



Slope Stability Monitoring Project Case Study

Location:

East Sussex, UK

Client:

Bluebell Heritage Railway

Application Summary:

Monitoring unstable slopes adjacent to railway infrastructure

Tags:

ipx; ots; asp; settlement; deformation; rail; cpt; slopes; geo-alert

Key Points:

- 75m section of embankment fully instrumented by 5 borehole sensing arrays within a single 6-hour possession
- 4 Inclinometers, 1 Extensometer, all to bedrock (6-11m)
- Instrument equipment costs reduced 35%
- Installation costs reduced 68%
- Installation speed increased 5x
- Fully remote & automated system

Description:

The Bluebell Railway is one of the UK's largest heritage railway lines, hosting over 150,000 visitors a year and a popular filming location for A-list TV and Film productions.

As part of its ongoing requirements to the UK's ORR, the earthworks along this line are routinely inspected and maintained to ensure they remain fit for public service.

In October 2024, operators at the Bluebell Railway identified signs of a slope movement on an embankment and invited Osprey Measurement Systems to install a range of automated, in-ground sensors to help understand the mechanics of this failure.



Osprey Measurement Systems

ospreymeasurement.systems



Due to the restricted off-track access this was an excellent opportunity to demonstrate an innovative new installation technique, using an RRV (Road Rail Vehicle) mounted CPT (Cone Penetration Test) platform to 'push' sensor strings into the ground.

Developed in collaboration with In-Situ Site Investigations Ltd, this is a highly efficient technique where a hollow steel access tube is pushed into the ground, forming a void in which sensors are fitted. The tube is then removed, leaving the sensors in direct contact with the natural ground. This is a highly productive and effective process, that removes the need for any grout backfill. No mess, no voids, no ambiguous grout matching. Just instant high-quality mating of the sensors and the ground.

In total five installations were completed to the required depths ranging from 6m to 11m

- 2 x Conventional 70mm splined inclinometer casing, fitted with the Osprey IPI for automated inclinometer measurements.
- 2 x Geo-Alert discrete inclinometer arrays in our Patent Pending 42mm flexi casing. Ideal for low false-positive landslip prediction / detection, on and below ground level.
- 1 x Magnetic Extensometer, with Osprey In-Place Extensometer (IPX) sensors, to monitor sub mm vertical displacements.





Key Benefits:

Installation of subsurface monitoring systems with conventional drill & grout techniques is not compatible with railway possession planning, or lineside realities.

Using Osprey's push-in technique, multiple borehole sensors can be installed and commissioned within a single shift.

- Quick and easy access to installation locations by RRV
- Valuable ground investigation during installation from CPT reports
- Rapid deployment of in-ground lateral and vertical displacement monitoring
- No drilling or grouting required
- Improved stability over surface mounted monitoring systems – fewer false alarms!
- Predictive and proactive monitoring
- Lower cost of equipment and install release budget for higher quality monitoring regimes: Better predictive and proactive monitoring

Daniel Scott, Osprey CTO says "It's really exciting to be able to instrument an entire embankment within a single shift. We have since been integrating our sensors into all the major NR logging platforms to develop RADR-ready compatibility. The next steps are to further miniaturise the drilling technology needed to instrument critical earthworks across our national infrastructure."



