

WATERSHED TREATMENT MODEL ANALYSIS

Prepared for

**State Land Corp
Crompond Road (Route 202)
Town of Yorktown, NY**

Prepared by:

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October 2012



Watershed Treatment Model Analysis
State Land Corporation
Route 202
Town of Yorktown
Westchester County, NY
9/13/12

State Land Corporation has contracted with Site Design Consultants to develop a Watershed Treatment Model of the stream that bisects the existing overall property that is currently owned by State Land Corporation. The subject site is located to the west of the intersection of Bear Mountain State Parkway and Route 202 in the Town of Yorktown, Westchester County, NY (Section 26.17, Block 1, Lot 1).. The Watershed Treatment Model identifies the proposed stormwater retrofit and stream restoration techniques that will be constructed as part of the overall development project of the subject property.

The Watershed Treatment Model provides an existing assessment of the watershed based upon the following parameters:

- 1) Primary Sources - identifies existing surface covers within the subject watershed including residential, commercial, roadway, industrial, forest, and rural conditions. This features also takes into consideration the existing soil types and characteristics (hydrologic soil group, depth to groundwater, etc).
- 2) Secondary Sources - identifies potential sanitary sewer, erosion, agricultural, roadway maintenance, and non-point source loading to the watershed.
- 3) Existing Management Practices - identifies the existing municipal/county programs that are in place that educate the public of fertilizing lawns, pet waste management, and erosion control. This section also includes identification of existing structural stormwater management practices, existing riparian buffers, street sweeping, and catch basin maintenance schedules.

With the input of all existing known parameters, the Watershed Treatment Model identifies the approximate existing pollutant loads that the watershed contributes to the existing stream.

Once the existing pollutant loads are identified, the Watershed Treatment Model allows the user to input the proposed improvements to assist in the analysis of the future conditions based upon the following parameters:

- 1) Primary Sources - identifies the proposed modified surface covers within the subject watershed including residential, commercial, roadway, industrial, forest, and rural conditions.
- 2) Secondary Sources - identifies sanitary sewer improvements, and non-point source loading reduction.
- 3) Future Management Practices - identifies the existing and/or proposed municipal/county programs that are in place that educate the public of fertilizing lawns, pet waste management, and erosion control. This section also includes identification of existing to remain and/or proposed street sweeping programs, impervious disconnection programs, riparian buffers, catch basin maintenance schedules, "urban downsizing", redevelopment projects, stormwater retrofits, and stream restoration. Please refer to Figure 10.1 and 10.2 for the locations of the Future Management Practices.

Once all of the proposed information is provided, the spreadsheet identifies the existing pollutant loads, and the loads to surface waters coupled with the proposed improvements that will reduce the pollutant loading to the stream. Below is the summary analysis of the Watershed Treatment Model.

	TN (lb/yr)	TP (lb/yr)	TSS (lb/yr)
Existing	513	97	33,291
Proposed	391	68	28,407
Reduction	122	29	4,884



SECONDARY SOURCES

General Sewage Use Data

Dwelling Units	0	Indi duats/Dwelling Unit	2.7
		Water Use (gpcd)	70
		Wastewater Characteristics	
		TN (mg/l)	60
		TP (mg/l)	10
		TSS (mg/l)	400
		FC (MPN/100 ml)	10,000,000

Nutrient Concentration in Stream Channels

Soil P(%)	Concentration	Enrichment Factor
Soil TN (%)	0.190% 0.190%	2 2

On-Site Sewage Disposal Systems

Unsewered Dwelling Units(% of total)	0%	Failure Rates	5%
% of Septic Systems <100' to waterway	0%		
		Normal	Adjacent to Waterway
Soils	Clay/Mixed Soils	Bacteria decay	13%
		Delivery ratio	100%
Untreated Sewage Delivered to Septic Systems	TN	TP	TSS
	0	0	0
			Bacteria (Billions)
			0
System Type	% of Systems	TN Efficiency	TP Efficiency
Conventional	100%		
Intermittent Sand Filter	28%	57%	TSS Efficiency
Recirculating Sand Filter	55%	80%	72%
Water Separation System	64%	80%	92%
Other	83%	30%	80%
	0%	0%	60%
			0%
Combined Efficiency	28%	57%	72%
Adjusted Efficiency (density)	28%	57%	72%
Current Septic System Management	High - inspection at installation, ongoing inspection, incentives to correct failing systems.		
Typical Separation from Groundwater Density (#/acre)	3-5 Feet		
	<1#/acre		
Removal by soil below the leach field	TN	TP	TSS
	10%	80%	100%
			Bacteria
			100%

SSOs

Miles of Sanitary Sewer	Overflows/1,000 Miles of Sewer	140
Fraction of Load as Storm Flow	Volume per Overflow (gallons)	90,000

CSOs

Median Storm Event (inches)	3.1	# of CSOs/year	0
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Sewershed Area (acres)	0	Capacity of CS system (rainfall depth in inches)	0.1
Sewershed Impervious Cover (%)	0%	Characteristics of CSOs	
		TN (mg/l)	10
		TP (mg/l)	2
		TSS (mg/l)	200
		FC (MPN/100 ml)	6,400,000

Illicit Connections	
Fraction of WS Population Illicitly Connected	0%
# of Illicit Connections	0
Number of Businesses	0
Fraction of Businesses with Illicit Connections	0.1
Fraction of Business Connections that are Wash Water Only	0.9
Wash Water Flow (gpd)	100
Total Flow/business (gpd)	150
	TN
Wash Water Concentrations	15
Total Flow Concentrations	30
	TP
	10
	TSS
	150
	FC
	3,300,000

Urban Channel Erosion (Applies only to Stream Reaches in Urban Portions of the Watershed)

Method (Select from List)	Method 1. Estimate based on typical estimates of channel erosion rates.
Method 1. Estimate based on typical estimates of channel erosion rates.	
Assessment of Channel Erosion	Estimated sediment load. Channels show signs of degradation, with some areas of erosion.
Method 2. Back calculate based on known watershed sediment loading.	
Total Watershed Loading (including Channel Erosion) in tons/year	N/A
Method 3. Estimate based on other sediment study results.	
Sediment Load from Channel Erosion (tons/year)	Est: N/A

Livestock

	Animals (#)	% Exposed to Runoff	N (lbs/animal/year)	N load	P (lbs/animal/year)	Bacteria (billions/animal/year)	Bacteria Load
Dairy Cattle	0	100%	175	0	30	2,000	0
Layers	0	15%	0.9	0	0.4	88	0
Broilers	0	15%	0.8	0	0.2	88	0
Turkeys	0	15%	3	0	0.8	47	0
Pigs	0	100%	32	0	7.4	3,200	0
Delivery Ratios	0		15%	0	10%	5%	0

Marinas

berths	0	typical occupancy (fraction of season)	0.5
season length (days)	0	flow rates (gpcd)	8
		individuals per boat	2

Road Sanding		
Sand Application (lbs/year)	0	Delivery ratio for Closed Section Roads
Fraction of Roads that are Open Section	0%	Delivery ratio for Open Section Roads

Non-Stormwater Point Sources

	Flow (MGD)	N Concentration (mg/l)	N Load (lbs/year)	P Concentration (mg/l)	P Load (lbs/year)	TSS Load (lbs/year)	Bacteria Concentration	Bacteria Load (Billion/year)
Point Source 1	0		0		0	0		0
Point Source 2	0		0		0	0		0
Point Source 3	0		0		0	0		0
Point Source 4	0		0		0	0		0
Point Source 5	0		0		0	0		0
Point Source 6	0		0		0	0		0
Point Source 7	0		0		0	0		0
Point Source 8	0		0		0	0		0
Point Source 9	0		0		0	0		0
Point Source 10	0		0		0	0		0

Total Annual Loads

	N Load (lbs/year)	P Load (lbs/year)	TSS Load (lbs/year)	Bacteria Load (billion/year)
Septic Systems - Surface	0	0	0	0
Septic Systems - Subsurface	0	0	0	0
Fertilizer - Subsurface	59	0	0	0
SSOs	0	0	0	0
CSOs	0	0	0	0
Illicit Connections	0	0	0	0
Channel Erosion	61	0	0	0
Hobby Farms/Livestock	0	0	15,944	0
Marinas	0	0	0	0
Road Sanding	0	0	0	0
Point Source Discharges	0	0	0	0
Total Secondary Load	120	61	15,944	0
Total Secondary Load to Surface Waters				
Storm Load	61	61	15,944	0
Non-storm Load (not to groundwater)	0	0	0	0
Total Secondary Load to Groundwater				
Groundwater Load	59	0	0	0

Pollutant Loads

Turf Condition and Management Practices - Residential			
Residential Turf Area	1.2		
% of Lawns Bare/ Compacted	0%		
Factors that Affect Nutrient Loading			
Typical # of Applications/Year	1.1		
% of Homes <10 Years Old	0%		
% of Lawn Area "Highly Managed" (high input)	0%		
Baseline (Recommended) Fertilizer Rate (N lb/acre)	150		
Estimated Average Fertilizer Application (N lb/acre)	150		
		Analysis	
Form	% of Fertilizer Use (N Application)	N	P
Organic	0%	0.8	0.3
Soluble/Urea	50%	35	3
Slow Release	50%	24	5
Phosphorus Free	0%	10	0
	N	P	
Total Fertilizer Application Rate (Lb/year)	175	26	

Turf Condition and Management Practices - Other		
Turf Category	Area (acres)	Management Compared to Residential Turf
Commercial	0.0	Same
Roadway	0.0	Same
Industrial	0.0	Same

Pet Waste Education			
Program in Place?	yes		
Both			
# of dwelling units	2		
Fraction of Households with a Dog	40%	Waste Production (lbs/dog-day)	0.32
Owners who Walk their Dogs (fraction)	50%	N Concentration (lb/lb)	0.23
Owners who Clean Up (fraction)	60%	N Delivery Factor	0.25
Fraction willing to change behavior	60%	P Concentration (lb/lb)	0.01
Awareness of Message (Fraction of Population)	30%	P Delivery Factor	0.75
		Bacteria Concentration(billion/lb)	10
		Bacteria Delivery Factor	0.05

Erosion and Sediment Control	
Program Efficiency	70%
Fraction of Building Permits Regulated	100%
Installation/ Maintenance Discount	0.9

Street Sweeping							
Sweeper Type	Streets Swept (Acres)		Parking Lots Swept (acres)	Efficiencies - Residential		Efficiencies - Other roads	
	Residential	Other Streets		Nutrients	TSS	Nutrients	TSS
Mechanical	0	0	0	24%	30%	4%	5%
Regenerative Air	0	0	0	51%	64%	18%	22%
Vacuum Assisted	0	0	0	62%	78%	63%	79%
Sweeping Frequency	monthly	monthly	weekly				
Technique Discount	0						

Existing Loads to Surface Waters					
	TN lb/year	TP lb/year	TSS lb/year	Runoff Volume (acre-feet/year)	
Urban Land	10	1.99	220	2	
Active Construction	-	-	-	-	
SSOs	-	-	-	-	
CSOs	-	-	-	-	
Channel Erosion	61	61	15,944	-	
Road Sanding	-	-	-	-	
Forest	422	34	16,887	14	
Rural Land	-	-	-	-	
Livestock	-	-	-	-	
Illicit Connections	-	-	-	-	
Marinas	-	-	-	-	
Point Sources	-	-	-	-	
Septic Systems	-	-	-	-	
Open Water	20	1	240	-	
Total Storm Load	302	87	31,603	16	
Total Non-Storm Load	211	10	1,689	-	
Total Load to Surface Waters	513	97	33,291	16	

Future Management Practices

Residential Lawn Care Education		
Awareness of Message (Fraction of Population)	Applied?	Ease of Implementation (Fraction that would Implement)
48%		
Goals of the Program		
Reduce Fertilizer Use to Recommended Levels	yes	50%
Switch to Non-Phosphorus Fertilizer	yes	25%
Change to Organic Fertilizer	yes	10%
Add Soil Amendments to Lawns	no	10%
Convert 25% of lawn to forest or native vegetation	no	15%
No fertilizer	no	10%

Resulting Turf Condition and Management Practices - Residential			
		(N)	Analysis
Revised Residential Turf Area	1.2		
Additional Residential Forest Area	0.0		
Revised Fertilizer Application (N lbs/acre)	150		
Fertilizer Use			
Organic	4.0%	0.8	0.3
Soluble/Urea	43%	35	3
Slow Release	45%	24	3
Phosphorus Free	10%	10	0
Total Fertilizer Application Rate (Lb/year)			
	N	P	
	175	25	

Pet Waste Education		
Program? (Y/N)		Waste Characteristics
yes		
Program Discounts		
Number of households	2	
Fraction of Households with a Dog	40%	Waste Production (lbs/dog-day)
Owners who Walk their Dogs (fraction)	50%	N Concentration (lb/lb)
Owners who Clean Up (fraction)	60%	N Delivery Factor
Fraction willing to change behavior	60%	P Concentration (lb/lb)
Awareness of Message (Fraction of Population)	30%	P Delivery Factor
		Bacteria Concentration(billion/lb)
		Bacteria Delivery Factor
		0.32
		0.23
		0.25
		0.01
		0.75
		10
		0.05

Erosion and Sediment Control	
Program Efficiency	70%
Fraction of Building Permits Regulated	100%
Installation/ Maintenance Discount	0.9

Street Sweeping

Sweeper Type	Streets Swept (Acres)		Other Streets	Parking Lots Swept (acres)	Efficiencies - Residential		Efficiencies - Other roads	
	Residential	Commercial			Nutrients	TSS	Nutrients	TSS
Mechanical	0	0	0	0	24%	30%	4%	5%
Regenerative Air	0	0	0	0	51%	54%	18%	22%
Vacuum Assisted	0	0	0	0	52%	78%	63%	78%
Sweeping Frequency (Monthly, W = Weekly)	monthly	monthly	monthly	monthly	0%	0%	0%	0%
Technique Discount	0	0	0	0	0%	0%	0%	0%

Impervious Cover Disconnection Program - Residential

Program in Place?	Yes
Typical Roof Footprint (square feet)	2000
Fraction of Residential Land where Applicable	5%
Fraction of Population Reached	5%
Fraction Willing to Participate	10%

Riparian Buffers

	Buffer 1	Buffer 2	Buffer 3	Buffer 4
Buffer Length (Miles)	0.28	0.28	0.28	0.28
Buffer Width (ft)	200	200	200	200
TN	TP	TSS	Bacteria	Runoff Reduction
50%	100%	85%	0%	60%
Treatability	100%	100%	100%	100%
Maintenance	0.5	0.5	0.5	0.5

Catch Basin Cleanouts

	Impervious Area Captured (acres)	Nutrients	Efficiency	TSS
Monthly Cleaning	0	15%	25%	15%
Semi-Annual Cleaning	0	8%	15%	15%
Disposal Discount	0.5	0	0	0

Marina Pumpouts

Number of Pumpouts	0
Total Number of Berths	0
Berths Served Per Station	160
Fraction of Owners Willing to Use	90%

"Urban Downsizing"

Land Use	Acres Available	Acres Converted	TN lb/acre/year	TP lb/acre/year	TSS lb/acre/year	FC # billion/acre/year	Runoff (inches/year)
LDR (<1/3acre)	2	0	6.31	1.55	144.70	259.80	11.64
MUR (1-4/3acre)	0	0	3.80	1.85	183.05	303.38	14.73
HDR (4-9/acre)	0	0	9.32	1.77	234.18	388.11	18.84
Multifamily	0	0	10.89	1.88	281.06	465.79	22.61
Commercial	0	0	14.96	1.89	400.38	663.53	32.21
Industrial	0	0	11.61	1.51	318.41	528.35	25.70
Forest	N/A	Acres Created	TN lb/acre/year	TP lb/acre/year	TSS lb/acre/year	FC # billion/acre/year	Runoff (inches/year)
Rural	0	0	2.50	0.20	100.00	12.00	1.01
Rural	0	0	4.60	0.70	100.00	36.00	1.01
Rural	0	0	4.60	0.70	100.00	39.00	1.01
Rural	0	0	4.60	0.70	100.00	39.00	1.01
Rural	0	0	4.60	0.70	100.00	39.00	1.01
Forest	N/A	0	2.50	0.20	100.00	12.00	1.01

Redevelopment with Improvements

Land to Be Redeveloped (Acres)	0
Average Impervious Cover Reduction (%)	0%
Average Turf Reduction (%)	0%

Retrofit Type	Pollutant Reduction (lb/year)						Bacteria Reduction (billion/year)	Runoff Reduction (ac-ft/year)
	Total Area	Captured (Acres)	TN	TP	TSS			
BMP Type								
Dry Water Quantity Pond	0	0	0	0	0	0	0	
Dry Extended Detention Pond	0	0	0	0	0	0	0	
Wet Pond	0	0	0	0	0	0	0	
Welland	35	35	47	18	3502	6297	0	
Filters	0	0	0	0	0	0	0	
Green Roof	0	0	0	0	0	0	0	
Rooftop Disconnection	0	0	0	0	0	0	0	
Permeable Pavement	0	0	0	0	0	0	0	
Grass (open) Channel	0	0	0	0	0	0	0	
Dry Swale (bioswale, WQ swale)	0	0	0	0	0	0	0	
Wet Swale	0	0	0	0	0	0	0	
Raintanks and Cisterns	0	0	0	0	0	0	0	
Soil Amendments	0	0	0	0	0	0	0	
Sheetflow to Open Space (excluding riparian buffers)	0	0	0	0	0	0	0	
Grassed Filter Strips	0	0	0	0	0	0	0	
Bioretention	0	0	0	0	0	0	0	
Infiltration Practices	0	0	0	0	0	0	0	
Other Practice (User Defined)	16	16	285	51	6028	11461	35	
Total	50.7	50.7	312.2	68.5	10490.7	17758.1	34.9	

Stream Restoration

Select Assessment Option	Total Area	Captured (Acres)
Option 2. Enter Removal from Stream Restoration Worksheet		
Option 1. Estimate Based on Miles of Stream Stabilized		
Portion of Total Stream Channel Unstable	17%	0.60
Miles of Unstable Channel	0.60	0.60
Miles of Stream Channel Stabilized	16%	0.61
Flow control for small storms (%)	100%	100%

Option 2. Data from Stream Restoration Worksheet

Total Sediment Removal (lbs/year)	2434
Total Phosphorus Removal (lbs/year)	7.28
Total Nitrogen Removal (lbs/year)	137.36

Illicit Connection Removal

Fraction of System Surveyed	0%
Fraction of Repairs Made	0%

CSO Repair/ Abatement

Target CSO Events after Repairs (#)	0
Fraction Complete	0%

SSO Repair/ Abatement

Goal (% Reduction)	0%
Fraction Complete	0%

Septic System Education

Program? (Y/N)	Yes
Awareness of Municipal (Fraction of Population)	40%
Fraction willing to change behavior	0%

Septic System Repair

Program? (Y/N)	no
Fraction Inspected	0%
Percent Willing to Repair	0%

Septic System Upgrade

Program? (Y/N)	no			
Fraction Inspected	0%			
Fraction Willing to Upgrade	0%			
Upgrade System?	Other (Enter at Right)			
	Enter Efficiencies if "Other"	TP Efficiency	TSS Efficiency	Bacteria Log Reduction
		Enter Value	Enter Value	Enter Value

Septic System Retirement (Convert to WWTP)

Fraction of Systems Inspected	100%			
Number of Septic Systems Retired	0			
% Failing among Retired Systems. Cannot Exceed 0%	0%			
% win 100' of waterway among Retired Systems. Cannot Exceed 0%	0%			
	WWTP Efficiency	TN Efficiency	TP Efficiency	TSS Efficiency
	Treatment Plant Load	0.000	0.000	0.000
				Bacteria Log Reduction
				0.0
				0.000

Point Source Reduction

	N Reduction (lbs/year)	P Reduction (lbs/year)	TSS Reduction (lb/year)	Bacteria Reduction (Billion/year)
Additional WWTP Load from Septic Conversion (Will be negative)	0	0	0	0
Point Source 1				
Point Source 2				
Point Source 3				
Point Source 4				
Point Source 5				
Point Source 6				
Point Source 7				
Point Source 8				
Point Source 9				
Point Source 10				

Load Reductions for Future Management Practices

	N (lbs/year)	P (lbs/year)	TSS (lbs/year)	Bacteria (billion/year)	Runoff Reduction (acre-ft/yr)
Lawn Care Education - Surface	0	0	0	0	
Lawn Care Education - Groundwater	2	0	0	0	
Pet Waste Education	0	0	0	0	
Erosion and Sediment Control	0	0	0	0	
Street Sweeping	0	0	0	0	
Street Sweeping - Sanding	0	0	0	0	
Riparian Buffers	0	0	0	0	0
Riparian Buffers - Infiltration	0	0	0	0	
Catch Basin Cleanouts	0	0	0	0	
Marine Pumpouts	0	0	0	0	
Urban Downspouting	0	0	0	0	0
Redevelopment With Improvements	0	0	0	0	0
Stormwater Retrofits	312	69	10,491	17,796	35
Retrofits - Discharge to GW	-23	0	0	0	
Illicit Connection Removal	0	0	0	0	
CSO Repair/ Abatement	0	0	0	0	
SSO Repair/ Abatement	0	0	0	0	
Septic System - Surface	0	0	0	0	
Septic System - Groundwater	137	7	2,434	0	
Stream Restoration	0	0	0	0	
Point Source Reduction	0	0	0	0	
Net Reductions to Surface Water Loads	450	76	12,925	17,796	35
Storm Load	0	0	0	0	0
Nonstorm Load	-24	0	0	0	0
Net Reductions to Groundwater Loads. Note: Negative values indicate an increase in load (e.g., infiltrating practices may cause an increase in groundwater loads)					
Groundwater Load					0

Stream Restoration Summary

1. Stream Restoration Locations and Reason for Restoration

- Sta 1+50 to Sta 3+50: Sediment removal, stream re-shaping, embankment stabilization (refer to attached stabilization techniques), and velocity control inclusive of a sediment trap (pooling area). Area had signs of significant embankment erosion and sediment deposit. Furthermore, the stream can be re-aligned to remove the 180 degree turn around Sta 3+50.
- Sta 4+10 to Sta 7+00: Boulder relocation/replacement and embankment stabilization (refer to attached stabilization techniques). Area had signs of significant erosion and sediment deposit.
- Sta 10+00 to Sta 10+50: Boulder relocation/replacement, stream re-shaping, embankment stabilization (refer to attached stabilization techniques) and velocity control inclusive of a sediment trap (pooling area)
- Sta 12+10 to Sta 13+50: Tree litter removal, embankment re-shaping and stabilization (refer to attached stabilization techniques)

Design Storm (Inches) 3.1

Water Quality Volumes Provide Full WQV 100%

Discount Factors Design Same for all (Enter at the right) Value: 1.2 Maintenance Same for all (Enter at the right) Value: 90%

Main data table with columns: Basic Site Information, Effectiveness and WQv of Retrofits, Discounts for Retrofits, Effects of the Original Practice, and Net Effects of Each Retrofit. Includes rows for various practice types like Wetland, Wetland, and various Error Practice entries.

Loads to Surface Waters with Future Practices					
	TN lb/year	TP lb/year	TSS lb/year	Runoff Volume (acre-feet/year)	
Urban Land	(302)	(66,53)	(10,270)	(33)	
Active Construction					
SSOs					
CSOs	(77)	53	13,509		
Channel Erosion					
Road Sanding	-	-	-	-	-
Forest	422	34	16,887	14	
Rural Land	-	-	-	-	-
Livestock	-	-	-	-	-
Illicit Connections	-	-	-	-	-
Marinas	-	-	-	-	-
Point Sources	-	-	-	-	-
Septic Systems	-	-	-	-	-
Open Water	20	1	240	-	-
Total Storm Load	(148)	11	18,677	(19)	
Total Non-Storm Load	211	10	1,689	-	-
Total Load to Surface Waters	63	21	20,366	(19)	

Future Land Use		Area (Acres)
Residential	LDR (<1du/acre)	1.66
	MDR (1-4 du/acre)	0.0
	HDR (>4 du/acre)	0.0
	Multifamily	0.0
		0.0
		0.0
		0.0
		0.0
		0.0
		0.0
Commercial	Commercial	27.83
		0.0
		0.0
		0.0
		0.0
Roadway	Roadway	0.5
		0.0
		0.0
		0.0
		0.0
Industrial	Industrial	0.0
		0.0
		0.0
		0.0
		0.0
Forest	Forest	137.85
		0.0
		0.0
		0.0
		0.0
Rural	Rural	0.0
		0.0
		0.0
		0.0
		0.0
		0.0
		0.0
		0.0
Open Water	Open Water	5.25
Active Construction	Active Construction	0.0
Total	Total Acres	Area = 172.59. Needs to Match WS Area
Total Watershed Area (Should be same as total)		172.59

New Development				Concentrations					Annual Loading Rates					Load (Pre-BMP)				
Land Use	Additional Development (Acres)	Impervious Cover %	Turf Cover (%)	TN (mg/l)	TP (mg/l)	TSS (mg/l)	FC (MPN/100 ml)	TN lb/acre	TP lb/acre	TSS lb/acre	FC # billion/acre	Runoff (in/year)	TN (lb/year)	TP (lb/year)	TSS (lbs/year)	FC (# billion/year)	Runoff (acre-feet)	
Residential	LDR (<1du/acre)	0.0	12%	70%	2.00	0.3	55	20000	6.2	1.5	145	240	12	-	-	-	-	-
	MDR (1-4 du/acre)	0.0	21%	63%	2.00	0.3	55	20000	7.5	1.6	183	303	15	-	-	-	-	-
	HDR (>4 du/acre)	0.0	33%	54%	2.00	0.3	55	20000	9.3	1.8	234	388	19	-	-	-	-	-
	Multifamily	0.0	44%	45%	2.00	0.3	55	20000	10.8	1.9	281	466	23	-	-	-	-	-
		0.0	0%	0%	2.00	0.3	55	20000	0.7	0.1	19	32	2	-	-	-	-	-
		0.0	0%	0%	2.00	0.3	55	20000	0.7	0.1	19	32	2	-	-	-	-	-
		0.0	0%	0%	2.00	0.3	55	20000	0.7	0.1	19	32	2	-	-	-	-	-
Commercial	Commercial	27.8	72%	22%	2.00	0.3	55	20000	14.6	1.9	400	664	32	405	53	11,142	18,466	75
		0.0	0%	0%	2.00	0.3	55	20000	0.7	0.1	19	32	2	-	-	-	-	-
		0.0	0%	0%	2.00	0.3	55	20000	0.7	0.1	19	32	2	-	-	-	-	-
		0.0	0%	0%	2.00	0.3	55	20000	0.7	0.1	19	32	2	-	-	-	-	-
Roadway	Roadway	0.0	100%	0%	2.00	0.3	55	20000	18.9	2.5	520	861	42	-	-	-	-	-
		0.0	0%	0%	2.00	0.3	55	20000	0.7	0.1	19	32	2	-	-	-	-	-
		0.0	0%	0%	2.00	0.3	55	20000	0.7	0.1	19	32	2	-	-	-	-	-
		0.0	0%	0%	2.00	0.3	55	20000	0.7	0.1	19	32	2	-	-	-	-	-
Industrial	Industrial	0.0	53%	38%	2.00	0.3	55	20000	11.6	1.5	319	529	26	-	-	-	-	-
		0.0	0%	0%	2.00	0.3	55	20000	0.7	0.1	19	32	2	-	-	-	-	-
		0.0	0%	0%	2.00	0.3	55	20000	0.7	0.1	19	32	2	-	-	-	-	-
		0.0	0%	0%	2.00	0.3	55	20000	0.7	0.1	19	32	2	-	-	-	-	-
Forest	Forest	-31.0							2.5	0.2	100	12	1	(78)	(6)	(3,102)	(372)	(3)
		0.0							2.5	0.2	100	12	-	-	-	-	-	-
		0.0							2.5	0.2	100	12	-	-	-	-	-	-
		0.0							2.5	0.2	100	12	-	-	-	-	-	-
		0.0							2.5	0.2	100	12	-	-	-	-	-	-
		0.0							2.5	0.2	100	12	-	-	-	-	-	-
Rural	Rural	0							4.6	0.7	100	39	1	-	-	-	-	-
		0							4.6	0.7	100	39	-	-	-	-	-	-
		0							4.6	0.7	100	39	-	-	-	-	-	-
		0							4.6	0.7	100	39	-	-	-	-	-	-
		0							4.6	0.7	100	39	-	-	-	-	-	-
		0							4.6	0.7	100	39	-	-	-	-	-	-
		0							4.6	0.7	100	39	-	-	-	-	-	-
		0							4.6	0.7	100	39	-	-	-	-	-	-
		0							4.6	0.7	100	39	-	-	-	-	-	-
		0							4.6	0.7	100	39	-	-	-	-	-	-

Stormwater Controls on New Development and Construction					
Program Discounts	Fraction of New Development Regulated				
	Capture Discount	Design Discount	Maintenance Discount		
	100%	0%	0.8	0.5	
Program Option	Option 3: Show no increase on each parcel.				
Target % Removal	TN	TP	TSS	FC	Runoff Volume
Target Load	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank
	Leave Blank	Leave Blank	Leave Blank	Leave Blank	Leave Blank
		lb/acre/year		billion/acre/year	ft/year
Is Channel Protection Required?	Yes				

Data to Quantify Wastewater Loads				
Septic Systems				
New Septic Customers (households)	Septic System Failure Rate	Septic System Efficiency		
	5%	Same As Current		
SSOs				
Miles of Sewer Constructed	SSOs/Mile			
	140			
CSOs				
% of Development on Combined Sewer	0%			
Illicit Connections				
% of new connections cross connected				
WWTP Dischargers: Only Report Discharges to WWTPs within the Watershed				
New Wastewater Customers (Households)				
	N	P	TSS	FC Log Reduction
Plant Efficiency	0%	0%	0%	0.0
Load	0.0	0.0	0.0	0.0

Active Construction				
Active Construction (net increase)	Program Efficiency	Fraction Regulated	Maintenance/Design	
0	70%	100%	0.9	

Net Additional Loads					
Surface Waters	TN	TP	TSS	FC	Runoff
	lb/year	lb/year	lb/year	billion/year	ac-ft/year
Urban Land	405	52,673,384,666	11,142,446,750	18,466,162,760	74,701,305,680
Active Construction	0	0	0	0	0
SSOs	0	0	0	0	0
CSOs	0	0	0	0	0
Channel Erosion	0	0	0	0	0
Point Sources	-	-	-	-	-
Illicit Discharges	-	-	-	-	-
Forest	-77.6	-8,204	-3,102	-372.24	-2,602,962,648
Rural Land	-	0	0	0	0
Septic Systems	0	0	0	0	0
Groundwater					
Urban Land	205,089,092,900	1,282,928,163	0	0	0
Septic Systems	0	0	0	0	0

Loads to Surface Waters with Projected New Development				
	TN lb/year	TP lb/year	TSS lb/year	Runoff Volume (acre-feet/year)
Urban Land	103	(13.86)	872	42
Active Construction	-	-	-	-
SSOs	-	-	-	-
CSOs	-	-	-	-
Channel Erosion	(77)	53	13,509	-
Road Sanding	-	-	-	-
Forest	345	28	13,785	14
Rural Land	-	-	-	-
Livestock	-	-	-	-
Illicit Connections	-	-	-	-
Marinas	-	-	-	-
Point Sources	-	-	-	-
Septic Systems	-	-	-	-
Open Water	20	1	240	-
Total Storm Load	218	60	27,028	56
Total Non-Storm Load	172	8	1,379	-
Total Load to Surface Waters	391	68	28,407	56