GEOfabrics®

ProTexia

Turf Reinforcement Mat

ProTexia TRM

Three dimensional Turf Reinforcement Geomat

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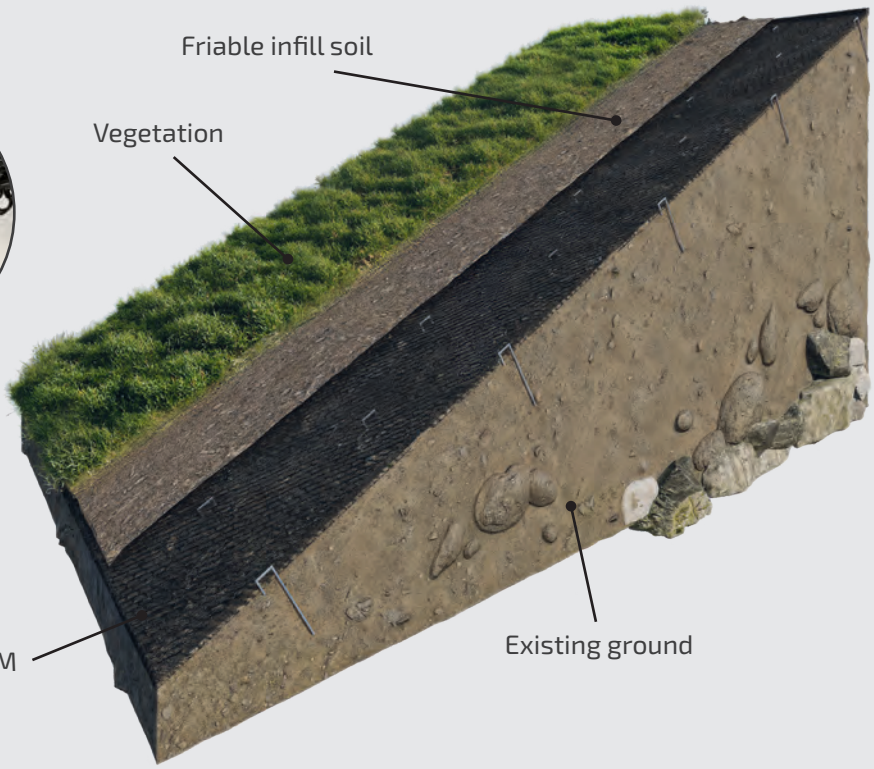
Managing surface erosion

Where earth is exposed to intermittent waterflow, rain, or wind the surface is liable to erode. Grass or other vegetation cover protects against low level erosion. Reinforcing the vegetation with a Turf Reinforcement Mat (TRM) enhances the erosion protection afforded, and allows this nature based erosion control approach to be used in a variety of applications.

The solution: ProTexia TRM

GEOfabrics ProTexia TRM is a range of specifically engineered turf reinforcement mats that provide surface erosion control. The mat is formed by bonding polypropylene monofilaments to create a three dimensional matrix that retains soil particles and seeds. For more demanding applications ProTexia TRM is available with an integral geogrid to give high tensile strengths.



For more information please call 0113 202 5678 or email info@geofabrics.com

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Applications

Where pluvial, fluvial or aeolian erosion is anticipated vegetation offers low cost, natural protection. The protection afforded by the vegetation is enhanced by the addition of ProTexia TRM.

The most common applications for ProTexia TRM are vegetated slopes, dykes and swales where intermittent waterflow is expected, for example on grassed waterways, riverbanks and flood defences, or where wind and rain erosion are likely on exposed slopes or embankments along linear infrastructure such as highways and railways.

Where housing or other infrastructure developments require surface water management swales, balancing ponds and other sustainable urban drainage systems may be used. ProTexia TRM may be used to protect the integrity of the vegetated assets contributing to a projects biodiversity net gain.

Green Infrastructure reduces the environmental impact of developments, and when compared with traditional linear or point drainage can often be installed in less time at a lower cost.

ProTexia TRM

ProTexia TRM provides an open matrix structure with high void ratio designed to retain soil and seeds. The flexible nature of ProTexia TRM allows it to follow the contours of the surface and maintain intimate contact with the soil. When filled with soil the three dimensional matrix creates a protected environment that resists surface erosion and accelerates the germination of vegetation.

As the root system develops it grows vertically and laterally through the matrix of ProTexia TRM, enhancing the natural performance of the grass roots and crown. The resulting sward is able to resist far greater shear forces than vegetation alone can, protecting the subsoil and integrity of the asset.

The carbon impact of a ProTexia TRM reinforced vegetation erosion protection layer is significantly lower than hard armour solutions. ProTexia TRM is a lightweight, simple to install option that works with site-won topsoil rather than imported carbon intensive concrete or asphalt based systems.

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Design Considerations

Design for turf reinforcement applications is influenced by several factors. Steepness and length of slope, roughness of the underlying substrate, thickness of cover material to be applied and so on.

ProTexia TRM can be used on most slopes to protect the surface from erosion. It is generally recognised that 65° is the steepest slope that allows rainfall to penetrate and sufficiently irrigate the vegetation.

For watercourse applications CIRIA 116 suggests vegetation reinforced with a TRM can be used in flows of up to 6 m/s. Velocity is only one element, with channel dimensions, frequency of flow, possible presence of debris and various other factors to be analysed as part of the design process.

Products in the ProTexia TRM family provide different levels of performance, which allow Engineers to achieve the optimal balance between performance and cost.

Product	Width (m)	Length (m)	Thickness (mm) ISO 9863	Tensile Strength MD (kN/m) ISO 10319	Elongation (%)
Megamat 10	2.4	75	10	1.3	65
Megamat 15	2.4	50	15	1.7	60
Megamat 20	2.4	40	20	1.8	50
Megamat R20	2.5	40	15	20	10
Megamat R35	2.5	40	15	35	10
Megamat R55	2.5	40	15	55	10
Megamat R80	2.5	40	15	80	10
Megamat R110	2.5	40	15	110	10
Megamat R150	2.5	40	15	150	10

Correct at the time of publication, refer to datasheets to verify current specifications

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ProTexia TRM installation

Correct installation is essential to maximise the performance and long-term effectiveness of ProTexia TRM.

Further attention may be required to address site-specific requirements and conditions. These guidelines are intended for the installer and to promote the most efficient and effective installation, whilst maintaining quality, maximising the geocomposites' performance, and without compromising health and safety.

ProTexia TRM can be used on most slopes to protect the surface from erosion. It is generally recognised that 65° is the steepest slope that allows rainfall to penetrate and sufficiently irrigate the vegetation.

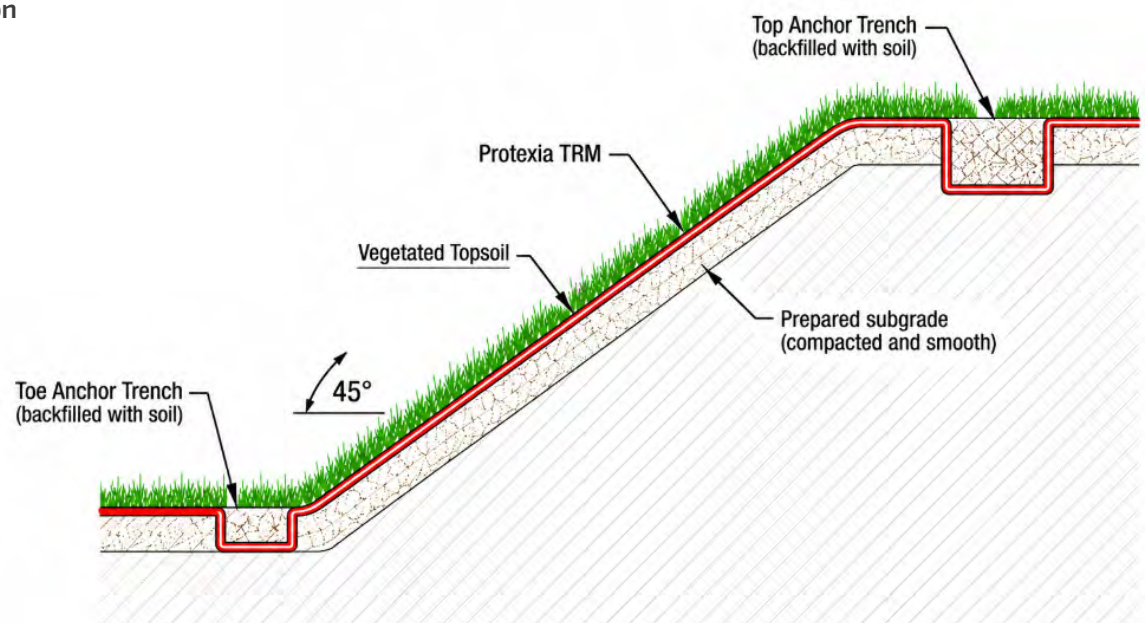
The prepared slope should have a smooth, regulated surface and be free of vegetation. ProTexia TRM must be anchored at the slope crest and unrolled from top to bottom and secured at the toe of the slope. The crest anchor trench must be sufficient to resist pull-out depending on site conditions, and in any case a minimum 300mm x 300mm.

Adjacent rolls are typically lapped by a minimum of 100-150mm to form a longitudinal joint on standard slopes. It may be necessary to increase the overlap on curved and other irregular profiles. Where waterflow is expected rolls should be installed "shiplap" style, i.e. the upstream roll is laid on top of the downstream roll.

Latitudinal joints mid-slope should be avoided where possible. If a mid-slope joint is necessary, for unreinforced solutions the lap should be min 100mm and secured with extra pins at 500mm centres. No more than one joint per drop should be permitted and overlaps in adjacent drops must be staggered by at least 2m. When dealing with reinforced solutions, lap length and pin placement should be specified by the project engineer to suit site specific requirements.

The ProTexia TRM is typically pinned to the soil to hold it in place and ensure intimate contact between TRM and soil across the whole area. The type of pin and frequency required is dependent on the soil and the application, but as a general rule our standard 500mm J-pin at a frequency of 0.5 to 1 pin per sqm is sufficient for erosion control applications up to 45°. For steeper slopes, or where turbulent or higher velocities are expected pinning frequency should be increased. Illustrative pinning layouts are shown below and should be adapted to meet design requirements and site conditions. For very steep slopes or more demanding installations with higher loads ProTexia TRM can be secured using ground anchors and an appropriate load spreading plate.

TRM Section



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Once placed and secured ProTexia TRM should be filled with a growing media. The growing media may be a friable soil, a hydroseed mulch or similar. It is important to make sure the mat is filled to promote good growth of vegetation. If airgaps are present vegetation may not establish sufficiently to grow through the mat and into the subsoil. Seed can be added before placement, or mixed into the cover soil. ProTexia TRM is inert and therefore compatible with all common landscaping grass and wildflower seed mixes.

In applications where frequent or continuous waterflow is expected, for example in the base of a surface water management channel, ProTexia TRM can be filled with a 2-5mm stone.

Where a pin or anchor cannot be used to secure ProTexia TRM, for example over a geomembrane or liner, or where reinforcement to allow a deeper cover is desired, a drapery style installation is possible using the ProTexia TRM R range. These products have an integral geogrid which provides reinforcement as well as erosion control. In these cases the reinforcement strength must be calculated according to the geometric and geotechnical conditions on site.

Storage on site

ProTexia TRM rolls should be stored in a clean, dry and secure location on firm, level ground, clear of standing water and other contaminants. Rolls should be kept in their original packaging until required for installation and protected from damage by construction plant, sharp objects and other site activities.

Where rolls are stored outdoors, they should be protected from prolonged exposure to direct sunlight and adverse weather conditions. Care should be taken during storage and stacking to prevent crushing, deformation or damage to the three-dimensional structure of the mat.

Rolls should be visually inspected prior to installation. Any material showing significant damage or deformation should be set aside and referred to GEOfabrics before use.

ProTexia TRM can be stored outdoors, but must be kept in it's packaging and protected from UV exposure. If stored in particularly cold climates it may lose some elasticity so care should be taken when unrolling.

Lifting

Roll weights can vary (19kg to 28kg)*. Rolls should be handled by two persons or using suitable mechanical handling equipment, subject to a site-specific manual handling assessment.

Note: Geofabrics does not supply lifting equipment.

Cutting

ProTexia TRM may be cut to the required dimensions on site using suitable sharp cutting tools. Where possible, the required length should be established before installation, allowing additional material for crest and toe anchor trenches and any required overlaps. Cutting should be carried out on a stable surface using appropriate PPE. For more information please call 0113 202 5678.

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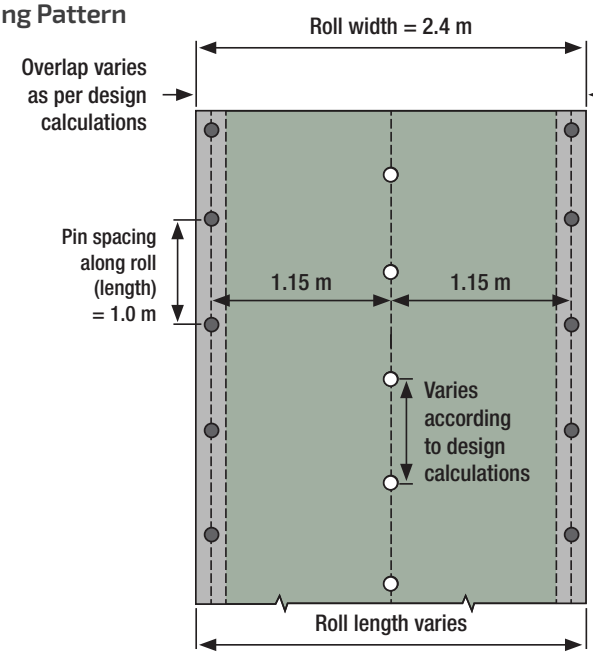
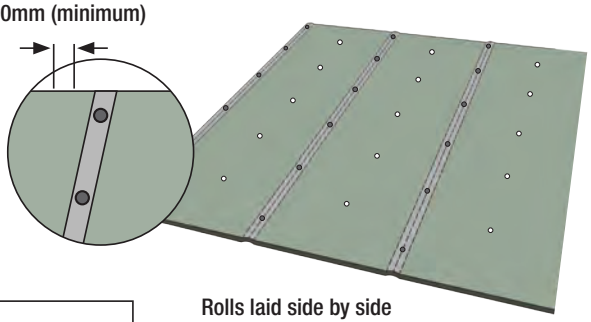
Low Density Example Pinning Pattern



The fixing layout shown is indicative only and is provided as an example. Roll dimensions, fixing spacings, number and arrangement of pins, and overlap widths may vary depending on site conditions and project requirements. The final fixing layout shall be determined by the Project Engineer.

Overlap detail (plan view) 100mm (minimum)

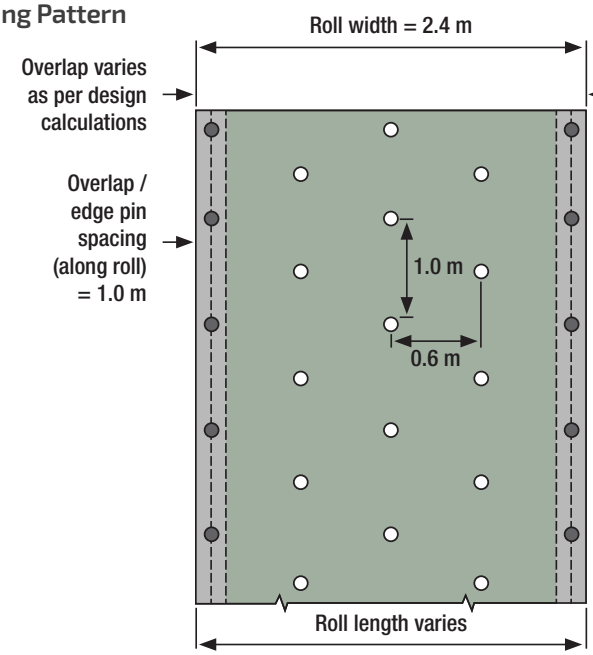
Indicative 3D view (looking down slope)



Rolls laid side by side with minimum 100 mm overlaps. Overlap pins are shared between adjacent rolls.

Key:
- Overlap/edge pin (1.0 m centres)
- Internal pin
- Overlap line (Min 100mm)
- Roll material (2.4 m wide)
- Overlap area

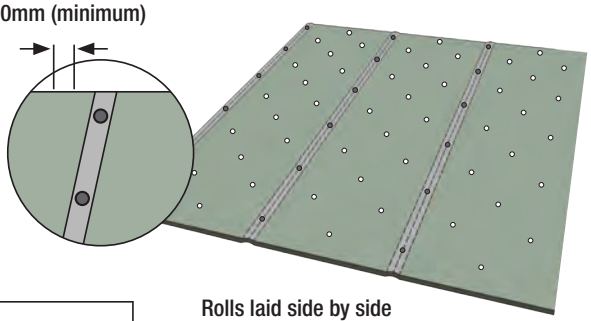
High Density Example Pinning Pattern



The fixing layout shown is indicative only and is provided as an example. Roll dimensions, fixing spacings, number and arrangement of pins, and overlap widths may vary depending on site conditions and project requirements. The final fixing layout shall be determined by the Project Engineer.

Overlap detail (plan view) 100mm (minimum)

Indicative 3D view (looking down slope)



Rolls laid side by side with minimum 100 mm overlaps. Overlap pins are shared between adjacent rolls.

Key:
- Overlap/edge pin (1.0 m centres)
- Internal pin
- Overlap line (Min 100mm)
- Roll material (2.4 m wide)
- Overlap area