

Appendix D

POLLUTANT LOADING REPORT

YORKTOWN FARMS SUBDIVISION

TOWN OF YORKTOWN
WESTCHESTER COUNTY, NEW YORK

PRE AND POST DEVELOPMENT POLLUTANT ESTIMATES

December 6, 2004

Prepared for

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PROJECT: Yorktown Farms
Town of Yorktown, NY

SCOPE: Pre and Post Development Pollutant Estimates

DATE: December 6, 2004

INTRODUCTION:

The construction of mixed residential and single-family units on this 43.17 acre site requires the study of storm water quality, as required by the New York City Department of Environmental Protection (NYCDEP) for the 13.4 acre portion of the site within their watershed. Runoff from the remainder of the site is treated in accordance with the New York State Department of Environmental Conservation (NYSDEC) Stormwater Design Manual (SDM).

This report provides computations using the 'Simple Method' for specific, non-point source pollutants as described in the publication "Reducing the Impacts of Stormwater Runoff from New Development", dated April 1993 for the portion of the property within NYCDEP's watershed. This method is used to quantify the increase in pollutant loads resulting from the project, and to size the Best Management Practices (BMP's) required to mitigate.

The portion of the site which is not tributary to the NYCDEP watershed is evaluated using the NYSDEC SDM. The Water Quality Volume (WQ_v), Channel Protection Volume (Cp_v), Overbank Flood Protection Volume (Qp_v), and Extreme Flood Protection Volume (Q_f) criteria as described in the NYSDEC Stormwater Design Manual are satisfied for all areas of the property proposed for development.

TABLE: NYSDEC Design Criteria

		Storm	Rainfall (in.)
Water Quality Volume	WQ_v	90%	1.3
Channel Protection Volume	Cp_v	1 Year	2.8
Overbank Flood Protection Volume	Qp_v	10 Year	5.0
Extreme Flood Protection Volume	Q_f	100 Year	7.5

METHODOLOGY:

The entire site and adjacent areas are segmented into subareas by land use, watershed design point, and SCS soil hydrologic grouping. The watersheds studied are identical to those in the Drainage and Hydrology Report for the project. The subareas are individually tabulated for nutrients and sediment in the existing, undisturbed condition, and the developed condition for disturbed and non-disturbed areas. Mitigating treatment consists of wet extended detention ponds, infiltration trenches, grass swales, filter strips, and Stormceptors®.

A Windows™ based computer program developed by our firm uses the simple method to analyze complex watersheds for pollutant loadings. A copy of the input file that contains each value used in the computation is provided in the appendix. The output from the model run used in preparing this report is also included in the appendices.

For pollutant loads, weighted mean concentrations (C) are taken from the NYSDEC publication “Reducing the Impacts of Storm water Runoff from New Development ”(RTISRND), dated April 1993, page 39, Table 8 for Total Phosphorous and Total Nitrogen; and NURP (1983) Homer et al (1994), and Cave 1994 for TSS and BOD. The post development BOD concentrations are derived from RTISRND Table 9. The loading of each parameter is determined by multiplying the area of each watershed times the mean concentration times the rainfall depth times a conversion factor times the runoff coefficient. The included table summarizes the mean concentrations of the various constituents used for the analysis. Bacterial pollution is addressed separately in this report.

TABLE: Flow – Weighted Mean Pollutant Concentrations

Pollutant	Reference	Pre Development mg/l	Post Development mg/l
TSS	Adapted from NURP, Ref. NYS DEC Draft SMDM 2001	51 (Forest)	97 (High Density Residential)
Phosphorous	NYS DEC RTISRND Table 8	0.15 (Hardwood Forest)	0.26 (New Suburban Sites)
Nitrogen	NYS DEC RTISRND Table 8	.78 (Hardwood Forest)	2.0 (New Suburban Sites)
BOD	NYS DEC RTISRND Table 9 Adapted from NURP, Ref. NYS DEC Draft SMDM 2001	15.826 (Forest)	14 (High Density Residential)

Several different types of Best Management Practices (BMPs) are proposed within the project to mitigate the increased pollutant loading resulting from development of the site. Wet extended detention ponds, infiltration trenches, filter strips, and grass swales have all been incorporated into the design. These facilities have been designed utilizing the criteria set forth in Figure 15 of the NYSDEC publication referenced above. The extended detention ponds within the NYCDEP watershed (WQ1BA and WQB1BB) have been sized to capture and treat the runoff from the 2 year storm (3.5 inches of rainfall). This area is tributary to the Muscoot reservoir which is phosphorus restricted; hence, the runoff from the 2-year 24 hour storm event must be captured and treated. Extended detention pond WQ1BB is in series with pond WQ1BA, and has been provided for additional treatment of the 2-year storm.

Watersheds WS1A and WS1C are within the NYCDEP watershed, but do not flow into the ponds. Infiltration trenches have been provided in these watersheds to capture and infiltrate the runoff from the disturbed areas of these watersheds generated by a 2-year storm.

The BMPs utilized for pollutant mitigation are summarized as follows:

TABLE: BMP Design Summary

BMP ID	Tributary Area			Required WQ Volume	Provided WQ Volume
	Acres	Type	Design	cu. ft.	cu. ft.
Pond WQ1BA	4.48	Wet Extended Detention	3	24,090	30,203
Pond WQ1BB	4.48	Wet Extended Detention	3	4,478	14,862
TOTAL				28,568	45,065

The runoff from this site tributary to the New York City watershed in the proposed condition is represented by the sum of DP1 and DP1C. For the purpose of the analysis, the total developed loading is computed by summing the pollutant loadings from these design points.

POLLUTANT MITIGATION DEVICES:

Removal efficiencies for the storm water devices are listed in the NYSDEC manual, "Reducing the Impacts of Storm water Runoff from New Development", page 90, Figure 15. The ponds have been designed to detain the runoff from the 2-year storm for at least 24 hours. In order to achieve the highest possible removals in the proposed mitigation devices, the use of stormwater management adjuncts is being proposed. A Stormceptor is proposed upstream of Water Quality Basins1BA and 1BB to enhance the performance of this system.

TABLE: Pollutant Removals

	SUSPENDED SEDIMENT	TOTAL PHOSPORUS	TOTAL NITROGEN	OXYGEN DEMAND
Total Watershed Existing (lb/day)	345	1.015	5.28	107.1
Total Watershed Proposed (lb/day)	101	0.637	6.54	54.6
% Change	-70.72%	-37.24%	23.86%	-49.02%

Medium removal rates are utilized for Water Quality Basins1BA and 1BB are justified due to the size of the ponds and the use of adjuncts. The high removal rates utilized for the infiltration trenches were selected due to the high removal rates anticipated when capturing the 2 year storm.

Significant fecal Coliform die-off will be achieved within the extended detention basins. Furthermore, the post development loading of fecal Coliform will be minimized through the use of public sewers.

The storage volume required for water quality ponds within the NYCDEP watershed (WQ1BA and WQ1BB) is based upon providing 24 hours of center of mass detention time for the 2-year storm. Pond WQ1BA is sized to store the runoff volume generated by the 2-year storm from watershed 1B based upon the HEC-1 analysis. A 1.75 inch orifice is used as the outlet of this pond to provide sufficient detention time. Pond WQ1BB is sized to provide an additional 24 hours of extended detention to the outflow from pond WQ1BA. The discharge from pond WQ1BB is controlled utilizing a 1.25 inch orifice.

CONCLUSION:

Based on the foregoing analysis, the inclusion of storm water BMP's for treatment of runoff will provide a significant amount of treatment of nutrients and sediment, reducing the developed loadings below pre development levels in most cases. This reduction is possible due to the inclusion of storm water treatment devices in accordance with the NYSDEC guidelines and regulations of the NYC DEP. The decrease in pollutants indicates that there would be no adverse impacts to water quality from the development of this site.

Submitted by:

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Simple Method Input File

Line	ID	Description	Parameters	Parameters
			Acres Design /Sum Points	Per Cent Impervious Design Range (L, M, H)
1		Simple Method NYCDEP Watershed	Santucci Yorktown Farms	
2	CO		49.5	0.9
3	PB	Start Pollutants		
4	PO	SUSPENDED SEDIMENT		97
5	PO	TOTAL PHOSPHOROUS		0.26
6	PO	TOTAL NITROGEN		2
7	PO	OXYGEN DEMAND		14
8	PE	End Pollutants		
9	WS	WS1A	1.528	12.02
10	BMP	Infiltration Trench	Design 9	H
11	BMP	Filter Strip	Design 12	M
12	WS	WS1B	4.483	19.94
13	BMP	Extended Detention	Design 3	M
14	BMP	Extended Detention	Design 3	M
15	BMP	Grassed Swale	Design 14	M
16	WS	WS1C	3.051	12.04
17	BMP	Infiltration Trench	Design 9	H
18	BMP	Filter Strip	Design 12	M
19	PB	Start Pollutants		
20	PO	SUSPENDED SEDIMENT		51
21	PO	TOTAL PHOSPHOROUS		0.15
22	PO	TOTAL NITROGEN		0.78
23	PO	OXYGEN DEMAND		15.826
24	PE	End Pollutants		
25	WS	WS1D	3.65	0
26	SUM	Summation	11, 15, 18, 25	
27	WS	Existing Watershed	13.399	0
28	ZZ	END	END	

Simple Method Computer Output:

Line	Simple Method NYCDEP Watershed	Santucci Yorktown Farms	Ac./Des./Sums	Range / % Imp.	SUSPENDED SEDIMENT	TOTAL PHOSPHOROUS	TOTAL NITROGEN	OXYGEN DEMAND	Pj	Rv	Cum. Area
9	WS	WS1A	1.528	12.02	236.746	0.635	4.881	34.169	0.9	0.158	
10	BMP	Infiltration Trench	Design 9	H	0.000	0.127	0.976	0.000			
11	BMP	Filter Strip	Design 12	M	0.000	0.063	0.488	0.000			
12	WS	WS1B	4.483	19.94	1007.588	2.701	20.775	145.425	0.9	0.229	
13	BMP	Extended Detention	Design 3	M	100.759	0.810	10.388	72.713			
14	BMP	Extended Detention	Design 3	M	10.076	0.243	5.194	36.356			
15	BMP	Grassed Swale	Design 14	M	7.053	0.170	3.636	25.449			
16	WS	WS1C	3.051	12.04	473.255	1.269	9.758	68.305	0.9	0.158	
17	BMP	Infiltration Trench	Design 9	H	0.000	0.254	1.952	0.000			
18	BMP	Filter Strip	Design 12	M	0.000	0.127	0.976	0.000			
25	WS	WS1D	3.65	0	93.987	0.276	1.437	29.165	0.9	0.05	
26	SUM	Summation	11, 15, 18, 25		101.040	0.637	6.537	54.615			12.71
27	WS	Existing Watershed	13.399	0	345.023	1.015	5.277	107.065	0.9	0.05	2

TABLE: BMP Design Criteria

BMP ID	Tributary Area	Type	Design	Rainfall	Required Volume	Provided Volume
	Acres			In.	cu. ft.	cu. ft.
Pond WQ1BA	4.48	Extended Detention	3	3.5	23,540	
Pond WQ1BB	4.48	Extended Detention	3	3.5		