Recent geophysical survey of English monastic sites

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Abstract
Geophysical survey can provide additional detail even from well understood monastic sites. Extended landscape survey in rural settings can reveal wider semi-industrial monastic activity. Vehicle towed ground penetrating radar used to complement earth resistance and magnetic survey.

Keywords
abbey; earth resistance; ground penetrating radar (GPR); magnetic survey; priory

Introduction

Geophysical survey can provide a useful means of investigating monastic sites, particularly the use of Ground penetrating radar to complement earth resistance and magnetic coverage (Linford and Payne 2017). This paper will focus on two recently surveyed monastic sites: Dunstable Priory, Bedfordshire, situated in an urban municipal park where the standing remains still function as an important parish church; and Sibton Abbey, Suffolk, a romantic ruin set in an open pastoral landscape where the relationship between the monastic complex and the river Yox immediately to the south can be more readily discerned. Dunstable Priory was an Augustinian order founded in 1132 where on the 23 May 1532 in the former Lady Chapel of the conventual church the marriage of Henry VIII and Catherine of Aragon was pronounced null and void. The Manshead Archaeological Society have previously conducted extensive earth resistance surveys and targeted excavation at Dunstable Priory, and the interpretation of the data is marked out in white paint on the grass. Sibton was an early Cistercian abbey founded by 1150 and grew rich from animal husbandry, including the export of Suffolk wool to Flemish weavers. Only the refectory and south walls of the nave survive today, with no trace of the later 18th Century manor house, built by the Levett-Scrivener family who have owned the site since 1610.

Methods

A vehicle-towed ground penetrating radar (GPR) survey was conducted at both sites using a 3d-Radar (Kontur) MkIV GeoScope Continuous Wave Step Frequency (CWSF) system with a multi-element DXG1820, ground-coupled antenna array (Cuenca-García et al. 2020; Eide et al. 2018; Linford et al. 2010; Stamnes and Kiersnowski 2021). Data were acquired at a 0.075 m by 0.075 m sample interval across a continuous wave stepped frequency range from 40 MHz to 2.99 GHz in 4 MHz increments using a dwell time of 3ms (Linford et al. 2022). In addition, a magnetic survey using Bartington 601 fluxgate gradiometers at a 0.25 m x 1.0 m sample interval and a targeted earth resistance survey using a Geoscan RM85 earth resistance meter at 0.5 m x 1.0 m sample interval were conducted at Sibton Abbey.

Results

Figure 1 shows extracts of the data collected at Dunstable Priory, including surface evidence of the former buildings, previous earth resistance results, together with the GPR survey where a series of fragmented anomalies suggest the apse and ambulatory immediately to the east of the standing remains of the church. The earth resistance from this area was less clear and, perhaps, indicative of rubble deposits associated with the demolition of the former Lady Chapel. The GPR data certainly suggests some potential

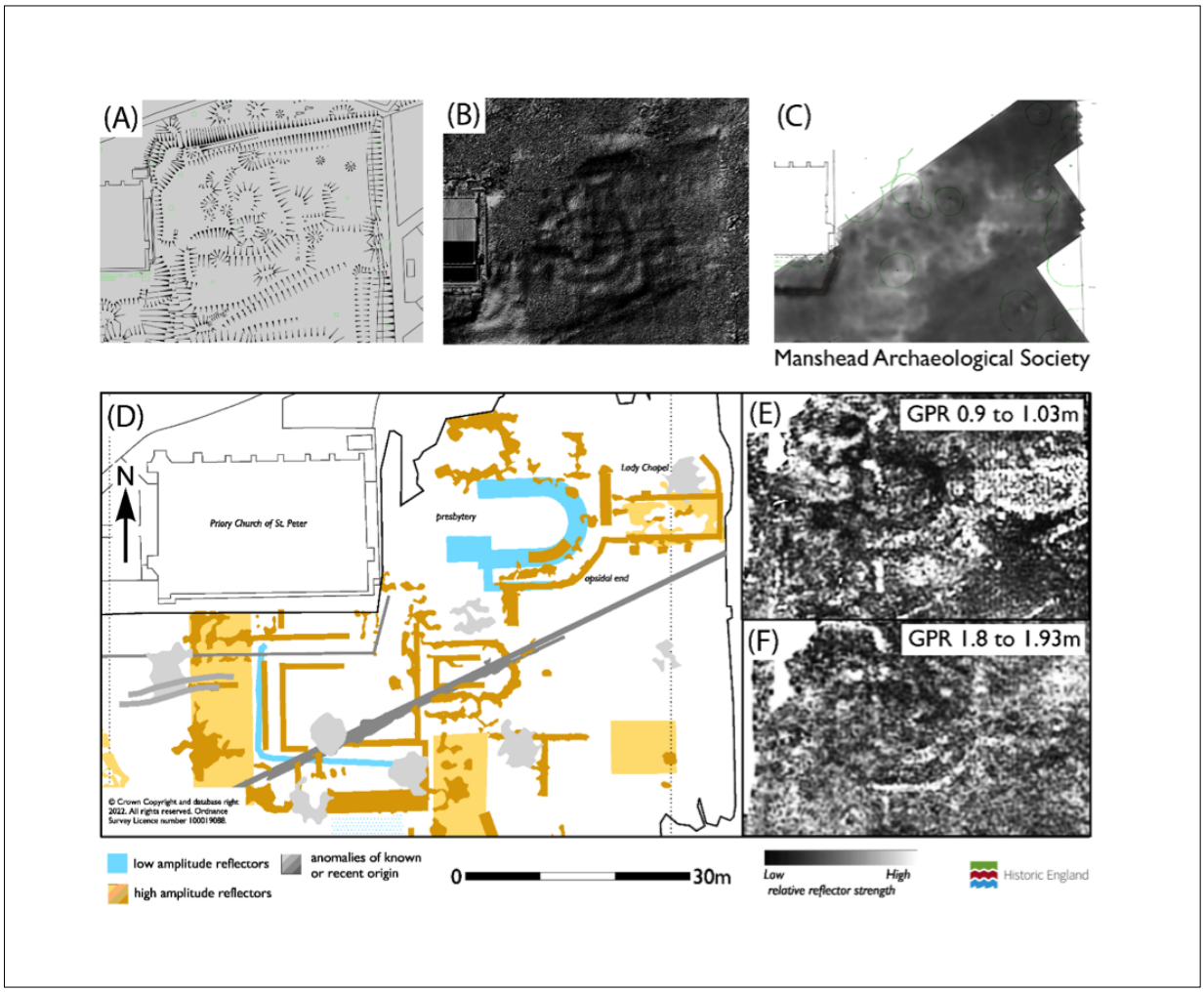

Fig. 1: Dunstable Priory (A) analytic earthwork survey and (B) digital elevation model derived from UAV photogrammetry over the site showing surface evidence for further monastic buildings. Extracts from (C) the previous local society earth resistance survey (high resistance plotted as lighter tones) is shown together with (D) a graphical interpretation of the GPR survey and data from two selected time slices that reveal (E) the robbed-out ambulatory and (F) deeper wall-footings of the apse leading to the former Lady Chapel.

robbed out wall footings and presents a much more elaborate church building on the site than has been previously recognised. Wider area GPR survey was constrained by more recent paths and planting associated with the modern park but did successfully reveal additional detail to complement the earth resistance data and suggest the slight realignment of buildings to the south of the monastic range. Survey beyond the Priory gardens was hampered by surrounding urban development, and the landscaping of the school playing field to the south of the gardens.

In contrast, investigation of the wider landscape beyond the immediate monastic range was possible at Sibton Abbey, where the standing remains are found within a series of pasture fields running alongside the river Yox (Linford and Payne 2022). The wider GPR survey here revealed evidence for a large building containing a series of internal circular anomalies. Further regular groups of circular anomalies were found immediately to the north, both apparently free standing and some with evidence for surrounding walls, and the magnetic survey data suggests the presence of strongly magnetized, semi-industrial anomalies within the same area. Comparison with the recent GPR survey conducted at Fountains Abbey, Yorkshire (National Trust 2021), suggests a similar interpretation for these anomalies providing evidence for either a tannery or, perhaps the processing of Suffolk wool, a lucrative export from Sibton.

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Fig. 2: View of the standing remains at Sibton Abbey, Suffolk.

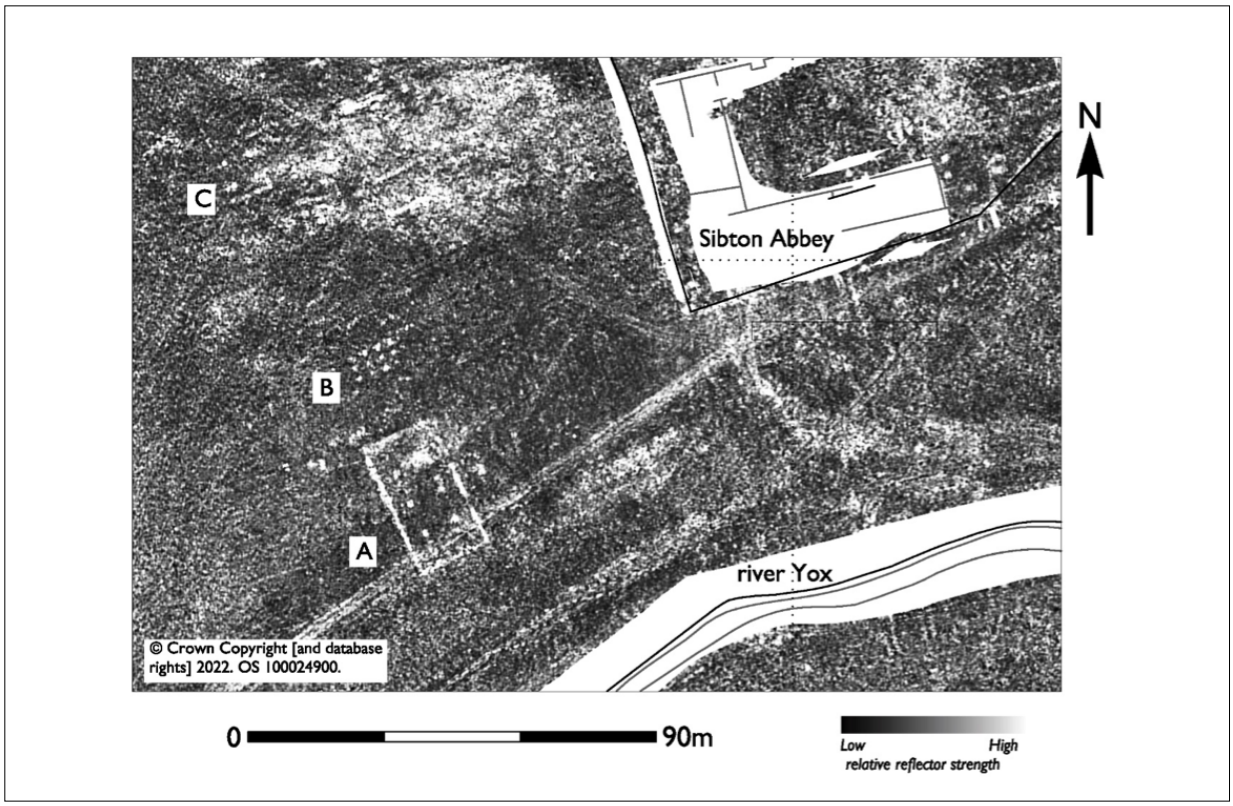

Fig. 3: Extract from the GPR survey at Sibton Abbey between 22.5 and 25.0 ns (1.23 to 1.36 m) showing a ~15 m x 30 m possible tannery building marked 'A' with internal circular pits or processing vats. A group of twelve pits are found immediately to the north at 'B' and a further structure containing pits or processing vats at 'C'.

Conclusion

The application of vehicle-towed GPR arrays to the investigation of monastic sites provides additional complementary detail to support the use of more conventional geophysical techniques. Investigation of the wider landscape surrounding the standing remains of the abbey at Sibton has proved particularly successful and provided further evidence for the scale of industrial activity associated with the religious community.

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