Railway Cutting Stabilisation at Denby Dale Rockfall Risk Mitigation Solution

Cumberworth, North Yorkshire



TYPE OF PROJECT	YEAR OF CONSTRUCTION	CLIENT	CONTRACTOR	DESIGNER
Dynamic Rockfall Barriers	**2009**	**CML (Network Rail)**	**CAN Scotland**	**URS**

PROD. RELATED
Rockfall Barriers ()

Challenge

Approximately half a mile north of Denby Dale station, a single-track railway line exits Cumberworth Tunnel into a 14-metre-deep cutting formed within lower coal measure geology. The cutting comprises interbedded semi-competent sandstone alongside weak, friable siltstones and mudstones, creating a geologically variable and inherently unstable slope environment.

The cutting slopes are steep, ranging between 45 and 55 degrees, with exposed rock outcrops measuring between 1.0 and 2.0 metres in height. Over more than 160 years of exposure, natural weathering processes have significantly degraded the strength and cohesion of the rock mass. This deterioration has increased the likelihood of slope instability and rockfall, posing a direct threat to railway infrastructure, operational reliability, and passenger safety.

Recognising the growing geotechnical risk, Network Rail commissioned URS to undertake a detailed site assessment. The objective was to evaluate slope stability conditions and develop an effective long-term rockfall protection solution for this critical section of railway.



Catch fences being installed on the Cumberworth Tunnel line



Catch fences installed on the Cumberworth Tunnel line

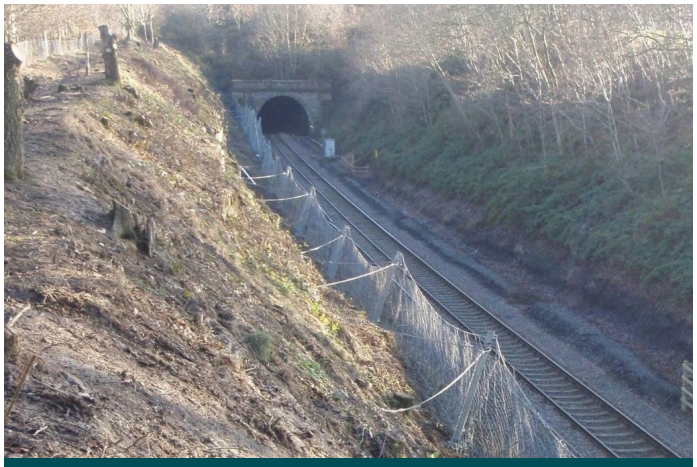
Solution

Delivering a safe and effective stabilisation solution presented several challenges. The site's remote location, combined with dense woodland at the crest of the cutting, severely restricted access for construction plant and lifting equipment. In addition, limited railway possession times meant that much of the installation work had to be carried out during night shifts, increasing logistical complexity.

A range of slope stabilisation and rockfall mitigation options were assessed during the design phase. These included localised rock bolting and manual scaling of unstable rock. However, due to the highly weathered and fractured nature of the ground, these methods were deemed unsuitable. Drilling for rock bolts risked further destabilising the rock mass, while ongoing weathering would likely lead to new fractures forming beyond treated areas. Furthermore, the relatively short design life of 5–10 years did not meet the long-term performance requirements of the asset.

The selected solution was the installation of a network of high-strength dynamic rockfall catch fences. This rockfall protection system was specifically designed to absorb and contain falling debris, preventing it from reaching the railway line. The system provides a durable, low-maintenance solution that accommodates ongoing slope weathering while ensuring continued operational safety.

This approach delivered an effective balance between constructability, safety, and long-term performance, significantly reducing rockfall risk and enhancing the resilience of the railway infrastructure at Denby Dale.



Catch fences installed on the Cumberworth Tunnel line



Post installation of the catch fences at Cumberworth

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