

MARLBORO II DISTRIBUTION

STORMWATER POLLUTION PREVENTION PLAN



10 Main Street Suite 321
New Paltz, NY 12561
T 845.255.0210
www.willinghamengineering.com

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
Revised: January 26, 2018

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.

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

. 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)

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

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	<i>acre</i>
Precipitation	1.4	<i>in</i>
Rv	0.95	
Minimum RRv	1,579	<i>ft3</i>
	0.04	<i>af</i>

Bioretention Worksheet

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

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

<p><i>A_f</i> Required Surface Area (ft²)</p> <p><i>WQv</i> Water Quality Volume (ft³)</p> <p><i>df</i> Depth of the Soil Medium (feet)</p> <p><i>hf</i> Average height of water above the planter bed</p> <p><i>tf</i> Volume Through the Filter Media (days)</p>	<p><i>k</i> 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 &</p>
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Design Point:	(Acres)						
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	R _v	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			<i>df</i>	2.5	ft	2.5-4 ft	
Enter Hydraulic Conductivity			<i>k</i>	0.5	ft/day		
Enter Average Height of Ponding			<i>hf</i>	0.5	ft	6 inches max.	
Enter Filter Time			<i>tf</i>	2	days		
Required Filter Area			A_f	2494	ft²		
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		
RR _v		840					
RR_v applied		840	ft³	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)

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

- | | | |
|-------|---|--|
| A_f | Required Surface Area (ft ²) | 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) |
| WQv | Water Quality Volume (ft ³) | |
| df | Depth of the Soil Medium (feet) | k |
| hf | Average height of water above the planter bed | |
| tf | Volume Through the Filter Media (days) | |

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				A_f	2494	ft²	
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	ft³	<i>This is 40% of the storage provided or WQv whichever is less.</i>			
Volume Treated		0	ft ³	<i>This is the portion of the WQv that is not reduced in the practice.</i>			

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