Maccaferri Ltd is the UK subsidiary of the worldwide Maccaferri Industrial Group, specialising in pavement reinforcement systems, retaining structures, erosion protection, rockfall mitigation and embankment stabilisation technology.

Renowned as the inventor of the ubiquitous wire basket Gabion, the Company has developed hugely over recent years and now operates over a wide spectrum of geotechnical and construction related sectors.

Through its dedicated installation division, Maccaferri Construction, the Company also provides a complete design and construct service for the geotechnical and civil engineering industry, through offices in Oxford, Perth, Belfast and Dublin.

The first UK installation of the Maccaferri MacRes®, concrete panel-faced, reinforced soil retaining wall system is currently being constructed at the new Sadler’s Farm Interchange in Essex.

The Sadler’s Farm junction near Basildon is a notorious congestion black-spot, with over 8000 vehicles per hour negotiating the gyratory system between the A13 from London and the A130 route into north Essex, during peak periods.

The new £63m interchange will bypass the busy roundabout and will include upgrades from dual two-lane to dual-four lane carriageways for the A13 and to dual three lane for the A130.

As part of the works, four new composite bridges are being constructed and two existing subways extended. Here, the MacRes Retaining Walls are being built to create facing and wing-walls to the bridge abutments.

Main Contractor Birse Civils brought in Maccaferri at an early stage and awarded the design and construction package to the Company’s specialist installation subsidiary, Maccaferri Construction. Birse was particularly keen to work with a company that could offer a combined design and construct package - a service that is not readily available for reinforced soil, concrete panel structures in the UK.

As well as this, Essex County Council wanted to ensure continuity with the engineered block facing walls and the contiguous piled walls also being constructed as part of the works.

Maccaferri Construction provided an indemnified design, supply and installation, sub-contract package which incorporated the precast concrete-panel MacRes system in combination with Paraweb, geosynthetic reinforcement straps from Linear Composites Ltd, also a Maccaferri Company. The Paraweb/concrete panel, reinforced soil structure is a system extensively used outside the UK with over 500,000sqm of walls completed worldwide, but is being used for the first time in this country, here at Sadler’s Farm.

Paraweb is BBA Roads and Bridges Certified geosynthetic strapping for use with panel faced reinforced soil systems such as MacRes. The Paraweb elements are placed in the ground between successive layers of compacted fill and connected to concrete facing panels.

The strength of the geosynthetic reinforcement is adjusted to suit the design loads. This makes the system simple to construct, as the standard concrete panels all have the same number of connection points. This optimises the efficiency of the structure and allows the construction of very tall walls capable of withstanding high loads.

MacRes Walls were constructed on three of the four bridges and one of the two subways, with a total area of approximately 2,700sqm and an installed value approaching £0.5m.

When completed it is estimated that the new interchange will reduce traffic levels on the gyratory system by 30% and significantly ease congestion in the nearby towns of Pitsea and Benfleet.
The £300 million Airdrie to Bathgate passenger rail link in the central belt of Scotland is a landmark project by Network Rail to widen and re-open a 24km line closed over 50 years ago.

Maccaferri’s stone-filled wire Gabions have been used as retaining walls to strengthen cuttings and embankments where the old single track line has been widened to accommodate twin tracks and access walkways.

At the western section between Airdrie and Drumgelloch Stations, Contractors BAM Nuttall used over 1800 cubic metres of pre-filled Gabions to create retaining walls up to 4.0m high around signal gantries adjacent to the line.

Further east, at the 5.5km long section between Raisehill and Caldercruix, Contractors Carillion brought in Maccaferri’s own specialist construction team to install Gabion retaining walls.

At Caldercruix, Gabion walls 72m long and 4m high on the north side and 10m long, 2m high on the south side were built to allow widening of the rail corridor and the construction of a new station complex.

Explaining the selection of Geomac Mattresses, Alan Blair, Technical Director of Consulting Engineers Fairhurst Partners, who designed the scheme said; “The Maccaferri Geomac System is the only one of its type using products with BBA Roads and Bridges Accreditation. It has a 120 year design life so we were totally confident of its long term performance capability”

“Transport Scotland also insisted on a green solution and the Geomac System gives us this. It really ticked all the boxes from a design, performance and appearance perspective”. Added Mr Blair.

Morgan Est, were the main contractors for the Portlethen Interchange with Maccaferri Construction Ltd undertaking the Geomac installation.
A giant screening bund designed with the assistance of Maccaferri, has been constructed at Gatwick Airport.

The 350m long, 16m high bund is part of a £43m investment in the airport and is designed to screen nearby villages from the new aircraft stands and taxi-ways being built to handle planes, including the Airbus A380 - the world's largest commercial passenger airliner - which will be housed there.

Although the nearest village to the airport’s perimeter at this point was over 2 km away, the possible visual impact of the development was still a serious concern to the Airport’s operators.

Consultants, Scott Wilson conceived a structure which would, from the village perspective, be as natural in appearance as practicable, with a varied profile and heavily vegetated to blend in with the local woodland setting.

At the airport side, a much steeper, 63 degree face was proposed to minimise the land take required for the bund. At 3:1, the slope face required geogrid reinforcement and Scott Wilson brought

Geomac Mattresses are large flat wire cages, similar to gabions, 6m x 2m x 0.23m, lined with filter and filled with stone and soil. Here, used to prevent embankment erosion on the Portlethen A90 Interchange, Scotland.
in Maccaferri to produce a detailed proposal. Maccaferri’s solution was a reinforced soil structure comprising the company’s Paragrid Geogrid in combination with large quantities of structural fill materials available on the airport site.

Paragrid is a soil reinforcement grid comprising composite geosynthetic straps with a polyester core within a protective polyethylene sheath.

The grid is designed to be placed horizontally between layers of compacted structural back-fill, nominally 600mm in thickness.

Overall, the Gatwick bund incorporated some 97,000sq m of Paragrid together with 180,000 tonnes of backfill, the majority of which was recycled granular materials and site won clay, reclaimed from other areas of the site.

Biomac, a bio-degradable erosion protection blanket also from Maccaferri, was used to face the sloped surface of the geogrid wrap. This allowed the inclusion and retention of a face layer of compacted top-soil which was later hydro-seeded to promote rapid establishment of vegetative cover.

The new screening bund was built in front of and over an existing smaller structure and despite challenging weather conditions, was completed in 2010. Since then, the bund has rapidly matured and now blends well with the surrounding Surrey countryside.

MACGRID PREVENTS REFLECTIVE CRACKING IN ROAD REPAIR SCHEME

MacGrid AR pavement reinforcement Grid has been used on a concrete road rehabilitation project at Carrickmacross in Northern Ireland.

Here, the existing road had been subject to extensive service invasion for the installation of new sewerage systems and Monaghan County Council were concerned that trench reinstatement could result in reflective cracking of the re-laid asphalt carriageway.

To prevent this the 100-250mm thick concrete slab was overlain with a 60mm thick asphalt regulating layer followed by the application of Maccaferri MacGrid AR 5A reinforcement Grid. Over this a 40mm wearing course was placed.

MacGrid® AR is a geocomposite manufactured from glass fibres woven into a grid configuration, with a polymeric protective coating. It offers high tensile strength and high modulus of elasticity at low elongation. Stress concentrations in the asphalt matrix are relieved and redistributed by the reinforcement, delaying the initiation of the cracks.

The MacGrid® AR 5A used here has a 50kN ultimate tensile strength in both directions. It also features a self-adhesive, pressure activated backing which holds the grid firmly in place whilst the asphalt is placed upon it. The MacGrid® AR was simply unrolled onto the surface of the existing pavement and the adhesive activated by rolling with a pneumatic tyred roller.
Maccaferri Rockfall protection barriers have been installed along a section of the main Londonderry to Coleraine coastal road in Northern Ireland. The installation follows a series of dangerous landslides, one of which lead to the closure of the road and the imposition of speed restrictions on the main Londonderry to Belfast rail line which runs adjacent to the road.

The "Downhill" site has a long history of rockfall and mindful of the potential dangers to both road and rail travellers, the Northern Ireland Department for Regional Development, Road Services, commissioned Chesterfield based URS / Scott Wilson to undertake a detailed assessment of the site.

URS Principle Engineer, Adrian Koe explains, "The north facing cliffs at Downhill are made up of layers of heavily jointed basalt – a volcanic material similar to the rocks that make up the Giant's Causeway. Weaker layers of rock have weathered more quickly which has made over lying layers unstable, causing significant rock-fall."

"Individual blocks as big as 1.0m cube and weighing 2700kg, that's roughly the equivalent to a VW Golf with four people and their luggage, have fallen down the slope" said Adrian Koe. "Potential velocities, before they hit the road, were up to approximately 15m/s (33mph)" he added.

Following their site assessment, URS / Scott Wilson proposed the installation of a network of high strength, dynamic rock-fall catch fences placed near the bottom of the slope to prevent debris spilling onto the road and rail line.

The catch fence system selected was supplied by Maccaferri, comprising continuous, steel-cable mesh panels and energy dissipaters, stretched between articulated vertical posts. The catch fence is the first of its type to be installed in Northern Ireland and is one of a wide range from Maccaferri, capable of withstanding 500kJ impacts for Maximum Energy Level [MEL] designs.

Adrian Koe continued: "We devised a catch fence 3.0m in height and 180m long, positioned 20m up from the toe of the slope to allow for deformation of the fence during impact."

Maccaferri fence kits are supplied to site part-prefabricated for simple, safe and rapid on-site assembly. The kits come with the majority of connections made in the factory so installation variables are minimised and reliable long term performance is assured.

For the Downhill project, key components were supplied with anti-corrosion coatings to provide additional protection against the extreme weather conditions experienced at the exposed site.
Maccaferri Construction has built a series of earth retaining walls at the new Glencorse Water Treatment works in Midlothian. They have been constructed to support thousands of cubic metres of soil being used in a complex re-landscaping project to effectively hide the £130m plant from walkers and residents in the beautiful Pentland Hills, south of Edinburgh.

The treatment plant’s setting, adjacent to the Pentlands Regional Park, 7.5 km south of Edinburgh, required careful design and planning to reconcile the very large buildings and reservoir with the surrounding area. The solution was to effectively “bury” the works into a carefully re-profiled landscape, created by placing thousands of cubic metres of excavated material behind massive retaining walls.

By completely burying huge sections of the plant and designing low aspect structures incorporating what will be the largest grassed roof structure in Scotland, the installation will be one of the best hidden and most sustainable construction projects in the country. “The whole idea is zero visual impact” according to John Marshall, Contract Manager for main contractor Black & Veatch.

One of the biggest challenges faced by the construction team was the creation of a series of retaining walls up to 9m high, required to support the huge quantities of reclaimed fill material used to landscape the south and east sides of the plant. For this, Black & Veatch brought in Perth based Maccaferri Construction to provide design and installation expertise.

Maccaferri proposed a network of mass gravity and reinforced soil structures, principally comprising their stone filled Gabion Terramesh units in combination with high strength uni-axial geogrids and reclaimed fill materials.

The Gabion Terramesh system used in the construction forms a hard facing to the wall and consists of a one-piece soil reinforcement geogrid with an integral gabion fascia unit. This system, including the reinforcing geogrid, is made from double twisted steel wire mesh. The mesh is heavily galvanised with an additional tough PVC sheathing to provide a long design life.

Behind the stone faced wall, varying lengths of Maccaferri Paragrid 80/05 uni-axial geogrid reinforcement were placed and overlain in 1.0m lifts, to coincide with the Gabion dimensions.

The £130m scheme is the largest capital project commissioned by Scottish Water and has been described by Professor Paul Jowett, Chairman of the ICE (Institution of Civil Engineers), as being “not only an exemplar project in terms of critical infrastructure but also in terms of sustainable development and carbon reduction”.

All the Maccaferri retaining walls were built by the company’s specialist installation subsidiary Maccaferri Construction.