

GRIFFITHS

civil engineering and construction

Geotechnical Division Case Study Capel y Ffin Emergency Works

Following a landslide along the critical rural route between Abergavenny and Capel y Ffin, Griffiths worked in collaboration with Monmouthshire County Council and Capita to deliver a safe and effective emergency solution in March 2022

Capel y Ffin is a remote rural village on the border between Monmouthshire and Powys Counties in South Wales. The surrounding area has a number of small communities that are reliant upon a single lane carriageway to connect them with Abergavenny in the South and Hay on Wye in the North. Following a landslide during storm weather events in 2021, this road became impassable immediately South of Capel y Ffin. This isolated these small communities and required up to a 35-mile diversionary route.

Whilst a permanent design was being progressed to remediate this and enhance the overall safety of this section of road, there was an immediate and emergency requirement to safeguard the section from trespassing vehicles. The site comprises a single carriageway cut into the valley-side, with the landslide occurring within the downslope side of the carriageway. The failure backscar had partially undercut the carriageway, suggesting that the road would remain at risk of further failure until a remedial solution was installed.

During an initial walkover visit, Griffiths engineers assessed site conditions with the Client and Designer to identify causes of failure and recommend solutions that may be available given the remote and constrained site conditions. Due to the extent of failure and the narrow carriageway width, remedial options were heavily limited by the practicalities of construction. These also required careful consideration of the road stability and position of the failure relative to construction plant. Furthermore, any recommendations were required to be compatible with the later permanent works and eliminate any potential conflicts between these.

Initial findings suggested that surface water run-off had repeatedly saturated the downslope area, thus causing the landslide. The limited vegetation coverage in adjacent fields and absence of carriageway drainage systems were amplified by the prevailing topography, directing surface water down towards the carriageway. The camber of the carriageway itself further promoted surface water to concentrate in isolated areas of over-the-edge drainage.



Pictured above: Views of the initial landslide from North and South perspectives, showing undercutting of carriageway.

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Working collaboratively with the Client, Designer and Griffiths' appointed Designers, Griffiths were able to develop a remedial solution to stabilise the carriageway and prevent further failure and erosion of this. Design recommendations were required to be progressed hand-in-hand with the practicalities of construction, ensuring that all proposals could be safely installed using plant that could operate within the tight confines of the site.

The design solution included installing a series of soil nails and erosion control netting system within the failed down-slope area. These were designed to support the road and to improve the resilience of the exposed failure, preventing further loss of carriageway. An edge beam detail consisting of anchored gabion baskets was also installed along the down-slope edge of the carriageway to prevent further degradation of the road verge. Regrading of the up-slope side of the carriageway was undertaken to increase carriageway width and move the carriageway edge away from the failure. This regraded slope was covered with erosion control matting to prevent soil erosion and assist in vegetation re-growth. Finally, surface water drainage ditches were installed along the crest and toe of the up-slope side to intercept and direct surface water away from the site towards major drainage outfalls to the North and South of the section.

Alongside the main construction work, Griffiths undertook a series of investigation and acceptance tests on various sacrificial and production soil nails to determine the capacity of ground anchorages within site geology. These direct tests were specified in conjunction with both Designers requirements to ensure that the results verified the initial construction and could also be used to inform the later enhancement works. These results could be combined with topographical site data, investigation information and other site observations to determine the most efficient anchorage arrangements and length for the permanent solution. This will lead to a direct cost saving to the Client through utilising similar construction methods and solutions.

Griffiths have a wealth of experience in emergency remediation works, with these projects often involving complex risks to health and safety, environment and the quality of the delivered solution. In the case of Capel y Ffin, it was critical to determine the main immediate risks to health and safety due to the requirement to complete construction works within close vicinity of an active landslide. Through careful planning with Design partners, Griffiths were able to maintain a safe 2m offset off plant loading from edge of carriageway while installing the top row of soil nails. After these nails had cured to a sufficient strength, they provided enough support for the heavy plant items to be positioned 0.5m offset from edge of carriageway, allowing the drill-mounted excavator to reach all required areas of the site. This allowed the smallest possible plant item to be used, thus controlling the risk of people-plant interface during construction within a constrained site. This also minimised the disturbance of the landslide from heavy plant and eliminated the requirement for hand drilling activities where HAVS exposure is high. Finally, all working at height activities were safely undertaken by Griffiths roped access operatives.



TOP: 13t excavator installing first row of nails for anchored gabion baskets by Griffiths roped access operatives.

CENTRE: Griffiths geotechnical specialists undertaking investigation test nails to inform the Permanent Works Design.

BOTTOM : Finished project, safeguarding the road against further failure and degradation prior to construction of a future enhancement scheme.

Project details at a glance

Client:	Monmouthshire County Council
Location:	Capel y Ffin, Near Abergavenny
Completed:	March 2022
Value:	£200,000
Contract:	NEC4 Option E