BASEL REINFORCEMENT
Product: PARALINK®

Problem
Ground conditions at a 50 acre wasteland site at Belfast Harbour were so poor that a major programme of stabilisation and improvement was required to allow the construction of a £50m transshipment and storage facility required to support the offshore wind industry.

The riverside site which is next to Belfast's George Best Airport and close to the City's Titanic Quarter is the largest in the Harbour's 400 year history. The project is part of a joint venture between Dong Energy and Scottish Power Renewables to support the construction of the West of Duddon off shore wind farm.

Stabilisation and strengthening of the upper ground formations was needed as the facility was to be used for the off lading storage and assembly of huge wind turbine components. Large tracked cranes would be used to move equipment and materials about the site and at full capacity would impose extreme loads on the surface.

Solution
Engineers devised a scheme which involved surface build up of up to 2m depth in places using a combination of site won fill and over 250,000 tonnes of imported stone. This was placed in layers over an array of Maccaferri PARALINK®, soil reinforcement geogrid approximately 1.3m below the finished surface.

Over 400,000 sq m of PARALINK® were used and placed in two layers set at 90 degrees to achieve maximum reinforcement of the unbound granular layers.

Maccaferri worked closely with the construction team throughout the project and helped streamline the installation programme by supplying the rolls of PARALINK®.

PARALINK® Geogrids are planar structures consisting of a mono-axial array of high strength composite geosynthetic strips. Each longitudinal strip has a core of low creep polyester yarn encased in a tough polyethylene sheathing. When installed it provides ultra high unidirectional strength in soil reinforcement. At Belfast Harbour 1350 kN/m strength strips were supplied.
To accommodate anticipated extreme point loadings upper layers of the formation were further reinforced using Maccaferri supplied 40kN biaxial polypropylene geogrid specifically designed for sub-base stabilisation and soil reinforcement of unpaved roads and pavements.

The decision to retain an unbound reinforced soil surfacing at the facility was taken at an early design stage. Usually a complex pile reinforced solution combined with an in situ concrete or block paved wearing course would have been specified. The sheer size of the site and high costs associated with the piled/paved option lead to the use of the PARALINK® Geogrid reinforced soil as the favoured solution.

A degree of deformation through settlement and a high incidence of surface damage were expected but felt to be an acceptable trade off as the unbound surface layers could be easily repaired using imported low cost material and on site plant.

**Product**

PARALINK® is part of a range of geosynthetic reinforcement composites from Maccaferri. Developed in the 1960s PARALINK® has been used successfully throughout the world in high profile construction projects including highway, marine, airport, commercial and industrial projects.

PARALINK® is BBA Roads and Bridges Certified as being suitable for structural applications where long term design life, typically 50-120 years is required.