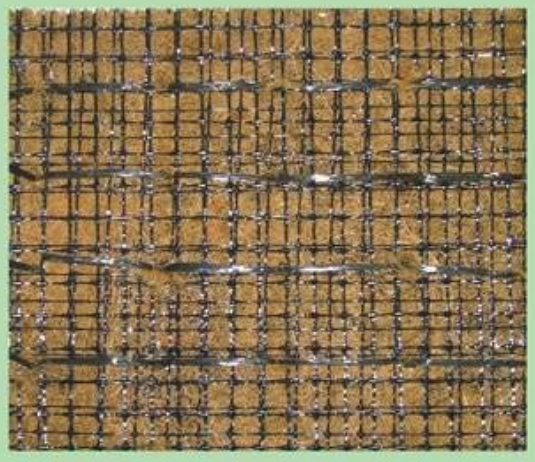
Doing what comes naturally

C - TRM

The reliable solution for fast vegetation growth on bare and steep slopes in civil engineering works.

C-TRM (Turf Reinforcement Mat-TRM) is a turf reinforcement concept method by which the natural ability of plants to protect soil from erosion is enhanced through the use of geosynthetic materials. C-TRM consists of a three-dimensional web of polypropylene netting layered with either coir or oil palm fibres are positioned and sandwiched between a bottom netting and a heavy, crimped, intermediate net which is overlaid with a heavy top netting. All these are mechanically bound together by stitching to form a unique triple netting matrix system. This flexible three-dimensional matrix retains seeds and soil, stimulates seed germination and assists the plants roots to be developed and integrated into a mesh system to prevent soil being eroded away by surface runoff water.



C-TRM reinforcement mats are composed of durable synthetic materials for a period of time until the grass and plant grows over or on top of the mats. This synthetic material shall be inert to chemicals normally encountered in soil. Not only the C-TRM will be able to blend aesthetically with the environment but also will perform erosion resistance due to tractive forces or shear stresses associated with high velocity or runoff on slopes and channels. Different grades of C-TRM are available to meet the different design requirements and applications designed by engineers.

C-TRM, turf reinforcement mats are applicable and cost effective to protect and to control erosion in difficult river banks, newly cut slopes, channels, sway and ditch slopes, landscaping, highway and railway verges, medians, embankment slopes, spillways, reservoir, pond and lagoon slopes, and golf courses.

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Erosion Control Mat, C-TRM
Typical Specifications

	Typical Values
Fibre	Coir or palm fibre
Fibre Content	100%
Width (m)	2.0 m
Length (m)	20m or custom length possible
Area (m^2)	40.0m

Coir -Turf Reinforcement Mat (C-TRM) consists of a dense layer of either coir or oil palm fibers, positioned between reinforcing polymer mesh and stitched together with polyolefin yarn at 4 cm centre to form a flexible but strong knitted three-dimensional bio-engineered blanket. The C-TRM shall be inert to chemicals normally encountered in a natural soil environment. It also includes a layer of corrugated netting to provide a void area which helps to hold one top soil in a more severe condition.

Properties	Test Method	Unit	TRM-CF 360
Mass per unit area	ASTM D5261	g/m^2	360
Thickness	ASTM D6525	mm	11
Resiliency	ASTM D6524	%	87
Density	ASTM D792, Method A	g/cm^3	0.9
Tensile Strength, MD CD	ASTM D4595 ASTM D4595	kN/m kN/m	10 7
Elongation at Break, MD CD	ASTM D4595 ASTM D4595	% %	11 9
Porosity	ECTC Method	%	97
Dimensional Data Width Length Area		 m m m^2	 2.0 20.0 40.0

Eff, 01/06/03

Flow Velocities (Short Term) 2.5m/s (estimate)
"n" Value Roughness Coefficient 0.018 (estimate)

TODAY'S ENGINEER CHOICE

Before After

Environmentally conscious engineers, architects and designers are choosing natural fibres and methods to meet the challenges of erosion of cut slopes, wetland rehabilitation, river bank and creek erosion to name a few. To achieve natural growth regeneration or reclamation under extreme conditions, grass seeds and young plants need to be protected while vegetation establishes.

Eco-BioMat *meets these challenges wherever rapid germination and sustained growth is required to solve erosion control and landscaping problems*. One of the best way is still the nature's way to heal erosion through the establishment of living matter and organisms.

Not all soil surface erosion is the same. When planning erosion prevention and remediation measures, soil type, climate and weather, moisture availability and humidity, the length and degree of slopes are some factors that need to be considered.

Eco-BioMat consists of natural materials-biodegradable coir or palm fibres, stitched together with lightweight reinforcing polymer mesh to form a flexible but strong knitted bio-engineered mat. The matrix provides a pad for surface movement of runoff, reduce erosion and minimize downward migration of soil beneath the blanket.

Eco-BioMat-Completely covered with grass

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Eco-BioMat works effectively when the following tough situations occur:

- **Rainfall** - It absorbs and dissipates energy released by heavy falling rain and hence prevents soil and fertilized seeds of being washed away.
- **Surface Runoff** - The three dimension blanket matrix reduces velocity of surface runoff hence prevent the formation of rills and gullies.
- **Drought Condition** - The natural fiber retains moisture and supports vegetation growth during the drought condition.
- **Improved Soil Fertility** - Since ***Eco-BioMat*** biodegrades and decomposes with time, it naturally fertilizes the soil by increasing and improving the organic content.
- **Cost Effective** - Since coir and palm fibres are easily available locally in abundance, these natural fibres are used to produce Eco-Biomat and made into efficient roll sizes for ease of transporting, handling and installing on site.
- **Improved the plant roots system** - The interlocking matrix of the coir or palm fibres assists young roots to spread easily across the surface of the slope and penetrate its roots deeper into the soil as the plant becomes established.

The common applications of ***Eco-BioMat*** are:

-Erosion Protection of slopes
-Revegetation of newly cut and fill slopes
-Protection of natural or man-made lakes, Wetland, channels, river and waterways.
-Leisure developments namely landscaping of Golf Course and Residential projects, etc.
-Revegetation of reclaimed mining lands.

General Specification

Properties	Test Method	Unit	CF-150 / PF-150	CF-250 / PF-250	CF-350 / PF-350	CF-400 / PF-400
Mass per unit area	ASTM D3776	g/m	135-165	235-265	335-365	385-415
Thickness	ASTM D1777	mm	3.0	5.0	7.0	8.0
Tensile Strength (MD)	ASTM D4595	kN/m	2.0	2.5	3.0	3.0
Elongation at Break (MD)	ASTM D4595	%	>20	>20	>20	>20
Dimensional Properties						
Width		m	2.0	2.0	2.0	2.0
Length		m	40.0	40.0	40.0	40.0
Area		m	80.0	80.0	80.0	80.0