Infrastructure Monitoring
Quantitative assessment of asset surface topography

FRMRC2 has produced:
Methods for rapid and accurate assessment of embankment geometry and guidance for their use

Intended readership:
• Asset management teams
• Consultants
• Policy makers

Where to find more information:
www.floodrisk.org.uk

Summary

Accurately assessing crest levels and profiles of flood defence assets such as embankments is critical to their management and cannot be easily achieved through a standard visual inspection. LiDAR and Kinematic GPS have both been shown to be highly effective tools in this regard.

Airborne LiDAR can profile large areas (reach or catchment level) rapidly and can typically assess asset topography to an accuracy of between 5-20cm. High resolution LiDAR (grid size of 50cm or less) also offers the capability to detect surface deformations indicative of asset deterioration.


Kinematic GPS is a highly accurate method for assessing crest levels and asset geometry at the sub-reach or asset level. Trials have shown that backpack or wheel mounted options can assess crest levels to within 10cm and can be easily used by a single operative with minimal training. Alternatively, integrating kinematic GPS with mowing equipment could enable efficient, rapid and accurate surveying of entire embankment surfaces with minimal additional resource requirements.

Intelligent implementation of these two technologies will provide flood defence managers with critical data for the management of their embankments and help to identify asset deterioration.

In order to assess the potential of LiDAR for identifying surface deformations, a computer simulation was produced. This allowed the researchers to examine the effects of grid resolution and other potential error sources on the results obtainable via airborne LiDAR surveys

The figure below illustrates some of the results obtained from this element of the work.
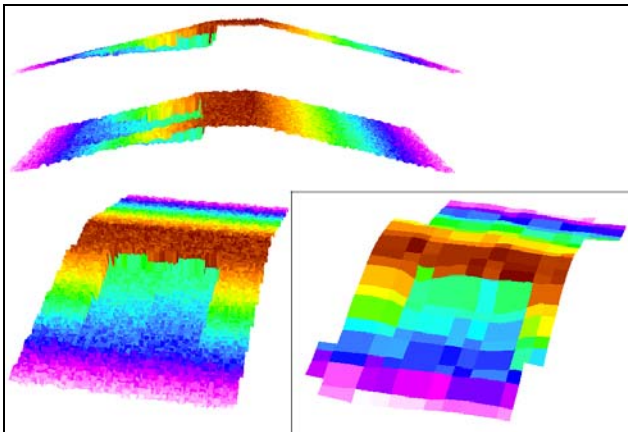

Fault identification & effect of LiDAR resolution

LiDAR data collected by the Geomatics Group was analysed to confirm results obtained from simulation and provide real world case studies of the utility of LiDAR for crest profiling and asset monitoring.

Kinematic GPS trials carried out showed that it is capable of profiling assets and is particularly suited to quantifying embankment crest levels using a backpack mounted platform. This enables greatly increased speed of profiling over traditional approaches using a surveyor's pole.

It can also be used to quantitatively assess potential failures as shown below.
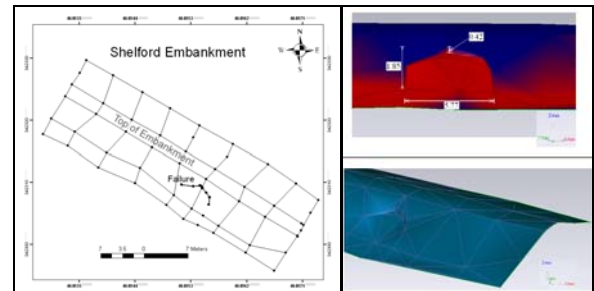
Failure Profiling using Kinematic GPS

Other sources of information

www.floodrisk.org.uk

Research Team

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