MARLBORO II DISTRIBUTION

STORMWATER POLLUTION PREVENTION PLAN

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Project Location:
1100 US Route 9W
Town of Marlborough
Ulster County, New York

Owner:
West Rac Contracting Corporation
687 Old Willets Path
Hauppauge, New York 11788

January 2018
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4.5 Site Design

As required by the SPDES permit, the majority of runoff from impervious surfaces at the site is directed to either an RR technique or standard SMP with RRv capacity. This runoff enters either one of the bioretention facilities or the stormwater pond, where the RRv requirement is satisfied and the WQv is treated. The runoff outlets to the existing stream east of the site. The "treatment train", as required by the Design Manual provides a high level of water quality treatment, efficiently removing pollutants before discharging to the downstream wetland and watercourse system.

Pretreatment is provided for all stormwater management practices. Pretreatment for the bioretention facilities is provided by a pea gravel diaphragm, grass filter strip and mulch layer over the bioretention planting bed. Additional pretreatment for the bioretention areas is provided by grass channels. Pretreatment for the pond will be provided by the sediment forebays which are designed to collect sediments and pollutants.

Please see below for a summary table of the WQv and RRv. For additional information please see the Appendices.

Parameter	Required	Provided	Practice / Information
WQv	7,737 cf	10,443 cf	Bioretention Facility 1 – 2,100 cf
			Bioretention Facility 2 – 2,160 cf
			Pond Permanent Pool – 6,183 cf
RRv	1,579 cf	1,704 cf	Bioretention Facility 1 – 840 cf
			Bioretention Facility 2 – 864 cf

4.6 Pre Development Conditions

The existing watershed area that will be impacted as a result of the proposed development is shown on the Pre Development Drainage Map, which is included as an Appendix. Pertinent information relating to this watershed is summarized in the table below.

Table 4.2 Pre-Development Conditions

Sub catch	Area (acre)	Cover Condition	Curve Number	Soil Group	Time of Conc. (min)
EX-1	5.387	Paved Parking, Buildings, Gravel, Woods, Brush, Grass	80	C	20.9

Post-construction Stormwater Management Practice (SMP) Requirements

Important: Completion of Questions 27-39 is not required if response to Question 22 is No.

27. Identify all site planning practices that were used to prepare the final site plan/layout for the project.

- ● **Preservation of Undisturbed Areas**
- ● **Preservation of Buffers**
- ○ **Reduction of Clearing and Grading**
- ● **Locating Development in Less Sensitive Areas**
- ○ **Roadway Reduction**
- ○ **Sidewalk Reduction**
- ○ **Driveway Reduction**
- ○ **Cul-de-sac Reduction**
- ○ **Building Footprint Reduction**
- ○ **Parking Reduction**

27a. Indicate which of the following soil restoration criteria was used to address the requirements in Section 5.1.6("Soil Restoration") of the Design Manual (2010 version).

- ● All disturbed areas will be restored in accordance with the Soil Restoration requirements in Table 5.3 of the Design Manual (see page 5-22).
- ○ Compacted areas were considered as impervious cover when calculating the **WQv Required**, and the compacted areas were assigned a post-construction Hydrologic Soil Group (HSG) designation that is one level less permeable than existing conditions for the hydrology analysis.

28. Provide the total Water Quality Volume (WQv) required for this project (based on final site plan/layout).

Total WQv Required

0.107178 **acre-feet**

29. Identify the RR techniques (Area Reduction), RR techniques(Volume Reduction) and Standard SMPs with RRv Capacity in Table 1 (See Page 9) that were used to reduce the Total WQv Required(#28).

Also, provide in Table 1 the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

Note: Redevelopment projects shall use Tables 1 and 2 to identify the SMPs used to treat and/or reduce the WQv required. If runoff reduction techniques will not be used to reduce the required WQv, skip to question 33a after identifying the SMPs.

Table 1 - Runoff Reduction (RR) Techniques and Standard Stormwater Management Practices (SMPs)

	Total Contributing Area (acres)		Total Contributing Impervious Area(acres)
RR Techniques (Area Reduction)			
○ Conservation of Natural Areas (RR-1)		and/or	
○ Sheetflow to Riparian Buffers/Filters Strips (RR-2)		and/or	
○ Tree Planting/Tree Pit (RR-3)		and/or	
○ Disconnection of Rooftop Runoff (RR-4)		and/or	
RR Techniques (Volume Reduction)			
○ Vegetated Swale (RR-5)			
○ Rain Garden (RR-6)			
○ Stormwater Planter (RR-7)			
○ Rain Barrel/Cistern (RR-8)			
○ Porous Pavement (RR-9)			
○ Green Roof (RR-10)			
Standard SMPs with RRv Capacity			
○ Infiltration Trench (I-1)			
○ Infiltration Basin (I-2)			
○ Dry Well (I-3)			
○ Underground Infiltration System (I-4)			
● Bioretention (F-5)	1.01	9.09	
○ Dry Swale (O-1)			
Standard SMPs			
○ Micropool Extended Detention (P-1)			
● Wet Pond (P-2)	1.41	5.45	
○ Wet Extended Detention (P-3)			
○ Multiple Pond System (P-4)			
○ Pocket Pond (P-5)			
○ Surface Sand Filter (F-1)			
○ Underground Sand Filter (F-2)			
○ Perimeter Sand Filter (F-3)			
○ Organic Filter (F-4)			
○ Shallow Wetland (W-1)			
○ Extended Detention Wetland (W-2)			
○ Pond/Wetland System (W-3)			
○ Pocket Wetland (W-4)			
○ Wet Swale (O-2)			

Redevelopment Calculations

Existing Impervious to be removed and redeveloped

Buildings		0.02	Ac
Gravel		1.43	Ac
	Total	1.45	Ac

Proposed Impervious

Building		0.92	Ac
Pavement		1.24	Ac
Future Building		0.36	Ac
Sidewalk		0.02	Ac
	Total	2.54	Ac

Impervious surface requiring Full WQv and RRv

1.09 ac

P=	1.4
Rv=	0.05 + 0.009 (I)
Rv=	0.30
I=	Impervious Cover (percent)
I=	28%
A=	3.94

WQv=[(P)(Rv)(A)]/12

WQv= 5,987 cf for portion of site with new impervious surfaces

Redevelopment impervious surface requiring 25% WQv treatment and no RRv requirement

1.45 ac

P=	1.4
Rv=	0.05 + 0.009 (I)
Rv=	0.95
I=	Impervious Cover (percent)
I=	100%
A=	1.45

WQv={[(P)(Rv)(A)]/12} * 25% reduction for redevelopment

WQv= 1,750 cf for portion of site to be redeveloped

Total WQv required for new impervious and redevelopment areas

Total WQv = 7,737 cf

Minimum RRV required

P=	1.4
Rv=	0.05 + 0.009 (I) where I is 100% Impervious cover
Rv=	0.95
I=	100%
Aic=	1.09
S=	0.3

RRv=[(P)(Rv)(Aic)(S)]/12

RRv= 1,579 cf for new impervious cover

Note - RRv is not required for areas of redevelopment

Version 1.6 Total Water Quality Volume Calculation

Last Updated: 03/28/2014 WQv(acre-feet) = [(P)(Rv)(A)] /12

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?.....	No

Design Point:	Total Area	
P=	1.40	*inch*

Manually enter P, Total Area and Impervious Cover.

Breakdown of Subcatchments

Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Rv	WQv *(ft^3)*	Description
1	1.97	0.55	28%	0.30	2,993	Bioretention
2	1.97	0.55	28%	0.30	2,993	Bioretention
3						
4						
5						
6						
7						
8						
9						
10						
Subtotal (1-30)	3.94	1.09	28%	0.30	**5,987**	**Subtotal 1**
Total	3.94	1.09	28%	0.30	**5,987**	**Initial WQv**

Minimum RRv

Enter the Soils Data for the site		
Soil Group	Acres	S
A		55%
B		40%
C	3.94	30%
D		20%
Total Area	3.94	
Calculate the Minimum RRv		
S =	**0.30**	
Impervious =	1.09	*acre*
Precipitation	1.4	*in*
Rv	0.95	
Minimum RRv	**1,579**	***ft3***
	0.04	af

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

Af=WQv*(df)/[k*(hf+df)(tf)]

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft3)
df	Depth of the Soil Medium (feet)
hf	Average height of water above the planter bed
tf	Volume Through the Filter Media (days)

k — The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil*** (0.5 ft/day (Claytor &

Design Point:	**(Acres)**

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
1	1.97	0.55	0.28	0.30	2993.30	1.40	Bioretention
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	28%	0.30	2,993	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						*ft^3*	

Soil Information			
Soil Group	C		
Soil Infiltration Rate	0.00	*in/hour*	*Okay*
Using Underdrains?	Yes	*Okay*	

Calculate the Minimum Filter Area				
		Value	Units	Notes
WQv		2,993	*ft^3*	
Enter Depth of Soil Media	*df*	2.5	*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity	*k*	0.5	*ft/day*	
Enter Average Height of Ponding	*hf*	0.5	*ft*	*6 inches max.*
Enter Filter Time	*tf*	2	*days*	
Required Filter Area	***Af***	**2494**	***ft^2***	

Determine Actual Bio-Retention Area			
Filter Width	50	*ft*	
Filter Length	35	*ft*	
Filter Area	1750	*ft^2*	
Actual Volume Provided	2100	*ft^3*	

Determine Runoff Reduction				
Is the Bioretention contributing flow to another practice?		Yes	Select Practice	Other/Standard SMP
RRv	840			
RRv applied	**840**	***ft^3***	***This is 40% of the storage provided or WQv whichever is less.***	
Volume Treated	0	*ft^3*	*This is the portion of the WQv that is not reduced in the practice.*	

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

Af=WQv*(df)/[k*(hf+df)(tf)]

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft3)
df	Depth of the Soil Medium (feet)
hf	Average height of water above the planter bed
tf	Volume Through the Filter Media (days)

k — The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil*** (0.5 ft/day (Claytor & Schueler, 1996)

Design Point:	**(Acres)**

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
2	1.97	0.55	0.28	0.30	2993.30	1.40	Bioretention
Enter Impervious Area Reduced by Disconnection of Rooftops			28%	0.30	2,993	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						*ft^3*	

Soil Information

Soil Group	C		
Soil Infiltration Rate	0.00	*in/hour*	*Okay*
Using Underdrains?	Yes	*Okay*	

Calculate the Minimum Filter Area

		Value	Units	Notes
WQv		2,993	*ft^3*	
Enter Depth of Soil Media	*df*	2.5	*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity	*k*	0.5	*ft/day*	
Enter Average Height of Ponding	*hf*	0.5	*ft*	*6 inches max.*
Enter Filter Time	*tf*	2	*days*	
Required Filter Area	***Af***	**2494**	***ft^2***	

Determine Actual Bio-Retention Area

Filter Width	90	*ft*	
Filter Length	20	*ft*	
Filter Area	1800	*ft^2*	
Actual Volume Provided	2160	*ft^3*	

Determine Runoff Reduction

Is the Bioretention contributing flow to another practice?		Yes	Select Practice	Other/Standard SMP
RRv	864			
RRv applied	**864**	***ft^3***	***This is 40% of the storage provided or WQv whichever is less.***	
Volume Treated	0	*ft^3*	*This is the portion of the WQv that is not reduced in the practice.*	

WQv and RRv Summary Sheet

Total WQv Required =			7,737	cf
WQv Provided by:	Bioretention -		4,260	cf
	Pond Permanent Pool-		6,183	cf
Total WQv Provided=			10,443	cf
Total Minimum RRv Required using specific reduction factor=			1,579	cf
RRv Provided by:	Bioretention (40% of WQv) -		1,704	cf
Total RRv Provided =			1,704	cf