Rail Accident Investigation Branch

Urgent Safety Advice 01/2025: Use of remote earthwork monitoring equipment to mitigate the risk to trains from landslides

Published 19 December 2025

1. Safety issue

Lineside monitoring equipment used on Network Rail managed infrastructure may not be able to detect the failure of slopes in some circumstances. As a result, this equipment may not provide data as expected to support safety decision-making, particularly during extreme weather conditions.

2. Safety advice

Duty holders should take urgent steps to consider and, if necessary, mitigate this risk.

3. Issued to:

Network Rail, other infrastructure managers, and those companies supplying or monitoring relevant equipment.

4. Background

At around 06:10 on 3 November 2025, a passenger train operated by Avanti West Coast, the 04:28 Glasgow Central to London Euston service, derailed after striking a landslip near to Shap Summit, between Penrith North Lakes and Oxenholme Lake District stations.

The train was travelling at around 83 mph (134 km/h) when it struck landslip debris that had been washed onto the track. This material lifted the first bogie off the rails and to the right, where it ran derailed for around 560 metres. There were nine staff and 86 passengers on board the train at the time of the collision. Four people were treated for minor injuries as a result of the accident, and damage was caused to the train and to railway infrastructure.

The landslip was caused by a period of heavy and sustained rainfall. RAIB's preliminary examination found that a drainage channel, which runs across the cutting slope above the washed-out material, was unable to accommodate the volume of water which was present. This led to the slope material below becoming saturated, initiating the landslip.

The cutting slope was fitted with remote monitoring equipment, which was designed to detect ground movement. At the time of the accident, the monitoring equipment at Shap was recording data and reporting to its online monitoring service. However, it had not been formally entered into operational use, so was not sending alerts to the Network Rail control centre. Similar equipment is operational on other parts of the railway infrastructure.

This type of equipment, when configured for Network Rail slope monitoring applications, is mounted on steel spikes every 2 metres along the base of the slope. The position of the sensors is recorded at intervals.

Movement of the sensors is recorded by the monitoring system as four colour-coded levels of alert, of which the highest two are considered to represent significant movement:

1. Green (information) – movement of between 10 and 30 mm
2. Amber (major) – movement of between 30 and 60 mm
3. Red (severe) – movement of between 60 and 90 mm
4. Black (critical) – movement of more than 90 mm

Around 4 hours before the accident, the sensors nearest to the landslip began to show minor movement of the earthwork, below the threshold needed to trigger a green alert. This movement continued for the next 2 hours, remaining below the green alert threshold.

At around 04:30, when the evidence available to RAIB suggests that the landslip occurred, the two sensors in the path of the debris were tipped over and subsumed by the material sliding down the slope. It would appear that this occurred too quickly for them to determine and transmit their movement and to generate an alert.

RAIB has further concluded that the sensors' wireless signal was also unable to pass through the layer of material which covered them. This is based on them being able to re-establish a connection and report a variety of alert levels as the site was cleared.