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The flood events experienced by much of the north of England (United Kingdom) during the winter of 2015–2016 subjected many flood defence assets to extreme loads and, in some cases, assets experienced loads and water levels in excess of their design criteria. The majority of flood defence assets performed well, but a limited number failed leading to breaching and flooding. Although the flooding resulting from breaches did not affect any properties which were not already flooded by the extreme conditions, the breaches themselves caused significant disruption and high costs were incurred in reinstating the defences.

A technical analysis of defence performance during these flood events commissioned by the Environment Agency (England) identified that many of the failures of flood defence embankments could be attributed to local irregularities (for example, transitions in surface protection, historical channel crossings and local low spots) in, on or under the embankments. The technical analysis report recommended that flood defence managers should focus more on identifying and resolving local irregularities. This paper presents work undertaken by the Environment Agency to address this recommendation. It explores the potential of remotely sensed data (in particular LIDAR data) to supplement the visual assessment of the condition of a flood defence to help identify local irregularities in flood defence embankments.

This paper describes the sources and availability of remotely sensed data used in this study alongside the range of analysis techniques that can be used to display and query these data in a geographical information system (GIS). It outlines how such analysis could support existing infrastructure asset management processes such as visual condition inspection and post inspection decisions and enable the early identification of irregularities and their proactive management.

A framework is put forward to characterise performance features of flood defence embankments in terms of indicators of (1) potential weaknesses, (2) deterioration and (3) damage

Real-life examples are provided which demonstrate how remotely sensed data can be used to identify and extract quantitative information to improve understanding of likely defence performance. Case study examples are presented to illustrate how such data can be used to support asset management decisions.