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MONITORING LEVEES TO DETECT PIPING

As part of a levee reinforcement programme Inventec supplied and installed a monitoring system covering two 300m long critical dike sections along the River Lek in The Netherlands.

The system serves to constantly monitor the functionality of a vertical geotextile that had been installed in the dike section in order to prevent piping, one of the major potential failure mechanisms in that area.

The technology that we applied here is Distributed Temperature Sensing (DTS) using the heat-pulse principle. A fiber optic cable was integrated into the levee over the full length to be monitored and connected up to a reading unit. This unit continuously launches a high frequency light pulse of one specific wavelength into the optical fiber and analyses the backscattered spectrum, resulting in the visualisation of the distributed temperature profile over the full length of the cable with a measurement interval of 0,5m and an accuracy of 0,1C°.

In the subject application the fiber cable has an integrated copper wire. By applying a voltage via a heat relay unit the copper wire heats up, thereby also increasing the temperature of the optical fiber. A local decrease in the measured temperature along the fiber shows that pore water velocity at that location is higher than elsewhere and therefore indicates the development of a pipe.

The monitoring system measures continuously so that the development of a pipe is detected and located with an accuracy in distance of 0,50m in the earliest possible stage. The measurement data are visualised and logged on our Livesense® web platform. Whenever somewhere along the dike the measurement values reach a pre-set level, an alert / alarm is raised automatically.