Real-Time Debris Flow Monitoring for Railway Infrastructure Safety

Delmore



TYPE OF PROJECT	YEAR OF CONSTRUCTION	CLIENT	CONTRACTOR	DESIGNER
	2025	Network Rail Scotland	Amco Giffen	

PROD. RELATED
HELLOMAC (Null)

Challenge

In July 2025, Maccaferri, in partnership with Network Rail and Amco Giffen, installed the UK's first Hellomac Geo monitoring system at Delmore, Inverness. The system was deployed on a chain link debris flow barrier designed to protect the Inverness–Wick railway line from landslide and hillside debris.

This remote rail location has historically required frequent manual inspections due to the regular build-up of debris within interceptor barriers. These inspections were typically carried out on a monthly basis and often required disruptive railway line possessions, increasing operational costs and impacting train services.

Without real-time monitoring, Network Rail asset managers relied on scheduled inspections rather than live data, limiting their ability to respond proactively to changing conditions. This reactive maintenance approach created inefficiencies, increased safety risks, and placed pressure on maintenance resources. The need for a smarter, more efficient solution for railway slope monitoring and debris flow management was clear.





Solution

To overcome these challenges, Maccaferri implemented Hellomac Geo, an advanced remote monitoring system for natural hazard protection. Already proven across major global infrastructure and rail projects, Hellomac Geo enables real-time monitoring of debris flow barriers and provides instant alerts when debris reaches critical levels.

The system delivers continuous, 24/7 monitoring without the need for routine site visits, allowing Network Rail to adopt a predictive and condition-based maintenance strategy. Its fully wireless design eliminates the need for mains power, making it ideal for remote railway environments. Reliable data transmission is ensured through roaming GSM or satellite connectivity, guaranteeing coverage even in isolated locations.

Hellomac Geo integrates seamlessly with existing asset management systems via API, while user-friendly desktop and mobile applications provide instant access to live data and alerts. The lightweight system allows for quick and efficient installation with minimal disruption to rail operations.

Following installation, Connor Gillan, Works Delivery Project Manager at Network Rail Scotland, highlighted the benefits of the system. He explained that the site had previously required frequent inspections due to debris accumulation risks. With Hellomac Geo in place, Network Rail now benefits from an early warning system that alerts teams only when intervention is necessary. This has significantly reduced unnecessary inspections, lowered maintenance costs, and avoided disruptive line closures.

He also emphasised that the system supports a more proactive approach to railway asset management, enabling better planning, improved resource allocation, and enhanced resilience of Scotland's rail network.

Matt Showan, Managing Director at Maccaferri Ltd, described the project as a major milestone in the digitalisation of natural hazard protection systems in the UK. He noted that Hellomac Geo combines real-time monitoring technology with cost-effective efficiency, transforming how infrastructure owners manage risk. The successful collaboration with Network Rail demonstrates how global innovation can strengthen national infrastructure, improve railway safety, and reduce operational costs.

The installation of Hellomac Geo at Delmore represents a significant advancement in railway infrastructure monitoring and landslide risk management in the UK. By replacing manual inspections with intelligent, real-time monitoring, the system enables safer, more efficient, and more sustainable asset management.

This project highlights how digital monitoring solutions can enhance railway safety, reduce disruption, and optimise maintenance strategies, setting a new standard for debris flow barrier monitoring and geohazard management across the rail sector.





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