WESTMORELAND SANITARY LANDFILL

111 Conner Lane
Belle Vernon, PA 15012

PERMIT NUMBER 100277
ROSTRAVER TOWNSHIP
WESTMORELAND COUNTY, PENNSYLVANIA

MINOR PERMIT MODIFICATION
(Leachate Management System)

PREPARED BY

Civil Design Solutions, Inc.

1331 State Avenue • Coraopolis, Pennsylvania 15108
Phone (412) 299-2700 • Fax (412) 299-2922
Project Number 2019-108

Submitted February 19, 2020
Revised June 10, 2020,
Revised August 16, 2020 and
Revised September 10, 2020

VOLUME 1 OF 1

September 10, 2020

Mr. Gregory W. Holesh, P.E.
Pennsylvania Department of Environmental Protection
Southwest Regional Office
Waste Management Program
400 Waterfront Drive
Pittsburgh, PA 15222-4745

Subject: Sanitary Landfill – Minor Permit Modification Application
Leachate Management System – Response to PADEP Comments
Rostraver Township, Westmoreland County, Pennsylvania
PADEP Permit No. 100277
Civil Design Solutions Project 2019-108

Civil Design Solutions, Inc. (Design Solutions) is pleased to present one original and three copies of this response to the PADEP August 28, 2020 Technical Review Comment Letter regarding the Minor Permit Modification Application for the Westmoreland Sanitary Landfill, LLC. – Sanitary Landfill facility located in Rostraver Township, Westmoreland County, Pennsylvania. This Minor Permit Modification was originally submitted February 19, 2020 with subsequent responses to PADEP comments submitted June 10, 2020 and August 17, 2020.

This letter has been prepared in a comment-response format where each PADEP comment is presented and a written response is provided. Revised pages presented with this response to comments are provided on salmon-colored paper and have been identified with a revision date on the page and a revision line is shown in the margin of those portions of the text that have been revised as part of this response to comments.

1. The response provided relative to Item 2.a of the Department's July 17, 2020 technical review letter concerning conformance of the proposed leak detection method for the Process Tank with 25 Pa. Code Section 299.122(b)(16) does not include the requested information. 25 Pa. Code Section 299.122(b)(16) requires that the method of leak detection be able to detect releases and be installed, calibrated, operated and maintained in accordance with industry practices and manufacturer's specifications. The capability of the proposed cane fiber material to be placed between the tank bottom and foundation to the weep tubes that will be installed in the foundation. Pursuant to 25 Pa. Code Section 271.122(b), documentation demonstrating that ability must be provided. That documentation may consist of excerpts from a code of practice developed by a Nationally recognized association in which the proposed method is identified as an acceptable leak detection method. Otherwise, the documentation previously requested regarding the hydraulic properties of the cane fiber material under loading conditions greater than or equal to that of the filled tank should be presented.

Response: The proposed configuration of the process tank has been revised to remove the

cane fiber mat beneath the primary tank and replace it with a geocomposite layer. The proposed geocomposite will be a non-woven geotextile heat bonded to both sides of a geonet. The proposed configuration has been discussed with the tank manufacturer (Mid-Atlantic Storage Systems, Inc.) and the geocomposite layer is an acceptable alternative to the cane fiber mat. The geocomposite material will be supplied by Westmoreland Sanitary Landfill for installation by the tank manufacturer.

It is currently anticipated that the geocomposite material to be utilized for tank construction will be surplus onsite material purchased and utilized for Cell S6(A) construction. The material is a Solmax (formerly GSE) Fabrinet 275-mil geonet with a 10-oz/sy (nominal) non-woven geotextile heat laminated to both sides. As part of conformance testing for the Cell S6(A) construction, the material was tested for transmissivity under a normal load of 15,000-psf which resulted in a laboratory tested in-plane transmissivity of 7.70×10^{-4}-cm/sec. This test load is significantly larger than the proposed tank load (less than 2,500-psf as described by the tank manufacturer and geotechnical report included in Form 25) to be experienced by the geocomposite layer. Therefore, the proposed geocomposite is more than adequate to transfer potential liquids from beneath the tank to the weep tubes.

A copy of the correspondence with Mid-Atlantic as well as information on the proposed geocomposite including manufacturer's quality control information and quality assurance testing is presented with this response for inclusion with the tank information presented in Form 25, Attachment 25-8. Should an alternative geocomposite product be selected, the material will at a minimum be tested for transmissivity under a load greater than or equal to the loaded process tank and the resulting transmissivity will be evaluated to ensure the ability to transmit liquids.

If you have any additional questions concerning this Minor Permit Modification, please do not hesitate to contact Mr. Rich Walton of Sanitary Landfill, at (610) 698-9291 or our office at (412) 299-2700.

Sincerely,
Civil Design Solutions, Inc.

Michael E. Zucatti, P.E.
Assistant Project Manager, Ext. 157

David W. Murray, P.E.
Principal Engineer, Ext. 151

cc: Mr. Rich Walton, Sanitary Landfill – 1 Copy

THE FOLLOWING CHANGES ARE PRESENTED HERE FOR APPLICATION

1. Replace the Binder Cover and Spine with those included here.
2. Insert the Cover Letter at the front of the Application.

THE FOLLOWING CHANGES ARE PRESENTED HERE FOR FORM A

1. Replace the Form A Table of Contents with that included here.
2. Replace Form A pages 1 and 2 with those included here.

FORM A
APPLICATION FOR MUNICIPAL WASTE PERMIT

Prepared 02/2020, Revised 06/2020, 08/2020**, 09/2020**

This Form A accompanies this application to identify it as a Minor Permit Modification Application, which presents no increase to the property area, facility area or disposal areas.

Form A - Table of Contents

2540-PM-BWM0357 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Coordination #

FORM A
APPLICATION FOR MUNICIPAL OR RESIDUAL WASTE PERMIT

Prepared 02/2020, Revised 06/2020, 08/2020, 09/2020

This form must be fully and accurately completed. All required information must be typed or legibly printed in the spaces provided herein. Replacement/substitution of or attachment to this form is prohibited. Improperly completed forms may be rejected by the Department, may be considered to be violations of the Department's Rules and Regulations, and may result in assessment of fines and penalties.

SECTION A. APPLICANT IDENTIFIER (Check one of the boxes and identify both)

☒ Owner	Name: *Westmoreland Sanitary Landfill, LLC*	Phone #: *(412) 426-5432*
	Address: *111 Conner Lane, Belle Vernon, PA 15012-4519*	Email:
☐ Operator	Name: *Westmoreland Sanitary Landfill, LLC*	Phone #: *(412) 426-5432*
	Address: *111 Conner Lane, Belle Vernon, PA 15012-4519*	Email: *nstork@nobleenviro.com*

SECTION B. TYPE OF FACILITY

Municipal Waste Landfill	☒	Residual Waste Landfill	☐
Construction/Demolition Waste Landfill	☐	Class I	☐
Municipal Waste Composting Facility	☐	Class II	☐
Municipal Waste Incinerator or Resource Recovery Facility	☐	Class III	☐
Municipal Waste Demonstration Facility	☐	Residual Waste Disposal Impoundment	
Municipal Waste Transfer Facility	☐	Class I	☐
Municipal Waste Processing Facility	☐	Class II	☐
Other, Specify	☐	Residual Waste Composting Facility	☐
		Residual Waste Demonstration Facility	☐
		Residual Waste Transfer Facility	☐
		Residual Waste Incinerator or Other Processing Facility	☐
		Residual Waste Agricultural Utilization	☐
		Residual Waste Land Reclamation	☐
		Other, Specify	☐

SECTION C. MAP LOCATION

U.S.G.S. Map Location of Facility (attach the map and identify location on the USGS map)

7.5" Map Name *Donora, Pennsylvania Quadrangle*

Center of Facility:

Latitude *N 40* ° *09* ' *01* " Longitude *W 79* ° *51* ' *15* "

SECTION D. GENERAL INFORMATION

Number of New Acres Proposed for Permit (Issued): *0 • 0*

Number of Acres Proposed for Permit (New): *0 • 0*

Total Acres of the Property: *292 • 5*

Number of Previously Permitted Acres: *270 • 0*

Current Permit ID Number(s): *100277*

SECTION E. AFFIDAVIT

COMMONWEALTH/STATE OF PENNSYLVANIA

ss:

COUNTY OF WASHINGTON

Commonwealth of Pennsylvania - Notary Seal
Deborah M. Sas, Notary Public
Washington County
My commission expires August 27, 2022
Commission number 1191248

Sworn and subscribed to before me this 10th day

of September 20 20

Deborah M. Sas
NOTARY PUBLIC

My Commission Expires August 27, 2022

Print or type name to be Signed: Richard Walton Date 9/10/2020

Date: 9/10/2020

I, _____ do hereby certify pursuant to the penalties of 18 Pa. C.S.A.
(Signature of Applicant)

Section 4904 to the best of my knowledge, information, and belief that the information contained in this application is true and correct and is in conformance with 25 PA. Code Chapters 271 or 287, whichever is applicable, of the rules and regulations of the Department of Environmental Protection.

SECTION F. APPLICATION FEE

A. Municipal Facilities

i. Application for new permit, or repermitting. (ref. 271.128)

☐	$18,500	–	Municipal Waste Landfill
☐	$19,250	–	Construction/Demolition Waste Landfill
☐	$4,400	–	Transfer Facility
☐	$1,900	–	Incinerator or Resource Recovery Facility
☐	$4,000	–	Other Municipal Waste Processing Facility, including Composting Facility
☐	$17,300	–	Demonstration Facility

ii. Application for a major permit modification.

☐	$300	–	Addition of types of waste not approved in the permit
☐	$7,800	–	Municipal Waste Landfill and Construction/Demolition Waste Landfill
☐	$700	–	Transfer Facility
☐	$1,500	–	Incinerator or Resource Recovery Facility
☐	$700	–	Other Municipal Waste Processing Facility, including Composting Facility
☐	$6,700	–	Demonstration Facility

iii.	☐	$300	–	Permit Reissuance
iv.	☐	$300	–	Permit Renewal
v.	☒	$300	–	Minor Permit Modification

THE FOLLOWING CHANGES ARE PRESENTED HERE FOR FORM 25

1. Replace the Form 25 Table of Contents with that included here.
2. Replace page 1 of Form 25 with that included here.
6. Insert the Attachment 25-8, Process Tank – Cane Fiber Mat Replacement and Clarification immediately after Attachment 25-8.

FORM 25
LEACHATE MANAGEMENT – PHASE II

Prepared 06/03; Rev 09/05, Rev 03/12, Rev 10/12, Rev 11/12, Rev 02/15, Rev 02/20, Rev 06/20, Rev 08/20**, Rev 09/20**

Form 25 - Table of Contents

2540-PM-BWM0152 6/2005

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

Date Prepared/Revised
06/03, Rev 09/05, 03/12, 10/12, 11/12, 02/15, 02/20, 06/20, 08/20
DEP USE ONLY
Date Received

FORM 25
LEACHATE MANAGEMENT - PHASE II

This form must be fully and accurately completed. All required information must be typed or legibly printed in the spaces provided. If additional space is necessary, identify each attached sheet as Form 25, reference the item number and identify the date prepared. The "date prepared/revised" on any attached sheets should match the "date prepared/revised" on this page.

General References: 273.162, 273.163, 273.271 to 273.275/277.162, 277.163, 277.271 to 277.275, 285.122, 285.123

SECTION A. SITE IDENTIFIER

Applicant/permittee: *Westmoreland Sanitary Landfill, LLC*

Site Name: *Sanitary Landfill*

Facility ID (as issued by DEP): *100277*

SECTION B. BASIC TREATMENT METHODS

☐ 1. Discharge to permitted POTW, following pretreatment, if required, by federal, state or local law or by discharge into another permitted treatment facility.

☐ 2. On-site treatment and discharge to stream.

☐ 3. Spray irrigation following treatment.

☒ 4. Other: *An onsite Evaporator will be utilized as the primary disposal method with offsite leachate hauling as interim and emergency backup. Two existing POTW connections may be reactivated in the future.*

For Proposed Site: Will permanent leachate pre-treatment method be in-place before placement of waste? *N/A*

SECTION C. COMPONENTS OF LEACHATE TREATMENT PLAN

Check and/or Describe

1.		Estimate of annual leachate quantity and quality and supporting calculations.	*Attachment 25-1 & 25-2*
	☒ 2.	Plans, designs, and cross sections for the proposed collection and handling system.	*Attachment 25-4*
	☒ 3.	Plans, designs, and cross-sections for on-site leachate treatment or disposal systems.	*Attachment 25-4*
	☐ 4.	Description of on-site treatment system already in operation, including NPDES number, capability to treat leachate, and compliance status under The Clean Streams Law.	*N/A*
5.		If interim vehicular transportation to an off-site treatment facility is proposed, provide:	
	☐ a.	Copy of signed contractual agreement with operator of off -site facility, or	*N/A*
	☒ b.	Signed letter of intent from operator of the off-site facility to enter a contractual agreement for leachate treatment.	*Exhibit 25-4.1*
	☐ c.	Copy of signed contractual agreement with the operator of a 2nd off-site facility as backup, or	*N/A*
	☒ d.	Signed letter of intent from operator of the 2nd off-site facility to enter a contractual agreement f or leachate treatment.	*Exhibit 25-4.1*
	☒ e.	Additional bond in amount sufficient to pay for the cost of vehicular transportation and off-site leachate treatment until final closure; if off-site treatment is negligent.	*Bonding Calcs.*
	☐ f.	Submit plans, designs, and cross-sections for an on site pretreatment facility.	*N/A*
6.		If recirculation of raw or pretreated leachate is proposed in conjunction with another method, describe:	
	☐ a.	Designs and cross-sections of leachate distribution method.	*N/A*
	☐ b.	Methods to prevent leachate seeps and breakouts.	*N/A*
	☐ c.	Methods to prevent odors, runoff, and ponding.	*N/A*
	☒ 7.	Schedule and method for cleaning sludges from the leachate storage and treatment system, and a plan for disposing of such sludges.	*Attachment 25-4*
	☒ 8.	Method for measuring average flow rate of leachate from landfill to leachate storage/treatment system.	*Attachment 25-4*
	☒ 9.	Identify if leachate pumping occurs.	*Attachment 25-4*
	☒ 10.	Plans and designs for secondary containment of underground pipes used for the transport of leachate from the liner system.	*Attachment 25-4*

ATTACHMENT 25-8

LEACHATE EVAPORATOR

Process Tank
Cane Fiber Mat Alternative and Clarification

A double-sided geocomposite (nowoven geotextile heat bonded to both sides of a geonet) may be used in place of the typical ½-inch cane fiber mat material beneath the primary tank. The proposed anticipated material to be utilized is a Solmax (formerly GSE) Fabrinet with a 275-mil thick (nominal) geonet core with 10-oz/sy (nominal) heat laminated to both sides. The material will be supplied by WSL and will be installed by the tank manufacturer / installer. The proposed material is onsite surplus material purchased for the recent Cell S6(A) construction project. The product datasheet, Manufacturer's Quality Control testing and third-party Quality Assurance testing is included here. Should an alternative product be utilized, the material will at a minimum be tested for Transmissivity under a normal load greater than or equal to the proposed process tank load.

Mike Zucatti

From: Mike Zucatti
Sent: Tuesday, September 8, 2020 11:45 AM
To: 'Greg Mullins'
Cc: 'Kyle Butts'
Subject: RE: Westmoreland Sanitary Landfill - Proposed Revision to Cane Fiber Mat

Thank you!

Michael E. Zucatti, P.E.
Civil Design Solutions, Inc.
1331 State Avenue
Coraopolis, PA 15108
Office Phone: 412-299-2700 ext. 157
Cell Phone: 717-448-5613
Office Fax: 412-299-2922

From: Greg Mullins <Greg@midatlanticstorage.com>
Sent: Tuesday, September 8, 2020 11:44 AM
To: Mike Zucatti <mzucatti@civildesign.org>
Cc: Kyle Butts <Kyle@midatlanticstorage.com>
Subject: RE: Westmoreland Sanitary Landfill - Proposed Revision to Cane Fiber Mat

Yes Mike, we agree that this material would be acceptable.

Thank you,

Greg Mullins | Regional Sales Manager

MID Atlantic Storage Systems, Inc.
1551 Robinson Road | Washington CH, OH 43160
740-895-6028 Direct | 740-335 0584 Fax | 740-606-5865 Cell
greg@midatlanticstorage.com | www.midatlanticstorage.com

From: Mike Zucatti <mzucatti@civildesign.org>
Sent: Tuesday, September 8, 2020 11:20 AM
To: Greg Mullins <Greg@midatlanticstorage.com>
Subject: Westmoreland Sanitary Landfill - Proposed Revision to Cane Fiber Mat

Good Morning Greg,

Please find the attached proposed revision to the tank section for Westmoreland Sanitary Landfill as follows.

- The ½-inch cane fiber mat will be replaced by a double-sided geocomposite layer (nonwoven geotextile on both sides heat laminated to a geonet layer). The material will be provided by WSL and is to be installed by Mid-Atlantic during tank installation.

- It is currently anticipated that the material to be used is onsite GSE Fabrinet 275-mil (geonet thickness) with 10-oz/sy (nominal) nonwoven geotextiles heat laminated to both sides. This material is surplus material from recent cell construction at the facility. The manufacturer's product data sheet as well as well as

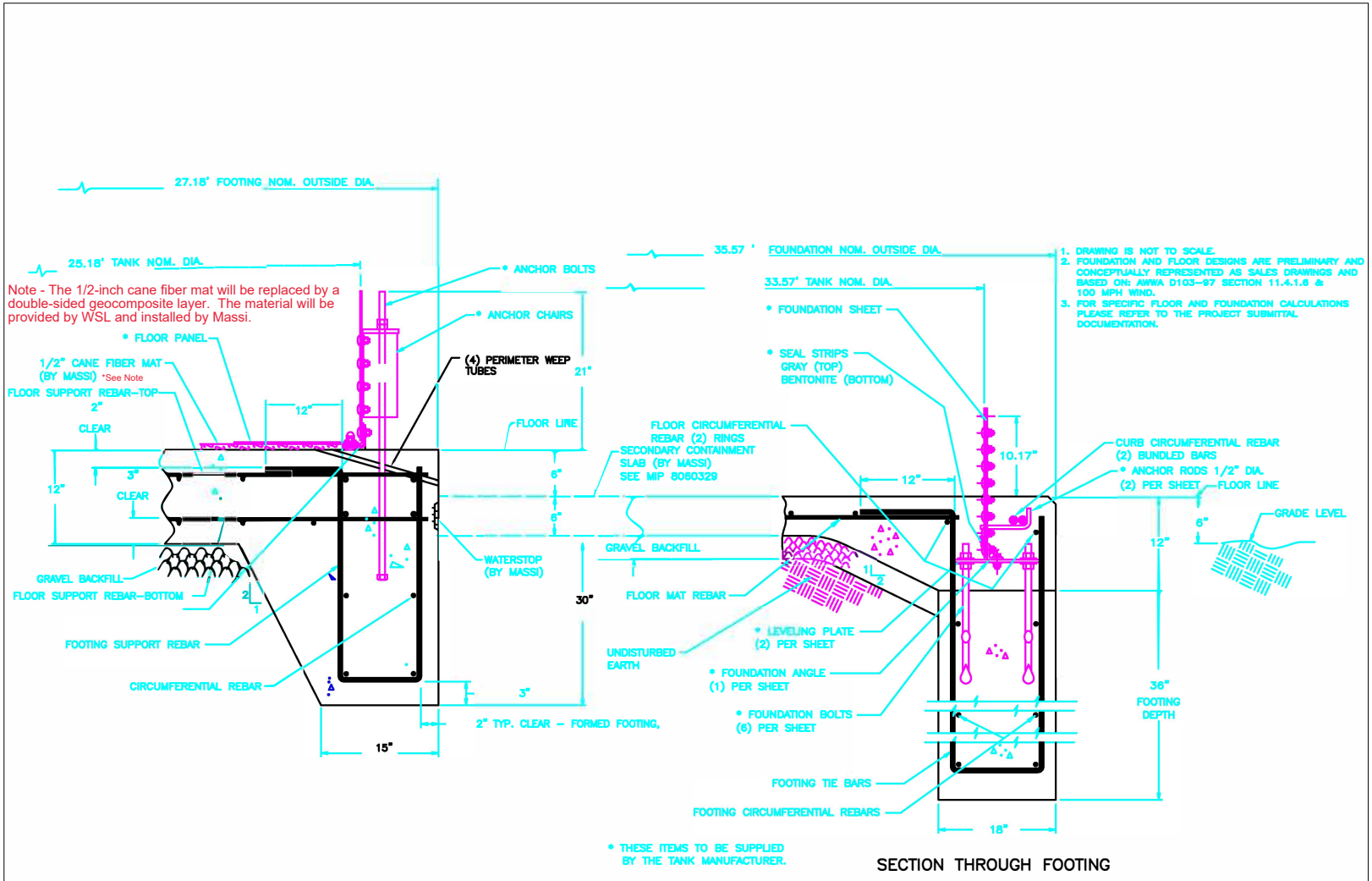
conformance testing results of the material performed as part of the cell construction project is attached here.

- Should a different product be selected, at a minimum, the material will be tested for Transmissivity under a load greater than or equal to the proposed tank load.

Please let me know if the proposed geocomposite in place of the cane fiber mat is acceptable.

Thank you,

Michael E. Zucatti, P.E.
Civil Design Solutions, Inc.
1331 State Avenue
Coraopolis, PA 15108
Office Phone: 412-299-2700 ext. 157
Cell Phone: 717-448-5613
Office Fax: 412-299-2922



SECTION THROUGH FOOTING

PRODUCT DATA SHEET

GSE FabriNet 275 mil Geocomposite

GSE FabriNet 275 geocomposite consists of a 275 mil thick GSE HyperNet geonet heat-laminated on one or both sides with a GSE nonwoven needle-punched geotextile. The geotextile is available in mass per unit area range of 6 oz/yd² to 16 oz/yd². The geocomposite is designed and formulated to perform drainage function under a range of anticipated site loads, gradients and boundary conditions.

AT THE CORE:

A 275 mil thick GSE HyperNet geonet heat-laminated on one or both sides with a nonwoven needlepunched geotextile.

Product Specifications

Tested Property	Test Method	Frequency	Minimum Average Roll Value [1]		
Geocomposite			6 oz/yd²	8 oz/yd²	10 oz/yd²
Transmissivity[2], gal/min/ft (m²/sec) Double-Sided Composite Single-Sided Composite	ASTM D 4716	1/540,000 ft²	 3.4 (7 x10^{-4}) 9.6 (2 x 10^{-3})	 3.4 (7 x 10^{-4}) 9.6 (2 x 10^{-3})	 2.4 (5 x 10^{-4}) 7.2 (1.5 x 10^{-3})
Ply Adhesion, lb/in	ASTM D 7005	1/50,000 ft²	1.0	1.0	1.0
Geonet Core[1,3] – GSE HyperNet					
Geonet Core Thickness, mil	ASTM D 5199	1/50,000 ft²	275	275	275
Transmissivity[2], gal/min/ft (m²/sec)	ASTM D 4716		29 (6 x 10^{-3})	29 (6 x 10^{-3})	29 (6 x 10^{-3})
Density, g/cm³	ASTM D 1505	1/50,000 ft²	0.94	0.94	0.94
Tensile Strength (MD), lb/in	ASTM D 7179	1/50,000 ft²	65	65	65
Carbon Black Content, %	ASTM D 4218	1/50,000 ft²	2.0	2.0	2.0
Geotextile[1,3]					
Mass per Unit Area, oz/yd²	ASTM D 5261	1/90,000 ft²	6	8	10
Grab Tensile Strength, lb	ASTM D 4632	1/90,000 ft²	160	220	260
Grab Elongation	ASTM D 4632	1/90,000 ft²	50%	50%	50%
CBR Puncture Strength, lb	ASTM D 6241	1/540,000 ft²	435	575	725
Trapezoidal Tear Strength, lb	ASTM D 4533	1/90,000 ft²	65	90	100
AOS, US sieve[1] (mm)	ASTM D 4751	1/540,000 ft²	70 (0.212)	80 (0.180)	100 (0.150)
Permittivity, sec^{-1}	ASTM D 4491	1/540,000 ft²	1.5	1.3	1.0
Water Flow Rate, gpm/ft²	ASTM D 4491	1/540,000 ft²	110	95	75
UV Resistance, % retained	ASTM D 4355 (after 500 hours)	per formulation	70	70	70
NOMINAL ROLL DIMENSIONS[4]					
Roll Width, ft			15	15	15
Roll Length, ft	Double-Sided Composite Single-Sided Composite		212 240	200 240	190 230
Roll Area, ft²	Double-Sided Composite Single-Sided Composite		3,180 3,600	3,000 3,600	2,850 3,450

NOTES:

- [1]All geotextile properties are minimum average roll values except AOS which is maximum average roll value and UV resistance is typical value. Geonet core thickness is nominal value.
- [2]Gradient of 0.1, normal load of 10,000 psf, water at 70˚F between steel plates for 15 minutes. Contact GSE for performance transmissivity value for use in design.
- [3]Component properties prior to lamination.
- [4]Roll widths and lengths have a tolerance of ±1%.

GSE is a leading manufacturer and marketer of geosynthetic lining products and services. We've built a reputation of reliability through our dedication to providing consistency of product, price and protection to our global customers.

Our commitment to innovation, our focus on quality and our industry expertise allow us the flexibility to collaborate with our clients to develop a custom, purpose-fit solution.

GSE ENVIRONMENTAL™

DURABILITY RUNS DEEP

For more information on this product and others, please visit us at GSEworld.com, call 800.435.2008 or contact your local sales office.

Roll Allocation List

Sales Order SO-087735
Customer Name Noble Environmental Inc.
Project Name Noble / Westmoreland County LF

Serial number	Item Number	Top	Bottom	Manufacturing date	Length
131574412	FS2-275E-10-10-E-00	130517872	130517867	9/3/2019	190.00
131574413	FS2-275E-10-10-E-00	130517872	130517867	9/3/2019	190.00
131574414	FS2-275E-10-10-E-00	130517872	130517867	9/3/2019	190.00
131574415	FS2-275E-10-10-E-00	130517872	130517867	9/3/2019	190.00
131574416	FS2-275E-10-10-E-00	130517872	130517867	9/3/2019	190.00
131574417	FS2-275E-10-10-E-00	130516634	130516651	9/3/2019	190.00
131574418	FS2-275E-10-10-E-00	130516634	130516651	9/3/2019	190.00
131574419	FS2-275E-10-10-E-00	130516634	130516651	9/3/2019	190.00
131574420	FS2-275E-10-10-E-00	130516634	130516651	9/3/2019	190.00
131574421	FS2-275E-10-10-E-00	130516634	130516651	9/3/2019	190.00
131574422	FS2-275E-10-10-E-00	130516634	130516651	9/3/2019	190.00
131574423	FS2-275E-10-10-E-00	130517870	130517869	9/3/2019	190.00
131574424	FS2-275E-10-10-E-00	130517870	130517869	9/3/2019	190.00
131574425	FS2-275E-10-10-E-00	130517870	130517869	9/3/2019	190.00
131574426	FS2-275E-10-10-E-00	130517870	130517869	9/3/2019	190.00
131574427	FS2-275E-10-10-E-00	130517870	130517869	9/3/2019	190.00
131574428	FS2-275E-10-10-E-00	130517870	130517869	9/3/2019	190.00
131574429	FS2-275E-10-10-E-00	130517876	130517881	9/3/2019	190.00
131574430	FS2-275E-10-10-E-00	130517876	130517881	9/3/2019	190.00
131574431	FS2-275E-10-10-E-00	130517876	130517881	9/3/2019	190.00
131574432	FS2-275E-10-10-E-00	130517876	130517881	9/3/2019	190.00
131574433	FS2-275E-10-10-E-00	130517876	130517881	9/3/2019	190.00
131574434	FS2-275E-10-10-E-00	130517876	130517881	9/3/2019	190.00
131574435	FS2-275E-10-10-E-00	130517874	130517875	9/3/2019	190.00
131574436	FS2-275E-10-10-E-00	130517874	130517875	9/3/2019	190.00
131574437	FS2-275E-10-10-E-00	130517874	130517875	9/3/2019	190.00
131574438	FS2-275E-10-10-E-00	130517874	130517875	9/3/2019	190.00
131574439	FS2-275E-10-10-E-00	130517874	130517875	9/3/2019	190.00
131574440	FS2-275E-10-10-E-00	130517874	130517875	9/3/2019	190.00
131574441	FS2-275E-10-10-E-00	130517877	130517868	9/3/2019	190.00
131574442	FS2-275E-10-10-E-00	130517877	130517868	9/3/2019	190.00
131574443	FS2-275E-10-10-E-00	130517877	130517868	9/3/2019	190.00
131574444	FS2-275E-10-10-E-00	130517877	130517868	9/3/2019	190.00
131574445	FS2-275E-10-10-E-00	130517877	130517868	9/3/2019	190.00
131574446	FS2-275E-10-10-E-00	130517862	130517868	9/3/2019	190.00
131574447	FS2-275E-10-10-E-00	130517862	130517882	9/3/2019	190.00
131574448	FS2-275E-10-10-E-00	130517862	130517882	9/3/2019	190.00
131574449	FS2-275E-10-10-E-00	130517862	130517882	9/3/2019	190.00
131574450	FS2-275E-10-10-E-00	130517862	130517882	9/3/2019	190.00
131574451	FS2-275E-10-10-E-00	130517862	130517882	9/3/2019	190.00
131574452	FS2-275E-10-10-E-00	130517873	130517882	9/3/2019	190.00
131574453	FS2-275E-10-10-E-00	130517873	130517882	9/3/2019	190.00
131574454	FS2-275E-10-10-E-00	130517873	130517878	9/4/2019	190.00
131574455	FS2-275E-10-10-E-00	130517873	130517878	9/4/2019	190.00
131574456	FS2-275E-10-10-E-00	130517873	130517878	9/4/2019	190.00
131574457	FS2-275E-10-10-E-00	130517873	130517878	9/4/2019	190.00
131574458	FS2-275E-10-10-E-00	130517871	130517878	9/4/2019	190.00
131574459	FS2-275E-10-10-E-00	130517871	130516649	9/4/2019	190.00
131574460	FS2-275E-10-10-E-00	130517871	130516649	9/4/2019	190.00
131574461	FS2-275E-10-10-E-00	130517871	130516649	9/4/2019	190.00
131574462	FS2-275E-10-10-E-00	130517871	130516645	9/4/2019	190.00
131574463	FS2-275E-10-10-E-00	130517871	130516645	9/4/2019	190.00

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Sep/9/2019

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-087735	Noble Environmental Inc.	Belle Vernon PA US	FS2-275E-10-10-E-00	

Roll Number	Geonet Thickness ASTM D5199 (mils)	Tensile Strength ASTM D7179 (ppi)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Ply Adhesion Average ASTM D7005 (ppi) Side A	Ply Adhesion Average ASTM D7005 (ppi) Side B
131574412	274	89	0.957	2.6	5.0	3.3
131574413	294	114	0.958	2.5	2.0	4.0
131574414	294	114	0.958	2.5	2.0	4.0
131574415	294	114	0.958	2.5	2.0	4.0
131574416	294	114	0.958	2.5	2.0	4.0
131574417	294	114	0.958	2.5	2.0	4.0
131574418	294	114	0.958	2.5	2.0	4.0
131574419	294	114	0.958	2.5	2.0	4.0
131574420	294	114	0.958	2.5	2.0	4.0
131574421	294	114	0.958	2.5	2.0	4.0
131574422	294	114	0.958	2.5	2.0	4.0
131574423	294	114	0.958	2.5	2.0	4.0
131574424	294	114	0.958	2.5	2.0	4.0
131574425	294	114	0.958	2.5	2.0	4.0
131574426	294	114	0.958	2.5	2.0	4.0
131574427	294	114	0.958	2.5	2.0	4.0
131574428	294	114	0.958	2.5	2.0	4.0
131574429	294	114	0.958	2.5	2.0	4.0
131574430	299	106	0.956	2.8	4.6	3.2
131574431	299	106	0.956	2.8	4.6	3.2
131574432	299	106	0.956	2.8	4.6	3.2
131574433	299	106	0.956	2.8	4.6	3.2
131574434	299	106	0.956	2.8	4.6	3.2
131574435	299	106	0.956	2.8	4.6	3.2
131574436	299	106	0.956	2.8	4.6	3.2
131574437	299	106	0.956	2.8	4.6	3.2
131574438	299	106	0.956	2.8	4.6	3.2
131574439	299	106	0.956	2.8	4.6	3.2
131574440	299	106	0.956	2.8	4.6	3.2
131574441	299	106	0.956	2.8	4.6	3.2
131574442	299	106	0.956	2.8	4.6	3.2
131574443	299	106	0.956	2.8	4.6	3.2
131574444	299	106	0.956	2.8	4.6	3.2
131574445	299	106	0.956	2.8	4.6	3.2

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date: Sep/9/2019

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-087735	Noble Environmental Inc.	Belle Vernon PA US	FS2-275E-10-10-E-00	

Roll Number	Geonet Thickness ASTM D5199 (mils)	Tensile Strength ASTM D7179 (ppi)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Ply Adhesion Average ASTM D7005 (ppi) Side A	Ply Adhesion Average ASTM D7005 (ppi) Side B
131574446	299	106	0.956	2.8	4.6	3.2
131574447	299	97	0.955	2.5	2.6	4.0
131574448	299	97	0.955	2.5	2.6	4.0
131574449	299	97	0.955	2.5	2.6	4.0
131574450	299	97	0.955	2.5	2.6	4.0
131574451	299	97	0.955	2.5	4.6	3.2
131574452	299	97	0.955	2.5	2.6	4.0
131574453	299	97	0.955	2.5	2.6	4.0
131574454	299	97	0.955	2.5	2.6	4.0
131574455	299	97	0.955	2.5	2.6	4.0
131574456	299	97	0.955	2.5	2.6	4.0
131574457	299	97	0.955	2.5	2.6	4.0
131574458	299	97	0.955	2.5	2.6	4.0
131574459	299	97	0.955	2.5	2.6	4.0
131574460	299	97	0.955	2.5	2.6	4.0
131574461	299	97	0.955	2.5	2.6	4.0
131574462	299	97	0.955	2.5	2.6	4.0
131574463	299	97	0.955	2.5	2.6	4.0

Laboratory Manager

GSE Environmental, LLC

ROLL TEST DATA REPORT

GSE QC APPROVED

Report Date : Sep/9/2019

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-087735	Noble Environmental Inc.	Belle Vernon , PA US	FBR-100E-EBC-E-00	

Roll Number	Mass per Unit Area ASTM D5261 (oz/yd²)	ASTM D4491 Water Flow Rate (gpm/ft²)	ASTM D4491 Permittivity (sec-1)	ASTM D4751 AOS (mm)	ASTM D4632 Grab Strength (lbs) MD	ASTM D4632 Grab Strength (lbs) TD	ASTM D4632 Grab Elongation (%) MD	ASTM D4632 Grab Elongation (%) TD	ASTM D4533 Trapezoidal Tear (lbs) MD	ASTM D4533 Trapezoidal Tear (lbs) TD	ASTM D6241 CBR Puncture (lbs)
130516634	10.9	117	1.60	0.150	328	366	92	118	289	352	885
130516645	11.7	84	1.10	0.150	331	367	184	200	325	368	980
130516649	10.6	85	1.10	0.150	290	322	171	200	279	341	853
130516651	10.6	85	1.10	0.150	290	322	171	200	279	341	853
130517862	10.7	116	1.60	0.150	293	346	89	131	184	214	867
130517867	10.4	121	1.60	0.150	310	361	92	109	170	239	895
130517868	10.6	127	1.70	0.150	305	382	83	105	198	243	870
130517869	10.6	127	1.70	0.150	305	382	83	105	198	243	870
130517870	10.6	127	1.70	0.150	305	382	83	105	198	243	870
130517871	10.6	127	1.70	0.150	305	382	83	105	198	243	870
130517872	10.6	127	1.70	0.150	305	382	83	105	198	243	870
130517873	11.2	98	1.30	0.150	353	393	88	126	138	193	894
130517874	11.2	98	1.30	0.150	353	393	88	126	138	193	894
130517875	11.2	98	1.30	0.150	353	393	88	126	138	193	894
130517876	11.2	98	1.30	0.150	353	393	88	126	138	193	894
130517877	11.2	98	1.30	0.150	353	393	88	126	138	193	894
130517878	10.9	90	1.20	0.150	299	358	89	130	131	194	763
130517881	10.9	90	1.20	0.150	299	358	89	130	131	194	763
130517882	10.9	90	1.20	0.150	299	358	89	130	131	194	763

Laboratory Manager _____

GSE Environmental, LLC.

Transmissivity Report

ASTM D4716

Roll No. *131574412*

ROLL IDENTIFICATION

Roll Number	131574412
Product Name	FS2-275E-10-10-E-00
Production Date	9/3/2019

CUSTOMER INFORMATION

Order Number	87735
Customer Name	Noble Environmental Inc.
Project Name	Noble/Westmoreland County LF
Location	Belle Vernon, PA

Pressure (psf)	***Gradient***	***Net/Composite***	***Transmissivity Results***		***Seat Time (min)***	***Boundary***
			(m^2/sec)	***(gal/min/ft)***		
15,000	0.10	Composite	6.64E-04	3.21	1440	Soil/Geocomposite/Geomembrane

GSE QC APPROVED

GSE Roll Allocation

Order SO-087735
Customer Noble Environmental Inc.
Project Name Westmoreland County LF

GEOTECHNICS
1/100,000 sf, min 1/lot
Geocomposite: 1.5 ft x rw
Geonet: 1 ft x rw
Geotextile: 3 ft x rw

Roll#	Resin Lot	Product Code	Mfg Date	Length	Pickup
131574412	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	Pending
131574413	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574414	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574415	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574416	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574417	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574418	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574419	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574420	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574421	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574422	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574423	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574424	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574425	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574426	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574427	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574428	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574429	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574430	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574431	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574432	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574433	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574434	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574435	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574436	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574437	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574438	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574439	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574440	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574441	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574442	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574443	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574444	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574445	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574446	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	Pending
131574447	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574448	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574449	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574450	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574451	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574452	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574453	19F1153	FS2-275E-10-10-E-00	9/3/2019	190	
131574454	19F1153	FS2-275E-10-10-E-00	9/4/2019	190	
131574455	19F1153	FS2-275E-10-10-E-00	9/4/2019	190	
131574456	19F1153	FS2-275E-10-10-E-00	9/4/2019	190	
131574457	19F1153	FS2-275E-10-10-E-00	9/4/2019	190	
131574458	19F1153	FS2-275E-10-10-E-00	9/4/2019	190	
131574459	19F1153	FS2-275E-10-10-E-00	9/4/2019	190	
131574460	19F1153	FS2-275E-10-10-E-00	9/4/2019	190	
131574461	19F1153	FS2-275E-10-10-E-00	9/4/2019	190	
131574462	19F1153	FS2-275E-10-10-E-00	9/4/2019	190	
131574463	19F1153	FS2-275E-10-10-E-00	9/4/2019	190	

CONFORMANCE TEST RESULTS

geotechnics
INTEGRITY IN TESTING

CLIENT: Civil Design Solutions, Inc.
CLIENT PROJECT: Westmoreland Sanitary LF - CellS6A & Closure
PROJECT NO.: L19-198-006
LAB ID NO.: L19-198-006-001
MATERIAL: Solmax FS2-275E-10-10 Geocomposite
SAMPLE NO.: 0
ROLL NO: 131574412

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet									
THICKNESS	D 5199	mils	304	306	295	295	287		
			293	304	297	296	303	**298**	5.6445
STRIP TENSILE	D 5035	MD-lb/in	104	96	112	119	84	**103**	12
		CD-lb/in	41	37	50	37	42		
Geocomposite									
PLY ADHESION	D7005								
	SIDE "A"	MD-lb/in	6.0	4.5	3.3	5.0	3.9	**4.52**	0.899
	SIDE"B"	MD-lb/in	4.5	5.9	2.5	4.6	2.4	**3.95**	1.329

CHECKED BY: JLK DATE: 10-24-19

T:\Synthetics\2019 Synthetics\198 - CDS - Westmoreland Sanitary LF - Cell S6A & Closure\[L19-198-006-001

10/24/2019

TRANSMISSIVITY TEST RESULTS

ASTM D 4716

Geotechnics
INTEGRITY IN TESTING

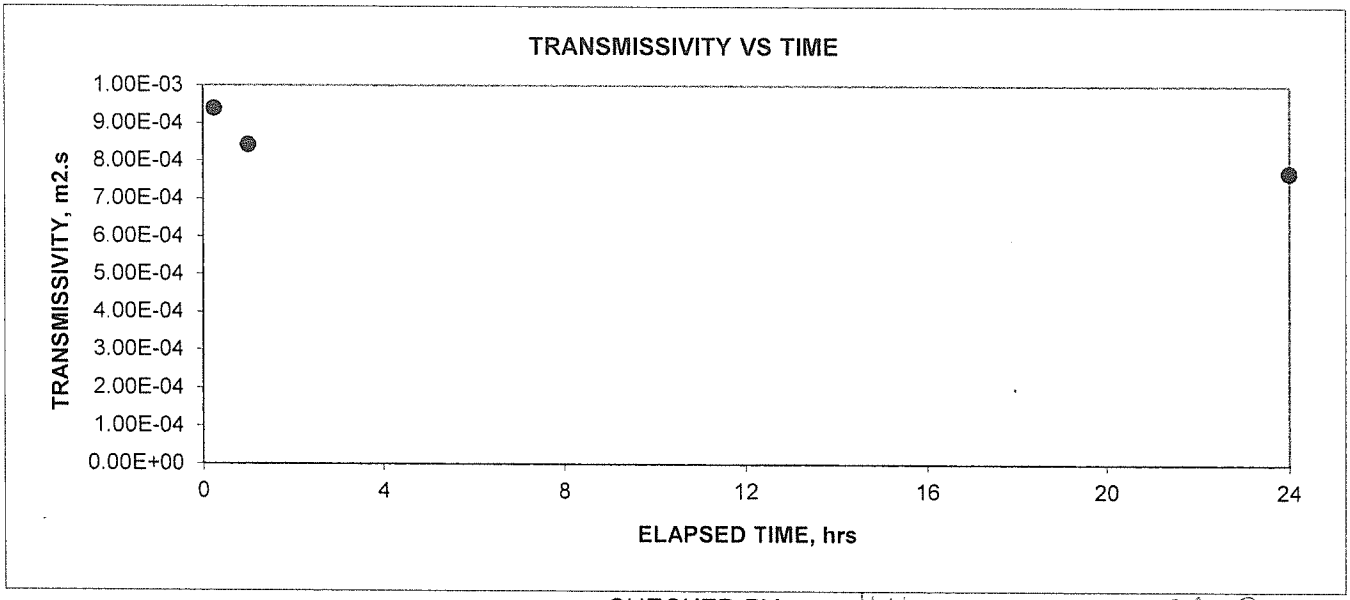
CLIENT: Civil Design Solutions, Inc.
PROJECT: Westmoreland Sanitary LF
MATERIAL: Solmax FS2-275E-10-10
Geocomposite

PROJECT NO.: L19-198-006
LAB I.D. NO.: L19-198-006-001
ROLL NO.: 131574412
REPLICATE NO.: 1 of 1

TEST SECTION: GCL
Geocomposite
60 mil Textured HDPE

15,000 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	4.70	0.70	0.33	980 980 980	10 10 10	20.0	3.13E-01	1.512	9.39E-04
1	4.70	0.70	0.33	880 880 880	10 10 10	20.0	2.81E-01	1.358	8.43E-04
24	4.70	0.70	0.33	800 800 800	10 10 10	19.8	2.57E-01	1.240	7.70E-04



CHECKED BY: JVK DATE: 10-24-19

C:\My Documents\EXCEL\Templates\[Trans100hr1Load1Grad.xls]Sheet1
T:\Synthetics\2019 Synthetics\198 - CDS - Westmoreland Sanitary LF - Cell S6A & Closure\[L19-198-006-001 24hr Trans.xls]Rep1 L19-198-006-00 10/24/2019

CONFORMANCE TEST RESULTS

Geotechnics
INTEGRITY IN TESTING

CLIENT: Civil Design Solutions, Inc.
CLIENT PROJECT: Westmoreland Sanitary LF - Cell S6A & Closure
PROJECT NO.: L19-198-006
LAB ID NO.: L19-198-006-002
MATERIAL: Solmax 10oz. Non-Woven Geotextile
SAMPLE I.D. 130517872
ROLL NO: 131574412

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	6	7	8	9	10	AVG	STD
MASS/UNIT AREA	D 5261	oz/sy	10.26	10.49	11.47	10.59	10.56	10.57	11.50	11.96	11.90	11.72	**11.10**	**0.631**
GRAB STRENGTH	D 4632	MD-lbs	404.3	345.7	379.7	341.0	295.9	270.0	280.7	331.4	282.6	320.9	**325.2**	**42.02**
		CD-lbs	423.9	421.2	388.1	402.6	394.1	441.9	393.5	350.4	400.0	406.4	**402.2**	**23.35**
GRAB ELONGATION	D 4632	MD-%	136.7	123.3	126.7	123.3	110.0	103.3	106.7	120.0	106.7	120.0	**117.7**	**10.12**
		CD-%	146.7	143.3	130.0	136.7	133.3	150.0	130.0	123.3	136.7	140.0	**137.0**	**7.81**
PERMITTIVITY	D 4491	sec-1	1.01	1.26	1.10	1.11							**1.12**	
A.O.S.	D 4751	mm	0.063	0.076	0.111	0.088	0.104						**0.088**	
								AVERAGE AOS, US STD.SIEVE SIZE =					**#170**	

CHECKED BY: JLK DATE: 11-8-19

T:\Synthetics\2019 Synthetics\198 - CDS - Westmoreland Sanitary LF - Cell S6A & Closure\[L19-198-006-002 Geotextile.xls]AOS

L19-198-006-002

11/8/2019

Geotechnics
INTEGRITY IN TESTING

PERMITTIVITY TEST RESULTS

ASTM D 4491
CONSTANT HEAD TEST

CLIENT: Civil Design Solutions, Inc.
CLIENT PROJECT: Westmoreland Sanitary LF - Cell S6A & Closure
PROJECT NO.: L19-198-006
LAB ID NO.: L19-198-006-002
MATERIAL: Solmax 10oz. Non-Woven Geotextile
SAMPLE I.D. 130517872
ROLL NO: 131574412

SPECIMEN NO.	1	2	3	4	
SPEC.THICKNESS, mils	118.5	115	109.5	114.5	
CONSTANT HEAD, in	2.0	2.0	2.0	2.0	
COLLECTION DIVISIONS	5	5	5	5	
READING NO.	COLLECTION TIME, sec				
1	21.78	17.20	19.50	19.95	
2	21.52	17.50	20.07	19.65	
3	21.82	17.41	19.58	19.72	
4	21.68	17.37	20.11	19.69	
5	21.70	17.29	20.04	19.88	SAMPLE
AVERAGE, sec	**21.70**	**17.35**	**19.86**	**19.78**	**AVERAGE**
PERMITTIVITY @ 20 C,sec-1	1.01	1.26	1.10	1.11	**1.12 sec-1**
PERMEABILITY @ 20 C, cm/sec	0.30	0.37	0.31	0.32	**0.325 cm/sec**
FLOW RATE @ 2" CONSTANT HEAD gpm/s.f.	75.4	94.3	82.4	82.7	**83.7 gpm/s.f.**

TEST PARAMETERS

QUANTITY COLLECTED PER DIV., cc	457
SPECIMEN DIA., cm	5.08
AREA, cm2	20.27
TEMP, C°	20.8
CORRECTION FACTOR, Rt	0.98
OXYGEN CONTENT, ppm	< 6

Checked By: JUK Date: 10-24-19

C:\My Documents\EXCEL\Templates\[Textile-Perm-FallHead.xls]Sheet1

T:\Synthetics\2019 Synthetics\198 - CDS - Westmoreland Sanitary LF - Cell S6A & Closure\[L19-198-006-002 Geotextile.xls]TEXT L19-198-006-00 10/24/2019

APPARENT OPENING SIZE
ASTM D 4751

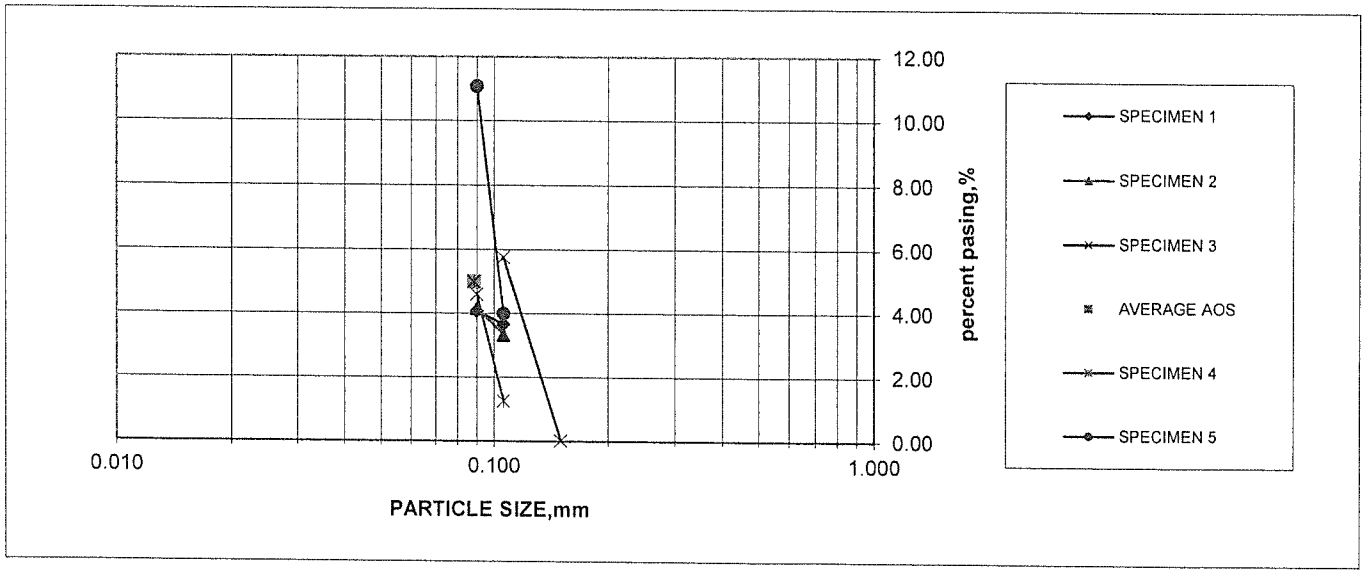
Geotechnics
INTEGRITY IN TESTING

CLIENT: Civil Design Solutions, Inc.
CLIENT PROJECT: Westmoreland Sanitary LF - Cell S6A & Closure
MATERIAL: Solmax 10oz. Non-Woven Geotextile

PROJECT NO.: L19-198-006
LAB ID NO.: L19-198-006-002
ROLL NO: 131574412
SAMPLE NO: 130517872

US STD. SIEVE SIZE	SIEVE OPENING (mm)	WT. FRAME & GEOTEXTILE & BEADS (gm)	WT. FRAME & GEOTEXTILE (gm)	WT. BEADS (gm)	WT. PAN & BEADS (gm)	WT. PAN (gm)	WT. BEADS PASSING (gm)	PERCENT PASSING (%)	AOS @ 5% PASSING (mm)
SPECIMEN 1									
#170	0.090	1545.46	1495.46	50.00	295.58	293.54	2.04	4.08	
#140	0.106	1545.20	1495.20	50.00	295.37	293.54	1.83	3.66	
									0.063
SPECIMEN 2									
#170	0.090	550.35	500.35	50.00	411.05	408.97	2.08	4.16	
#140	0.106	550.23	500.23	50.00	410.64	408.97	1.67	3.34	
									0.076
SPECIMEN 3									
#140	0.106	537.06	487.06	50.00	411.51	408.63	2.88	5.76	
#100	0.150	537.12	487.12	50.00	408.64	408.63	0.01	0.02	
									0.111
SPECIMEN 4									
#170	0.090	547.02	497.02	50.00	411.39	409.09	2.30	4.60	
#140	0.106	546.92	496.92	50.00	409.72	409.09	0.63	1.26	
									0.088
SPECIMEN 5									
#170	0.090	548.70	498.70	50.00	416.10	410.56	5.54	11.08	
#140	0.106	548.52	498.52	50.00	412.56	410.56	2.00	4.00	
									0.104

AVERAGE AOS @ 5% PASSING, mm: 0.088
AVERAGE AOS, US STD. SIEVE SIZE: **#170**



Checked By: JLK Date: 11-8-19

544 Braddock Avenue • East Pittsburgh, PA 15112 • 412-823-7600 • FAX 412-823-8999 • www.geotechnics.net

CONFORMANCE TEST RESULTS

Geotechnics
INTEGRITY IN TESTING

CLIENT: Civil Design Solutions, Inc.
CLIENT PROJECT: Westmoreland Sanitary LF - Cell S6A & Closure
PROJECT NO.: L19-198-006
LAB ID NO.: L19-198-006-003
MATERIAL: Solmax 10oz. Non-Woven Geotextile
SAMPLE I.D. 130517867
ROLL NO: 131574412

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	6	7	8	9	10	AVG	STD
MASS/UNIT AREA	D 5261	oz/sy	11.59	11.46	11.16	10.82	11.47	11.02	10.92	11.44	10.02	10.44	**11.03**	**0.481**
GRAB STRENGTH	D 4632	MD-lbs	340.3	284.6	338.9	302.3	295.0	335.4	311.7	341.8	283.1	374.5	**320.8**	**28.40**
		CD-lbs	389.0	467.9	389.1	373.9	371.9	363.4	410.6	324.0	328.8	323.0	**374.2**	**42.27**
GRAB ELONGATION	D 4632	MD-%	123.3	100.0	120.0	106.7	103.3	123.3	110.0	123.3	100.0	133.3	**114.3**	**11.16**
		CD-%	136.7	160.0	140.0	133.3	130.0	123.3	143.3	130.0	130.0	126.7	**135.3**	**10.02**
PERMITTIVITY	D 4491	sec-1	1.18	1.32	1.60	1.36							**1.36**	
A.O.S.	D 4751	mm	0.115	0.130	0.125	0.081	0.096						**0.109**	
								AVERAGE AOS, US STD.SIEVE SIZE =					**#120**	

CHECKED BY: JLK DATE: 11-8-19

544 Braddock Avenue • East Pittsburgh, PA 15112 • 412-823-7600 • FAX 412-823-8999 • www.geotechnics.net

Geotechnics
INTEGRITY IN TESTING

PERMITTIVITY TEST RESULTS

ASTM D 4491
CONSTANT HEAD TEST

CLIENT: Civil Design Solutions, Inc.
CLIENT PROJECT: Westmoreland Sanitary LF - Cell S6A & Closure
PROJECT NO.: L19-198-006
LAB ID NO.: L19-198-006-003
MATERIAL: Solmax 10oz. Non-Woven Geotextile
SAMPLE I.D. 130517867
ROLL NO: 131574412

SPECIMEN NO.	1	2	3	4	
SPEC.THICKNESS, mils	142.5	124	102.5	90	
CONSTANT HEAD, in	2.0	2.0	2.0	2.0	
COLLECTION DIVISIONS	5	5	5	5	
READING NO.	COLLECTION TIME, sec				
1	18.37	16.41	13.79	16.07	
2	18.41	16.59	13.56	16.16	
3	18.48	16.63	13.80	16.21	
4	18.51	16.43	13.62	16.09	
5	18.53	16.60	13.64	16.12	SAMPLE
AVERAGE, sec	**18.46**	**16.53**	**13.68**	**16.13**	**AVERAGE**
PERMITTIVITY @ 20 C,sec-1	1.18	1.32	1.60	1.36	**1.36 sec-1**
PERMEABILITY @ 20 C, cm/sec	0.43	0.42	0.42	0.31	**0.393 cm/sec**
FLOW RATE @ 2" CONSTANT HEAD gpm/s.f.	88.6	99.0	119.6	101.4	**102.1 gpm/s.f.**

TEST PARAMETERS

QUANTITY COLLECTED PER DIV., cc	457
SPECIMEN DIA., cm	5.08
AREA, cm2	20.27
TEMP, C°	20.8
CORRECTION FACTOR, Rt	0.98
OXYGEN CONTENT, ppm	< 6

Checked By: JLK Date: 10-29-19

C:\My Documents\EXCEL\Templates\[Textile-Perm-FallHead.xls]Sheet1

T:\Synthetics\2019 Synthetics\198 - CDS - Westmoreland Sanitary LF - Cell S6A & Closure\[L19-198-006-003 Geotextile.xls]AOS L19-198-006-00 10/24/2019

APPARENT OPENING SIZE
ASTM D 4751

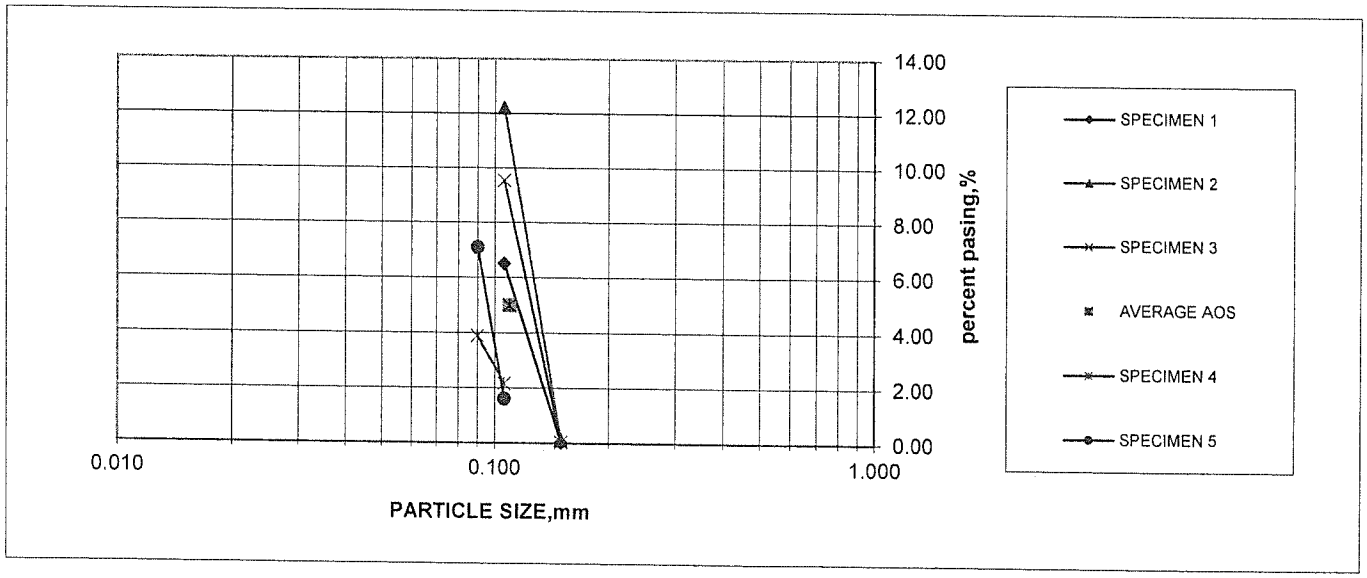
Geotechnics
INTEGRITY IN TESTING

CLIENT: Civil Design Solutions, Inc.
CLIENT PROJECT: Westmoreland Sanitary LF - Cell S6A & Closure
MATERIAL: Solmax 10oz. Non-Woven Geotextile

PROJECT NO.: L19-198-006
LAB ID NO.: L19-198-006-003
ROLL NO: 131574412
SAMPLE NO: 130517867

US STD. SIEVE SIZE	SIEVE OPENING (mm)	WT. FRAME & GEOTEXTILE & BEADS (gm)	WT. FRAME & GEOTEXTILE (gm)	WT. BEADS (gm)	WT. PAN & BEADS (gm)	WT. PAN (gm)	WT. BEADS PASSING (gm)	PERCENT PASSING (%)	AOS @ 5% PASSING (mm)
SPECIMEN 1									
#140	0.106	1544.02	1494.02	50.00	296.82	293.56	3.26	6.52	
#100	0.150	1544.08	1494.08	50.00	293.57	293.56	0.01	0.02	
									0.115
SPECIMEN 2									
#140	0.106	548.69	498.69	50.00	415.08	408.97	6.11	12.22	
#100	0.150	548.70	498.70	50.00	409.03	408.97	0.06	0.12	
									0.130
SPECIMEN 3									
#140	0.106	536.23	486.23	50.00	413.40	408.63	4.77	9.54	
#100	0.150	536.31	486.31	50.00	408.65	408.63	0.02	0.04	
									0.125
SPECIMEN 4									
#170	0.090	545.86	495.86	50.00	411.03	409.09	1.94	3.88	
#140	0.106	545.94	495.94	50.00	410.17	409.09	1.08	2.16	
									0.081
SPECIMEN 5									
#170	0.090	547.96	497.96	50.00	414.11	410.56	3.55	7.10	
#140	0.106	547.93	497.93	50.00	411.37	410.56	0.81	1.62	
									0.096

AVERAGE AOS @ 5% PASSING, mm 0.109
AVERAGE AOS, US STD. SIEVE SIZE **#120**



Checked By: JVK Date: 11-8-19

544 Braddock Avenue • East Pittsburgh, PA 15112 • 412-823-7600 • FAX 412-823-8999 • www.geotechnics.net

CONFORMANCE TEST RESULTS

Geotechnics
INTEGRITY IN TESTING

CLIENT: Civil Design Solutions, Inc.
CLIENT PROJECT: Westmoreland Sanitary LF - CellS6A & Closure
PROJECT NO.: L19-198-006
LAB ID NO.: L19-198-006-004
MATERIAL: Solmax FS2-275E-10-10 Geocomposite
SAMPLE NO.: 0
ROLL NO: 131574446

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet									
THICKNESS	D 5199	mils	301	299	285	291	309		
			306	293	294	308	302	**299**	7.3797
STRIP TENSILE	D 5035	MD-lb/in	112	98	102	96	102	**102**	6
		CD-lb/in	33	35	51	43	41		
Geocomposite									
PLY ADHESION	D7005								
	SIDE "A"	MD-lb/in	2.6	1.5	1.9	2.7	1.2	**1.96**	0.587
	SIDE"B"	MD-lb/in	4.5	2.4	5.0	4.8	2.9	**3.90**	1.043

CHECKED BY: JLK DATE: 10-29-19

T:\Synthetics\2019 Synthetics\198 - CDS - Westmoreland Sanitary LF - Cell S6A & Closure\[L19-198-006-004

10/24/2019

TRANSMISSIVITY TEST RESULTS

ASTM D 4716

Geotechnics
INTEGRITY IN TESTING

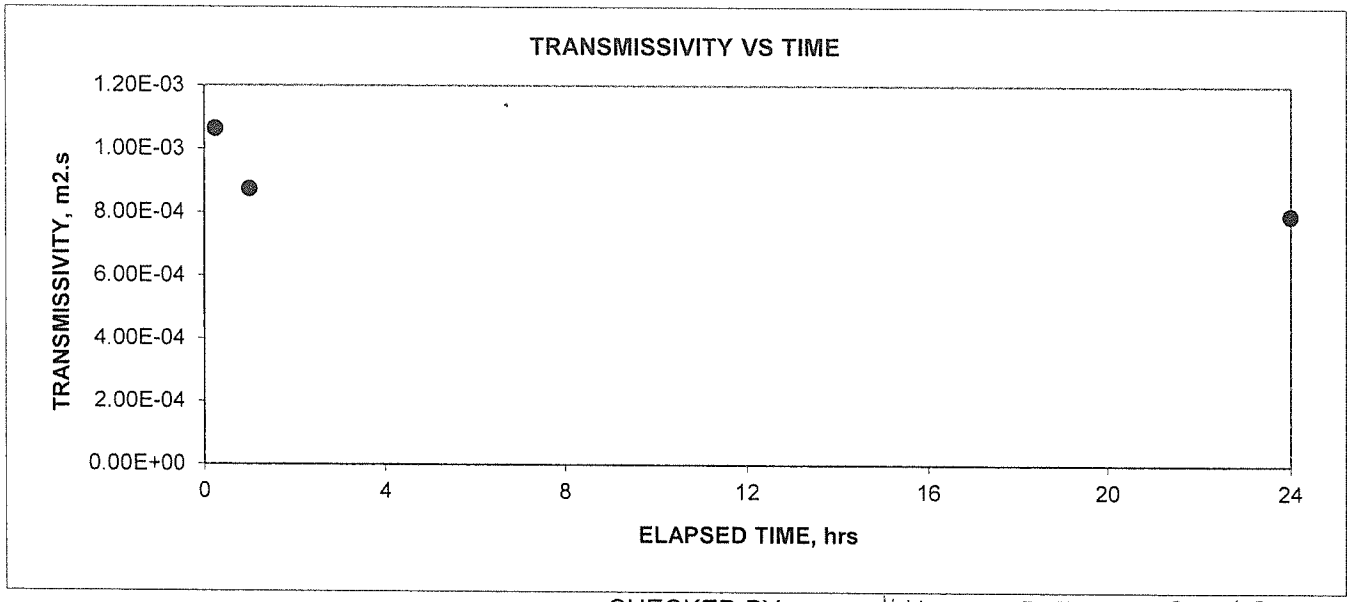
CLIENT: Civil Design Solutions, Inc.
PROJECT: Westmoreland Sanitary LF
MATERIAL: Solmax FS2-275E-10-10
Geocomposite

PROJECT NO.: L19-198-006
LAB I.D. NO.: L19-198-006-004
ROLL NO.: 131574446
REPLICATE NO.: 1 of 1

TEST SECTION: GCL
Geocomposite
60 mil Textured HDPE

15,000 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	4.70	0.70	0.33	1110 1110 1110	10 10 10	20.0	3.54E-01	1.713	1.06E-03
1	4.70	0.70	0.33	910 910 910	10 10 10	19.9	2.91E-01	1.407	8.74E-04
24	4.70	0.70	0.33	830 830 830	10 10 10	20.0	2.65E-01	1.281	7.95E-04



CHECKED BY: JLK DATE: 10-24-19

C:\My Documents\EXCEL\Templates\[Trans100hr1Load1Grad.xls]Sheet1
T:\Synthetics\2019 Synthetics\198 - CDS - Westmoreland Sanitary LF - Cell S6A & Closure\[L19-198-006-004 24hr Trans.xls]Rep1 L19-198-006-00 10/24/2019

CONFORMANCE TEST RESULTS

Geotechnics
INTEGRITY IN TESTING

CLIENT: Civil Design Solutions, Inc.
CLIENT PROJECT: Westmoreland Sanitary LF - Cell S6A & Closure
PROJECT NO.: L19-198-006
LAB ID NO.: L19-198-006-005
MATERIAL: Solmax 10oz. Non-Woven Geotextile
SAMPLE I.D. 130517862
ROLL NO: 131574446

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	6	7	8	9	10	AVG	STD
MASS/UNIT AREA	D 5261	oz/sy	12.64	10.89	10.26	10.19	10.22	10.14	10.00	10.17	10.03	10.02	**10.46**	**0.768**
GRAB STRENGTH	D 4632	MD-lbs	278.0	274.1	251.3	222.0	204.4	278.4	234.4	285.7	348.8	431.1	**280.8**	**62.94**
		CD-lbs	422.8	361.6	326.1	307.1	345.8	358.3	283.9	326.3	343.8	360.5	**343.6**	**35.50**
GRAB ELONGATION	D 4632	MD-%	96.7	96.7	93.3	86.7	80.0	100.0	90.0	106.7	130.0	140.0	**102.0**	**18.02**
		CD-%	143.3	133.3	126.7	120.0	133.3	136.7	113.3	136.7	133.3	133.3	**131.0**	**8.31**
PERMITTIVITY	D 4491	sec-1	1.37	0.91	1.05	0.87							**1.05**	
A.O.S.	D 4751	mm	0.146	0.144	0.119	0.141	0.147						**0.139**	
								AVERAGE AOS, US STD.SIEVE SIZE =					**#100**	

CHECKED BY: JLK DATE: 11-8-19

544 Braddock Avenue • East Pittsburgh, PA 15112 • 412-823-7600 • FAX 412-823-8999 • www.geotechnics.net

Geotechnics
INTEGRITY IN TESTING

PERMITTIVITY TEST RESULTS

ASTM D 4491
CONSTANT HEAD TEST

CLIENT: Civil Design Solutions, Inc.
CLIENT PROJECT: Westmoreland Sanitary LF - Cell S6A & Closure
PROJECT NO.: L19-198-006
LAB ID NO.: L19-198-006-005
MATERIAL: Solmax 10oz. Non-Woven Geotextile
SAMPLE I.D. 130517862
ROLL NO: 131574446

SPECIMEN NO.	1	2	3	4	
SPEC.THICKNESS, mils	118.5	125.5	113	118	
CONSTANT HEAD, in	2.0	2.0	2.0	2.0	
COLLECTION DIVISIONS	5	5	5	5	
READING NO.	COLLECTION TIME, sec				
1	15.95	23.91	20.84	24.97	
2	16.00	24.10	20.82	25.02	
3	15.90	23.98	20.90	24.92	
4	16.05	24.12	20.94	25.06	
5	15.93	24.08	20.81	25.01	SAMPLE
AVERAGE, sec	**15.97**	**24.04**	**20.86**	**25.00**	**AVERAGE**
PERMITTIVITY @ 20 C,sec-1	1.37	0.91	1.05	0.87	**1.05 sec-1**
PERMEABILITY @ 20 C, cm/sec	0.41	0.29	0.30	0.26	**0.316 cm/sec**
FLOW RATE @ 2" CONSTANT HEAD gpm/s.f.	102.5	68.1	78.4	65.5	**78.6 gpm/s.f.**

TEST PARAMETERS

QUANTITY COLLECTED PER DIV., cc	457
SPECIMEN DIA., cm	5.08
AREA, cm2	20.27
TEMP, C°	20.8
CORRECTION FACTOR, Rt	0.98
OXYGEN CONTENT, ppm	< 6

Checked By: JLK Date: 10.24.19

C:\My Documents\EXCEL\Templates\[Textile-Perm-FallHead.xls]Sheet1

T:\Synthetics\2019 Synthetics\198 - CDS - Westmoreland Sanitary LF - Cell S6A & Closure\[L19-198-006-005 Geotextile.xls]AOS L19-198-006-00 10/24/2019

APPARENT OPENING SIZE
ASTM D 4751

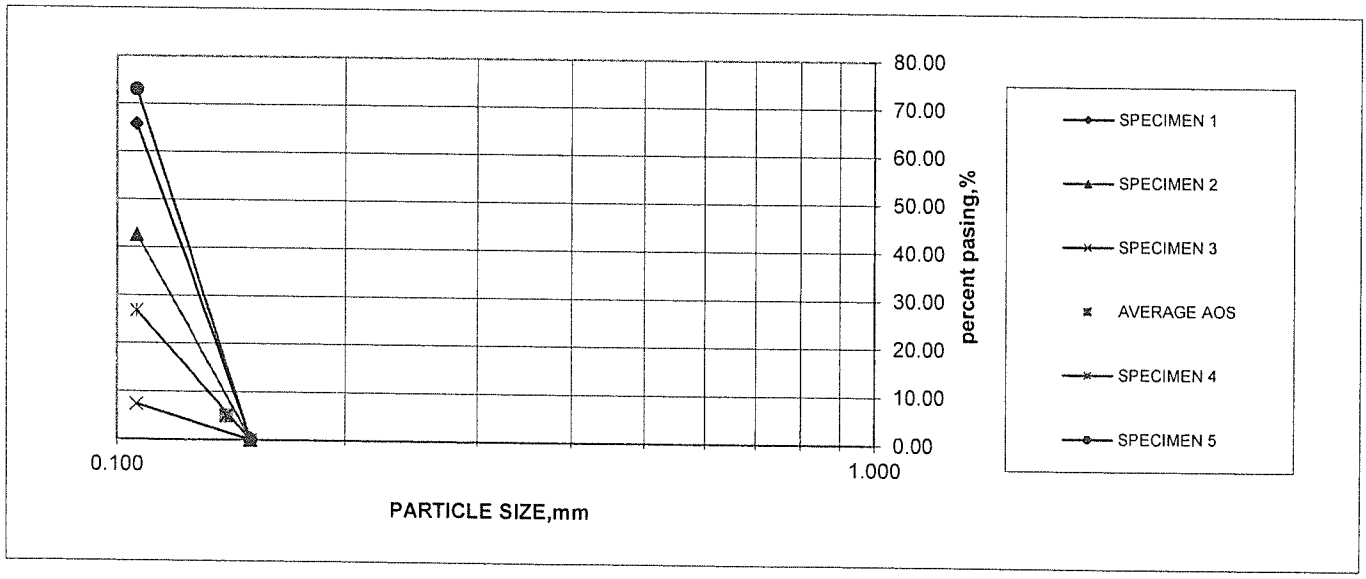
Geotechnics
INTEGRITY IN TESTING

CLIENT: Civil Design Solutions, Inc.
CLIENT PROJECT: Westmoreland Sanitary LF - Cell S6A & Closure
MATERIAL: Solmax 10oz. Non-Woven Geotextile

PROJECT NO.: L19-198-006
LAB ID NO.: L19-198-006-005
ROLL NO: 131574446
SAMPLE NO: 130517862

US STD. SIEVE SIZE	SIEVE OPENING (mm)	WT. FRAME & GEOTEXTILE & BEADS (gm)	WT. FRAME & GEOTEXTILE (gm)	WT. BEADS (gm)	WT. PAN & BEADS (gm)	WT. PAN (gm)	WT. BEADS PASSING (gm)	PERCENT PASSING (%)	AOS @ 5% PASSING (mm)
SPECIMEN 1									
#140	0.106	1540.55	1490.55	50.00	326.45	293.56	32.89	65.78	
#100	0.150	1540.71	1490.71	50.00	293.72	293.56	0.16	0.32	
									0.146
SPECIMEN 2									
#140	0.106	546.56	496.56	50.00	430.29	408.97	21.32	42.64	
#100	0.150	546.72	496.72	50.00	409.00	408.97	0.03	0.06	
									0.144
SPECIMEN 3									
#140	0.106	537.08	487.08	50.00	412.31	408.63	3.68	7.36	
#100	0.150	537.35	487.35	50.00	408.65	408.63	0.02	0.04	
									0.119
SPECIMEN 4									
#140	0.106	544.66	494.66	50.00	422.50	409.09	13.41	26.82	
#100	0.150	544.87	494.87	50.00	409.10	409.09	0.01	0.02	
									0.141
SPECIMEN 5									
#140	0.106	543.08	493.08	50.00	447.08	410.56	36.52	73.04	
#100	0.150	543.22	493.22	50.00	410.59	410.56	0.03	0.06	
									0.147

AVERAGE AOS @ 5% PASSING, mm 0.139
AVERAGE AOS, US STD. SIEVE SIZE **#100**



Checked By: JUK Date: 11-8-19

544 Braddock Avenue • East Pittsburgh, PA 15112 • 412-823-7600 • FAX 412-823-8999 • www.geotechnics.net

CONFORMANCE TEST RESULTS

Geotechnics
INTEGRITY IN TESTING

CLIENT: Civil Design Solutions, Inc.
CLIENT PROJECT: Westmoreland Sanitary LF - Cell S6A & Closure
PROJECT NO.: L19-198-006
LAB ID NO.: L19-198-006-006
MATERIAL: Solmax 10oz. Non-Woven Geotextile
SAMPLE I.D. 130517868
ROLL NO: 131574446

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	6	7	8	9	10	AVG	STD
MASS/UNIT AREA	D 5261	oz/sy	10.14	10.00	10.00	9.92	11.43	11.54	11.10	11.56	12.19	12.89	**11.08**	**0.981**
GRAB STRENGTH	D 4632	MD-lbs	301.7	267.9	322.9	306.9	278.2	255.2	319.6	338.3	326.2	375.7	**309.3**	**33.91**
		CD-lbs	401.8	460.4	453.6	418.4	368.8	402.5	390.0	314.3	242.6	253.0	**370.5**	**72.80**
GRAB ELONGATION	D 4632	MD-%	110.0	96.7	120.0	113.3	96.7	96.7	116.7	120.0	116.7	130.0	**111.7**	**10.98**
		CD-%	140.0	150.0	150.0	140.0	130.0	133.3	130.0	126.7	96.7	100.0	**129.7**	**17.41**
PERMITTIVITY	D 4491	sec-1	1.09	1.01	1.24	1.26							**1.15**	
A.O.S.	D 4751	mm	0.095	0.103	0.098	0.097	0.106						**0.100**	
								AVERAGE AOS, US STD.SIEVE SIZE =					**#140**	

CHECKED BY: JLK DATE: 11-8-19

544 Braddock Avenue • East Pittsburgh, PA 15112 • 412-823-7600 • FAX 412-823-8999 • www.geotechnics.net

Geotechnics
INTEGRITY IN TESTING

PERMITTIVITY TEST RESULTS

ASTM D 4491
CONSTANT HEAD TEST

CLIENT: Civil Design Solutions, Inc.
CLIENT PROJECT: Westmoreland Sanitary LF - Cell S6A & Closure
PROJECT NO.: L19-198-006
LAB ID NO.: L19-198-006-006
MATERIAL: Solmax 10oz. Non-Woven Geotextile
SAMPLE I.D. 130517868
ROLL NO: 131574446

SPECIMEN NO.	1	2	3	4	
SPEC.THICKNESS, mils	115	118.5	115	120.5	
CONSTANT HEAD, in	2.0	2.0	2.0	2.0	
COLLECTION DIVISIONS	5	5	5	5	
READING NO.	COLLECTION TIME, sec				
1	20.05	21.51	17.59	17.24	
2	20.16	21.64	17.81	17.29	
3	19.97	21.76	17.69	17.43	
4	19.96	21.81	17.63	17.49	
5	20.11	21.59	17.72	17.38	**SAMPLE**
AVERAGE, sec	**20.05**	**21.66**	**17.69**	**17.37**	**AVERAGE**
PERMITTIVITY @ 20 C,sec-1	1.09	1.01	1.24	1.26	**1.15 sec-1**
PERMEABILITY @ 20 C, cm/sec	0.32	0.30	0.36	0.39	**0.342 cm/sec**
FLOW RATE @ 2" CONSTANT HEAD gpm/s.f.	81.6	75.5	92.5	94.2	**86.0 gpm/s.f.**

TEST PARAMETERS

QUANTITY COLLECTED PER DIV., cc	457
SPECIMEN DIA., cm	5.08
AREA, cm2	20.27
TEMP, C°	20.8
CORRECTION FACTOR, Rt	0.98
OXYGEN CONTENT, ppm	< 6

Checked By: JLK Date: 10.29.19

C:\My Documents\EXCEL\Templates\[Textile-Perm-FallHead.xls]Sheet1

T:\Synthetics\2019 Synthetics\198 - CDS - Westmoreland Sanitary LF - Cell S6A & Closure\[L19-198-006-006 Geotextile.xls]AOS L19-198-006-00 10/24/2019

APPARENT OPENING SIZE
ASTM D 4751

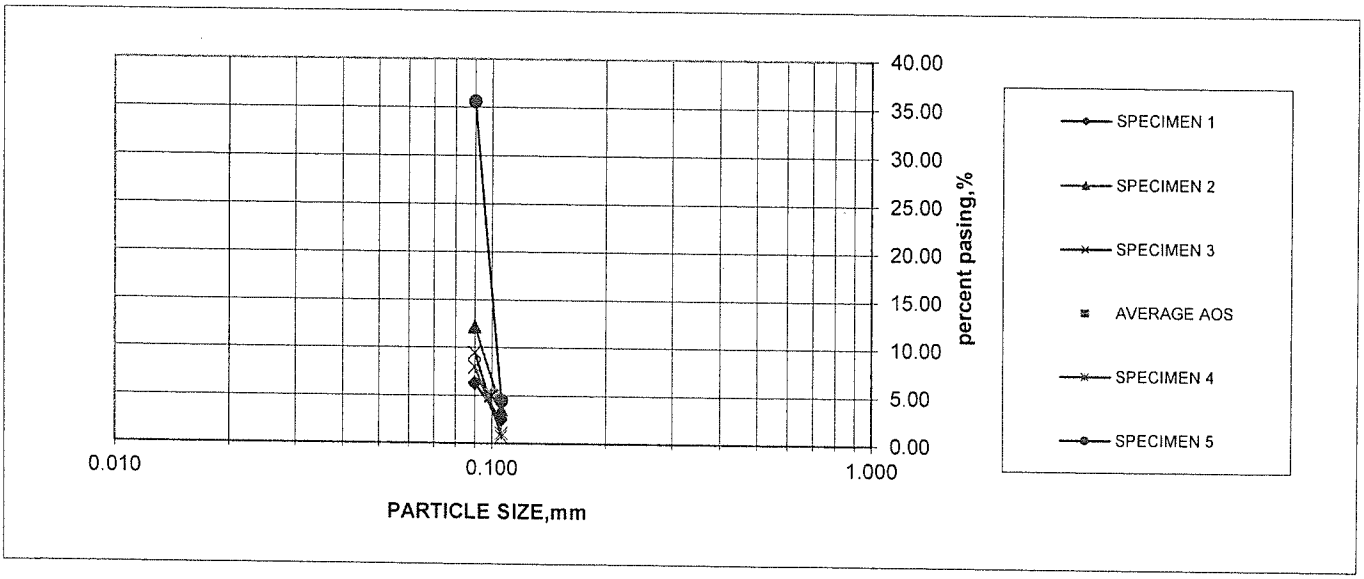
Geotechnics
INTEGRITY IN TESTING

CLIENT: Civil Design Solutions, Inc.
CLIENT PROJECT: Westmoreland Sanitary LF - Cell S6A & Closure
MATERIAL: Solmax 10oz. Non-Woven Geotextile

PROJECT NO.: L19-198-006
LAB ID NO.: L19-198-006-006
ROLL NO: 131574446
SAMPLE NO: 130517868

US STD. SIEVE SIZE	SIEVE OPENING (mm)	WT. FRAME & GEOTEXTILE & BEADS (gm)	WT. FRAME & GEOTEXTILE (gm)	WT. BEADS (gm)	WT. PAN & BEADS (gm)	WT. PAN (gm)	WT. BEADS PASSING (gm)	PERCENT PASSING (%)	AOS @ 5% PASSING (mm)
SPECIMEN 1									
#170	0.090	1544.68	1494.68	50.00	296.71	293.56	3.15	6.30	
#140	0.106	1544.46	1494.46	50.00	294.81	293.56	1.25	2.50	
									0.095
SPECIMEN 2									
#170	0.090	548.71	498.71	50.00	415.07	408.97	6.10	12.20	
#140	0.106	548.53	498.53	50.00	410.76	408.97	1.79	3.58	
									0.103
SPECIMEN 3									
#170	0.090	538.71	488.71	50.00	413.37	408.63	4.74	9.48	
#140	0.106	538.52	488.52	50.00	409.00	408.63	0.37	0.74	
									0.098
SPECIMEN 4									
#170	0.090	546.48	496.48	50.00	413.09	409.09	4.00	8.00	
#140	0.106	546.36	496.36	50.00	409.62	409.09	0.53	1.06	
									0.097
SPECIMEN 5									
#170	0.090	546.62	496.62	50.00	428.37	410.56	17.81	35.62	
#140	0.106	546.43	496.43	50.00	412.80	410.56	2.24	4.48	
									0.106

AVERAGE AOS @ 5% PASSING, mm 0.100
AVERAGE AOS, US STD. SIEVE SIZE **#140**



Checked By: JLK Date: 11-8-19

544 Braddock Avenue • East Pittsburgh, PA 15112 • 412-823-7600 • FAX 412-823-8999 • www.geotechnics.net