FURNESS ABBEY PRESBYTERY, FURNESS ABBEY BARROW-IN-FURNESS, CUMBRIA

Archaeological Evaluation

Oxford Archaeology North

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SUMMARY

English Heritage requested that Oxford Archaeology North (OA North) undertake an archaeological investigation at the site of Furness Abbey, Barrow-in-Furness, Cumbria (NGR centred SD 2182 7179). The abbey ruins are a Scheduled Monument (SM13572), and open to visitors. The investigation took place within the abbey cemetery immediately to the east of the ruins of the presbytery, the eastern arm of the abbey church, the walls of which remain to almost full height. Major structural cracks have appeared, running from top to bottom, of the north and south walls of the presbytery. The cause of the shift in structure is unknown; one possibility is that there is a difference in foundations between the mid- to late-twelfth century masonry of the original presbytery and a later fifteenth century extension to it; or it may be due to underlying geological or archaeological features causing differential settlement in the structure. During repair work in the 1920s it was discovered that the foundations consisted of oak piles, and many of the walls suffered sinkage due to insufficient foundations, as seen currently in the presbytery walls.

Furness Abbey, originally the abbey of St Mary of Furness, was the first proper and most important foundation of the Savigniac Order of the British Isles. The newly established congregation had started in northern France at Savigny in Mortain. In 1124, a group of Savigniac monks was invited by Stephen, then Count of Boulogne and Mortain and later King of England, to settle at Tulketh (near Preston). After three years the establishment was abandoned and relocated to the secluded valley of Bekansgill in Furness, where the abbey was founded. For over 400 years, the abbey enjoyed substantial wealth, privileges and possessions and had a major influence on regional and national affairs.

Only 13 Savignac monasteries were established in Britain, although by 1147 the entire congregation of Savigny was incorporated into the much larger and more powerful Cistercian Order. It is not known how much of the abbey had been completed in stone by 1147 but it is likely that the church and buildings surrounding the cloister had been largely finished. The earliest, Savigniac, church was built in a lavish Romanesque style, surviving elements of which can be seen within the transepts and parts of the early phase of the presbytery. Excavation, however, revealed that the original east walls of the transepts were apsidal, and thus it has been conjectured that the east end of the presbytery was also apse-ended. These buildings were gradually replaced on a larger scale during the twelfth and thirteenth centuries, including the presbytery, in the Early Gothic (or Early English) style. Rebuilding work was carried out again later in the fifteenth century, when the presbytery was equipped with much larger windows and a *sedilia*. The *sedilia* consists of three canopied seats positioned in the south wall of the presbytery, near to the high alter, and used by the officiating clergy, of which this is considered to be one of the most impressive in the country.

In order to investigate the possible underlying cause of the structural problems affecting the presbytery walls, an archaeological excavation was required abutting the foundations of the east presbytery wall. This took the form of a single evaluation trench measuring 2m by 5m, later expanded to 8m in length. Three phases of activity were identified; Phase 1 is pre-fifteenth/sixteenth century; Phase 2 belongs to the construction of the fifteenth century presbytery and after; Phase 3 includes nineteenth and twentieth century activity. The earliest remains comprised the top two courses of

a possibly more substantial wall ***131***, which lay directly below the east wall of the presbytery, and it was associated with a gravel layer, ***147***. Lying above this were two silty layers (***144-45***), the lower of which was quite organic in nature. These were seen not only abutting the east wall of the presbytery, but further eastwards within a sondage, at the north-east end of the trench, that was excavated to a depth of 1.87m below the present ground level (seen as ***150*** and ***151***). Within this sondage, the lowest layer encountered, ***151***, contained a wooden plank, and samples taken from three of the early deposits (***145***, ***151*** and ***153***) showed evidence of human activity, revealing the use of cereals and fruit-bearing trees, as well as seeds suggestive of a range of environments, comprising open ground, cultivated or waste ground and wetter areas.

These first phase layers had then been sealed by almost a metre of stone rubble, of which the uppermost unit (***137***) at the south-west end of the trench had possibly been utilised as a burial horizon. The foundations of the fifteenth/sixteenth century presbytery extension had been cut through this layer. Evidence of the construction comprised a foundation trench cut (***140***) into which had been placed a large baulk of timber (***130***). The timber lay on wall ***131***, onto which the later wall of the presbytery extension had then been built. It was unclear whether the use of the earlier stone structure (***131***) for the timber was by design or whether it had been found by accident. Further investigation would elucidate the full construction sequence. The upper-most deposit (***141***) within the foundation trench (***140***) contained charnel material, presumably from displaced graves.

More ground-raising deposits were then recorded across the trench. In the top layer were three burials (***127***, ***134*** and ***136***), all of which followed the alignment of the presbytery. A possible cist burial (***152***) placed against the east presbytery wall was located within the north-west-facing section of the trench. These burials were dated to at least the fifteenth/sixteenth century. A later layer of buried topsoil (***109***) then sealed a stone culvert and ceramic pipe. Finally, there was further evidence of ground-raising deposits, this time likely to be early twentieth century in date, and a small bore iron pipe.

The presence of the timber raft (***130***) upon which the east wall of the fifteenth century presbytery extension was constructed has probably contributed to the major structural cracks in the north and south walls. It has been conjectured that repeated drying and wetting of this timber structure may have led to the timber rotting and thus to differential areas of loss of structural integrity, resulting in the cracks appearing.

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OA North would like to thank Ian Whittick of English Heritage for commissioning the project, and also Andrew Davison and Mark Douglas of English Heritage for their help and advice.

The archaeological evaluation was undertaken by Tim Christian, Pascal Eloy and Jeremy Bradley, who also wrote this report. Sandra Bonsall processed the environmental samples, whilst Denise Druce examined the wood, and Elizabeth Huckerby assessed the plant remains. The finds were assessed by Christine Howard-Davis and the bones were assessed by John Griffiths. The drawings were produced by Anne Stewardson. The project was managed by Emily Mercer, who also edited the report.

1. INTRODUCTION

1.1 CIRCUMSTANCES OF PROJECT

1.1.1 English Heritage requested that Oxford Archaeology North (OA North) submit proposals to undertake an archaeological investigation at the site of Furness Abbey, Barrow-in-Furness, Cumbria (NGR centred SD 2182 7179; Fig 1). The abbey ruins are a Scheduled Monument (SM13572), and open to visitors. The investigation took place within the abbey cemetery, immediately to the east of the ruins of the presbytery, the eastern arm of the abbey church, the walls of which remain to almost full height (Fig 2; Plate 1). Major structural cracks have appeared running from top to bottom of the north and south walls of the presbytery. The cause of the shift in structure is unknown; one possibility is that there is a difference in foundations between the mid- to late-twelfth century masonry of the original presbytery and a later fifteenth century extension; or it may be due to underlying geological or archaeological features causing differential settlement in the structure.

1.1.2 Therefore, in order to investigate the possible underlying cause, an archaeological investigation was required, abutting the foundations of the eastern wall of the presbytery. This was undertaken in February and March 2009 and took the form of a 2m by 5m trench, later expanded to 8m in length. Subsequent excavations are planned within the interior of the presbytery to examine the foundations of the two-phased construction (mid-late twelfth and late fifteenth centuries) and mitigate the necessary shoring-up works.

1.1.3 In an effort to further understand the ground conditions and possible causes of the shift in the structure, and to pre-empt any problems or hazards to the shoring, a geophysical survey was undertaken, the interim results of which were made available prior to the fieldwork (Archaeophysica forthcoming). An electrical resistance survey was undertaken around the outside of the walls and a number of profiles were obtained, both externally, as well as internally. A number of features were identified, but those of particular relevance were two features lying to the east of the presbytery, which included a low resistance feature parallel to the north, south and east walls of the presbytery thought to be a path, and a previously unknown service trench. Therefore, the trench was also used to determine precisely what these features are and how they sit within the cemetery.

1.1.4 The following report is based on a formal brief provided by English Heritage for an investigation of the interior of the presbytery (*Appendix 1*), which was revised by a verbal brief for this investigation. The proposed methodology is concerned only with this latter external trench to the east of the presbytery. Any internal excavation will be dealt with in a separate project design, as this will be informed by the results of this first stage investigation.

1.2 LOCATION, TOPOGRAPHY AND GEOLOGY

1.2.1 Furness Abbey lies in a small but steep-sided valley in a rural setting on the north-east edge of the town of Barrow-in-Furness (NGR centred SD 2203 7161; Fig 1). The Furness Peninsula of Cumbria is largely dominated by undulating fells, within which a pastoral landscape with substantial woodlands has developed. The southern limit of the county is defined by the broad expanse of Morecambe Bay and the surrounding limestone lowlands (Hodgkinson *et al* 2000). The underlying solid geology of the area consists of Silurian Ludlow greywackes (Coniston Grits) and banded mudstones and siltstones (Countryside Commission 1998). The glacial drift geology is overlain by typical brown earths of the Eardiston 1 association, as categorised by Ordnance Survey (1983).

1.3 HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

1.3.1 This report does not intend to discuss in any depth the history of Furness Abbey, which is beyond the scope of this project, but will present a brief outline in order to provide an archaeological and historical context for the results of the investigation.

1.3.2 Furness is not mentioned in the Domesday survey of 1086 (Faull and Stinson 1986), and the area seems to have been largely deserted prior to this. The township of Dalton had belonged to Earl Tostig, brother to Harold Godwinson, until his rebellion in 1065. At the Conquest it fell to Roger of Poitou, whose later defection left it in the hands of the crown (*ibid*).

1.3.3 Furness Abbey, originally the abbey of St Mary of Furness, was the first proper and most important foundation of the Savigniac Order of the British Isles. The newly established congregation had started in northern France at Savigny in Mortain (Wood 1998, 23). In 1124, a group of Savigniac monks was invited by Stephen, then Count of Boulogne and Mortain and later King of England, to settle at Tulketh (near Preston). After three years the establishment was abandoned and relocated to the secluded valley of Bekansgill in Furness, where the abbey was founded (*ibid*). The abbey is a rare representative of this order in Britain, where only 13 Savignac monasteries were established. It was the earliest monastic house in the region (Pevsner 1967, 16) and continued as 'the largest, richest and most important of the Lancashire houses'. For over 400 years, the abbey enjoyed substantial wealth, privileges and possessions and had a major influence on regional and national affairs (Wood 1998, 23).

1.3.4 In 1147, the entire congregation of Savigny was incorporated into the much larger and more powerful Cistercian Order (Harrison 1998, 4). It is not known how much of the abbey had been completed in stone in 1147 but it seems fairly certain that the church and buildings surrounding the cloister had been largely finished. These buildings were gradually replaced on a larger scale during the twelfth and thirteenth centuries (*ibid*). The Cistercians adapted the site, incorporating all of the components usual in their foundations, but with some distinctive variations and a slightly unorthodox alignment dictated by the

shape of the rising ground on the east and west sides of the valley (*op cit*, 3). It included a central cloister to the south of the church, dining hall and living room with dormitory above, a chapter house also with dormitory above, the church itself, latrines, the monks' dining room, kitchen and warming house, an infirmary, a guest house and the abbot's lodging (*ibid*).

1.3.5 The site was typical of those chosen for medieval monastic foundations of the more eremitic sects, lying in a secluded, steep-sided valley situated in the southern part of the Furness Peninsula. Formerly part of Lancashire, the area's situation between the waters of Morecambe Bay, the undrained lands of South Cumbria, and the inhospitable hills of Lakeland was one of isolation. However, the location was well chosen, as the valley provided a sheltered site with a ready supply of water, and access to abundant timber and stone for building (Wood 1998, 22).

1.3.6 The site is somewhat unusual in that elements of its precinct wall survive, built to enclose and define the abbey grounds. The church is built on a typical cruciform plan. The north and south transepts each had three chapels on the east sides and the aisled nave was divided into ten bays. This is the second church to have occupied this site, replacing a slightly smaller building (Harrison 1998, 4). During repair work in the 1920s it was discovered that the foundations consisted of oak piles (Dickinson 1967, 53), and many of the walls suffered sinkage due to insufficient foundations, as seen currently in the presbytery walls (I Whittick pers comm).

1.3.7 The earliest, Savigniac, church was built in a lavish Romanesque style, surviving elements of which can be seen within the transepts and parts of the early phase of the presbytery. Excavation, however, revealed that the original east walls of the transepts were apsidal, and thus it has been conjectured that the east end of the original presbytery was also apse-ended (Harrison 1998, 4-5, 8). The presbytery was then rebuilt during the Early Gothic (or Early English) era, from the end of the twelfth century to the end of the thirteenth century (Curl 1992, 121). Rebuilding work was carried out again later in the fifteenth century, when it was equipped with much larger windows and a *sedilia*. The *sedilia* consists of three canopied seats positioned in the south wall of the presbytery, near to the high alter, and used by the officiating clergy (*op cit*, 283). It is considered to be one of the most impressive in the country (Harrison 1998, 6).

1.3.8 In the fifteenth century there was also a general trend towards tower building (*op cit*, 11). At abbeys such as Furness, where the central tower could not be enlarged for structural reasons, a completely new tower was added to another part of the church (*ibid*). High buildings, creating a rectangular court that would have felt quite enclosed, originally surrounded the cloister area. It had covered alleys on each side, supported on elegant arcading (*ibid*). The chapter house also replaced a more modest Savigniac building. It was in this room that the monks met daily to confess, receive punishment, and hear a chapter read from the rules of St Benedict. Business matters and policy were also discussed here (*ibid*).

1.3.9 To the south of the main cloister range is the site of the great infirmary hall, built in the late thirteenth century. The infirmary complex was provided for those monks too sick or infirm to take part in the normal monastic regime. Surviving remains show this is one of the largest of such halls built by the Cistercians (*op cit*, 17). Many monks lived here permanently, and the rooms duplicate the main rooms of the abbey, such as the kitchen and latrines. The great hall would have been divided up by timber screens into a series of cubicles, with beds for the residents. In some of the wall recesses were fireplaces. The infirmary also had a chapel, a large building covered with three bays of fine-ribbed vaulting (*ibid*).

1.3.10 To the east of the great infirmary are the ruins of the substantial building identified as an earlier infirmary and, subsequently the abbot's lodgings (*ibid*). As the abbot's lodgings, it would have had a suite of rooms, such as a hall, dining chamber, bedrooms, secretariat and private chapel. Parts of the upper floors still survive (*ibid*).

1.3.11 To the south-east, is a small cottage known as the Custodian's Cottage, as for many years it served as the residence for the abbey custodian. This building retained its medieval roof, relatively intact, until recent years. It was the only abbey building to have remained roofed since the Dissolution (Wood 1998, 20).

1.3.12 During the fourteenth century, two exceptional privileges were added to the abbot's powers. These were the rights to act in place of the sheriff and the right to appoint his own coroner. During this period the abbot's principal court was established in nearby Dalton (Dickinson 1967, 30). A series of crises in the fourteenth century, including famine and plague and war, badly affected the Cistercian economy. Furness found itself in financial difficulties. The abbey began to abandon its involvement in agriculture and much of its land was leased providing rental income. During the fifteenth century the numbers of monks in residence grew smaller. The last forty years of the abbey's existence were marked by a general decline. The deed of surrender was signed in 1537 and Furness Abbey became one of the first of the major monasteries to be dissolved (*ibid*). At the time of its Dissolution a survey described 'divers granges, fields, meadows, mills, fisheries, within the manor' and 'orchards, mill, and certain closes adjoining [the abbey]' (West 1774, 100).

1.3.13 By 1549, the abbey and various parts of its land were leased to John Preston of Preston Patrick. He and his descendants resided in a manor house close to the abbey, of which parts may survive in and around the Abbey Tavern (*ibid*). The site of the abbey remained in the Preston family for several generations. It then passed by marriage to the Lowthers (who preferred to live at Holker Hall), and finally to the Cavendish family (Wood 1998, 34). During this time, from the late seventeenth century, the manor house was occupied by a variety of tenants, and by the second half of the eighteenth century it was in decline. An estate map drawn for Lord Cavendish by William Gibson in 1775 shows that the manor had degenerated into a mere farmhouse (*op cit*, 31). Following the construction of the railways into Furness and the subsequent increase in tourism to the area, the Cavendishes sold the manor house to the Railway Company and, during the 1850s and 1860s, the building was substantially

remodelled to become the Furness Abbey Hotel (*op. cit*, 34). The Cavendish family finally placed the ruins in the guardianship of the state in 1923 (Wood 1998, 34).

1.4 PREVIOUS ARCHAEOLOGICAL WORK

1.4.1 The mid-nineteenth century saw the first attempts at devegetation, cleaning and restoration, with some removal of "rubbish" in the church and other areas undertaken in the 1840s. Similar work was then undertaken within the cloister and monastic buildings during 1881-82. Archaeological interest in monastic sites developed during the nineteenth century, with a particular focus on Cistercian sites, and the first systematic excavations and archaeological assessment took place between 1896-1898 under the direction of Sir William St John Hope (1900, 221-301). This campaign concentrated on the abbot's house and other buildings to the east, the octagonal kitchen and foundations to south of the cloister (*ibid*). Excavations also took place within the presbytery, which exposed the lower parts of the walls down to the footings (*op cit*, 244).

1.4.2 Following the placing of Furness Abbey in the care of the guardianship of the Office of Works in 1923 (Wood 1998) a series of excavations was carried out in connection with the repair of the church and chapter house, which saw the first episode of underpinning. These excavations examined the foundations and highlighted the unstable nature of the ground conditions, and the use of timber piles on to which the stone foundations were placed (Collingwood, Graham, and McIntire 1929, 334). Unfortunately, the fortnightly reports of this work were pulped before or during World War II, and the only accounts that survive were a short note in the *Cumberland and Westmorland Transactions* and in Dickinson's article in the same periodical published nearly 40 years later (*op cit*, 333-335; Dickinson 1967, 53).

1.4.3 Little or no further work appears to have been undertaken until the 1960s, when another excavation took place at the abbey, although no information was forthcoming for this event (pastscape.english-heritage). From the mid 1980s until the early 1990s there were successive small-scale excavations, watching briefs and surveys carried out at the abbey. In 1985, a small-scale excavation undertaken by Cumbria and Lancashire Archaeological Unit took place in advance of construction work to the east of the abbey museum. The excavation revealed a sequence of four stone structures dating from the medieval monastic occupation to the present. The earliest feature was a massive, well-constructed drain with a short stretch of medieval wall to the south and a quantity of medieval pottery (Youngs, Clark and Barry 1986, 126). This was followed by further excavations in 1988 by Lancaster University Archaeological Unit (LUAU), within the outer court of the abbey, which extended the work carried out in 1985 and revealed medieval walls and part of a possible octagonal kitchen thought to be associated with the Guest House and a metalled surface. A further drain with a barrel vault was also found running parallel to the drain discovered in 1985 (Gaimster, Margeson and Hurley 1990, 171).

1.4.4 A large-scale historic fabric survey of the entire monastery was carried out by LUAU between 1985 and 1989 in order to provide a full basic recording of the monument prior to consolidation. This included a gazetteer of loose sculptured stone and several pieces of screen work. Samples of ten oak timbers were taken from the roof of Abbey Park Cottage, one of which produced a date AD 1355-1436 (*ibid*). A survey by RCHME of the surviving earthworks in the southern half of the abbey precinct was also undertaken, which identified boundary banks, tracks, building platforms and cultivation remains (*ibid*). A watching brief was also undertaken by LUAU during the replacement of sewer and water mains within the abbey car park in 1988. Further watching briefs were carried out by LUAU in advance of the reinstatement of a late medieval ?pulpit base to its former position in the south-west corner of the north transept of the abbey, and on the laying of electricity cables within the abbey grounds (*ibid;* pastscape.english-heritage).

1.4.5 Between 1988-1990 three geophysical surveys were undertaken, the first of which was by English Heritage on all land under guardianship, and a trial area immediately south of Abbey Park Cottage. A survey by Geophysical Surveys of Bradford in the grounds of the Abbey House Hotel identified two areas of potential archaeological interest (Gaimster, Margeson and Hurley 1990, 171). A survey was also carried out in the amphitheatre field (pastscape.english-heritage). A survey by CAN (UK) Ltd of the abbey watercourses was also completed in 1988 (CAN 1988).

1.4.6 In 1992 an evaluation was carried out by English Heritage in advance of remedial work in the area of the Monk's Dorter and Reredorter and in the angle of the north transept and presbytery. The first trench revealed medieval deposits 200mm below the turf, whilst the second trench revealed human bone some 400mm below the surface, and one complete and one displaced cist burial (Emerick 1992)

1.4.7 Abbey House Hotel was the location of another watching brief in 2001, carried out by OA North, where the groundworks associated with an extension were monitored (OA North 2001). Post-medieval features and a possible extension to the medieval precinct boundary of the abbey were recorded. More recently, the construction of a cycleway, known as the Dalton to Roose Greenway, through the Amphitheatre Field uncovered an apparent medieval trackway (OA North 2009).

2. METHODOLOGY

2.1 PROJECT DESIGN

2.1.1 As far as possible, the project design approved by English Heritage (*Appendix 2*), outlining the methodology for the evaluation, was adhered to in full, and all works were undertaken in accordance with the relevant standards and procedures of the Institute for Archaeologists (IfA) and generally accepted best practice. Deviations from the project design, concerning the lengthening of the trench from 5m to 8m, were established in consultation with, and at the request of, English Heritage, and are detailed within the methodology below.

2.2 EVALUATION

2.2.1 ***Introduction:*** the evaluation programme aimed to establish the presence or absence of any previously unsuspected archaeological deposits. The evaluation would then test the date, nature, depth and quality of preservation of any such deposits. The trench position was stipulated by English Heritage.

2.2.2 ***Methodology:*** a single trench totalling 16m², was examined in an area extending from the east wall of the presbytery (Fig 2). The trench was excavated by hand in a stratigraphical manner, and originally measured 2m in width and 5m long. It was extended after initial findings at English Heritage's request to 8m. It was excavated to an average depth of 1.2m, with the exception of two sondages located against the presbytery wall and in the north-east half of the trench (Fig 2). These were excavated to a depth of 1.76m and 1.87m respectively. Extensive layers were sampled, where possible, by partial rather than complete removal, with a view to avoiding damage to any archaeological features that appeared worthy of preservation *in situ*.

2.2.3 The excavation trench was situated in the cemetery, and human remains were encountered. It was agreed from the outset with English Heritage that OA North would examine and record any burials *in situ* with no attempt to excavate them, unless absolutely necessary.

2.2.4 The area was manually planned with the position of the trench recorded by an experienced surveyor utilising GPS to record the site according to OS co-ordinates. In this case, a Leica differential GPS was employed that uses real-time (RTK) corrections using mobile SmartNet technology to achieve an accuracy of ± 0.01m. The digital survey data was transferred, via Leica Geo Office (V.4), as shp files into a CAD system (AutoCAD Map 2004), and superimposed onto the embedded digital data provided by Archaeophysica.

2.2.5 All the trenches and deposits were described and recorded using OA North *pro-forma* sheets, with plans and sections drawn on permatrace to an appropriate scale. An indexed photographic archive was created using monochrome prints, and digital photographs for presentation. The trenches were accurately located by GPS, and all levels were established in relation to Ordnance Datum.

2.3 PALAEOENVIRONMENTAL ASSESSMENT

2.3.1 ***Introduction and quantification***: four bulk samples were taken from the site for the assessment of charred and waterlogged remains. One of the samples was taken from the fill, ***117***, of stone culvert ***115*** (sample 1), and the remaining three were from organic layers; sandy-silt deposit ***145*** at the western end of the trench, which was seen to contain both charcoal and small round wood fragments (sample 2), and abutted the presbytery wall ***131***; and two samples from ***151*** and ***153*** at the eastern end of the trench (samples 3 and 4).

2.3.2 ***Methods***: the samples were hand-floated. The flot was then collected on a 250 micron mesh, and air dried. A representative sample of each flot was scanned with a Leica MZ60 stereo microscope and the plant material was recorded and provisionally identified. The data are shown in Table 1 (*Section 3.3*). Botanical nomenclature follows Stace (2001). Plant remains were scored on a scale of abundance of 1-5, where 1 is rare (up to 5 items) and 5 is abundant (>100 items). The components of the matrix were also noted.

2.4 FINDS

2.4.1 Finds' recovery and sampling programmes were carried out in accordance with best practice (following current IfA guidelines), and subject to expert advice in order to minimise deterioration. All artefacts recovered from the evaluation trench were retained.

2.5 ARCHIVE

2.5.1 A full professional archive has been compiled in accordance with current IfA and English Heritage guidelines (English Heritage 1991). The paper and digital archive will be provided in the English Heritage Centre for Archaeology format and will be submitted to the Barrow Record Office on completion of the project. Copies of the report will also be submitted to the Historic Environment Record. The Arts and Humanities Data Service (AHDS) online database *Online Access index of Archaeological Investigations* (OASIS) will be completed as part of the archiving phase of the project. Any finds that meet criteria for retention will be transferred to the English Heritage store at Helmsley.

3. RESULTS

3.1 INTRODUCTION

3.1.1 A single trench was excavated during February and March 2009, extending from the east wall of the presbytery (Fig 2). The north-east/south-west trench, which measured 2m by 5m, later extended to 8m in length, was hand excavated, and reached, via two sondages at the south-west and north-east of the trench, a maximum depth of 1.87m (13.18m OD). The present ground level (hereafter PGL) lay at a height of between 15.02m OD at the south-west end of the trench and 15.1m OD to the north-east. Archaeological features and deposits, albeit evidence of nineteenth or early twentieth century landscaping, were found immediately below the topsoil, some 100mm below PGL, while the medieval horizon was located 0.35m (14.73m OD) below PGL.

3.1.2 Analysis of the stratigraphic sequence, along with the preliminary dating of the finds, has enabled three broad chronological phases of activity to be assigned to the site:

- **Phase 1:** Medieval - pre-fifteenth/sixteenth century,
- **Phase 2:** Later medieval and early post-medieval - construction of the fifteenth century presbytery and after,
- **Phase 3:** Nineteenth and twentieth century activity

3.2 RESULTS

3.2.1 ***Phase 1a:*** the earliest features and deposits, that is to say those that were found at the lowest levels, were observed within two hand-excavated sondages, the first positioned adjacent to the presbytery wall and the second situated some 4.6m to the north-east. At the south-west end of the trench was a sandstone wall, ***131***, which comprised two courses of stone (Plate 2; Fig 4). Excavation ceased at this depth (13.22m OD) in consultation with English Heritage, thus it was not ascertained whether the wall extended any deeper. Although it should be noted that the lowest layer encountered (***147***), of silty-clay sand and gravel, was possibly natural in origin. Abutting the wall were two sandy-silt deposits (***144*** and ***145***), the lowest of which (***145***) was quite organic in nature and contained charcoal, small round wood fragments, and insect remains, together with plants remains indicating open ground, cultivated or waste ground and some that may have been used as a food source (see *Section 3.3*).

3.2.2 At the north-east end of the trench, the second sondage revealed deposits ***151*** and ***153***, which were located at 13.32m OD and 13.18m OD, some 1.76m and 1.87m respectively below PGL. Although similar in character to ***144*** and ***145***, these deposits contained cereal seeds, as well as rushes and sedge, which are plants typical of wet ground (*Section 3.3*). Deposit ***151*** also contained a north-east/south-west aligned wooden plank, measuring 0.18m across and extending

to the south-west beyond the limits of excavation (Plate 3; Figs 3 and 4). The wood species was not closely identifiable, but the presence of vivianite crystals further indicates human activity (*Section 3.3*).

3.2.3 ***Phase 1b:*** the eastern side of the abbey would then appear to have undergone an episode of substantial landscaping. This was composed of similar layers of red sandstone rubble, ***137-139*** at the south-west end, and ***128***, ***148-150*** towards the north-east end of the trench, raising the ground level in places by between 0.79m and 1m to 14.3m OD (Fig 4; Plate 4).

3.2.4 ***Phase 2:*** the beginning of Phase 2 was marked by the construction of the current presbytery (Figs 3-5; Plate 5). A 0.64m deep construction trench, ***140***, was cut through layer ***137***, which narrowed to the south-east. Laid at the base of this cut was a large baulk of timber, ***130***, the visible dimensions being 0.29m high by 0.15m deep, which had been laid on a bed of clay and sand. Placed on top of the timber were two stone foundation courses, ***129***. The basal course was again placed on a bed of clay, whilst the upper course was mortared in position and stepped in slightly. The stones were a mixture of coarsely- and finely-tooled examples and included a moulded stone on the south-east side (Figs 3 and 5; Plate 6). Built onto the foundations was the wall proper, ***116***, of the presbytery, the lower course formed a shallow plinth. Two mason's marks were noted on the basal course of wall ***116*** (Fig 5; Plate 7). Cut ***140*** was subsequently backfilled with deposits ***141-143***, with the upper layer ***141/146***, containing a number of disarticulated human bones, including two skulls (Fig 3; Plate 8). A further cut, ***120***, noted partly within the south-east-facing section, also cutting into layer ***137***, may have been the remains of an emptied grave.

3.2.5 Seen within the north-western section was a deposit of stones ***152*** (Fig 4, *Section 2*), including two roughly-squared examples, which overlay fill ***141***. It was not apparent as to whether these stones were part of a roughly-built structure abutting the presbytery wall, or a layer of rubble.

3.2.6 Following the construction of the extant presbytery during the fifteenth century there was a further episode of levelling, which raised the ground level by upwards of 0.43m (14.74m OD; Fig 4-5; Plate 4). The basal layer ***119*** could be traced throughout the trench and had been discoloured with a black residue, thought to be iron panning, interpreted as a former level of the water table. Further layers above this, comprising ***118/124*** and upper layer ***110***/***114***, were quite compact and may have been utilised as surfacing material.

3.2.7 Layer ***110***/***114***, which rose in height from 14.42m OD by the presbytery wall to 14.74m OD at the north-east end of the trench, was also the burial horizon within which three graves were located (Figs 3 and 4). Grave cuts ***134*** and ***136*** were located partly in the north-east end of the trench and partly beyond the limits of excavation. The graves were aligned north-east/south-west, following the orientation of the presbytery. Grave ***134*** contained skeleton ***133***, which was laid in a supine position with the head at the south-west end (Plate 9). The right arm was flexed, with the ulna and radius lying over the chest. No other parts of the skeleton were revealed. Grave cut ***136*** lay 0.2m to the south-east of ***134*** and followed the same alignment.

3.2.8 Located some 4m to the south-west, and partly within the north-west-facing section (Fig 4), was a further grave cut ***127***, which contained a similarly aligned skeleton ***126***. Again, the body had been laid in a supine position with the head at the south-west end, whilst the left radius and ulna were found overlying the pelvis. This area had also been subject to some truncation by a later feature. The bones were discoloured to an almost black hue, which was probably the result of waterlogging. Sealing the graves was a layer of compact gravel and rubble ***111*** found throughout the trench, thought to be a relict ground surface (Fig 4).

3.2.9 ***Phase 3:*** cutting layer ***111*** were a stone culvert ***115*** and 10" (255mm) ceramic pipe ***122***, both of which were north-west/south-east aligned (Figs 3 and 4; Plate 10). Culvert ***111*** had partially truncated skeleton ***126***. Sealing these two features was a layer of dark silt ***109***, which represented a buried topsoil (Fig 4). Lying above this was a layer of stone rubble ***107***, which lay over the south-western third of the site, but did not extend over to the north-western edge of the trench. Sealing this was a further layer of finer stone rubble ***108***. Located 1.1m from the north-east end of the trench was a north-west/south-east aligned stone surface ***106***, measuring 0.7m wide. This was then sealed below a later gravel surface ***102***, seen throughout the entire trench. Layer ***102*** was then cut by service trench ***105***, which contained a 1¾" (30mm) iron pipe, which was aligned north-west/south-east (Figs 3 and 4; Plate 10). Abutting the presbytery wall was a 0.37m wide band of silt ***103***. The trench was sealed by the topsoil/turf layer ***101***.

3.3 PALAEOENVIRONMENTAL RESULTS

3.3.1 Waterlogged plant remains were recorded in all four samples, and charred plant remains were identified from fills ***151*** and ***153*** (samples 3 and 4).

3.3.2 ***Charred seeds:*** although the number of charred remains was low overall, a few cereal grains were recorded from fills ***151*** and ***153***, including a tentatively identified grain of wheat (*Triticum* sp) in deposit ***153***, and a possible oat (*Avena*) grain in the similar deposit ***145***. Some charred weed seeds were also identified and included elderberry pips (*Sambucus nigra*), sorrel (*Rumex*), grass (Poaceae) and sedge (*Carex*).

3.3.3 ***Waterlogged plant remains:*** there was a rich assemblage of weed seeds from native plants that may have been used as a food source, for example sloe (Prunus spinosa), blackberry (*Rubus fruticosus*) and elderberry. Some hazel (Corylus avellan) nut shell was also recorded. These were found together with seeds from a range of plants of open ground, cultivated or waste ground, for example nipplewort (*Lapsana communis*), common nettle (*Urtica dioica*), common hempnettle (*Galeopsis communis*) and pale persicaria (*Persicaria lapathifolia*), and of wet ground, for example sedges (*Carex* spp) and ragged robbin (*Lychnis flos-cuculi*).

3.3.4 Wood fragments were abundant in all the samples except that taken from the fill of the culvert, ***117*** (sample 1), and included small twigs, buds and leaf

scales. There was also charcoal present in all the samples, as were insect remains, which were abundant in the silty layers (***117***, ***145*** and ***153***).

3.3.5 The sample of wood taken from a plank found in deposit ***151*** has been identified as being from diffuse porous taxa such as alder, hazel, or birch (*Alnus glutinosa*/*Corylus avellana*/*Betula*). Vivianite crystals were identified on its surface, which is used, when found in occupation deposits, as an indicator of the breakdown of anthropogenic material from the movement and redeposition of phosphate (Richard MacPhail *pers com*).

CTXT	SAMPLE NUMBER	FLOT VOL. (ML)	FLOT DESCRIPTION	PLANT REMAINS	POTENTIAL FOR ANALYSIS
117	1	25	Charcoal (2), human bone, molluscs, worm casts, insect remains (1) and sand	WPR (2) including *Sambucus nigra. Urtica dioica* and *Solanum* sp	None
145	2	100	Wood fragments (5), charcoal (2), insect remains (5), vivianite	WPR (5), including *Prunus spinosa*, *Sambucus nigra, Lapsana communis*, *Urtica dioica*, *Rubus fruticosus*, *Ranunculus repens*-type, *Ranunculus* sp, *Galeopsis tetrahit*, *Filipendula ulmaria*	Yes
151	3	75	Wood (5), charcoal (2), mammal bone (1), vivianite modern contamination,	CPR cereals (1) cf *Avena* WPR (5) including *Corylus avellana nutshell, Sambucus nirga, Galeopsis tetrahit, Lychnis flos-cuculi, Silene sp, Persicaria lapathifolia,Urtica dioica, Ranunculus* sp,	Yes
153	4	100	Charcoal (3), wood (5), insects(5), vivianite, earthworm egg cases and sand	CPR cereals 1, CPR weed seeds 1, charred pollen catkin, charred seed capsule, WPR 5 including *Rubus fruticosus*, *Sambucus nigra*, *Ranunculus* sp, *Carex*, *Rumex*, *Urtica dioica*, *Juncus*	Yes

Table 1: Assessment of charred (CPR) and waterlogged (WPR) plant remains. Plants recorded on a scale of 1-5, where 1 is rare (up to 5 items) and 5 is abundant (>100 items).

3.4 FINDS

3.4.1 In total, 149 fragments of artefacts or ecofacts were recovered during the investigation, their distribution is shown in Table 2, below. With the exception of the masonry fragments, the material was in poor condition, being very small fragment size and often highly abraded, implying considerable post-depositional disturbance.

CONTEXT	POTTERY	BUILDING STONE	HUMAN BONE	METAL-WORK	OTHER	TOTALS
100		1		12	1	*14*
101	4			5	1	*10*
102	1			3	13	*17*
108	3	4		1	17	*25*
109	5			3	24	*32*
110			5	6		*11*
111	1	1	5	1		*8*
112		1			1	*2*
115		1				*1*
117			5			
119			8			*8*
120		1				*1*
121	1				1	*2*
125			1			*1*
132				2		*2*
133			8			*9*
135				1		*1*
148		1				*1*
TOTALS	*15*	*10*	*32*	*34*	*58*	*150*

Table 2: Distribution of significant material types between contexts. Glass, ceramic building material, clay tobacco pipe and animal bone are included under 'Other'

3.4.2 Only a small amount of pottery was recovered, each fragment probably representing a single vessel. Only three fragments were of any antiquity; medieval sherds were recovered from gravel layer ***102*** and stone rubble layer

108, and a fragment of probably seventeenth-century stoneware came from relict ground surface ***111***. The two medieval fragments are too small for confident dating or attribution of the fabrics to a specific production site, but their presence presumably relates to the monastic activity on the site. Both are from green-glazed vessels, in one case decorated with applied strips. The remainder of the pottery is late in date; a very small fragment of blue-painted porcelain from buried topsoil ***109*** is presumably Chinese in origin, and can thus perhaps be dated to the mid-eighteenth century or later, when the use of imported teawares was probably at its most widespread (Allan 1984). There were surprisingly few fragments of clay tobacco pipe (six from buried topsoil ***109***, one from the fill of service trench ***121***). Only one bowl survived (from ***109***), and can be dated to the mid-late eighteenth century.

3.4.3 Two poorly-made handmade brick fragments came from rubble layer ***108***, and probably reflect relatively early structures on the site, although dressed blocks of red sandstone, and smaller fragments of mouldings from a number of contexts (Table 2) almost certainly derive from the monastic buildings, presumably reflecting demolition and recycling at or after the Dissolution. A single fragment of line-impressed floor tile, again from buried topsoil ***109***, presumably originates from the abbey church or the chapter house.

3.4.4 Eight fragments of glass were examined, from topsoil ***101***, gravel layer ***102***, and buried topsoil ***109***. All are late in date, none dating earlier than the end of the nineteenth century. It is likely that all of the metalwork from the site (14 fragments of iron, six of copper alloy, and 14 of lead) is of recent date and contributes little to the understanding of the site. Two of the copper alloy items are low denomination coins of Edward VII (1904) and George V (1915), both effectively unstratified (from topsoil ***101*** and US/***100*** respectively), and a thimble from gravel surface ***102*** is of recent type.

3.4.5 ***Bone***: in total, 57 fragments of bone were recovered, of which 32 are human, and 17 are animal, including cow, sheep, pig and dog, the remainder undetermined. The distribution of human bone is shown in Table 2. All remains were identified and then assessed for completeness, preservation and fragmentation. Where possible, age and sex were determined and stature calculated. All bones were examined for pathology and any occurrence was noted. The methods used were in accordance with recognised standards (Brickley and McKinley 2004) and OA Heritage Burial Services guidance.

3.4.6 Human remains were found in deposits ***110***, ***111***, ***117, 119***, ***125*** and ***133***. Only the bones from ***133*** and ***125*** were from an intact burials (grave cut ***134*** and grave cut ***127***), whilst those from ***117*** and ***119*** both represented disturbed burial contexts; the former was the fill of a culvert, ***115***, which cut through burial ***127*** and the latter was the fill of a charnel pit, ***140***. The remainder were from various levelling layers. It is obvious that the bone from the charnel deposit ***119*** and culvert fill ***117***, was highly disturbed, but nonetheless it seems likely that their original place of burial was in close proximity. Although grave cuts ***127***, ***134*** and ***136*** were left *in situ*, some bone was the disturbed during the initial cleaning stage from fill ***125*** and skeleton ***133*** before they were positively identified.

3.4.7 The bones from the culvert fill ***117***, consisted of a trapezoid and a first metacarpal, both from the right hand, as well as two manual phalanges and a fragment of a further metacarpal. Very little can be said about these bones other than they most probably came from burial ***127***.

3.4.8 The bones from the charnel deposit ***119*** consisted of two fragments of parietal, an occipital, a fragment of both a right and a left *os coxae*, a left tibia, a fragment of left fibula and some unidentifiable fragments. These bones probably represent a single individual, a probable male adult, but it is possible more than one individual is present, as the bones were disarticulated when found.

3.4.9 Very little can be said about the remainder of the bones. Those from skeleton ***133*** comprised eight skull fragments. Those from surfacing material ***111*** comprised a single thoracic vertebrae, two rib fragments, an intermediate manual phalanx and a fifth left metacarpal. Levelling layer ***110*** produced a single left humerus and a possible left ulna. A single clavicle fragment was retrieved from fill ***125*** of grave cut ***127***.

3.4.10 No pathology was noted on any bone from any of the contexts. In general, the preservation of these bones was fair and the fragmentation average. If further work is undertaken and burials have to be removed, the potential for detailed analysis is high.

4. CONCLUSIONS

4.1 DISCUSSION

4.1.1 The investigation to examine the possible underlying cause of the shift in the presbytery north and south walls identified three main phases of activity. The earliest phase, from the twelfth to thirteenth centuries, comprised the top two courses of a possibly more substantial wall (***131***), which lay directly below the position of the east wall of the extant presbytery. Lying above this were two silty layers (***144-45*** = ***150-151***), the lower of which was quite organic in nature, with a wooden plank found within ***151***. Environmental assessment of samples taken from three of these early deposits (***145***, ***151*** and ***153***) revealed evidence of the use of cereals and fruit-bearing trees.

4.1.2 These layers were then sealed by almost a metre of stone rubble, of which the uppermost layer (***137***) at the south-west end of the trench had possibly been utilised as a burial horizon. The foundations of the fifteenth/sixteenth century presbytery extension had been sunk into this layer, and comprised a construction cut (***140***). Into this a large baulk of timber (***130***) was laid, on which the foundations and wall of the presbytery had been built. The upper-most deposit (***141***) within the foundation trench contained charnel material, presumably from displaced graves.

4.1.3 More ground-raising deposits were then laid down, and in the top layer were three burials (***127***, ***134*** and ***136***), all of which followed the alignment of the presbytery. A possible cist burial (***152***) placed against the wall was located within the north-west-facing section. A later layer of buried topsoil (***109***) then sealed a stone culvert and ceramic pipe, belonging to Phase 3. Finally, there was further evidence of ground-raising deposits, this time likely to be early twentieth century in date, and a small bore iron pipe.

4.1.4 The earliest remains found in the trench from Phase 1a (Fig 4, section 2 and Fig 5; Plate 2), that is structure ***131***, gravel layer ***147***, and the organic deposits abutting it (***144-145***), have proved difficult to interpret. It was not clear whether structure ***131*** dates to the Savigniac period, although the conjectural remains would suggest that they did not extend as far as the later presbytery wall, thus it is possible that they date to the first rebuilding of the presbytery in the early Gothic style (Harrison 1998, 4,6). It is also possible that the organic layers ***144-145***, and the similar layers ***151*** and ***153*** found in the sondage in the north-east of the trench, may be the "waterlogged soil" referred to by Sir Charles Peers in 1928, reported in Dickinson's 1967 article, and that the result of building on waterlogged ground meant that later building took place at a higher level (Dickinson 1967, 53). Indeed, in the same article it was indicated that the original level of the east of the church was "a yard below that of the later ones" (*op cit*, 57). A similar depth was noted (0.88m) from the top of the presbytery foundation ***129*** to the top of structure ***131***.

4.1.5 The Phase 2 archaeological features dating to the later fifteenth to sixteenth century included the wooden raft ***130*** (Plate 2), constructed via cut ***140***, through some 0.7m of later medieval levelling and onto structure ***131***. The

inclusion of the earlier structure may have resulted from a chance encounter during construction, or it was possibly part of the first rebuilding phase of the presbytery and hence the remains of an already standing structure was reused. However, such an hypothesis would surely negate the construction of a timber raft. Emerick, and also more recently Mark Douglas (pers comm), thought that there may have been a watercourse situated below the east wall of the abbey, which was considered to be contributing to the current structural problems. Part of the aim of the 1992 excavations undertaken by Emerick was to investigate the existence of this putative watercourse, evidence of which was suggested by two blocked arches between the east range and reredorter (Emerick 1992). However, it was concluded that no stone-built watercourse existed, but it was later noted by M Douglas that the southern surviving watercourse, where it emerges from below the reredorter had a noticeable kink, which might hint that it once headed in the direction of the presbytery. The hypothesis, therefore, is that the watercourse was moved to its present position when the presbytery was rebuilt in the fifteenth/sixteenth century (Douglas, pers comm). Thus, structure ***131*** may be part of the watercourse.

4.1.6 The rebuilding at a higher level, referred to by Dickinson (1967, 53) can be illustrated by a later Phase 2 landscaping/levelling episode. This may have been a response, not only to the waterlogged conditions mentioned above, but also goes some way to backing up Emerick's assertion that the east side of the abbey was built on the infilled original river course (Emerick 1992).

4.1.7 The discovery of the wooden platform or raft (***130***), upon which the fifteenth century presbytery wall was constructed, may offer some insight into why there has been movement within the walls. In addition, it may also be able to provide a more precise date, via dendrochronology, for the rebuilding of the presbytery. In Dickinson's article (Dickinson 1967, 53) he reports that the monks "dug down about eight feet into the ground until they came to a bed of gravel and on that they built the foundations of their walls", although it is not clear from where this eight foot depth was measured. During the investigation of the east end of the presbytery there was clearly no evidence of excessive digging in order to lay the presbytery foundations, nor was there any evidence of the gravel layer or the peat layer supposedly accessed by the Savignians (*ibid*). Whatever the depth and nature of the original foundations, the end result is that parts of the building started to tip over (*op cit*, 54). It is also interesting to note that the rebuilding of the east end of the church in the fifteenth/sixteenth century was seen by Dickinson as repair work to counter earlier episodes of collapse or tipping (*ibid*). It may be pertinent to suggest that the recurrent use of buttresses in the fifteenth/sixteenth century phases might have been an attempt to provide more stability to the buildings.

4.1.8 There was some indication from the excavation that during the construction of the fifteenth century presbytery an earlier burial horizon had been disturbed, which had resulted in human remains being deposited within the upper fill (***119***/***141***/***146***; Figs 3 and 4) of the construction cut (***140***). During the excavations undertaken in the vestry in the late nineteenth century an extensive deposit of human bones was revealed that was thought to have been disturbed by the building of the new presbytery (Hope 1990, footnote 245).

Furthermore, a cut (***120***), partially truncated by construction cut ***140***, may have been an emptied grave. The disturbed bones in ***119***/***141***/***146*** were isolated from the later burial horizon and no other earlier burials were located. This might suggest that these disturbed bones related to an isolated group of early inhumations, perhaps associated with the Savigniac church, and these did not extend much beyond its conjectural apse end (Harrison 1998, 5).

4.1.9 Once the fifteenth century presbytery had been constructed the ground level was once again raised, although whether this was contemporary with the construction of the presbytery, was not evident during the excavation. The upper deposits within this renewed ground-raising sequence (***110***/***114***/***124***) was found to contain three burials, all aligned on the orientation of presbytery, rather than the following the orientation of the graves elsewhere in the cemetery. It is worth noting that the burials to the north-east of the presbytery were found at a similar depth to the human bones found in 1992 (Emerick 1992). Emerick also noted the presence of cist burials located in the exterior yard, situated between the vestry and south transept (*ibid*). A possible stone structure (***152***), which may have been an intact cist, was noted within the north-west-facing section situated above construction deposit ***141***/***146*** and the burial horizon ***114***.

4.1.10 The apparent 4m gap between grave ***127*** and graves ***134*** and ***136*** might be explained by the geophysical anomaly seen to cross the trench in the same position (Archaeophysica forthcoming), which may be explained as a possible road through the cemetery, leading from the cemetery gatehouse. Unfortunately, this area of the trench was subject to later truncation by two service trenches (part of Phase 3) and, therefore, it was not possible to examine the area in any great detail, although deposit ***110*** may have been utilised as a surface. It should also be noted that the bones from grave ***127*** were blackened due to being immersed in water, which was similar to the condition of the human bones recorded at a similar depth by Emerick in 1992 (Emerick 1992).

4.1.11 The palaeoenvironmental assessment demonstrated that there were well-preserved plant remains in three contexts (***145***, ***151*** and ***153***). The remains of cultivated crops were identified, although not abundant, together with native plants, which may have been used as a food source. Earlier work by Huntley (1989), cited in Hall and Huntley (2007), from a single ditch fill at Furness Abbey, of probable medieval date, contained no dietary evidence, although there were well-preserved plant remains in the sample. The presence of waterlogged plant remains from the investigation was also suggestive of some waste or cultivated and wet ground in the immediate vicinity. The excellent preservation of these remains suggest that the water table was high, allowing the anaerobic conditions necessary for such preservation to develop. Many of the wood fragments were from twigs, and included bud scales and leaf scars suggesting that the deposits (***145***, ***151*** and ***153***) formed naturally. The presence of the plank in deposit ***151*** is of interest, and may have been dumped having seen some use previously.

4.1.12 Samples taken from three of these early deposits (***145***, ***151*** and ***153***) indicated that they were connected with human activity, revealing evidence of the use of

cereals and fruit-bearing trees, as well as seeds suggestive of a range of environments, comprising open ground, cultivated or waste ground and wetter areas.

4.1.13 Newman, in the North West Archaeological Research Framework (2006, 114), highlighted the need to collect more data, in the form plant remains, from suitable deposits from medieval settlements due to the dearth of information from sites of this period in the North West. Furthermore, there has been little palaeoenvironmental work undertaken during previous investigations at Furness Abbey. Samples 2, 3 and 4 (from deposits ***145***, ***151*** and ***153***) have potential for further analysis. The insect/invertebrate remains have also the potential to provide a more detailed analysis of the environment.

4.2 CONCLUSIONS

4.2.1 The investigations abutting the east wall of the presbytery have potentially identified the cause, or at least a contributory factor, of the major structural cracks running from top to bottom, of the north and south walls and of the shifting of the structure. This would appear to be the timber raft ***130***, which supports the latest fifteenth/sixteenth century rebuild or extension of the presbytery. Furthermore, this wooden structure was constructed upon an earlier stone coursing, ***131***.

4.2.2 The suggestion is that the wooden raft, has been subjected to fluctuating water levels over a considerable length of time, as highlighted by the layer of iron staining found on deposit ***119***, which may then have caused sections of the raft to rot, thus causing instability within the foundations. This may have exacerbated by the instability of the lower stone coursing, ***131***, which might have been built on fairly soft ground as witnessed by the organic deposits ***144*** and ***145***.

4.2.3 The problem of the wooden piles has long been known as a cause of instability at Furness Abbey. As far back as 1928 Sir Charles Peers highlighted the problems of the abbey's construction on waterlogged soil coupled with the use of oak logs, which caused the foundations to tip and the walls to lean (Dickinson 1967, 51-2). Such subsidence precipitated the first campaign of underpinning work in the 1920s (*op cit*, 54). The question of fluctuating water levels was posed by Emerick as far back as 1990 (Emerick 1990), when he noted that there had been a decrease in the amount of water flowing through the drains to the east side of the abbey, and that as the church had originally been constructed on the aforementioned timber piles, these required anaerobic conditions to remain intact. He then posited that the drying out may led to shrinkage, leading to 'tension between wet and dry piles leading to movement of the fabric in the church' (*ibid*).

4.3 IMPACT ASSESSMENT

4.3.1 It is obvious from the results of the evaluation trench that any below-ground works that may be associated with the proposed stabilisation of the presbytery walls has the potential to impact on the preserved archaeological remains. The evaluation trench demonstrated that the level of preservation is good and, for

the most part, undisturbed, with the exception of skeleton ***126*** and the area of the putative road/deposit ***110***, and the recent service trenches.

4.3.2 Any below-ground works penetrating deeper than 0.35m below PGL will impact on medieval deposits and features, in particular the graves situated in layer ***110***/***114***/***124***. It is further assumed, given the location of the trench within the cemetery, that any below-ground disturbance in this area will encounter more burials.

4.3.3 The following summarises the potential impacts of the proposed works. As the specifics of the design are not currently known, it is not at this time possible to state categorically how great the impact will be, although given the proximity of the burials to the present ground surface almost any disturbance will have some impact. Where surviving structural remains or deposits have been identified, a potential impact has been noted. No attempt has been made to prejudge the significance of the remains, other than to it assume that any medieval structural remains will be considered to be of significance, as will any associated deposits.

4.3.4 ***The Trench*** (Figs 3 and 3)***:*** the trench was excavated to a maximum depth of 1.87m, but the stratigraphy was observed to continue to greater depth. The deposits and potential impacts are summarised in Table 3, which gives the depth below the present ground level (PGL; between 15.02m OD at the south-western end of the trench and 15.1m OD at the north-eastern end):

Depth below PGL (m)	**Coverage in trench**	**Character**	**Potential impact**
0-0.35	North-east	Modern gravel surface and rubble deposits and iron pipe	None
0-0.5	Centre	Modern gravel surface and rubble deposits and iron pipe	None
0-0.52	South-west	Modern gravel surface and rubble deposits and iron pipe	None
0.35-0.95	North-east	Medieval burials and ground-raising deposits	Yes
0.5-0.9+	Centre	Medieval burials and ground-raising deposits, post-medieval and late nineteenth/twentieth century services	Yes
0.52-0.9	South-west	Medieval ground-raising deposits	Yes
0.95-1.63	North-east	Medieval ground-raising deposits	Yes
Service trench	Centre	No information	Yes
0.52-1.44	South-west	Timber raft, construction cut and deposits and Medieval ground-raising deposits	Yes
1.63-1.87+	North-east	Organic deposits including wooden plank	Yes

Depth below PGL (m)	Coverage in trench	Character	Potential impact
Service trench	Centre	No information	Yes
1.44-1.76+	South-west	Stone structure and organic deposits	Yes

Table 3: Potential impact on archaeological remains as observed during the evaluation

4.3.5 From the results of the evaluation, the impact of any proposed works would be quite considerable, with only the upper 0.35m at the north-east end to 0.5m at the south-west end being free of significant archaeological remains. Furthermore, since possible archaeological features and deposits have the potential to continue beyond 1.87m below PGL, the total depth of impact is unknown at the present time, and this is of some significance for any proposed future stabilisation works.

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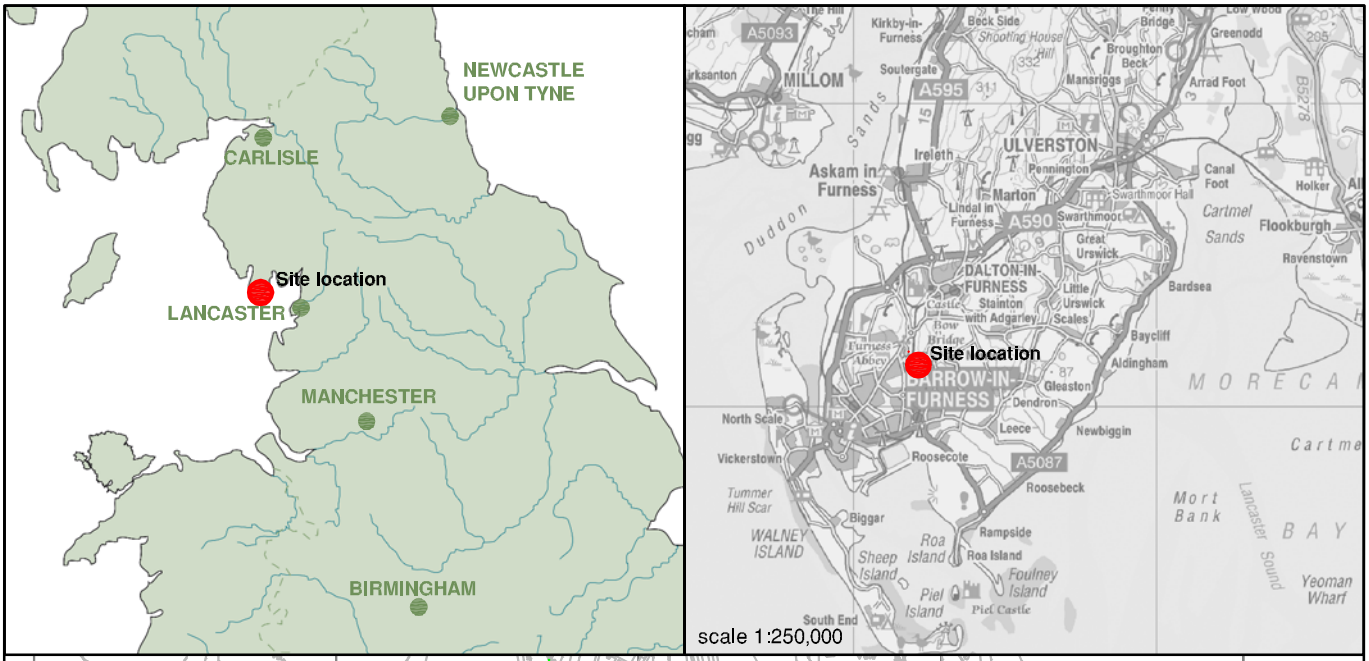

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Figure 1: Site location

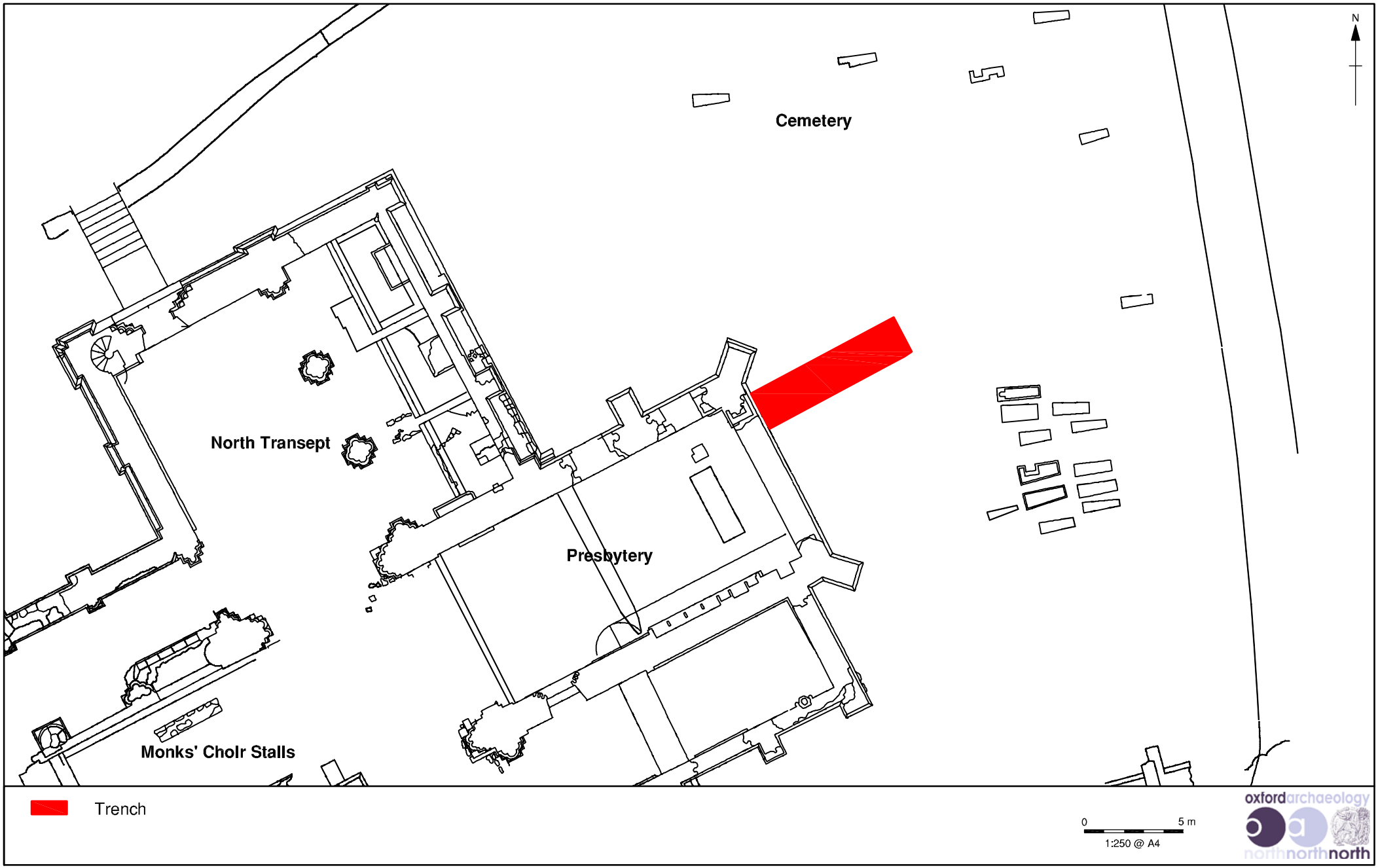


Figure 2: Trench location plan

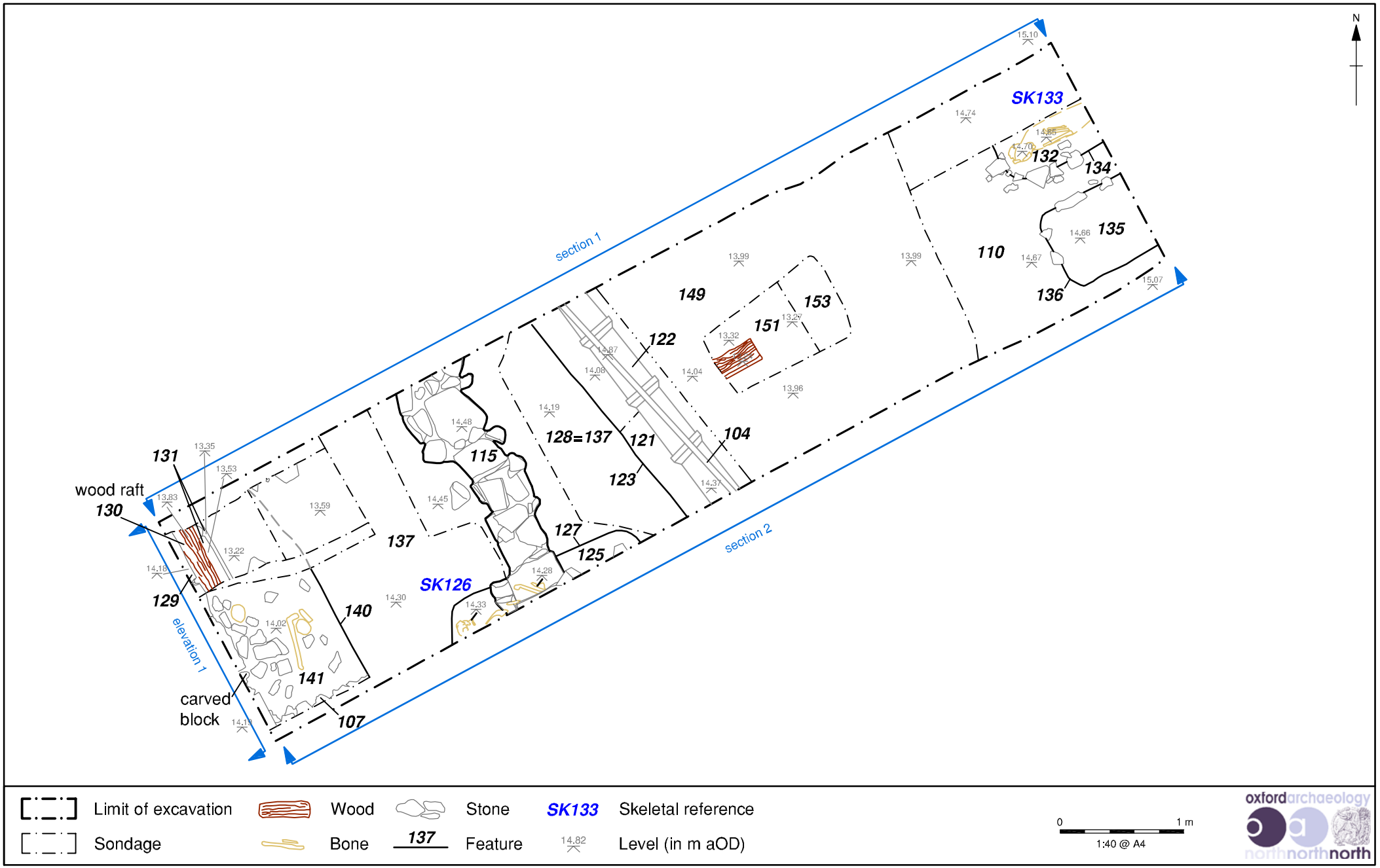
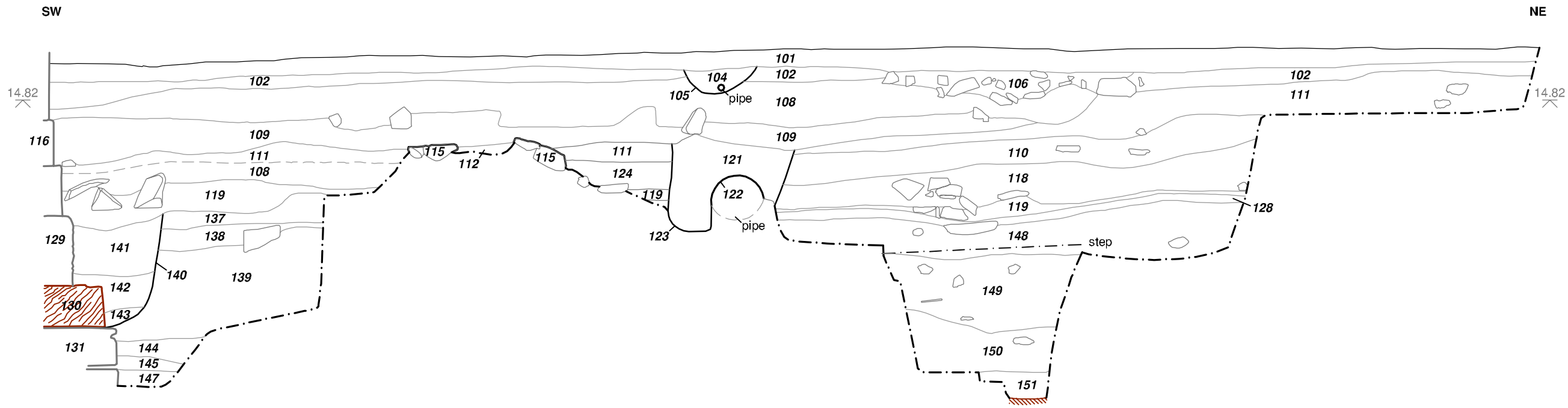
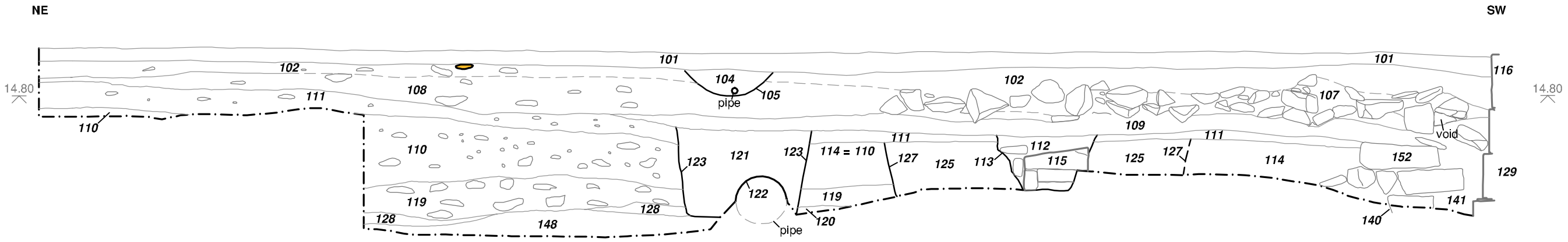


Figure 3: Plan of trench

Section 1



Section 2



Limit of excavation
Mortar
Wood
Bone
Stone
137 Feature
14.82 Level (in m aOD)

0 0.5 m
1:25 @ A3

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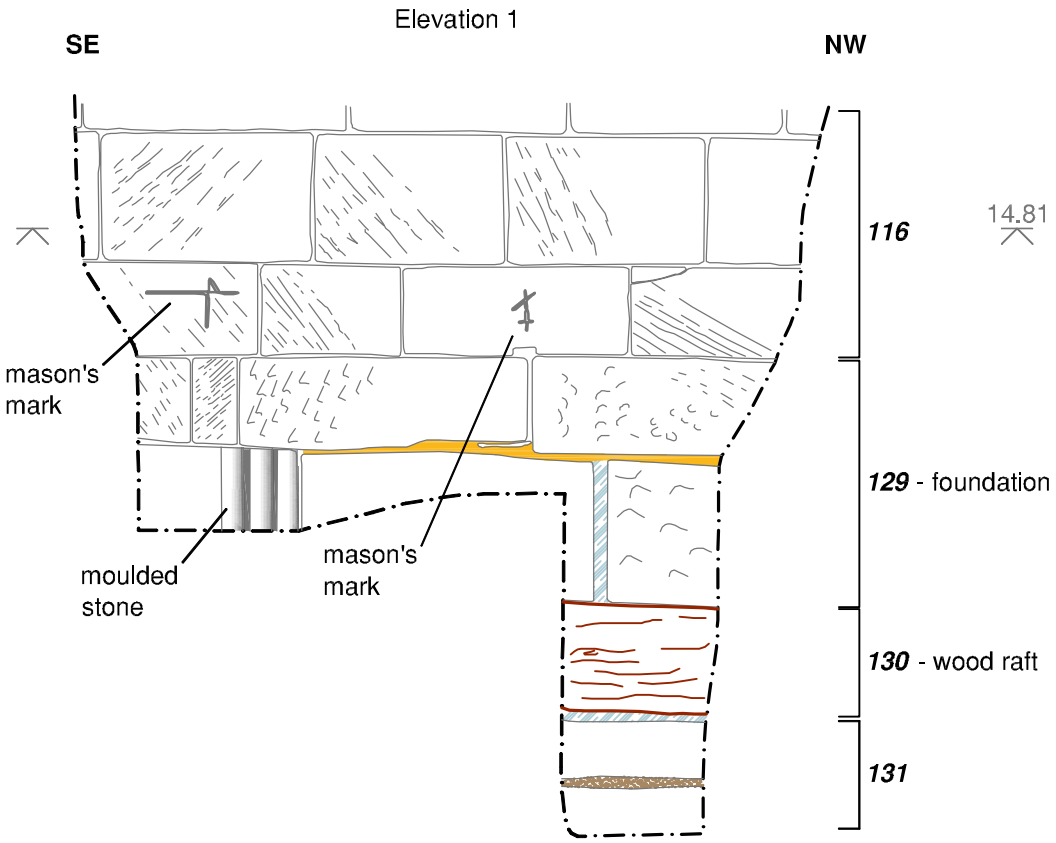
Figure 4: South-east-facing section (Section 1) and north-west-facing section (Section 2)



N

Limit of excavation
Representative sample of tool marks
Wood
Clay
Gravel
Mortar
0
0.5 m
1:20 @ A4

oxfordarchaeology northnorthnorth

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Figure 5: Elevation of the presbytery wall, showing foundations, ***129***, and timber raft, ***130***

Plate 1: General view of the excavation area viewed from the east, with the presbytery and church in the background.

Plate 2: The stone coursing (Phase 1a) below the later Phase 2 timber raft, viewed from the north-east, 0.5m scale.

Plate 3: The possible timber plank found within layer ***151***.

Plate 4: General view of the trench from the east showing the various ground raising events.

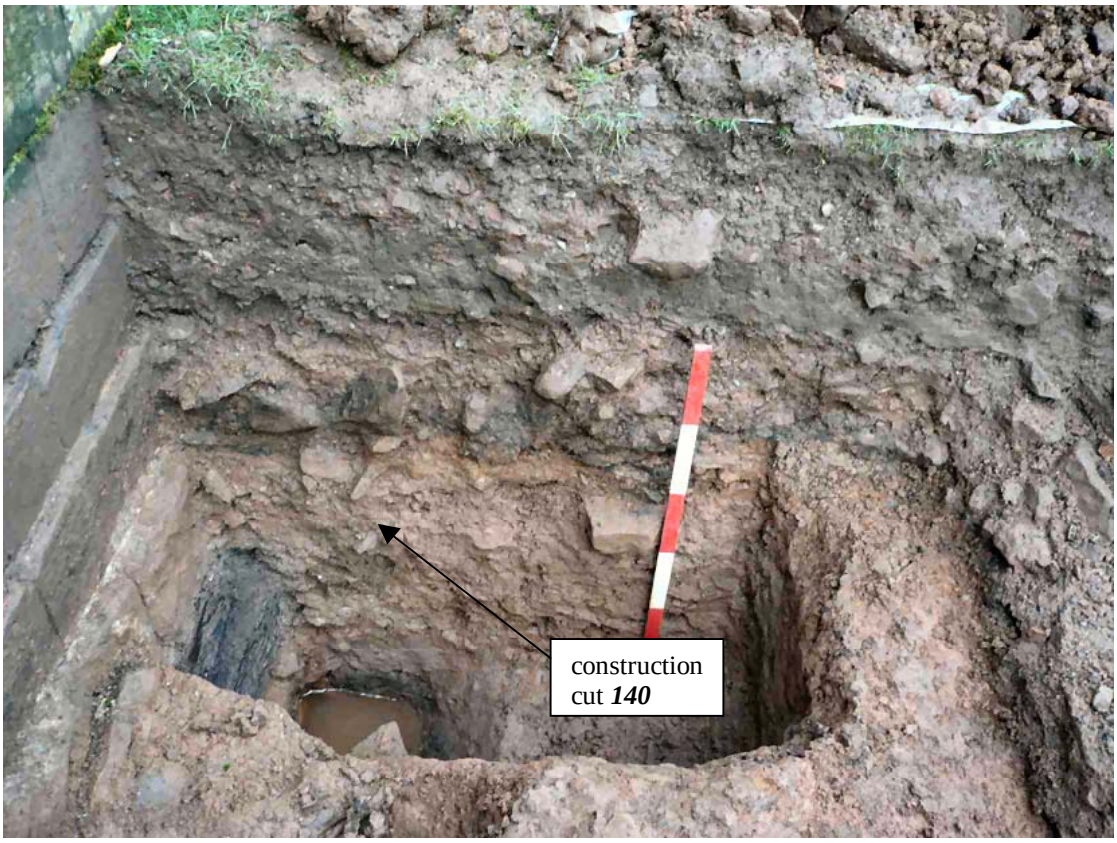

Plate 5: The timber raft ***130*** and foundation course ***131***, and construction cut ***140***.

Plate 6: Moulded stone within foundation course ***131***, viewed from the north-east.

Plate 7: Mason's mark on the lowest course of the presbytery wall (***116***).

Plate 8: The charnel deposit ***141***/***146*** within the top of the presbytery wall construction cut ***140***.

Plate 9: Skeleton ***133*** within grace cut ***134***, with head lying at the south-west end. The graves found within the trench were aligned on the presbytery, rather than with the graves in the cemetery.

Plate 10: Culvert ***115*** (centre) and later iron pipe in service trench ***105***, both from Phase 3

APPENDIX 1: PROJECT BRIEF

BRIEF FOR ARCHAEOLOGICAL INVESTIGATION OF CAUSES OF STRUCTURAL FAILURE OF THE PRESBYTERY WALLS, FURNESS ABBEY, CUMBRIA

1 BACKGROUND

The ruins of Furness Abbey, a major Cistercian monastic house founded in 1127 and dissolved in 1537, lie in a secluded wooded valley to the north-east of Barrow-in-Furness, Cumbria, at OSGR SD 2182 7179. The majority of the ruins of the Abbey, which is a scheduled ancient monument (SM 13572), are in the guardianship of English Heritage.

Major structural cracks have appeared in the north and south walls of the Presbytery, the eastern arm of the Abbey Church. The cracks run from top to bottom of both walls, passing through the western window in each. It is possible that the failure, which is close to the junction of the mid- to late-C12 masonry of the original Presbytery with the late-C15 masonry forming an extension to it, is due to differences between the foundations of the two builds. However, there may be alternative explanations for the problem, such as underlying geological or archaeological features which are causing differential settlement in the structure above.

Detailed proposals are invited for carrying out the work described in this brief, including the production of a detailed report.

2 SCOPE OF PROJECT

NB: due to obstruction by scaffolding erected for the examination and support of the north wall of the Presbytery, only the south wall and the southern half of the floor area are available for investigation.

The object of the exercise is to investigate the foundations of the south wall of the Presbytery, and to locate any underlying geological or archaeological features which may be causing settlement of the masonry above. This may only be possible once archaeological deposits associated with the construction and use of the Church have been fully recorded and removed.

It is suggested that the investigation should take the form of a single trench parallel to the south wall of the Presbytery, with extensions at right angles to investigate the nature and conditions of the foundations either side of the major structural crack. The exact form and location of the trench(es) should be specified in the detailed proposal.

Following the completion of fieldwork, an appropriate level of post-excavation analysis should result in the production of a report detailing the results of the project.

3 PROJECT DESIGN

Proposals to meet this brief should take the form of a detailed project design, which should include:

- A description of the recording system to be used.
- A description of the finds and environmental sampling strategies.
- A description of the post-excavation and reporting work to be undertaken.
- Identification of key project staff, including the project manager, site supervisor and any specialist staff or sub-contractors to be employed during the site work and the post-excavation analysis.

- Details of site staffing.
- A timetable for all site and post-excavation work through to completion of the final report.

4 REPORTING

The results of the site and post-excavation work should form the basis of a report, which should include:

- A site location plan, related to the national grid.
- A non-technical summary of the results.
- Descriptions of the methodology employed, the work undertaken and the results obtained.
- An appropriate level of illustration, including plans and sections at a suitable scale to show the location and position of features, deposits, finds etc.
- Descriptions and interpretations (including dating information where appropriate) of features, deposits and finds.
- Details of any environmental or other specialist work undertaken, and the results obtained.

Two copies of the report shall be supplied to English Heritage (for the attention of Andrew Davison, Inspector of Ancient Monuments, North West Region, Canada House, 3 Chepstow Street, Manchester, M1 5FW and of Iain Whittick, Technical Manager, Estates Department, 37 Tanner Row, York, YO1 6WP) and one to the County Historic Environment Record (for the attention of Jo Mackintosh, Cumbria County Council, Economy Culture and Environment, County Offices, Kendal, LA9 4RQ).

5 ARCHIVING

An archive should be prepared and arrangements made for its deposition with an appropriate repository, a copy also being offered to the National Monuments Record.

6 PROJECT MONITORING

Not less than two weeks' notice (or such lesser period as may be mutually agreed) of the commencement of the fieldwork should be given to Andrew Davison (address as at section 4 above) in order that an English Heritage representative can inspect and advise on the works and their effect in compliance with the necessary Class Consent and with the contents of this brief.

Brief prepared by:

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October, 2008.

APPENDIX 2: PROJECT DESIGN

1. INTRODUCTION

1.1 PROJECT BACKGROUND

1.1.1 English Heritage (hereafter the 'client') has requested that Oxford Archaeology North (OA North) submit proposals to undertake an archaeological investigation at the site of Furness Abbey, Barrow-in-Furness, Cumbria (NGR centred SD 2182 7179). The abbey ruins are a scheduled monument (SM13572), and open to visitors. The investigation will take place around the ruins of the Presbytery, the eastern arm of the Abbey Church, the walls of which remain to almost full height. Major structural cracks have appeared running from top to bottom of the north and south walls of the Presbytery. The cause of the shift in structure is unknown; one possibility is that there is a difference in foundations between the mid to late twelfth century masonry of the original Presbytery and the later fifteenth century extension to it; or it may be due to underlying geological or archaeological features causing differential settlement in the structure. The abbey cemetery surrounds the north and eastern sides of the Presbytery.

1.1.2 Therefore, in order to investigate the possible underlying cause, an archaeological excavation is required in and around the foundations of the walls. This will take the form of a two-staged process. An excavation along, and immediately adjacent to, the south side (interior) of the north Presbytery wall is required, which will look at the foundations of the two phased construction (mid-late twelfth and late fifteenth centuries) of the present Presbytery. However, due to the risk of collapse of part of both the north and south walls, it is necessary to shore up and make secure the walls before such an investigation can be carried out.

1.1.3 In an effort to pre-empt any problems or hazards to the shoring, a geophysical survey was undertaken, the interim results of which have been forwarded to OA North (Archaeophysica forthcoming). An electrical resistance survey was carried out around the outside of the walls and a number of pseudosections/profiles were carried out externally as well as internally. A number of features were identified, but those of particular relevance were two features lying to the east of the Presbytery, which included a low resistance feature parallel to the north, south and east walls of the Presbytery thought to be a path, and a presently unknown service trench. Therefore, an initial, first stage, investigation trench is required to the east of the Presbytery to determine precisely what these features are and how they sit within the graveyard.

1.1.4 The following proposals are based on a formal brief provided by English Heritage for the main, second stage, investigation of the interior of the Presbytery, together with a verbal brief for this first stage of investigation. The proposed methodology is concerned only with this latter external trench to the east of the Presbytery. The second stage internal investigation will be dealt with in a separate project design, as this will be informed by the results of this first stage investigation.

1.2 OXFORD ARCHAEOLOGY

1.2.1 Oxford Archaeology (OA), which is an educational charity under the guidance of a board of trustees, has over 30 years of experience in professional archaeology, and can provide a professional and cost-effective service. We are the largest employer of archaeologists in the country, and can thus deploy considerable resources with extensive experience to deal with any archaeological obligations. In the UK, we have offices in Lancaster, Oxford and Cambridge, trading as Oxford Archaeology North (OA North), Oxford Archaeology (OA South), and Oxford Archaeology East (OA East) respectively, enabling us to provide a truly nationwide service. OA is an Institute of Archaeologists Registered Organisation (No 17). All work on the project will be undertaken in accordance with relevant professional standards.

1.2.2 OA North has considerable experience of the evaluation and excavation of sites of all periods, having undertaken a great number of small and large-scale projects throughout Northern England during the past 30 years. Watching briefs, evaluations and excavations have taken

place within the planning process, to fulfil the requirements of clients and planning authorities, to very rigorous timetables. OA North has recently completed a watching brief during the installation of a greenway from Dalton to Roose that passed to the immediate south of Furness Abbey, within the scheduled area. A cobbled track was discovered within the Amphitheatre field.

2. AIMS AND OBJECTIVES

2.1 ACADEMIC AIMS

2.1.1 The main research aim of the investigation will be to characterise the extent, depth and nature of any sub-surface archaeological remains, together with their level of preservation and significance. The main aims can be summarised as follows:

- to assess the nature, date, density, extent, function and state of preservation of archaeological remains;
- to examine the surviving archaeological remains in order to identify the development of the site, in particular the construction of the foundations of the Presbytery;
- to investigate and identify the function of the anomalies identified in the results of the electrical resistance survey, and their place within the cemetery;
- to investigate the potential underlying cause of the structural cracks;
- to provide information to aid an understanding of any remains or deposits that may be affected or pose a potential risk to subsequent shoring of the Presbytery walls;
- to inform wider regional, national and period based research frameworks.

2.2 OBJECTIVES

2.2.1 The following programme has been designed to investigate and evaluate any archaeological deposits or features that may be present within an area outlined for investigation by English Heritage. The fieldwork will be carried out in line with current IfA guidelines and in line with the IfA Code of Conduct. It will be conducted within the general parameters defined by PPG16 'Archaeology and Planning' and current English Heritage guidelines.

2.2.2 ***Archaeological Investigation:*** to excavate a trench aligned east/west and measuring 2m x 5m, adjacent to, or abutting as far as practical, the exterior of the east Presbytery wall, so as to identify, investigate and record any archaeological remains.

2.2.3 ***Report Production:*** following completion of the fieldwork, a report will be produced for the client within eight weeks, unless a report submission deadline is agreed with the client at the time of commission. An archive will be produced to current English Heritage guidelines.

3. HEALTH AND SAFETY

3.1 RISK ASSESSMENT

3.1.1 OA North provides a Health and Safety Statement for all projects and maintains a Unit Safety policy. All site procedures are in accordance with the guidance set out in the Health and Safety Manual compiled by the Standing Conference of Archaeological Unit Managers (1997). OA North will liase with the client to ensure all health and safety regulations are met. A detailed risk assessment will be completed in advance of any on-site works, with continuous monitoring and updating during the fieldwork. This can be supplied to all interested parties on request.

3.1.2 All open archaeological sites, especially in the event of deep excavations, will be inspected by the Site Director or other appointed and competent person. These inspection records will be signed and dated, and form part of the on-site Health and Safety folder, which will always be available to all interested parties on request.

3.2 STAFF ISSUES

3.2.1 All project staff will be CSCS qualified, proof of which can be provided in the form of CSCS cards.

3.2.2 All project staff will wear full basic PPE whilst on site, to include safety helmets, safety boots and high-visibility jackets. Noise defenders and eye protectors will be made available to staff as necessary.

3.2.3 It is understood that the on-site visitors' toilet facilities will be made available during the site work.

3.3 SERVICES

3.1.1 Full regard will, of course, be given to all constraints (services etc) during the excavation as well as to all Health and Safety considerations. As a matter of course the field team will use a CAT and Genny prior to any excavation to test for services. However, this is only an approximate location tool. Any **information regarding services**, i.e. drawings or knowledge of live cables or services, within the study area and held with the client should be made known to the OA North project manager prior to the commencement of the evaluation.

3.4 CONTAMINATION

3.4.1 Any known contamination issues or any specific health and safety requirements on site should be made known to OA North by the client to ensure all procedures can be met, and that the risk is dealt with appropriately.

3.4.2 Should any presently unknown contamination be discovered during excavation, it may be necessary to halt the works and reassess the risk assessment. Should it be necessary to supply additional PPE or other contamination avoidance equipment this will be costed as a variation.

3.5 FENCING REQUIREMENTS

3.5.1 Outside of the main season, the site is only open to the visiting public at weekends. Nevertheless, the excavation trench, spoil and any areas of archaeological sensitivity will require protection with security fencing whilst open, and any appropriate signage. OA North have assumed that the security fencing currently preventing access to the Presbytery, internally and externally, will remain during the course of the fieldwork.

4. METHOD STATEMENT

4.1 LOCATION/EXTENT OF THE EXTERNAL ARCHAEOLOGICAL INVESTIGATION

4.1.1 The location and extent of this first stage archaeological trench has been determined by English Heritage, and based on the results of the electrical resistance survey (Archaeophysica forthcoming), in relation to the requirements for the shoring up of, and making safe, the north and south walls. The exact position and extent of the excavation will be located from discussions with on-site discussions with English Heritage, and located on the ground and recorded using GPS tied into the Ordnance Survey (OS) grid. The trench will be aligned east/west and measure 2m x 5m initially. Further on-site discussions with the client during the fieldwork may subsequently lead to the trench being expanded. Depending on the extent of expansion, should this extend the time allocated for fieldwork, a variation to the cost will need to be agreed with the client.

4.2 EXCAVATION

4.2.1 The turf will be removed by hand and stored adjacent to the trench. Thereafter, excavation will be undertaken in successive, level spits, by hand and under the supervision of a suitably experienced archaeologist. This deposit will be cleaned by hand, using either hoes, shovel scraping, and/or trowels depending on the subsoil conditions, and inspected for archaeological features. Such features will be defined and a base plan produced. Any features identified will then be manually excavated through to natural deposits. All features of archaeological interest will be investigated and recorded unless otherwise agreed by EH. The trenches will not be excavated deeper than 1.2m to accommodate health and safety constraints; any requirements to excavate below this depth will involve stepping out or shoring.

4.2.2 The trench will be excavated in a stratigraphical manner, by hand. Any investigation of intact archaeological deposits will be exclusively manual. Selected pits and postholes will normally only be half-sectioned, linear features will be subject to no more than a 10% sample, and extensive layers will, where possible, be sampled by partial rather than complete removal. It is hoped that in terms of the vertical stratigraphy, maximum information retrieval will be achieved through the examination of sections of cut features. All excavation will be manual and undertaken with a view to avoiding damage to any archaeological features, which appear worthy of preservation *in situ*.

4.2.3 All information identified in the course of the site works will be recorded stratigraphically, using a system, adapted from that used by Centre for Archaeology Service of English Heritage, with sufficient pictorial record (plans, sections, and monochrome contacts) to identify and illustrate individual features. Primary records will be available for inspection at all times.

4.2.4 Results will be recorded on *pro forma* context sheets. The site archive will include both a photographic record and accurate large scale plans and sections at an appropriate scale (1:50, 1:20 and 1:10). All artefacts and ecofacts will be recorded using the same system, and will be handled and stored according to standard practice (following current Institute of Archaeologists guidelines) in order to minimise deterioration.

4.2.5 Should any particularly deep-cut feature be revealed this will be manually excavated to 1.2m. Thereafter, if the Inspector (EH) wishes to see the further excavation of any such feature, this could be achieved by reducing the general area of the feature (i.e. a 1m 'cordon' around the feature) to allow further safe manual excavation. It should be noted, however, that recourse to such a methodology may incur additional costs, should it impinge on the work schedule, and would be derived from the contingency sum outlined at the end of this document, or as a variation to be agreed with the client.

4.2.6 If feasible, the area will be planned digitally by experienced surveyors utilising GPS to record the site according to OS co-ordinates. In this case, a Leica differential GPS will be employed that uses real-time (RTK) corrections using mobile SmartNet technology to achieve an accuracy of ± 0.01m. The accuracy of the OA North GPS system provides for a quick and effective means of recording the position and extent of sites. The digital survey data will be transferred, via Leica Geo Office (V.4), as shp files into a CAD system (AutoCAD Map 2004), and superimposed onto the embedded digital OS data. Should the site not be suitable for the use of GPS, a EDM Total Station will be used, based on a site grid related to the national grid obtained from any available client base mapping. However, this is obviously a much slower process. The mapping will include height information across the stripped natural to allow contour modelling of the site should it be required during the post-excavation process.

4.3 GENERAL PROCEDURES

4.3.1 ***Environmental Sampling:*** environmental samples (bulk samples of 40 litres volume, to be sub-sampled at a later stage) will be collected from suitable deposits (i.e. the deposits are reasonably well dated and are from contexts the derivation of which can be understood with a degree of confidence). Where such deposits are encountered, an appropriate sampling strategy

in accordance with English Heritage Guidelines for Environmental Archaeology (2002) will be employed and the English Heritage Regional Science Advisor may be notified or consulted. It may also be necessary for the OA North palaeoenvironmentalist to attend site to advise on appropriate sampling of specific features.

4.3.2 Samples will also be collected for technological, pedological and chronological analysis as appropriate. If necessary, access to conservation advice and facilities can be made available. OA North maintains close relationships with Ancient Monuments Laboratory staff at the Universities of Durham and York and, in addition, employs artefact and palaeoecology specialists with considerable expertise in the investigation, excavation and finds management of sites of all periods and types, who are readily available for consultation.

4.3.3 ***Human remains:*** the excavation trench is situated in the cemetery and, therefore, it is anticipated that human remains may be encountered. It has been agreed with EH that OA North will examine and record any burials *in situ* but will not attempt to excavate them. It is possible that a visit will be required from an OA North human remains specialist to advise on recording.

4.3.4 ***Finds:*** all finds recovered during the investigation will be exposed, lifted, cleaned, conserved, marked, bagged and boxed in accordance with the United Kingdom Institute for Conservation (UKIC) *First Aid For Finds*, 1998 (new edition) and the recipient museum's guidelines.

4.3.5 Finds recovery and sampling programmes will be in accordance with best practice (current IfA guidelines) and subject to expert advice. OA has close contact with Ancient Monuments Laboratory staff at the Universities of Durham and York and, in addition, employs in-house artefact and palaeoecology specialists, with considerable expertise in the investigation, excavation, and finds management of sites of all periods and types, who are readily available for consultation. Finds storage during fieldwork and any site archive preparation will follow professional guidelines (UKIC). Emergency access to conservation facilities is maintained by OA North with the Department of Archaeology, the University of Durham.

4.3.6 Neither artefacts nor ecofacts will be collected systematically during the mechanical excavation of the topsoil unless significant deposits, for example clay pipe waster dumps, are encountered. In such an eventuality, material will be sampled in such a manner as to provide data to enhance present knowledge of the production and dating of such artefacts, although any ensuing studies will not be regarded as a major element in any post-excavation analysis of the site. Other finds recovered during the removal of overburden will be retained only if of significance to the dating and/or interpretation of the site. It is not anticipated that ecofacts (e.g. unmodified animal bone) will be collected during this procedure.

4.3.7 All material will be collected and identified by stratigraphic unit during the excavation process. Hand collection by stratigraphic unit will be the principal method of collection, but targeted on-site sieving could serve as a check on recovery levels. Objects deemed to be of potential significance to the understanding, interpretation and dating of individual features, or of the site as a whole, will be recorded as individual items, and their location plotted in 3-D. This may include, for instance, material recovered from datable medieval pit groups.

4.3.8 Finds will be administered at regular intervals and removed from the site in order that they can be processed as the excavation proceeds back at OA North offices. All finds will be treated in accordance with OA standard practice, which is cognisant of IfA and UKIC Guidelines. In general this will mean that (where appropriate or safe to do so) finds are washed, dried, marked, bagged and packed in stable conditions; no attempt at conservation will be made unless special circumstances require prompt action. In such case guidance will be sought from OA North's consultant conservator.

4.3.9 It is not anticipated that there will be any waterlogged deposits. However, should such finds be encountered they will be treated as appropriate. In the case of large deposits of waterlogged environmental material (e.g. unmodified wood), advice will be sought with the OA North specialist and English Heritage Regional Science Advisor with regard to an appropriate sampling strategy.

4.3.10 Where possible, spot dates will be obtained on pottery and other finds recovered from the site. Artefacts will be examined and commented upon by OA North in-house specialists.

4.3.11 Any gold and silver artefacts recovered during the course of the excavation will be removed to a safe place and reported to the local Coroner according to the procedures relating to the Treasure Act, 1996. Where removal cannot take place on the same working day as discovery, suitable security will be employed to protect the finds from theft.

5. POST-EXCAVATION REPORT AND ARCHIVE

5.1 REPORT

5.1.1 An interim statement will be produced within approximately two weeks of the completion of the fieldwork. For the final report, two copies will be submitted to English Heritage (one to the client contact, Iain Whittick, and one to the Inspector of Ancient Monuments, Andrew Davison), and one copy to the Cumbria HER within approximately eight weeks of completion of the work, unless any specialist reports are still outstanding. The report will include;

- a site location plan related to the national grid
- a front cover to include the NGR
- a concise, non-technical summary of the results
- the circumstances of the project and the dates on which the fieldwork was undertaken
- description of the methodology, including the sources consulted
- description and interpretation, to include the results of any specialist work undertaken
- appropriate plans showing the location and position of features or sites located
- photographs as appropriate
- a copy of this project design, and indications of any agreed departure from that design
- the report will also include a complete bibliography of sources from which data has been derived, and a list of any further sources identified but not consulted
- an index to the project archive

5.1.2 ***Confidentiality:*** all internal reports to the client are designed as documents for the specific use of the client, for the particular purpose as defined in the project brief and project design, and should be treated as such. They are not suitable for publication as academic documents or otherwise without amendment or revision.

5.2 ARCHIVE

5.2.1 The results of all archaeological work carried out will form the basis for a full archive to professional standards, in accordance with Appendix 3 of English Heritage guidelines (*Management of Archaeological Projects*, 2nd edition, 1991). This archive will be provided in the English Heritage Centre for Archaeology format and a synthesis will be submitted to the HER (the index to the archive and a copy of the report). OA North practice is to deposit the original record archive of projects (paper, magnetic and plastic media) with the County Record Office, Barrow, and the material archive will be submitted to an appropriate museum.

6. OTHER MATTERS

6.1 PROJECT MONITORING

6.1.1 Monitoring of the archaeological investigations will be undertaken by the Inspector of Ancient Monuments for EH who will be afforded access to the site at all times.

6.1.2 Monitoring meetings will be established with the client contact and the Inspector, and the following is anticipated;

- at the beginning of the excavation fieldwork,
- during the fieldwork (the frequency of such visits will be dictated to some extent by the findings on site),
- on completion of the fieldwork, to ensure all site work has been competed to satisfy the condition,

6.1.3 OA North will ensure that any significant results are brought to the attention of the client and the Inspector (EH) as soon as is practically possible.

6.2 SPOIL AND REINSTATEMENT

6.2.1 The removed turf and spoil will be stored adjacent to the trench, with the spoil separated into topsoil and subsoil. This will be replaced appropriately with the topsoil placed on top and the turf reinstated.

6.3 SITE WELFARE

6.3.1 Health and safety regulations require access to adequate handwashing facilities to be provided for the duration of the fieldwork. It is understood that this will be provided together with a messing area for the laying out of plans and the secure storage of tools in the visitors' centre. Should it become necessary for a secure cabin to be used as a lock up and messing facility this will be hired, the cost has been provided as a contingency, and will be situated in the visitors' car park.

6.4 INSURANCE

6.4.1 OA North has professional indemnity to a value of £2,000,000, employer's liability cover to a value of £10,000,000 and public liability to a value of £15,000,000. Written details of insurance cover can be provided if required.

7. PROGRAMME AND STAFFING

7.1 PROGRAMME

7.1.1 It is anticipated that the work will commence on Monday 23rd February 2009.

7.1.2 ***Excavation:*** up to a two week period is expected for this element.

7.1.3 ***Report and Archive:*** the report and archive will be produced following the completion of all the fieldwork. An interim statement can be provided within approximately two weeks following completion of the site work and the final report will be available within eight weeks of completion of the fieldwork. The archive will be deposited within six months.

7.2 STAFFING

7.2.1 The project will be under the direct management of **Emily Mercer BA (Hons) MSc AIFA** (OA North Senior Project Manager) to whom all correspondence should be addressed.

7.2.2 The excavation will be supervised in the field by **Jeremy Bradley** (OA North project officer). Jeremy is an experienced field archaeologist, specialising in medieval archaeology, having completed an excavation on the medieval suburbs of Penrith, Cumbria last year. He will be assisted in the field initially by two archaeologists, although this number may increase to meet the site requirements.

7.2.3 **Christine Howard-Davis**, **BA, MIFA** (OA North finds manager) has extensive knowledge of all categories of artefacts of all periods. The assessment and subsequent analysis of all artefacts recovered during the course of the investigation will be undertaken by or under the auspices of Christine.

7.2.4 Any requirement for conservation work will be undertaken by **Jennifer Jones**, the AML contract conservator based at the University of Durham. Jennifer is a nationally-recognised specialist in conservation, and is readily available to provide advice on the treatment of any delicate finds recovered from the excavation.

7.2.5 **Environmental management** will be undertaken by **Elizabeth Huckerby BA, MSc** (OA North environmental manager), who will also provide specialist input on pollen analysis/charred and waterlogged plant remains. Elizabeth has extensive knowledge of the palaeoecology of the North, and has contributed to all of the English Heritage funded volumes of the Wetlands of the North West. Elizabeth has also acted as palaeoenvironmental consultant for several archaeological investigations. Elizabeth will advise on site sampling procedures and co-ordinate the processing of samples and organise internal and external specialist input as required.

7.2.6 **Andrew Bates BSc, MSc** (OA North project officer) has considerable experience in commercial archaeology as both an archaeozoologist and field archaeologist throughout Britain. As an in-house archaeozoologist, he has been involved in the examination and stabilisation of animal bones both during the post-excavation process and as an on-site specialist.

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APPENDIX 3: CONTEXT LIST

Key: T = thickness; D = depth; W = width; L = length

Context	Interpretation	Description
100	Unstratified	Number allocated to unstratified material
101	Topsoil	Reddish brown sandy silt (T 0.1-0.15m)
102	Surface	Stone rubble surface (T 0.1-0.3m)
103	Silt layer	Narrow band of silt (T 70mm, W 0.3m) against Presbytery wall
104	Iron pipe	North-west/south-east aligned 1¼ inch iron pipe within cut ***105***
105	Constriction cut for ***104***	Shallow north-west/south-west aligned construction cut (W 0.92, D 0.3m)
106	Surface	Compact stone at north-east end of trench (L 1m, T 0.1m)
107	Rubble layer	Stone rubble layer comprising stones up to 220 x 320mm located on south-east side of trench (T 0.24m, L 3.8m)
108	Levelling layer	Levelling layer composed of stone rubble (T 0.25m, L 3.9m)
109	Buried soil horizon	Brownish-grey sandy-silt (T 0.15m, L 3.84m)
110	Levelling layer (same as ***114***)	Stony layer forming burial horizon (T 0.3m, L 3.2m)
111	Rubble layer/surface	Possible gravel surface (T 0.1m, L2.5m)
112	Fill of construction cut ***113***	Reddish-grey gravel fill (T 90mm, W 0.56m)
113	Construction cut for culvert ***115***	North-west/south-east aligned construction cut (W 0.56m, D 0.3m)
114	Levelling layer (same as ***110***)	Stony layer forming burial horizon (T 0.42m, L 3.3m)
115	Culvert	Roughly constructed stone culvert (H 0.21m , W 1.4m)
116	Presbytery wall	North (standing) wall of presbytery
117	Fill within culvert ***115***	Silty-clay fill within culvert (T 80mm, W 0.2m)
118	Levelling layer	Sand stone rubble at north-east of trench (L 1.72m, T 0.26m)
119	Levelling layer	Stone rubble layer with distinct black coloration,

		found throughout the trench (T 0.2-0.25m)
120	Construction cut for presbytery wall. Same as ***140***	See ***140***
121	Fill of construction cut ***123***	Greyish-pink silty-sand fill of construction cut
122	Ceramic pipe	10" diameter salt glazed ceramic pipe within construction cut ***123***
123	Service trench containing ***122***	North-west/south-east aligned construction cut (T 0.48m, W 0.65m)
124	Same as ***118***	Sand stone rubble at north-east of trench (L 2.1m, 0.15m)
125	Fill of grave ***127***	Greyish-pink silty sand (un-excavated)
126	Skeleton	unexcavated
127	Grave cut containing ***SK126***	North-east/south-west aligned grave cut (L 1.44m, W < 0.3m, D < 0.27m)
128	Sandy layer	Thin band of pinkish-orange sand (T 60mm, L 2.57m)
129	Presbytery wall foundation	Two courses of ashlar and moulded stone forming the foundation of the presbytery wall (H 0.63m)
130	Wooden raft	Wooden raft supporting presbytery wall foundation (T 0.25m)
131	Wall foundation	Two courses of roughly-squared stone below raft (131(H 0.3m))
132	Fill of grave ***134***	Greyish-pink silty-sand fill of grave (un-excavated)
133	Skeleton	unexcavated
134	Grave cut containing ***SK133***	North-east/south-west aligned grave cut (L < 0.8m, W < 0.4m (unexcavated))
135	Fill of possible grave cut ***136***	Greyish-pink silty-sand fill of grave (un-excavated)
136	Possible grave cut	North-east/south-west aligned grave cut (L < 0.76m, W < 0.65m (unexcavated))
137	Levelling layer	Orange-brown crushed sandstone layer located at south-west end of trench (T 0.12, L 0.7m)
138	Levelling layer	Pinkish-brown crushed sandstone layer located at south-west end of trench (T 0.18m, L 0.89m)
139	Levelling layer	Pinkish-orange sandstone and silty clay (T 0.35m, L 0.85m)

140	Construction cut for presbytery. Same as ***120***	Near vertical-sided construction cut for presbytery wall (W 0.5m, D 0.5m)
141	Upper fill of ***140***	Pink-brown gravel upper fill of ***140*** (T 0.22m)
142	Fill of ***140***	Grey-pink-brown gravel fill of ***140*** (T 0.23m)
143	Basal fill of ***140***	Grey-brown clay used to seal raft ***130***
144	Silt layer	Brown silt layer abutting foundation ***131*** (T 0.13m, L 0.45)
145	Organic silt layer	Dark brown organic silt abutting foundation ***131*** (T 80mm, W 0.3m)
146	Not used	
147	Gravel layer	Pink-brown gravel at base of sondage abutting butting foundation ***131*** (T 0.1m, L 0.3m)
148	Levelling layer	Pinkish-orange sand and sandstone layer (T 0.32m, L 2.48m)
149	Levelling layer	Mid pinkish-orange silty-sand located in sondage at north-east end of trench (T 0.3m, L > 1m)
150	Levelling layer	Brownish-orange silty-sand located in sondage at north-east end of trench (T 0.39m, L > 1m)
151	Silty organic layer	Mid brown organic silt layer containing a wooden plank, located in sondage at north-east end of trench (T > 0.15m, L > 0.5)
152	Possible cist burial	Possible structure composed of large roughly-squared boulders (up to 440 x 150mm) and abutting presbytery wall
153	Organic silty layer	Dark grey organic silty sand located at very base of sondage at north-east end of trench (unexcavated)

APPENDIX 4: SUMMARY OF FINDS

Ctext = Context number; OR No = Object record number; Mat = material; Qty = Quantity of fragments

CTEXT	OR NO	MAT	CATEGORY	QTY	DESCRIPTION	DATE/PERIOD
100	1001	Lead	strip	3	Sheet	Undateable
100	1000	Copper alloy	coin	1	Halfpenny of George V; dated 1915	1915
100	1002	Glass	vessel	1	'Blob top' bottle rim. Natural bluish	Late nineteenth - early twentieth century
100	1003	Iron	object	1	Unidentified	Undateable
100	1004	Copper alloy	object	1	Cylinder	Modern
100	1005	Lead	object	4	Unidentified	Undateable
100	1057	Stone	worked	1	Round disc with central perforation	Undateable
100	1006	Iron	nail?	2	-	Undateable
101	1007	Ceramic	vessel	4	Two fragments white earthenware; one fragment green underglaze transfer-printed earthenware; one fragment self-glazed red earthenware	Late nineteenth century - early twentieth century
101	1008	Copper alloy	coin	1	Penny of Edward VII; dated 1904	1904
101	1009	Iron	nail?	4	hand-forged nails?	Undateable
101	1010	Plastic?	tooth?	1	Plastic ?crocodile tooth set in epoxy resin?	Twentieth century
102	1012	Glass	stopper	1	Bottle stopper or marble	Late nineteenth - early twentieth century
102	1015	Iron	nail	1	-	Undateable
102	1013	Mortar		1	-	Undateable
102	1055	Iron	object	1	-	Undateable
102	1056	Bone	animal	11	Rabbit sacrum, four fragments	Undateable

					of large mammal shaft, three medium mammal shafts, one fragment large mammal mandible, two unidentified mammal fragments, one fragment sheep/goat distal tibia (distal epiphysis fused), distal tibia from a robust sheep/small deer	
102	1011	Copper alloy	thimble	1	Thimble stamped from sheet	Modern
102	1014	Ceramic	vessel	1	One fragment green-glazed orange oxidised fabric	Medieval
108	1020	Iron	nail?	1	-	Undateable
108	1062	Stone	worked	1	Red sandstone carved moulding	Undateable
108	1027	Stone	worked	1	Red sandstone block	Undateable
108	1026	Stone	worked	1	Red sandstone carved moulding	Undateable
108	1025	Stone	worked	1	Red sandstone carved moulding	Undateable
108	1024	Ceramic	building material	1	Hand-made brick	Undateable
108	1023	Ceramic	building material	1	Hand-made brick	Undateable
108	1021	Ind debris		1	-	Undateable
108	1019	Bone	animal	12	One fragment distal pig tibia, one fragment cow distal radius (un-fused epiphysis) from a juvenile with osteochondritic lesion on medial articular surface, lower left molar from a cow, dog lower canine, pig upper incisor, well worn, sheep/goat femoral head (proximal fused), two fragments of large mammal shaft, four fragments of unidentified mammal	Undateable
108	1018	Ind debris		1	-	Undateable
108	1017	Ceramic	vessel	1	Small fragment reduced green-glazed ware with	Medieval

					applied decoration.	
108	1016	Ceramic	vessel	2	Two small fragments, modern	Modern
108	1022	Stone	building material	1	Roof slate	Not easily dateable
109	1029	Bone	animal?	5	Four fragments of unidentified large mammal, one large mammal shaft, (cow-sized)	Undateable
109	1028	Iron	nail?	1	-	Not easily dateable
109	1033	Ceramic	tobacco pipe	6	Five fragments undiagnostic stem, one bowl	Eighteenth century
109	1038	Ceramic	vessel	1	One fragment painted porcelain, possibly import	Eighteenth century or later
109	1030	Mollusc	oyster	4	-	Undateable
109	1031	Ceramic	building material	1	Small fragment line-impressed floor tile, yellowish glaze over white slip	Medieval
109	1039	Copper alloy	object	2	-	Undateable
109	1037	Glass	vessel	5	Two fragment natural bluish, three fragments dark green, all late forms	Twentieth century
109	1036	Stone	cube	1	-	Undateable
109	1035	Bone		1	One large fragment medium mammal shaft	Undateable
109	1034	Glass	vessel	1	One fragment dark olive green bottle, late form	Nineteenth century
109	1032	Ceramic	vessel	4	Transfer-printed whitewares	Nineteenth century
110	1041	Bone	human	3	a single left humerus and a possible left ulna	
110	1042	Lead	strip	4	-	Undateable
110	1043	Iron	object	1	Unidentified	Undateable
110	1044	Lead	fragment	1	Small amorphous fragment	Undateable

110	1040	Bone	human	2	a single thoracic vertebrae, two rib fragments, an intermediate manual phalanx and a fifth left metacarpal	
111	1045	Ceramic	vessel	1	One fragment brown stoneware bottle	Seventeenth century
111	1048	Stone	worked	1	Red sandstone block	Undateable
111	1046	Iron	nail	1	-	Undateable
111	1047	Bone	human	5	a single thoracic vertebrae, two rib fragments, an intermediate manual phalanx and a fifth left metacarpal	
112	1059	Ceramic	building material	1	-	Undateable
112	1063	Stone	worked	1	Red sandstone block	Medieval
115	1060	Stone	worked	1	Red sandstone block with mason's mark. Possibly stair riser	Medieval
117		Bone	human	6	Trapezoid and first metacarpal from right hand, two manual phalanges and a metacarpal fragment	Medieval
119	1058	Bone	human	8	Fragments of parietal, occipital, right and left os coxae, a left tibia, left fibula fragment and unidentifiable fragments	Medieval
120	1064	Stone	worked	1	Red sandstone block	Medieval
121	1049	Ceramic	tobacco pipe	1	Stem fragment	Post-medieval
121	1050	Ceramic	vessel	1	One fragment white earthenware	Modern

125	1051	Bone	human	1	single clavicle fragment	
132	1052	Lead	strip	2	Folded sheet, probably roofing	Undateable
133	1053	Bone	human?	9	Skull fragments	
135	1054	Iron	object	1	Unidentified	Undateable
148	1061	Stone	worked	1	Red sandstone block	Medieval