Manufactured Treatment Device (MTD) Registration

1. **Manufactured Treatment Device Name:**

   Terre Kleen Hydrodynamic Separator (FIGURE 1)

2. **Company Name: Terre Hill Concrete Products t/a Terre Hill Stormwater Systems**
   Mailing Address: PO Box 10
   City: Terre Hill
   State: PA Zip: 17581

3. **Contact Name (**to whom questions should be addressed)**:**
   Gene LaManna
   PO Box 10
   Terre Hill
   PA 17581 717 445 3111 717 445 0242 (fax) glamanna@terrehill.com
   www.terrestorm.com

4. **Technology**
   Specific size/capacity of MTD assessed (include units): Terre Kleen 18

   See attached NJDEP Certification Letter dated August 31, 2011 **(EXHIBIT 1)**
   http://www.nj.gov/dep/stormwater/treatment.html

   Range of drainage areas served by MTD (acres):
   Drainage area is determined by specific site design and flows directed to the Terre Kleen.
   Treatment area and sizing of Terre Kleen defined by flows directed to the Terre Kleen.

   See attached NJDEP Certification Letter dated August 31, 2011 **(EXHIBIT 1)**
   http://www.nj.gov/dep/stormwater/treatment.html

   Include sizing chart or describe sizing criteria:
   Sizing determined by flows directed to the Terre Kleen device.

   See attached NJDEP Certification Letter dated August 31, 2011 **(EXHIBIT 1)**
   http://www.nj.gov/dep/stormwater/treatment.html

   Intended application:
   Terre Kleen can be designed for both on-line and off-line configuration.

   See attached: Optional Online Installation Re-entrainment/scour testing of the Terre Kleen18 Hydrodynamic Separator Stormwater Treatment unit per NJDEP Testing Protocol dated: August 25, 2009, as amended December 15, 2009 by Alden Research Laboratory dated February 7, 2011. **(EXHIBIT 2)**

   Media used (if applicable): Not Applicable

5. Warranty Information (describe, or provide web address)**:**

See attached Warranty. **(EXHIBIT 3)**

Web Site for Terre Hill Stormwater Systems: **www.terrestorm.com**

6. Treatment Type

X☐ Hydrodynamic Structure
☐ Filtering Structure
☐ Manufactured Bioretention System
Provide Infiltration Rate (in/hr):
☐ Other (describe):

7. Water Quality Treatment Mechanisms (check all that apply)

X☐ Sedimentation/settling
☐ Infiltration
☐ Filtration (specify filter media)
☐ Adsorption/cation exchange
☐ Chelating/precipitation
☐ Chemical treatment
☐ Biological uptake
☐ Other (describe):

8. Performance Testing and Certification (check all that apply):

Performance Claim (include removal efficiencies for treated pollutants, flow criteria, drainage area):

Certified by NJDEP for 50% removal of TSS at a Surface Overflow Rate of 18gpm/square ft. of sedimentation surface area.

See attached NJDEP Certification Letter dated August 31, 2011 **(EXHIBIT 1)**
http://www.nj.gov/dep/stormwater/treatment.html

Specific size/Capacity of MTD assessed:

Terre Kleen 18 tested at Alden Research Laboratory pursuant to NJDEP Protocol for Manufactured Hydrodynamic Sedimentation Devices for Total Suspended Solids Based on Laboratory Analysis Dated December 23, 2003.

See attached Alden Laboratory Lab Report dated September 23, 2008 **(EXHIBIT 4)**
Exhibit 4 also enclosed as an email attachment

Has the MTD been "approved" by an established granting agency, e.g. New Jersey Department of Environmental Protection (NJDEP) , Washington State Department of Ecology, etc.
☐ **No**
X☐ **Yes**; For each approval, indicate (1) the granting agency, (2) use level if awarded (3) the protocol version under which performance testing occurred (if applicable), and (4) the date of award, and attach award letter.

See attached NJCAT Verification Report dated January 2010. **(EXHIBIT 5)**
http://www.nj.gov/dep/stormwater/treatment.html
Exhibit 5 also enclosed as an email attachment

See attached NJDEP Certification Letter dated August 31, 2011. **(EXHIBIT 1)**
http://www.nj.gov/dep/stormwater/treatment.html

See attached Alden Laboratory Lab Report dated September 23, 2008. **(EXHIBIT 4)**
Exhibit 4 also enclosed as an email attachment

NJDEP Protocol for Manufactured Hydrodynamic Sedimentation Devices for
Total Suspended Solids Based on Laboratory Analysis
Dated December 23, 2003.

Was an established testing protocol followed?
☐ **No**
X☐ **Yes**, (1) Provide name of testing protocol followed, (2) list any protocol deviations:

Protocol for Manufactured Hydrodynamic Sedimentation Devices for
Total Suspended Solids Based on Laboratory Analysis
Dated December 23, 2003.

NO PROTOCOL DEVIATIONS

Provide the information below and provide a performance report (attach report):

See attached NJCAT Verification Report dated January 2010. **(EXHIBIT 5)**
http://www.nj.gov/dep/stormwater/treatment.html
Exhibit 5 also enclosed as an email attachment

See attached NJDEP Certification Letter dated August 31, 2011. **(EXHIBIT 1)**
http://www.nj.gov/dep/stormwater/treatment.html

See attached Alden Laboratory Lab Report dated September 23, 2008. **(EXHIBIT 4)**
Exhibit 4 enclosed as an email attachment

For lab tests:

i. Summarize the specific settings for each test run (flow rates, run times, loading rates) and performance for each run:

See attached Alden Laboratory Report dated September 23, 2008 **(EXHIBIT 4)**
Exhibit 4 enclosed as an email attachment

ii. If a synthetic sediment product was used, include information about the particle size distribution of the test material:

See attached Alden Laboratory Report dated September 23, 2008 **(EXHIBIT 4)**
Exhibit 4 enclosed as an email attachment

iii. If less than full-scale setup was tested, describe the ratio of that tested to the full-scale MTD:

Full scale Terre Kleen 18 tested

For field tests: **Not Applicable**

9. MTD History:

How long has this specific model/design been on the market?
February 15, 2004

List no more than three locations where the assessed model size(s) has/have been installed in **Virginia**. If applicable, provide permitting authority. If known, provide latitude & longitude:
Location:
Premium Outlets, Route 60, 5715-62 Richmond Road, Williamsburg, James City County, VA 23188
5 Terre Kleens installed 3/11/2008;
(2) Terre Kleen 09s; (1) Terre Kleen 18; (2) Terre Kleen 27s

Permitting Authority: James City County, VA

Engineer: Land Mark Design Group
4029 Ironbound Road, Suite 100
Williamsburg, VA 23188
Steven Romeo, P.E. sromeo@landmarkdg.com

List no more than three locations where the assessed model size(s) has/have been installed outside of Virginia. If applicable, provide permitting authority. If known, provide latitude & longitude:

1. PA Turnpike: Bowmansville Equipment Maintenance Facility, Lancaster County, PA
   Terre Kleen 18 installed 7/18/2006
   Permitting Authority: **PaDEP**
2. Lambs Gap Road, Cumberland County, PA
   Terre Kleen 27 installed 1/15/2007
   Permitting Authority: **PaDEP**
3. Madison Farms, Northampton County, PA
   Terre Kleen 63 installed 5/28/2014
   Permitting Authority: **PaDEP**

10. Maintenance:

What is the generic inspection and maintenance plan/procedure? (attach necessary documents):
See attached Maintenance Instructions **(EXHIBIT 6)**

Is there a maintenance track record/history that can be documented?
☐ No, no track record.
X☐ Yes, track record exists; (provide maintenance track record, location, and sizing of three to five MTDs installed in Virginia [preferred] or elsewhere):

1. Pa Turnpike: Quakertown Vehicle Maintenance Facility, Bucks County, PA
   a. Model: **Terre Kleen 18**
   b. Install Date: 10/31/2006
   c. Maintenance Date: 11/10/2009: **37 month maintenance interval**
   d. Inspection of Terre Kleen every six (6) months per Inspection agreement; **3 year, 1**

month maintenance interval before requiring clean out and removal of sediment, trash, debris and hydrocarbon absorbent media

2. Exeter Commons, Exeter Township, Berks County, PA Regional Shopping Center
   a. Model: **Terre Kleen 54**
   b. Install Date: 5/12/2008
   c. Maintenance Date: 10/11/2010: **29 month maintenance interval,** before requiring clean out and removal of sediment, trash, debris and hydrocarbon absorbent media

3. Blue Mountains Commons, Dauphin County, PA, Regional Shopping Center
   3037 Trindle Rd.
   Camp Hill, PA 17011
   a. Model: **Terre Kleen 36**
   b. Install Date: 4/22/2008
   c. Maintenance Date: 7/02/2010: **26 month maintenance interval,** before requiring clean out and removal of sediment, trash, debris and hydrocarbon absorbent media

4. Pa Turnpike: Newville Vehicle Maintenance Facility, Upper Frankford Township, Cumberland County, PA
   a. Model: **Terre Kleen 09**
   b. Install Date: 10/11/2006
   c. Maintenance Date: 11/03/2009: **37 month maintenance interval,** before requiring clean out and removal of sediment, trash, debris, and hydrocarbon absorbent media

5. Exeter Commons, Exeter Township, Berks County, PA Regional Shopping Center
   a. Model: **Terre Kleen 36**
   b. Install Date: 08/01/2008
   c. Maintenance Date: 10/12/2010: **27 month maintenance interval,** before requiring clean out and removal of sediment, trash, debris and hydrocarbon absorbent media

Recognizing that maintenance is an integral function of the MTD, provide the following: amount of runoff treated, the water quality of the runoff, and what is the expected maintenance frequency for this MTD in Virginia, per year?

a. Amount of runoff treated: See attached NJDEP Certification Letter dated August 31, 2011
   http://www.nj.gov/dep/stormwater/treatment.html **(EXHIBIT 1)**
b. WQ of runoff: See attached NJDEP Certification Letter dated August 31, 2011
   http://www.nj.gov/dep/stormwater/treatment.html **(EXHIBIT 1)**
c. Expected maintenance frequency for Terre Kleen in Virginia is every **24 months**

Total life expectancy of MTD when properly operated in Virginia and, if relevant, life expectancy of media:

Useful Life of Terre Kleen is greater than 60 years

For media or amendments functioning based on cation exchange or adsorption, how long will the media last before breakthrough (indicator capacity is nearly reached) occurs?

Not Applicable

For media or amendments functioning based on cation exchange or adsorption, how has the longevity of the media or amendments been quantified prior to breakthrough (attach necessary performance data or documents)? Not Applicable

Is the maintenance procedure and/or are materials/components proprietary?

☐ Yes, proprietary

X☐ No, not proprietary: Maintenance procedure not proprietary and does not require replacement of any components.

Maintenance complexity (check all that apply):

☐ Confined space training required for maintenance: **No Confined Space Entry**

X☐ Liquid pumping and transportation

Specify method: Standard Vacuum Truck operation to remove water

X☐ Solids removal and disposal: Standard Vacuum operation to remove solids (TSS, Trash, debris; non emulsified hydrocarbons captured in absorbent socks located in primary chamber

All captured material can be disposed of as non-hazardous waste at appropriate disposal site

Specify method: Vacuum Truck removal of all contents

Other noteworthy maintenance parameter (describe):

Terre Kleen has a sludge dispersment manifold located on the floor, at the bottom of the sediment collection area under the inclined plates . This manifold consists of perforated pipes that are connected by a hose to an area immediately under the frame and cover. This hose is energized with air and/or water from the vacuum truck. When activated, this forces the sediment to the vacuum truck suction nozzle and facilitates the removal of 100% of captured sediment.

See attached Maintenance Instructions for description and illustration. **(EXHIBIT 6)**

11. Comments

Include any additional explanations or comments:

a. Terre Hill Stormwater Systems was only 1 of 3 manufacturers that tested in full compliance with the NJDEP Hydrodynamic Laboratory Protocol for the period 2003 through 2013.

b. Terre Hill Stormwater Systems has an agreement with Alden Research Laboratory, Inc. to test a Terre Kleen 27 in September 2014 in accordance with the New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device January 25, 2013.

c. Reference:

a. Ocean County, NJ Engineering Department
   129 Hooper Avenue
   Toms River, NJ 08754
   Roger Shapley, RShapley@co.ocean.nj.us
   732 929 2130
b. Alden Research Laboratory, Inc.
   30 Shrewsbury Street
   Holden, MA 01520
   Jim Mailloux jmailloux@aldenlab.com
   508 829 6000

12. Certification

Signed by the company president or responsible officer of the organization:

"I certify that all information submitted is to the best of my knowledge and belief true, accurate, and complete."

Signature: Gene LaManna

Name: Gene LaManna 717 445 3111 glamanna@terrehill.com

Title: Marketing Manager

Date: June 3, 2014

NOTE: All information submitted to the department will be made publically accessible to all interested parties. This MTD registration form will be posted on the Virginia Stormwater BMP Clearinghouse website.

EXHIBIT 1: NJDEP Certification Letter: http://www.nj.gov/dep/stormwater/treatment.html