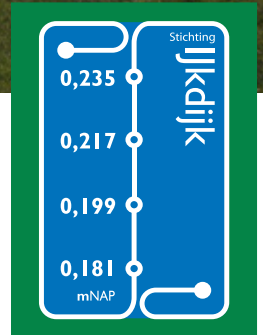




LiveDijk Eemshaven is a unique project aimed at the practical application of sensor management systems in the western protection dike of the Eemshaven.



stowa

Waterschap NOORDERZIJLVEST



LiveDijk

E E M S H A V E N

LiveDijk Eemshaven was designed by the Noorderzijvest Water Board, STOWA, within the framework of the Improvement of Dam Inspection -2 and the IJkdijk Foundation. The Flood Control Foundation, Deltares, TNO and IBM have worked together to set up a monitoring and forecasting system for the strength of the LiveDijk Eemshaven. In addition, an important part of the technology that was tested in the macro-stability experiment has been employed.

Macro stability experiment

The IJkdijk foundation was set up on the initiative of N.V. NOM, STOWA, the IDL Foundation, Deltares and TNO. In 2008, the IJkdijk Foundation carried out the macro-stability experiment in cooperation with the Innovation Test Centre of the Netherlands Directorate-General for Public Works and Water Management (Rijkswaterstaat). During this experiment it was demonstrated that the application of measurement and sensor techniques is a useful addition to the regular visual inspection of dikes in order to be able to detect stability problems in time. At the end of September 2008, a specially built dike that could be used under controlled conditions was brought to collapse in accordance with the macro instability mechanism. 13 different companies deployed a large variety of innovative methods of measuring and observation in order to register all the events in and around the dike. For an overview of these parties, see www.ijkdijk.nl.

Scaling up

In order to achieve a complete monitoring system for dikes in the long run, the technology of the macro-stability experiment is being applied on a much larger scale (in both time and length) in an existing dike belonging to the Noorderzijvest Water Authority. This pilot is intended to put the knowledge gained from the macro-stability experiment into practice so it can be used in the future by dike managers (such as water authorities).





Installation LiveDijk Eemshaven



The sensor technology that was developed has been added to a 600 meter section of the western protection dike around the Eemshaven in North Groningen. This dike is located in an area where a great deal of shipping and construction activity takes place. The dike is put under pressure by strong waves and storms on the sea side. The experiment will not result in any risk to safety in the province of Groningen.

The Live Inside consortium (Alert Solutions BV and GTC Kappelmeyer GmbH) has been commissioned to provide the in-situ real time monitoring of the LiveDijk Eemshaven. Alert Solutions has employed the GeoBeads sensor modules in this LiveDijk that can carry out real time and simultaneous observations of both water pressure and temperature for detecting water volume and movement. GTC Kappelmeyer has used a fibre optic cable for temperature measurement, whereby precise measurement of the localized water flow can be made and the water volume and water flow speed can be recorded.

The long-term operation of sensor technology under practical conditions provides a great deal of valuable data. This data will be used for actual calculations of the strength of the dike. The way in which the dike stands up to heavy storms and waves will be investigated.

Monitoring and forecasting system

The major research questions for LiveDijk Eemshaven in order to realise a monitoring and forecasting system in the long term are:

- How does a dike manager deal with a dike provided with sensors in his organisation?
- What are the effects of this on the organisation, inspection and monitoring of the barriers?
- Which information does the management and the board of directors want to have reported?
- How can the results of the measurements be used in safety tests and managers' decisions?

For more information

www.ijkdijk.nl
www.livedijk.nl

Info@ijkdijk.nl

The IJkdijk Foundation was established by:



Deltares
P.O. Box 177
2600 MH DELFT
The Netherlands
www.deltares.nl



**Foundation for
Applied Water Research**
Arthur van Schendelstraat 816
3511 ML UTRECHT
The Netherlands
www.stowa.nl



**Stichting Integrated
Development Lab**
Anne de Vriesstraat 70
9402 NT ASSEN
The Netherlands
www.idl.sensing.com



TNO Knowledge for business
Eemgolaan 3
9727 DW GRONINGEN
The Netherlands
www.tno.nl



N.V. NOM
Paterswolderseweg 810
9728 BM GRONINGEN
The Netherlands
www.nom.nl

If you would like more information about the IJkdijk, then contact

Wouter Zomer
Foundation IJkdijk
P.O. Box 424
9700 AK Groningen
The Netherlands
Tel. (+31) 06 224 042 60
info@ijkdijk.nl
www.ijkdijk.nl

