

**SLOPES**

**EMBANKMENTS**

**LANDFILLS**

**SHORELINES**

**CHANNEL LININGS**

**DITCHES**

**PONDS**

**EARTHEN DAMS**

**STORM CHANNELS**

**SPILLWAYS**

**BIOENGINEERING**

**LEVEES**

**WETLANDS**

**GOLF COURSES**

**RESIDENTIAL**

# Enkamat<sup>®</sup>

Root Reinforcement Matrix R<sup>2</sup>M



*The thin line between comfort and catastrophe™*

**Enka-Engineered**

CIVIL ENGINEERING  
PRODUCTS

**COLBOND**



Kansas City, KS before



Kansas City, KS after

**Enkamat R<sup>2</sup>M is designed to grow wetland plants and / or native ecospecies. TRM's are designed for turf only.**

### Why Green Engineering?

Green engineering focuses on improving local and global environmental quality. It is applying environmentally conscious attitudes, values, and principles and combining them with science and technology to make the world a better place to live.

Restoring natural vegetation with Enkamat reduces soil erosion, filters pollutants, recharges groundwater, improves water quality, and enhances native ecosystems.

### Enkamat Enhances the Environment

Soil erosion and sedimentation caused by stormwater runoff and concentrated water flow is a big problem not only during construction, but during the post closure phase of construction projects. The Phase II Rule of the EPA's Clean Water Act (1998), National Pollutant Discharge Elimination System (NDPES) promotes stricter requirements and increased federal dollars for the implementation of best management practices (BMP's) for erosion and sedimentation control.

It is estimated that 97% of all acreage under development is, and will continue to be, affected by this legislation. One of the most cost effective ways to prevent erosion and reduce sediment loss is to stabilize disturbed land with bioengineering.

Especially around wetlands, lakes, streams, and channels. Enkamat anchors natural vegetation and can be used to re-engineer the land to enhance the natural cover's performance on designed steeper slopes or under high water velocity and shear conditions.

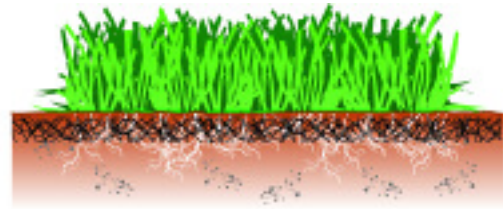
### Enkamat Technology

Enkamat root reinforcement technology was introduced in the early 1970's and set the parameters for success for all erosion control products:

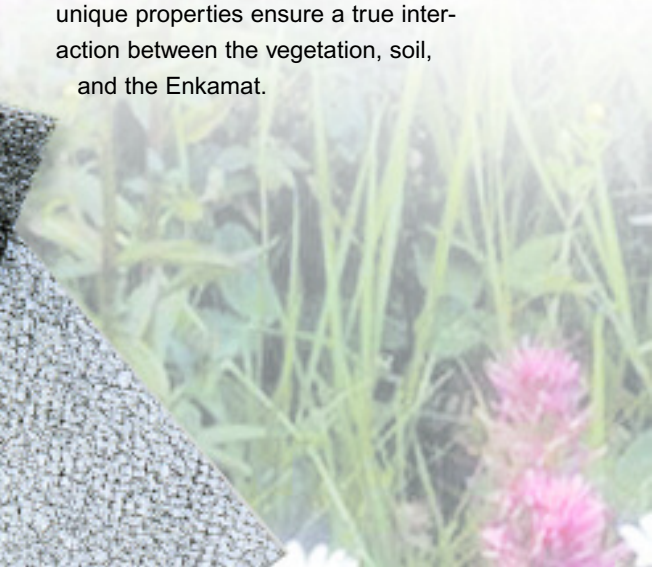
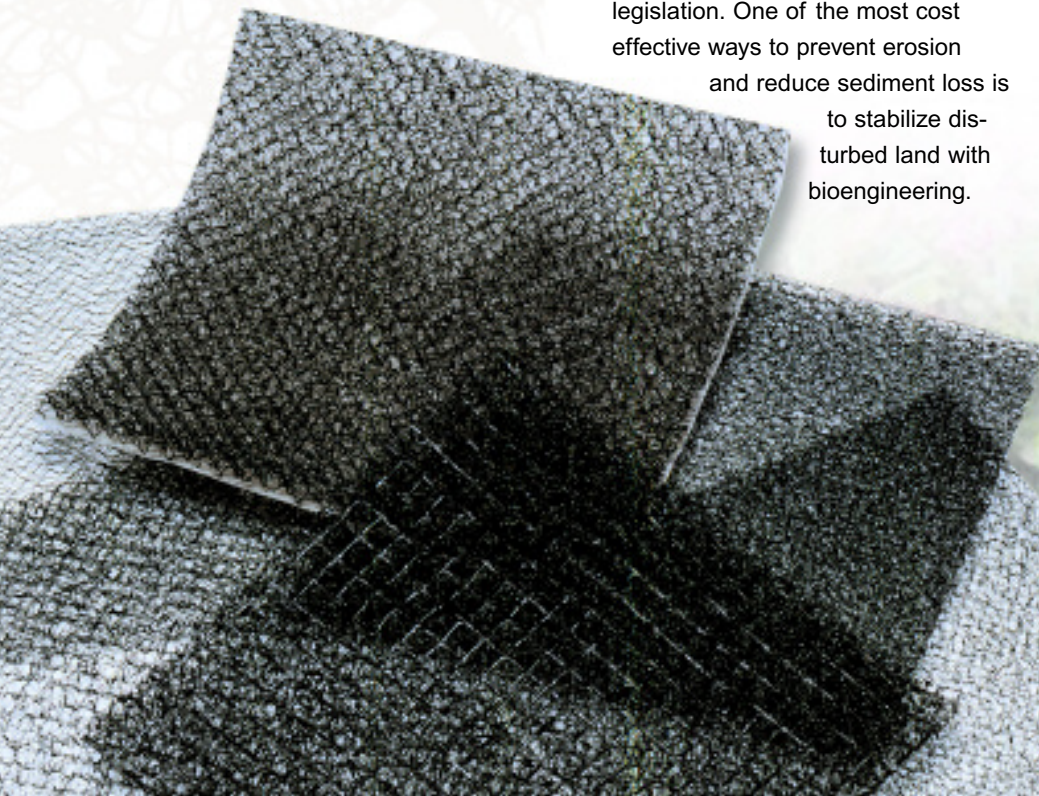
**Conformability / Flexibility** - the ability to conform and adapt to any ground surface.

**Survivability / Durability** - resistance to damage before, during, and after construction.

**Performance** - the ability to minimize soil and vegetation movement during rainfall (hydraulic loading).



The 95% open structure of Enkamat is designed to ensure that any type of vegetative growth is not restricted when interacting with the mat. As the roots grow, they become entwined within the Enkamat, making an extremely stable cover. Its tough root reinforcing system anchors vegetation and provides a holding cavity for the soil. These unique properties ensure a true interaction between the vegetation, soil, and the Enkamat.



Enkamat will not unravel or lose its structural integrity when cut in the field during installation.

Note: Some competitive products lose their fibers if the RECP is cut. This compromises the integrity of the product and causes environmental concerns when loose fibers migrate into ecological systems.

The performance parameter that best predicts failure or maximum performance of a TRM is resistance to shear force created by hydraulic loading. Also, Enkamat is manufactured from nylon which has a specific gravity  $> 1$  to ensure that it will not float under any hydraulic condition. TRM's manufactured from polypropylene have a specific gravity  $< 1$  which causes them to float.

Consider these factors when using Enkamat:

- Soil characteristics
- Gradient / slope
- Flow characteristics
- Water runoff
- Frequency of rain events
- Establishing / maintenance of vegetation

### **Enkamat vs. Temporary Erosion Control**

Enkamat, unlike temporary erosion control products, is designed to stay in place permanently to protect seeds and soil. The protection improves over time with the establishment of vegetation.

### **Why use Enkamat?**

- Reinforced vegetation layer
- Increased permissible shear of the vegetation
- Will not lose performance or integrity when cut in the field
- Non-restrictive vegetation growth

### **Slopes and Channels**

Because of the dense concentration of land development, erosion and slope failures due to upstream construction activities are becoming more of a burden for communities. An increase in runoff and shear stresses on slopes and channels causes sediment loss and downstream deposition, which is a costly violation of NDPEs / Phase II Rules. Enkamat helps vegetation perform better on steep slopes and high velocity channels by anchoring roots permanently in the soil. This is a major factor to consider in slopes steeper than 3:1 and channels with a high water velocity.

### **Green Slopes & Channels Provide:**

- Erosion control
- Filters pollutants
- Groundwater recharge
- Oxygen production
- Cooling effect
- Recreation
- Aesthetics



*Beverly Hills, CA before*



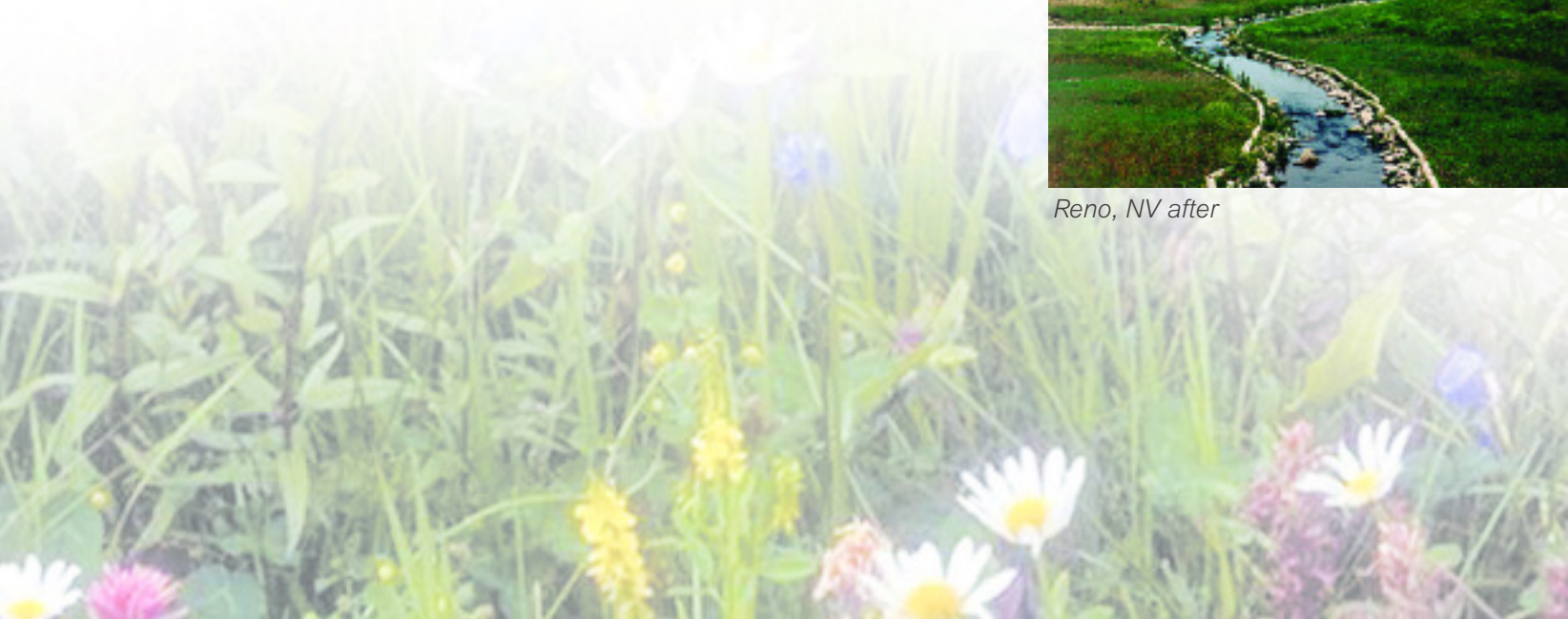
*Beverly Hills, CA after*



*Reno, NV before*



*Reno, NV after*



## EnkaGreen e-engineering with Enkamat®

Designing with Enkamat on your next erosion control project is just a few clicks away. EnkaGreen allows engineers / designers to analyze various channel linings using FHWA's Hydraulic Engineer Circulation (HEC-15) design methodology. It can also calculate slope linings using USDA's Revised Universal Soil Loss Equation (RUSLE). Once slope or channel costs are calculated, the results can be analyzed and compared.

### What makes EnkaGreen better than the erosion control design software currently available?

- Extensive help file and graphics make the CD more user friendly
- Ability to analyze user-determined Manning's roughness coefficient
- Haestad Flow Master results can be verified
- Cost analysis module allows more freedom to enter whatever tasks or materials are needed

## Enkamat II Composite TRM - Temporary & Permanent Solution

Enkamat II was developed specially for NDPES Phase II compliance. It reduces soil loss and sediment transport, while establishing a long term erosion control solution. The result is immediate erosion protection until vegetation becomes completely established and permanently anchored in place.

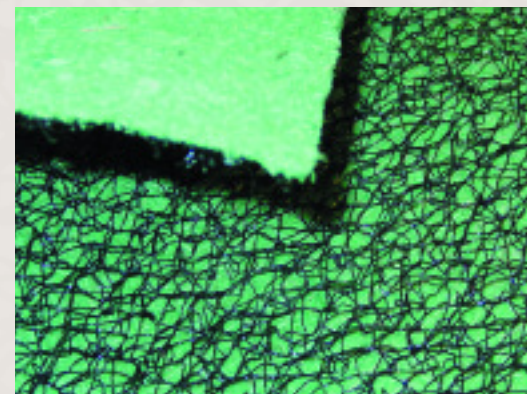
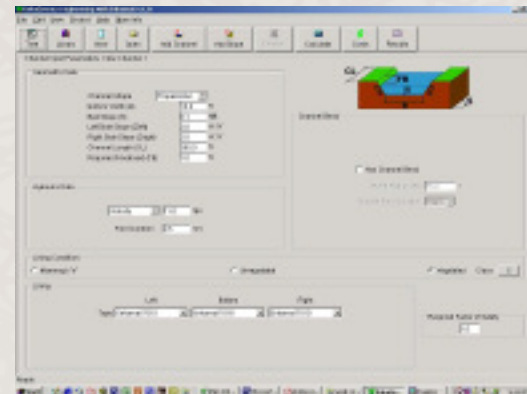
Vegetation is the most cost-effective and aesthetic way of preventing erosion or reducing sediment transport on any construction site. Enkamat II's fiber-reinforced, biodegradable component protects seeds from displacement while retaining moisture for optimal seed germination and plant emergence. The quicker vegetation is established, the less opportunity there is for soil washing away from the site. With concerned citizen groups and environmentalists aware of Phase II violations, risking the potential fines / litigation of noncompliance could be costly.

Enkamat II is ideal for use in natural wetland areas and sensitive ecosystems. It is netless and stitchless, which means there are no unsightly and harmful nets or yarns floating downstream or trapping wildlife. It's a green alternative with - *No Strings Attached!*

**Colbond** is a global producer of high-quality synthetic nonwovens for flooring, automotive, and construction applications and three-dimensional polymeric mats and composites for civil engineering, building, and industrial applications.

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Enkamat II is a TRM composite made of fiber-reinforced, biodegradable materials bonded to a three-dimensional Enkamat core.

# COLBOND

1301 Sand Hill Road  
P.O. Box 1057  
Enka, NC 28728  
Tel. (+1) 828-665-5050  
Toll Free: (+1) 800-365-7391  
Fax (+1) 828-665-5009

email:  
enka-engineered@colbond.com

Internet:  
www.colbond-usa.com