

# EARTHWORKS SLIPPAGE MONITORING

CLIENT: NETWORK RAIL/COSTAIN | **KENT**



## THE CHALLENGE

300m embankments in a deep cutting, leading into a tunnel portal, were proving unstable and required shoring up with ballast. A monitoring solution was required that enabled any slippage of the earthwork to be detected and alerted to NR operational staff. Additionally, it was required that any potential blockage of the line, through material on or near the track, could be observed remotely and immediately using image/camera technology, in order to manage running traffic appropriately.

A major communications challenge was that the whole system had to be wire and mains power free and yet there was little to no GSM mobile signal (less than one bar).



## OUR SOLUTION

Along the 300m section, Senceive installed 40 wireless tilt nodes integrated with 6 cameras providing back-up images on demand and triggered by movement of the sensors. Tilt sensors were mounted on lightweight stakes into the embankment, acting as shallow tilt meters, in order to detect any earth movement. A single solar powered 3G gateway transmits the data. Texts and email alerts were automatically generated, based on configured trigger levels.

On the opposite side of the track, 6 solar powered wireless cameras were installed. These routinely take a reference photographic image every few hours, which is also transmitted back to the remote web host server.

Senceive has implemented a patented solution for automatically triggering the cameras to take and transmit an image in the event of a tilt node moving in excess of its configured trigger level. In this case any of the sensors will trigger its associated camera to capture an image immediately.

Fitted with IR illuminators, the camera can detect a potentially dangerous fall of material onto the track at a range of 75m and without interfering with train driver vision.

## THE OUTCOME

Whilst the deep cutting has provided significant challenges in ensuring data rich camera images are able to exit the area, these have all been overcome using a range of sophisticated telecommunications techniques and upgraded software.

Fortunately, there has not been an incident that has generated any alerts, but the system continues to operate and provide essential security for this section of railway track.

It has been mentioned already in a number of geo-technical articles (see Ground Engineering), has been in situ for over 1 year and is planned to be there for between 5-10 years.