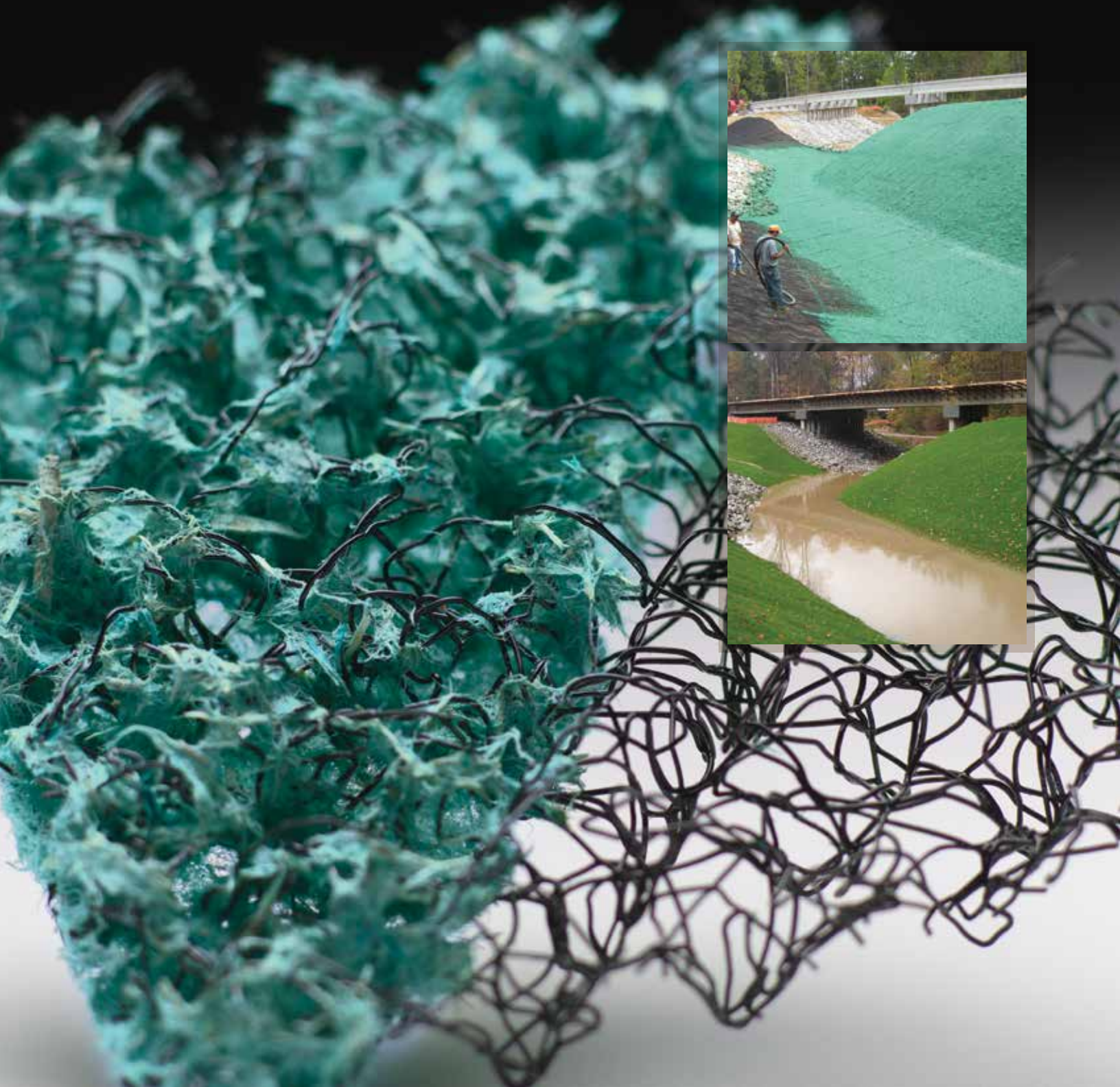




Solutions for your Environment™



A Revolutionary Green Alternative to Hard Armor



EXTEND THE BOUNDARIES OF NATURAL VEGETATION

The GreenArmor™ System combines engineering and agronomic excellence to create the world's most effective Green Design Engineering™ alternative. The system begins with Futerra® TRM (Turf Reinforcement Mat) which provides a permanent, lofty and open matrix. It is then hydraulically infilled with Flexterra® HP-FGM™ (High Performance-Flexible Growth Medium™) to intimately bond soil and seeds while accelerating growth. This unique system protects against elevated levels of hydraulic lift and shear force while encouraging turf establishment and long-term root reinforcement—growing denser vegetation, faster, in areas where other TRMs have fallen short. This synergistic combination of cost effective technologies enables the GreenArmor System to provide unprecedented levels of design safety.

QUICK, THICK AND LONG-TERM KEYS TO THE GREENARMOR SYSTEM



1) FUTERRA TRM PERMANENT PROTECTION

The resilient three-dimensional matrix of thermally fused nylon filaments creates the ideal anchor for root reinforcement. Because the lofty matrix consists of 95% open space, it readily accepts a hydraulic infill, captures soil and encourages vegetative growth. And unlike stitch-bonded TRM products combining loose fibers, threads and nets, Futerra TRMs resist crushing, unraveling and tearing during and long after installation. The durable, UV-stabilized Futerra TRM matrix offers unrivaled structural integrity.



2) FLEXTERRA HP-FGM IMMEDIATE PROTECTION/RAPID GROWTH

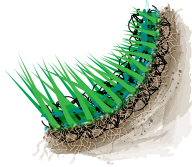
This hydraulically applied blanket provides immediate erosion control with no cure time required. Flexterra HP-FGM is designed with Thermally Refined® wood fibers, biodegradable crimped interlocking fibers and additives engineered to perform under extreme conditions, delivering > 99% erosion control effectiveness. When applied into a Futerra TRM, Flexterra HP forms an intimate bond with the matrix, seeds and soil. Holding 17 times its weight in water, the GreenArmor System doubles turf establishment rates of other TRMs.



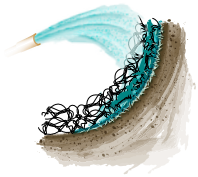
3) SYNERGISTIC SOLUTION UNMATCHED ROOT REINFORCEMENT

Combining today's most technologically advanced erosion control and revegetation products, the GreenArmor System is a superior way to reinforce turf. Futerra TRM is designed to maximize root reinforcement and stand up to high water velocity and shear conditions. Flexterra HP-FGM offers immediate protection while speeding growth establishment and root entanglement. Together these components provide up to ten times the erosion resistance of natural vegetation.

UNMATCHED FACTORS OF SAFETY
 Providing immediate and lasting protection, the GreenArmor System exceeds safety factors of other TRMs at 1/3 to 1/2 the cost of hard armor.



TWICE AS FAST!
 Holding 17 times its weight in water, the GreenArmor System doubles turf establishment rates of other TRMs.



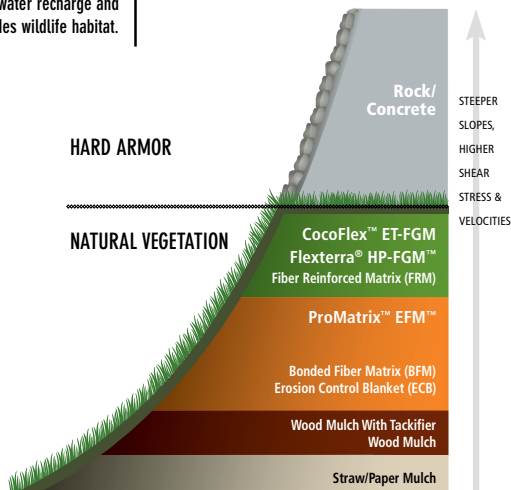
HYDRAULICALLY INFILLED
 Flexterra HP-FGM is sprayed into the Futerra® TRM matrix to provide immediate erosion control.

STRUCTURAL INTEGRITY
 Designed with durable, UV-stabilized, thermally fused nylon filaments, Futerra TRM will not unravel, crush or tear.

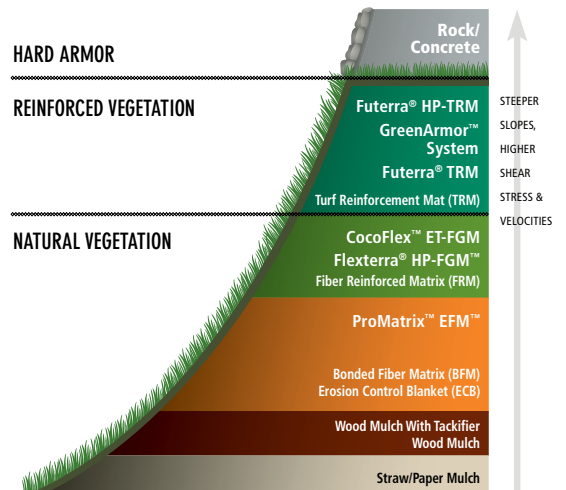
ENVIRONMENTALLY SUPERIOR
 More aesthetically pleasing—vegetation filters pollutants and cools runoff, promotes groundwater recharge and provides wildlife habitat.

HIGHER-DENSITY TURF
 With 95% open space, Futerra TRM assures thicker turf establishment and enhanced root reinforcement.

99% EFFECTIVE
 Upon installation, the GreenArmor System delivers superior erosion control on slopes and in channels.



Prior to the introduction of turf reinforcement systems, hard armor was used exclusively to accommodate sites where velocities of 6-8 ft/sec (1.8-2.4 m/sec) and shear stresses over 2-3 lb/ft² (95-143 N/m²) exceeded the limits of natural vegetation.



Today, the fully vegetated GreenArmor R45 can protect against velocities as high as 30 ft/sec (9.1 m/sec) and shear stresses up to 20 lb/ft² (958 N/m²).

REVOLUTIONARY SYSTEM— UNPRECEDENTED RESULTS

Designers need to know TRM performance limits in vegetated and unvegetated conditions. The GreenArmor™ System has been comprehensively evaluated at the world renowned Colorado State University (CSU) Hydraulics Laboratory. All testing was conducted according to ASTM D6460-12 protocol—“Determination of Rolled Erosion Control Product (RECP) Performance in Protecting Earthen Channels from Stormwater-Induced Erosion.”

VEGETATED RESULTS:

The GreenArmor 7020 System has been scrutinized for its performance with both cool season (Kentucky Bluegrass) and warm season (Bermuda Grass) species. Both species were seeded and established in portable planter boxes that were placed into a hydraulic flume at a fixed slope of 50 percent (2:1 H:V). The reinforced vegetation was then subjected to a series of increasing water discharge rates.

Close monitoring of the severe conditions proved the reinforced warm and cool season grasses resisted extreme flow velocities and shear stresses—a testimony to the strength, dimensional stability and true root reinforcement provided by the GreenArmor System. Further, High Performance GreenArmor R45 was evaluated with Bluegrass under the same conditions and demonstrated even higher levels of performance.



Image taken during testing at Colorado State University.



View of the GreenArmor System, demonstrating extensive root development within and below the reinforcing matrix.

Vegetated Product	Critical Shear Stress	Critical Velocity
GreenArmor™ System 7020	17.0 lb/ft² (814 N/m²)	20 ft/sec (6.1 m/sec)
GreenArmor™ System R45	20.0 lb/ft² (958 N/m²)	30 ft/sec (9.1 m/sec)

UNVEGETATED RESULTS:

The objective of unvegetated testing is to measure the ability of an RECP to resist soil erosion prior to vegetative establishment. The unvegetated GreenArmor System was installed within an indoor flume above a one-foot thick soil layer and subjected to increasing flow discharges.

This research demonstrated the unique properties of Flexterra® HP-FGM™ to physically bond to the soil surface and create a barrier to overland flow; resisting soil erosion and holding seeds in place. The GreenArmor 7020 System produced the highest unvegetated critical shear stress and velocity ratings reported in the industry—easily outperforming other TRM products.



Image taken during testing at Colorado State University.



Post-test endurance results concluded that unvegetated GreenArmor 7020 exhibited a critical shear stress of 5.8 lb/ft² (276 N/m²).

Unvegetated Product	Critical Shear Stress	Critical Velocity
GreenArmor™ System 7010	3.3 lb/ft² (158 N/m²)	12 ft/sec (3.7 m/sec)
GreenArmor™ System 7020	5.8 lb/ft² (276 N/m²)	16 ft/sec (4.9 m/sec)

REPLACES HARD ARMOR ON A WIDE RANGE OF SITES

The GreenArmor™ System brings together the rapid growth establishment capabilities found in Flexterra® HP-FGM™ with the dimensional stability of Futerra TRM®, the most widely used type of turf reinforcement mat on the planet. This unique solution has been proven to provide immediate erosion control, speed growth establishment and deliver superior performance—in a range of applications worldwide, including:



○ STEEP SLOPES & EMBANKMENTS



○ LANDFILL SLOPES & DIVERSION CHANNELS



○ EARTHEN DAMS & SPILLWAYS



○ DITCHES & STORMWATER CONVEYANCE CHANNELS



○ STREAMBANKS & SHORELINES



○ LEVEES & CANAL SIDE SLOPES



Case Study: Collierville, TN: Residential Development



Challenge: Developers of a retirement community sought an aesthetically pleasing and environmentally superior means of protecting a storm water conveyance channel located adjacent to a sensitive wetland.

Solution: Profile's GreenArmor™ System was recommended for its ability to withstand high-discharge water flow with triple the erosion resistance of non-reinforced vegetation, while also addressing environmental and aesthetic considerations.

Results: Even under the exceptional drought conditions of 2007, the conveyance channel exhibited dense vegetative growth in less than two months, requiring minimal maintenance and enhancing the area's visual appeal to nearby residents.



Case Study: San Antonio, TX: Residential Project



Challenge: Poor soil conditions on near-vertical geogrid reinforced slopes of up to 40 feet (12.2 m) in height required a cost-effective erosion control solution for the Toll Brother's Sonoma Verde residential project in San Antonio, TX.

Solution: Profile's GreenArmor System was chosen for the unrivaled structural integrity of Futerra TRM and the immediate protection and rapid turf establishment provided by Flexterra HP-FGM.

Results: More than 10 walls were implemented with the GreenArmor System. Within three months, the first 30-foot (9.1 m) wall was fully vegetated, and each of the walls held up despite record rainfall events and torrential downpours during the spring and summer of 2007.



**GREEN DESIGN
ENGINEERING™**
EARTH-FRIENDLY SOLUTIONS
FOR SUSTAINABLE RESULTS™

Green Design Engineering™ is a holistic approach that combines agronomic and engineering expertise with advanced technologies to provide cost-effective and earth-friendly solutions. Profile strives to deliver Green Design Engineering across our team of consulting professionals, innovative products and educational resources.



PS³ is a free, comprehensive 24/7 online resource you can use to design a project and select the right products that address both the physical and agronomic needs of your site. It will help you develop holistic, sustainable solutions for cost-effective erosion control, vegetation establishment and subsequent reductions in sediment and other pollutants from leaving disturbed sites. Because good plans start with the soil, PS³ offers free soil testing to ensure this critical step is considered. To access the site, design your project and take advantage of a free soil analysis, visit www.profileps3.com.



Solutions for your Environment™

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