



Eden Brows Landslip



PROJECT SUMMARY

PROJECT NAME: Eden Brows

PROJECT DATE: 2016/17

CLIENT: Network Rail

CONTRACTOR : Van Elle

INSTRUMENTATION SPECIALIST: AECOM



OVERVIEW

A major landslip at Eden Brows, Armathwaite, in Cumbria occurred along the Carlisle to Settle railway in February 2016 following storm Desmond in December the previous year.

It was estimated that 500,000 tonnes of earth had slipped down the embankment towards the River Eden causing the collapse and shutdown of the existing railway line.

A wide range of remedial packages were carried out including the installation of 198 660mm diameter piles for a contiguous retaining wall at depths between 18- 20m and with a tolerance of only 25mm in both plan and verticality.

The piles would also support a reinforced concrete slab for the newly-laid railway line.

As part of the design verification, lateral loading was carried out on a test pile to quantify the deflections under load.

MONITORING

The first requirement was to monitor the tolerance of just 25mm in both plan and verticality of the initial test piles and any ongoing movement.

Geosense QJ inclinometer casing was installed within individual pile cage lengths. The challenge was to ensure quick and easy connection and to avoid any damage to the casing as the cage lengths were joined together and lowered vertically.

The casing allowed a Portable Inclinometer to be used to carry out surveys initially to check the verticality of the pile and then monitor any subsequent movement during the lateral loading.

In addition Geosense vibrating wire Embedment Strain Gauges were installed in arrays along the length of the pile cage to monitor strain and thus allow engineers to calculate any bending of the pile under the test loading.

PRODUCTS USED

QJ Inclinometer casing

For use with portable inclinometers.

Portable Vertical MEMS inclinometer

For measuring vertical displacements.

VWS-2100 Embedment Strain Gauges

Measure strain in the pile.