

### MEDWAY GATE DARTFORD, KENT, UK

## SLOPE REINFORCEMENT

**Product:** ROCKFALL NETTING, ARMATER, MACMAT R, GREEN TERRAMESH, ENKAGRID PRO,

### Problem

With Greenfield sites becoming harder to find, developers are having to become more and more inventive with redundant brown-field land in their quest to provide sufficient new homes to satisfy demand from the British buying public.

At one impressive site near Dartford in Kent, Persimmon Homes has taken over a 20 hectare redundant quarry – until the late 1960's, the source of chalk for a neighbouring cement factory - with the plan to build the Medway Gate Development, a mixed housing, commercial and retail project with over 400 new homes within its walls.

Before any building could start however, a major programme of groundworks was put in motion to stabilise the crumbling quarry walls to make the site safe for future residents. Innovative geotechnical solutions were found to engineering challenges in three particular areas in the site.

### Solution

#### Buttress Wall

Firstly, engineers had to create sufficient support for the A228 Cuxton Road which runs on top of the quarry's eastern boundary. This road gives access to the site and also acts as a feeder road to the nearby M2 motorway. Buttress wall element designers, Consultants, Peter Brett Associates, proposed a design for a 170m long, 25m high, 45° sloping buttress built against the quarry face. This would give the additional support to the road, in anticipation of the extra traffic generated by the development.

To create the buttress slope, Green Terramesh units from geotechnical specialists, Maccaferri were chosen for the facing with Enkagrid Pro as the main slope reinforcement. Green Terramesh comprises 2.0m long x 600mm high, double twist steel geogrid baskets into which compacted site won backfill is placed.

Client:

PERSIMMON HOMES

Main contractor:

C A BLACKWELL

Designer:

PETER BRETT ASSOCIATES

Products used:

ROCKFALL NETTING, ARMATER, MACMAT-R,  
GREEN TERRAMESH, ENKAGRID PRO

Date of construction

February 2006



Redundant quarry prior to construction commencing



Green Terramesh during construction



Green Terramesh units

Courses of Green Terramesh facing units were tied at 600mm centres into the compacted backfill using Enkagrid-Pro, a uniaxial polyester geogrid, also from Maccaferri. A total of 23,000sq m was used in varying lengths and grades of strength, depending on their position in the wall.

Each of 2148 Green Terramesh units has a factory fitted, biodegradable facing layer which retains a 300mm layer of good quality topsoil to act as a nutrient reservoir. When the Green Terramesh wall was completed the whole face was hydro-seeded to create a natural grass façade.

The buttress wall was installed by Subcontractor, PML Geotech under the direction of Main Contractor C A Blackwell. Commenting on the choice of facing system for the wall, Contracts Manager, Jess Yates explained. "Persimmon wanted something that was more aesthetically pleasing than an exposed chalk face. With the Green Terramesh system we gave them a natural vegetative appearance as well as a sound engineering solution"

Green Terramesh units feature a factory fitted "lost Shutter" system, which supports the face at the designated angle without the need for any external formwork or shuttering. This, and the crisp face produced with Green Terramesh, are further advantages over traditional wrapped-face geogrid structures.

#### Cellular Containment System

Although permanent guard fencing was installed around much of the south and west boundaries, it was not possible to cordon off the quarry face above the main access road to the eastern side of the site. To stabilise the friable chalk in this area and in places, to provide an aesthetically pleasing vegetating "green" face, 3200sqm of Armater Cellular Containment system were installed to help prevent the chalk from gradually eroding. Looking like a giant concertina of interlocking 500mm diameter hexagons, the Armater creates a grid of 100mm deep pockets that hold topsoil. When seeded, root growth binds the soil layer together and to the underlying materials, preventing it from slumping down the steeply sloping site.

In less steeply sloping areas, CAN used Maccaferri's MacMat-R soil containment matting as an erosion prevention measure. The steel mesh-reinforced, polymer fibre, 3-D matrix system was pinned to the 30 degree slope using 2m long high yield bars using handheld boring

equipment. Imported topsoil, which was then hydro seeded to bear grass, gives the area a softer rural aspect, more in keeping with the surrounding countryside.

#### Rock-fall Catch netting

The remaining near vertical quarry faces needed even more dramatic erosion management techniques. Accepting the fact that total erosion control was not possible and that localised rock-face erosion was inevitable. Rockfall Netting was used to completely enclose the remaining areas of exposed quarry face. The resulting high-strength drapery system encapsulates falling debris, preventing potential hazards to the future users of the development.



Armater prior to filling

#### Conclusion

The £2m groundworks programme began at the Persimmon Homes, Medway Gate Development in early 2006 and was due to complete in spring 2007. House-building began in early 2007 and is scheduled to continue until 2011.



Medway Gate project site

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