CHAPTER 4: RESULTS FROM REMOTE SENSED DATA

4.1 Floodplain and Terrace Geomorphology

Two hundred and twenty six photographs from 25 separate sorties were examined as part of the study. Detailed analysis of air-photographs was restricted to those displaying clearly defined geomorphological detail, evident as crop or soilmarks, earthworks or through differential flooding. Modern landscape features, such as hedge lines, suggestive of for example relict river channels, were excluded from consideration as it was felt that these features could not be taken as definitive evidence of geomorphological features without field examination, which was to be undertaken separately; the aim of this aspect of the study being exclusively to examine the efficacy of remote techniques.

Using these criteria, clearly defined geomorphological detail was confined to only five of the 25 NMR listed sorties examined and to a set of Fairey Survey air-photographs held by Leicestershire County Council (Tab. 4.1). Evidence from these photographs (but excluding the 1945 sortie used by TVG2002) was digitised within ArcGIS to generate mapping, principally of palaeochannels (Fig. 4.5). The results of this mapping, using photographs from five sorties, may be compared with that carried out by TVG2002, (Fig. 4.1) using photographs from only two sorties (principally RAF photographs from 1946 [RAF/106G/UK/734/3099] and Aerofilms photographs from the 1970s [Aerofilms 7145 9-768]).

There appears to be agreement between the two independent studies on general disposition of all major palaeochannels, including those significant relict channels marking the boundary between terrace 1 (the Holmepierrepont Terrace) and terrace 2 (the Hemington, or floodplain terrace) and channel belts within the Hemington terrace, mapped as alluvium by the BGS.

Finer details of channel form vary between each study, probably in part as a result of the vagaries of interpretation of different workers. Significant extra detail of channels within the floodplain alluvium was revealed by photographs showing groundwater flooding in December 1954 (Fig. 4.2). Further significant detail of terraces 1 and 2 is provided on the exceptional Fairey Survey photographs of June 1976 (Fig. 4.4). The impact of the unusually dry summer conditions is evident both in the degree to which subtle detail of the geomorphology of terrace 1 and 2 is revealed and also by the very clear cropmarks of the Lockington later prehistoric settlement complex and Romano-British villa on terrace 2. Much of this detail is impossible to capture through crude digitising of channel outlines, and reference to the geocorrected photographs is required to gain full appreciation of the complex geomorphology.

Photo Ref	Year	Geo Unit	Comment
RAF/106G/UK/734	1945	T2, FP	Paleochannels revealed by flooded depressions, and earthworks (See Baker 2003).
RAF CPE UK 1865	1946	T2, FP	Palaeochannels revealed by groundwater flooding (fig. 2)
RAF 542 97	1954	T1, T2, FP	Terrace units defined by extensive overbank flooding of Trent and Soar (fig. 3)
MAL/78023	1978	T1, T2, FP	Some cm/sm evidence of geomorph
Fairey Surveys 1861	1976	T1, T2	Extensive cm/sm evidence of palaeochannels and terrace details
OS/67011	1978	T1, T2, FP	Some cm/sm evidence of geomorph

Tab 4.1: Summary of vertical sorties containing good evidence of fluvial geomorphology within the study area.

4.2 Cultural Archaeology

No systematic attempt was made to transcribe cultural archaeological details from vertical aerial photographs, nor were oblique photographs examined for such. However, evidence for the ridge and furrow remains of medieval ploughing, surviving as relict earthworks and also revealed as cropmarks and soilmarks was transcribed (Fig. 4.6). In general evidence for ridge and furrow is confined to terrace 1 (the Hemimgton terrace) and absent from terrace 2 (Holmepierrpont) and the floodplain. This probably reflect the marginal nature of the land of the Hemington terrace in the Post-Medieval period, where land use, largely of long term pasture and meadow, led to the survival of ridge and furrow otherwise eradicated by continued ploughing on the higher land of the Holmepierrepont Terrace. In contrast, the floodplain was probably never ploughed. A fragment of ridge and furrow close to the present course of the Trent may reflect an isolated relict of terrace 1. The boundaries of individual furlongs of ridge and furrow conform closely to those of geomorphological units, as do those of enclosure field boundaries – probably as the relict channels marking most unit boundaries have remained significant, seasonally flooded, landscape features.

4.3 Flooding on the River Trent

The December 1954 photographs record a significant episode of over bank flooding effecting both the Rivers Trent and Soar (Fig. 4.3). The extent of the flood waters recorded by the photographs has been used in conjunction with LiDAR elevation data to produce a visualisation of the extent of flooded and not flooded areas. This clearly defines the impact of flooding on different geomorphological units (Fig. 4.7), and a pseudo three dimensional map of the 1954 flood, based entirely in the LiDAR elevation data (Fig. 4.8) shows for example that the central portions of the Hemington terrace remain largely unaffected by flood waters.

Comparison of the photographic evidence with LiDAR intensity values (Fig. 4.9) shows areas flooded in 1954 generally display lower intensity values, while a number of higher terrace remnants within the

Hemington terrace have higher intensity values, although a substantial part of the centre of the terrace has low values. High intensity values appear to be linked to areas which on geomorphological grounds might be interpreted as bar or splay features. This may suggest that intensity is in some way linked to substrate.

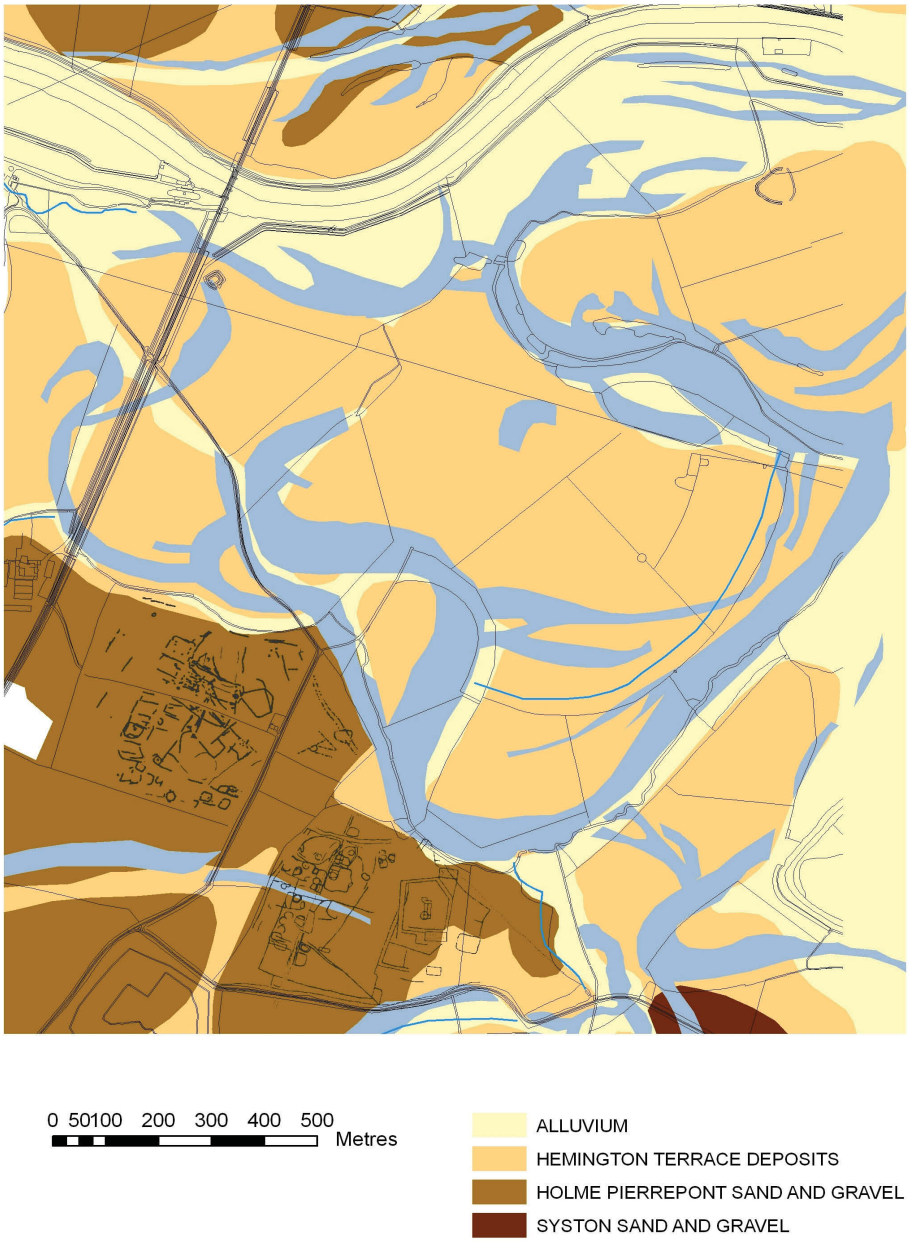

Fig 4.1: Map showing the drift geology of the study area (as recorded by the Geological Survey) with superimposed palaeochannels mapped by TVG2002 (Baker 2003) and cropmark and geophysical survey evidence for later prehistoric and Romano-British activity on the Holme Pierrpont terrace..

Fig 4.2: Geocorrected vertical air-photographs of the north-east corner of the study area taken on 2nd December 1946 (RAF CPE UK 1865 6137) showing groundwater flooding highlighting palaeochannels on the Hemington (floodplain) Terrace and floodplain.

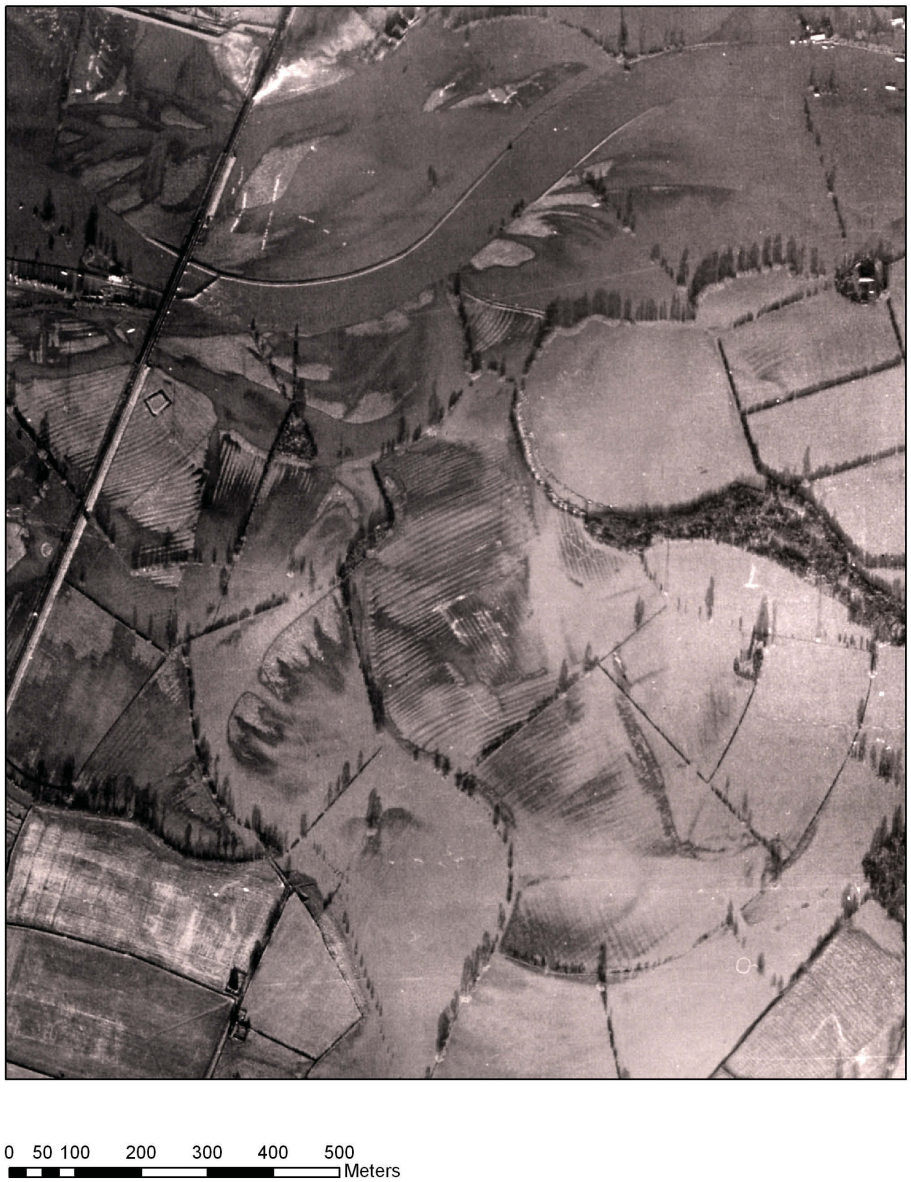

Fig 4.3: Geocorrected vertical aerial photograph mosaic of the study area taken on15th December1954 (RAF 542 97 0048 and 0049) showing extensive over bank flooding of the Rivers Trent and Soar.

Fig 4.4: Geocorrected vertical aerial photograph of the study area taken on 28th June 1976 (Fairey Surveys 1861 7615) showing extensive and well developed crop and soil mark evidence for fluvial features within the Holmepierrepont and Hemington Terraces and palaeochannels between the terrace units. The cropmarks of the Lockington villa complex are also clearly evident.

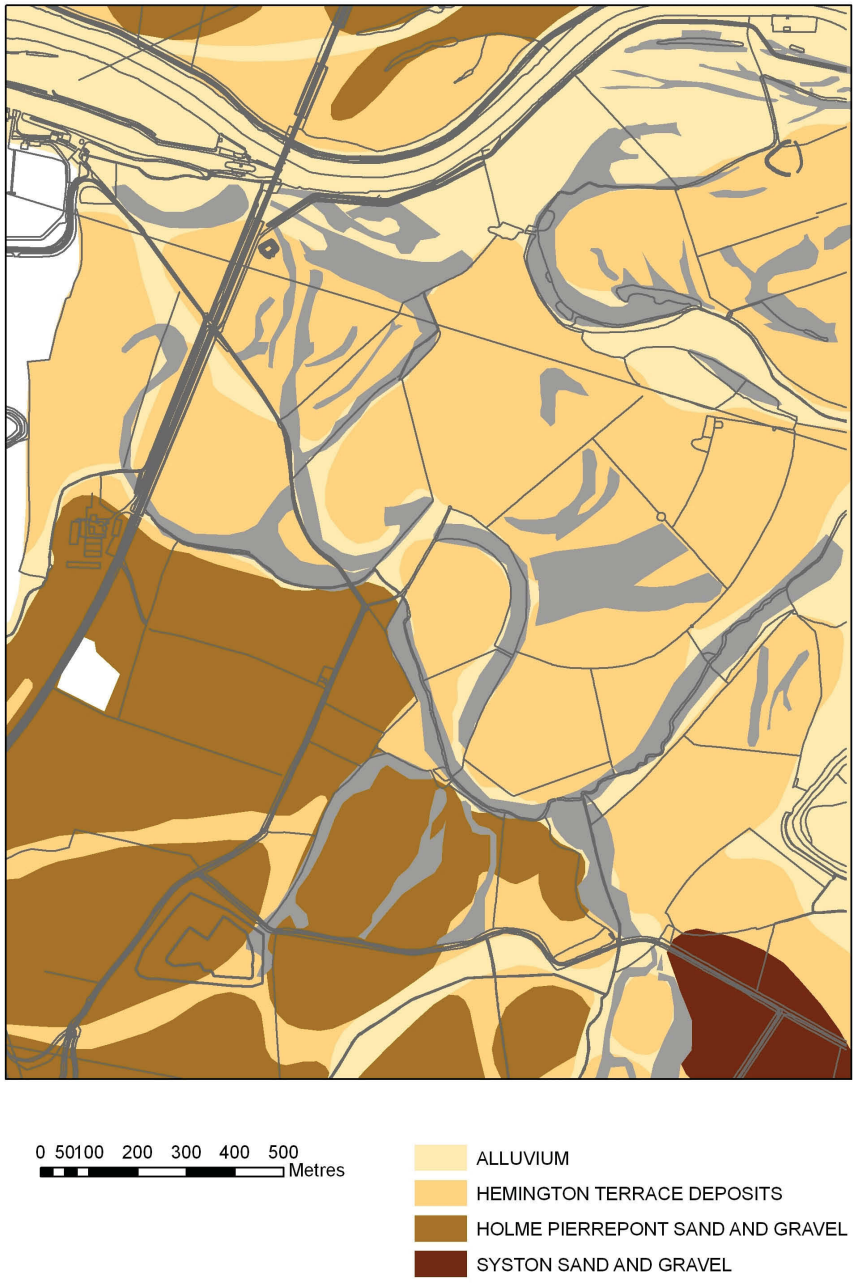

Fig 4.5: Map summarising the fluvial geomorphological features across the study area transcribed from air-photographs as part of the study. This may be compared with the work of TVG 2002 (fig.1) and with LiDAR evidence (Figs. 4.10-4.12).

Fig 4.6: Map summarising cultural archaeological remains transcribed from air-photographs of the study area with in addition the Warren Lane later prehistoric settlement complex revealed largely by geophysical survey.

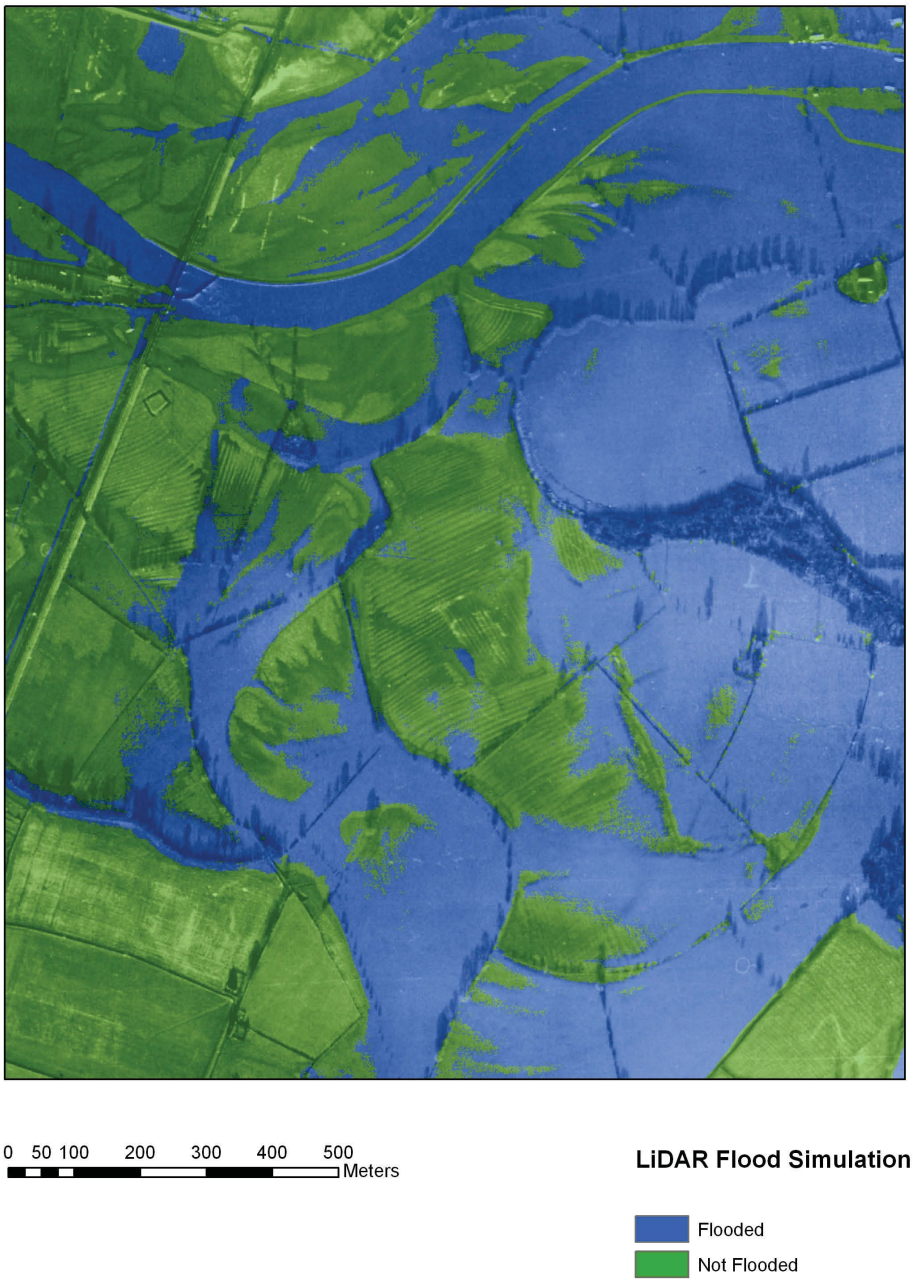

Fig 4.7: December 1954 vertical aerial photograph of the study with the Rivers Trent and Soar in flood, showing the extent of flooding (extracted by analysis of elevation values on the LiDAR DSM highlighted in blue).

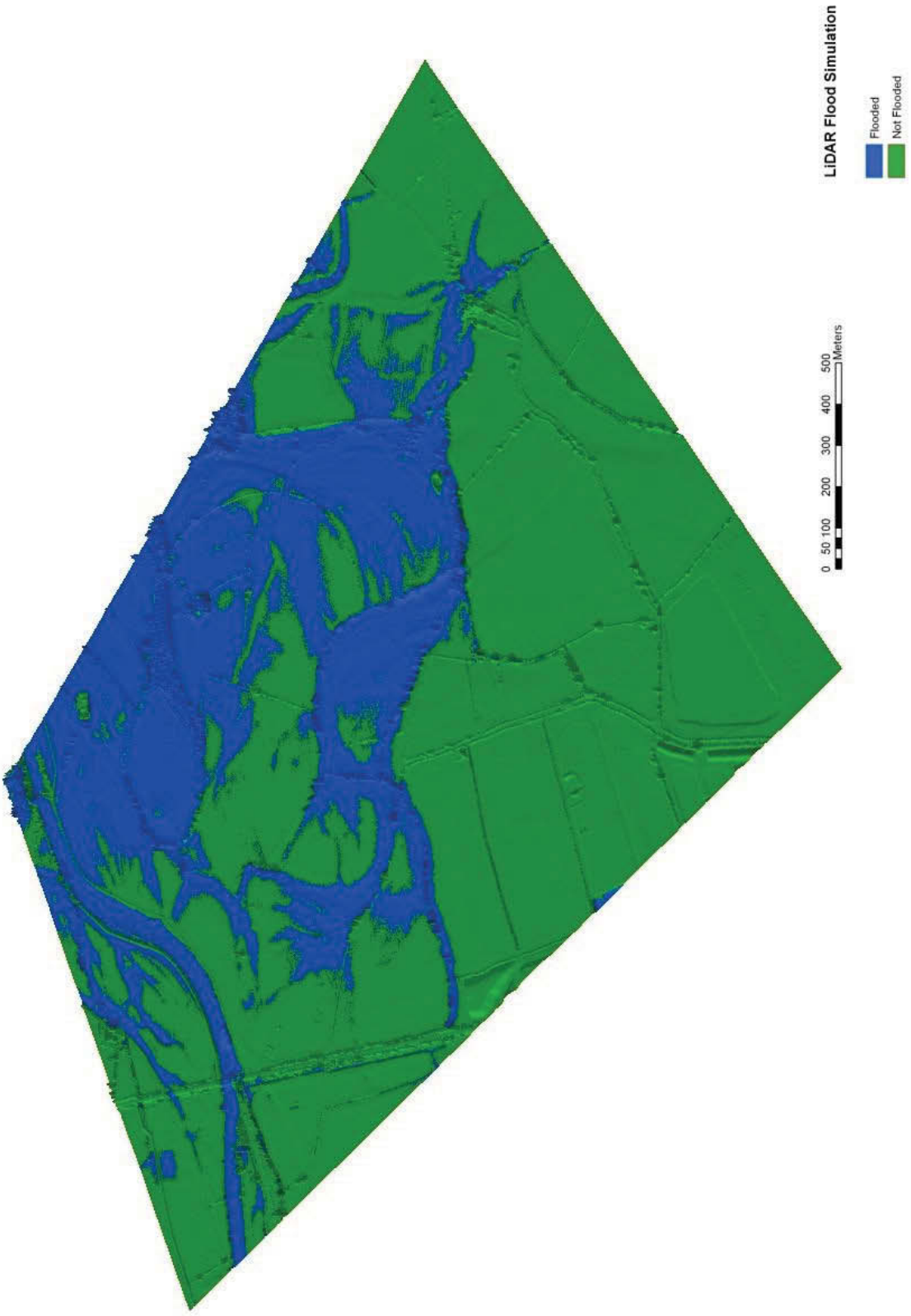

Fig 4.8: Pseudo 3D view of a LiDAR derived simulation of the extent of flooding of the study area on 15th December 1954.

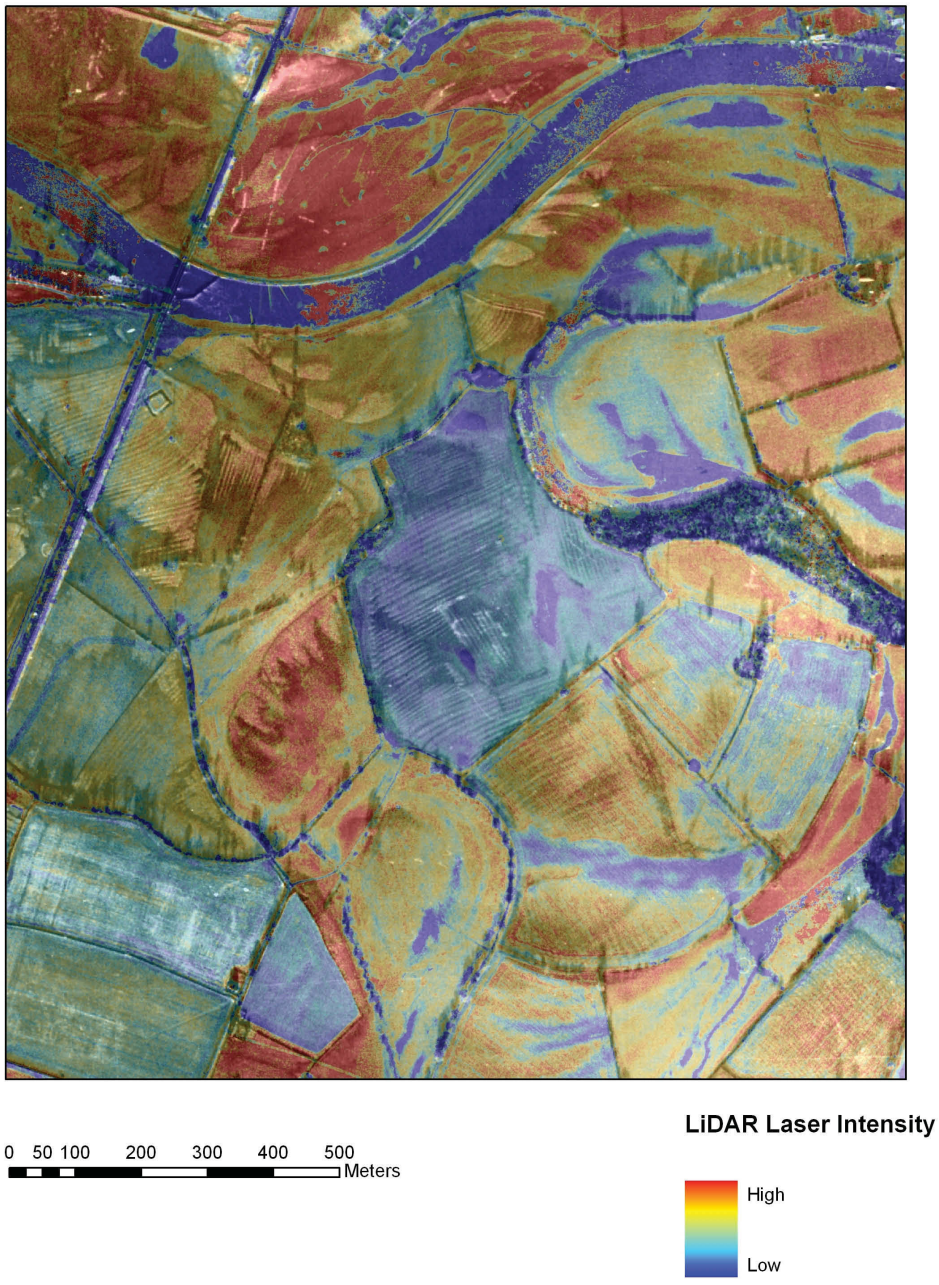

Fig 4.9: The December 1954 aerial photograph of the study area with LiDAR laser intensity data superimposed.