Attachment - C

Maintenance Procedures

Maintaining the StormGarden system is necessary to continue the effective pollutant removal from stormwater runoff prior to discharge into the stormdarin system. Ongoing maintenance will also extend the life of the filter media and the StormGarden system. As the StormGarden filters stormwater runoff, pollutants accumulate within the filter media and floating debris such as silt, trash and leaves accumulate on top of the media underneath the concrete slab. When an excessive amount of silt and trash build up on top of the media, the flow-through rate of the media is reduced, thus decreasing the capacity of the system. Regular replacement of the top mulch layer helps stop the accumulation of such sediment and debris and maintaining the overall performance of the system.

Rotondo Environmental Solutions (RES) includes a 1-year maintenance plan with each StormGarden purchase. The included maintenance plan consists of a maximum of 2 scheduled visits. If additional visits are required due to excessive sediment and trash loading, they will be performed by RES for an additional charge. The start of the maintenance plan begins when the system is activated for full operation. Full operation is defined as the unit installed, curb and gutter and transitions in place, and the unit activated by RES which includes the mulch and plant installed and the temporary throat protection removed.

Activation cannot occur until the site is fully stabilized, which means full landscaping, grass cover, final paving and sweeping is complete. Maintenance visits are scheduled seasonally. The spring visit cleans up after winter loads which include salts and sands, and the fall visit is to remove excessive leaves and debris.

It is the responsibility of the owner to provide adequate irrigation when necessary to the plant of the StormGarden system. Cleanup due to major contamination such as oils, chemicals, toxic spills, etc. will result in additional costs and are not covered under the 1-year maintenance plan provided by RES. Should a major contamination event occur, the owner must block off the outlet pipe to the StormGarden unit (where the cleaned runoff drains to from the StormGarden, such as the bypass inlet) and block off the throat of the StormGarden. RES should be informed immediately.

Each maintenance visit consists of the following tasks:

- Visual inspection of StormGarden unit and surrounding area
- Removal of tree grate and erosion control stones
- Removal of sediment, trash, debris and mulch
- Mulch replacement
- Clean and replace erosion control stones
- Evaluation of plant and pruning or replacement if necessary
- Clean area around StormGarden unit
- Maintenance report

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Brookside Square - Filterra - Inspection & Maintenance

Project Information

Date of Maintenance	05/24/2016
Filterra Units on this Order	4
Total Units on this Project	4
Arrival Time	
Departure Time	
Number of Workers	1
Notes on Project	
Activation Supervisor	Santino Nappi

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Project Name	Brookside Square	Structure Number	F1
Plant Type		Structure Size	6 x 4

Initial Observations

Standing Water in Bypass	No	Damage to Tree Grate?	No
Damage to Box Structure?	No	Is Bypass Clear	Yes

Waste

Silt Clay	No
Cups Bags	No
Leaves	Yes
Buckets Removed	2

Mulch

Netting Replaced	No
Stones Replaced	No
Bags of Mulch Added	3

Plant

	#1	#2		#1	#2
Plant height above grate	7’ 1”		Damage to Plant	No	
Stem diameter/caliper	1”		Plant Replaced	No	
Plant’s Widest Width	3’ 5”				
Plant Health	Alive				

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Project Name	Brookside Square	Structure Number	F2
Plant Type		Structure Size	6 x 4

Initial Observations

Standing Water in Bypass	No	Damage to Tree Grate?	No
Damage to Box Structure?	No	Is Bypass Clear	Yes

Waste

Silt Clay	Yes
Cups Bags	Yes
Leaves	Yes
Buckets Removed	2

Mulch

Netting Replaced	No
Stones Replaced	No
Bags of Mulch Added	3

Plant

	#1	#2		#1	#2
Plant height above grate	7’ 10”		Damage to Plant	No	
Stem diameter/caliper	1.5”		Plant Replaced	No	
Plant’s Widest Width	3’ 4”				
Plant Health	Alive				

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Project Name	Brookside Square	Structure Number	F3
Plant Type		Structure Size	6 x 4

Initial Observations

Standing Water in Bypass	No	Damage to Tree Grate?	No
Damage to Box Structure?	No	Is Bypass Clear	Yes

Waste

Silt Clay	No
Cups Bags	No
Leaves	Yes
Buckets Removed	2

Mulch

Netting Replaced	No
Stones Replaced	
Bags of Mulch Added	3

Plant

	#1	#2		#1	#2
Plant height above grate	7’ 8”		Damage to Plant	No	
Stem diameter/caliper	1.5”		Plant Replaced	No	
Plant’s Widest Width	3’ 4”				
Plant Health	Alive				

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Project Name	Brookside Square	Structure Number	F4
Plant Type		Structure Size	6 x 4

Initial Observations

Standing Water in Bypass	No	Damage to Tree Grate?	No
Damage to Box Structure?	No	Is Bypass Clear	Yes

Waste

Silt Clay	No
Cups Bags	No
Leaves	Yes
Buckets Removed	2

Mulch

Netting Replaced	No
Stones Replaced	No
Bags of Mulch Added	3

Plant

	#1	#2		#1	#2
Plant height above grate	7”		Damage to Plant	No	
Stem diameter/caliper	1.5”		Plant Replaced	No	
Plant’s Widest Width	3’ 4”				
Plant Health	Alive				

5-24-16 - Brookside Square - Filterra Maintenance

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DSCF8670

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DSCF8676

StormWater Compliance, LLC

5-24-16 - Brookside Square - Filterra Maintenance

DSCF8677

DSCF8678

DSCF8679

DSCF8680

DSCF8681

DSCF8682

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Brookside Square - Filterra - Inspection & Maintenance

Project Information

Date of Maintenance	12/07/2016
Filterra Units on this Order	4
Total Units on this Project	4
Arrival Time	10
Departure Time	2
Number of Workers	2
Notes on Project	
Activation Supervisor	Brian Mulcahy

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Project Name	Brookside Square	Structure Number	1
Plant Type		Structure Size	6x4

Initial Observations

Standing Water in Bypass	No	Damage to Tree Grate?	No
Damage to Box Structure?	No	Is Bypass Clear	Yes

Waste

Silt Clay	No
Cups Bags	No
Leaves	Yes
Buckets Removed	4

Mulch

Netting Replaced	No
Stones Replaced	No
Bags of Mulch Added	4

Plant

	#1	#2		#1	#2
Plant height above grate	7'6"		Damage to Plant	No	
Stem diameter/caliper	1.5"		Plant Replaced	No	
Plant's Widest Width	3'9"				
Plant Health	Alive				

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Project Name	Brookside Square	Structure Number	2
Plant Type		Structure Size	6x4

Initial Observations

Standing Water in Bypass	No	Damage to Tree Grate?	No
Damage to Box Structure?	No	Is Bypass Clear	Yes

Waste

Silt Clay	No
Cups Bags	No
Leaves	Yes
Buckets Removed	4

Mulch

Netting Replaced	No
Stones Replaced	No
Bags of Mulch Added	4

Plant

	#1	#2		#1	#2
Plant height above grate	7’10”		Damage to Plant	No	
Stem diameter/caliper	1.5”		Plant Replaced	No	
Plant’s Widest Width	3’2”				
Plant Health	Alive				

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Project Name	Brookside Square	Structure Number	3
Plant Type		Structure Size	6x4

Initial Observations

Standing Water in Bypass	No	Damage to Tree Grate?	No
Damage to Box Structure?	No	Is Bypass Clear	No

Waste

Silt Clay	No
Cups Bags	No
Leaves	Yes
Buckets Removed	4

Mulch

Netting Replaced	No
Stones Replaced	No
Bags of Mulch Added	4

Plant

	#1	#2		#1	#2
Plant height above grate	7'8"		Damage to Plant	No	
Stem diameter/caliper	1.75"		Plant Replaced	No	
Plant's Widest Width	3'3"				
Plant Health	Alive				

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Project Name	Brookside Square	Structure Number	4
Plant Type		Structure Size	6x4

Initial Observations

Standing Water in Bypass	No	Damage to Tree Grate?	No
Damage to Box Structure?	No	Is Bypass Clear	Yes

Waste

Silt Clay	No
Cups Bags	No
Leaves	Yes
Buckets Removed	4

Mulch

Netting Replaced	No
Stones Replaced	No
Bags of Mulch Added	4

Plant

	#1	#2		#1	#2
Plant height above grate	7'2"		Damage to Plant	No	
Stem diameter/caliper	1.5"		Plant Replaced	No	
Plant's Widest Width	2'11"				
Plant Health	Alive				

Concord Filterra

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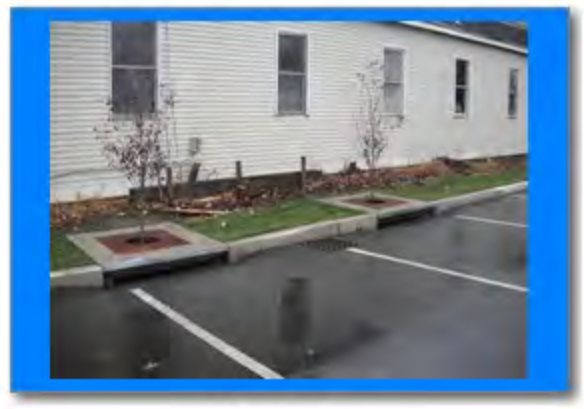

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Concord Filterra

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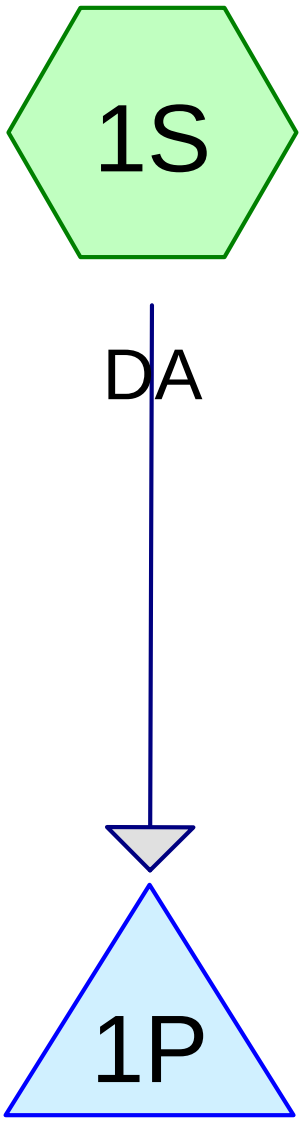


SG 6x4

Subcat Reach Pond Link

Routing Diagram for SG-6x4_(RCN-98)
Prepared by {enter your company name here}, Printed 1/30/2018

Summary for Pond 1P: SG 6x4

Inflow Area = 0.100 ac,100.00% Impervious, Inflow Depth = 0.79" for WQv Storm event
Inflow = 0.13 cfs @ 11.96 hrs, Volume= 0.007 af
Outflow = 0.08 cfs @ 11.90 hrs, Volume= 0.006 af, Atten= 37%, Lag= 0.0 min
Primary = 0.08 cfs @ 11.90 hrs, Volume= 0.006 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 0.74' @ 12.04 hrs Surf.Area= 24 sf Storage= 18 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 3.2 min (787.8 - 784.6)

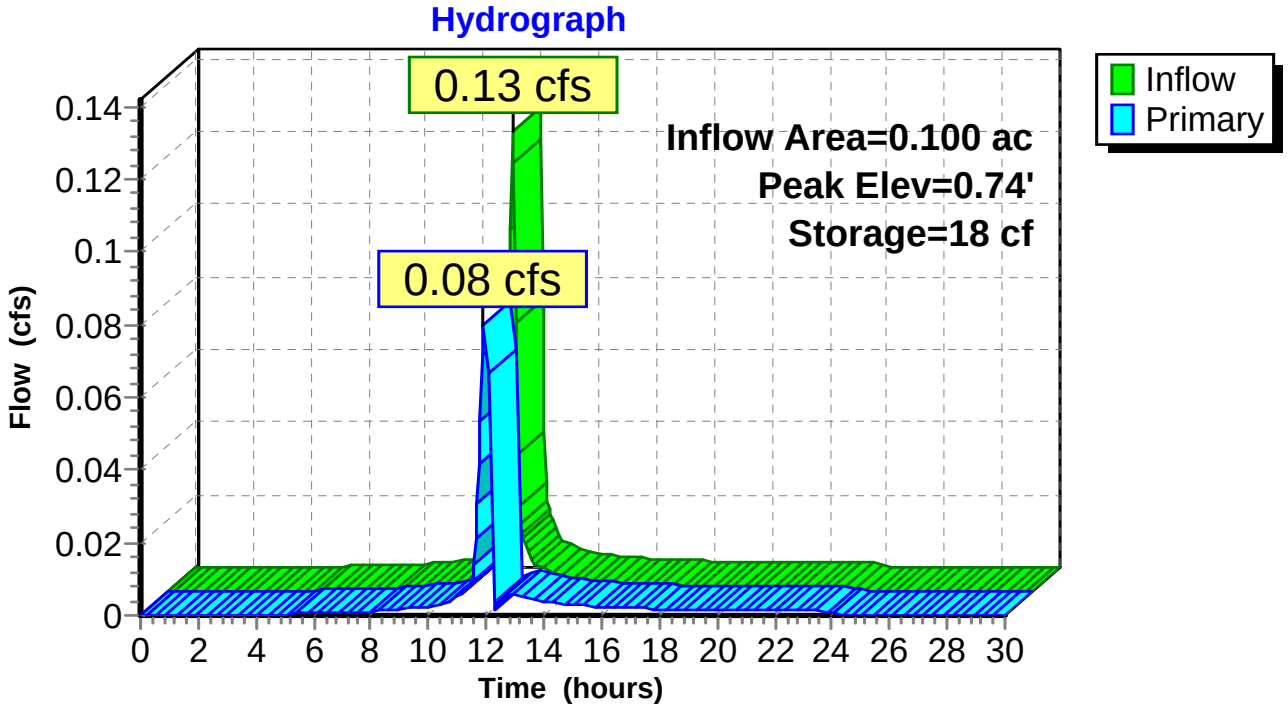
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	18 cf	**Storage Above Filter (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	24	0	0
0.75	24	18	18

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**0.08 cfs Exfiltration (k = 140 in/hr) at all elevations**

Primary OutFlow Max=0.08 cfs @ 11.90 hrs HW=0.06' (Free Discharge)
└**1=Exfiltration (k = 140 in/hr)** (Exfiltration Controls 0.08 cfs)

Pond 1P: SG 6x4



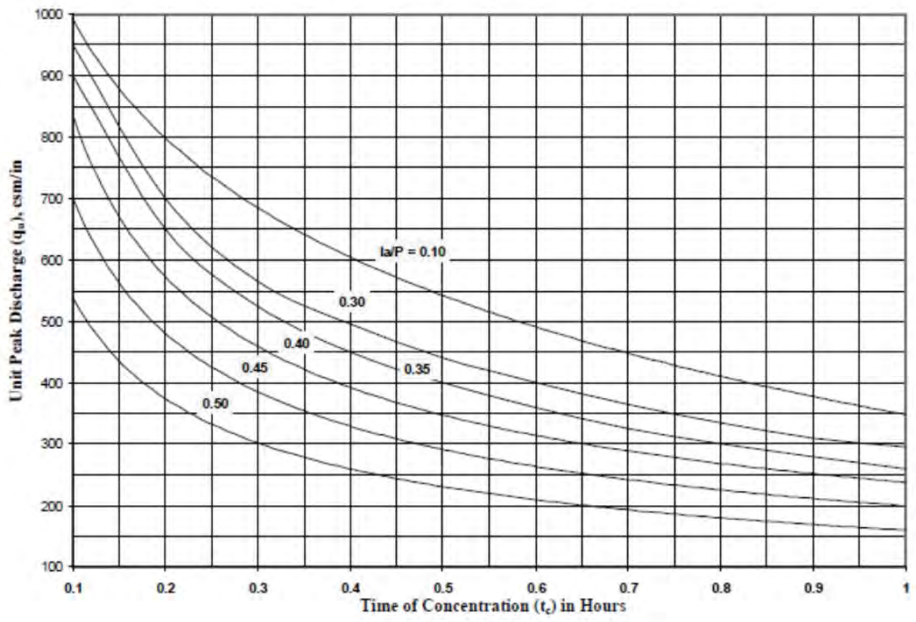
ROTONDO Environmental Solutions LLC

StormGarden Size: 6' x 4'
RCN: 98
Date: January 30, 2018

WQv Peak Discharge:

0.100	ac	= Contributing Drainage Area
0.087	ac	= Impervious Area
87.00%		= I (Percent Impervious)
1.00	in	= P (Rainfall Depth)
0.833		= Rv = 0.05 + 0.009(I)
0.833	in	= Qa = P x Rv
98		= CN (Curve Number)
6	min	= Tc (Time of Concentration)
0.0315		= Ia = (200/CN) - 2
0.0315		= Ia/P
1000	csm/in	= qu (from TR-55 exhibit 4-II)
0.0002	mi^2	= A (Area)
0.13	cfs	= Qp (Peak Discharge) = qu x A x Qa

Figure D.11.1 SCS Graphical Method of Determining Peak Discharge (q_u) in csm/in for 24-Hour Type II Storm Distribution



Summary for Pond 1P: SG 6x4

Inflow Area = 0.133 ac, 0.00% Impervious, Inflow Depth = 0.56" for WQv Storm event
Inflow = 0.13 cfs @ 11.97 hrs, Volume= 0.006 af
Outflow = 0.08 cfs @ 11.90 hrs, Volume= 0.006 af, Atten= 38%, Lag= 0.0 min
Primary = 0.08 cfs @ 11.90 hrs, Volume= 0.006 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 0.74' @ 12.05 hrs Surf.Area= 24 sf Storage= 18 cf

Plug-Flow detention time= 47.5 min calculated for 0.006 af (92% of inflow)
Center-of-Mass det. time= 6.9 min (827.9 - 820.9)

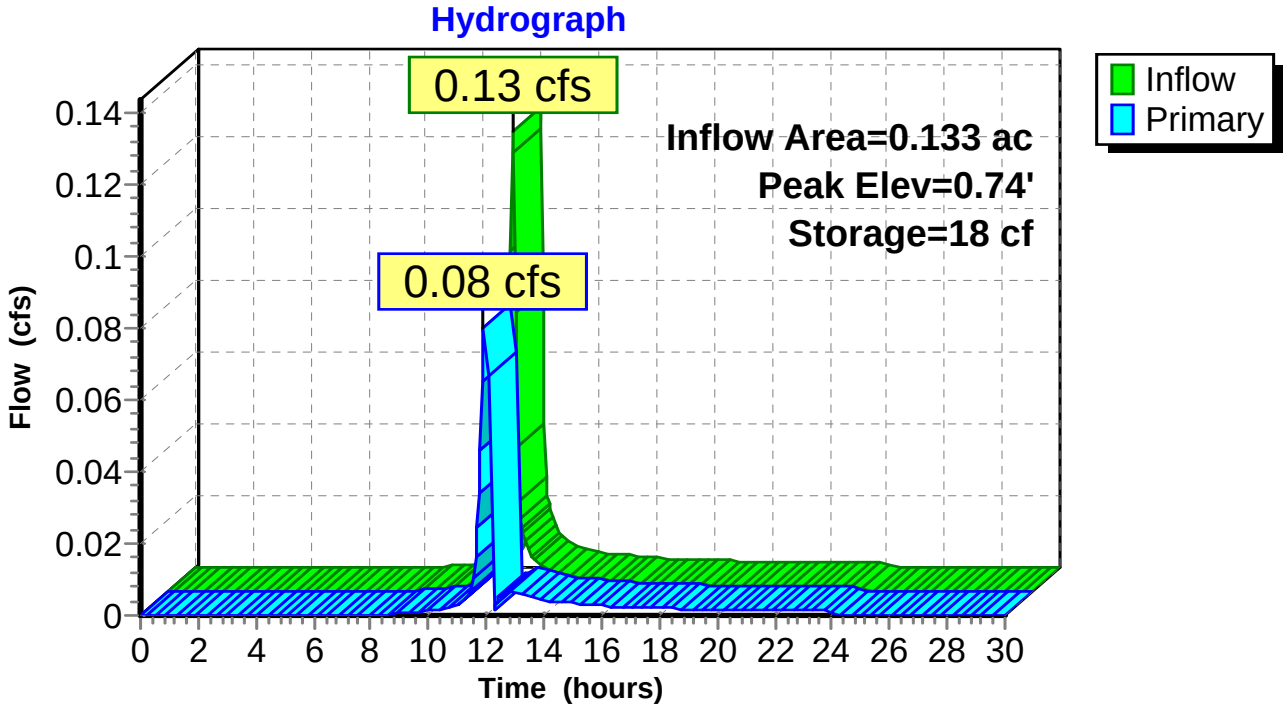
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	18 cf	**Storage Above Filter (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	24	0	0
0.75	24	18	18

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**0.08 cfs Exfiltration (k = 140 in/hr) at all elevations**

Primary OutFlow Max=0.08 cfs @ 11.90 hrs HW=0.04' (Free Discharge)
└**1=Exfiltration (k = 140 in/hr)** (Exfiltration Controls 0.08 cfs)

Pond 1P: SG 6x4



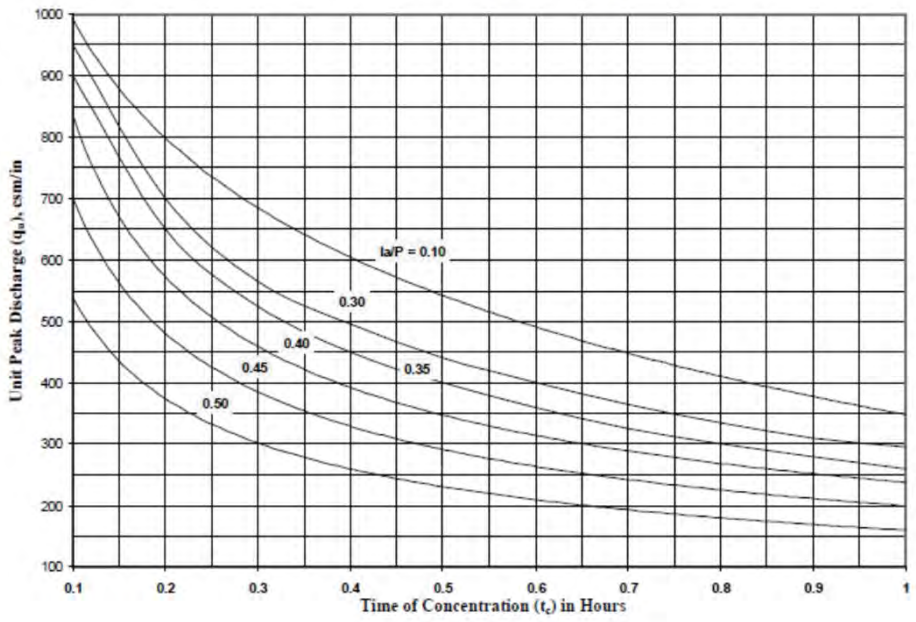
ROTONDO Environmental Solutions LLC

StormGarden Size: 6' x 4'
RCN: 95
Date: January 30, 2018

WQv Peak Discharge:

0.133	ac	= Contributing Drainage Area
0.080	ac	= Impervious Area
60.15%		= I (Percent Impervious)
1.00	in	= P (Rainfall Depth)
0.591		= Rv = 0.05 + 0.009(I)
0.591	in	= Qa = P x Rv
95		= CN (Curve Number)
6	min	= Tc (Time of Concentration)
0.0957		= Ia = (200/CN) - 2
0.0957		= Ia/P
1000	csm/in	= qu (from TR-55 exhibit 4-II)
0.0002	mi^2	= A (Area)
0.12	cfs	= Qp (Peak Discharge) = qu x A x Qa

Figure D.11.1 SCS Graphical Method of Determining Peak Discharge (q_u) in csm/in for 24-Hour Type II Storm Distribution



Summary for Pond 1P: SG 6x4

Inflow Area = 0.275 ac, 0.00% Impervious, Inflow Depth = 0.28" for WQv Storm event
Inflow = 0.13 cfs @ 11.98 hrs, Volume= 0.007 af
Outflow = 0.08 cfs @ 11.90 hrs, Volume= 0.007 af, Atten= 40%, Lag= 0.0 min
Primary = 0.08 cfs @ 11.90 hrs, Volume= 0.007 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 0.75' @ 12.06 hrs Surf.Area= 24 sf Storage= 18 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

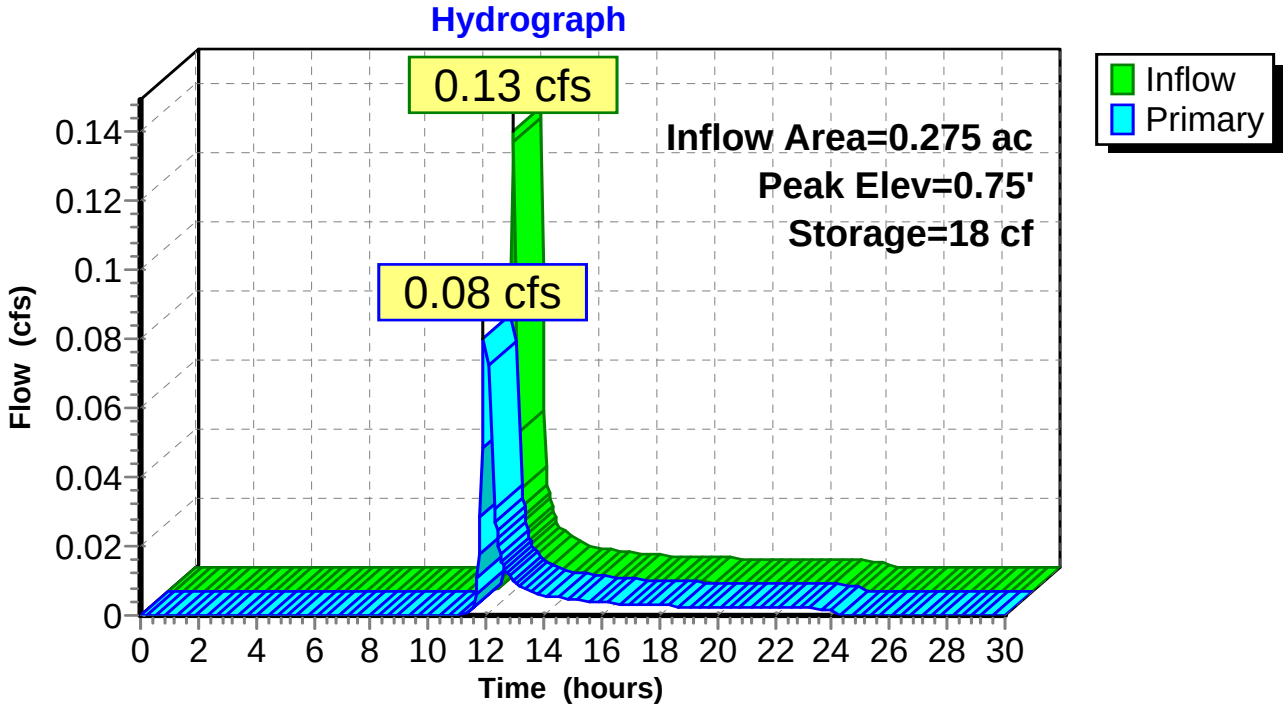
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	18 cf	**Storage Above Filter (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	24	0	0
0.75	24	18	18

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**0.08 cfs Exfiltration (k = 140 in/hr) at all elevations**

Primary OutFlow Max=0.08 cfs @ 11.90 hrs HW=0.01' (Free Discharge)
└**1=Exfiltration (k = 140 in/hr)** (Exfiltration Controls 0.08 cfs)

Pond 1P: SG 6x4



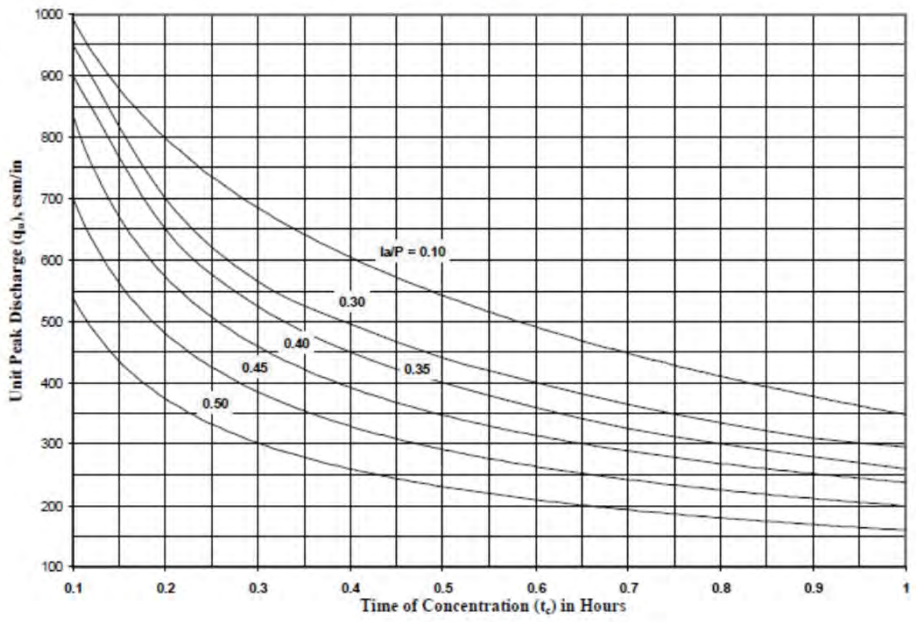
ROTONDO Environmental Solutions LLC

StormGarden Size: 6' x 4'
RCN: 89
Date: January 30, 2018

WQv Peak Discharge:

0.275	ac	= Contributing Drainage Area
0.077	ac	= Impervious Area
28.00%		= I (Percent Impervious)
1.00	in	= P (Rainfall Depth)
0.302		= Rv = 0.05 + 0.009(I)
0.302	in	= Qa = P x Rv
89		= CN (Curve Number)
6	min	= Tc (Time of Concentration)
0.2348		= Ia = (200/CN) - 2
0.2348		= Ia/P
1000	csm/in	= qu (from TR-55 exhibit 4-II)
0.0004	mi^2	= A (Area)
0.13	cfs	= Qp (Peak Discharge) = qu x A x Qa

Figure D.11.1 SCS Graphical Method of Determining Peak Discharge (q_u) in csm/in for 24-Hour Type II Storm Distribution



StormGarden

HIGH RATE BIOFILTER

Taking Low Impact Design (LID) to New Heights

The StormGarden Advantage

StormGarden is a patent-pending Low Impact Design (LID) micro-bioretention system that has been engineered for high flow treatment and high pollutant removal. The high flow-through rate of the engineered media results in a much smaller footprint than traditional bioretention systems, thus treating the same amount of stormwater runoff at a fraction of the cost.
Stormgarden is unique in that it has a “Runoff Reduction Infiltration Panel” that allows a portion of the runoff to infiltrate into the ground thus replenishing the groundwater supply and reducing the volume of runoff discharging downstream. The panel also allows the unit to completely drain between storm events to prevent bacteria growth and nitrogen release during the next storm.

How it Works

Stormwater runoff enters the StormGarden unit through a curb inlet opening and flows down through the engineered filter media mixture that is contained in a landscaped concrete structure. The filter media captures sediment, nutrients, metals and hydrocarbons and removes them from the runoff. The stormwater runoff flows down through the media and into an underdrain pipe at the bottom of the structure, where the treated water is discharged. However, a portion of the treated water exits the structure through the infiltration panel into the surrounding soil.

Benefits

- 20% to 30% smaller footprint than the competition due to a higher media flow-through rate.
- Increased pollutant removal efficiencies due to runoff reduction capabilities.
- Factory installed bio-media insures that the system will perform as designed.
- Easily maintained by local landscape companies.

Expected Pollutant Removal

The following information on the pollutant removal efficiency of the StormGarden filter is based on third party field studies.

- Total Suspended Solids (TSS) > 91%
- Total Phosphorous > 60%
- Total Copper > 60%
- Dissolved Copper > 36%
- Total Zinc > 79%
- Dissolved Zinc > 64%
- Oil & Grease > 34%

Available Options

- External or Internal Bypass
- Side or End Inlet
- Multi-Chamber Systems with Pre-treatment Chamber
- Roof Drain Systems
- Outlet/Junction Chamber
- Boxless Filters

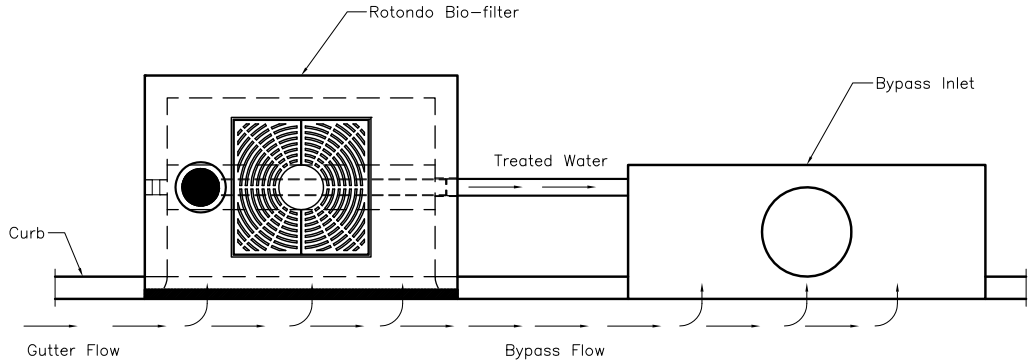
STORMGARDEN SIZING CHART

Filter Sizes (ID)		Tree/Grate Quantity	Rated Flow Capacity (cfs)	Rated Flow Capacity (gpm)	Max. Drainage Area Treated (ac)
W (ft)	L (ft)				
4	4	1 EA	0.052	23.3	0.26
4	5	1 EA	0.065	29.1	0.32
4	7	1 EA	0.091	40.7	0.45
4	11	2 EA	0.143	64.0	0.71
5	6	1 EA	0.097	43.6	0.48
6	7	1 EA	0.136	61.1	0.67
6	9	1 EA	0.175	78.5	0.87
6	11	2 EA	0.214	96.0	1.06
6	13	2 EA	0.253	113.4	1.25
7	13	2 EA	0.295	132.4	1.46

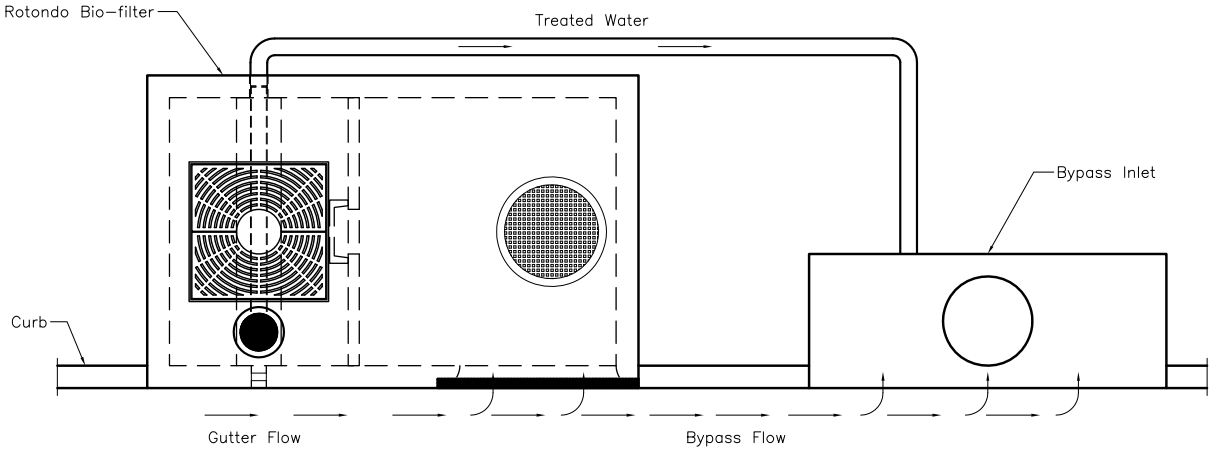
C=1.00, I=0.20 in/hr
C - Values from San Diego County Hydrology Manual (2002)
I - Values reflect Uniform Intensity Approach targeting 85%-ile storm (CASQA)

Boxless StormGarden

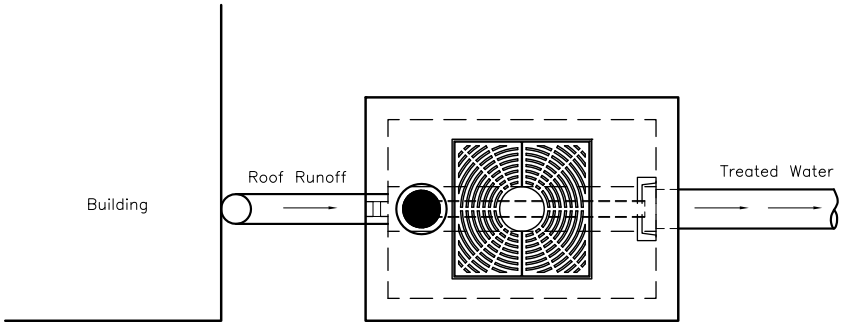
StormGarden with a pre-treatment chamber



STANDARD CONFIGURATION



PRE-TREATMENT CONFIGURATION



ROOFDRAIN CONFIGURATION

Patent Pending

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