D!KEALERT

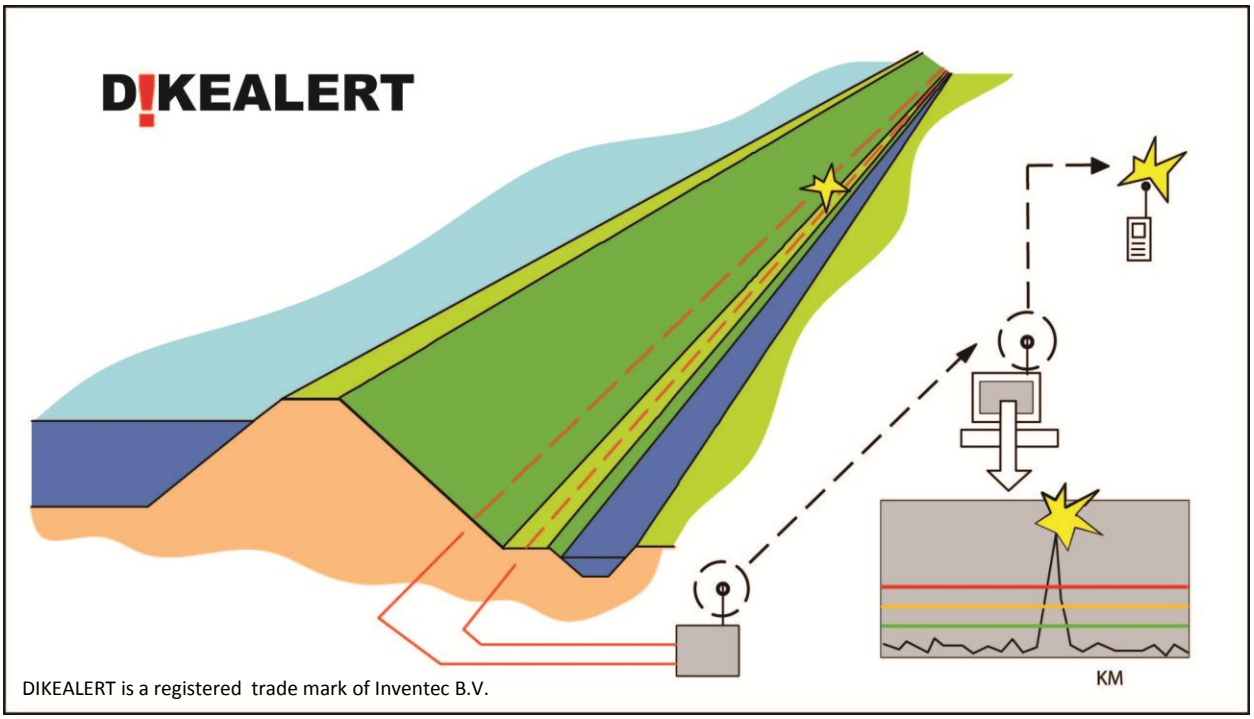
REAL-TIME DIKE SURVEILLANCE WITH FIBER OPTIC TECHNOLOGY

DIKE SURVEILLANCE

The existing methods of inspection and surveillance of dikes and levees mainly depend on observation by the human eye. The process is discontinuous. In addition, the current methods of observation imply the danger of superficiality and subjectiveness. Climate change, subsidence of the land, increased economic value and a decreased level of acceptance of calamities by the general public are leading to a demand for intensified monitoring and a more adequate management of the surveillance process. To this end the implementation of an early warning system is imperative. Such a system will alert the dike owner immediately when something out of the ordinary occurs at a particular location along the dike. Furthermore such a warning must be raised in a sufficiently early stage so that the dike owner has sufficient time to implement corrective or preventive measures.

DIKEALERT.

A couple of fiber optic cables or strips of geotextile with integrated optical fibers are installed at a depth of 0,20-0,30m at specific points long the dike's cross section. A reading unit constantly launches a light pulse through the fibers and analyses the backscattered light. The reading unit measures the shift of the so-called Brillouin frequency in the backscattered spectrum and translates this into the distributed deformation over the full length of the fibers. If the dike deforms at a particular location (or its deformation does not correspond with the overall



behaviour of the dike section) the fibers will be stretched (more) at that spot which immediately is visible as a peak in the readings. And the location of the event is determined with an accuracy of only 1 (one!) meter for dike sections up to 50 kilometers. Whenever a pre-set deformation level is reached, the system automatically raises an alarm via email and SMS. Thus DIKEALERT is an extremely powerful early warning tool to discover hidden deficiencies that are unable to be detected by the currently existing surveillance procedures.

CHARACTERISTICS

- Continuous monitoring of every single meter of a dike
- 24 hours per day, 365 days per year
- Real-time, objective
- A single reading unit to survey up to 50kms of dike
- One reading every meter. So 25.000 sensors (!) for a 25km long dike
- Spatial resolution: 1,00m
- No disruption of the structure of the dike.

IJkdijk: DIKEALERT forecasts location of failure 48 hours in advance!

PROVEN TECHNOLOGY

In practice DIKEALERT already has proven itself as an excellent technology for monitoring the stability of earth structures. A particular application is the detection of erosion behind quay walls. On a number of occasions DIKEALERT has provided an early warning for impending collapses in the Port of Rotterdam as a consequence of which accidents could be averted.

Fiber optic cable

Geotextile with integrated fiber optic cable

PRACTICAL OPERATIONAL ASPECTS

- Easy to install in existing dikes and levees
- Implementation in the existing organisation:
  - No specialist's knowledge required
  - No overkill of data
  - First find the location of a possible weak spot, then call in the specialists
- Noise (grazing cattle, agricultural vehicles..) can be filtered out.
- Damaged or cut fiber cable:
  - The system indicates exactly where
  - Easily repaired by field splicing
  - The system continues to operate (loop configuration)
- Hooligan free: the system is invisible and the "local" reading unit can be installed in a safe place at up to 5km distance
- 24 hour per day surveillance along every meter along the full length of the dike.

inventec b.v.

P.O. Box 497 Tel. +31-341-274470
8070 AL Nunspeet Fax. +31-341-274471
The Netherlands
Email: info@inventec.nl
Website: www.inventec.nl