CM	39.95	60.0%	23.97	30%		133.15		
	PV	7.98	10.0%	0.80	1.00		7.98		
	R	80.01	60.0%	48.01	1.00		80.01		
	RD	88.45	5.0%	4.42	4.00		22.11		
	RP	134.05	5.0%	6.70	5%			291,955.01	1,459.78
	RPPV	0.76	5.0%	0.04	5%			1,648.37	8.24
		351.19		83.94					

Build-out Conditions
Township of Upper

Impervious Coverage Limits
Table C-1

HUC14	Watershed/ Zone	Developable Area (Acres)	Allowable Impervious Coverage	Amount of Impervious (Acres)	Density (Res. - units/acre; Comm. - Bldg. Cov.)	Residential Units	Commercial Building (SF)	No. Parking Spaces (req. based on 5 per 1000 sf)
02040302070080	Cedar Swamp							
	Ck/Cedar Swamp							
	(above Rt 50)							
	AR	26.88	40.0%	10.75	3.00	8.96		
	C	28.49	10.0%	2.85	10.00	2.85		
	CM	53.37	60.0%	32.02	30%		697,393.05	3,486.97
	F25	224.59	2.0%	4.49	25.00	8.98		
	F3	38.61	5.0%	1.93	3.50	11.03		
	M	118.23	10.0%	11.82	5%		257,500.82	1,287.50
	PV	93.61	10.0%	9.36	1.00	93.61		
	R	278.22	60.0%	166.93	1.00	278.22		
	RD	0.00	5.0%	0.00	4.00	0.00		
	RP	107.01	5.0%	5.35	5%		233,062.53	1,165.31
	969.00		245.51					
02040302070090	Cedar Swamp Ck							
	(below Rt 50)							
	AR	162.55	40.0%	65.02	3.00	54.18		
	C	35.47	10.0%	3.55	10.00	3.55		
	CM	14.24	60.0%	8.55	30%		186,116.28	930.58
	M	0.01	10.0%	0.00	5%		17.78	0.09
	R	217.48	60.0%	130.49	1.00	217.48		
	RP	2.65	5.0%	0.13	5%		5,769.46	28.85
	432.40		207.73					

Build-out Conditions
Township of Upper

Impervious Coverage Limits
Table C-1

HUC14	Watershed/ Zone	Developable Area (Acres)	Allowable Impervious Coverage	Amount of Impervious (Acres)	Density (Res. - units/acre;		Residential Units	Commercial Building (SF)	No. Parking Spaces (req. based on 5 per 1000 sf)
					Comm. - Bldg. Cov.)	Commercial Building (SF)			
02040302070100	Willis Thorofare / Hughes Creek	89.00	10.0%	8.90	10.00		8.90		
	C	1.89	60.0%	1.13	30%			24,702.84	123.51
	CM	100.87	60.0%	60.52	1.00		100.87		
	R	191.76		70.56					
02040302070110	Tuckahoe River (below Rt 49)	2.78	10.0%	0.28	10.00				
	C	38.36	60.0%	23.01	30%			501,258.50	2,506.29
	CM	77.62	2.0%	1.55	10.00		7.76		
	F10	205.71	0.5%	1.03	25.00		8.23		
	F25	41.94	10.0%	4.19	1.00		41.94		
	PV	138.44	60.0%	83.06	1.00		138.44		
	R	90.97	5.0%	4.55	4.00		22.74		
	RD	118.15	40.0%	47.26	2.00		59.07		
	TR	19.21	75.0%	14.41	1.00		19.21		
	TV	733.18		179.35					

**Build-out Conditions
Township of Upper**

**Impervious Coverage Limits
Table C-1**

HUC14	Watershed/ Zone	Developable Area (Acres)	Allowable Impervious Coverage	Amount of Impervious (Acres)	Density (Res. - units/acre;		Residential Units	Commercial Building (SF)	No. Parking Spaces (req. based on 5 per 1000 sf)
					Comm. - Bldg. Cov.)	Commercial Building (SF)			
02040302080010	Crook Horn Creek (above Devils Island)	0.71	10.0%	0.07	10.00		0.07		
	C	72.07	60.0%	43.24	30%			941,792.73	4,708.96
	CM	76.72	60.0%	46.03	1.00		76.72		
	R	0.00	5.0%	0.00	5%			0.02	0.00
	RP	149.50		89.34					
02040302080020	Corson Inlet & Sound / Ludlam Bay	0.11	10.0%	0.01	10.00		0.01		
	C	142.25	60.0%	85.35	30%			1,858,952.18	9,294.76
	CM	358.55	60.0%	215.13	1.00		358.55		
	R	0.32	60.0%	0.19	25%			3,480.86	17.40
	RC	0.00	5.0%	0.00	5%			0.15	0.00
	RP	5.95	60.0%	3.57	0.09		66.06		
	RR	507.18		304.25					
	Totals	4,294.25		1,224.81		Existing Residential (222.00)	1,763.29	5,074,548.43	25,372.74

These totals are based on gross acreage and do not reflect an actual lot-by-lot analysis. Other zoning criteria such as lot frontage, lot width, wetland buffers and proximity to an improved street will effect these results. Additionally, property in the Pinelands District will be effected by the depth of seasonal high groundwater and larger wetland buffers.

Build-out Conditions
Township of Upper

Nonpoint Pollution Source Loads
Table C-2

HUC14	Watershed/ Zone	Developable Area (Acres)	Total Phosphorous Load (lbs/acre/yr)	Total Phos. (lbs/yr)	Total Nitrogen Load (lbs/acre/yr)	Total Nit. (lbs/yr)	Total Suspended Solids Load (lbs/acre/yr)	TSS (lbs/yr)
02030902940020	Atlantic Coast(Corson to Townsend's Inlet)							
	RC	1.10	1.4	1.54	15	16.45	140	153.56
	RR	3.25	1.4	4.55	15	48.73	140	454.83
		4.35		6.08		65.18		608.39
02040302060040	GEH Bay/Lakes Bay/Skull							
	Bay/Peck Bay							
	C	1.07	0.6	0.64	5	5.35	100	107.10
	CM	4.51	2.1	9.47	22	99.25	200	902.25
	R	25.12	0.6	15.07	5	125.60	100	2,511.99
		30.70		25.19		230.20		3,521.34
02040302070040	Tuckahoe River (Rt 49 to 39d19m52s)							
	F25	83.17	0.6	49.90	5	415.85	100	8,316.99
		83.17		49.90		415.85		8,316.99
02040302070050	Tarklin Brook (Tuckahoe River)							
	F25	93.69	0.6	56.21	5	468.43	100	9,368.55

Build-out Conditions
Township of Upper

Nonpoint Pollution Source Loads
Table C-2

HUC14	Watershed/ Zone	Developable Area (Acres)	Total Phosphorous Load (lbs/acre/yr)	Total Phos. (lbs/yr)	Total Nitrogen Load (lbs/acre/yr)	Total Nit. (lbs/yr)	Total Suspended Solids Load (lbs/acre/yr)	TSS (lbs/yr)
		93.69		56.21		468.43		9,368.55
	Mill Creek / Back Run (Tuckahoe River)							
02040302070060	F10	60.77	0.6	36.46	5	303.85	100	6,077.07
	F25	502.37	0.6	301.42	5	2,511.86	100	50,237.12
	F3	75.86	0.6	45.52	5	379.31	100	7,586.24
	PV	0.00	0.6	0.00	5	0.02	100	0.39
	R	13.40	0.6	8.04	5	67.00	100	1,340.06
	RD	88.86	0.6	53.32	5	444.30	100	8,885.92
	TR	6.88	0.6	4.13	5	34.39	100	687.84
		748.15		448.89		3,740.73		74,814.63
02040302070070	Halfway Creek C	0.00	0.6	0.00	5	0.01	100	0.12
	CM	39.95	2.1	83.89	22	878.82	200	7,989.24
	PV	7.98	0.6	4.79	5	39.89	100	797.79
	R	80.01	0.6	48.01	5	400.07	100	8,001.31
	RD	88.45	0.6	53.07	5	442.23	100	8,844.51
	RP	134.05	0.6	80.43	5	670.24	100	13,404.73
	RPPV	0.76	0.6	0.45	5	3.78	100	75.68
		351.19		270.63		2,435.02		39,113.37

Build-out Conditions
Township of Upper

Nonpoint Pollution Source Loads
Table C-2

HUC14	Watershed/ Zone	Developable Area (Acres)	Total Phosphorous Load (lbs/acre/yr)	Total Phos. Load (lbs/yr)	Total Nitrogen Load (lbs/acre/yr)	Total Nit. (lbs/yr)	Total Suspended Solids Load (lbs/acre/yr)	TSS (lbs/yr)	
02040302070080	Cedar Swamp								
	Ck/Cedar Swamp								
	(above Rt 50)								
	AR	26.88	0.6	16.13	5	134.40	100	2,687.93	
	C	28.49	0.6	17.09	5	142.45	100	2,848.92	
	CM	53.37	2.1	112.07	22	1,174.06	200	10,673.29	
	F25	224.59	0.6	134.75	5	1,122.94	100	22,458.71	
	F3	38.61	0.6	23.17	5	193.06	100	3,861.11	
	M	118.23	1.5	177.34	16	1,891.65	200	23,645.62	
	PV	93.61	0.6	56.17	5	468.05	100	9,360.99	
	R	278.22	0.6	166.93	5	1,391.08	100	27,821.67	
	RD	0.00	0.6	0.00	5	0.00	100	0.01	
	RP	107.01	0.6	64.20	5	535.04	100	10,700.76	
		969.00		767.85		7,052.72		114,059.00	
02040302070090	Cedar Swamp Ck								
	(below Rt 50)								
	AR	162.55	0.6	97.53	5	812.74	100	16,254.72	
	C	35.47	0.6	21.28	5	177.35	100	3,546.95	
	CM	14.24	2.1	29.91	22	313.33	200	2,848.43	
	M	0.01	1.5	0.01	16	0.13	200	1.63	
R	217.48	0.6	130.49	5	1,087.42	100	21,748.30		
RP	2.65	0.6	1.59	5	13.24	100	264.90		
	432.40		280.81		2,404.20		44,664.93		

Build-out Conditions
Township of Upper

Nonpoint Pollution Source Loads
Table C-2

HUC14	Watershed/ Zone	Developable Area (Acres)	Total Phosphorous Load (lbs/acre/yr)	Total Phos. (lbs/yr)	Total Nitrogen Load (lbs/acre/yr)	Total Nit. (lbs/yr)	Total Suspended Solids Load (lbs/acre/yr)	TSS (lbs/yr)
02040302070100	Willis Thorofare / Hughes Creek							
	C	89.00	0.6	53.40	5	444.98	100	8,899.59
	CM	1.89	2.1	3.97	22	41.59	200	378.07
	R	100.87	0.6	60.52	5	504.35	100	10,087.09
		191.76		117.89		990.92		
02040302070110	Tuckahoe River (below Rt 49)							
	C	2.78	0.6	1.67	5	13.90	100	277.93
	CM	38.36	2.1	80.55	22	843.87	200	7,671.54
	F10	77.62	0.6	46.57	5	388.09	100	7,761.81
	F25	205.71	0.6	123.43	5	1,028.57	100	20,571.35
	PV	41.94	0.6	25.17	5	209.72	100	4,194.42
	R	138.44	0.6	83.06	5	692.20	100	13,844.07
	RD	90.97	0.6	54.58	5	454.87	100	9,097.32
	TR	118.15	0.6	70.89	5	590.75	100	11,814.90
	TV	19.21	1.4	26.89	15	288.14	140	2,689.26
		733.18		512.81		4,510.09		77,922.61

Build-out Conditions
Township of Upper

Nonpoint Pollution Source Loads
Table C-2

HUC14	Watershed/ Zone	Developable Area (Acres)	Total Phosphorous Load (lbs/acre/yr)	Total Phos. (lbs/yr)	Total Nitrogen Load (lbs/acre/yr)	Total Nit. (lbs/yr)	Total Suspended Solids Load (lbs/acre/yr)	TSS (lbs/yr)
02040302080010	Crook Horn Creek (above Devils Island)							
	C	0.71	0.6	0.43	5	3.55	100	71.00
	CM	72.07	2.1	151.34	22	1,585.51	200	14,413.72
	R	76.72	0.6	46.03	5	383.61	100	7,672.12
	RP	0.00	0.6	0.00	5	0.00	100	0.00
		149.50		197.80		1,972.67		22,156.85
02040302080020	Corson Inlet & Sound / Ludlam Bay							
	C	0.11	0.6	0.07	5	0.55	100	10.92
	CM	142.25	2.1	298.73	22	3,129.55	200	28,450.45
	R	358.55	0.6	215.13	5	1,792.75	100	35,855.07
	RC	0.32	1.4	0.45	15	4.79	140	44.75
	RP	0.00	0.6	0.00	5	0.00	100	0.01
	RR	5.95	1.4	8.32	15	89.18	140	832.33
		507.18		522.70		5,016.82		65,193.53
	Totals	4,294.25		3,256.77		29,302.84		459,740.19