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SUMMARY

Lancaster University was granted planning permission in 2011 for the installation of a 2MW wind turbine generator, with associated site access, on-site access tracks, hardstanding areas, temporary construction and storage compound, cabling, and landscaping and environmental measures (planning ref 10/01061/FUL), on land on the east side of the M6 motorway, opposite to the University's South West Campus, off Bailrigg Lane, Lancaster (centred on NGR SD 4904 5742). Following a period of consultation, on behalf of the client, with the Lancashire County Archaeology Service (LCAS), it was agreed that the areas of groundworks be subject to a programme of archaeological investigation prior to any construction works commencing on site.

Oxford Archaeology North (OA North) undertook an archaeological desk-based assessment and technical chapter for the purposes of an Environmental Statement, to accompany the planning application, in December 2009 and April 2010, respectively, the aim being to inform the planning process as to the potential impact of the proposals on any cultural heritage resources. The technical chapter was also informed by a magnetic gradiometer survey over the site. Originally, the application was for two turbine generators, but was revised for a single turbine generator later in 2010, when OA North's input into the Environmental Statement was accordingly revised, in September 2010.

The assessment showed that the site was within an area of late prehistoric to Roman-period potential: a Bronze Age axe findspot is known from within the study area, and there is further evidence for Bronze Age activity in the wider area; the putative route of the Lancaster to Overburrow Roman road passes to the north of the site, and a Romano-British settlement site (known as Barker House Farm) has been excavated to the west of the southern end of the site. The assessment also identified the township boundary between Scotforth to the north and Ellel to the south, which is believed to be medieval in date. Post-medieval sites included relict boundaries and tracks, former pits and ponds, a ditch and bank, a cropmark, a former woodland enclosure bank, and nine Grade II listed buildings in the vicinity. The geophysical survey located magnetic anomalies within the southern end of the site that may have related to activity contemporaneous with the Romano-British settlement at Barker House Farm.

The investigation, carried out intermittently between December 2011 and June 2012, and often in extremely poor weather conditions, comprised a programme of archaeological trial trenching and three areas of subsequent strip and record, within the footprints of the access track, compound and turbine base, to examine in more detail areas of archaeological remains. Two of the strip and record areas were used to expand two evaluation trenches on the access road (Trenches 11 and 20), whilst a third larger area, Area 29, was opened in the footprint of the turbine base and crane pad. This revealed evidence for medieval activity of a mainly agricultural nature, which correlated with an adjacent field system and an area of ridge and furrow identified within the study area. This could be corroborated with geophysical survey anomalies relating to such agricultural activity over the whole site.

The earliest features revealed during the excavations were several charcoal-bearing tree throws within Trench/Area 20 and within Area 29. These features are arguably interpreted as naturally-felled trees that have subsequently been burnt by human

agency. Radiocarbon assay of three of these features revealed evidence of woodland clearance dating from the late Mesolithic period to the Late Bronze Age, indicating that woodland in the area was being managed or cleared through a large part of the prehistoric period.

Both the evaluation and the strip and record excavation revealed evidence of medieval activity. A scatter of medieval pottery was recovered, almost all of which was produced at the nearby Ellet kiln site, and can generally be dated to the twelfth to thirteenth century. Medieval ridge and furrow was evident along the course of the access road, in the vicinity of Trenches 5-23. Where it was evident, around Trenches 5-10, it was aligned approximately north/south. Trench 11 revealed what may have been an east/west-aligned stone boundary (also seen in the geophysical survey data), between two areas of ridge and furrow, with the direction of the ridge and furrow north of this boundary being aligned east/west across the crest of the hill.

Several ditches and gullies were identified in Area 29 that appeared to demonstrate the presence of successive stock-management features that sloped down towards a southerly flowing stream. The ditches were further bounded to the east by a substantial ditch that may have marked the original medieval boundary between the open moor and the managed landscape. The remaining ditches could be divided into stock funnels (converging ditches forming a V-shape in plan in order to facilitate the ingathering of animals), and those that formed paddocks. Despite the presence of thirteenth-century pottery from the most westerly of the stock funnels, there was no evidence of any settlement, which was presumed to lie some distance beyond the limits of excavation. Pollen analysis was carried out on samples from a single monolith, which produced evidence of cereals, as well as indicating a partially wooded landscape, interspersed with damp meadows. Charcoal from two of the ditches provided radiocarbon dates from the twelfth and later thirteenth centuries, correlating with the pottery dating.

Pre-enclosure cartographic evidence indicates that the site investigations had taken place within a discrete block of land surrounded by common grazing, some 800m south-west of Bailrigg Farm, a manor belonging to Cockersand Abbey. Twelfth- to fifteenth-century documentary evidence suggests that the name Hazelrigg, within the manor of Scotforth, can be identified within this block of land, associated with a farm approximately 500m south of the excavation area. Although there was no direct evidence of occupation, other than the pottery, it would appear likely that the medieval inhabitants of the area were exploiting both arable land, in the form of ridge and furrow, whilst raising stock in the adjacent common grazing, managing the movement of such livestock via the stock funnels and paddocks found on the site. The general scarcity of excavated medieval rural sites within northern Lancashire indicates that this site is regionally significant, and worthy of formal publication.

ACKNOWLEDGEMENTS

Oxford Archaeology North (OA North) would like to thank Peter McMullen of Lancaster University for commissioning the excavation and this post-excavation assessment, together with his logistical help, and Peter Iles, the Specialist Adviser (Archaeology) for Lancashire County Council, for his assistance and advice.

The excavation was directed by Jeremy Bradley and Andy Bates, with the assistance of Phil Cooke, Paul Dunn, Andrew Frudd, Vickie Jamieson, Nate Jepson, Graham Mottishead, Lewis Stitt and Becky Wegiel. The report was compiled by Jeremy Bradley. The illustrations were produced by Mark Tidmarsh. Jeremy Bradley assessed the artefactual material, with contributions by Christine Howard-Davis. The palaeoenvironmental samples were assessed by Denise Druce, whilst the pollen was examined by Helen Shaw. Emily Mercer managed the project and edited the report, which was quality assured by Rachel Newman.

1. INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

- 1.1.1 Lancaster University was granted planning permission for the installation of a 2MW wind turbine generator, with associated site access, on-site access tracks, hardstanding areas, temporary construction and storage compound, cabling, and landscaping, and environmental measures (planning ref 10/01061/FUL), on land on the east side of the M6 motorway, opposite to the University's South West Campus, off Bailrigg Lane, Lancaster (centred on NGR SD 4904 5742; Fig 1). Following a period of consultation, on behalf of the client, with the Lancashire County Archaeology Service (LCAS), it was agreed that the areas of groundworks should be subject to a programme of archaeological evaluation prior to any construction works commencing on site.
- 1.1.2 Oxford Archaeology North (OA North) undertook an archaeological desk-based assessment and technical chapter for the purposes of an Environmental Statement (Segen 2010) to accompany the planning application, in December 2009 and April 2010, respectively (OA North 2010). The aim of the assessment was to inform the planning process as to the potential impact of the proposals on any cultural heritage resources. The technical chapter was also informed by a magnetic gradiometer survey over the site. Originally, the application was for two turbine generators, but was revised for a single turbine generator later in 2010. OA North's input into the Environmental Statement was accordingly revised in September 2010 (OA North 2010).
- 1.1.3 The assessment showed that the site was within an area of late prehistoric to Roman-period potential: a Bronze Age axe findspot is known from within the study area, and there is further evidence for Bronze Age activity in the wider area; the putative route of the Lancaster to Overburrow Roman road passes to the north of the site, and a Romano-British settlement site (known as Barker House Farm) has been excavated to the west of the southern end of the site (OA North 2010; Zant and Bagwell in prep). The geophysical survey located magnetic anomalies within the southern end of the site, in relatively close proximity to the Romano-British settlement at Barker House Farm, that may have related to contemporaneous activity. The assessment also identified the township boundary between Scotforth, to the north, and Ellel, to the south, which is believed to be medieval in date. Post-medieval sites included relict boundaries and tracks, former pits and ponds, a ditch and bank, a cropmark, a former woodland enclosure bank, and nine Grade II listed buildings in the vicinity.
- 1.1.4 Consequently, in accordance with a request from LCAS, a project design was compiled, firstly, for a programme of evaluation trenching (*Appendix 1*), targeting anomalies observed in the geophysical survey data, as well as obtaining a representative 5% sample over the footprint of the whole scheme (Fig 2). Following on from the evaluation, a second project design was compiled (*Appendix 2*) for three areas of significant archaeological remains that required further investigation and recording via a programme of strip and

record (Fig 2). Two of the areas (Areas 11 and 20) were used to extend two evaluation trenches within the area of the access road, whilst a third larger area (Area 29) was opened in the footprint of the turbine base and crane pad (Fig 3). Subsequently, Area 29 was expanded in order to investigate two further areas of high archaeological potential. These comprised an access road that adjoined Area 29 to the west, and a further area adjoining to the north. The investigation was carried out intermittently between December 2011 and June 2012, and often in extremely poor weather conditions (Plate 1).



Plate 1: Area 29, looking towards the University during cleaning, showing the poor weather conditions, with standing water and mud being a constant factor during the main stage of excavation

1.2 LOCATION AND SETTING

- 1.2.1 The development area is situated to the south of Lancaster, within the parish of Scotforth. Lancaster University's South West Campus lies a short distance to the west, separated from it by the north/south-aligned M6 motorway, which forms the western boundary of the site. Hazelrigg Lane, where it crosses under the motorway, forms the southern boundary of the development area, whilst its north-eastern portion is occupied by Lancaster University's Meteorological Station. A small stream flows down the eastern boundary of the site.
- 1.2.2 Beyond the immediate boundaries of the development site, the land to the north (with the exception of Blea Tarn Reservoir), east and south is largely rolling farmland used for grazing, intersected by narrow lanes and sporadic residential development. The area of the site gradually slopes upwards from c 40m AOD at its south end to c 96m AOD at its north end (Ordnance Survey (OS) 1974). The fields that occupied the site were in use as pasture.
- 1.2.3 The solid geology of the area consists of mudstones, probably of the Crossdale Mudstone Formation, of the Upper Carboniferous Millstone Grit series, dating

to the Namurian geological era, 250 million years ago (Crofts 1992). Overlying the solid geology, the drift geology is essentially boulder clay, laid down approximately 10,000 years ago following the last glaciation. The soils of the area belong to the Brickfield Association, which are cambic stagnogleys (Jarvis *et al* 1984). The resulting landscape is one of mixed arable and pastoral agricultural land.

1.3 GENERAL ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

- 1.3.1 **Prehistoric Activity (c 8000 BC - c AD 43):** relatively little is known about prehistoric activity in North Lancashire, which is due in part to the poor visibility of the remains of this period, but also reflects the paucity of archaeological work undertaken on prehistoric sites in the region (Middleton *et al* 1995; Chitty and Brennand 2007, 8-10). In the Lancaster area, a sparse distribution of Mesolithic, Neolithic and Bronze Age finds, including pottery, flint tools, and some Bronze Age burials, indicates settlement of some kind during these periods (White 1988; Shotter and White 1990, 5; Barrowclough 2008, 50, 77, 98). That Castle Hill in central Lancaster may have been a favoured location for prehistoric settlement seems possible, in view of its natural strength, but the chance discovery of a Bronze Age palstave currently represents the only evidence for pre-Roman activity on the hill itself (White 1988, 207), although both Neolithic pottery and possible Early Bronze Age burials have been discovered nearby (White 1974; Barrowclough 2008, 99, fig 47).
- 1.3.2 South of the city, local place names, such as Barrow Greave and Burrow Heights, might suggest the existence of Bronze Age cemeteries, although, at Burrow Heights, only finds of Roman date are known (*see Section 1.3.7* below). Better evidence is provided by a flint scatter found at Galgate Allotments in 1978, which is thought to represent Bronze Age occupation (Lancashire Historic Environment Record (HER) 2759). There are no known remains dating to the Iron Age, either in Lancaster or the wider area, but this is almost certainly due to the fact that sites of this period have proved extremely difficult to identify across the region as a whole (Haselgrove 1996, 64). At the beginning of the Roman period, Lancaster and its region may have lain, politically, within the territory of the Brigantes, a tribe, or possibly tribal confederation, extending over most of what is now northern England (Shotter and White 1990, 17; Shotter 2004, 2-3).
- 1.3.3 **Roman Period (c AD 43 - AD 410):** the evidence available suggests that the Roman military established an auxiliary fort on Castle Hill in Lancaster during the late first century AD (Jones and Shotter 1988). The precise date is unclear, though it was probably during the governorship of Petillius Cerialis (AD 71-4), a time when the Roman army was undertaking the subjugation of the Brigantes and the occupation of their territories (Shotter 2001, 7).
- 1.3.4 After a possible short phase of abandonment (Shotter 2004, 44), the fort was rebuilt at the beginning of the second century (Shotter and White 1990, 21-2) and was enlarged considerably, either at this time or possibly slightly earlier (*op cit*, 21). Evidence for second- and third-century occupation is limited, but

the fort may have been abandoned during the Antonine advance into Scotland in the early AD 140s (Shotter and White 1995, 22). Reoccupation, perhaps at a reduced level, occurred in the second half of the second century (*op cit*, 22-3), and an inscription records the rebuilding of a bath-house and a *basilica* during the AD 260s (*ibid*).

- 1.3.5 During the first half of the fourth century, perhaps around AD 330-40, a major new fortification was constructed. This was enclosed by massive stone walls incorporating projecting bastions (Shotter and White 1990, 23). Although details remain unclear, this installation was perhaps similar in type to the Saxon Shore forts of the south-east coast, and to contemporary installations on the Welsh coast (*op cit*, 26; Shotter and White 1995, 78-9), which were built in response to developing sea-borne threats in the later Roman period. Numismatic and ceramic evidence suggests that intensive occupation of the site continued into the late fourth century or early fifth century at least (Shotter and White 1990, 27; Shotter 2001, 27).
- 1.3.6 In common with other forts in Britain, it seems likely that a civil settlement was established outside the fort within a few years of the arrival of the Roman army (Sommer 1984, 11), but there is as yet little firm evidence for settlement before the very late first century or early second century (Shotter and White 1990, 32, 36; Howard-Davis *et al* in prep). Precisely where the earliest elements of the settlement lay remains unclear, although it seems likely that it originated, and continued, as ribbon development along the road leading from the fort's east gate, the line of which is followed by modern Church Street (Shotter and White 1990, 32, 36). Archaeological evidence suggests that the settlement flourished in the second and third centuries, before suffering a decline during the fourth century (Shotter 2001, 20, 27; 2004, 162).
- 1.3.7 Evidence of settlement around Lancaster is limited, perhaps partly reflecting the lack of development in the area. Archaeological investigations at Barker House Farm, situated 1.2km to the south-west of the site, revealed part of a small Romano-British farmstead, situated on the spur of a low promontory overlooking the River Wyre, and comprising the remains of two roundhouses possibly set within a rectilinear enclosure. Dating evidence suggested a likely second-third-century AD *floruit* for the settlement (Zant and Bagwell in prep). Burrow Heights, a low eminence close to the presumed line of the Roman road, approximately 1.8km north-west of the site has produced Romano-British finds, most notably a group of sculpted figures, including heads, a small female statue possibly representing the deceased, and two animal figures, thought to be from a temple or mausoleum (Iles and Shotter 2010, 103-4; Shotter and White 1990, 8-9), as well as two milestones (Shotter and White 1990, 62-3). Undated enclosures, identified during the geophysical survey (Stratascan 2010) at the southern end of the development area, are likely to represent agricultural features, but given the proximity of the Barker House Farm farmstead, may be of some considerable antiquity (OA North 2010).
- 1.3.8 To the south, two Roman roads, one running north from the industrial site at Walton-le-Dale, the other leading north-west from the fort at Ribchester, are believed to have converged near Galgate (Margary 1973), from where a single

road continued north to Lancaster. In the vicinity of the university, this road is thought to lie to the west of the modern A6, perhaps c 200m west of the area excavated in 2003 for the south-west campus (OA North 2004), but little fieldwork has been carried out to verify its precise route. It has been recorded, in the form of an earthwork, at the former Royal Albert Hospital (LUAU 2000; 2001), c 3km north-west of the excavation site, and at Highland Brow, c 400m south-west of the site, where it is visible as a linear cropmark on aerial photographs (Neil 1995, 16).

1.3.9 **Early Medieval Activity (c AD 410 - c 1066):** archaeological evidence for early medieval activity in Lancaster and the surrounding area is extremely slight, being based largely upon isolated chance finds. At Lancaster, it is conceivable that settlement persisted during the fifth to seventh centuries AD. Certainly, elements of the late Roman stone-built fort, including the Wery Wall, which survives to this day, must have remained upstanding throughout this period. Several fragments of early medieval stone crosses, found when the north wall of the priory church was demolished in 1903 (White 2001, 34), including pieces in Anglian and Scandinavian styles and a number with inscriptions, suggest the existence of a monastic establishment on Castle Hill from at least the eighth century (Newman 1996, 98). The discovery of a hoard of mid-ninth-century Northumbrian *stycas* in the same area in 1914 (Edwards 1988, 223) also points to broadly contemporary activity. More widely, place-name evidence suggests that the area may have been home to an ethnically mixed population during this period, including people of Norse descent (Penney 1981, 13; Newman 1996, 95). By the Norman Conquest, the English kingdom seems only to have extended as far as the River Lune, the remaining elements of Westmorland, and Cumberland, being annexed when William Rufus marched north to Carlisle in AD 1092 (Newman 2006, 114).

1.3.10 **Medieval Activity (c AD 1066 - c 1540):** the majority of the study area lies within Scotforth township, with a small portion in Ellel township to the south. These areas are mentioned in the Domesday Survey of 1086 as the manors of *Scozforde* and *Ellhale* and were adjacent to the manor of *Estun* (Ashton) (Faull and Stinson 1986). After the Norman Conquest, much of the land in Lancashire, including *Scozforde* and *Ellhale*, was given to Roger de Poitou by William the Conqueror, the lands passing to the Lancaster family some time later (Baines 1891; Farrer and Brownbill 1914, 56-8). Two plough-lands in the manor of Scotforth were subsequently granted by William de Lancaster I (died c 1170) to Hugh le Norreys, to be held by knight's service. Hugh's daughter, Alice, had a son, Roger, who was a benefactor of Lancaster Priory and Cockersand Abbey. Hugh or Alice also seems to have granted part of the manor to Hugh de Letwell, William de Meluer and Anabil his wife, and others. Parts of these lands were repurchased by Gilbert Fitz Reinfrid, the lord of the manor in 1204, but, following this, the manor appears to have become increasingly divided (*ibid*).

1.3.11 Documentary sources indicate that 'Long Lands', the name given to a number of the fields in and around the proposed development area on the Tithe Map of 1841 (LRO DRB 1/173), may have been derived from *Laundlands*, mentioned

in the Cockersand Chartulary. Therefore, direct abbey ownership can be traced in the study area (OA North 2004; Farrer and Brownbill 1914, 99).

- 1.3.12 Bailrigg, a hamlet within Scotforth, also belonged, at least in part, to Cockersand Abbey. Burrow, Hazelrigg and Hallatrice are mentioned in the abbey records and charters, with Hazelrigg mentioned in 1450, when a William Cave gave four acres of land to a Lambert Stodagh (Farrer and Brownbill 1914, 56-8).
- 1.3.13 The place-names in the study area provide a topographical rather than historical insight into the area, with Hazelrigg being derived from the Old Norse *hesli*, meaning hazel, and *hryggr*, meaning ridge (Ekwall 1922, 173-4). Bailrigg also has the ridge element, with 'Bail-' being derived from the Old Norse *bali*, meaning a gentle slope. Ekwall (*ibid*) states that the name 'Big Forth', given to a farm to the west of the development area, probably evolved from 'Bighthwaite', which was derived from the Old Norse *bygg*, meaning barley, and *thwaite* meaning clearing. The evidence on the ground indicates that much of the development area, other than the field containing the proposed turbine position, was in agricultural use in the medieval period, with ridge and furrow being seen all the way along Hazelrigg Lane (OA North 2010).
- 1.3.14 **Post-medieval and Industrial Activity (c 1540 - 1901):** an Enclosure Act for Scotforth Moor and Bailrigg Moor was passed in 1806 ((LRO) AE/5/11). This was part of the large-scale Parliamentary Enclosure Acts, which took place across Britain in the eighteenth and nineteenth centuries, involving the intake of all available lands around the peripheries of the medieval enclosures (Whyte 2003). The resultant enclosure map of 1809 (LRO AE/5/11) shows the study area, depicted partly as an area of open moor and partly within a large enclosure on Yates' map of 1786, as partially divided into fields, with new straight roads crossing it.
- 1.3.15 The development site appears to have been excluded from the 1806 enclosure, however, as this area is labelled 'The Duke of Hamilton and Brandon' on the map (*ibid*). The Duke of Hamilton and Brandon held the Ashton Estate at this time, until it was sold to Le Gendre Nicholas Starkie in 1853 (<http://www.nationalarchives.gov.uk/a2a/advanced-search.aspx?tab=1>). The development area appears to have been sold off before this, however, as, on the Tithe Map of 1841, the owner of the now-enclosed land is named as 'TA and W Dewhurst' (LRO DRB 1/173).
- 1.3.16 From the nineteenth century onwards, the principal communication route through the area has been the A6 road, which was part of the Garstang and Heron Syke Trust and was operated as a turnpike. The road dates from after 1786 (Yates 1786), but was shown on a plan of 1815 (Lancaster Library PL 13/42). The turnpike superseded a medieval road slightly to the east, the 'road to Scotland', shown on Yates' map. This road gave Galgate its name, with 'Gal' deriving from 'Galloway' and 'Gate' from 'gata', meaning 'road', hence 'the road to Scotland' (OA North 2004).

- 1.3.17 Several sites of probable post-medieval date were identified within the study area during the desk-based assessment (OA North 2010). These predominantly comprise agricultural features, such as relict boundaries and tracks, former pits and ponds, a ditch and bank, a cropmark, and a former woodland enclosure bank.

2. ORIGINAL AIMS AND OBJECTIVES FOR EXCAVATION

2.1 INTRODUCTION

- 2.1.1 The main research aim of the investigation, given the nature of the development, was to establish the presence or absence of buried archaeological remains on the site in the areas to be affected by groundworks and, if present, to compile a detailed record to mitigate their destruction during the course of the development.

2.2 OBJECTIVES

- 2.2.1 The objectives of the project may be summarised as follows:
- the main objective of the archaeological investigation was to determine the presence or absence of any buried remains of archaeological significance within the development area;
 - to investigate the nature, extent and significance of the anomalies identified in the geophysical survey towards the southern end of the site, in the area of the proposed soil storage, compound areas and access track;
 - to determine the presence or absence of any prehistoric or Romano-British remains;
 - to compile an archival record of any archaeological remains within the proposed development area.
- 2.2.2 To these ends, the programme of archaeological work was designed, in accordance with English Heritage (1991; 2006) and the Institute for Archaeologists (IfA) (2008a; 2008b; and 2012) standards and guidelines.

3. METHODOLOGY

3.1 PROJECT DESIGN

- 3.1.1 The LCAS-approved project designs for the programme of evaluation trenching and strip and record (*Appendices 1 and 2*) were adhered to in full throughout the fieldwork. All works were consistent with the relevant standards and procedures of the IfA (IfA 2008a; 2008b; 2012), and generally accepted best practice, and in line with the National Planning Policy Framework produced by the Department for Communities and Local Government (DCLG 2012).

3.2 FIELDWORK METHODOLOGY

- 3.2.1 The programme of evaluation trenching was undertaken on the course of the access road and the footprint of the crane-pad and turbine, which comprised some 28 trenches in total. Following excavation of the evaluation trenches, three areas were targeted for a programme of strip and record, Areas 11 and 20 being on the access road (Fig 2). The strip and record was undertaken around the sites of Trenches 11 and 20 (Areas 11 and 20, respectively), and Area 29, which incorporated Trenches 24-28 (Fig 2). The combined area of Areas 11 and 20 measured approximately 134m², whilst Area 29 was approximately 4300m². This involved the stripping of an area to the full width of the access road, around the features identified in the evaluation. The position of the crane pad and turbine footprint was excavated by strip and record (Area 29). Following on from the completion of the excavation of strip and record area, consultation with Peter Iles (LCAS) concerning the archaeological sensitivity of the proposed access track, immediately adjacent to strip and record area, led to Area 29 being extended. The area of the access track, and a buffer on either side, was excavated in April 2012, with a further area being stripped on the northern edge in June 2012.
- 3.2.2 The topsoil overburden was by removed by a 13-ton tracked 360° excavator (fitted with a toothless ditching bucket) under archaeological supervision. The exposed deposits were then cleaned by hand, using hoes, shovel scraping, and/or trowels depending on the subsoil conditions, and inspected for archaeological features. Excavation was in a stratigraphical manner, whether by machine or by hand, and was located by the use of GPS equipment, which is accurate to $\pm 0.25\text{m}$. Altitude information was established with respect to Ordnance Survey Datum.
- 3.2.3 All information identified during the course of the site works was recorded stratigraphically, using a system, adapted from that used by Centre for Archaeology Service of English Heritage, with sufficient pictorial record (plans, sections, and digital images) to identify and illustrate individual features. Primary records were available for inspection at all times.

- 3.2.4 Results of all field investigations were recorded on *pro forma* context sheets. The site archive comprised photographic records and accurate large-scale plans and sections at an appropriate scale (1:50, 1:20 and 1:10). All artefacts and ecofacts were recorded using the same system, and handled and stored according to standard practice (following current IfA guidelines; 2008c) in order to minimise deterioration.

3.3 REPORT

- 3.3.1 On completion of the initial post-excavation assessment of the site, it was felt that the results did not warrant a separate full programme of post-excavation analysis. Following discussion with both LCAS and the client, it was agreed that a report detailing the results of the excavations, environmental assessment, radiocarbon assay and artefactual findings, combined with an analytical section would suffice, with publication, as appropriate.
- 3.3.2 This report is to be submitted to the client and LCAS. The archives of original records and finds have been prepared for deposition, respectively, with the Lancashire Record Office and, where appropriate, the Lancaster City Museum, Lancaster.

4. SUMMARY OF EXCAVATION RESULTS

4.1 INTRODUCTION

- 4.1.1 Some 28 evaluation trenches were excavated on the course of the access road (Figs 1 and 2). Following excavation of the evaluation trenches, three areas were targeted for a programme of strip and record, Areas 11 and 20 being on the access road (Fig 2). The position of the crane pad and turbine footprint was excavated by strip and record (Area 29), and was extended subsequently to form an irregular trench orientated east/west (Fig 3).
- 4.1.2 Generally, the deposits encountered during the investigation were quite similar, being light-brownish grey sandy-silts, with occasional clay components. Charred plant remains recorded in the environmental bulk samples were restricted to the tree throws, which contained quantities of charcoal fragments dominated by oak (**2004**, **2011** and **2904**; see *Section 5.8*) or alder/hazel (**2949**; see *Section 5.8*). Charcoal from three of the tree throws was submitted for radiocarbon dating (see *Section 5.9*), the results indicating several phases of clearance/burning activity. Many of the samples contained abundant modern roots and uncharred, probably modern, seeds, which might be expected, given the shallowness of most of the features.

4.2 EVALUATION TRENCHES

- 4.2.1 Since very few archaeological features were revealed within the course of the excavations of the access road, other than stone-lined land drains (Plate 2) and a small assemblage of medieval and post-medieval pottery, the results of the trial trenching have been tabulated (Table 1). Trenches 4, 6, 11 and 20 (Fig 2), however, contained more significant archaeological features, which comprised a shallow pit (**403**) in Trench 4, that contained a single sherd of medieval pottery, and a relict field-boundary ditch (**606**) in Trench 6. Those features within Trenches 11 and 20, a stone boundary (**1106**), and a pit containing charcoal (**2005**; Plate 3), were subject to further archaeological work (see *Section 3.2.1*).



Plate 2: Typical stone-lined field drain, Trench 1 (1m scale)

Trench	Results
1	The trench did not contain any archaeological features other than stone-lined land drains.
2	The trench did not contain any archaeological features other than stone-lined land drains.
3	The trench did not contain any archaeological features other than stone-lined land drains.
4	The trench contained a shallow pit (403), which contained a single sherd of medieval pottery, and a stone-lined land drain.
5	The trench did not contain any archaeological features other than stone-lined land drains.
6	The trench contained a single north-east/south-west-aligned (606) ditch and two land drains.
7	The trench did not contain any archaeological features other than stone-lined land drains.
8	The trench did not contain any archaeological features.
9	The trench did not contain any archaeological features other than a single stone-lined land drain.
10	The trench did not contain any archaeological features other than stone-lined land drains.
11	The trench contained a possible stone boundary (1106), and a number of stone-lined land drains.
12	The trench did not contain any archaeological features other than stone-lined land drains.

13	The trench did not contain any archaeological features other than a single stone-lined land drain.
14	The trench did not contain any archaeological features other than a single stone-lined land drain.
15	The trench did not contain any archaeological features.
16	The trench did not contain any archaeological features other than stone-lined land drains.
17	The trench did not contain any archaeological features other than the possible terminus of a stone-lined land drain.
18	The trench did not contain any archaeological features.
19	The trench did not contain any archaeological features other than stone-lined land drains.
20	The trench contained a charcoal-filled hearth or tree-throw hole (2005), and a water-pipe trench.
21	The trench did not contain any archaeological features.
22	The trench did not contain any archaeological features.
23	The trench did not contain any archaeological features other than stone-lined land drains.
24	The trench contained an east/west-aligned ditch (2405) and a posthole (2408).
25	The trench contained two parallel east/west-aligned ditches (2507 and 2513), with a third narrow east/west-aligned ditch located between them (2417).
26	The trench did not contain any archaeological features other than stone-lined land drains.
27	The trench contained a north/south-aligned ditch (2712), which contained a ceramic land drain.
28	The trench contained a north-west/south-east-aligned ditch (2804), which contained a ceramic land drain.

Table 1: Evaluation trench results



Plate 3: Charcoal-filled tree-throw hole (2005), Trench 20/Area 20, 1m scale

4.2.2 The five trenches excavated within the area of the crane pad and turbine footprint, Trenches 24-8, were more productive in terms of archaeological features (Table 1; Fig 3). Trench 24 contained a single ditch (2405) 1.5m across, whilst Trench 25 contained two parallel ditches (2507 and 2901 (2513)), both over 3m wide, and a further narrow ditch (2900 (2417)) between them. Trenches 27 and 28 contained two ditches (2712 and 2804), which, upon further investigation, proved to be post-medieval in date. The ditches within Trenches 24 and 25 contained no material dating evidence, which suggested that they might be of considerable antiquity, and, following consultation with Peter Iles of LCAS, they were subject to a programme of archaeological strip and record.

4.3 STRIP AND RECORD

4.3.1 Analysis of the archaeological remains revealed through both the strip and record of Areas 11, 20 and 29, and those features seen during the evaluation trenching have suggested three main periods of activity (Fig 3). These encompassed prehistoric woodland clearance of the surrounding landscape, medieval settlement activity and an associated field system, followed by later post-medieval exploitation of the landscape. The features within this area were typically very shallow, or, in the case of some features, appearing only as fragmentary segments, having been heavily truncated by later ploughing.

4.3.2 **Phase 1 (Prehistoric Period) Woodland Clearance:** several tree-throw holes, which contained varying quantities of charcoal, were noted during the evaluation and strip and record, the majority of which were found within Area

29 (Fig 3), with a single example from Trench 20/Area 20 (Fig 4). Three of these tree throws were selected for radiocarbon assay (*Section 4.8*).

- 4.3.3 The tree-throws in Area 29 were generally sparse, with a concentration in the southern part of area. Tree-throw hole **2905** (Fig 3), which contained oak charcoal, was situated at the eastern end of the trench, and was dated by radiocarbon assay to the late Mesolithic period (5926-5752 cal BC (6980±40 BP; SUERC 40178) and 5883-5736 cal BC (6930±30 BP; SUERC 40179)). The southern grouping comprised **3031**, **3033**, **3040**, with an outlier (**2948**) to the east. This latter feature contained alder charcoal, which was dated by radiocarbon assay to the late Bronze Age (1056-906 cal BC (2830±30 BP; SUERC 40171); 1001-841 cal BC (2775±30 BP; SUERC 40172)). A further tree throw (**3043**) was identified in the northern part of the site.
- 4.3.4 Tree throw/pit **2015** was located in Trench 20/Area 20 (Fig 4; Plate 4). This was an irregular-shaped feature, measuring over 6m long by 2.1m wide, which contained a smaller oval pit (**2005**) filled with charcoal fragments (**2004**). This tree throw, which contained oak charcoal, produced an early Bronze Age radiocarbon date (2489–2299 cal BC (3925±30 BP; SUERC 40173); 2347-2189 cal BC (3810±30 BP; SUERC 40174)).



Plate 4: Area 20, looking towards the south, with tree-throw/pit **2015** beyond the (2m) ranging rod

- 4.3.5 Two refitting fragments of chert, with evidence of retouching/preparation, were recovered from tree throw **2905** (Fig 3), which was perhaps the only overt indication of human activity connected with the features. Three fire-affected rocks from drain **2947**, although residual in this feature, perhaps hint at further prehistoric activity. A stone artefact, which had been used as a

mortar/door pivot, was unstratified. The latter artefact could date to any of the three phases of activity on the site.

- 4.3.6 **Phase 2 (Medieval Period) Settlement and Field System:** medieval activity was found throughout the site (Figs 2 and 3). Within Area 29, all the medieval activity was bounded to the east by a wide (up to 2.9m) ditch **3072**. The ditch, which was aligned north/south before turning to the north-west, was a long-lived feature, surviving until the twentieth century (Section 7.3). The features found to the west of ditch **3072** increased in density as the site descended from the east and levelled-out toward the west, suggesting an evolving landscape, with its genesis in the late twelfth or thirteenth century, on the basis of the medieval pottery.
- 4.3.7 A few fragmentary features lay immediately to west of ditch **3072** (Fig 3). These comprised heavily truncated ditches **2924** and **2928**, which were aligned north-west/south-east, as was ditch segment **2942**, which lay further to the west. The origin of these features was not clear: they were, perhaps, related to a more defined suite of features further to the west that were stratigraphically early. For instance, ditches **2990** and **2965** formed a north-west/south-east-aligned trackway, some 2m wide, that was less well-preserved on the east side (**2990**). At the northern end of **2965**, a narrow ditch branched off to the west (**2989**) and then turned to the north, forming what may have been a small paddock. The continuation of **2965** may have formed the east side of the paddock (**3002**). At the southern end of **2965**, a further ditch (**3001**) branched off to the west, forming either another fragmentary paddock or a field boundary.
- 4.3.8 Overlying the trackway were two ditches (**2987** and **2986**), which created a funnel, open to the east, but seemingly closed at its south-western end. Ditch **2987** was 1.3m wide, and was traced for over 30m (Fig 5). Ditch **2986** had either been recut several times or had originally had a W-shaped profile. Radiocarbon assay of two samples of alder and hazel charcoal from within ditch segment **2405** (of **2987**, produced dates of cal AD 1153-1270 (836±35 BP; SUERC 44793) and cal AD 1209-1287 (770±35 BP; SUERC 44794). These features may have formed a stock funnel to bring sheep or cattle down from the common land situated beyond boundary ditch **3072**.
- 4.3.9 A long (over 45m) east/west-aligned ditch, **3076**, was excavated towards the north of Area 29 (Fig 3), and probably represents a field boundary. The western end of this curved toward the north before being truncated by a later feature (**2507**; Section 4.3.13). It was seen to cut ditch **2987**. If it is contemporaneous with north/south-aligned boundary ditch **3072**, the resulting field would have been large.
- 4.3.10 A further stock funnel was formed by wide and shallow ditches **4000** and **4001** to the west (Fig 5; Plate 5). Ditch **4000**, which was 4m wide, clearly terminated to the east. Despite ditch **4000** being stratigraphically later than ditch **4001**, they were, in all likelihood, contemporary with each other, since they formed part of the same funnel, a much more substantial feature than the funnel to the east. That both features contained thirteenth-century pottery further augments this idea of contemporaneity.

- 4.3.11 Charcoal from ditch fill **4022** (from **4000**), which was submitted for radiocarbon assay, produced a date of cal AD 1186-1284 (780± 35BP; SUERC 44795). Given the dates obtained from ditch **2987** to the east (Section 4.3.8), this would suggest activity on the site from the twelfth to the end of the thirteenth century at least, which is in accordance with the pottery from these features.
- 4.3.12 Pollen from ditch **4000** (see Section 5.8) perhaps suggests that this stood in a relatively open environment, with scattered trees, and shrubs along the field boundaries. The presence of alder suggests rather wetter conditions along the nearby stream, within the shallow valley bottom. The pollen suggests a period of pastoral land-use, linked to a shift away from crop production, indicated by other herbaceous rural types, such as ribwort plantain, and buttercups and dandelions. A slightly curving feature (**4006/4008**), of unknown function, was found within the mouth of the funnel.



Plate 5: Section through ditch 4000, looking east (2m scale)

- 4.3.13 The northern extension to Area 29 was occupied by a series of wide ditches aligned east/west, with ditch **2507** being the latest stratigraphically, cutting ditch **3076** (Fig 6). Pre-dating these were two intercutting gullies (**3028** and **3045**), which were difficult to interpret.
- 4.3.14 Ditch **2507** was a wide (3.7m) feature, flaring on its northern side toward the north-west (Fig 6). The W-shaped profile (Fig 7) was typical of the ditches from elsewhere on the site. Like ditch **4001**, ditch **2507** terminated toward the east, although the reason for this was unclear.
- 4.3.15 Some 5.5m to the north of ditch **2507** was a similarly aligned ditch, **2900** (Fig 6), formed from a complex series of converging ditches. At the western end, it

could be seen to be formed of three distinct gullies, with gully **3010** curving toward the north-west and **3012** toward the north-east. The southern element of ditch **2900** was formed from a single gully (**2952/3008**). To the north of this was a single posthole (**2971**).

- 4.3.16 Ditch **2901** was excavated to the north of both **2900** and **2507** (Fig 6; Plate 6). This was also aligned east/west and, like its neighbour, **2900**, curved distinctly to the north-west. This ditch was 2.25m wide and exhibited a W-shaped profile (Fig 7). Ditches **2901** and **2507** were positioned approximately 11m apart, and may have formed part of a trackway or, given the similarity between **2507** and ditch **4001**, to the south, they could have been part of another stock funnel.



Plate 6: East-facing section through ditch **2901** (1m scale), comprising cuts **3047** (left) and **3049** (right)

- 4.3.17 Much of the remaining medieval activity within the development area was visible as fossilised ridge and furrow along the course of the access road (Fig 2); none was visible within the field that contained Area 29. At the southern end of the development site, the ridge and furrow was shallow and aligned approximately north/south, whilst, to the north of Trench 11, it was aligned approximately east/west. Significantly, where the ridge and furrow changed direction, investigated by Trench 11/Area 11 (Fig 8: Plate 7), an east/west-aligned stone feature (**1106**), which may have been the remains of a boundary, was found to contain medieval pottery. This feature could be traced some distance eastwards on the geophysical survey (Stratascan 2010). To the south of this feature was a stone-filled pit (**1109**), containing no dating evidence. Trenches 3, 4, 6, 7, 11, 23, and Area 29, all produced medieval pottery, probably deposited originally as the result of medieval manuring practices (Jones 2005).



Plate 7: East/west-aligned stone feature **1106**, marked by the (2m) ranging rod, with stone-filled pit (**1109**) in the foreground, in Area 11

- 4.3.18 **Phase 3 (Post-medieval Period) Agriculture:** little archaeological evidence for post-medieval activity was recovered from the site, other than the plethora of north/south-aligned stone field drains in Area 29, as well as in Trenches 1-7, 9-14, 16, 17, 19 and 23. Despite the evidence for later ceramic drains having been placed within boundary ditch **3072**, this continued to form a distinctive landscape feature. The site also produced a small quantity of post-medieval pottery, generally dating from the later eighteenth century onwards. The upper fills of ditch **2507** (Section 5.2.13) contained a number of tobacco pipe fragments, which can be dated to the eighteenth century. The presence of the tobacco pipe fragments within the upper fill of the ditch indicates that these features were still partially open at that time. However, by the time that the Scotforth Moor and Bailrigg Moor Enclosure Map was surveyed in 1809 (LRO AE/5/11), all trace of these ditches had disappeared.

5. ARTEFACTUAL AND PALAEOENVIRONMENTAL RESULTS

5.1 INTRODUCTION TO THE FINDS

- 5.1.1 Some 223 artefacts were recovered during the excavations, and these have been quantified by material class (Table 2). The majority of the assemblage was made up of medieval and post-medieval pottery, dating from the thirteenth to perhaps the early fourteenth century, and the late seventeenth century to the early nineteenth century. The only closely datable artefacts were eight tobacco pipe stems and bowls, dating to the first half of the eighteenth century. The rest of the artefactual assemblage comprised small amounts of lithics, ceramic building material (CBM), industrial residue and a single copper-alloy button.

Category	Quantity
CBM	4
Clothing accessory (button)	1
Fire-affected stones	3
Flint	2
Door pivot/grinding stone	1
Tobacco pipe fragments	10
Pottery	200
Total	223

Table 2: Quantitative record of the artefactual remains

5.2 THE MEDIEVAL AND LATER POTTERY

- 5.2.1 **Quantification:** the excavation produced a modestly-sized assemblage of medieval and post-medieval pottery, the majority of which dates from the thirteenth to, perhaps, the early fourteenth century. In all, some 200 fragments were recovered, weighing 2237g, with an average sherd weight of 10.9g. Some 153 sherds (c 76%) were medieval in date (Table 3), with most of the medieval pottery recovered from just two ditches (**4000** and **4001**). The remaining group can be dated to the late seventeenth and eighteenth centuries, with some examples of fabrics that continued in production into the twentieth century. In broad terms, the pottery was in good condition, although there was some abrasion, and the sherds were generally less than 50mm in size. This high degree of fragmentation seems typical for Lancashire and the North West (see, for instance, OA North 2006; Bradley forthcoming a; forthcoming b), but there were some chronologically and/or functionally diagnostic sherds surviving, for the most part, rims.

Fabric	Quantity
<i>Medieval</i>	
Fabric 1	141
Fabric 2	9
Fabric 3	2
Fabric 4	1
<i>Total weight</i>	<i>1668g</i>
<i>Early post-medieval</i>	
Mottled ware	2
Slip-coated ware	1
<i>Total weight</i>	<i>19g</i>
<i>Post-medieval</i>	
Brown-glazed redware	1
Black-glazed redware	9
Brown stoneware	1
Creamware	1
Industrial slipware	1
Late green stoneware	1
Unknown fabric	1
Pearlware	15
Purple-glazed reduced ware	1
Glazed redware	6
Refined white earthenware	6
Yellow ware	1
<i>Total weight</i>	<i>550g</i>
<i>Total weight of assemblage</i>	<i>2237g</i>
<i>Sherd Totals</i>	<i>2831</i>

Table 3: Quantification of medieval and post-medieval pottery by fabric and weight

5.2.2 **Medieval Fabrics:** the medieval pottery has been divided by fabric, but was dominated by a single type (Fabric 1), which can probably be attributed to the nearby production site at Ellel (White 1993). It is thus likely to be of thirteenth- to early fourteenth-century date. A visually similar fabric (Fabric 2) seems, simply, to be a finer version of Fabric 1. The remainder, only three sherds, are likely to be regional imports (Fabrics 3 and 4).

5.2.3 **Fabric 1:** this fabric is very pale brown (10YR 8/3; Munsell Color 1990), sometimes reduced to light grey. The fabric contains 7-10% poorly-sorted quartz, grains up to 1.5mm and, occasionally, up to 2mm. Mica and varying quantities of red iron ore are also present. The surface colour ranges from very pale brown to reddish-yellow (7.5YR 7/8-6/6; *ibid*). Generally, glaze is absent,

although specks were noted on a sherd from subsoil **1102**. All of the recognisable vessels are jars, with sherds from 14 of the 27 contexts producing medieval pottery showing sooting on their external surfaces, implying that they had been used in or over a fire, presumably for cooking.

- 5.2.4 *Fabric 2*: similar to, but finer than, Fabric 1, this fabric contained similar quantities of smaller, well-sorted quartz grains. Specks of green glaze were present on a handle from ditch **4000** (see *Sections 4.3.10-11*). The few sherds in this fabric were from jug forms, represented by two rod handles and an unglazed upright collared rim, reminiscent of an example from the Ellel kiln site (White 1993, 18, no 70). A single sooted fragment, representing a cooking pot, was also identified.
- 5.2.5 *Fabric 3*: a fine, reduced sandy fabric, partially green-glazed, had a distinctive white margin below the glaze. This pottery most resembles the partially-reduced tradition seen at Carlisle and Penrith, which has a date-range from the twelfth to the fourteenth century, but was dominant in the thirteenth and fourteenth centuries (McCarthy and Brooks 1992, 29).
- 5.2.6 *Fabric 4*: reddish-yellow in colour (7.5 YR 6/6), the fabric contained poorly-sorted quartz sand (less than 3%). The pottery was distinguishable from Fabric 3 by its colour and the pronounced rilling visible on the interior wall.
- 5.2.7 ***Form and Decoration of the Medieval Pottery***: the pottery belongs to the widespread Northern gritty ware tradition, which is known from the twelfth century onwards. In the North West, this is characterised by the distinctive red gritty wares found in Carlisle and Cumbria, whilst, further south, similar pottery has been recovered from production centres at Docker Moor (Edwards 1967), Ellel (White 1993), and the kilns at Samlesbury, near Preston, which were also producing their own distinctive style of gritty ware alongside finer products (Wood *et al* 2009). There may well have been other producers in Preston, as seen from the distinctive well-gritted orange pottery recovered during the excavations at Preston East (OA North forthcoming a). Further south still, Wigan was also producing yet another variation of gritty ware (OA North 2008; 2011).
- 5.2.8 Discussion of vessel form and decoration is essentially confined to those made of Fabric 1, with many of the diagnostic sherds reflecting rim types seen amongst the kiln assemblage from Ellel (White 1993). The rims from Ellel jars are everted, collared, and generally flanged or lid-seated. In section, they are almost triangular in profile, and, in the case of globular jars, the rim can touch the walls. Discontinuous thumbing around the top of the rims is a particular feature of Ellel cooking jars, and is seen amongst the material from the Wind Turbine site.
- 5.2.9 Pottery from the Ellel kilns can be distinguished from the products of its neighbour at Docker, by colour, where they are buff to orange (Edwards 1967, 48), but also by rim form. Although the same types of vessel are represented by these gritty wares from the North West, rims associated with Carlisle's red gritty wares tend to be plainer, being squared or clubbed (Miller 2011, 30, fig 17), whilst those from a site at Preston East are finely everted, straight-edged,

and often hooked, occasionally exhibiting the thumbing present on the Elled vessels (OA North forthcoming a). Examples can also be everted and ‘chunky’, and often flanged, or lid-seated (OA North 2008; 2011). The Docker rims are much squarer than those from Elled (Edwards 1967, 48; White 1993), and they also lack the thumbing seen on Elled products.

5.2.10 The Elled kilns, like their relatively near neighbours and contemporaries at Docker Moor, appear to have been producing for the Lancaster market and those in the Lune Valley, but how far these products travelled up the valley is unclear. They were present, not unexpectedly, in an investigation in Galgate, within the parish of Elled (Howard-Davis 1996), and have been identified at several sites in Lancaster, including Mitchell’s Brewery (Howard-Davis *et al* forthcoming), and Dalton Square (Bates *et al* 2012). The pottery production site at Samlesbury, near Preston, was also producing gritty wares, but little of this material has been identified from excavated settlement sites in the region (Wood *et al* 2009).

5.2.11 It seems most likely that the forms of the vessels from the present site reflect generalised domestic activity, rather than anything more specialised, for instance dairying, and the range of vessels is restricted, almost entirely to jars, with frequent evidence of sooting suggesting their use for cooking. Jugs formed only a small component of the assemblage. The utilitarian nature of the vessels suggests a very plain and functional domesticity, with decoration of any type completely absent. To an extent, this lack of decoration is typical of the North West, with, outside Chester, only small numbers of highly decorated pots from the region. In Lancaster, sites such as Mitchell’s Brewery (Howard-Davis *et al* forthcoming) and Dalton Square (OA North 2006, 10) produced occasional decorated vessels, but these were the exception. In other parts of the North West, decorated pots were also either absent or rare, for instance, from Rickergate (Miller 2011), Penrith (Bradley forthcoming a), Cumwhinton (Bradley forthcoming b) and further south, in Wigan (OA North 2008). There was also a marked lack of some forms, such as pipkins, from the Wind Turbine site. It would be unwise to try to infer status from such a small assemblage, especially as it comprised kitchen, rather than table, wares, which are *per se* more utilitarian in form, and might suggest that the site was not of high status.

5.2.12 **Dating and Distribution of the Medieval Pottery:** the precise date-range of the pottery is difficult to determine, as well-dated, stratified pottery sequences are rare within the region (Mellor 1994). It is clear, however, that Fabric 1 can be attributed, with relative confidence, to the nearby production site at Elled, which has been dated, from documentary sources, to the late twelfth and thirteenth centuries (White 1977, 121). More generally, the pottery could be placed within the mid-twelfth to mid-fourteenth centuries (McCarthy and Brooks 1992), although there is a marked lack of exclusively fourteenth-century or later fabrics in the assemblage, apart from the two partially-reduced sherds from ditch **4021** (fill **4023**), which resemble material in the partially-reduced tradition from Carlisle and Penrith (*op cit*, 29, 35, fig 10). It is perhaps of interest that no later medieval material was found in the ploughsoils,

suggesting that all domestic activity, perhaps including arable agriculture, had ceased by the early fourteenth century.

- 5.2.13 **Post-medieval Pottery:** in all, 47 sherds of post-medieval pottery were recovered, the majority dating from the late eighteenth century onwards. The pottery was fairly typical for the region, comprising refined white earthenwares, for instance pearlware, the ubiquitous black-glazed redwares, self-glazed redwares, and single sherds of slip-coated and mottled wares, both of which could date to the late seventeenth or earlier eighteenth century. Apart for these two sherds, later medieval and early post-medieval pottery was completely absent. This is not unusual in the North West, and there seems to be a genuine slackening in the use of ceramic vessels during the sixteenth and seventeenth centuries (McNeil and Newman 2006, 157).
- 5.2.14 **Potential:** this small rural site is unusual in the North West in that it has produced a closely dated, albeit small, medieval pottery assemblage. Furthermore, it is almost entirely derived from a single kiln source, probably that at nearby Ellel (White 1993). The rarity value of such sites and their material culture has been highlighted in the North West Regional Research Agenda, where it is noted that the material culture of such sites remains largely unknown (Newman and Newman 2007, 98).
- 5.2.15 It is of note that most of the medieval pottery assemblage (143 sherds) was recovered from only two features, ditches **4000** and **4001**, which formed the western of the presumed stock funnels (*Sections 4.3.10-12*), none of the other ditches producing either artefactual or environmental evidence. There are, however, only a small number of vessels represented within the assemblage, and their disposal might well reflect a single disposal event. A small amount of medieval pottery was also recovered from the evaluation trenches, deriving from the ploughsoils forming the medieval ridge and furrow and a possible boundary feature (**1106**). Like the material from ditches **4000** and **4001**, this, too, can be ascribed with some certainty to the Ellel kiln site. The absence of earlier post-medieval artefacts suggests that there was little in the way of manuring for arable agriculture in the area before the eighteenth century.

5.3 CLAY TOBACCO PIPES

- 5.3.1 Ten fragments of ceramic tobacco pipe were recovered from the site, with five being derived from the upper fill of ditch fill **3058**, whilst the remaining were derived from Trenches 6, 9, 20 and 21. The fragments from ditch **3058** included the only bowls from the site, one of which exhibits a stamp on the bowl (possibly an 'M' within a circular border), and are both eighteenth-century in date. Much like the post-medieval pottery, the tobacco pipe evidence suggests little or no activity prior to c 1700.

5.4 CERAMIC BUILDING MATERIAL

- 5.4.1 Four ceramic building material fragments were recovered from ditch **606** and topsoil deposit **2401**. All four fragments were undiagnostic. This, coupled with

the small size of the assemblage, and the lack of complete examples, suggests that little information could be gained from further study of the material.

5.5 VESSEL AND WINDOW GLASS

- 5.5.1 Three fragments of glass were recovered from topsoil contexts, or was unstratified. A small fragment of bluish glass from topsoil deposit **2401** may be of some antiquity, but cannot be closely dated. The remaining vessel fragments are derived from a half-pint milk bottle, which exhibits the name 'Preston Dairies', and a possible faceted beer glass, both of which are likely to be of twentieth-century date. The glass has no analytical value.

5.6 DRESS FITTING

- 5.6.1 A single plain copper-alloy button was recovered from the top of the natural geology (**2912**). The button is circular, and the front is corroded and undecorated. The reverse has been gilded, and the loop is missing. It is likely to be nineteenth-century in date (<http://finds.org.uk>).

5.7 STONE

- 5.7.1 Six stones of potential prehistoric, or later, date were recovered during the investigations. Three fire-affected stones were recovered from post-medieval drain **2947**, whilst two black/grey chert fragments came from tree-throw hole **2905**. The two refitting fragments of chert exhibited evidence of retouching/preparation.
- 5.7.2 Finally, an unstratified large stone object came from Area 29. It is a worn sandy limestone cobble, roughly sub-rectangular in shape, and c 170mm in maximum dimension, and had clearly been modified. At one corner, there was a shallow, round depression, c 50mm in diameter, probably pecked, and one side was dished, as if used for grinding. The presence of both suggests reuse, but the order of that use cannot now be determined. The smaller perforation on the stone object suggests use as a door pivot for a harr-hung door, and a similar object, with a depression of a similar size, was recovered from Roman levels at Ribchester (Howard-Davis 2000, 300, fig 87.21). Such door pivots are relatively common finds, and have probably continued in use over an extended period, almost to the present day. The dished surface suggests that the object had also been used, at some point, as a mortar or saddle quern, although its size suggests the former. Similarly, the relatively soft nature of the stone suggests that it would not have endured prolonged use as a quern. It seems more likely that it was used for grinding relatively soft substances in small amounts, perhaps vegetable matter. Saddle querns and simple mortars are both long-lived types, from the Neolithic period well into the medieval period, and cannot be dated with any precision (Buckley and Major 1990). In addition, the grinding surface and other parts of the object are covered with converging scratches, which appear to be systematic and not simply the result of repeated plough-strike, although nothing more can be made of them.

- 5.7.3 This small assemblage adds a further chronological dimension to the site, with the flint flakes suggesting that this area may have witnessed small-scale activity during the Late Neolithic/Early Bronze Age. The fire-affected rocks cannot be closely dated, but are further indications of prehistoric activity.

5.8 THE POLLEN

- 5.8.1 **Quantification:** following a rapid assessment of the palaeoenvironmental remains, pollen analysis was carried out on samples from monolith <143>, from fill **4022** of ditch **4000**. Although the monolith was not dated, the site is adjacent to a field containing ridge and furrow, and the ditch contained fragments of medieval pottery, thus indicating it was part of a field system dated to the twelfth to fourteenth century. The Archaeological Research Framework for the North West of England highlights the need for environmental analyses for the later prehistoric and historic periods (Chitty and Brennand 2007), with specific attention to be paid to an evaluation of developments in land use and resource exploitation (Newman and Newman 2007). The results of this pollen analysis can contribute to that debate.
- 5.8.2 The interpretation of the pollen data from archaeological features such as ditches, rather than natural deposits, must be treated with caution, given the variety of ways in which pollen may arrive at the site (Moore *et al* 1991). Variations in taphonomic processes can lead to biases in the pollen record. Ideal pollen preservation requires a continuously anaerobic environment with no bioturbation or reworking of sediment, and ditch deposits may be subjected to periodic drying of the surface, which leads to deterioration of the pollen. This deterioration tends to be taxon specific, with the pollen of Pteridophyte (bracken) spores being particularly resistant, and the pollen of some other taxon, such as the Cyperaceae (sedges), being particularly prone to breakdown. In addition, ditch deposits are likely to be subject to periods of inwashing, and especially of linear transport of sediments along the ditch, which may mix pollen from different environments and time periods. These factors need to be considered in the interpretation and use of the pollen data presented below.
- 5.8.3 **Stratigraphic Descriptions:** a single 0.3m-long monolith (<143>) was taken from ditch **4000**, and was cleaned and subsampled in the laboratory. The sediment descriptions and context for each of the sub-samples used for pollen analysis is shown in Table 4.

Depth from ground surface (m)		Soil micromorphology summary	Depth of pollen sub-samples (m)
Top	Base		
0.00	0.07	Grey friable silt	0.02-0.03 0.04-0.05 0.06-0.07
0.07	0.14	Grey mottled, slightly clayey, silt	0.08-0.09 0.10-0.11 0.12-0.13

0.14	0.17	Disturbed grey mottled, slightly clayey, silt, with degraded red 'brick' fragments	0.14-0.15 0.16-0.17
0.17	0.25	Mottled silty-clay	0.18-0.19 0.20-0.21
0.25	0.3	Dark grey silty-clay	

Table 4: Stratigraphic depths and pollen sampling depths from fill 4022 of ditch 4000 (monolith <143>)

- 5.8.4 **Preparation and Analysis of Samples:** ten sub-samples were extracted from monolith <143> at 20mm intervals, from 20-200mm. Volumetric samples were processed for pollen using the standard technique of heating with hydrochloric acid, potassium hydroxide, sieving (170µm), hot hydrofluoric acid, and Erdtman's acetolysis, to remove carbonates, humic acids, large particles, silicates, and cellulose, respectively. The samples were then stained with safranin, dehydrated with tertiary butyl alcohol, and mounted in 2000 centistoke (cs) silicone oil (Method B of Berglund and Ralska-Jasiewiczowa 1986), with the addition of one *Lycopodium* tablet (*cf* Stockmarr 1971: using *Lycopodium* Batch 1031, containing 20,848 spores per tablet) to allow pollen concentration to be calculated. Samples were mounted in silicone oil (1250 Cs) on standard glass slides with cover slips. Pollen slides were examined using a Leica DM2500 microscope using x400 magnification. Higher magnification (x1000 under oil immersion) and phase contrast was used for the determination of difficult grains, where required. Pollen was counted to approximately 500 determinate pollen grains, where possible.
- 5.8.5 Pollen and Pteridophyte (bracken) spore identification was carried out using the standard keys in Moore *et al* (1991), using Faegri and Iversen (1989) and Beug (2004), and a small pollen-type slide collection for supplementary information. Pollen nomenclature is adjusted to follow Bennett (1995-2007); plant nomenclature follows Stace (2010). Particular attention was made to the identification and separation of hazel (*Corylus*) and bog myrtle (*Myrica*) pollen types, using the identification features of the pore area, as outlined in Blackmore *et al* (2003, fig 1, 74). Where separation between these types was impossible, grains have been assigned to an undifferentiated group labelled Coryloid. The majority of grains were assigned to the hazel (*Corylus avellana*) group, and this seems to be likely, given the other environmental indicators and the lack of heath pollen; however, the preservation state of most grains was poor, and this can lead to errors in the determination of these two types. Cereal-type grains were defined using the criteria of Andersen (1979), summarised in Moore *et al* (1991, 100). Microscopic charcoal fragments were counted in three size-classes: 3-25µm; 25-50µm; and greater than 50µm. However, the quantities of charcoal in the smaller size classes was large and, therefore, difficult to count without error in many samples.
- 5.8.6 **Data Analysis:** pollen and spore data are presented as percentages of total land pollen (tlp) for trees and shrubs, Poales (which includes cereal-type, grass and sedge pollen), heaths and herbs, and as a percentage of tlp plus the group for other types. Pollen data for rare types, those with three grains or less in a sample, are assigned a + symbol. Pollen data were transformed using Tilia,

and diagrams constructed using TiliaGraph (Grimm 1991-2012). A stratigraphically constrained cluster analysis was performed in CONISS (Grimm 1987). The analysis was made using tlp-only Pteridophyte (bracken) spores, and other palynomorphs were excluded from the cluster analysis, as their high percentages may skew the cluster analysis as a result of preservational bias.

- 5.8.7 **Chronology:** the stratigraphy remains undated as it is unlikely to be suitable for radiocarbon dating. The recovery of medieval pottery from the fill, from the wider excavation of the ditch, indicates a medieval/post-medieval period of deposition, and this is assumed for comparison with other palaeoecological studies. The discovery of Spheroidal Carbonaceous Particles (SCP; Rose *et al* 1995) in three levels may provide some indication of a more recent origin for the deposit; however, SCPs, which were deposited in quantity as atmospheric pollution particles derived from combustion from the Industrial Revolution through to the 1970s (Swindles 2011), need to be found in large quantities before they can provide any robust conclusions. There are some problems with their movement through peat deposits and identification of single particles on pollen slides is not a robust method (*ibid*).
- 5.8.8 **Results:** a full percentage pollen diagram has been compiled (Fig 9). The pollen is split into three zones, LUW-a, LUW-b and LUW-c. The basal zone, LUW-a, was extremely sparse in pollen, with counts of 74 grains at a depth of 180-190mm, and just 17 grains at a depth of 200-210mm. These data are insufficient to use for any meaningful vegetation reconstruction, and thus an interpretation can only be made for the upper two zones, LUW-b and LUW-c.
- 5.8.9 Pollen preservation was poor, with a proportion of grains that were crumpled and corroded to a state beyond confident identification. Indeterminate grains comprised approximately 30-40% of total grains counted, but this rose steeply in the samples at the base of the stratigraphy. This, together with the high percentage of Pteridophyte (bracken) spores, may indicate preservational bias, especially as the increase in spores mirrors an increase in indeterminate grains across the samples. This preservational bias must, therefore, be considered in the palaeoecological interpretation.
- 5.8.10 Zone LUW-c contained abundant mineral particles, despite HF treatment during pollen extraction. However, the samples in zones LUW-b and LUW-a contained only occasional mineral particles. In LUW-a, the reduction in pollen-grain concentration seems to be linked to an increase in amorphous organic matter, and unidentified non-pollen palynomorphs (NPP), likely to be a mixture of plant fragments, fungal spores and insect remains. This increase in organic matter may indicate a rapid accumulation of sediment, thus diluting the pollen concentration. In contrast, the samples high in mineral grains at the top of the sequence may contain additional pollen from inwashed material.
- 5.8.11 Three pollen grains of cereal type were identified (measurements are presented in Table 5). Two pollen grains, assigned to the broad *Avena/Triticum* (oats/wheat) group, were found in zone LUW-c. The third grain, at a depth of 100-110mm in zone LUW-b, although too large to be assigned to the wild

grasses category, was crumpled and therefore could not be measured accurately.

Slide depth/no/ location	Pore annulus (µm)	Grain width (µm)	Grain length (µm)	Average grain ø (µm)	Exine structure	Pollen taxa
20-30mm slide	12	43	47	45	not clear	<i>Avena-Triticum</i> group
40-50mm slide	12	35	48	41.5	cf verrucate	<i>Avena-Triticum</i> group
100-110mm slide	too crumpled to measure				not clear	Not assigned

Table 5: Cereal pollen grains found in fill **4022** of ditch **4000** (monolith <143>). All measurements taken under x1000 magnification

5.8.12 **Interpretation of the Pollen Evidence:** throughout the monolith, the pollen spectra is dominated by pollen of alder (*Alnus glutinosa*), hazel (*Corylus avellana*), and grasses (Poaceae). It is tempting to interpret a woodland environment; however, although other tree pollen types (oak (*Quercus*), birch (*Betula*), elm (*Ulmus*), and willow (*Salix*)) are continuously present throughout the monolith, the percentages of these as a percentage of total pollen are very low. The percentages of alders, hazel and grasses from fill **4022** of ditch **4000** (monolith <143>) are similar to the percentages of these species in early medieval deposits at Fenton Cottage (pollen zone FC-e; Wells *et al* 1997). In the Fenton Cottage analysis, this was interpreted as a period of post-Roman woodland recovery but the diagram there includes higher oak (*Quercus*), ash (*Fraxinus*), elm (*Ulmus*) and occasional lime (*Tilia*) pollen, none of which occur in significant proportions in the data for the turbine development site.

5.8.13 The lack of significant quantities of pollen from any of the larger tree species is of note. Given the prolific production of hazel (*Corylus avellana*) pollen, and the likely local source of alder (*Alnus*) along the wet ditch, it is difficult to assess if the pollen represents fewer trees nearer to the site of pollen deposition, or many trees at a distance from the site. An alternative interpretation may be that of a more open environment, with scattered trees and arboreal taxa confined to linear features. The occasional pollen grains from the Rosaceae family (hawthorn, blackthorn, rowan, *etc*), as well as holly (*Ilex aquifolium*), may add support to the interpretation of an open environment with scattered trees. Also in support of this more open environment is the low percentage of pollen from sedges (Cyperaceae family), since a more widespread scatter of alder (*Alnus glutinosa*) would imply widespread damp conditions conducive to the growth of sedges. The lack of sedge pollen may indicate that the wetter conditions were limited to the locality of the ditch, thus providing a limited area for the growth of sedges. It must also be noted, however, that sedge pollen is more prone to breakdown and corrosion and, therefore, more easily lost from the pollen spectra.

5.8.14 The ditch is associated with ridge and furrow systems in the wider landscape and, therefore, the depiction of an open environment with active agricultural use would be consistent with the wider archaeological context. However, only

single pollen grains assigned to cereal-type were only found, in samples at 20-30mm, 40-50mm and 100-110mm (Table 5). In contrast, similar periods of deposition at Fenton Cottage (Wells *et al* 1997), and further north, around Hadrian's Wall (Dumayne-Peaty 1999), contain consistent and increased numbers of cereal-type grains to 1% and above 1% of ribwort plantain (*Plantago lanceolata*). The sparse cereal grains at the site perhaps indicate that the period of deposition from which the pollen samples were taken represents post-agricultural use following land abandonment, or a later period, where there has been a shift in focus from arable to pastoral use. Other herbaceous ruderal types are present (*eg* ribwort plantain (*Plantago lanceolata*) and buttercups (*Ranunculus*), dandelions (Lactuceae)), which could indicate, in the absence of significant numbers of cereal grains, such a pastoral landscape. However, percentages from these types are also low at this site, and it should also be noted that pollen of buttercups and dandelions is more resistant to decay. In addition, the key indicator of pastures and wet meadows, docks (*Rumex* sp), is present only sporadically. Pollen from the cabbage family (Brassicaceae) is also almost continuously present throughout the monolith as single grains. It was not possible to resolve this pollen to species level and, therefore, it could be from wild types, such as the bitter cresses (*Cardamines*), which flourish in wetter conditions at streamsides, or from cultivated species within this large family.

- 5.8.15 Pollen from other herbs is generally limited to single grains from each species. Thus, although the diversity of grains contributes to the overall diversity of the pollen spectra, little can be interpreted about the widespread presence of each of the herbaceous plant species.
- 5.8.16 The differences between zones LUW-b and LUW-c are subtle and characterised by a slight increase in hazel (*Corylus*) and decrease in alder (*Alnus*), together with a slight reduction in the number of herb species. This may be consistent with the filling of the ditch causing a localised drying-out of the environment, and shift in alder to hazel around the ditch feature. This may be linked to pastoral improvement, thus providing an interpretation for the slight reduction in herbaceous pollen types.
- 5.8.17 **Potential:** there is little pollen evidence from the medieval/post-medieval period in Lancashire and the North West (Hall and Huntley 2007). Human activity, including land drainage and peat cutting, have resulted in the truncation of many deposits, making opportunities for palaeoecological analysis of the near-surface deposits extremely rare (Wells *et al* 1997). The data derived from this study of a ditch deposit, despite the taphonomic problems (see Sections 4.3.10-11), represent an opportunity to obtain an analysis at the local scale (*cf* Jacobson and Bradshaw 1981).
- 5.8.18 Pollen diagrams from the medieval period tend to indicate increasing periods of clearance, as, for example, the upper layers in the diagram from Fenton Cottage (Wells *et al* 1997, 156-7, figs 3 and 4), following post-Roman woodland regeneration (*eg ibid*; Dumayne-Peaty 1999). The numbers of cereal grains often increase in the medieval period, indicating expansion of agricultural production. However, the grains of cereal pollen are extremely limited at this site, which is difficult to reconcile with the adjacent expansive

ridge and furrow. The pollen diagram probably depicts, therefore, a period of pastoral land use, linked with a shift away from crop production. This would be consistent with the ditches becoming filled as a result of a reduction in management. The results may indicate that, for this locality, cereal production was a relatively short-lived event, though, with no sediment chronology, this assumption requires further confirmation.

5.9 RADIOCARBON DATING

5.9.1 **Quantification:** in the course of the post-excavation analysis, several of the samples of organic remains, retrieved from charcoal-bearing tree-throw holes (2949, 2949, 2004, 2004, 2904 and 2904) during the fieldwork, were submitted to the Scottish Universities Environmental Research Centre (SUERC) laboratories for radiocarbon assay. This was intended to provide a chronology for features found on the site, to help assess the significance of the archaeological remains, and help to determine their potential for further research. To this end, six samples in total, from three features (Table 6), were subject to initial radiocarbon assay.

Area	Context	Feature	Interpretation	Material	SUERC Code	Radiocarbon Age BP	Cal BC/AD (95.4% Confidence)	$\delta^{13}\text{C}$ ‰
29	2949		Tree-throw	Alder	40171	2830 ± 30	1056-906 BC	-27.4 ‰
29	2949		Tree-throw	Alder	40172	2775 ± 30	1001-841 BC	-27.7 ‰
Trench 20	2004		Tree-throw	Oak	40173	3925± 30	2489-2299 BC	25.4 ‰
Trench 20	2004		Tree-throw	Oak	40174	3810 ± 30	2347-2189 BC	-24.9 ‰
29	2904		Tree-throw	Oak	40178	6980 ± 40	5926-5752 BC	-26.2 ‰
29	2904		Tree-throw	Oak	40179	6930 ± 30	5883-5736 BC	-25.7 ‰
29/Trench 24	2403	2987	Ditch	Alder/hazel	44793	836± 35	AD 1153-1270	-27.5 ‰
29/Trench 24	2404	2987	Ditch	Alder	44794	770± 35	AD 1209-1287	-26.8 ‰
29	4022	4001	Ditch	Alder/hazel	44795	780± 35	AD 1186-1284	-27.5 ‰

NB – $\delta^{13}\text{C}$ ‰ relative to Vienna Pee Dee Belemnite

Table 6: Results of the programme of radiocarbon assay

5.9.2 **Methodology:** the calibrated results were produced using the Reimer *et al* (2004) curve and the computer program Oxcal (v4.1; build 44; Bronk Ramsey 1995; 1998; 2001; 2009a; 2009b). Ranges have been obtained using the maximum intercept method (Stuiver and Reimer 1986) and are quoted in accordance with Stuiver and Polach (1977), but adapted for the increased precision available in later datasets (A Millard *pers comm*), rounded out by ten years, when the error term is greater or equal to 25 years, and by five years when the error term is less than 25 years. When more than one result was produced on material from a single interpretative phase of a site, the statistical

consistency of results can be used to determine whether it is possible that they are of the same actual age (Ward and Wilson 1978).

- 5.9.3 The samples have been variously dated to the early Mesolithic period, later Bronze Age, and the later medieval period. Significantly, they have highlighted the existence of human activity on the site for a period stretching back nearly 7000 years.
- 5.9.4 The results from the tree-throw from Trench 20 (SUERC 40173; SUERC 40174) are not statistically consistent ($df=1$ $T=7.3(5\% \ 3.8)$), which suggests that it is likely that the charcoal from the tree-throw hole was not contemporary. The more likely explanation, however, is that, as the charcoal was not derived from roundwood, the tree was several hundred years old. This would explain the variation in the results, if some of the charcoal was, for instance, derived from the earliest annual growth rings, and some from much later growth rings.

6. CURATION AND CONSERVATION

6.1 RECIPIENT MUSEUM

- 6.1.1 The Lancaster City Museum, Lancaster, has been nominated as the ultimate repository for the finds:

Lancaster City Museum
Market Square
Lancaster
LA1 1HT
Tel: 01524 64637

- 6.1.2 Arrangements will be made with the County Record Office, Preston, for the deposition of the complete site archive.

Lancashire Archives
Lancashire Record Office,
Bow Lane,
Preston.
PR1 2RE
Tel: 01772 533039

6.2 CONSERVATION

- 6.2.1 The assemblage is well-preserved and in good condition, and thus, the conservation requirement is low.

6.3 STORAGE

- 6.3.1 The complete project archive, which will include written records, plans, monochrome photographs, electronic media, artefacts, ecofacts and sieved residues, will be prepared for long-term storage following the guidelines set out in *Environmental standards for the permanent storage of excavated material from archaeological sites* (UKIC 1984, Conservation Guidelines 3), and *Guidelines for the preparation of excavation archives for long-term storage* (Walker 1990).

- 6.3.2 All finds will be packaged according to the museum's specifications, either in acid-free cardboard boxes or, in the case of less stable materials, in airtight plastic boxes.

6.4 PACKAGING

- 6.4.1 The assemblage is currently well-packed and will require no further packaging. Subject to consultation with the receiving museum, the discard of the unstratified material is recommended; objects that are good examples of their fabric or type should, however, be retained. It is also recommended that a discard policy relating to the environmental samples is agreed with the Lancaster City Museum. A record will be kept of all discarded material.

7. ANALYSIS

7.1 INTRODUCTION

- 7.1.1 The excavation has identified the presence of significant archaeological remains, dating from the prehistoric (dated by radiocarbon assay; see *Section 5.8*) through to the medieval and post-medieval periods. The following section seeks to synthesise the current results of the fieldwork, and of the environmental and artefactual data.
- 7.1.2 The fieldwork, which involved controlled soil stripping across a wide area, has enabled the identification of sites of archaeological significance that had not been identified previously. The majority of the cut features were encountered within Area 29, but, other than ditches **4000** and **4001**, which produced some 144 sherds of medieval pottery between them, these could not be dated with any certainty. However, three radiocarbon dates obtained from ditches **2987** and **4000** confirmed the date of the pottery, and indicated that the site was occupied from the twelfth to the late thirteenth century.

7.2 PREHISTORIC ACTIVITY (PHASE 1)

- 7.2.1 The radiocarbon assay of three tree-throws (Fig 3) containing charcoal indicates a long sequence of woodland clearance that was being undertaken in the Mesolithic period, at least, which continued into the later Bronze Age (*Section 4.4*). Such routine radiocarbon dating has been encouraged as part of the North West Archaeological Research Agenda, where the need to target a wide variety of features and deposits, both with and without artefacts, has been highlighted for the prehistoric period (Hodgson and Brennand 2007, 34). Where tree-throw holes are found to contain charcoal of mainly a single species, as is the case here, it has been suggested that the fallen tree was burned *in situ*. Such evidence does not confirm deliberate clearance, however, but may indicate opportunistic events as a result of the tree being naturally blown down (Goldberg and Macphail 2006, 195).
- 7.2.2 Such tree throws elsewhere in the North West, such as at Holbeck Park Avenue, Barrow-in-Furness, have yielded a considerable assemblage of early Neolithic pottery, lithic artefacts and a rich suite of environmental remains, dated by radiocarbon assay to 3900-3700 cal BC (OA North forthcoming b). However, such anthropogenic material was absent from the tree-throws at this site, although these features do provide significant dating evidence for early woodland clearance in Lancashire.
- 7.2.3 Defining the significance of these features is difficult, as they can be dated to a considerable timespan, of some 5000 years (Table 6). However, that the data derived from these dates does match the widespread palaeoenvironmental evidence from the North West indicates repeated woodland reduction episodes and, in the uplands, burning of the woodland to encourage regeneration and browsing, which may have been an important part of the land use (Mellars 1976; Middleton *et al* 1995; Hodgson and Brennand 2006, 25).

7.3 MEDIEVAL ACTIVITY (PHASE 2)

- 7.3.1 The three dates obtained by radiocarbon assay from ditches **4000** and **2987**, and the presence of twelfth- to thirteenth-century medieval pottery from both stratified features and the medieval ploughsoil, suggests the present site (Area 29; Fig 3) lay close to an as yet unidentified area of medieval occupation. The natural assumption would be to suggest that it shared the same location as the post-medieval farm of Hazelrigg, that is marked on Yates' map of 1786, although some evidence perhaps indicates an early settlement to the west (Section 7.3.4).
- 7.3.2 Several sources mention land in Hazelrigg explicitly, which can only mean the discrete block of land shown on Yates' Map, within which Hazelrigg Farm is situated. About 1450, William Cave gave Lambert Stodagh four acres in Hazelrigg in the vill of Scotforth (Farrer and Brownbill 1914, 56-8, fn 18). Leicester Abbey had land, common of pasture, in, among other places, Hazelrigg (*op cit*, 56-8, fn 20), whilst mention is made of the tenants of Hazelrigg being allowed housebote and heybote, also acquittance of pannage for their pigs in mast-time, from the the Abbot of Leicester (*op cit*, 96-101, fn 25). Housebote and heybote, and pannage (Coredon with Williams 2004), are all rights of common that allowed peasants to take wood for repair and to feed pigs on beech mast and acorns, suggesting that there was still extant woodland in the area. Moreover, other documentary sources indicate that 'Long Lands', the name given to a number of the fields in and around the site on the tithe map of 1841 (LRO DRB 1/173), may have been derived from *Laundlands*, mentioned in the Cockersand Chartulary, suggesting that this abbey owned land within the study area (OA North 2004; Farrer and Brownbill 1914, 99). Other field names, specifically in Area 29 and to the west of it, are referred to as 'Old Lands', which may suggest plots of some antiquity (LRO DRB 1/173).
- 7.3.3 It is perhaps possible to interpret the ditches found in Area 29 as representing successive phases of land management centred around an isolated settlement. The ditches were seemingly used to funnel stock from the high ground to the east, while others appear to form fields and paddocks. They were all bounded to the east by a large enclosure ditch, some 3m wide in places. Equally, the small but important group of twelfth- and thirteenth-century pottery (and perhaps earlier fourteenth-century) from the site represents one of the few ceramic assemblages from a rural location in Lancashire. The rarity value of such sites and their material culture has been highlighted in the North West Regional Research Agenda, where it is noted that the material culture of such sites remains largely unknown (Newman and Newman 2007, 98). Furthermore, the assemblage is almost entirely derived from a single kiln source, probably that at nearby Ellel (White 1993). The absence of earlier post-medieval artefacts might suggest a post-fourteenth-century abandonment date for the site, and may also strengthen the argument that there was little in the way of arable agriculture in the area before the eighteenth century.
- 7.3.4 What may be harder to understand is the absence of medieval pottery and environmental data from the ditches east of **4000** and **4001**. Pottery generally finds its way into ditches and fields via disposal of domestic and agricultural waste, in the form of manure. Thus it may be argued that domestic waste was

not moving very far from its point of origin, *ie* somewhere in the vicinity of ditches **4000** and **4001**, whilst the ditches and fields to the east might have been pasture and, therefore, would not be subject to manuring (Jones 2005). This idea can be further verified by the inclusion of medieval pottery within the ridge and furrow fields, recovered from Trenches 4, 6, 7 and 11 (see *Section 5.2*), to the west and south (the pottery contained within manure will not have travelled far).

- 7.3.5 The presence of ridge and furrow in this area, which was previously thought to be one of modern enclosure (Ede and Darlington 2002), and its absence in Area 29, along with the network of ditches that have been interpreted as stock-control features that lie to the east, perhaps indicates the exploitation of both arable and pastoral resources. This element, however, of the medieval period has not received much attention outside the county-based historic landscape characterisations (Newman 2006, 116). The land around the study area is an area of rising ground, formerly well-wooded, between the coastal lowland zone and an upland zone. This would have been exploited by hamlets and individual farmsteads, with a combination of open and small enclosed fields (Newman 1996, 114), a landscape not unlike the one visible today.
- 7.3.6 As for the lack of environmental evidence from the features east of ditches **4000** and **4001**, this again can be explained, perhaps by local circumstances. Most of the fills were sandy, relatively free-draining, and therefore not conducive to good preservation, perhaps also exacerbated by the western downhill trend that would have carried material in that direction. The focus of any putative settlement may well have been there, and perhaps also west of, the ditch complex. Moreover, the degree of truncation, probably caused by the resumption of arable farming in the eighteenth century, resulted in the typically shallow nature of the features.
- 7.3.7 The surviving pollen from ditch **4000** illustrates the nature of the surrounding landscape, which may have been open, with scattered trees and shrubs perhaps confined to hedges growing alongside the ditches. These hedgerows may have contained members of the Rosaceae family, which includes hawthorn, blackthorn, and rowan, as well as holly. The pollen evidence might also suggest hazel and alder growing along the shallow valley that separates the ridge and furrow from the common land (see *Section 5.8.12*). The presence of grains of cereal pollen attests to some, perhaps limited, crop production in the vicinity. That it is sparse may indicate a period of post-agricultural use following either land abandonment, or where there had been a shift in focus from arable to pastoral use.
- 7.3.8 The features found on the site can be identified within the wider medieval and post-medieval landscapes. One of the earliest maps of the region, that of Yates, published in 1786, shows a discrete block of land that falls largely within the current site boundary (Fig 10). The map does not show individual fields, but depicts cultivated and uncultivated land. The surrounding land can be identified as an area of common pasture, which was part of Scotforth Moor, known as Hazelrigg and enclosed in 1809 (Fig 11; Scotforth Moor and Bailrigg Enclosure Map 1809; Scotforth Tithe Map 1841; Whyte 2003, 94). Once the roads associated with the enclosure of the area are removed, it can be

seen that the whole ridge is devoid of roads to beyond another enclosure called Longthwaite, which once again reinforces the idea that this was a discrete block of land, which by the late eighteenth century was farmed from the apparent building complex to the south of the site (Yates 1786).

- 7.3.9 The presence of medieval fields, in the form of the surviving ridge and furrow, indicates the antiquity of this area of land. In the Midlands, ridge and furrow can generally be thought to indicate a specific form of agricultural regime, although this cannot be taken for granted in the North West, where, for instance, ridge and furrow can be found within small irregularly-enclosed fields (Higham 2004, 65). Although, in the case of the Hazelrigg fields, their date can be confirmed by the presence of medieval pottery. Moreover, ridge and furrow was arguably valuable for its drainage qualities, with cross-contour furrows channelling water away into nearby streams (*op cit*, 57), which is exactly what is found at Hazelrigg, where the ridge and furrow is aligned across the prevailing north/south ridge.
- 7.3.10 Such fields can also date to the post-medieval period, especially when found in upland areas, although, in this case, the presence of pottery that can be dated to before the middle of the fourteenth century suggests that the system is not only medieval, but quite early too. This early date probably coincided with the remarkable rise in agriculture within the Lancaster area between 1190 and 1290 (Cunliffe Shaw 1956), mirroring the same phenomenon in the rest of England, where the expansion of cultivation was often accompanied by the foundation of new settlements amongst the newly-won fields (Dyer 2002, 161-2). This followed hard on the ameliorating climate, which would eventually crash in the fourteenth century (*op cit*, 233). This remarkable expansion in the amount of land under cultivation went hand in hand with a wholesale population rise between 1100 and 1300, which can be seen both nationally and regionally (*op cit*, 161, 235, fig 2; Higham 2004, 72-3). Evidence of this expansion, particularly into what had traditionally been classified as waste, such as woods and moors, can be seen all over Lancashire. Examples of assarting, literally the grubbing of trees to turn waste into ploughland, abound in the county, since they were frequently associated with court cases (Higham 2004, 75). They not only show that the land was being won from the moors and waste for agriculture, but can be used as indirect evidence of population growth (*ibid*). This can probably be taken as representative of the type of activity to be found at Hazelrigg.
- 7.3.11 The pollen evidence for cereal cultivation from the site, meagre though it is, also lends weight to this argument. The sparse cereal grains from the site perhaps indicate that the period of deposition from which the pollen samples were taken was one of post-agricultural use following land abandonment, or where there had been a shift in focus from arable to pastoral use (*see Section 5.8.13*). The subsequent downturn in the climate coincides with the dearth of later pottery found on the site.
- 7.3.12 Many of the ditches seem to have been associated with the management of stock, and, in particular, were used as stock funnels to bring livestock from the common grazing upon Scotforth Moor. This type of landscape feature has been identified elsewhere in the region, for instance in Leyland, south of

Preston (Atkin 1986). There, they are identified with very ancient enclosures, perhaps pre-Conquest in date, and usually take the form of a steadily widening lane, debouching on to the common (*op cit*, 175). A particularly good example is illustrated on the Yates' map on the eastern side of the large enclosure of Longthwaite (Fig 10), the examples seen at Hazelrigg being much more modest in scale.

- 7.3.13 Further evidence to support the notion of settlement and expansion into the uplands above Lancaster in the earlier medieval period can be seen from the Yates' map, where the Hazelrigg boundary is depicted as passing through the eastern end of Area 29 (Fig 10). This boundary clearly pre-dates the Parliamentary enclosure of what, in the early nineteenth century, was known as Scotforthmoor and Bailrigg, as it was largely swept away by that action. Its line can be seen more clearly on later maps, such as the Scotforth Moor and Bailrigg Enclosure award map, the 1841 Scotforth tithe map (Fig 11), and the First Edition Ordnance Survey map (1847). This feature can be identified, from its noticeable kink in alignment, as ditch **3072** (Fig 3). Although the fills did not produce any dating evidence, the ditch may record the original outline of the medieval enclosure, and it must be significant that no features lay beyond it. Furthermore, the ditch was upwards of 3m wide, suggesting that it would have needed a fairly substantial input in terms of manpower to excavate such a feature. Admittedly, it could also be a post-medieval extension on to the common, although this seems unlikely, given the discrete nature of Hazelrigg as a block of land, containing, as it does, extant ridge and furrow almost all the way along its length.
- 7.3.14 If the ditch did form the boundary between the common pasture and the medieval ploughlands to the west, it may also be significant that the stock-control features lie within it, separating the arable area from the livestock. Such division can be seen elsewhere in upland areas in the North West, where the simplest model of land management uses the 'head-dyke', a permanent physical boundary separating the two categories of land (Winchester 2000, 52). In some cases, this was called 'acredyke', which is redolent of an island of cultivated land in a sea of waste (*op cit*, 53), something that has similarities with Hazelrigg, although better describes nearby Longthwaite Hill.
- 7.3.15 Certainly, both Hazelrigg and Longthwaite (see *Section 1.3.13*), and other place-names, are Old Norse in origin (Ekwall 1922, 173-4). Place-name evidence should be used with caution, however, as some words with Norse origins demonstrate continuity of use into much later periods. Thus, for instance, in the Lake District, the Norse word 'thwaite' was used widely to indicate a clearing and, subsequently, became part of the Cumbrian dialect, and was still being applied to new clearings as late as the thirteenth century (Winchester 1987, 41). This might well be the case with the Hazelrigg and Longthwaite place-names, given that the origin might well be associated with land expansion after the Norman Conquest (Higham 2004, 70-75)
- 7.3.16 However, the archaeological evidence for a settlement is missing in the immediate vicinity of the site. It is possible that the medieval settlement was always centred on the farmstead depicted on Yates' map (1786; *Section 7.3.2*). It may even be possible that there were originally two settlements, or that

Hazelrigg Farm is the successor settlement to the remains found within Area 29. What can be said is that, like its near neighbour Longthwaite, Hazelrigg is a discrete block of land with early origins.

- 7.3.17 Therefore, it can be suggested that this block of land is a medieval assart. The shape of the Hazelrigg enclosure does not immediately offer itself to such a feature of the medieval landscape, since it lacks the sinuous field boundaries that are characteristic of assarting (Newman 2006, 117-18), that can be seen so clearly at Longthwaite, and are illustrated on both the Yates map (1786), and the First Edition Ordnance Survey map (1847). It might be possible, however, to suggest that the linear nature of the enclosure, perched on the ridge (hence its name) may have dictated the shape of any putative assart. If this is the case, it may be possible to suggest that it was once used as a cattle-rearing station, or vaccary. Vaccaries were economically important in the North West, particularly in Lancashire and nearby Wyresdale, where they were able to exploit a landscape that was more suited to cattle rearing than arable production (Higham 2004, 114). Vaccaries were often sited close to rivers in well-wooded valleys, intermixed with small areas of arable (*ibid*), all present at Hazelrigg, situated as it is, west of the River Conder. Crucially, access to upland grassland was a key factor (*ibid*), one which Hazelrigg has in abundance. Extensive research carried out by Cunliffe Shaw in the 1950s on the Royal Forest of Lancashire (Scotforth was originally a forest vill) failed to highlight any such vaccaries in this area (Cunliffe Shaw 1956, 14). However, there was certainly a tendency for vaccaries to be exploited, not by the great estates, such as the Royal Forest, but on a more ad-hoc basis (Higham 2004, 114), from which it might be possible to infer such an interpretation for Hazelrigg.

7.4 CONCLUSIONS

- 7.4.1 The site has produced evidence of intermittent woodland clearance, starting in the Mesolithic period and continuing into the later Bronze Age, the dates confirmed by radiocarbon determination. Although the significance of these dates is not clear, they do add to the growing body of evidence that suggests that, during the fifth to third millennia BC in upland areas, communities were involved in the creation and management of forest and heathland clearings in a variety of topographical settings (Hodgson and Brennand 2006, 30).
- 7.4.2 During the medieval period, the dates produced by radiocarbon assay and the medieval pottery from the site would suggest occupation from the twelfth to the end of the fourteenth century. This settlement was exploiting both the common pastures of Scotforth for stock rearing, as can be seen by the stock funnels, and arable farming, which has left its physical traces in the form of ridge and furrow and the pollen grains from ditch **4000**. The exact location of the actual settlement is unknown, although it was presumably close by; the later, post-medieval farmstead, however, was to the south (Yates 1786).
- 7.4.3 The site has also gone some way to addressing some of the initiatives highlighted in the North West Regional Archaeological Research agenda and strategy (Brennand 2007), although the nature of the evidence has been

somewhat equivocal. For instance, the present study has been able to look at the relationship between identifiable pottery kilns (Ellel in this case), and product distribution (Newman and Newman 2007, 111).

- 7.4.4 The recovery of some pollen data, however incomplete, has at least started to address the dearth of excavated data for most rural settlements of all types (*op cit*, 111). The presence of small amounts of cereal pollen, along with the dates obtained from radiocarbon, indicate arable farming during the late twelfth to late thirteenth century (see *Section 5.9*, Table 6). This, along side the pottery evidence (see *Section 5.2.11-12*), suggests arable exploitation may have ceased by the fourteenth century, perhaps being part of the wider abandonment of arable farming happening on a national level (Dyer 2002, 101). This type of data might signal evidence for changes in climate and subsequent responses in the nature of agriculture and land use (Newman and Newman 2007, 99–101). The presence of arboreal pollen, particularly hazel, is reflected not only in the Hazelrigg place-name, but also in the exploitation of the woodland, demonstrated by the references to housebote and heybote, and pannage (Farrer and Brownbill 1914, 96-101, fn 25).
- 7.4.5 The current project has also examined some of the aspects explored in the *The Lancashire Historic Landscape Characterisation Programme* (Ede and Darlington 2002), which defined the land in the vicinity of the current study area as being modern enclosure. The analysis of current and historical field boundaries, combined with the archaeological evidence produced by the current investigations, has been able to show that what is visible on the ground may be much more complex. The discrete block of land, marked as Hazelrigg on William Yates' map of 1786, contains visible evidence of medieval arable farming in the form of ridge and furrow, whilst below-ground remains indicate a network of boundaries used to manage stock movement from an area of common land. With the aid of radiocarbon determinations and pottery evidence, these features have indicated occupation from as early as the twelfth century until the end of the thirteenth.

8. PUBLICATION

8.1 PUBLICATION

8.1.1 In accordance with the guidelines provided in *MAP2* (English Heritage 1991) and *MoRPHE* (English Heritage 2006), it is proposed that the results of the project should be disseminated through the production of an academic publication. This publication is likely to comprise no more than 5000 words of text, excluding bibliography, and the narrative will be supported by an appropriate number of line drawings, including artefactual illustrations and interpretative phase drawings, and plates. It is anticipated that the publication will form either an academic article, within an appropriate academic journal, such as *Contrebis*, or possibly integrated within an OA North monograph, presently being compiled, detailing the development of rural settlement in the historic county of Lancashire.

8.1.2 The publication will address the revised research objectives for the project (*Section 7*) and will comprise the following short sections:

1. **INTRODUCTION**

1.1 Site Location

1.2 Circumstances of the Project

1.3 Historical Background

2. **STRATIGRAPHIC NARRATIVE**

3. **ARTEFACTUAL AND ECOFACTUAL ANALYSIS**

4. **DISCUSSION** (this may be integrated with that for other sites if this forms an element of the monograph)

Bibliography

Acknowledgements

8.1.3 Following completion, the draft publication text will be submitted for internal revision and will then be copy edited ready for publication.

8.2 PROJECT ARCHIVE AND DEPOSITION

8.2.1 The completion of the project will result in an integrated archive, containing full details and catalogues of all stratigraphical, artefactual, and environmental analyses.

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Figure 9: Percentage pollen diagram of fill **4022** in ditch **4000**

Figure 10: Extract from William Yates' map of 1786, showing Area 29 at Hazelrigg, with (insert) the area of Hazelrigg and nearby Longthwaite, surrounded by common grazing

Figure 11: Extract from the Scotforth Tithe map of 1841

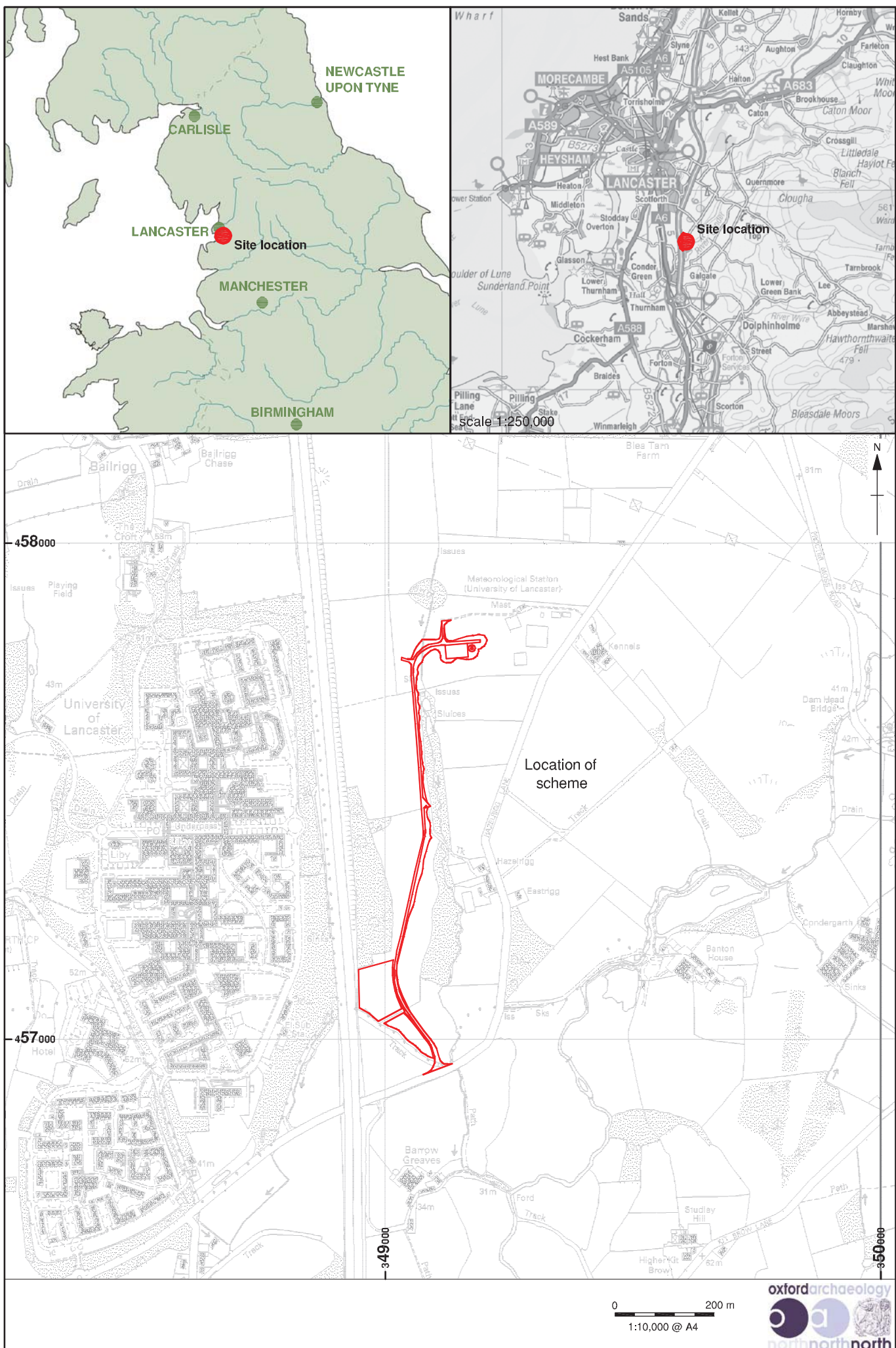


Figure1: Site location

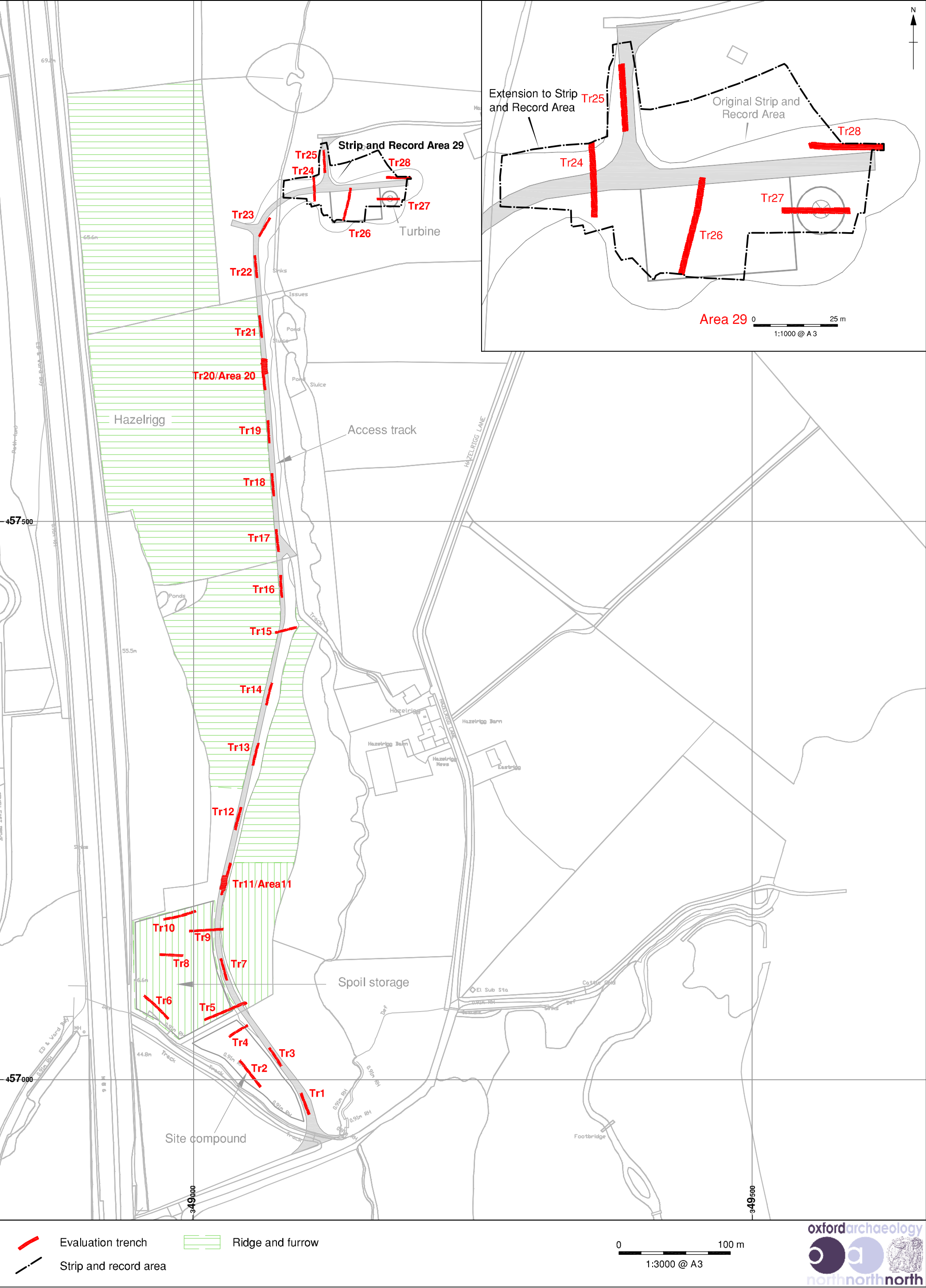
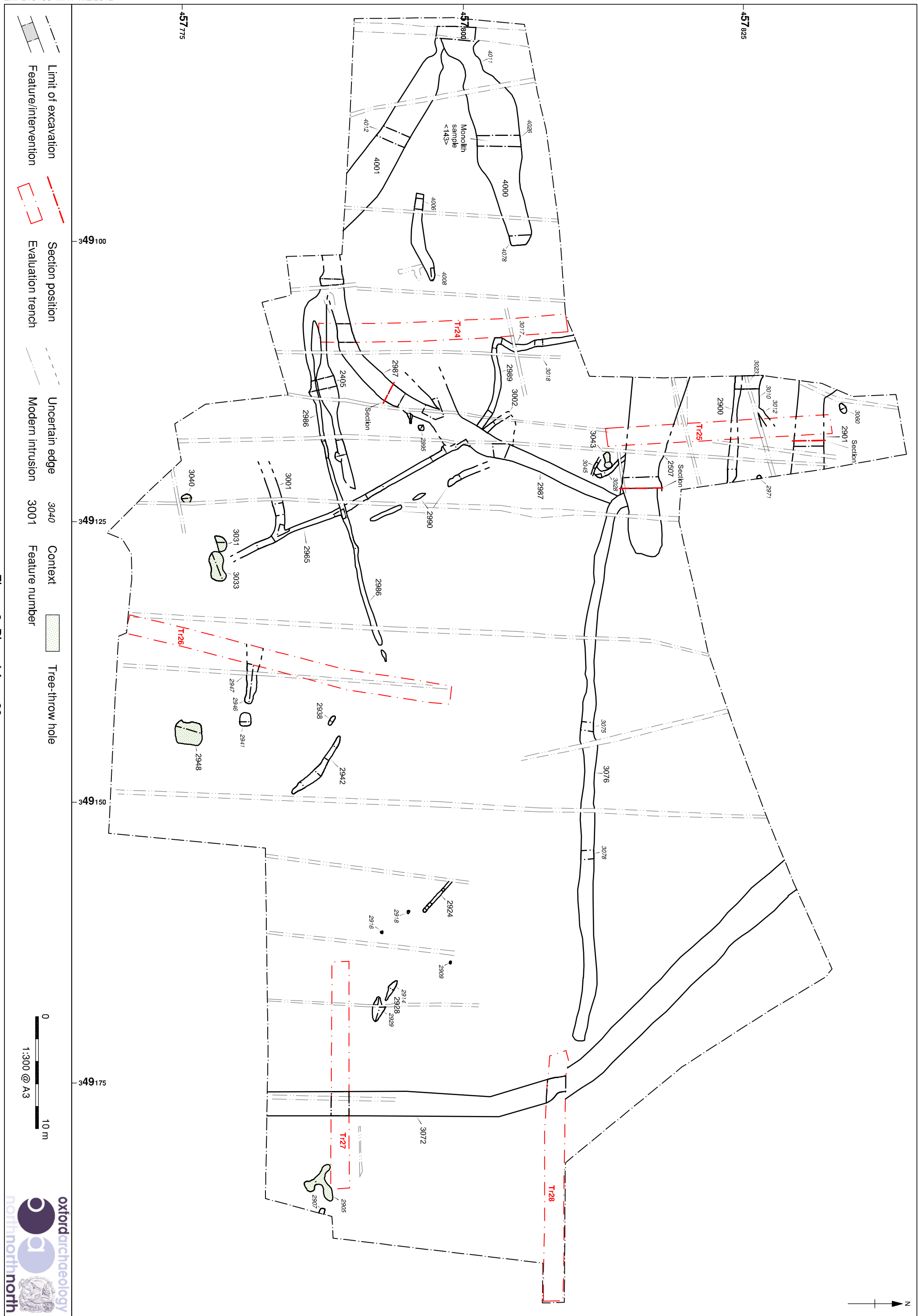


Figure 2: Location of archaeological investigations



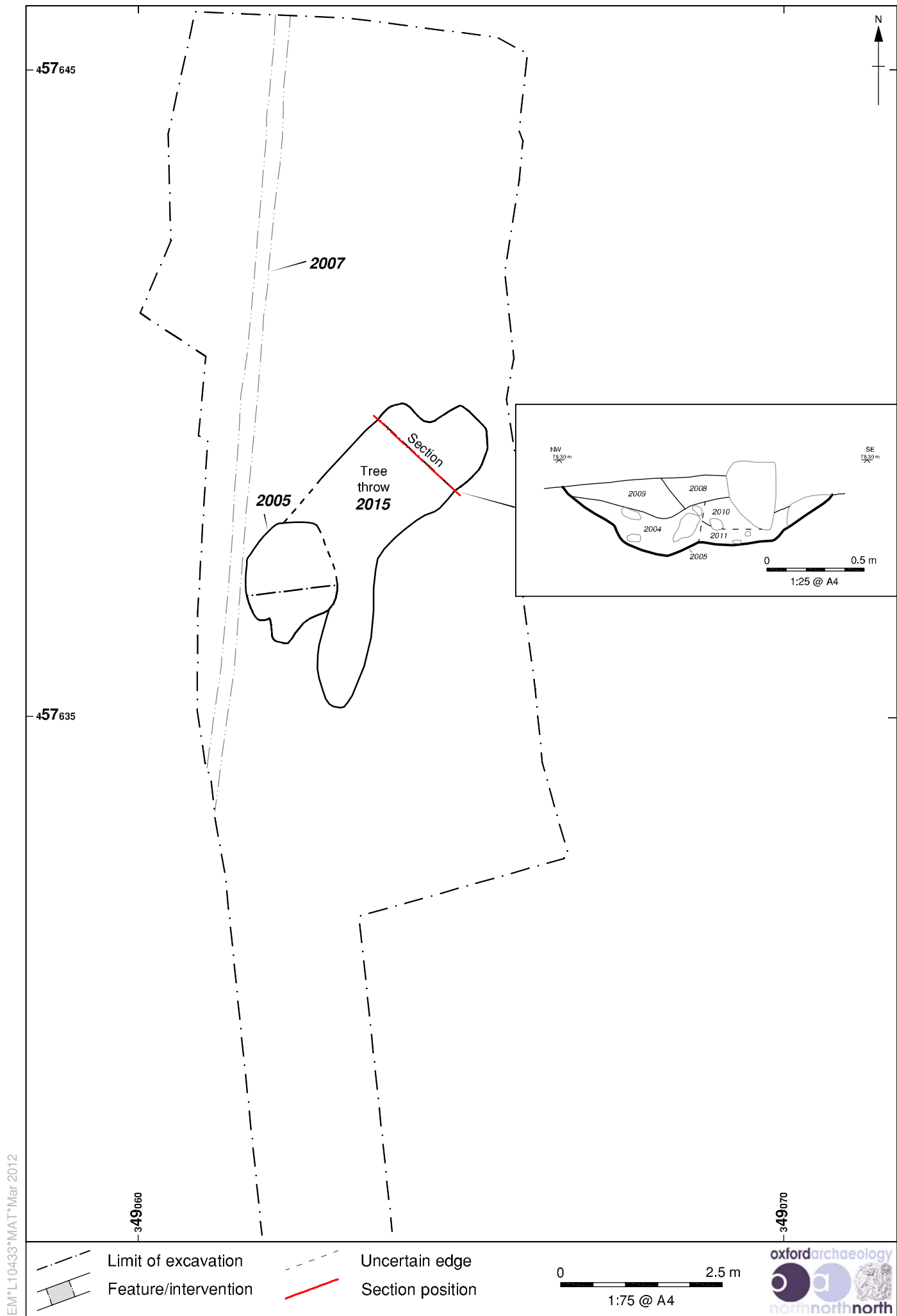
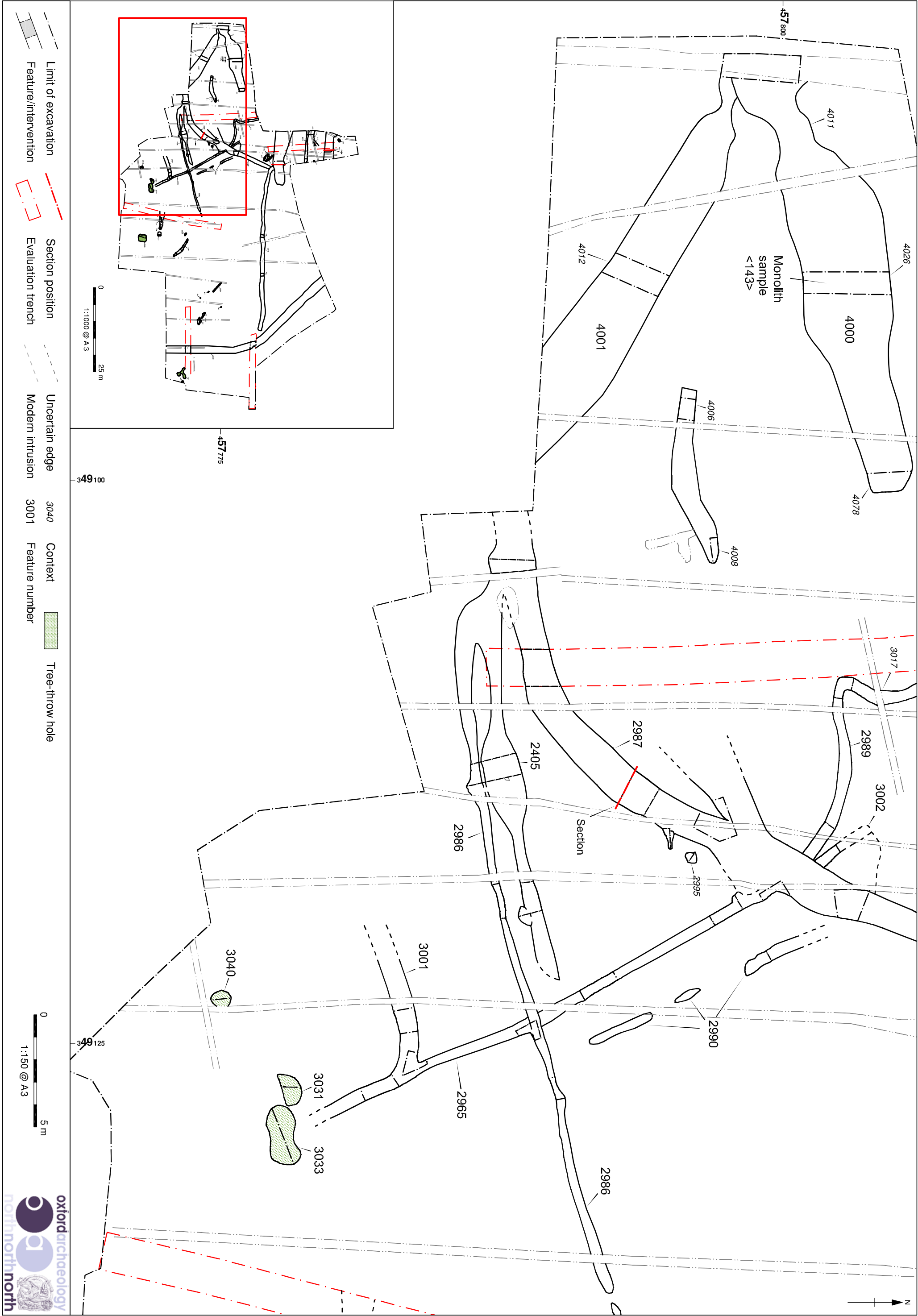


Figure 4: Plan of Trench 20 extension (Area 20) and section through tree-throw hole **2015**



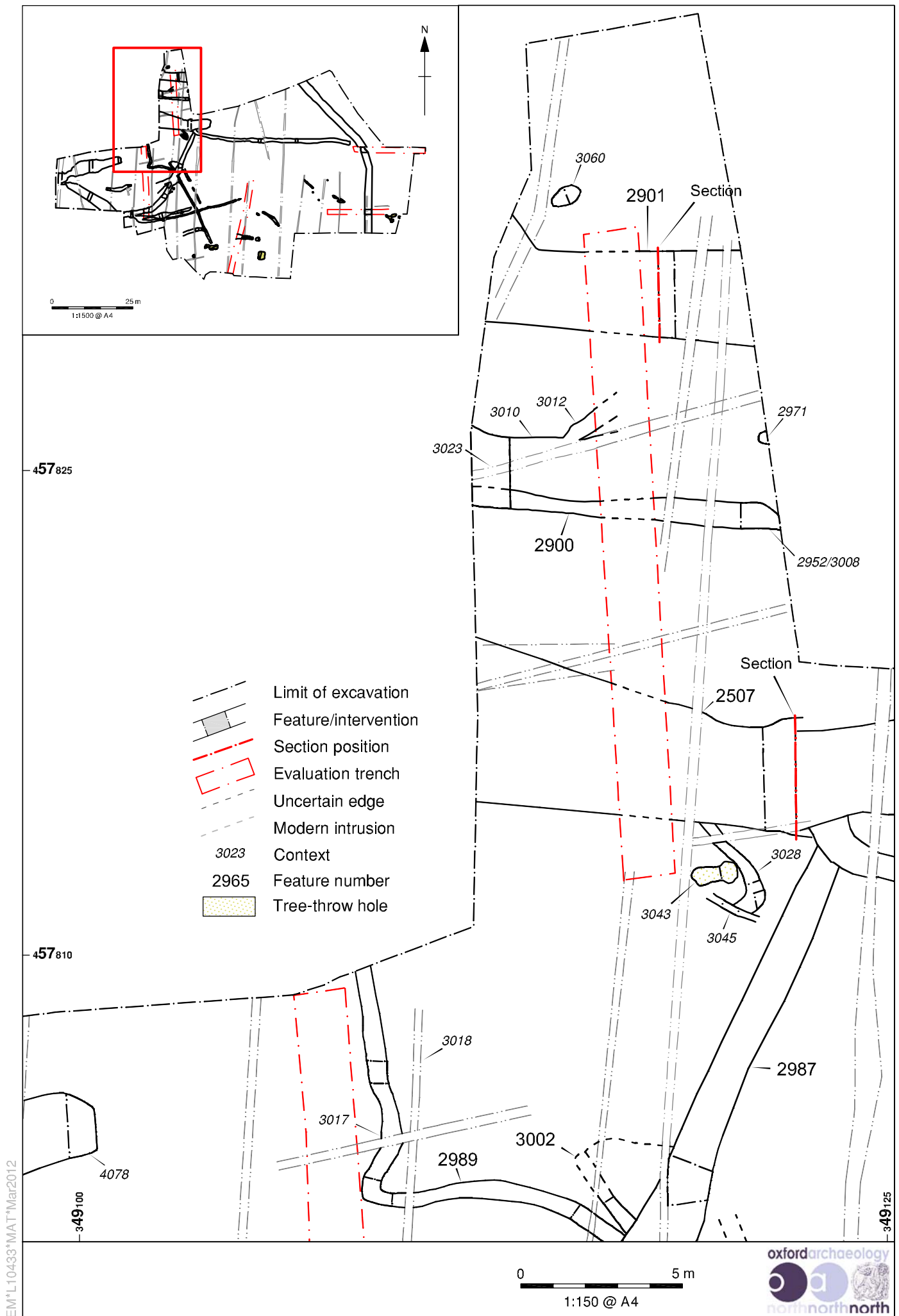


Figure 6: Plan of Area 29 - north-west

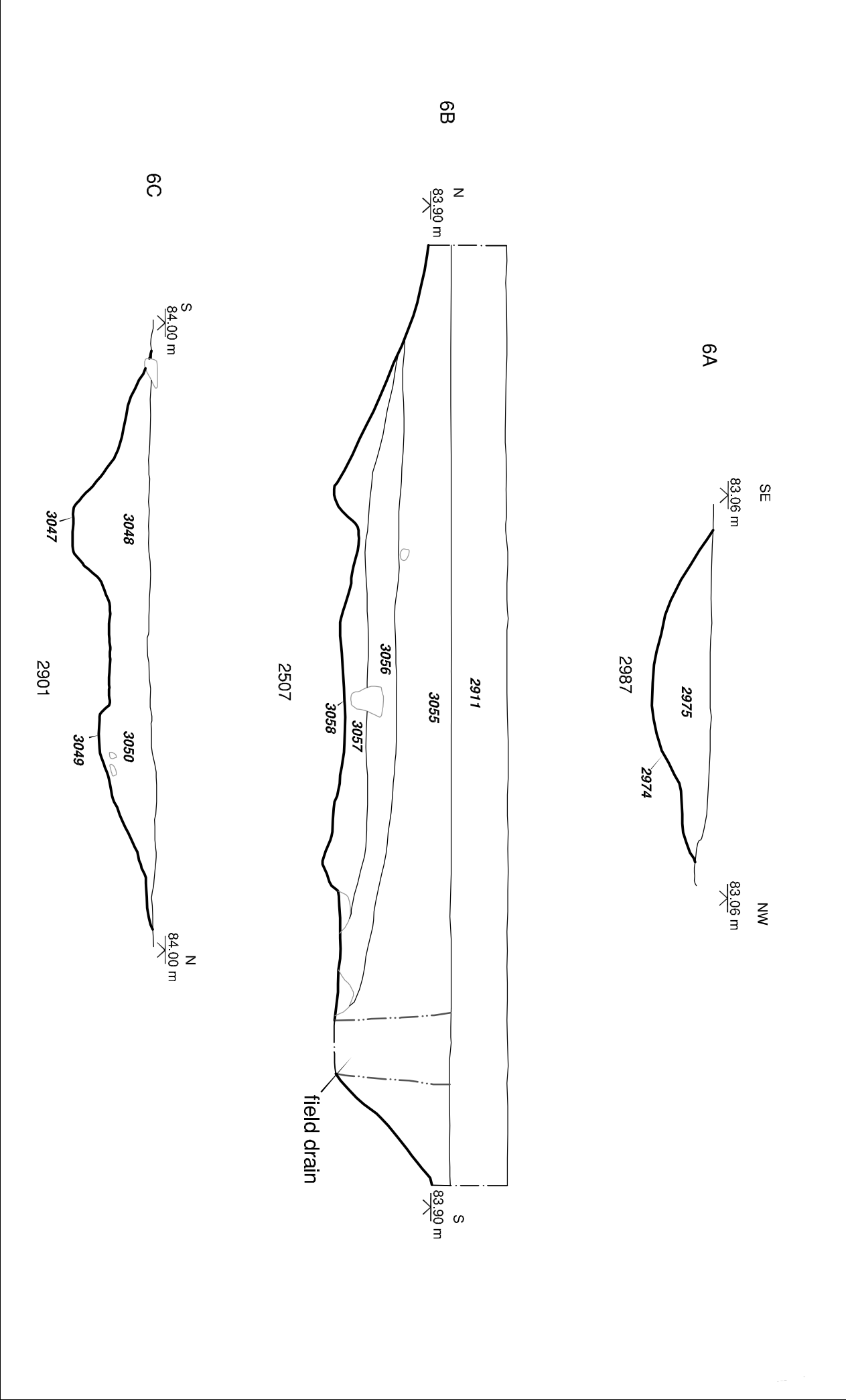


Figure 7: Sections: 2987, 2507 and 2901

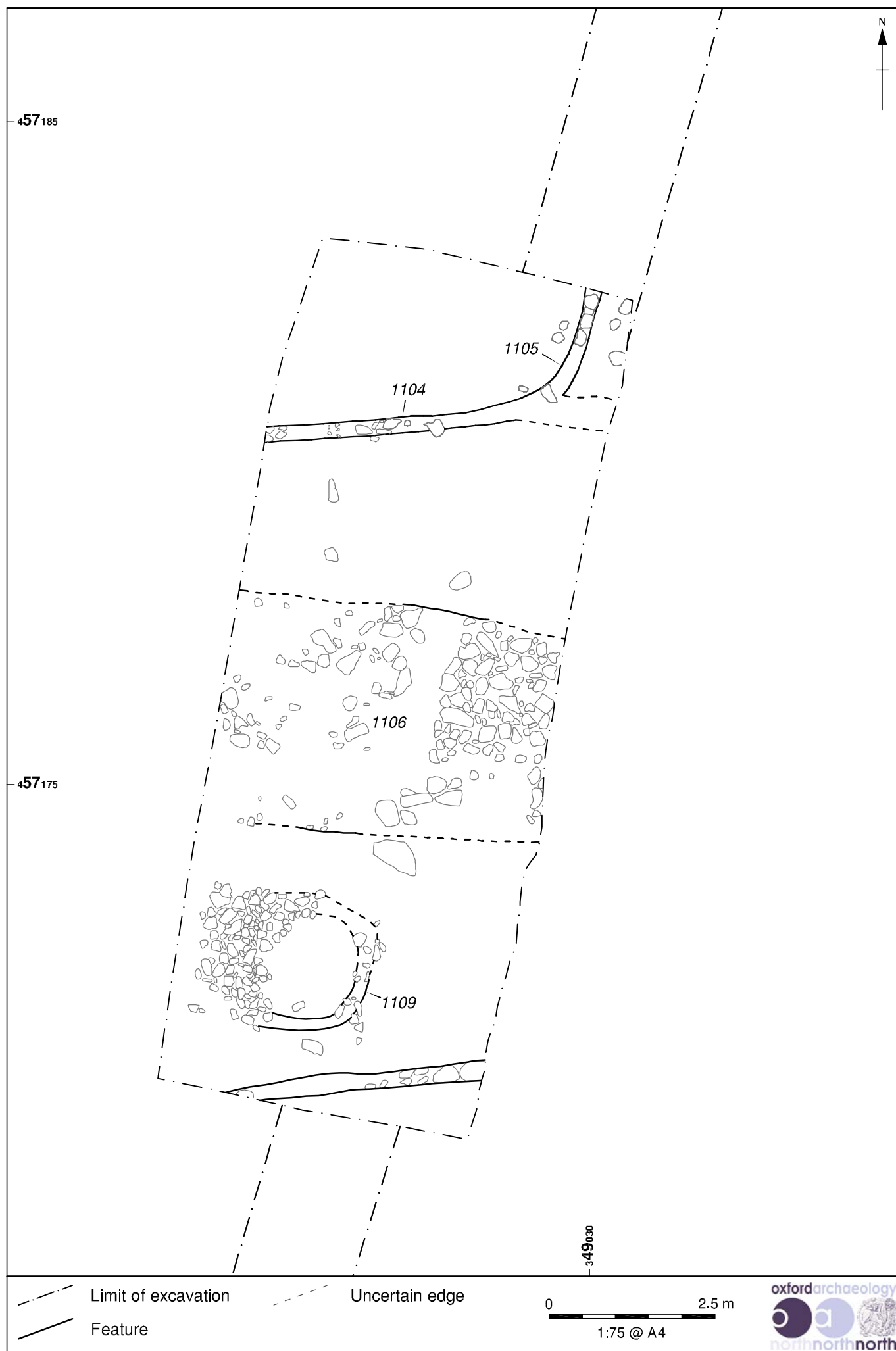


Figure 8: Plan of Trench 11 extension (Area 11)

Analyst: Helen Shaw

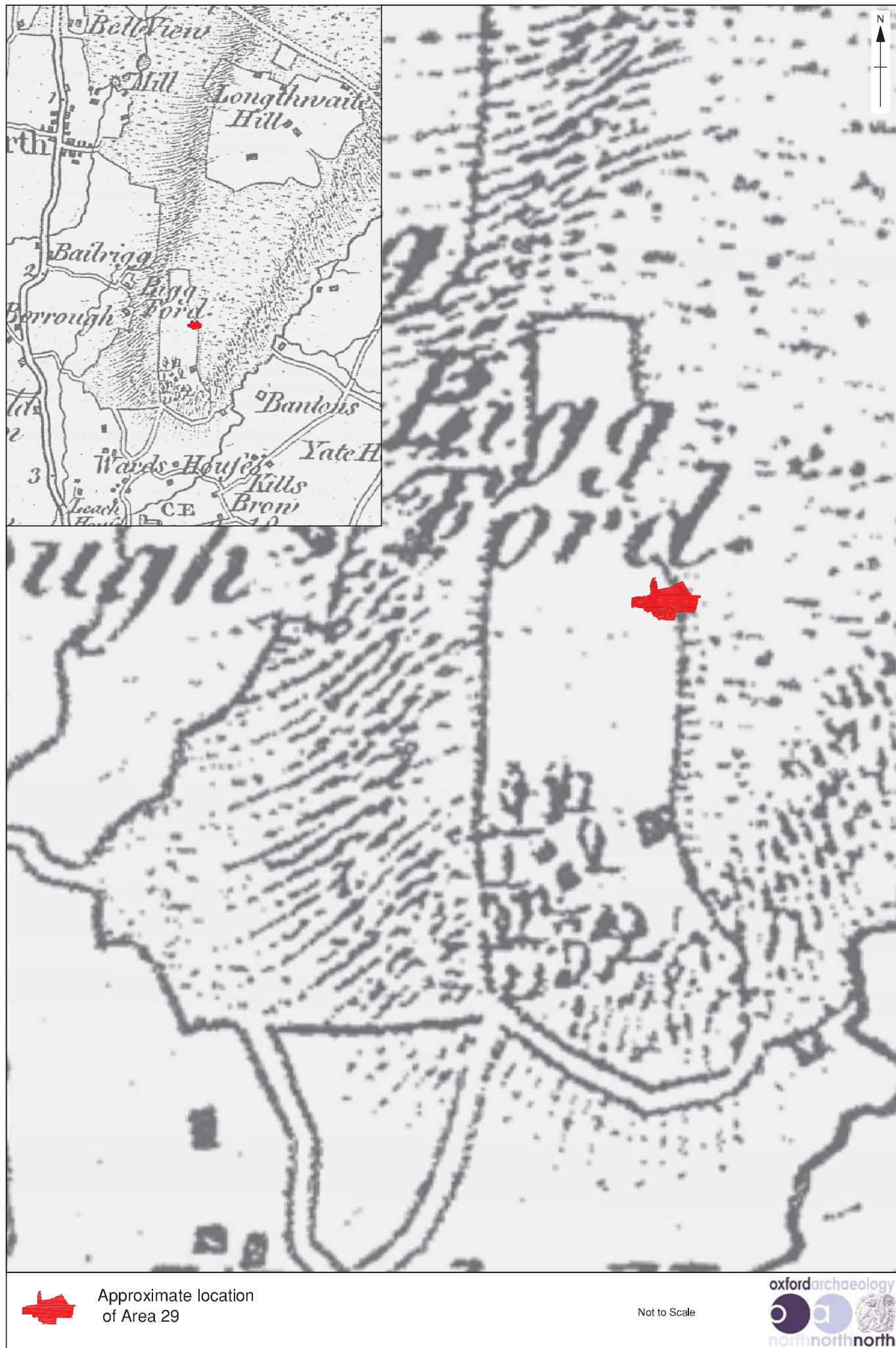
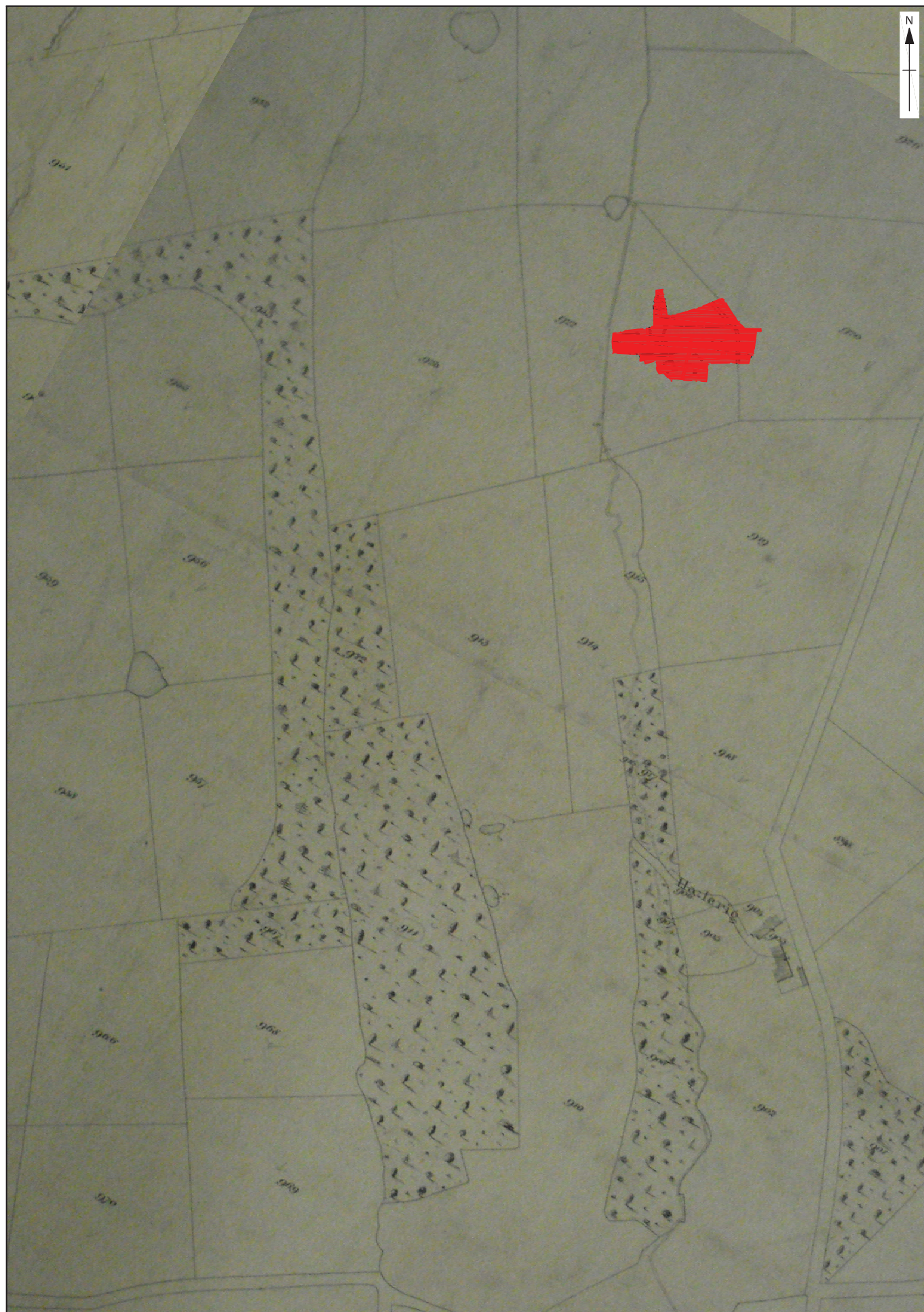


Figure 10: Extract from William Yates' map of 1786, showing Area 29 at Hazelrigg, with (insert) the area of Hazelrigg and nearby Longthwaite, surrounded by common grazing



Approximate location
of Area 29

Not to Scale

Figure 11: Extract from the Scotforth Tithe map of 1841

APPENDIX 1: PROJECT DESIGN (ARCHAEOLOGICAL EVALUATION)

1 INTRODUCTION

1.1 PROJECT BACKGROUND

- 1.1.1 Lancaster University (hereafter the client) have been granted planning permission for the installation of a 2 MW wind turbine generator, with associated site access, on site access tracks, hardstanding areas, temporary construction and storage compound, cabling, and landscaping and environmental measures (planning ref 10/01061/FUL), on land to the east of the University's South West Campus, off Bailrigg Lane, Lancaster (centred on NGR SD 4904 5742). The planning permission is subject to a number of conditions, one of which (no 15) relates to the requirements for an archaeological investigation. Following a period of consultation, on behalf of the client, with the Lancashire County Archaeology Service (LCAS), it has been agreed that the areas of groundworks be subject to a programme of archaeological evaluation prior to any construction works commencing on site. Evaluation is part of an iterative process to investigate the archaeological potential of the site and, should any features, deposits or finds of archaeological significance be found, this may lead to more detailed open-area excavation (as detailed in Planning Policy Statement 5 (PPS 5): Planning for the Historic Environment (DCLG 2010)).
- 1.1.2 Oxford Archaeology North (OA North) undertook an archaeological desk-based assessment and technical chapter for the purposes of an Environmental Impact Assessment to accompany the planning application in December 2009 and April 2010, respectively. The technical chapter was also informed by a magnetic gradiometer survey over the site. Originally, the application was for two turbine generators, but was revised for a single turbine generator later in 2010. OA North's input into the Environmental Statement was accordingly revised in September 2010, the aim being to inform the planning process as to the potential impact of the proposals on any cultural heritage resources.
- 1.1.3 The cultural heritage assessment showed that the site was within an area of late prehistoric to Romano-British potential: a Bronze Age axe findspot is known from within the study area, and there is further evidence for Bronze Age activity in the wider area; the putative route of the Lancaster to Overburrow Roman road passes to the north of the site, and a Romano-British settlement site (known as Barker House Farm) is located to the west of the southern end of the site. It was within the southern end of the site, in relative close proximity to the Romano-British settlement site that the geophysical survey located magnetic anomalies that may relate to contemporaneous activity.
- 1.1.4 The assessment showed that evidence for medieval activity in the area appears to be mainly agricultural in nature, with a field system and an area of ridge and furrow identified within the study area. This was confirmed by the geophysical survey that showed anomalies relating to such agricultural activity over the whole site. A further area of medieval/post-medieval ridge and furrow was also identified in the cultural heritage assessment, as well as the township boundary between Scotforth to the north and Ellet to the south believed to be medieval. Post-medieval sites include relict boundaries and tracks, former pits and ponds, a ditch and bank, a cropmark, a former woodland enclosure bank, and nine Grade II listed buildings in the vicinity.
- 1.1.5 The diversity of the period of the sites shows that the longevity of use of the area offers the potential for archaeological remains to be exposed or impacted upon during groundworks associated with the wind turbine generator.
- 1.1.6 Consequently, in accordance with LCAS' request, the following project design has been compiled for a programme of evaluation trenching, targeting anomalies observed in the geophysical survey data. This will meet with all the requirements and standards of the Institute for Archaeologists (IfA) and, within the framework of MorPHE (EH 2006), which represents a methodology, for fieldwork and post-excavation reporting. Should significant

archaeological remains be identified it will be necessary to produce an updated project design for a programme of detailed archaeological excavation, archive processing, and post-excavation assessment, making allowance for any appropriate analysis and publication.

1.2 OXFORD ARCHAEOLOGY NORTH

- 1.2.1 Oxford Archaeology is an educational charity under the guidance of a board of trustees with over 35 years of experience in archaeology, and can provide a professional and cost-effective service. We are the largest employer of archaeologists in the country (we currently have more than 300 members of staff throughout three regional offices in Oxford, Cambridge and Lancaster), and can thus deploy considerable resources with extensive experience to deal with any archaeological obligations you or your clients may have.
- 1.2.2 Oxford Archaeology North has considerable experience of sites of all periods, having undertaken a great number of small and large scale projects throughout Northern England during the past three decades. Evaluations, assessments, watching briefs and excavations have taken place within the planning process, to fulfil the requirements of Clients and planning authorities, to very rigorous timetables.
- 1.2.3 OA North has the professional expertise and resources to undertake the project detailed below to a high level of quality and efficiency. OA North is an Institute for Archaeologists (IfA) registered organisation, registration number 17, and all its members of staff operate subject to the IfA Code of Conduct (2010).

2 AIMS AND OBJECTIVES

2.1 ACADEMIC AIMS

- 2.1.1 The main research aim of the investigation, given the nature of the development, will be to establish the presence or absence of buried archaeological remains on the site in the areas to be affected by groundworks and, if present, compile a detailed record to mitigate their destruction during the course of the development in accordance with planning guidance PPS 5 (2010).

2.2 OBJECTIVES

- 2.2.1 The objectives of the project may be summarised as follows:
- the main objective of the archaeological investigation is to determine the presence or absence of any buried remains of archaeological interest within the proposed development area;
 - to investigate the nature, extent and significance of the anomalies identified in the geophysical survey towards the southern end of the site, in the area of the proposed soil storage, compound areas and access track;
 - to determine the presence or absence of any prehistoric or Roman-British remains;
 - to compile an archival record of any archaeological remains within the proposed development area.
- 2.2.2 To these ends, the following programme of archaeological work has been designed in accordance with English Heritage (1991) and the Institute for Archaeologists (IfA) (2008a, b and 2010) standards and guidelines, and will be carried out in two stages. The results will provide information as to whether more detailed works are required during the fieldwork or post-excavation stages of the project;
- **Stage 1:** a programme of trial-trench evaluation to sample 5% of the total footprint of the proposed groundworks/area of disturbance (which equates to 1277m²) to target the geophysical survey anomalies, and test a 'blank' area wherein no anomalies were observed;
 - **Stage 2:** additional trial-trench evaluation up to a further 5% (equating to a total of up to 10%) of the groundworks footprint, depending on the results of the initial 5%.
 - **Report and archive:** production of an illustrated report of the findings and assessment of impact of the proposals on the archaeological resource, for submission to the client

and to LCAS, and preparation of archives of original records and finds for deposition, respectively, with the Lancashire Record Office and (where appropriate) the Lancashire Museum.

3 HEALTH AND SAFETY

- 3.1 **Risk Assessment:** OA North provides a Health and Safety Statement for all projects and maintains a Company 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). A written risk assessment will be undertaken in advance of project commencement and copies will be made available on request to all interested parties.
- 3.2 **Services and other constraints:** full regard will, of course, be given to all constraints (services etc) during the investigation, as well as to all Health and Safety considerations. As a matter of course the field team will use a Cable Avoidance Tool (CAT) and Signal Generator 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 investigation. If the client does not hold any service drawings, OA North can purchase these at cost on behalf of the client, although this may delay the commencement of the site work.
- 3.3 **Contamination:** 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. 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.
- 3.4 **Staff issues:** all project staff will be CSCS qualified, proof of which can be provided in the form of CSCS cards.
- 3.5 Staff welfare facilities will be provided and positioned on or adjacent to the site, in a location to be agreed with the client, which have been included in the costs.
- 3.6 **Fencing requirements:** it is assumed that there will be no public access to the site during the archaeological investigation. The archaeological groundworks area will be marked by barrier tape if necessary. Any other requirements for fencing at the client's request may be charged as a variation.
- 3.7 **Insurance:** 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.

4 METHOD STATEMENT

4.1 TRIAL TRENCHING

- 4.1.1 The programme of trial trenching will establish the presence or absence of any previously unsuspected archaeological deposits and, if established, will then test their date, nature, depth and quality of preservation. This will enable the outlined area to be adequately sampled. The following methodology is prepared in line with the LCAS brief.
- 4.1.2 **Trenching requirements:** the evaluation is required to undertake two stages of trenching. The first stage is a 5% sample of the groundworks area (1277m²), which is equivalent to 32 trial trenches measuring 20m by 2m, targeting anomalies seen in the geophysical survey (see Fig A). Depending on the results of this first stage, there will be a second stage of trenching for an additional maximum 5% (bringing the total area sampled by trial trenching to a maximum 10%), the amount to be agreed in consultation with LCAS, and will run continuous to the first stage.
- 4.1.3 **Access:** liaison for basic site access will be undertaken through the client. It is understood that there will be access for both pedestrian and plant traffic to the site.
- 4.1.4 **Methodology:** the topsoil overburden will be removed by a 13-ton tracked 360 excavator (fitted with a toothless ditching bucket) under archaeological supervision and, thereafter,

excavation will proceed in level spits of a maximum 0.25m each down to the surface of the first significant archaeological or natural deposit, whichever is encountered first. 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. All features of archaeological interest will be investigated and recorded unless otherwise agreed with LCAS. The trench 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 battering of the trench sides, which will require the agreement of a variation to the costing.

- 4.1.5 The trench will be excavated in a stratigraphical manner, whether by machine or by hand, and will be located by the use of GPS equipment, which is accurate to +/- 0.25m, or using an EDM Total Station, based on a site grid related to the national grid obtained from any available client base mapping. Altitude information will be established with respect to Ordnance Survey Datum.
- 4.1.6 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, whether by machine or by hand, will be undertaken with a view to avoiding damage to any archaeological features, which appear worthy of preservation *in situ*.
- 4.1.7 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. A Harris Matrix will be compiled during the fieldwork. Primary records will be available for inspection at all times.
- 4.1.8 Results of all field investigations will be recorded on *pro forma* context sheets. The site archive will include both a photographic record (black and white (35mm), and digital shots for illustration purposes) and accurate large scale plans and sections at an appropriate scale (1:50, 1:20 and 1:10). At least one long section of the trench will be recorded. All artefacts and ecofacts will be recorded using the same system, and will be handled and stored according to standard practice (following current IfA guidelines) in order to minimise deterioration.
- 4.1.9 **Contingency plan:** a contingency costing may also be employed for unseen delays caused by prolonged periods of bad weather, vandalism, discovery of unforeseen complex deposits and/or artefacts which require specialist removal, use of shoring to excavate important features close to the excavation sections etc. This has been included in the costings document and would be utilised in agreement with the client.

4.2 GENERAL PROCEDURES

- 4.2.1 **Environmental Sampling:** environmental samples (bulk samples of 40 litres volume, to be sub-sampled at a later stage) will be collected from stratified undisturbed deposits and will particularly target negative features (gullies, pits and ditches). An assessment of the environmental potential of the site will be undertaken through the examination of suitable deposits by the in-house palaeoecological specialist, who will examine the potential for further analysis. The assessment would include soil pollen analysis and the retrieval of charred plant macrofossils and land molluscs from former dry-land palaeosols and cut features. In addition, the samples would be assessed for plant macrofossils, insect, molluscs and pollen from waterlogged deposits. The costs for the palaeoecological assessment are defined as a contingency and will only be called into effect if good deposits are identified.
- 4.2.2 Advice will also be sought as to whether a soil micromorphological study or any other analytical techniques will enhance the understanding of the site formation processes, including the amount of truncation to buried deposits and the preservation of deposits within negative features. Should this be required the costs for analysis have been provided as a contingency.
- 4.2.3 **Faunal remains:** if there is found to be the potential for discovery of bones of fish and small mammals a sieving programme will be carried out. These will be assessed as appropriate by

OA north's specialist in faunal remains, and subject to the results, there may be a requirement for more detailed analysis. A contingency has been included for the assessment of such faunal remains for analysis.

- 4.2.4 **Human Remains:** any human remains uncovered will be left *in situ*, covered and protected. No further investigation will continue beyond that required to establish the date and character of the burial. LCAS, the client, and the local Coroner will be informed immediately. If removal is essential the exhumation of any funerary remains will require the provision of a Home Office license, under section 25 of the Burial Act of 1857. An application will be made by OA North for the study area on discovery of any such remains and the removal will be carried out with due care and sensitivity under the environmental health regulations. Any delays caused by unforeseen and complex excavation of inhumations may be subject to a variation to the cost of the contract and will be agreed with the client.
- 4.2.5 **Treatment of finds:** all finds 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.
- 4.2.6 All identified finds and artefacts will be retained, although certain classes of building material can sometimes be discarded after recording if an appropriate sample is retained on advice from the recipient museum's archive curator.
- 4.2.7 **Treasure:** 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.

4.3 REPORT

- 4.3.1 One copy of a written synthetic report will be submitted to the client, together with a digital copy on CD, within six to eight weeks of completion of the fieldwork. A digital copy (pdf) will be forwarded to LCAS for reference purposes following agreement with the client. The report will include;
- a site location plan related to the national grid
 - a front cover to include the planning application number, where relevant, and 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
 - a summary of the historical background of the study area
 - appropriate plans showing the location and position of features
 - a statement, where appropriate, of the archaeological impact
 - 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
- 4.3.2 **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.
- ### 4.4 ARCHIVE
- 4.4.1 The results of all archaeological work carried out will form the basis for a full archive to professional standards, in accordance with current English Heritage guidelines (2006). The project archive will include summary processing and analysis of all features, finds, which will be catalogued by context.

- 4.4.2 The deposition of a properly ordered and indexed project archive in an appropriate repository is essential and archive will be provided in the English Heritage Centre for Archaeology format and a synthesis will be submitted to the Lancashire HER, Preston (the index to the archive and a copy of the report). OA North practice is to deposit the original record archive of projects with the appropriate Record Office (in this instance, that at Preston).
- 4.4.3 All artefacts will be processed to MAP2 standards and will be assessed by our in-house finds specialists. The deposition and disposal of any artefacts recovered in the evaluation will be agreed with the legal owner and an appropriate recipient museum. Discussion regarding the museum's requirement for the transfer and storage of finds will be conducted prior to the commencement of the project, and LCAS will be notified of the arrangements made.
- 4.4.4 **OASIS:** an OASIS form will be completed as part of the works.

5 WORK TIMETABLE

5.1 FIELDWORK

- 5.1.1 **Stage 1:** it is estimated that the evaluation of the first batch of 5% trenches would take a five person team approximately eight days to complete, although this is dependant on weather conditions given that the proposed schedule for the work is during November/December.
- 5.1.2 **Stage 2:** monitoring of the project will be undertaken by LCAS, who will be afforded access to the site at all times. Therefore, ongoing consultation with LCAS during this period will enable a decision to be made as to the level of work required for the second phase of trenching. Therefore, the schedule of work for this element is currently unknown.
- 5.1.3 **Reinstatement:** should it be required to reinstate the area the subsoil and topsoil will be replaced in the correct order and the area roughly graded with a machine (no further reinstatement has been costed for). It is estimated that this element will take with between two to four additional days for one to two people to supervise the completion of the reinstatement of the trenches
- 5.1.4 **Report and archive:** approximately six to eight weeks will be required for the compilation of the report and archive following the completion of the fieldwork, unless more detailed excavation has been undertaken. In which case a programme of post-excavation will be necessary. An interim statement on any salient results can be produced sooner, if required. The archive will submitted within approximately six months.
- 5.1.5 **Holiday period:** please note that the above schedule does not include the period after Friday 23rd December 2011 and before 3rd January 2012, as OA North's office will be closed for the duration.
- 5.1.6 **Lead-in time and mobilisation:** OA North can execute projects at very short notice once an agreement has been signed with the client, but one to two weeks is usually required for the purposes of LCAS' monitoring.

6 STAFFING PROPOSALS

6.1 OA NORTH STAFF

- 6.1.1 The project will be under the overall charge of **Emily Mercer** (OA North project manager) to whom all correspondence should be addressed.
- 6.1.2 The fieldwork will undertaken under the direction of **Jeremy Bradley** (OA North project officer) who will be a highly experienced field archaeologist, used to working with on-site plant, and capable of running sites of all sizes. Jeremy will be accompanied by a team of five OA North staff of varying grades, depending on their role within the team. All OA North field staff hold CSCS cards and the vast majority are qualified to degree and often, to post-graduate level.
- 6.1.3 Health and Safety advice will be provided by **Murray Cook** (OA North Project Manager) who is NEEBOSH training.
- 6.1.4 Assessment of any finds from the excavation will be undertaken by OA North's in-house finds specialist **Christine Howard-Davis** (OA North Finds Manager). Christine has extensive knowledge of all finds of all periods from archaeological sites in northern England.

- 6.1.5 Assessment of any palaeoenvironmental samples will be undertaken by or under the auspices of **Elizabeth Huckerby MSc** (OA North project officer). Elizabeth has extensive knowledge of the palaeoecology of the North West through her work on the English Heritage-funded North West Wetlands Survey.

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APPENDIX 2: PROJECT DESIGN (ARCHAEOLOGICAL STRIP AND RECORD)

1 INTRODUCTION

1.1 PROJECT BACKGROUND

- 1.1.1 Lancaster University have been granted planning permission for the installation of a 2 MW wind turbine generator, with associated site access, on site access tracks, hardstanding areas, temporary construction and storage compound, cabling, and landscaping and environmental measures (planning ref 10/01061/FUL), on land to the east of the University's South West Campus, off Bailrigg Lane, Lancaster (centred on NGR SD 4904 5742). The planning permission is subject to a number of conditions, one of which (no 15) relates to the requirements for an archaeological investigation. AECOM, acting on behalf of the University, have consulted with the Lancashire County Archaeology Service (LCAS) who provided an informal brief requesting that the areas of groundworks be subject to a programme of strip, map and sample prior to any constructions commencing on site. The following project design, therefore, has been prepared in accordance with LCAS' brief.
- 1.1.2 Oxford Archaeology North (OA North) undertook an archaeological desk-based assessment and technical chapter for the purposes of an Environmental Impact Assessment to accompany the planning application in December 2009 and April 2010, respectively. The technical chapter was also informed by a magnetic gradiometer survey over the site. Originally, the application was for two turbine generators, but was revised for a single turbine generator later in 2010. OA North's input into the Environmental Statement was accordingly revised in September 2010, the aim being to inform the planning process as to the potential impact of the proposals on any cultural heritage resources.
- 1.1.3 The cultural heritage assessment showed that the site was within an area of late prehistoric to Romano-British potential: a Bronze Age axe findspot is known from within the study area, and there is further evidence for Bronze Age activity in the wider area; the putative route of the Lancaster to Overburrow Roman road passes to the north of the site, and a Romano-British settlement site (known as Barker House Farm) is located to the west of the southern end of the site. It was within the southern end of the site, in relative close proximity to the Romano-British settlement site that the geophysical survey located magnetic anomalies that may relate to contemporaneous activity.
- 1.1.4 The assessment showed that evidence for medieval activity in the area appears to be mainly agricultural in nature, with a field system and an area of ridge and furrow identified within the study area. This was confirmed by the geophysical survey that showed anomalies relating to such agricultural activity over the whole site. A further area of medieval/post-medieval ridge and furrow was also identified in the cultural heritage assessment, as well as the township boundary between Scotforth to the north and Ellel to the south believed to be medieval. Post-medieval sites include relict boundaries and tracks, former pits and ponds, a ditch and bank, a cropmark, a former woodland enclosure bank, and nine Grade II listed buildings in the vicinity.
- 1.1.5 The diversity of the period of the sites shows that the longevity of use of the area offers the potential for archaeological remains to be exposed or impacted upon during groundworks associated with the wind turbine generator.
- 1.1.6 Consequently, in accordance with LCAS' request, the county council's body responsible for advising local planning authorities on cultural heritage matters, the following project design has been compiled for a programme of strip, map and record. This will meet with all the requirements and standards of the Institute for Archaeologists (IfA) and, within the framework of MorRPHE (EH 2006), which represents a methodology, for fieldwork and post-excavation reporting. Should significant archaeological remains be identified during the programme of strip and record, it will be necessary to produce an updated project design for a programme of detailed archaeological excavation, archive processing, and post-excavation assessment, making allowance for any appropriate analysis and publication.

1.2 OXFORD ARCHAEOLOGY NORTH

- 1.2.1 Oxford Archaeology is an educational charity under the guidance of a board of trustees with over 35 years of experience in archaeology, and can provide a professional and cost-effective service. We are the largest employer of archaeologists in the country (we currently have more than 300 members of staff throughout three regional offices in Oxford, Cambridge and Lancaster), and can thus deploy considerable resources with extensive experience to deal with any archaeological obligations you or your clients may have.
- 1.2.2 Oxford Archaeology North has considerable experience of sites of all periods, having undertaken a great number of small and large scale projects throughout Northern England during the past three decades. Evaluations, assessments, watching briefs and excavations have taken place within the planning process, to fulfil the requirements of Clients and planning authorities, to very rigorous timetables.
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2 AIMS AND OBJECTIVES

2.1 ACADEMIC AIMS

- 2.1.1 The main research aim of the investigation, given the nature of the development, will be to establish the presence or absence of buried archaeological remains on the site in the areas to be affected by groundworks and, if present, compile a detailed record to mitigate their destruction during the course of the development in accordance with planning guidance PPS 5 (2010).

2.2 OBJECTIVES

- 2.2.1 The objectives of the project may be summarised as follows:
- the main objective of the archaeological investigation is to determine the presence or absence of any buried remains of archaeological interest within the proposed development area;
 - to investigate the nature, extent and significance of the anomalies identified in the geophysical survey towards the southern end of the site, in the area of the proposed soil storage, compound areas and access track;
 - to determine the presence or absence of any prehistoric or Roman-British remains;
 - to compile an archival record of any archaeological remains within the proposed development area.
- 2.2.2 To these ends, the following programme of archaeological work has been designed, in accordance with English Heritage (1991) and the Institute for Archaeologists (IfA) (2008a, b and 2010) standards and guidelines. The results will provide information as to whether more detailed works are required during the fieldwork or post-excavation stages of the project.

3 HEALTH AND SAFETY

- 3.1 **Risk Assessment:** OA North provides a Health and Safety Statement for all projects and maintains a Company 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). A written risk assessment will be undertaken in advance of project commencement and copies will be made available on request to all interested parties.
- 3.2 **Services and other constraints:** full regard will, of course, be given to all constraints (services etc) during the investigation, as well as to all Health and Safety considerations. As a matter of course the field team will use a Cable Avoidance Tool (CAT) and Signal Generator 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 investigation. If the client does not hold any service

drawings, OA North can purchase these at cost on behalf of the client, although this may delay the commencement of the site work.

- 3.3 **Contamination:** 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. 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.
- 3.4 **Staff issues:** all project staff will be CSCS qualified, proof of which can be provided in the form of CSCS cards.
- 3.5 Staff welfare facilities will be provided and positioned on or adjacent to the site, in a location to be agreed with the client, which have been included in the costs
- 3.6 **Fencing requirements:** it is assumed that there will be no public access to the site during the archaeological investigation. The archaeological groundworks area will be marked by barrier tape if necessary. Any other requirements for fencing at the client's request may be charged as a variation.
- 3.7 **insurance:** 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.

4 METHOD STATEMENT

4.1 INTRODUCTION

- 4.1.1 The following methodology is to archaeologically supervise the stripping of topsoil deposits down to the underlying natural or archaeological deposits, whichever is encountered first, to survey-in any archaeological features and deposits revealed, and then sample-excavate a proportion of these deposits so that their nature, quality, extent and importance can be established, and an appropriate programme of detailed investigation devised. This methodology will provide a flexible, iterative approach, to allow the implementation of an appropriate strategy for dealing with the remains.
- 4.1.2 The strip and record investigations will be undertaken in two stages: Stage 1 comprises the removal of topsoil and overburden material to expose the first archaeological horizon. All archaeological features thus exposed will be sufficiently cleaned to allow a pre-excavation plan to be produced. This will be used in consultation with LCAS to agree a strategy for the next stage; Stage 2 comprises the sample excavation and recording of any archaeology revealed in the Stage 1. The sample will be appropriate and proportional to the importance, quantity and complexity of the archaeology exposed, as well as its perceived research value.
- 4.1.3 **Stage 1:** the initial topsoil stripping will be designed to expose the character and nature of the archaeological remains, and assess their potential research value. The primary aims will be:
 - to expose archaeological remains across each of the three archaeological sites by the mechanical removal of topsoil and any masking subsoil;
 - to create a pre-excavation plan of exposed deposits;
 - to collect datable/activity specific material from the surface of exposed deposits;
 - to confirm the priorities for and level of further archaeological investigation.
- 4.1.4 It will not be necessary for the strip and record exercise to include groundworks continuing below the surface of the underlying natural geology once this has been demonstrated to be barren of archaeological remains.
- 4.1.5 **Stage 2:** further archaeological investigations will be designed to recover data sufficient to allow for "preservation by record" and establish the extent, date, character and significance of the archaeological remains. The primary aims will be:
 - to characterise the overall nature of the archaeological resource and to understand the process of its formation;

- to create a detailed plan of all archaeological features;
- to establish the character of those features in terms of cuts, soil matrices and interfaces;
- to recover, where appropriate, across the archaeological site representative ecofactual and palaeoenvironmental samples to provide evidence of function and past landuse;
- to establish in outline a dated sequence of structures and/or deposits and thus to define changes in site organisation over time.

4.2 STRIPPING (STAGE 1)

- 4.2.1 This will be undertaken by two teams of three archaeologists, plus one surveyor (depending on the complexity of the findings as the work progresses), working simultaneously: one to machine watch, and two to clean. It is anticipated that the maximum period of time required would be three weeks, or 105 man-days, although this is dependent upon the level of archaeology encountered and weather conditions.
- 4.2.2 During the investigation, two 21 tonne tracked mechanical excavators, or equivalent, fitted with a toothless ditching buckets will remove the topsoil under archaeological supervision over an area c 2.5ha, which includes all areas of intrusive groundworks, e.g. access tracks, compound areas, crane pad etc; no machine work will be carried out in the absence of an archaeologist. The topsoil will be stripped in a systematic and logical manner, to ensure that where practicable the excavators and machines used to remove spoil do not rut, compact or otherwise damage buried or exposed archaeological features and deposits by crossing previously stripped areas.
- 4.2.3 Stripping will proceed in successive spits until the uppermost horizons of significant archaeological remains have been revealed or, where these are absent, the natural substrate. All machine stripping will be carried out at a speed which will leave a good standard of finished surface, i.e. a smooth, even and clean surface, with a minimum of smearing, polishing and rutting. The stripped areas, including the edges if necessary, will be cleaned sufficiently to enhance the definition of features. The surface of the exposed natural deposits will be inspected for archaeological finds. Mechanically excavated spoil will be monitored in order to recover artefacts that will assist in meeting the aims of the project, before being removed to the designated storage area (see 4.2.5, below).
- 4.2.4 If appropriate, further machine excavation will be carried out after hand- excavation and recording of deposits has been completed. Such techniques are only appropriate for the removal of homogenous low-grade deposits, which may give a "window" into underlying levels; or for characterising features where there is no danger of removing important stratigraphic relationships and sufficient stratigraphy will remain to allow the excavation of hand-excavated samples.
- 4.2.5 It is assumed that the topsoil and any subsoil will need to be kept separate, therefore a significant proportion of the site will be stripped of topsoil before subsoil is removed. Spoil resulting from the stripping, and smaller quantities from the excavation, will be removed to an agreed area and tamped down by the mechanical excavator. Two options are available for the removal of the spoil and storage, given the linear nature of the site, and have been provided accordingly in the Costings section;
- OPTION 1: where it is necessary to restrict the storing of the spoil to designated areas (to be agreed with the client, although too far apart would affect the rate at which the plant could operate) along the route of the site, each team will be supplied with a mechanical excavator to remove the soil and two six tonne dumpers to alternatively run the spoil.
 - Option 2: this is the preferred method of working, being much more efficient. The spoil will be side-cast along the route of the site, which enables the two dumpers to be replaced by a second, but smaller, mechanical excavator to manage the spoil heaps.
- 4.2.6 **Significant archaeological discoveries:** during supervision of the machining, should archaeological remains be identified, the archaeologist will stop the machine so that they can examine what has been revealed. In the very rare event that the findings are extremely fragile, the archaeologist may cease excavation within that part of the site. The archaeological features or deposits will be demarcated with netlon fencing or candy tape. LCAS will be informed of the discovery of the features, and will be kept abreast of the results of subsequent exploratory

investigations. Ordinarily, the archaeologist will utilise the machine to strip the soil from around the feature of archaeological interest, gradually expanding this area until the limits of the archaeological find are defined.

4.3 MAPPING (STAGE 1)

- 4.3.1 The stripping team will pay close attention to achieving a clean-stripped surface, using the mechanical plant under close archaeological supervision, to reduce the need for extensive hand cleaning, which uses either hoes, shovel scraping, and/or trowels depending on the soil conditions. Limited areas may still require hand-cleaning, to clarify complex feature intersections. The principal aim of the initial work will be to produce a plan of the revealed features that can be used to define and quantify the second stage of formal and detailed excavation. Plans will be maintained as stripping progresses and features will be defined on the ground by a process of scoring around the feature, or other such methods. A general site plan will be produced at an appropriate scale to map the exposed features. The plan will be presented to LCAS and the level of Stage 2 works agreed. This consultation normally causes a short delay in the progress of the fieldwork.
- 4.3.2 It should be borne in mind that over the course of several days, archaeological features can 'weather-out' and become visible as the minerals within their fills oxidise (i.e. rust) upon exposure to the air. This means that features such as ditches and pits may only be visible after several days. For these reasons, it may be some days before an archaeologist is able to sign-off seemingly archaeologically blank areas of the site.
- 4.3.3 The area will be planned digitally by experienced surveyors utilising GPS to record the sites according to Ordnance Survey (OS) coordinates. A Leica differential GPS will be employed that uses real-time (RTK) corrections using mobile SmartNet technology to achieve an accuracy of $\pm 0.01\text{m}$. The accuracy of the OA North dGPS 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 coverage prevent the use of GPS, a EDM Total Station will be used, based on a site grid related to the national grid obtained from client base mapping.

4.4 SAMPLE EXCAVATION (STAGE 2)

- 4.4.1 This stage would follow a consultation period with LCAS. The number of archaeologists on site may increase, depending on the complexity of features requiring excavation. The research value of the archaeology and the necessity to achieve "preservation by record" in advance of the development will inform the second stage excavation sampling strategies. The exact sampling levels will be determined by the nature of the remains uncovered.
- 4.4.2 Any archaeological deposits will be excavated to the extent that they are sufficiently characterised and understood, this will involve excavating a representative range of elements such as postholes, ditches etc. Some sufficiently important features, e.g. hearths or burials, require 100% samples.
- 4.4.3 A selection of the features will be sample-excavated in order to ascertain depths, state of preservation, complexity, function, date and significance. All such investigation of intact archaeological deposits will be exclusively manual. Selected discrete features, such as pits and postholes, would be subject to 50% examination (i.e. half-sectioned), linear features will be subject to a 25% sample where the fill is found to be non-uniform, and 10% where the fill is uniform, 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 undertaken with a view to avoiding damage to any archaeological features, which appear worthy of preservation *in situ*.
- 4.4.4 For other features, such as working hollows, quarry pits, etc, all relationships will be ascertained. Further investigation will be a matter of on-site judgement, but should seek to define their extent, date and function. If features/deposits are revealed which need to be removed and which are suitable for machine excavation, such as large-scale dump deposits, large areas of cultivation soil, or substantial linear cut features, then they would be sample-excavated to confirm their

homogeneity before being removed by machine. Large post-medieval deposits/features will be fully recorded, such as cobbled or flagged surfaces, and machine-removed.

- 4.4.5 Cut features identified against the edges of the excavation will not be excavated below a safe working limit unless it is confirmed by LCAS that they are of exceptional importance.
- 4.4.6 Should any particularly deep-cut feature be revealed this will be manually excavated to a safe working limit. Thereafter, if LCAS 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') using a machine to allow further safe manual excavation.
- 4.4.7 **Significant Archaeological findings:** should, following the exploratory investigation of the features, it be found that the archaeological remains are highly significant, it is likely that LCAS would recommend a more formal process of excavation and a revision to the present project design, more accurately reflecting the nature of the discovery, and the attendant academic aims and objectives, both in terms of the fieldwork requirements, and of the post-excavation programme, which may include detailed analysis and publication. All such works would be submitted to the client as a resource variation to the present scope of works.
- 4.4.8 **Recording Strategy:** 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, and in accordance with IfA standards (2008b), with sufficient pictorial record (plans, sections, and photographs) to identify and illustrate individual features. Primary records will be available for inspection at all times. Results, comprising a full description and preliminary classification of features or materials revealed, will be recorded on *pro-forma* context sheets, and will be accompanied with sufficient pictorial record to identify and illustrate individual features. Sections will be generated and features will be planned accurately at appropriate scales. An indexed photographic record, utilising archivable monochrome print and digital imaging, will be undertaken simultaneously and all frames will include a visible, graduated metric scale. 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 IfA guidelines (2008a)) in order to minimise deterioration.
- 4.4.9 **Treatment of finds:** all finds 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. All identified finds and artefacts will be retained, although certain classes of building material can sometimes be discarded after recording if an appropriate sample is retained on advice from the recipient museum's archive curator.
- 4.4.10 **Treasure:** 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.
- 4.4.11 **Human Remains:** any human remains uncovered will be left *in situ*, covered and protected. No further investigation will continue beyond that required to establish the date and character of the burial. LCAS and the local Coroner will be informed immediately. If removal is essential, the exhumation of any funerary remains will require the provision of a Ministry of Justice licence, under section 25 of the Burial Act of 1857. It is likely that the discovery of human remains will necessitate a revision to this project design and to the present agreed resources. The removal of human remains will be carried out with due care and sensitivity under the environmental health regulations.
- 4.4.12 **Environmental sampling for plants, faunal remains, technological remains and artefacts:** the recovery of adequate samples of environmental material can provide useful information for an understanding of processes acting upon the site and for placing the site within a wider ecological context. Bulk sediment samples of c 40 litres will be collected from any suitable (undisturbed, uncontaminated and of non-modern origin) deposits or features of demonstrable anthropological origin for the recovery of plant and faunal remains.
- 4.4.13 **Samples for absolute dating:** should deposits, or material within deposits, suitable for radiocarbon assay be encountered, samples will be taken wherever possible. These would

include well-stratified artefacts and ecofacts, but also suitable material collected from environmental samples through flotation and, in the case of ceramics, from any bulk sieving, wet sieving and hand-collection.

- 4.4.14 **Contingency plan:** in the event of significant archaeological features being encountered during the watching brief, discussions will take place with the Planning Archaeologist or his representative, as to the extent of further works to be carried out. All further works would be subject to a variation to this project design. In the event of environmental/organic deposits being present on site, it would be necessary to discuss and agree a programme of palaeoenvironmental sampling and or dating with the Planning Archaeologist.

4.5 REPORT

- 4.5.1 The report is very much dependant on the requirements for Stage 2, and there may be a requirement for more detailed excavation and subsequent programme of post-excavation work, which is beyond the scope of this project design. However, if this is not the case, then a bound copy of the final report, together with a digital copy on CD, will be submitted to the client within approximately eight weeks (pending any specialist results) of the completion of the fieldwork. One digital copy will be forwarded to LCAS. The report will include:

- a site location plan related to the national grid;
- a front cover to include the planning application number and the NGR;
- a concise, non-technical summary of the results;
- the dates on which each phase of the programme of work was undertaken;
- an explanation to any agreed variations to the brief, including any justification for any analyses not undertaken;
- a description of the methodology employed, work undertaken and results obtained;
- plans and sections at an appropriate scale showing the location and position of deposits and finds located;
- monochrome and colour photographs as appropriate;
- a list of and dates for any finds recovered and a description and interpretation of the deposits identified;
- a description of any the results obtained;
- a summary of the impact of the development on any archaeological remains and, where possible, a model of potential archaeological deposits within as-yet unexplored environmental or other specialist work undertaken and areas of the development site;
- 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;
- a summary of the archive.

- 4.5.2 This report will be in the same basic format as this project design; a copy of the report can be provided on CD, if required. Recommendations concerning any subsequent mitigation strategies and/or further archaeological work following the results of the field evaluation will be provided in a separate communication.

- 4.5.3 **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 design, and should be treated as such. They are not suitable for publication as academic documents or otherwise without amendment or revision.

4.6 ARCHIVE

- 4.6.1 The results of all archaeological work carried out will form the basis for a full archive to professional standards, in accordance with current English Heritage guidelines (1991). The

project archive will include summary processing and analysis of all features, finds, which will be catalogued by context.

- 4.6.2 The deposition of a properly ordered and indexed project archive in an appropriate repository is essential and archive will be provided in the English Heritage Centre for Archaeology format and a synthesis will be submitted to the Lancashire HER, Preston (the index to the archive and a copy of the report). OA North practice is to deposit the original record archive of projects with the appropriate Record Office (in this instance, that at Preston).
- 4.6.3 All artefacts will be processed to MAP2 standards and will be assessed by our in-house finds specialists. The deposition and disposal of any artefacts recovered in the evaluation will be agreed with the legal owner and an appropriate recipient museum. Discussion regarding the museum's requirement for the transfer and storage of finds will be conducted prior to the commencement of the project, and LCAS will be notified of the arrangements made.
- 4.6.4 **OASIS:** an OASIS form will be completed as part of the works.

5 WORK TIMETABLE

5.1 STAGE 1

- 5.1.1 **Strip and map fieldwork:** the duration of the site work is likely to be approximately three weeks using a team of seven people, depending on weather conditions given that the proposed schedule for the work is during winter.
- 5.1.2 **Consultation:** following the fieldwork, one to two weeks will be required to draw up the digital plan of the archaeological features, which will be used during consultation with LCAS as to the second phase of site work, recording the necessary features. Monitoring meetings will be established with the client and the archaeological curator at the outset of the project. Monitoring of the project will be undertaken by LCAS, who will be afforded access to the site at all times.

5.2 STAGE 2

- 5.2.1 **Sample excavation and recording of features:** the time required to investigate any archaeological features is not possible to predict presently, given that the quantity and nature of any below ground remains is not currently known.
- 5.2.2 **Reinstatement:** should it be required to reinstate the area the subsoil and topsoil will be replaced in the correct order and the area roughly graded with a machine (no further reinstatement has been costed for). It is estimated that this element will be approximately one week, although this is dependant on the method of spoil storage (see 4.2.5, above) and the level of excavation during Stage 2. The cost has therefore been provided as a day rate, with the options provided corresponding with the method of stripping.
- 5.2.3 **Report and archive:** approximately eight weeks will be required for the compilation of the report and archive following the completion of the fieldwork, unless more detailed excavation has been undertaken. In which case a programme of post-excavation will be necessary. An interim statement on any salient results can be produced sooner, if required. The archive will be submitted within approximately six months.
- 5.2.4 **Lead-in time and mobilisation:** OA North can execute projects at very short notice once an agreement has been signed with the client, but one to two weeks is usually required for the purposes of LCAS' monitoring.

6 STAFFING PROPOSALS

6.1 OA NORTH STAFF

- 6.1.1 The project will be under the overall charge of **Emily Mercer** (OA North project manager) to whom all correspondence should be addressed. The fieldwork will be undertaken under the direction of an OA North project officer who will be a highly experienced field archaeologist, used to working within on-site plant, and capable of running sites of all sizes. Due to scheduling requirements it is not possible to provide these details at the present time. All OA North field staff hold CSCS cards and the vast majority are qualified to degree and often, to post-graduate level.

- 6.1.2 Health and Safety advice will be provided by **Murray Cook** (OA North Project Manager) who is NEEBOSH training.
- 6.1.3 Assessment of any finds from the excavation will be undertaken by OA North's in-house finds specialist **Christine Howard-Davis** (OA North Finds Manager). Christine has extensive knowledge of all finds of all periods from archaeological sites in northern England, and is a recognised expert in the study of post-medieval artefacts.

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