



## Geosynthetics

Geosynthetics are becoming commonplace within the construction markets. They are used for countless applications including: to strengthen existing ground, improve its bearing capacity, make highways last longer, support embankments, stop landfill leachates contaminating the ground and limit erosion.

With defined technical characteristics and performance properties, geosynthetics are replacing the use of natural materials within construction. They are proven to reduce project cost and environmental impact compared with traditional construction methods.

Innovation and development has generated many product types; there is a significant difference in the performance of a simple geotextile to

separate two construction materials and a high technology geogrid designed to support a railway embankment within a seismic zone. Clients should be aware of and select, solutions and products that are appropriate for their specific site conditions.

Maccaferri has over 30 years' experience in the manufacture and supply of geosynthetics, and nearly 140 years with its world renown traditional products. The knowledge and capability to easily combine these products and solutions enables Maccaferri to offer clients tailored solutions, optimising value and reducing project cost.

Maccaferri works with its clients to develop, manufacture, design and construct solutions for the construction industry.

# Our Range

#### Reinforcement



Paraproduct

Geogrid Reinforcement





**MacGrid®WG** Reinforcement



Woven Geotextile



MacGrid<sup>®</sup>WG MacTex<sup>®</sup> W Woven Geotextile Geoarid Reinforcement



Stabilisation & Asphalt Reinforcement

MacGrid<sup>®</sup> EG



**MacGrid®AR** Pavement



Drainage

**MacDrain**<sup>®</sup>

Drainage Geocomposites

#### Separation / Filtration / Protection

Geoarid



MacTex<sup>®</sup> W Woven Geotextile



**MacTex**<sup>®</sup> BFM Ballasted Filter Non-Woven Geotextile Mattress



MacTube<sup>®</sup> MacBag®



Erosion Control

Reinforcement





**MacMat**<sup>®</sup> Reinforced Geomats Geomats

**MacWeb**<sup>TI</sup> Cellular Soil Containment





### MACCAFERF

## Reinforcement

For over 30 years, geogrids have reinforced and strengthened soils, enabling the soil to perform better than it would in its unreinforced state, accommodating greater loads, standing at steeper angles and reducing settlement.

#### **Slopes and Walls**

Maccaferri has a wide range of geogrids (with a variety of polymers, configurations and strengths) to maximise the opportunity to reuse site won materials as backfill to reinforced soil walls and slopes.

Cost savings and "carbon footprint" reductions through the use of geogrids can be substantial when compared to traditional solutions. Additional improvements can be realised through re-using site won material as structural backfill, saving the transportation of materials to and from the project site, embracing sustainability and reducing polluting truck movements.

Whether geogrids are used for small retaining walls in housing developments, or reinforced soil megastructures on infrastructure projects, Maccaferri offers cost-effective, value engineered scalable solutions.





Geoarid Reinforcement



Paraproduct Geogrid Reinforcement

**MacGrid®WG** MacTex<sup>®</sup> W Woven Geotextile



#### Basal reinforcement and void spanning

In use since 1977 and with strengths up to 1350 kN/m, Maccaferri's Paralink® provides performance and reassurance in the most demanding applications; embankments over piles or on soils subject to voids.

For less demanding soil reinforcement applications, the woven composite, MacTex® C2, or woven polyester MacTex® W2, offer performance with value.

## Stabilisation

#### Soil stabilisation and asphalt reinforcement

Maccaferri geogrids are also used to extend the life of unbound and asphalt pavements; MacGrid® AR is a specific composite geogrid used to reduce reflective cracking within asphalt pavements and overlays.

MacGrid® EG or MacGrid® WG S biaxial geogrids are used (often in combination with MacTex® geotextiles) to strengthen unbound pavements, reducing rutting and the thickness of granular material required.









MacGrid<sup>®</sup>WG MacTex<sup>®</sup> W Geogrid Reinforcement

MacGrid<sup>®</sup> EG Woven Geotextile

MacGrid<sup>®</sup>AR Pavement Reinforcement



## Function

Excess, or uncontrolled water within soils can weaken them, causing numerous problems. The management of water behind retaining walls and civil engineering structures, beneath highways, inside tunnels or within slopes, is one of the most important aspects influencing the long term performance of that structure.

The MacDrain<sup>®</sup> range are geo-composites for drainage, manufactured with a rigid or flexible polymeric core, providing a free conduit for water and fluid flow, from the adjacent materials. Geotextiles, or geomembranes, bonded to one or both sides of the core ensure filtration, separation, waterproofing and protection of the core.

With lab-tested performance and quality controlled manufacturing, MacDrain® can replace traditional gravel drainage, offering faster installation, quantifiable performance and construction cost savings. Additionally, the reduction of gravel extraction and truck movements to and from the project site, serve to reduce project environmental impact.





MacDrain Drainage Geocomposites

## Function Separation/Filtration/Protection

MacTex® geotextiles are used to replace the traditional methods of:

- Separating and filtering two distinct soils or layers and preventing cross-contamination
- Protecting membranes or other vulnerable structures
- Improving the bearing capacity of weak soils.

The wide range of products is augmented by Maccaferri's capability to develop and manufacture specific textiles to suit individual projects.

In dewatering, industrial or contaminated slurries can be pumped into the MacTube<sup>®</sup>. Once the slurry has dried, it can be disposed of far more safely and cost effectively, than wet slurried material.





**MacTex**<sup>®</sup> Non-Woven Geotextile



BFM

Mattress

Ballasted Filter



MacTube® MacBag





## Function Barrier Systems

Geomembranes are used to prevent the migration of fluids from one location to another; for example, lining landfills to stop leachate polluting groundwater, controlling groundwater entering tunnels or creating attenuation ponds within developments. Maccaferri MacLine<sup>®</sup> geomembranes and geosynthetic clay liners are available in a variety of thicknesses and compositions to suit applications such as mining heap leach pads, settlement lagoons, landfills, tunnels and many other specialist applications.





MacLine<sup>®</sup> Geomembrane

MacLine® GCL Bentonite Liners



MacLine<sup>®</sup> products are often used in conjunction with MacDrain<sup>®</sup> geocomposites and MacTex<sup>®</sup> geotextiles providing a complete solution to capture, contain and drain fluids.

MacMat<sup>®</sup> R, MacGrid<sup>®</sup> T or MacWeb<sup>™</sup> can be used to secure a layer of topsoil on the membrane, facilitating revegetation.

#### **VOLUME INCREASE**



Available landfill volumes can be increased by using MacLine<sup>®</sup> in place of traditional compacted clay and Maccaferri geogrids to make cell walls steeper.





### Function Erosion Protection

All natural slopes and surfaces are subject to continuous erosion forces. To limit expensive land-loss, Maccaferri offers a range of erosion protection systems to suit the severity of erosion expected. Relying upon vegetation growth alone is very unpredictable and unreliable as it is difficult to achieve 100% vegetation coverage, leaving vulnerable exposed areas. Furthermore, vegetation can die back or become diseased, reducing the anticipated erosion control capability.

MacMat<sup>®</sup> and MacMat<sup>®</sup> R (reinforced), threedimensional permanent erosion control mats increase the soil's resistance to erosion. They provide immediate protection of exposed topsoil areas from the direct effects of wind, rainfall impact or water flow regardless of the amount of vegetation established.

Additionally MacMat<sup>®</sup> R and MacGrid<sup>®</sup> T are used to reinforce soil veneers over low-friction surfaces and also in conjunction with soil nails on strengthened slopes.

Where thicker layers of soil need stabilisation and containment, MacWeb<sup>™</sup> geocells are used to promote slope revegetation.



#### **Coastal Protection**

MacTubes<sup>®</sup> and MacBags<sup>®</sup>, fabricated from quality geotextiles are geocontainment systems, used as a component in a variety of marine, hydraulic engineering, coastal protection and dewatering applications. Filled in-situ with a pumped slurry, the water drains through the fabric walls, leaving the residue within the MacTube<sup>®</sup>. In coastal and hydraulic works, the filled tubes are then used to construct breakwaters, dykes or for dune reconstruction.



As geosynthetics are used in so many geotechnical and civil engineering applications, it is not possible to consider them all here. The table below indicates principle functions and uses. Please contact your local Maccaferri office for advice or assistance in these, or any other use of geosynthetics.

Sectors						
Building, Industrial & Sport	Infrastructure	Urban Infrastructure	Mining	Environmental Protection	Hydraulic & Coastal	Function Product
						Applications
						Gravity Walls & Reinforced Soil
4	4	4	4	4	4	Reinforced soil slopes
4	4	4	4	4	4	Reinforced soil walls - vertical
4	4	4	4	4	4	Reinforcing wet/marginal fills
						Stabilisation and Reinforcement
	4	4	4			Anti-reflective cracking in asphalt
	4	4	4			Unbound pavement reinforcement
4	4	4	4	4		Soft ground stabilisation
	4	4	4			Rail & road foundation stabilisation
4	4	4	4			Parking Areas
						Environment & Landfill
				4		Landfills - lining & capping
			4	4		Mining heap leach pads
	4	4	4	4		Dams/Reservoirs/Lagoons
	4	4	4	4		Pollution control liners
4	4		4	4		Protection of liners. structures
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						Erosion Control & Drainage
	4	4	4	4	4	Dry / Wet slope protection
	4	4	4	4	4	Slope face stabilisation
	4	4	4	4	4	Soil containment
	4	4	4	4		Structural drainage
	4	4	4	4		Roadway drainage
	4	4	4	4		Landfill/lagoon water drainage
	4	4	4	4		Landfill/lagoon gas venting
4						Green-Roof drainage
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						Hydraulic Works
	4	4	4	4	4	Separation
	4	4	4	4	4	Flitration
						Coastal & Dowstoring
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					4	Groynes & Breakwaters
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						Basal Reinforcement
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	4	4				Piled embankments
	4	4	Δ	Δ		Void spanning
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						Tunnels
	4	4	4			Waterproofing & drainage
	4	4	4			Frosion protection at portals

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# Solutions

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Software

High quality products are only part of the solution; design and selection of a solution that meets the clients requirements are equally important.

Maccaferri's software uses the latest modelling techniques, in accordance with various design methodologies to design robust, cost effective solutions.

#### MacFLOW

Design of drainage systems using MacDrain for vertical, flat and sloped applications



#### Landfills

Design of veneer stability over membranes, drainage capacity and GCL-CCL equivalence

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MacRA 1 & 2 Design of channel linings and drop structures for hydraulic erosion protection works



Design of reinforced soil slopes and walls using the full range of geogrids and soil nails

#### MacREAD & OLCRACK Design of paved and unpaved reinforced roads

### Quality Control Quality Control

Maccaferri's geosynthetics are manufactured under quality controlled conditions and where appropriate, are CE Marked. This provides client reassurance that the product has been tried and rigorously tested before installation within the project.





## Officine Maccaferri Group Profile

Founded in 1879, **Officine Maccaferri** soon became a technical reference in the design and development of solutions for erosion control and retaining structures.

Since then, through technological innovation, geographical expansion and focussed diversification, Maccaferri now offers solutions at a global level for a wide range of **civil and environmental engineering** applications.

## **Consultancy and Partnership**

Maccaferri's motto is 'Engineering a Better Solution'; We do not merely supply products, but work in **partnership** with our clients, offering technical expertise to deliver versatile, cost effective and environmentally sound solutions. We aim to build mutually beneficial relationships with clients through the **quality of our service and solutions**.

## **Organisational Structure**

Officine Maccaferri is at the heart of the Maccaferri Industrial Group. Its continued growth is based upon long-held values of innovation, integrity, excellent service and respect for the environment.

Maccaferri's vision is to become a leading international provider of advanced solutions to the civil engineering and construction market. Implementing a strategy of vertical integration, Maccaferri researches, manufactures, designs, supplies and constructs solutions within its target markets.

The capability of the business continues to expand due to a strategic plan to open new markets and grow existing ones; Maccaferri now offers advanced engineered solutions from beach nourishment to reinforced soil structures and from rockfall mitigation to tunnelling systems.

With over 2000 employees, 26 manufacturing facilities and local operations in 100 countries around the world, Maccaferri can truly claim to have a global presence with local focus.

MACCAFERRI

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#### Maccaferri: Engineering a Better Solution

Maccaferri

Industrial

Group







Bureau Veritas Certified Quality System Company with ACCREDIA's and UKAS's accreditation



ANY REPRODUCTION, INCLUDING PHOTOCOP

BIANCHINI

**INGENIERO** 

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