DESIGN PROCEDURE FOR DESIGN VOLUME BASED V_BMP
Spreadsheet Based on Orange County Stormwater Program - Model Water Quality Management Plan Guidance

Designer: Ha Chau
Project: T.T.M. 15353 Portola Center (Drainage Area A) @ Node 379, **Basin #1**
Location: City of Lake Forest, Orange County
Date: 6/3/2012

1. Determine drainage area tributary to the BMP	A_total =	1.1 acres	**(1)**
2. Calculate the composite runoff coefficient "C-Factor"	"C-Factor" = @ Ap= 0.10	0.83	**(2)**
3. Calculate Unit Basin Storage Volume Design to capture 85% of annual runoff	Unit Basin Storage Volume =	1.13 inches	**(3)**
4. Calculate the required capture volume of BMP V_BMP = (1) x (3)	V_BMP =	1.243 acre inches	**(4)**
5. Convert units to cubic feet V_BMP = (4) x (1 ft/12) x (43,560 ft^2 / 1 acre)	V_BMP =	4512 cubic feet	**(5)**
6. Convert units to acre feet V_BMP = (5) x (43,560 ft^2/ 1 acre)	V_BMP =	0.10 acre feet	**(6)**

DESIGN PROCEDURE FOR DESIGN VOLUME BASED V_BMP
Spreadsheet Based on Orange County Stormwater Program - Model Water Quality Management Plan Guidance

Designer: Ha Chau
Project: T.T.M. 15353 & 17300 Portola Center (Drainage Area A) @ Node 317.3, **Basin #3**
Location: City of Lake Forest, Orange County
Date: 1/11/2013

1. Determine drainage area tributary to the BMP	A_total =	36.7 acres	**(1)**
2. Calculate the composite runoff coefficient "C-Factor"	"C-Factor" = @ Ap= 0.50	0.53	**(2)**
3. Calculate Unit Basin Storage Volume Design to capture 85% of annual runoff	Unit Basin Storage Volume =	0.70 inches	**(3)**
4. Calculate the required capture volume of BMP V_BMP = (1) x (3)	V_BMP =	25.69 acre inches	**(4)**
5. Convert units to cubic feet V_BMP = (4) x (1 ft/12) x (43,560 ft^2 / 1 acre)	V_BMP =	93255 cubic feet	**(5)**
6. Convert units to acre feet V_BMP = (5) x (43,560 ft^2/ 1 acre)	V_BMP =	2.14 acre feet	**(6)**

DESIGN PROCEDURE FOR DESIGN VOLUME BASED V_BMP
Spreadsheet Based on Orange County Stormwater Program - Model Water Quality Management Plan Guidance

Designer: Ha Chau
Project: T.T.M. 15353 & 17300 Portola Center (Drainage Area A) @ Node 357, **Basin #4**
Location: City of Lake Forest, Orange County
Date: 6/12/2012

1. Determine drainage area tributary to the BMP	A_total =	10.3 acres	**(1)**
2. Calculate the composite runoff coefficient "C-Factor"	"C-Factor" = @ Ap= 0.20	0.75	**(2)**
3. Calculate Unit Basin Storage Volume Design to capture 85% of annual runoff	Unit Basin Storage Volume =	1.02 inches	**(3)**
4. Calculate the required capture volume of BMP V_BMP = (1) x (3)	V_BMP =	10.506 acre inches	**(4)**
5. Convert units to cubic feet V_BMP = (4) x (1 ft/12) x (43,560 ft^2 / 1 acre)	V_BMP =	38137 cubic feet	**(5)**
6. Convert units to acre feet V_BMP = (5) x (43,560 ft^2/ 1 acre)	V_BMP =	0.88 acre feet	**(6)**

DESIGN PROCEDURE FOR DESIGN VOLUME BASED V_BMP
Spreadsheet Based on Orange County Stormwater Program - Model Water Quality Management Plan Guidance

Designer: Ha Chau
Project: T.T.M. 15353 & 17300 Portola Center (Drainage Area B) @ Node 64, **Basin #5**
Location: City of Lake Forest, Orange County
Date: 1/11/2013

1. Determine drainage area tributary to the BMP	A_total =	73.8 acres	**(1)**
2. Calculate the composite runoff coefficient "C-Factor"	"C-Factor" = @ Ap= 0.55	0.49	**(2)**
3. Calculate Unit Basin Storage Volume Design to capture 85% of annual runoff	Unit Basin Storage Volume =	0.66 inches	**(3)**
4. Calculate the required capture volume of BMP V_BMP = (1) x (3)	V_BMP =	48.708 acre inches	**(4)**
5. Convert units to cubic feet V_BMP = (4) x (1 ft/12) x (43,560 ft^2 / 1 acre)	V_BMP =	176810 cubic feet	**(5)**
6. Convert units to acre feet V_BMP = (5) x (43,560 ft^2/ 1 acre)	V_BMP =	4.06 acre feet	**(6)**

DESIGN PROCEDURE FOR DESIGN VOLUME BASED V_BMP
Spreadsheet Based on Orange County Stormwater Program - Model Water Quality Management Plan Guidance

Designer: Ha Chau
Project: T.T.M. 15353 Portola Center (Drainage Area B) @ Node 67, **Basins #7A & #7B**
Location: City of Lake Forest, Orange County
Date: 6/3/2012

1. Determine drainage area tributary to the BMP	A_total =	9.2 acres	**(1)**
2. Calculate the composite runoff coefficient "C-Factor"	"C-Factor" = @ Ap= 0.44	0.57	**(2)**
3. Calculate Unit Basin Storage Volume Design to capture 85% of annual runoff	Unit Basin Storage Volume =	0.77 inches	**(3)**
4. Calculate the required capture volume of BMP V_BMP = (1) x (3)	V_BMP =	7.084 acre inches	**(4)**
5. Convert units to cubic feet V_BMP = (4) x (1 ft/12) x (43,560 ft^2 / 1 acre)	V_BMP =	25715 cubic feet	**(5)**
6. Convert units to acre feet V_BMP = (5) x (43,560 ft^2/ 1 acre)	V_BMP =	0.59 acre feet	**(6)**

DESIGN PROCEDURE FOR DESIGN VOLUME BASED V_BMP
Spreadsheet Based on Orange County Stormwater Program - Model Water Quality Management Plan Guidance

Designer: Ha Chau
Project: T.T.M. 15353 Portola Center (Drainage Area C) @ Node 102, **Basin #8A**
Location: City of Lake Forest, Orange County
Date: 6/3/2012

1. Determine drainage area tributary to the BMP	A_total =	4.2 acres	**(1)**
2. Calculate the composite runoff coefficient "C-Factor"	"C-Factor" = @ Ap= 0.52	0.51	**(2)**
3. Calculate Unit Basin Storage Volume Design to capture 85% of annual runoff	Unit Basin Storage Volume =	0.68 inches	**(3)**
4. Calculate the required capture volume of BMP V_BMP = (1) x (3)	V_BMP =	2.856 acre inches	**(4)**
5. Convert units to cubic feet V_BMP = (4) x (1 ft/12) x (43,560 ft^2 / 1 acre)	V_BMP =	10367 cubic feet	**(5)**
6. Convert units to acre feet V_BMP = (5) x (43,560 ft^2/ 1 acre)	V_BMP =	0.24 acre feet	**(6)**

DESIGN PROCEDURE FOR DESIGN VOLUME BASED V_BMP
Spreadsheet Based on Orange County Stormwater Program - Model Water Quality Management Plan Guidance

Designer: Ha Chau
Project: T.T.M. 15353 Portola Center (Drainage Area C) @ Node 113.1, **Basin #8B**
Location: City of Lake Forest, Orange County
Date: 6/3/2012

1. Determine drainage area tributary to the BMP	A_total =	6.0 acres	**(1)**
2. Calculate the composite runoff coefficient "C-Factor"	"C-Factor" = @ Ap= 0.50	0.53	**(2)**
3. Calculate Unit Basin Storage Volume Design to capture 85% of annual runoff	Unit Basin Storage Volume =	0.72 inches	**(3)**
4. Calculate the required capture volume of BMP V_BMP = (1) x (3)	V_BMP =	4.32 acre inches	**(4)**
5. Convert units to cubic feet V_BMP = (4) x (1 ft/12) x (43,560 ft^2 / 1 acre)	V_BMP =	15682 cubic feet	**(5)**
6. Convert units to acre feet V_BMP = (5) x (43,560 ft^2/ 1 acre)	V_BMP =	0.36 acre feet	**(6)**

DESIGN PROCEDURE FOR DESIGN VOLUME BASED V_BMP
Spreadsheet Based on Orange County Stormwater Program - Model Water Quality Management Plan Guidance

Designer: Ha Chau
Project: T.T.M. 15353 Portola Center (Drainage Area D) @ Node 206, **Basin #9**
Location: City of Lake Forest, Orange County
Date: 6/3/2012

1. Determine drainage area tributary to the BMP	A_total =	12.5 acres	**(1)**
2. Calculate the composite runoff coefficient "C-Factor"	"C-Factor" = @ Ap= 0.47	0.55	**(2)**
3. Calculate Unit Basin Storage Volume Design to capture 85% of annual runoff	Unit Basin Storage Volume =	0.74 inches	**(3)**
4. Calculate the required capture volume of BMP V_BMP = (1) x (3)	V_BMP =	9.25 acre inches	**(4)**
5. Convert units to cubic feet V_BMP = (4) x (1 ft/12) x (43,560 ft^2 / 1 acre)	V_BMP =	33578 cubic feet	**(5)**
6. Convert units to acre feet V_BMP = (5) x (43,560 ft^2/ 1 acre)	V_BMP =	0.77 acre feet	**(6)**

DESIGN PROCEDURE FOR DESIGN VOLUME BASED V_BMP
Spreadsheet Based on Orange County Stormwater Program - Model Water Quality Management Plan Guidance

Designer: Ha Chau
Project: T.T.M. 15353 Portola Center (Drainage Area A) @ Node 376, **Modified Sand Filter**
Location: City of Lake Forest, Orange County
Date: 4/8/2013

1. Determine drainage area tributary to the BMP	A_total =	2.1 acres	**(1)**
2. Calculate the composite runoff coefficient "C-Factor"	"C-Factor" = @ Ap= 0.85	0.26	**(2)**
3. Calculate Unit Basin Storage Volume Design to capture 85% of annual runoff	Unit Basin Storage Volume =	0.34 inches	**(3)**
4. Calculate the required capture volume of BMP V_BMP = (1) x (3)	V_BMP =	0.714 acre inches	**(4)**
5. Convert units to cubic feet V_BMP = (4) x (1 ft/12) x (43,560 ft^2 / 1 acre)	V_BMP =	2592 cubic feet	**(5)**
6. Convert units to acre feet V_BMP = (5) x (43,560 ft^2/ 1 acre)	V_BMP =	0.06 acre feet	**(6)**

DESIGN PROCEDURE FOR DESIGN VOLUME BASED V_BMP
Spreadsheet Based on Orange County Stormwater Program - Model Water Quality Management Plan Guidance

Designer: Ha Chau
Project: T.T.M. 15353 Portola Center (Drainage Area A) @ Node 380, **Modified Sand Filter**
Location: City of Lake Forest, Orange County
Date: 4/8/2013

1. Determine drainage area tributary to the BMP	A_total =	2.1 acres	**(1)**
2. Calculate the composite runoff coefficient "C-Factor"	"C-Factor" = @ Ap= 0.85	0.26	**(2)**
3. Calculate Unit Basin Storage Volume Design to capture 85% of annual runoff	Unit Basin Storage Volume =	0.34 inches	**(3)**
4. Calculate the required capture volume of BMP V_BMP = (1) x (3)	V_BMP =	0.714 acre inches	**(4)**
5. Convert units to cubic feet V_BMP = (4) x (1 ft/12) x (43,560 ft^2 / 1 acre)	V_BMP =	2592 cubic feet	**(5)**
6. Convert units to acre feet V_BMP = (5) x (43,560 ft^2/ 1 acre)	V_BMP =	0.06 acre feet	**(6)**

Bio Clean Dual Stage Hydrodynamic Separator Performance
(Vortex Separator with Elevated Screen System)

City of
Santa Monica℠

Watershed Management Section
Office of Sustainability &
the Environment

200 Santa Monica Pier, Suite E
Santa Monica, CA 90401
(310) 458-8223 Fax 393-1279
neal.shapiro@smgov.net

June 22, 2010

ATTN.: Greg Kent, President
Bioclean
Oceanside, CA
From: Neal Shapiro

Subject: Water Quality Results – Centinela-Mar Vista urban runoff treatment project

Dear Mr. Kent:

The City of Santa Monica installed a Nutrient Separating Baffle Box to treat wet-weather runoff generated from the City of Santa Monica's Centinela Sub-Watershed drainage basin and a portion of west Los Angeles. This project received a CASQA award for treatment control/structural BMP Implementation in 2007.

Wet-weather flows are treated by a Nutrient Separating Baffle Box Model # 8-12-96. The system is designed to treat up to 33 CFS. The City of Santa Monica independently gathered and evaluated pollutant removal data for wet and dry-weather flows. This data was shared with the public at a recent conference, California Water Environment Association's (CWEA) 36th, Annual Pretreatment, Pollution Prevention, and Stormwater (P3S) Conference and Exhibition: The Many Hats of P3S, Hyatt Regency, Monterey, CA., March 2-4, 2010, in a presentation titled "Effectiveness of Dry Weather Diversions". The presentation was given by Jamie Malpede of the City's Water Resources Protection Program.

Following are the results of the data collected for wet-weather flows:

- **TSS** - avg. influent 366 mg/L, avg. effluent 48 mg/L. Avg. removal of **86.9%**
- **Oils & Grease** - avg. influent 4 mg/L, avg. effluent ND. Avg. removal of **>99%**

- **Fecal Coliform** - avg. influent >16,000. avg. effluent > 8,400. Avg. removal **47.5%**
- **Turbidity** - avg. influent 170 NTU, avg. effluent 48 NTU. Avg. removal of **71.7%**
- **Copper** - avg. influent 7 ug/L, avg. effluent 4.2 ug/L. Avg. removal of **40%**

Please call me if you have any questions.

Sincerely,

Neal Shapiro, Supervisor
Watershed Section
Watershed Management Program Coordinator

1200 Florence Columbus Road
Bordentown, NJ 08505
609.499.3600 ext. 227
www.njcat.org

VERIFICATION

To: Thomas H. Happel
President
Suntree Technologies Inc.
798 Clearlake Road
Suite 2
Cocoa, FL 32926

Re: Identification of Technology:

Nutrient Separating Baffle Box technology is concrete or fiberglass structures containing a series of sediment settling chambers separated by baffles. The primary function of baffle boxes is to remove sediment, suspended particles, and associated pollutants from storm water. Baffle boxes may also contain trash screens or skimmers to capture larger materials, trash, and floatables. Baffle boxes are located either in-line or at the end of storm pipes.

Identification of Claim(s):

Claim – The Suntree Nutrient Separating Baffle Box, Model NSBB-3-6-72, at a treatment flow rate of 1.0 cfs (448 gpm; 24.9 gpm/ft^2), has been shown to have a 67.3% suspended solids concentration (SSC) removal efficiency (as per the NJDEP methodology for calculation of treatment efficiency) using NJDEP specified material with an average d_{50} particle size of 63 microns, influent concentrations of 100-330 mg/L and 50% initial sediment loading in laboratory studies using simulated stormwater.

This will confirm that NJCAT has concluded the evaluation of the above captioned claims for the above captioned technology, pursuant to your application and our mutually agreed plan of evaluation. NJCAT is pleased to provide a copy of the final report, "NJCAT Technology Verification – **Suntree Technologies Inc.**" detailing the review procedures conducted to evaluate the claims.

The verification differs from typical NJCAT verifications in that final verification of the **Suntree Technologies Inc.** technology awaits completed field testing that meets the full requirements of the Technology Acceptance and Reciprocity Partnership (TARP) - Stormwater Best Management Practice Tier II Protocol for Interstate Reciprocity for stormwater treatment technology. This verification reflects an evaluation of **Suntree Technologies Inc.** initial performance claims for the

technology based primarily on carefully conducted laboratory studies. These claims are expected to be modified and expanded following completion of the TARP required field testing.

NJCAT is pleased to confirm that the above captioned claim have been verified by our review procedures and that **Suntree Technologies Inc.** may use the notation *"NJCAT Verified"* and the Verification Mark in its literature describing the claim in accordance with this Verification Agreement.

NJ Verified
Corporation for Advanced Technology

VERIFIED

Suntree Technologies Inc. agrees that the notation "NJCAT Verified" and the Verification Mark will only be used in connection with the above-captioned claims, and the above-captioned technology. Breach by Suntree Technologies Inc. of these conditions of use may result in the withdrawal of this verification and the right to use the notation "NJCAT Verified" and the Verification Mark. Suntree Technologies Inc. agrees to provide NJCAT, upon request, with sample copies of any literature in which the notation "NJCAT Verified" or the Verification Mark are used. Any third party, who submits a written inquiry to NJCAT concerning this Verification, may be provided with a copy of this Verification Agreement, the final report, and any subsequent correspondence and/or revocation of Suntree Technologies Inc. rights hereunder, upon terms and conditions established by NJCAT.

In consideration for participation in the NJCAT Technology Verification Program, the undersigned hereby releases and holds harmless NJCAT, its officers, directors, trustees, employees, members, and subcontractors from any and all damages, claims and liabilities arising out of participation by Suntree Technologies Inc. in the NJCAT Technology Verification Program.

Please confirm your acceptance of this Verification Agreement by executing the enclosed copy of this Verification Agreement and returning the same to NJCAT.

New Jersey Corporation for Advanced Technology

By: _____
RHEA WEINBERG BREKKE
Executive Director
Date: November 18, 2008

Suntree Technologies Inc.

Accepted: _____
Tom Happel
President
Date: Nov. 19, 2008

Modular Wetland System Performance
(Media Filter & Wetland/Bioretention)

WASHINGTON STATE DEPARTMENT OF ECOLOGY

June 27, 2011

CONDITIONAL USE LEVEL DESIGNATION FOR BASIC TREATMENT and PILOT USE LEVEL DESIGNATION FOR ENHANCED TREATMENT

For the

MWS-Linear Modular Wetland

Ecology's Decision:

Based on MWS-Linear's application submissions, Ecology hereby issues the following use level designation:

1. Pilot use level designation (PULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Enhanced treatment
   - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of surface area.
2. Conditional use level designation (CULD) for the MWS-Linear Modular Wetland Stormwater Treatment System for Basic treatment
   - Sized at a hydraulic loading rate of 1 gallon per minute (gpm) per square foot (sq ft) of surface area.

The use level designation expires on January 1, 2014 unless extended by Ecology, and is subject to the conditions specified below.

Ecology's Conditions of Use:

Applicants shall design, install, and maintain the MWS - Linear Modular Wetland Stormwater Treatment System units to comply with these conditions:

1. The MWS – Linear Modular Wetland Stormwater Treatment System units must be designed, assembled, installed, operated, and maintained in accordance with Bio Clean Environment Services applicable manuals and documents and the Ecology Decision.
2. The MWS - Linear Modular Wetland Stormwater Treatment System units are approved for Basic and Enhanced treatment at the hydraulic loading rate listed above at the 15-minute water quality design flow rate (as specified in Ecology's most recent Stormwater Manual), as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model. Note that if you use Single event methods to estimate runoff flow rates, Figures 9.6a and 9.6b of the 2005 Stormwater Management

Manual for Western Washington should be used to adjust the peak single event flowrate for calculation purposes. This is done by dividing the peak 10 minute flow rate predicted by the single event method by the ratio indicated in Figure 9.6a for on-line designs, or Figure 9.6b for offline designs. The 6-month, 24-hour rainfall amount for the project site must be known to identify the appropriate ratio. The adjusted flowrate is then used to determine the Model of the MWS - Linear Modular Wetland Treatment system to be used. Note: This method is not applicable for Eastern Washington.

Systems installed in Eastern Washington must use the appropriate design flow rate from the Stormwater Management Manual for Eastern Washington (SWMMEW).

3. Bio Clean Environment Services commits to submitting a QAPP for BER review and Ecology approval by January 31, 2012 that meets the TAPE requirements for attaining a GULD for basic and enhanced treatment for the MWS - Linear Modular Wetland unit. Additional QAPPs must be reviewed and approved by the BER and Ecology for each field site in Washington State. The sites chosen (maximum of five for the PULD and ten for the CULD) should be reflective of the product's treatment intent.
4. Local jurisdictions must file a "Pilot Level Technologies Notice of Intent" form with the Department of Ecology prior to authorizing The MWS - Linear Modular Wetland Stormwater Treatment System for a pilot use level application.
5. Bio Clean Environment Services shall complete all required testing and submit a TER for BER and Ecology review by September 30, 2013.
6. Bio Clean Environment Services may request Ecology to grant deadline or expiration date extensions, upon showing cause for such extensions.
7. Discharges from the MWS - Linear Modular Wetland Stormwater Treatment System units shall not cause or contribute to water quality standards violations in receiving waters.

Applicant:	*Bio Clean Environmental Services, Inc*
Applicant's Address:	*PO. Box 869*
	Oceanside, CA 92054

Application Documents:

- Original Application for Conditional Use Level Designation, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., January 2011
- Quality Assurance Project Plan: Modular Wetland system – Linear Treatment System performance Monitoring Project, draft, January 2011.
- Revised Application for Conditional Use Level Designation, Modular Wetland System, Linear Stormwater Filtration System Modular Wetland Systems, Inc., May 2011

Applicant's Use Level Request:

- Conditional Use Level Designation (CULD) for Basic and Enhanced treatment in accordance with Ecology's 2005 Western Washington Stormwater Manual.

Applicant's Performance Claims:

- The MWS – Linear Modular wetland is capable of removing a minimum of 80-percent of TSS from stormwater with influent concentrations between 100 and 200 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 50-percent of Total Phosphorus from stormwater with influent concentrations between 0.1 and 0.5 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 30-percent of dissolved Copper from stormwater with influent concentrations between 0.003 and 0.020 mg/l.
- The MWS – Linear Modular wetland is capable of removing a minimum of 60-percent of dissolved Zinc from stormwater with influent concentrations between 0.02 and 0.30 mg/l.

TAPE Program Recommendations:

The TAPE Program finds that:

- Bio Clean Environment Services should be given the opportunity to demonstrate, through additional laboratory and field-testing, whether the MWS - Linear Modular Wetland Stormwater Treatment System filter system can attain Ecology's Basic and Enhanced treatment goals.

Findings of Fact:

- Capability to remove 99percent of total suspended solids (using Sil-Co-Sil 106) in a quarter-scale model with influent concentrations of 270 mg/L.
- Capability to remove 91percent of total suspended solids (using Sil-Co-Sil 106) in laboratory conditions with influent concentrations of 84.6 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 93-percent of dissolved Copper in a quarter-scale model with influent concentrations of 0.757 mg/L.
- Capability to remove 79-percent of dissolved Copper in laboratory conditions with influent concentrations of 0.567 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 80.5-percent of dissolved Zinc in a quarter-scale model with influent concentrations of 0.95 mg/L at a flow rate of 3.0 gpm per square foot of media.
- Capability to remove 78-percent of dissolved Zinc in laboratory conditions with influent concentrations of 0.75 mg/L at a flow rate of 3.0 gpm per square foot of media.

Issues to be addressed by the Company:

1. The MWS - Linear Modular Wetland Stormwater Treatment System must show that it can reliably attain the minimum percent removal criteria for Basic and Enhanced treatment for runoff found on local highways, parking lots, and other high-use areas at the design-operating rate in accordance with the Ecology TAPE protocols. Bio Clean Environment Services should test a variety of operating rates to establish conservative

design rates. Pollutant loading capacities should also be determined to better predict maintenance cycles.

2. The system should be tested under normal operating conditions, such that the settling basin is partially filled with pollutants. Results obtained for "clean" systems may not be representative of typical performance.
3. Calculation of treatment efficiency shall be in accordance with the 2011 Revision of the *Guidance for Evaluating Emerging Stormwater Treatment Technologies: Technology Assessment Protocol – Ecology (TAPE).*
4. A discussion of treatment efficiency (percent removed) as flow rates change shall be included in the Technical Evaluation Report.
5. Field-testing should be conducted at sites that are indicative of the treatment goals.
6. Testing should be conducted to obtain information about maintenance requirements in order to come up with a maintenance cycle.
7. Loading tests should be conducted on the units to determine maximum treatment life of the system.

Technology Description:

Download at www.biocleanenvironmental.com

Contact Information:

Applicant: Greg Kent

Bio Clean Environment System, Inc.
P.O. Box 869
Oceanside, CA 92054
gkent@biocleanenvironmental.net

Applicant website: www.biocleanenvironmental.com

Ecology web link: http://www.ecy.wa.gov/programs/wg/stormwater/newtech/index.html

Ecology: Douglas C. Howie, P.E. Water Quality Program (360) 407-6444
douglas.howie@ecy.wa.gov

MWS - LINEAR (Field Test)

Pollutant Removal Performance Summary

Test Run	Nitrate-N (mg/L)		TSS (mg/L)		Copper (mg/L)		Lead (mg/L)		Zinc (mg/L)		TPH - Gasoline (mg/L)		TPH - Diesel (mg/L)	
	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
5/30/2008			43	3	0.03	0.02	0.1	0.1	0.36	0.05	0.14	0	0	0
6/12/2008			40	0.13	0.06	0.03	0.1	0.1	0.18	0.05	0	0	0	0
6/14/2008			22	4	0.04	0.02	0.1	0.1	0.11	0.05	0	0	0	0
6/20/2008	0.56	0.36	68	4	0.04	0.02	0.1	0.1	0.28	0.05	0	0	0	0
7/7/2008	0.97	0.16	92	17	0.02	0.02	0.1	0.1	0.25	0.05	0	0	0	0
7/18/2008	0.93	0.28	52	17			0.1	0.1	0.23	0.05	0	0	0	0
8/1/2008	0.05	0.07	35	5	0.04	0.02	0.1	0.1	0.38	0.06	0	0	2.65	0
8/15/2008	0.85	0.17	32	6	0.02	0.02	0.1	0.1	0.23	0.05	1.29	0.65	0	0
8/28/2008	0.92	0.21	27	18	0.04	0.02	0.1	0.1	0.18	0.05	0.55	0.49	0	0
Averages	0.85	0.21	45.67	8.24	0.04	0.02	0.10	0.10	0.24	0.05	0.22	0.13	0.29	0.00
Average Removal Efficiency (%)	75.37%		81.96%		52.78%		0.00%		79.09%		42.42%		100.00%	
	0.05 in red was less than decetable limit		82% 5-15 microns		0.02 in red was less than decetable limit		0.1 in red was less than decetable limit		0.05 in red was less than decetable limit					

Mean particle size < 8 microns

Test Run	TPH - Motor Oil (mg/L)		Fecal Coliform (MPN/100 mL)		E.Coli (MPN/100 mL)		Enterococci (MPN/100 mL)		pH	
	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
5/30/2008	0.43	0							8	8.08
6/12/2008	0.5	0							7.15	7.13
6/14/2008	0	0							7.35	7.41
6/20/2008	0	0	22000	7000	15286	1850	1396	41	7.25	7.31
7/7/2008	0	0	50000	8000	2851	860	250	52	7.68	7.67
7/18/2008	0	0							7.93	7.84
8/1/2008	6.13	0							7.97	7.84
8/15/2008	0.06	0							7.57	7.46
8/28/2008	0.39	0	23000	11000	703	464	30	96	6.77	6.74
Averages	0.83	0.00	31666.67	8666.67	6280.00	1058.00	558.67	63.00	7.52	7.50
Average Removal Efficiency (%)	100.00%		72.63%		83.15%		88.72%		0.28%	

Independent Third Party Field Testing - at Oceanside Harbor Boat Wash Drainage Area - 2008

Modular Wetland System - Linear is manufactured by Modular Wetland Sytems, Inc. 760-433-7640 www.modularwetlands.com

CITY OF ONTARIO

303 EAST "B" STREET, CIVIC CENTER ONTARIO CALIFORNIA 91764-4105

(909) 395-2000
FAX (909) 395-2070

ENGINEERING DEPARTMENT

November 18, 2010

Mr. Greg Kent
BIOCLEAN ENVIRONMENTAL SERVICES, INC.
P.O. Box 869
Oceanside, CA 92049

SUBJECT: "MODULAR WETLANDS" STORMWATER FILTRATION SYSTEM"

Dear Mr. Kent:

In 2009, the City of Ontario installed eight (8) Modular Wetlands Stormwater Filtration Systems in a five (5) acre paved parking lot of a twenty acre, public Soccer Complex, at 2200 E. Philadelphia St, Ontario, CA.

The City selected these devices for the project since this technology has been shown to remove identified pollutants in pavement runoff, such as Bacteria, Nutrients, Oil & Grease, Organic pollutants and Heavy Metals. Since the installation, the City has evaluated the performance of the devices and has found that they provide a high level of treatment for the design storm from the project. The City has determined that the Modular Wetlands units comply with the current MS4 stormwater permit requirements for new development projects and have accepted this technology for use in future projects.

Sincerely,

Stephen Wilson

Stephen Wilson
Environmental Water/Wastewater Engineer
City of Ontario
(909) 395-2389

SW/CH

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CITY OF CHULA VISTA

Department of Public Works

March 3, 2011
File # 0780-70-KY181

Mr. Greg Kent
Bio Clean Environmental Services
P.O. Box 869
Oceanside, CA 92049

SUBJECT: MODULAR WETLANDS STORM WATER FILTRATION SYSTEM

Over the past few years, the City of Chula Vista has installed eight (8) Modular Wetlands Storm Water Filtration Systems as part of several street improvement projects.

Based on third-party test results, technical information, and presentations provided by Bio Clean representatives, City staff believes that for street improvement projects, where available space is limited for treatment control Best Management Practices, this product meets the "Maximum Extent Practicable" ("MEP") standard established by the San Diego Regional Water Quality Control Board.

City staff is very satisfied with the service provided by Bio Clean during the design and installation of the Modular Wetlands and plans to continue considering this product in its future projects.

KIRK AMMERMAN
PRINCIPAL CIVIL ENGINEER