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# CHURCH OF ALL SAINTS, EDINGTHORPE, NORFOLK
# TREE-RING ANALYSIS OF NAVE ROOF TIMBERS

## SCIENTIFIC DATING REPORT

Martin Bridge


ARCHAEOLOGICAL SCIENCE

ENGLISH HERITAGE

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## SUMMARY

A total of five *in situ* rafters were sampled, of which only one had sufficient numbers of rings to warrant further analysis. Six *ex situ* timbers, rafters or possibly collars, were sliced on-site and subsequently analysed. Six sequences, four of which had over one hundred rings, failed to date. The roof therefore remains undated.

## CONTRIBUTORS

Dr M C Bridge

## ACKNOWLEDGEMENTS

This work was commissioned by Dr Peter Marshall (EH). Access to the site was arranged through Keith Atthowe. The data were checked by Cathy Tyers (Sheffield University) who made useful comments on earlier drafts of this report, as did Derek Hamilton.

## ARCHIVE LOCATION

Norfolk HER, Norfolk Landscape Archaeology, Union House, Gressenhall, Dereham, Norfolk, NR20 4DR

## DATES OF INVESTIGATION

2010

## CONTACT DETAILS

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## INTRODUCTION

A small isolated parish church with a twelfth-century tower and nave remodelled in the fourteenth century, the Church of All Saints sits at the north-east extremity of the present village and some 5km north-east of the town of North Walsham (Figs 1 and 2). It has a thatched nave roof, pantiles to the chancel roof, and a three stage circular tower. The nave has diagonal corner buttresses, with stepped buttresses to the flancks.

A grant-aided repair programme prior to the re-thatching of the nave roof resulted in the removal of some rafter couples, whilst others were exposed and accessible for a brief period. Ian Harper, EH Historic Buildings Architect, requested dendrochronological investigation of the nave roof timbers to inform grant-aided repairs and to better understand the history of the church.

## METHODOLOGY

Fieldwork for the present study was carried out in July 2010. In the initial assessment, accessible oak timbers with more than 50 rings and where possible traces of sapwood were sought, although slightly shorter sequences are sometimes sampled if little other material is available. Those *in situ* timbers judged to be potentially useful were cored using a 15mm auger attached to an electric drill. The cores were glued to wooden laths, labelled, and stored for subsequent analysis. A number of *ex situ* timbers were assessed on-site, and slices were sawn from those considered suitable.

The cores and slices were polished on a belt sander using 80 to 400 grit abrasive paper to allow the ring boundaries to be clearly distinguished. The samples had their tree-ring sequences measured to an accuracy of 0.01mm, using a specially constructed system utilising a binocular microscope with the sample mounted on a travelling stage with a linear transducer linked to a PC, which recorded the ring widths into a dataset. The software used in measuring and subsequent analysis was written by Ian Tyers (2004). Cross-matching was attempted by a combination of visual matching and a process of qualified statistical comparison by computer. The ring-width series were compared for statistical cross-matching, using a variant of the Belfast CROS program (Baillie and Pilcher 1973). Ring sequences were plotted to allow visual comparisons to be made between sequences. This method provides a measure of quality control in identifying any potential errors in the measurements when the samples cross-match.

In comparing one sample or site master against other samples or chronologies, *t*-values over 3.5 are considered significant, although in reality it is common to find demonstrably spurious *t*-values of 4 and 5 because more than one matching position is indicated. For this reason, dendrochronologists prefer to see some *t*-value ranges of 5, 6, and higher, and for these to be well replicated from different, independent chronologies with both local and regional chronologies well represented, except where imported timbers are identified.

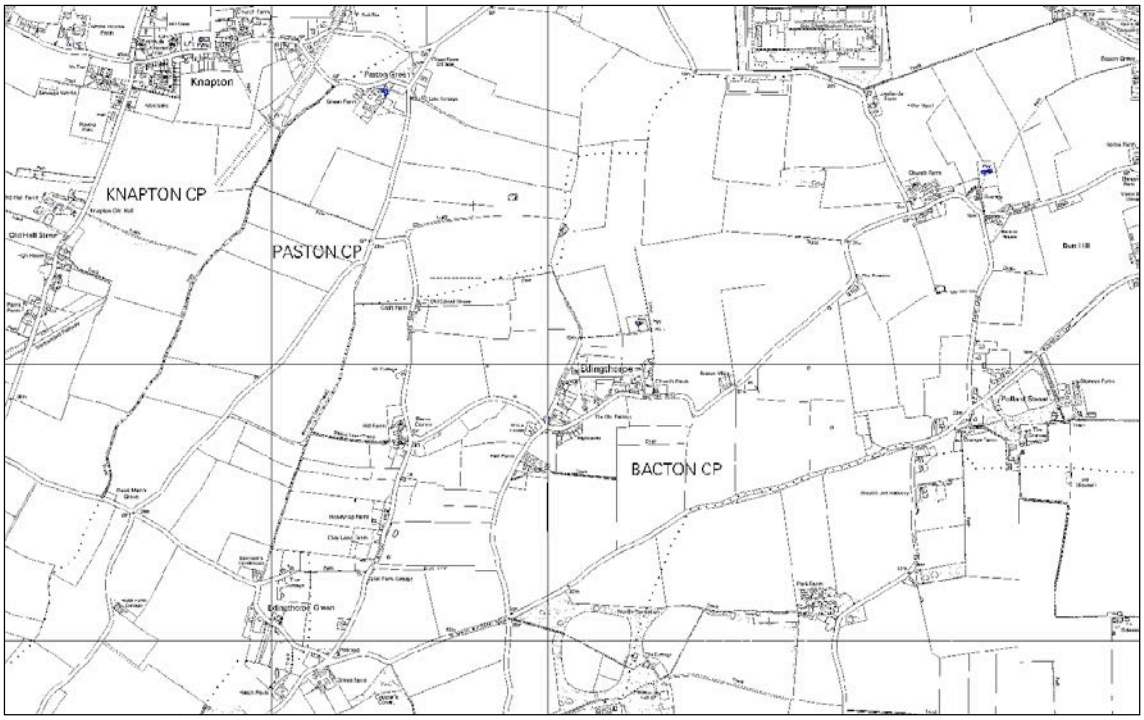


*Figure 1. Map to show the location of Edingthorpe (based on the Ordnance Survey map with permission of the Controller of Her Majesty's Stationery Office, ©Crown Copyright)*

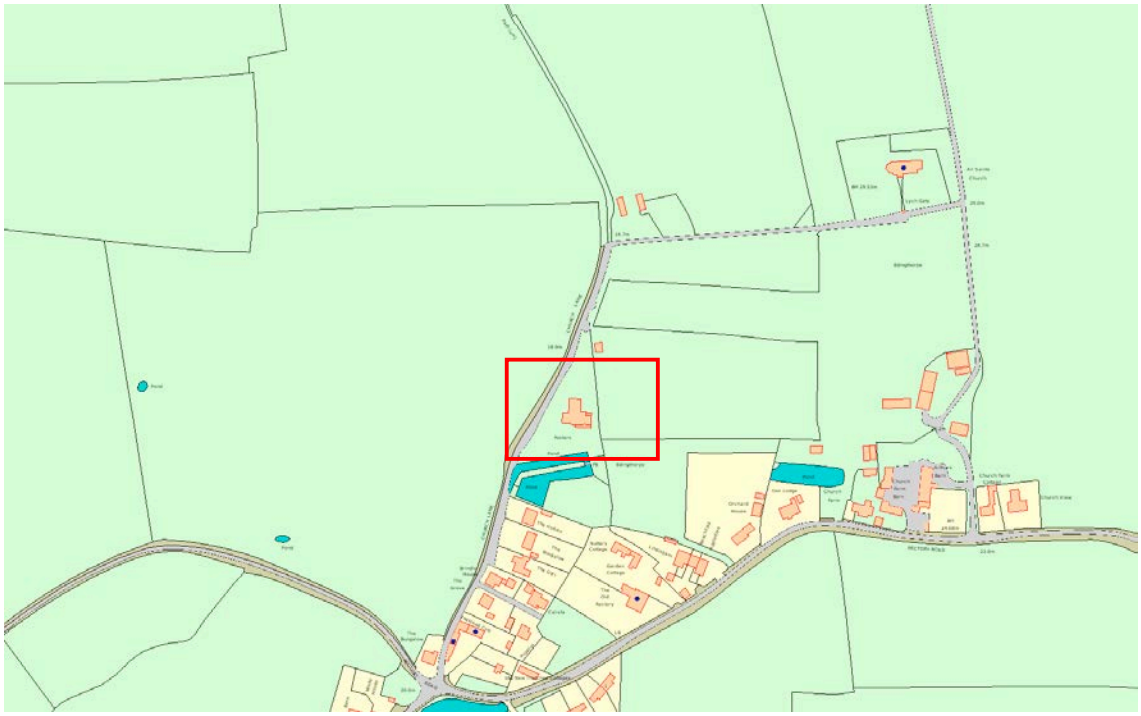

*Figure 2. Map showing the location of All Saint's Church within its immediate environs (based on the Ordnance Survey map with permission of the Controller of Her Majesty's Stationery Office, ©Crown Copyright)*

### Ascribing felling dates and date ranges

Once a tree-ring sequence has been firmly dated in time, a felling date, or date range, is ascribed where possible. With samples which have sapwood complete to the underside of, or including bark, this process is relatively straightforward. Depending on the completeness of the final ring, ie if it has only the spring vessels or early wood formed, or the latewood or summer growth, a precise felling date and season can be given. If the sapwood is partially missing, or if only a heartwood/sapwood transition boundary survives, then an estimated felling date range can be given for each sample. The number of sapwood rings can be estimated by using an empirically derived sapwood estimate with a given confidence limit. If no sapwood or heartwood/sapwood boundary survives then the minimum number of sapwood rings from the appropriate sapwood estimate is added to the last measured ring to give a *terminus post quem* (*tpq*) or felled-after date.

A review of the geographical distribution of dated sapwood data from historic timbers has shown that a sapwood estimate relevant to the region of origin should be used in interpretation, which in this area is 9–41 rings (Miles 1997). It must be emphasised that dendrochronology can only date when a tree has been felled, not when the timber was used to construct the structure or object under study.

## RESULTS AND DISCUSSION

Basic information about the samples taken is presented in Table 1. Five cores were taken from the most promising looking rafters on the north side of the nave roof. Only one of these contained sufficient numbers of rings to make further analysis justified, and subsequent assessment of timbers on the south side suggested that none of these were likely to be any better, and coring was halted. Six cross-sectional slices were taken from timbers stacked in the working area in the churchyard. One of these when cleaned up was also found to have too few rings for useful analysis. The remaining five slices were all measured. Cross-matching was only found between two series, edgS01 and edgS04 ($t$ = 4.4 with 115 years of overlap). These two series were combined to produce a new sequence, edgS41m. Neither this, nor any of the other measured series gave consistent acceptable matches when compared with the dated reference material, and all the timbers therefore remain undated.

This lack of dating success is disappointing, given that four series had in excess of 100 rings. Norfolk has proved to be a difficult area for dating previously, for example at Beeston-next-Mileham (Bridge 2007), and it is possible that these series may be dated at some time in the future, when a more localised network of chronologies become available.

*Figure 3. Photograph of the south side of the nave roof at the time of sampling, showing the small scantling of the rafters and braces*

*Table 1. Details of the samples taken for dendrochronology, rafters are numbered from the west end*

| Sample | Description | Rings | Sapwood | Mean ring-width (mm) | Date of measured sequence (AD) |
|---|---|---|---|---|---|
| Cores | | | | | |
| edg01 | Rafter 7 north | <40 | h/s | NM | undated |
| edg02 | Rafter 9 north | <40 | h/s | NM | undated |
| edg03 | Rafter 16 north | <40 | h/s | NM | undated |
| edg04 | Rafter 17 north | 78 | h/s | 1.45 | undated |
| edg05 | Rafter 19 north | <40 | h/s | NM | undated |
| *Ex situ* roof timbers | | | | | |
| edgS01 | Rafter or collar | 117 | h/s? | 0.87 | undated |
| edgS02 | Rafter or collar | 59 | h/s? | 1.78 | undated |
| edgS03 | Rafter or collar | <40 | h/s | NM | undated |
| edgS04 | Rafter or collar | 128 | h/s | 0.87 | undated |
| edgS05 | Rafter or collar | 123 | h/s? | 0.94 | undated |
| edgS06 | Rafter or collar | 122 | h/s? | 0.88 | undated |

h/s = heartwood-sapwood boundary; h/s? = possible heartwood-sapwood boundary; NM = not measured

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