Virginia Department of Health
Office of Environmental Health Services

To: Marcia J. Degen, Ph.D., P.E.
Environmental Technical Services Administrator

From: Douglas F. Canody, P.E.
Technical Services Engineer

Date: October 25, 2016

Re: Technical Evaluation of the Geomatrix Systems, LLC, "GeoMat Pressure and Gravity Leaching System"

On March 25, 2016, Sean McGuigan, President of Three S Environmental, requested on behalf of Geomatrix, Systems that the Virginia Department of Health (VDH) recognize the GeoMat Pressure and Gravity Leaching System as a generally-approved Treatment Level 2 (TL-2) process. The submitted information included a design manual entitled "*Virginia Design Manual For GeoMat™ Pressure and Gravity Leaching Systems"* (prepared by Sean McGuigan and dated October 2016) and a copy of the NSF / ANSI Standard 40 testing report, dated June, 2014. The unit evaluated was a GeoMat standard configuration designated as N40-450. The standard configuration tested was sized for a 3-bedroom residence, and tested as having a capacity 450 gallons per day. Components of the tested system included

1. A single 1,000 gallon septic tank (with no effluent strainer or filter);
2. Gravity conveyance line between the septic tank and a distribution box
3. GeoMat TL-2 treatment system consisting of (bottom to top):
    a. A 13.75'W x 27.1'L x 6"D bed of ASTM C-33 sand, providing a basal area of 372.6 sqft;
    b. Three side-by-side sections of GeoMat, each 3.25'W x 23.1'L, for a total GeoMat area of 225.2 sqft. The GeoMat sections abutted each other to the interior, with the exterior sides and ends located 2' from the outside edges of the sand bed;
    c. Three 23.1'L, 2" diameter, gravity fed perforated dispersal lines, each centered lengthwise on a section of GeoMat. All lines were provided with distal end cleanouts. (See page 22 of the NSF report for a plan view of the system and dimensions of the dispersal system and spacing).
    d. A covering layer of geotextile fabric.
    e. Also provided, but not part of the treatment system, were a polyethylene liner below the sand bed to facilitate effluent sample collection during NSF testing and 6 inches of cover sand above the geotextile cover layer for system protection/insulation. (See pages 22 and 23 of the NSF report for a vertical profile of the system components and their relative spacing.)

The detailed NSF testing results may be found in the attached NSF testing report. A summary of these results follows in the table below:

It should be noted that the table below incorporates the data from the stress tests required by the NSF 40 protocol. During the test, the system remained in operation throughout with no repairs required

TABLE I. SUMMARY OF ANALYTICAL RESULTS – GeoMat NSF 40 testing

	Average	Std. Dev	Minimum	Maximum	Median	IQrt Range
Infl BOD_5	90	73	90	600	170	130 - 230
Eff $CBOD_5$	12	7	1	35	11	7- 15
TSS *Influent*	210	55	93	440	200	170- 230
TSS Effluent	15	7	4	33	14	9 -20
pH *Influent*			6.1	7.5	7.0	6.8 – 7.2
pH Effluent - -			6.1	7.4	6.7	6.3 – 6.9
Temp (°C)						
Influent	19	3	11	27	20	18 – 21
Effluent	19	6	4	27	22	15 - 24
Dissolved Oxygen (mg/L)						
Influent	*0.3*	0.2	0.01	1.5	0.2	0.1 – 0.3
Effluent	1.8	1.5	0.2	12.9	1.7	1.2 –2.1

Note: units are mg/l for all results except for pH and temperature which is given in degrees C as noted above.

Subsequent to my review, and in consideration of the NSF testing results, I recommend VDH recognize the GeoMat system as generally-approved for TL-2 treatment subject to construction in compliance with the submitted design manual and relevant regulations. Also I recommend VDH conclude that the design manual for this system is appropriate, in its present form and note the same in our letter. A draft approval letter is attached for review. For inclusion on project tracking, the following is a date history for the project.

3/25/16 – OEHS receives design manual
4/22/16 – DFC comments
5/9/16 – Revisions received
6/8/16 - DFC comments
8/15/16 – Revisions received
10/3/16 – Approval drafted
10/12/16 – Revisions received
10/21/16 – Approval revised