



# COMMONWEALTH of VIRGINIA

## DEPARTMENT OF ENVIRONMENTAL QUALITY

Street address: 629 East Main Street, Richmond, Virginia 23219

Mailing address: P.O. Box 1105, Richmond, Virginia 23218

[www.deq.virginia.gov](http://www.deq.virginia.gov)

Molly Joseph Ward  
Secretary of Natural Resources

David K. Paylor  
Director

(804) 698-4000  
1-800-592-5482

December 19, 2017

Ms. Brenda Guglielmina  
DeepRoot Southeast Account Manager  
DeepRoot Green Infrastructure  
101 Montgomery Street, Suite 2850  
San Francisco, CA 94104

Re: Silva Cell Suspended Pavement System with Bioretention percent removal efficiencies for Total Phosphorus

Dear Ms. Guglielmina:

Thank you for your submittal of the Manufactured Treatment Device (MTD) Registration Form and supporting documentation for the Silva Cell Suspended Pavement System with Bioretention (Silva Cell). The MTD information provided (Appendix A) was reviewed for the purpose of assigning a pollutant removal efficiency for total phosphorus (TP). This review was performed in accordance with the Guidance Memo Number 14-2009 titled "Interim Use of Stormwater Manufactured Treatment Devices (MTDs) to meet the new Virginia Stormwater Management Program (VSMP) Technical Criteria, Part IIB Water Quality Design Requirements". The review process included the analysis of the documents submitted and any other publically available reports.


The documents submitted provided descriptive information about the Silva Cell, the maintenance plan, and performance studies. The data provided within the contents of the submitted performance study included drainage area size and land cover, storm event and runoff parameters, event mean concentrations (EMC) of selected nutrients, metals, and sediment, and performance results. The performance data received was analyzed by calculating the removal efficiencies for each storm event sampled for TP and then computing the mean of the removal efficiencies for that study period. This method of analysis was applied to all data received in order to achieve a consistent analytical process to aid in the assigning of removal efficiencies. A summary of the results is provided in Appendix B.

Consistent with Guidance Memo Number 14-2009, Silva Cell is receiving an EMC percent TP removal efficiency of 50%. This efficiency value is assigned based on the soil media composition used during the study conducted in North Carolina. This soil media composition must be in accordance with the composition of the field tested media mix. As stated in the guidance memo, this information will be posted on the Virginia Stormwater Clearinghouse website. This MTD and

the assigned removal efficiency can be manually added into Virginia Runoff Reduction spreadsheet to demonstrate compliance with Runoff Reduction Method.

If you have any questions regarding this information, please contact Robert E. Cooper, P.E. at (804) 698-4033 or e-mail at [Robert.Cooper@deq.virginia.gov](mailto:Robert.Cooper@deq.virginia.gov).

Sincerely,

A handwritten signature in blue ink that reads "Jaime B. Robb".

Jaime B. Robb  
Manager, Office of Stormwater Management

## Appendix A

- 1) North Carolina Stormwater Design Manual
- 2) Virginia MTD Registration Form
- 3) Soils beneath suspended pavements: An opportunity for stormwater control and treatment. By Jonathan L. Page \*, Ryan J. Winston, William F. Hunt III
- 4) Plans and Calculations for a project located in Charlottesville VA
- 5) Sizing Spreadsheet

## Appendix B

Data from Ann St Silva Cell Data for TP and TSS measured from 2012-2013

Date	Rainfall (in)	TP (mg/L)			TSS (mg/L)		
		IN	OUT	*Efficiency (%)	IN	OUT	*Efficiency (%)
30-Sep	0.58	0.08	0.06	25%	14	13	7%
1-Oct	0.34	0.05	0.05	0%	17	13	24%
27-Oct	1.81	0.10	0.03	70%	122	9	93%
19-Nov	2.82	0.09	0.03	67%	31	7	77%
13-Dec	0.90	0.16	0.04	75%	58	6	90%
7-Feb	1.35	0.05	0.02	60%	155	5	97%
14-Feb	0.73	0.10	0.03	70%	37	5	86%
4-Apr	0.92	0.07	0.02	71%	27	3	89%
12-Apr	1.34	0.13	0.01	92%	24	3	88%
15-Apr	0.60	0.11	0.03	73%	35	4	89%
19-Apr	1.00	0.23	0.02	91%	56	5	91%
28-Apr	1.26	0.25	0.03	88%	57	7	88%
6-May	0.17	0.33	0.05	85%	36	5	86%
3-Jun	0.72	0.17	0.05	71%	24	4	83%
6-Jun	1.98	0.06	0.03	50%	24	6	75%
19-Jun	2.47	0.10	0.04	60%	24	3	88%
21-Jun	0.62	0.08	0.03	63%	36	5	86%
24-Jun	0.42	0.08	0.02	75%	45	5	89%
25-Jun	0.29	0.13	0.03	77%	58	5	91%
27-Jun	2.21	0.05	0.04	20%	38	9	76%
1-Jul	0.52	0.06	0.04	33%	35	13	63%
		<b>Mean</b>		<b>63%</b>	<b>Mean</b>		<b>79%</b>

\*Efficiency = 100 x (1-Effluent EMC/Influent EMC)

Data from Orange St Silva Cell Data for TP and TSS measured from 2012-2013

Date	Rainfall (in)	TP (mg/L)			TSS (mg/L)		
		IN	OUT	*Efficiency (%)	IN	OUT	*Efficiency (%)
19-Nov	2.82	0.17	0.06	65%	5	14	-180%
13-Dec	0.9	0.47	0.12	74%	7	9	-29%
7-Feb	1.35	0.15	0.04	73%	13	5	62%
13-Feb	0.73	0.08	0.05	38%	20	5	75%
4-Apr	0.92	0.39	0.08	79%	24	2	92%
12-Apr	1.34	NS	NS		9	17	-89%
15-Apr	0.6	0.3	0.24	20%	9	13	-44%
28-Apr	1.26	0.35	0.12	66%	13	5	62%
6-May	0.17	0.71	0.13	82%	14	5	64%
6-Jun	1.98	0.35	0.12	66%	102	3	97%
19-Jun	2.47	0.33	0.19	42%	103	11	89%
21-Jun	0.62	0.24	0.12	50%	85	3	96%
24-Jun	0.42	0.25	0.04	84%	224	27	88%
25-Jun	0.29	0.32	0.1	69%	241	5	98%
27-Jun	2.21	0.18	0.07	61%	177	3	98%
1-Jul	0.52	0.16	0.05	69%	88	3	97%
12-Jul	2.16	1.22	0.17	86%	196	8	96%
15-Jul	1.3	0.34	0.05	85%	70	3	96%
0.27	0.04	1.38	0.19	86%	518	5	99%
		<b>Mean</b>		<b>66%</b>		<b>Mean</b>	<b>51%</b>

\*Efficiency = 100 x (1-Effluent EMC/Influent EMC)