



Erosion Control Products and Fabrics

Portions of Presentation Courtesy of
East Coast Erosion Blankets

Overview

- *Definition of Erosion Control Blanket*
- *Types of Blankets and TRMs*
- *Blanket and TRM Benefits*
- *Basic Design/Selection*
- *Applications*
- *Types and Uses of Geotextile Fabrics*

What is an Erosion Control Blanket?

–A *temporary, degradable or long-term, non-degradable* material manufactured or fabricated into rolls designed to reduce soil erosion and assist in the growth, establishment and protection of vegetation.

- **Netting**
Single and Double
- **Matrix**
- **Thread**



Types

– Degradable (45 Days to 36 Months)

- Erosion Control Blanket



ECSC-2, ECC-2, Bios, North Am. Green DS75

– Permanent (Greater than 36 Months)

- Turf Reinforcement Mat (TRM)



ECC-3

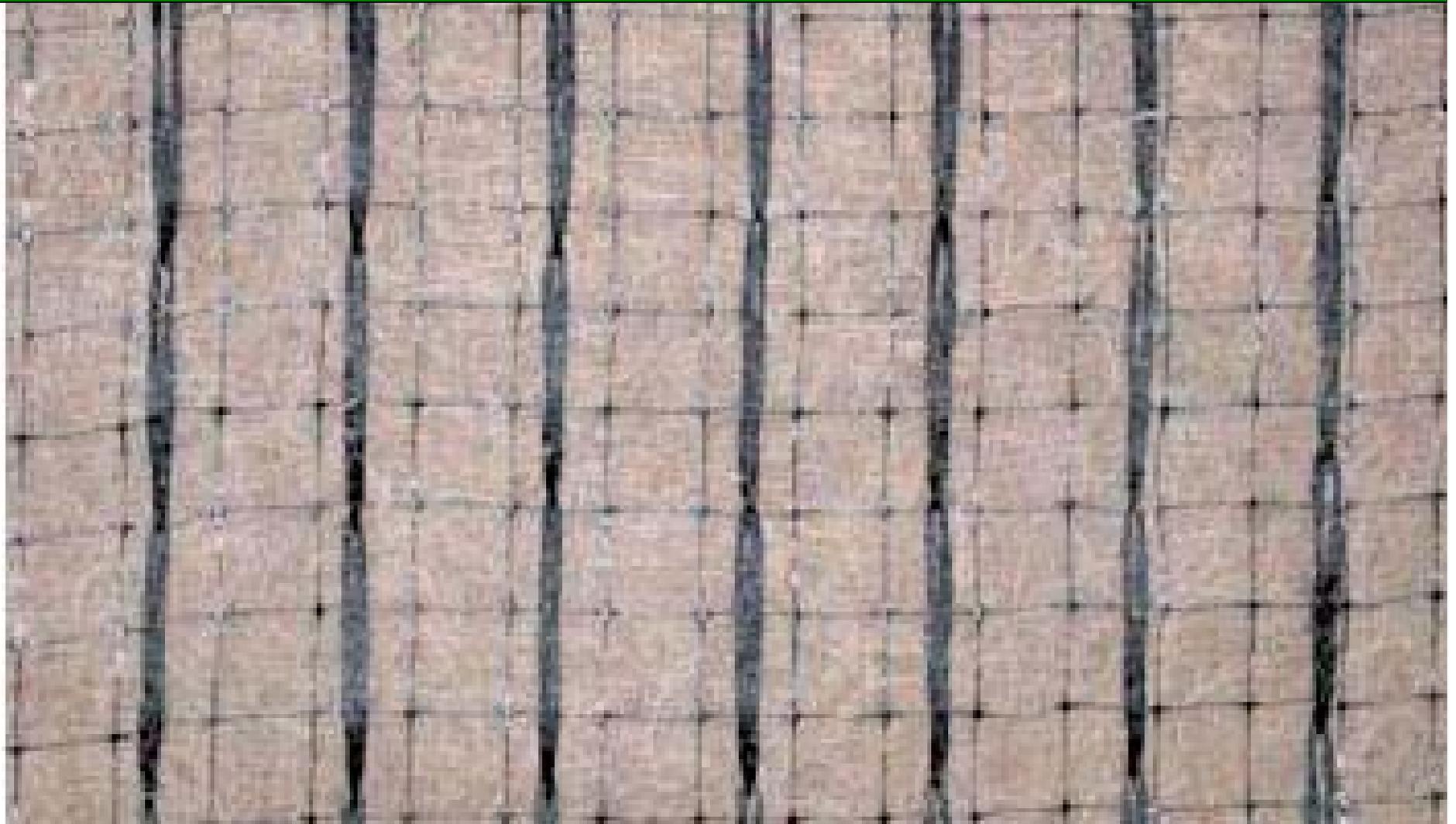


ECP-2

Biodegradable Straw Blanket



Coconut Blanket



The image shows a close-up of a brown, fibrous erosion control blanket. The material is composed of numerous thin, straw-like fibers that are densely packed and oriented in various directions, creating a textured surface. A white rectangular box is centered at the top of the image, containing the product's branding. The background is a uniform, light brown color, suggesting the blanket is laid on a similar surface.

Futerra[®]
F4NETLESS[™]
Erosion Control Blanket





Two Weeks Later

What is a Turf Reinforcement Mat (TRM)?

- UV stabilized, non-degradable fiber and/or netting processed into a blanket
- Designed for permanent and critical hydraulic applications where design discharges exert velocities and shear stresses that *exceed the limits of mature, natural vegetation* (just grass)
- Greater strength and durability for more extreme applications



Coconut TRM



Good Installation of TRM



Bad Installation of TRM



Polypropylene TRM



Landlok 450 TRM



10/08/2013

Green Armor TRM





GREENARMOR
SYSTEM System

Benefits of Blankets and TRMs

- Acts as a reinforced mulch
- Protects the seed and soil from erosion
- Mulch holds moisture and moderates soil temperature
- Accelerates germination and vegetation establishment
- Product degrades in prescribed time frame

How do I choose one?

**The CCR doesn't choose
the blanket or TRM....**



**The designer chooses
the appropriate
blanket or TRM.**

Functional Longevity Categories

Less than 3 months

(North American Green DS75; East Coast "D Series")

Between 3 and 12 months

(East Coast ECS-1, ECS-2, ECX-1)

Between 12 and 24 months

(North Am. Green SC150BN; East Coast ECS-2, ECX-2, ECSC-2B)

Between 24 and 36 months

(East Coast ECSC-2, ECC-2; North Am. Green C125)

Greater than 36 months (Permanent - TRMs)

(North Am. Green SC250, C350, P550; East Coast ECP-2, ECC-3)

Design Factors

- Grade/Slope – *harder the slope, the higher the blanket*
- Soil Type
- Performance Factors – C & Sheer Stress

Cons of RECPs

- The heavier the mulch layer/polypropylene in the blanket the higher probability that the grass may not thrive
- Dark colored polypropylene matting increases heat
- Polypropylene nettings entangle wildlife
- In most applications of TRMs, they are not “mowable”
- **Relies on proper installation**

Wildlife Entanglement



North American Green S75 and Curlex products



Straw Blanket with Polypropylene Netting



Residential







Other Erosion Control Products

- There are many new products on the market for erosion control, that doesn't mean that they meet the Delaware sediment and stormwater specifications. Be sure that any product that you come across in the field meets the specifications.
- Where do you find the specifications for E&S products?

The Delaware Erosion and Sediment
Control Handbook

Delaware E&S Control Handbook- Appendix 4

Soil Stabilization Matting

Types I through IV (SSM-I through SSM-IV) are temporary to long-term degradable mattings, applied to surface to prevent erosion prior to vegetative establishment. They can be used both in slope applications temporary channelliners.

SSM-I is a temporary mat that will degrade within 12 months. It is composed of 100% agricultural straw (min 0.5 lbs/SY) or 100% wood excelsior fiber (min 0.8 lbs/SY, min 80% six-inch or longer fiber length) and a single top netting of biodegradable material. An **SSM-I** is acceptable on slopes of 3:1 or flatter and in low flow swales with a maximum design shear stress of 1.55 psf, where natural vegetation will provide permanent stabilization. *Example Products: North American Green S758M, East Coast Erosion Blankets ECS-18.*

SSM-II is also a temporary mat that will degrade within 12 months. It is also composed of 100% agricultural straw (min 0.5 lbs/SY) or 100% wood excelsior fiber (min 0.8 lbs/SY, min 80% six-inch or longer fiber length) but it contains a double netting (top and bottom) of biodegradable material. An **SSM-II** is acceptable on slopes of 2:1 or flatter and in low flow swales with a maximum design shear stress of 1.65 psf, where natural vegetation will provide permanent stabilization. *Example Products: North American Green S1508M, East Coast Erosion Blankets ECS-28.*

SSM-III is an extended term mat lasting 12 to 24 months. It is composed of 70% agricultural straw or excelsior fiber and 30% coconut (coir) fibers with two woven biodegradable nettings. An **SSM-III** is acceptable on slopes of 1.5:1 or flatter and in medium flow swales with a maximum design shear stress of 1.80 psf, where natural vegetation will provide permanent stabilization. *Example Products: American Green SC1508M, North American Green CT258M, East Coast Erosion Blankets ECC-18.*

SSM-IV is a long term mat lasting 18 to 36 months. It is composed of 100% coconut (coir) fibers and polypropylene fibers with two plastic or woven biodegradable nettings with UV stabilization. An **SSM-IV** is acceptable on slopes of 1:1 or flatter and in high flow swales with a maximum design shear stress of 2.0 psf, where natural vegetation will provide permanent stabilization. *Example Products: North American Green CT25, Synthetic Industries Landlok C2, East Coast Erosion Blankets ECC-2 Double Net C2.*

Delaware E&S Control Handbook- Appendix 4

Turf Reinforcement Mats

Types I through IV (TRM-I through TRM-IV) are permanent, non-degradable three-dimensional mats that provide a matrix for the roots of vegetation to penetrate and entangle. TRMs can be used both in slope applications and as permanent channel liners. Some TRMs offer the option of being soil-filled or non-soil-filled, depending on the site conditions and desired results.

TRM-I provides permanent soil and turf reinforcement on slopes steeper than 1:1 and in channels where the maximum design shear stress over a 50-hour flow duration is 2 psf or less and where natural vegetation alone will not provide long term stabilization. *Example Products: Landlok TRM 450, North America P300 and East Coast Erosion Blanket ECP-2 10 oz. (all non-vegetated).*

TRM-II provides permanent soil and turf reinforcement on slopes steeper than 1:1 and in channels where the maximum design shear stress over a 50-hour flow duration ranges from 2.1 psf to 5.9 psf and where natural vegetation alone will not provide long term stabilization. *Example Products: North America P550 (non-vegetated), Landlok TRM 435 (vegetated), T060 and T0618 (all vegetated), Mirafi Mirafi (vegetated), Contech C-60 (vegetated) and East Coast Erosion Blanket ECP-2/ECSC-3/ECC-3 (non-vegetated).*

TRM-III provides permanent soil and turf reinforcement on slopes steeper than 1:1 and in channels where the maximum design shear stress over a 50-hour flow duration ranges from 6 psf to 8 psf and where natural vegetation alone will not provide long term stabilization. Products in the **TRM-III** category have a minimum tensile strength in the machine direction of less than 1,500 lbs. *Example Products: North America P300 and P550 (vegetated), East Coast Erosion Blanket ECP-2/ECSC-3/ECC-3/ECP-3 (all vegetated), Landlok 450/T051 (all vegetated).*

TRM-IV provides permanent soil and turf reinforcement on slopes steeper than 1:1 and in channels where the maximum design shear stress over a 50-hour duration of flow ranges from 6 psf to 8 psf and where natural vegetation alone will not provide long term stabilization. Products in the **TRM-IV** category have a minimum tensile strength in the machine direction of 1,500 lbs or greater. **TRM-IV** may be used in stormwater management pond emergency spillways in lieu of riprap (up to a riprap size of 12 inches) where infrequent flow will occur and grass is preferred over riprap. **TRM-IV** is not applicable as a riprap replacement in areas of outlet protection where concentrated flow is anticipated. *Example Products: High Performance TRM and East Coast Erosion Blanket T-RECS (all vegetated).*

Delaware E&S Control Handbook- Appendix 4

Stabilization Matting Selection Table			
Application	Criteria	Type	Example Products
Slope Stabilization	3:1 or flatter	SSM-I	North American Green S758N American Excelsior Corfix I PPS Packaging Xcel Straw Regular SR1
	2:1 or flatter	SSM-II	North American Green S1508N East Coast Broxbro Basket ECS-2B
	1.5:1 or flatter	SSM-II	North American Green SC1508N East Coast Broxbro Basket ECS-2B
	1:1 or flatter	SSM-IV	North American Green C125 Synthetic Industries Landlok C2
	steeper than 1:1	TRM-I	Landlok TRM 450 (non-vegetated) North American Green F300 (non-vegetated) Coilock C-45 (non-vegetated)
Channel Lining, Temporary	≤ 1.55 psf	SSM-I	North American Green S758N
	≤ 1.65 psf	SSM-II	North American Green S1508N East Coast Broxbro Basket ECS-2B
	≤ 1.80 psf	SSM-II	North American Green SC1508N East Coast Broxbro Basket ECS-2B
	≤ 2.0 psf	SSM-IV	North American Green C125 Synthetic Industries Landlok C2 East Coast Broxbro Basket ECS-2 Obl Net Coconut
Channel Lining, Permanent	≤ 2 psf	TRM-I	Landlok TRM 450 (non-vegetated) North American Green F300 (non-vegetated) Coilock TRM C-45 (non-vegetated) East Coast Broxbro Basket ECP-2 10 oz. (non-vegetated)
	2.1 psf - 5.9 psf	TRM-I	Miraf/Miramat TMS (vegetated) Landlok TRM 1050 & 1061B (vegetated) Coilock C-60 (vegetated)
	6 psf - 8 psf and < 1500 lbs/m ² tensile strength (Machine Directly)	TRM-II	North American Green P550 (vegetated) Landlok 450 (vegetated) East Coast Broxbro Basket ECS-3/ ECP-3/ECS-3/ECP-2 (all vegetated)
	6 psf - 8 psf and > 1500 lbs/m ² tensile strength (Machine Directly)	TRM-IV	Pyramat High Performance TRM (vegetated) East Coast Broxbro Basket T-RECS (vegetated)

Figure A-4a Stabilization matting selection table



Overview of Geotextiles

- **Underlayment for stabilized construction entrances and rip rap (soil stability)**
- **Silt fence**
- **Inlet Protection (Typ-1)**
- **Inlet Protection (Typ-2)**
- **Bioretention Fabric**

Stabilized Construction Entrance & Rip Rap Underlayment (GS-I)

- **Woven Geotextile for lining under the construction entrance DE#3 stone**
- **The flow-thru rate is 5 gallons/minute/sqft**
- **Also used under applications of rip rap for**
 - **Channel Lining**
 - **Outlet Protection**
 - **Stilling Basin**

Woven - 5 gallons/minute/sqft
Geotex 315ST

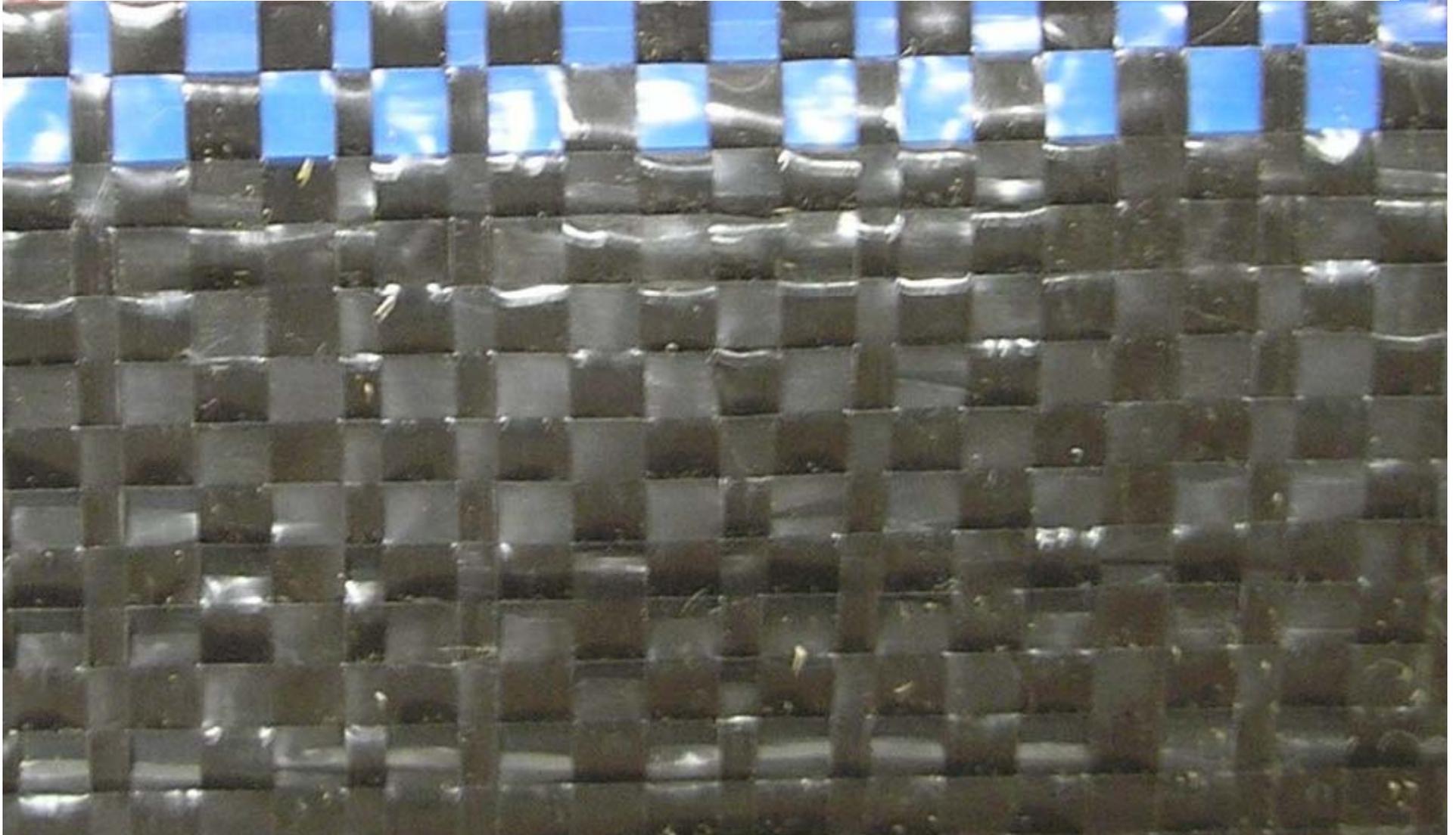


Silt Fence Fabric

(GD-I)

- **It is a woven fabric with a flow-thru rate of 25 gallons/minute/sqft (maximum)**
- **The same fabric is used for:**
 - **Standard Silt Fence**
 - **Reinforced Silt Fence**
 - **Super Silt Fence**

Standard Silt Fence Fabric-
Woven-25 gallons/minute/sqft



Inlet Protection (Typ-1)

(GD-II)

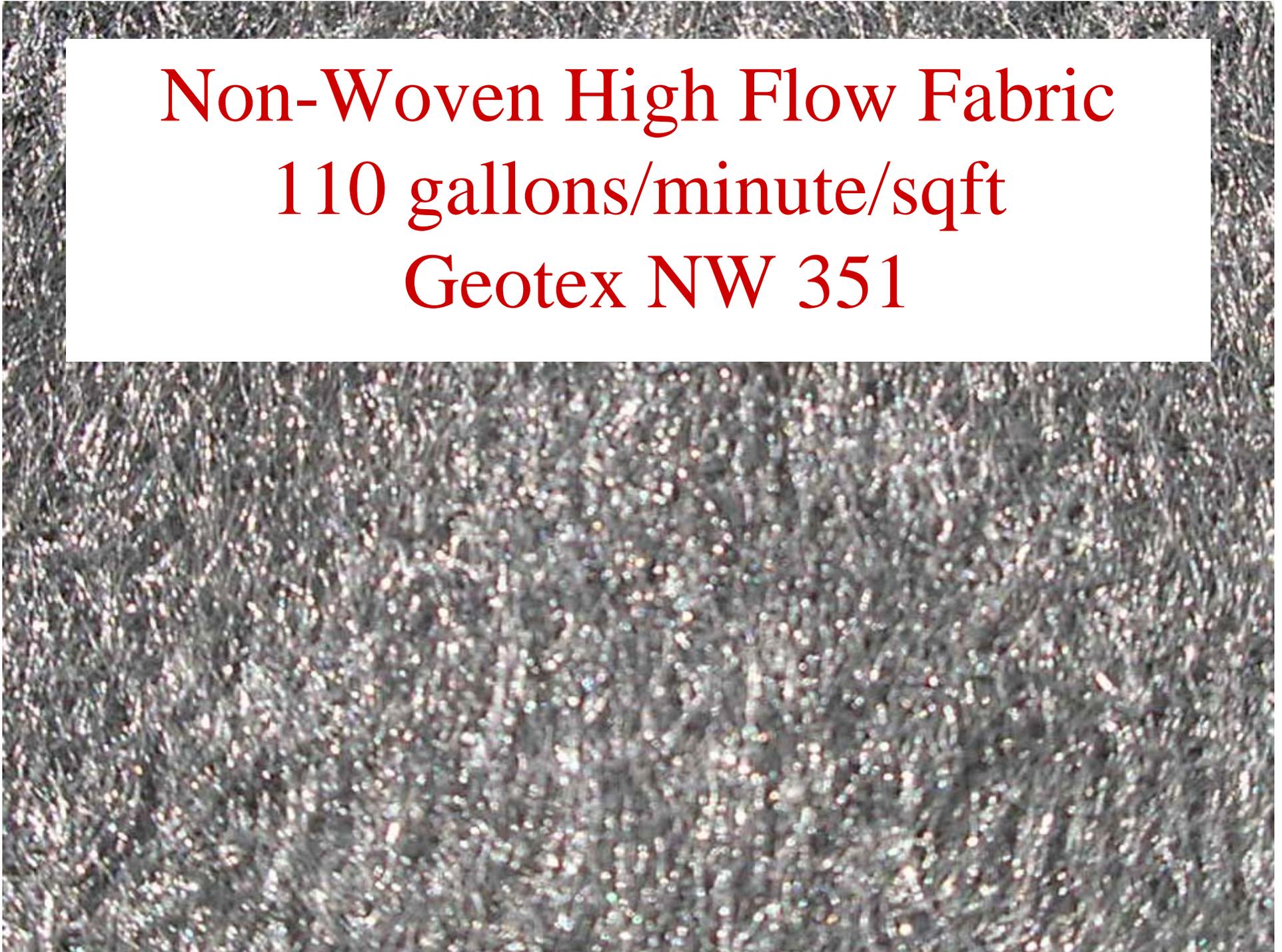
The non-woven fabric is used on the Typ-1 inlet and has a flow-thru rate of 110 gallons/minute/sqft (minimum) and a tensile strength of 80 lbs



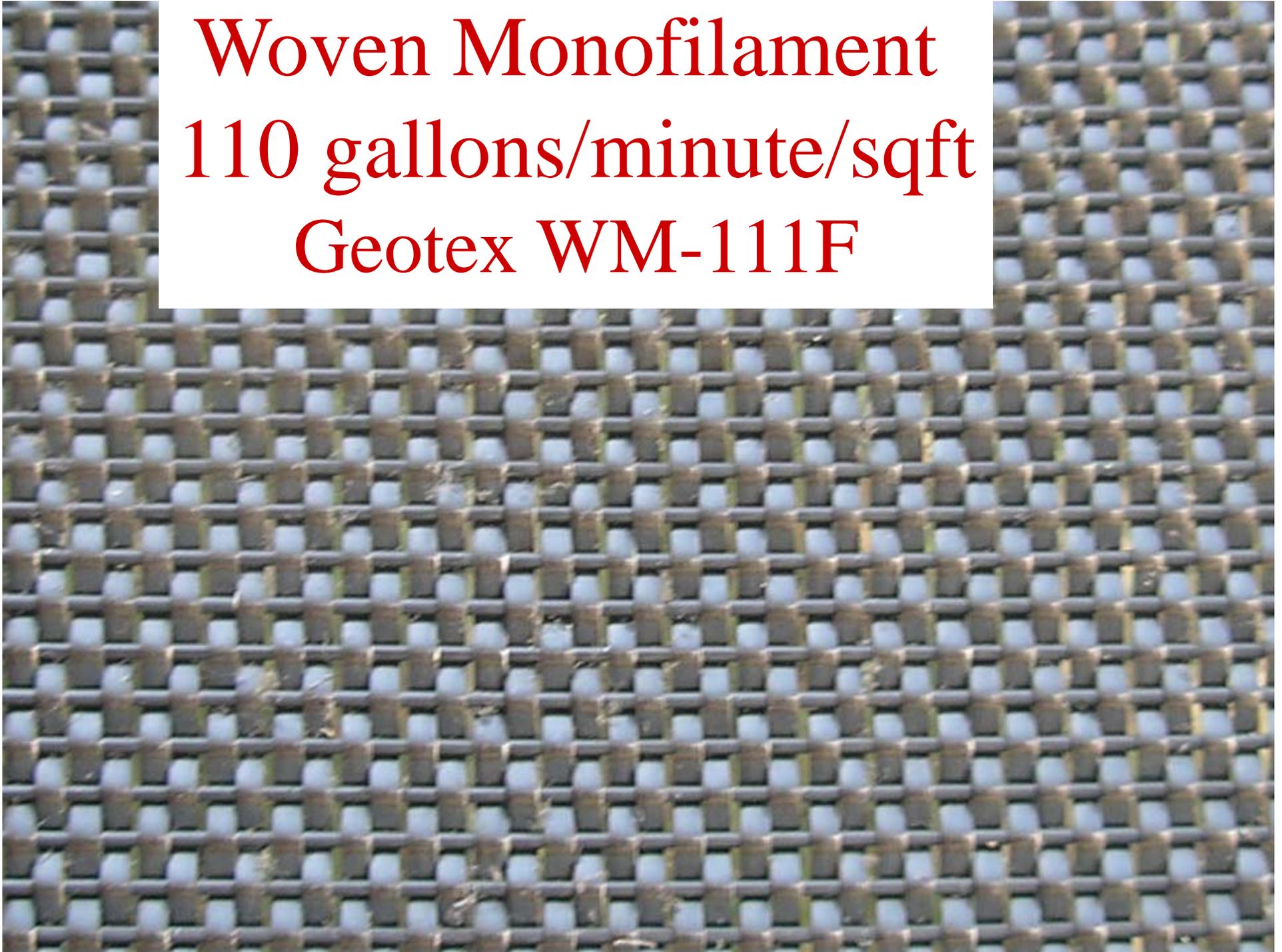
Non-Woven High Flow Fabric

110 gallons/minute/sqft

Geotex NW 351



Woven Monofilament
110 gallons/minute/sqft
Geotex WM-111F



Inlet Protection (Typ-2)

(GD-III)

The silt bags are used under the grate of a catch basin and has a flow-thru rate of 110 gallons/minute/sqft (minimum) and a tensile strength of 265 lbs.

A close-up photograph of a dark, woven fabric mesh. The mesh consists of a grid of vertical and horizontal strands, creating a series of small, rectangular openings. The strands are dark in color, possibly black or dark grey, and have a slightly textured appearance. The lighting is even, highlighting the texture of the fabric.

High Flow Fabric
110 gallons/minute/sqft
Tensile Strength 265 lbs



High Flow Fabric
110 gallons/minute/sqft
Tensile Strength 265 lbs

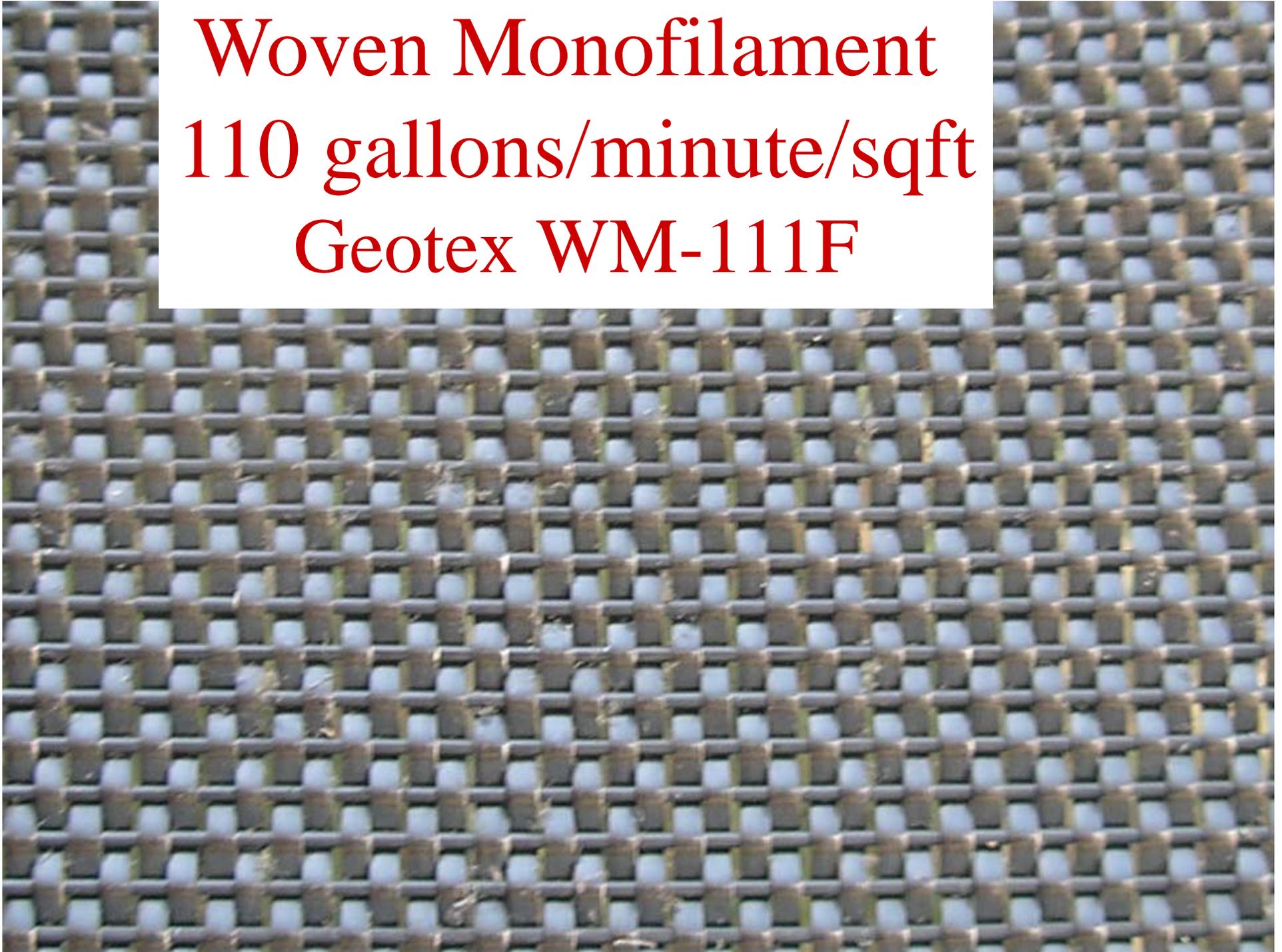


Bioretention Fabric

(GD-II)

The fabric used for lining a bioretention area is a woven monofilament with a flow-thru rate of 110 gallons/minute/sqft (minimum). If you hold this fabric up to the light you can easily see through it, unlike the lower flow fabrics.

Woven Monofilament
110 gallons/minute/sqft
Geotex WM-111F



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Handbook-
Appendix 3

Geotextile Selection Table		
Type	Application	Example Products
GS-I	Separation / Stabilization / Underlayment for: Dewatering Basin - Type 2 Gabion Chute Lined Channel Riprap Chute Riprap Outlet Protection Riprap Stilling Basin Stabilized Construction Entrance Stream Diversion Temporary Crossing	Mirafi 800X Amoco 2006 Geotex 315ST
GD-I	Culvert Inlet Protection Reinforced Silt Fence Silt Fence Super Silt Fence	Mirafi 100X Geotex 915SC Amoco ProPex 2130
GD-II	Dewatering Basin - Type 1 Dewatering Device Inlet Protection - Type 1 Pumping Pit	Mirafi F00402 GeoTex 111F Amoco 4535
GD-III	Inlet Protection - Type 2	Silt Sack High Flow Dandy Bag II Ultra-Drain Guard
GD-IV	Geotextile Dewatering Bag	Dirtbag 53/55 Dandy Dewatering Bag TerraTex N08/N10

Figure A-3a Geotextile selection table

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Geotextile Properties Table					
Type	GS-I	GD-I	GD-II	GD-III	GD-IV
Minimum Grab Tensile Strength (ASTM D-4632)	315 lbs	110 lbs	80 lbs	265 lbs	200 lbs
Maximum Grab Tensile Elongation (ASTM D-4632)	15%	20%	50%	20%	50%
Minimum Trapezoidal Tear Strength (ASTM D-4633)	120 lbs	50 lbs	35 lbs	45 lbs	80 lbs
Minimum Mullen Burst Strength (ASTM D-3786)	600 psi	300 psi	160 psi	420 psi	380 psi
Minimum Puncture Strength (ASTM D-4833)	120 lbs	60 lbs	45 lbs	100 lbs	130 lbs
Apparent Opening Size (ASTM D-4751)	40-80 US Sieve	40-80 US Sieve	40-80 US Sieve	20-40 US Sieve	40-80 US Sieve
Minimum UV Resistance after 500 hours (ASTM D-4355)	70%	70%	70%	70%	70%
Flow-thru Rate (ASTM D-4491)	5 gal/min/sqft maximum	25 gal/min/sqft maximum	110 gal/min/sqft minimum	110 gal/min/sqft minimum	70 gal/min/sqft minimum

Figure A-3b Geotextile properties table

QUIZ Question

Name two construction best management practices (BMPs) that would be reviewed on a construction site that use a geotextile. (Temporary controls used during construction)





POSSIBLE ANSWERS

Stabilized Construction Entrance
Dewatering Bag

Under Outlet Protection

Inlet Protections: Typ-1, Typ-2
or Typ-3

Stream Diversion



? Questions ?