CARNFORTH BUSINESS PARK, CARNFORTH

Lancashire

Geophysical Survey and Archaeological Evaluation Report

Oxford Archaeology North

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SUMMARY

Strong Developments Ltd has proposed the development of land adjacent to the M6 motorway and Kellet Road, Carnforth, Lancashire (SD 50696 70304) for the purposes of constructing a number of industrial units. Following consultation, the Planning Archaeologist at Lancashire County Archaeology Service (LCAS) requested that a programme of geophysical survey and archaeological evaluation trenching be undertaken in order to support and inform the planning application. Consequently, Oxford Archaeology North (OA North) was commissioned to undertake the archaeological programme of work.

OA North submitted a Written Scheme of Investigation to the Planning Archaeologist, and following its approval, the subsequent programme of work was undertaken in March and April of 2011. The University of Liverpool carried out the initial element of the fieldwork, the geophysical survey, prior to the evaluation trenching taking place. The excavation of the evaluation trenches was, in part, informed by the results of the geophysical survey. This document presents the results of the work, and assesses the significance of the archaeological resource of the site.

Rapid research identified a local economy sustained primarily by agriculture from the medieval period up to, and during the nineteenth century. This was augmented during the post-medieval period by the production of iron at the local furnace, and gravel extraction. Cartographic evidence demonstrated that the township boundary between Carnforth and Nether Kellet crossed the development site, however, the evaluation trenching failed to produce any physical evidence for this. The geophysical survey identified a number of magnetic anomalies, but the negative results of the subsequent trenching suggest these may have had natural origins.

Archaeological remains were encountered within three trenches. Trench 8 contained a boundary ditch, most likely associated with Kellet Road prior to the construction of the M6 motorway. Trenches 16 and 20 contained the remains of a former field boundary, again, most likely of post-medieval origins.

Following the extensive nature of the evaluation trenching, the limited presence of archaeological remains, and stringent health and safety constraints, no recommendations for further work are offered.

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ACKNOWLEDGEMENTS

Oxford Archaeology North (OA North) would like to thank Strong Developments Ltd for commissioning the work, and JMP Architects Ltd for their support during the project.

Alastair Vannan compiled the historical background, Dr Ben Edwards of the University of Liverpool carried out the geophysical survey, and Andy Bates, assisted by Nate Jepson, undertook the evaluation trenching. Chris Howard-Davis commented on the finds assemblage resulting from the fieldwork. Andy Bates and Alastair Vannan compiled the report, and Mark Tidmarsh produced the drawings. Alison Plummer managed the project, and also edited the report.

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1. INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

1.1.1 Strong Developments Ltd has applied for planning permission to develop land adjacent to the M6 and Kellet Road for the purposes of constructing industrial units (Fig 1). Following consultation with the Lancashire County Archaeology Service (LCAS), the Planning Archaeologist advised that a programme of geophysical survey and archaeological evaluation trenching be undertaken at the site, in order to support and inform the planning application.

1.1.2 Oxford Archaeology North was commissioned to undertake the programme of work, which was carried out following the approval of a Written Scheme of Investigation (*Appendix 1*). The geophysical survey was undertaken by the University of Liverpool in March 2011, the results of which are presented in *Appendix 3* of this report. The evaluation trenches were excavated in March and April of 2011.

1.1.3 This document presents the results obtained from the programme of work, and assesses the significance of the archaeological resource of the site.

1.2 LOCATION, TOPOGRAPHY AND GEOLOGY

1.2.1 The site comprises an arrangement of three fields, and is located to the east of Carnforth, being bounded to the east by the M6 and to the south by Kellet Road (Fig 1). The land is currently pasture for sheep. Much of the surrounding agricultural landscape is also pasture, for dairy cattle, store cattle and sheep (Countryside Commission 1998, 73). The small to medium size fields of the area are bounded by limestone walls or hedgerows, with few hedgerow trees (*ibid*).

1.2.2 The site lies at approximately 25m above ordnance datum. The underlying solid geological deposits consist of Carboniferous Limestone; however, the general character of the study area is formed by Boulder Clay and Moraine drift deposits (British Geological Survey 1977).

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2. METHODOLOGY

2.1 WRITTEN SCHEME OF INVESTIGATION

2.1.1 All work was carried out in accordance with the Written Scheme of Investigation (*Appendix 1*), and was consistent with the relevant standards and procedures of the Institute for Archaeology (2008a), and generally accepted best practise.

2.1.2 The geophysical survey was undertaken in accordance with the methodology presented in *Section 3* of the Geophysical Survey report (*Appendix 3*).

2.2 HISTORIC RESEARCH

2.2.1 The sources consulted during the course of the historical research included the Lancashire County Archaeological Service (LCAS) Historic Environment Record (HER), historic mapping, and published and unpublished materials held by the Lancashire Record Office (LRO), in Preston, and the OA North library. The methodology conformed to the *Standards and Guidance for Archaeological Desk-Based Assessment* compiled by the Institute for Archaeologists (IfA 2001). The sources consulted included:

2.2.2 ***LCAS Historic Environment Record (HER), Preston:*** the Historic Environment Record (HER) in Preston has an extensive database of all known sites of archaeological interest within Lancashire.

2.2.3 ***Lancashire Record Office (LRO), Preston:*** the record office in Preston is the main source of primary information, including maps, plans, documents and aerial photographs, for Lancashire.

2.2.4 ***Oxford Archaeology North:*** OA North has an extensive archive of secondary sources, as well as numerous unpublished client reports on work carried out both as OA North and in its former guise of Lancaster University Archaeological Unit (LUAU). These were consulted where necessary.

2.3 EVALUATION TRENCHING

2.3.1 ***Trench configuration:*** in total, 20 trenches were excavated across the development area measuring either 25m or 50m in length and 2m wide (Fig 2). Three zones were excluded from the archaeological trial trenching for health and safety reasons. These included:

- *High pressure gas pipe:* an 8m exclusions zone was established to the north and west of the high-pressure gas pipe located along the southern and eastern extent of the proposed development site (Fig 2). The area between the gas pipe and the motorway, incorporating the public footpath was also excluded;

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- *Overhead pylons:* a 12m exclusion zone was established to the east and the west of the overhead wires which cross the centre of the development site, as measured from the outer arm of the pylons (Fig 2);
- *Public footpath:* a 6m exclusion zone was maintained from the public footpath, where it crosses the northern extent of the development site (Fig 2).

2.3.2 Six of the 20 trenches targeted the position of potential and/or known sites, these being geophysical anomalies, a former field boundary, and the alignment of the township boundary between Carnforth and Nether Kellet townships. The trenches were as follows:

- *Trench 9:* targeted a circular geophysical anomaly;
- *Trench 16:* was positioned to intercept a former field boundary;
- *Trench 17:* targeted three linear geophysical anomalies;
- *Trench 18:* targeted three linear geophysical anomalies and the aforementioned township boundary;
- *Trench 19:* targeted two linear geophysical anomalies, and the aforementioned township boundary;
- Trench 20: was positioned to intercept a former field boundary.

2.3.3 The remaining trenches were positioned to provide a good spatial distribution over the development area, providing a minimum 3% sample of the total area.

2.3.4 ***Excavation:*** each trench was excavated by a 13 ton 360° mechanical excavator, fitted with a 1.9m wide toothless bucket. The machine was operated under archaeological supervision, down to the depth of the archaeological deposits or natural geology, and thereafter all excavation was undertaken manually. All spoil was scanned for artefacts.

2.3.5 Recording comprised a full description and preliminary classification of the deposits and materials revealed on OA North *pro-forma* sheets. The trenches were located with a Total Station Theodoloite (TST) and tied to the Ordnance Survey Grid. Hand-drawn plans were produced in the field showing the contents of the trenches, with representative sections being drawn at a scale of 1:10 or 1:20 as appropriate. The field survey data was incorporated with digital map data in a CAD system to create the figures used in this report.

2.3.6 A full and detailed photographic record of the trenches was maintained, and general views of the trench locations were also produced. Photography was undertaken using 35mm cameras on archival black and white film and digital images using a 12 megapixel digital camera, which provided the illustrations for the report.

2.4 FINDS

2.4.1 The recovery of finds and sampling programmes were in accordance with current best practice (*eg* IFA 2008b, and other specialist guidelines) and subject to appropriate expert advice. Handling of finds, their management and storage during and after fieldwork followed professional guidelines (IFA

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2008b; UKIC 1984). All artefacts recovered from the evaluation trenches were retained for assessment.

2.5 ARCHIVE

2.5.1 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 (*Management of Research Projects in the Historic Environment*, 2006). The original record archive of the project will be deposited with the Lancashire Record Office in Preston.

2.5.2 The Arts and Humanities Data Service (AHDS) online database *Online Access to index of Archaeological Investigations* (OASIS) will be completed as part of the archiving phase of the project.

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3. HISTORICAL BACKGROUND

3.1 INTRODUCTION

3.1.1 The following section presents a summary of the historical and archaeological background of the general area. This is presented by historical period, and has been compiled in order to place the study area into a wider archaeological context.

Period	Date Range
Palaeolithic	30,000 – 10,000 BC
Mesolithic	10,000 – 3,800 BC
Neolithic	4,000 – 2,500 BC
Bronze Age	2,500 – 700 BC
Iron Age	700 BC – AD 43
Romano-British	AD 43 – AD 410
Early Medieval	AD 410 – AD 1066
Late Medieval	AD 1066 – AD 1540
Post-medieval	AD 1540 – *c*1750
Industrial Period	*c*AD1750 – 1901
Modern	Post-1901

Table 1: Summary of British archaeological periods and date ranges

3.2 THE PREHISTORIC PERIODS

3.2.1 ***Mesolithic:*** the Mesolithic was the latest cultural epoch in Britain during which people employed a subsistence strategy based wholly upon hunting, gathering, and fishing. There is substantial evidence for Mesolithic activity across Lancashire and Southern Cumbria, consisting primarily of flint scatters and evidence from pollen studies, (Hodgson and Brennand 2006, 25-6; Barrowclough 2008, 48-50). The nearest identified sites of Mesolithic date to Carnforth consist of scatters of worked flint, including waste material and tool types, which have been found in the vicinity of the River Lune at Halton, Crook O'Lune, and Hornby (Hodgson and Brennand 2006, 25-6; Barrowclough 2008, 48-50). Palaeoevironmanetal studies at Thwaite House Moss, approximately 1km to the south of Carnforth, have revealed pollen evidence that is strongly suggestive of woodland clearance by humans during the Mesolithic period, prior to 6000 BC (Swain and Swan 1995, 188-9).

3.2.2 It has been suggested that the functions of sites may have differed between lowland and upland areas, with lithic evidence suggesting that the lowland sites within Lancashire might have included base camps and smaller specialised sites (Cowell 1996, 28). The base camps are more likely to have been based in coastal areas, with specialised sites representing more mobile activities, such as kill sites, butchery sites, hunting stands, and bivouac sites (*ibid*). Although the study area currently lies within 2.5km of the coast at Morecambe Bay, reduced sea levels during the earlier part of the Mesolithic period meant that Morecambe Bay would not have been inundated until after 6000 BC (*see* Barrowclough 2008, 17-18).

3.2.3 ***Neolithic:*** Following the introduction of farming to the British Isles, from around 4000 BC, the Neolithic period saw the beginning of the widespread

construction of monumental architecture, although few such sites have been identified within Lancashire (*see* Middleton 1996, 41). An eighteenth-century historian called John Lucas provided some information on the history of Carnforth, as well as detailed descriptions of many of the surrounding fields. Lucas recorded the site of a tumulus at Hellbank (or Hallbank), which lay near a crossroads in the centre of Carnforth (Lucas 1744, 125). His description suggests that this monument might have been a long barrow (Farrer and Brownbill 1914, 165-70), and therefore, of Neolithic date.

3.2.4 Much settlement during this period appears to have been concentrated in the lowlands and the results of pollen studies from Thwaite House Moss suggest that the natural environment of the locality continued to be disturbed during the Neolithic period, with evidence of land clearance and cereal cultivation (Swain and Swan 1995, 189). Artefacts of Neolithic date have also been discovered within the vicinity of Thwaite House Moss (*op cit*, 184). At Borwick, to the north-east of Carnforth, Neolithic stone tools, including three kite-shaped arrowheads, were found in buried soil beneath a Bronze Age burial mound (Barrowclough 2008, 77). Two polished stone axes were found within 5km to the north-west of the site, at Storrs Moss (Middleton 1996, 40)

3.2.5 ***Bronze Age:*** the beginning of the Bronze Age in Britain, defined mainly by the introduction of the use of copper, developed gradually out of the preceding Neolithic during the mid third millennium BC (Parker Pearson 2000, 13). The tradition of monumental architecture continued into the Bronze Age, with new ritual and religious traditions developing that were associated with new monument types (*see* Hodgson and Brennand 2006, 41-5). A large dished earthwork at Manor Farm, in Borwick, to the north-east of the study area, was revealed to be a large Early Bronze Age funerary monument following excavation (Barrowclough 2008, 98) and a round cairn (NMR no. SD57 SW1) and a putative stone circle (NMR no. SD57 SW2) are situated 3km to the north of the study area, at Summerhouse Hill in Yealand Conyers.

3.2.6 Beginning in the Neolithic period, a tradition of the votive deposition of valuable objects in watery places, such as rivers and mosses, developed throughout the prehistoric period (Middleton 1996, 45). This practice was not restricted to Lancashire but was a phenomenon that occurred throughout Britain and Ireland (*ibid*; Waddell 2000, 47). Other conspicuous features in the natural landscape also appear to have been foci for artefact deposition and burial, such as caves sites, which include Dog Holes cave at Warton, to the north of the study area (*op cit*, 98). These may represent part of a movement towards the use of dry land for deposition during the Late Bronze Age (*op cit*, 155).

3.2.7 A series of hillforts in northern Lancashire, including a site at Warton Crag, have traditionally been considered to be of Iron-Age date, although increasing research suggests that many of the hillforts might have originated during the Late Bronze Age (*op cit*, 157; 180).

3.2.8 ***Iron Age:*** evidence for the Iron-Age period in northern Lancashire is under-represented within the archaeological record and, within the region, the period is poorly understood as a result of a lack of surviving material culture (*eg*

Hodgson and Brennand 2006, 52-3). The most conspicuous site types in this broad area are enclosed hill-top sites known as hillforts (*eg* Barrowclough 2008, 182-7), including Warton Crag, to the north of the development site, although these sites are not numerous (Hodgson and Brennand 2006, 52-3). In addition to these site-types, it is likely that other settlement sites that were not associated with such easily identifiable earthworks also existed.

3.3 THE HISTORIC PERIODS

3.3.1 ***Romano-British:*** although a Roman fort is known to the south of Carnforth, at Lancaster (*op cit*, 60), no Roman military sites or roads have as yet been identified in the immediate vicinity of Carnforth. Similar to the Iron Age, however, it is possible that less conspicuous site types, such as enclosed or unenclosed rural farmsteads of Romano-British date might remain undetected within the local area, particularly given the poor cropmark response of heavy subsoils in the North West, which inhibits the visibility of such sites on aerial photographs (Philpott 2006, 61).

3.3.2 ***Early medieval:*** evidence for early-medieval activity within the immediate vicinity of the study area appears to be largely confined to place-names with roots that pre-date modern English. It should, however, be considered that place-names are a linguistic trait and, alone, do not conclusively demonstrate the ethnic origins of those responsible for establishing any settlement (Newman 2006, 95). The nearby Old English *tun* place-names of Warton and Bolton le Sands may suggest early settlement foci that might pre-date Scandanavian incursions during the later part of the early medieval period (*see ibid*). Carnforth was certainly established prior to the Norman Conquest, and in 1066 comprised two ploughlands and formed part of Earl Tostig's lordship of Halton (Farrer and Brownbill 1914, 165-70). It was named Chreneforde in 1066 and this name may have derived from the location of the town on the southern bank of the river Keer and suggest that this was a fording point across the river (*ibid*). A burial found close to Carnforth has been assigned a putative early-medieval date (Newman 2006, 101).

3.3.3 ***Medieval period:*** Carnforth was recorded as Cherneforde in 1066, Cameford in 1212, and Kerneford in 1261 (Farrer and Brownbill 1914, 165-70). In *c* 1130-40 it comprised part of the feoffment made to William, son of Gilbert de Lancaster and later became part of the barony of Kendal (*ibid*). A chapel is suggested to have been present in Carnforth during the medieval period, which is referenced in field names such as Chapel Flat, although all of the present churches in this town are of industrial period or modern date (*ibid*). Lands in Carnforth were directly held and worked for the profit of the manorial lord and in 1344 64 acres in Carnforth comprised such demesne holdings, which were let to farm (*ibid*). In 1340 free warren, or hunting rights, were granted to William de Coucy, which included Carnforth (*ibid*). Carnforth was part of the parish of Bolton le Sands before being transferred to the parish of Warton in 1208 (*ibid*).

3.3.4 A possible medieval hall, which had completely disappeared by the early eighteenth century, but which survived in field names such as Hall Croft and

Hall Gate was discussed by Lucus in 1744 (Lucas 1744, 124). At this time the hall was traditionally thought to have been sited at the end of the common fields closest to the village. Lucas recorded the remains of some foundations in this area, which was known as the Huthwaites (*ibid*). However, there was no definitive evidence of the location of the hall, and the field-names that included the element 'hall' may have referred to parcels of land that were the property of the lord of the manor (Field 1981). It is possible that the name Carnforth Lodge related to a hunting lodge associated with the hall, but no evidence has been found to support this suggestion.

3.3.5 ***Post-medieval and industrial periods:*** Carnforth lay within the Parish of Warton until the twentieth century. The local economy appears to have been sustained primarily by agriculture until the nineteenth century and during the mid-eighteenth century five large common fields were present at the western side of the township (*see* Farrer and Brownbill 1914, 165-70). A hillock to the north of the canal known as the Mootlaw was said to have been used as a place of encampment by Charles II in August 1651 (*ibid*). The Ordnance Survey (OS) map of 1848 (Plate 1) showed the boundary between the townships of Carnforth and Nether Kellet running north-east/south-west through the centre of the development site.

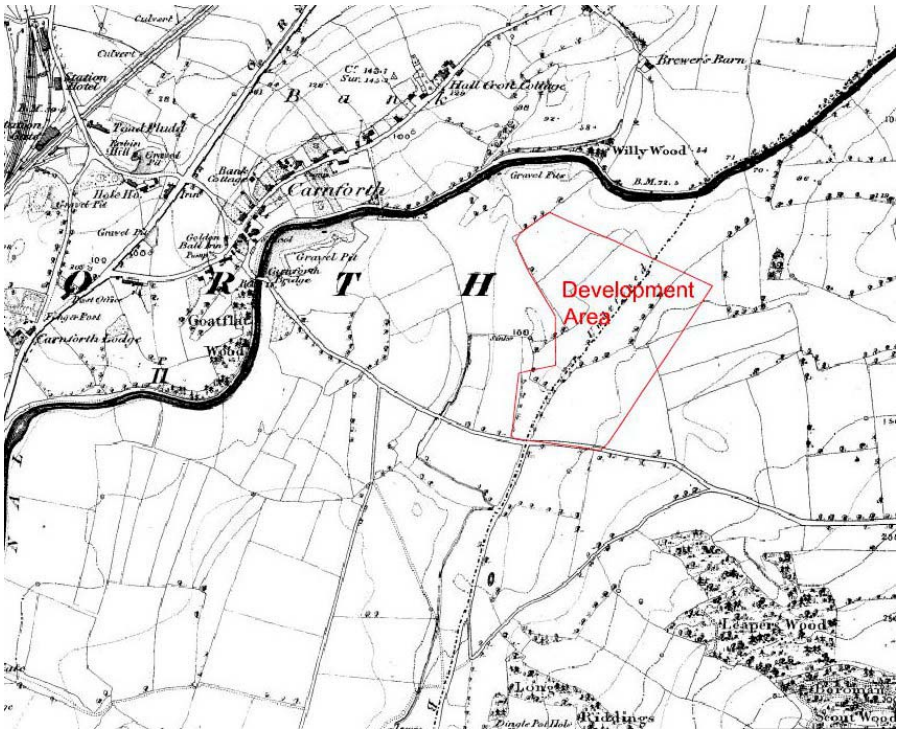

Plate 1: 1848 Ordnance survey map of the area

3.3.6 The northern side of the town was subject to numerous inundations during the seventeenth and eighteenth centuries with records from 1687 describing seven successive years of marine flooding over the marshes, which resulted in the course of the River Keer being shifted and tracts of marshes being washed away (*ibid*). In 1848, Lewis (1848, 523-6) described Carnforth as having been the scene of a 'great aquatic depredation' during the preceding century, which had resulted in several hundred acres of saltmarsh adjoining the southern bank

of the Keer being washed away. These marshes represented valuable resources as they provided food for cattle, turf for fuel, sods for garden walls and roofing, rushes for flooring, and seaweed for manure (Farrer and Brownbill 1914, 165-70).

3.3.7 Lewis also described a large and well-known sandstone quarry in Carnforth, which was used for the extraction of sand for mortar (*ibid*). Carnforth was well served with communication routes during the nineteenth century. The Lancaster and Kendal canal was constructed between 1791 and 1819 (Priestly 1969, 372-7) and a station serving the Lancaster and Carlisle railway had been established at Carnforth by 1848 (*ibid*). The current route of the A6 had also been established by 1848 (OS 1848; Plate 1). These amenities are likely to have aided the decision to develop local iron furnaces in 1864, which provided the primary source of employment for the town at this time (Farrer and Brownbill 1914, 165-70). The local economy was augmented by the extraction of gravel, which included a pit adjacent to the northern boundary of the development site by 1891 (OS 1891; Plate 2), and agriculture remained prominent, with a customary cattle fair being held each year on the last Friday of April (*ibid*).

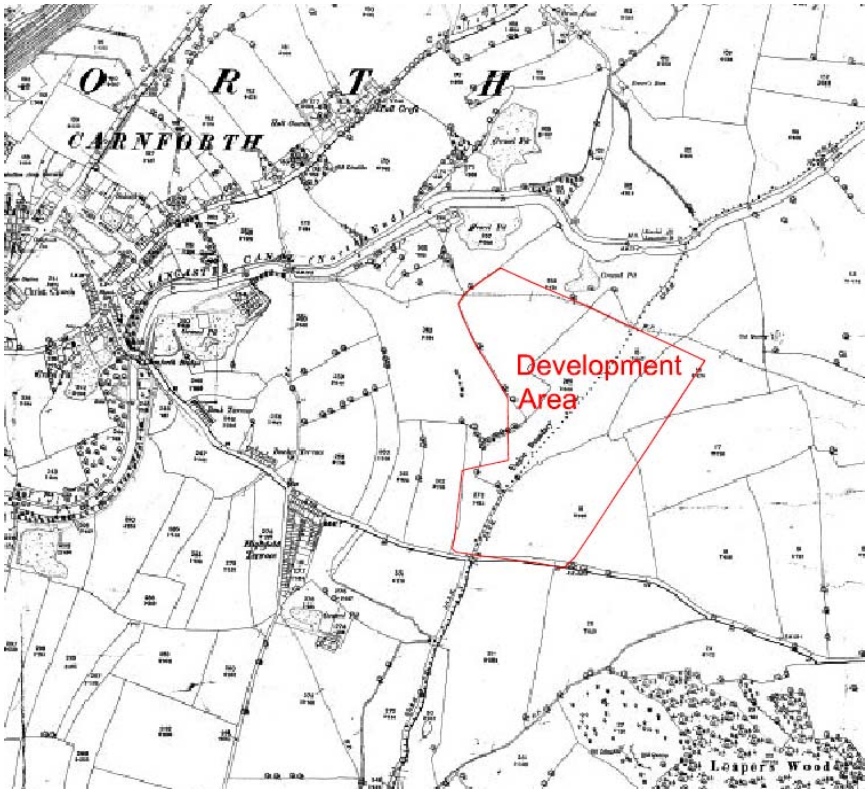

Plate 2: 1891 Ordnance survey map of the area

3.3.8 The impact of the growing iron industry on the population of Carnforth was conspicuous in the depiction of the area on maps during the nineteenth century. The first edition OS mapping of 1848 showed the locality of the development site as an agricultural landscape of field systems and dispersed farmsteads. By the time of the production of the OS map of 1891 (Plate 2), the growth of the local population was reflected in the expansion of housing from

the nucleus of Carnforth into the surrounding landscape, with terraced rows, such as Bowker and Highfield Terraces, having been constructed to the west of the development site.

3.3.9 ***Modern period:*** Carnforth continued to grow during the later nineteenth and early twentieth centuries and the OS maps from this period (OS 1910; Plate 3, OS 1913, OS 1916-19, OS 1930) showed a conspicuous pattern of development radiating from the centre of Carnforth. By the production of the OS map of 1930 the iron works appear to have closed and fewer buildings were visible within this area and they were no longer labelled as iron works. The motorway was constructed to the east of Carnforth, and immediately to the east of the development area, between the publication of the OS maps of 1956 and 1962-4, continuing the practice of the establishment of north/south communication routes along this narrow strip of low-lying land between Morcambe Bay to the west and the rising lands to the east. Further housing and a cemetery had been established to the west of the development area by 1964 (OS 1962-4) and an industrial estate had been established adjacent to the western side of the site by 1988 (OS 1988). A gas valve station had also been established within the southern portion of the site by this time. Between 1962-4 and 1988 a field boundary within the development site was removed and this was clearly visible on the gradiometer survey plot prepared by Ben Edwards (Appendix 3).

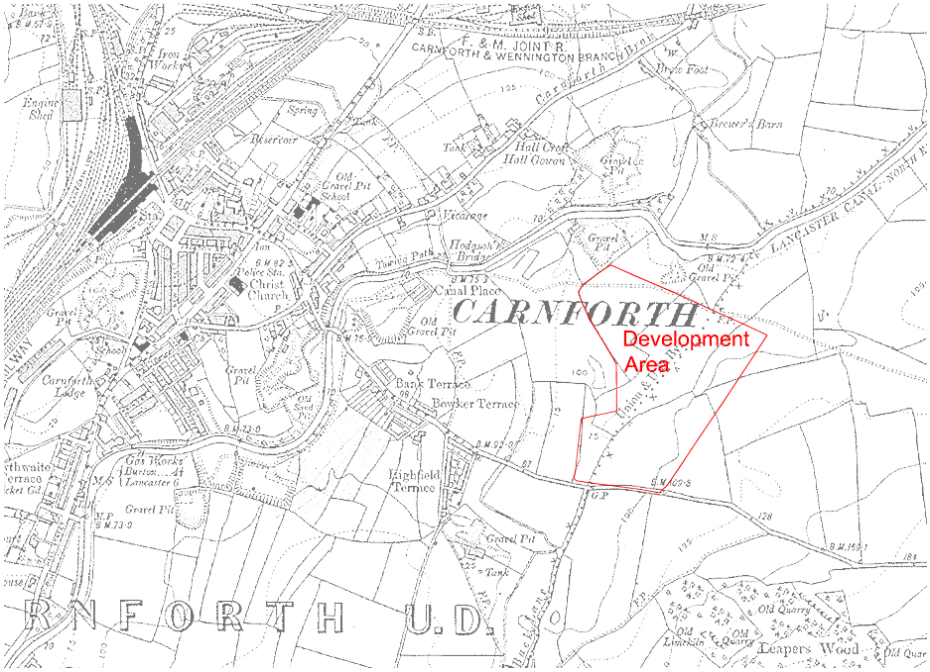

Plate 3: 1910 Ordnance survey map of the area

4. EVALUATION RESULTS

4.1 INTRODUCTION

4.1.1 In total, 20 trenches each measuring either 25m or 50m in length and 2m wide were excavated across the development area (Fig 2), in accordance with the Written Scheme of Investigation (*Appendix 1*) and the methodology (*Section 2.3*). An overview of the results is presented below; the detailed descriptions of each trench and any archaeological features observed are presented in *Appendix 2*.

4.2 TRENCH SUMMARY

4.2.1 Of the 20 trenches excavated only three – Trenches 8, 16 and 20 contained archaeological remains. In all cases, the topsoil and subsoil (*Appendix 2*) were removed to expose a glacial till and, where necessary, a sondage was excavated to confirm the extent of the natural geology.

4.2.2 Trench 1 was aligned north-east/south-west in the south-western quarter of the development site (Fig 2; Plate 4). It measured 50m in length and was excavated to a maximum depth of 0.70m.

Plate 4: Trench 1, looking south

4.2.3 Trench 2 was aligned north-west/south-east in the south-western quarter of the development site (Fig 2; Plate 5). It measured 25m in length and was excavated to a maximum depth of 1.10m.

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Plate 5: Trench 2, looking south-east

4.2.4 Trench 3 was aligned north-east/south-west in the north-western part of the development site (Fig 2; Plate 6). It measured 50m in length and was excavated to a maximum depth of 0.99m.

Plate 6: Trench 3, looking south-west

4.2.5 Trench 4 was aligned north-east/south-west in the north-western part of the development site (Fig 2; Plate 7). It also measured 50m in length and was excavated to a maximum depth of 0.74m.

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Plate 7: Trench 4, looking south-east

4.2.6 Trench 5 was aligned north- west/south- east in the north-western part of the development site (Fig 2; Plate 8). It measured 50m in length and was excavated to a maximum depth of 0.72m.

Plate 8: Trench 5, looking south

4.2.7 Trench 6 was aligned north-west/south-east in the north-western corner of the development site (Fig 2; Plate 9). Measuring 50m in length, it was excavated to a depth of 0.57m.

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Plate 9: Trench 6, looking south-east

4.2.8 Trench 7 was aligned east/west in the south-western part of the development site (Fig 2; Plate 10). Measuring 25m in length, it was excavated to a maximum depth of 1.14m.

Plate 10: Trench 7, looking east

4.2.9 Trench 8 was aligned north- east/south-west in the south-western corner of the development site (Fig 2; Plate 11). The trench measured 50m in length and was excavated to a maximum depth of 1.04m at its northern end, and 0.76m at its southern end.

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Plate 11: Trench 8, looking south

4.2.10 In the southern half of the trench on an east/west aligned ditch, ***803***, was observed (Fig 3; Plate 9). It was filled with a single deposit, ***802***, an accumulation of sediment derived from the surrounding eroding topsoil. A single sherd of nineteenth to early twentieth century pottery was recovered from deposit ***802*** (*Section 4.22*). The ditch almost certainly comprised part of the northern boundary of Kellet Road, which was present prior to the construction of the M6 motorway (Fig 2 and Plate 3). The motorway construction works involved raising the level of Kellet Road to bridge the motorway.

*Plate 12: Ditch **803**, looking east*

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4.2.11 Trench 9 was aligned north-east/south-west in the north-western corner of the development site (Fig 2; Plate 13). It measured 50m in length and was excavated to a maximum depth of 1.28m.

Plate 13: Trench 9, looking north-east

4.2.12 Trench 10 was aligned north-east/south-west in the north-western quarter of the development site (Fig 2; Plate 14). It measured 50m in length and was excavated to a maximum depth of 0.46m.

Plate 14: Trench 10, looking south-west

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4.2.13 Trench 11 was aligned north-east/south-west close to the centre of the development site (Fig 2; Plate 15). It measured 25m in length and was excavated to a maximum depth of 0.40m.

Plate 15: Trench 11, looking north-east

4.2.14 Trench 12 was aligned east/west close to the southern limit of the development site (Fig 2; Plate 16). The trench measured 25m in length and was excavated to a maximum depth of 0.90m.

Plate 16: Trench 12, looking east

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4.2.15 Trench 13 was aligned north-east/south-west in the southern part of the development site (Fig 2; Plate 17). The trench was located on a natural slope. It measured 25m in length, and was excavated to a maximum depth of 0.70m.

Plate 17: Trench 13, looking north-east

4.2.16 Trench 14 was aligned north-east/south-west in the south-eastern part of the development site (Fig 2; Plate 18). The trench was located on a naturally undulating area of ground. The trench measured 25m in length and was excavated to a maximum depth of 0.50m.

Plate 18: Trench 14, looking south

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4.2.17 Trench 15 was aligned north-west/south-east in the south-eastern part of the development site (Fig 2; Plate 19). It measured 50m in length and was excavated to a depth of 0.50m. Within the southern 25m of the trench a concentration of stone was located just below the turf. It was too loose to comprise a road or path, and was considered to be the remains of a former spoil heap possibly associated with the insertion of the gas pipe or construction of the motorway. In section it appeared simply as a greater abundance of stones within the soil horizon (Plate 20). A sondage was excavated at the northernmost end of the trench to a depth of 0.50m to test the geology. No archaeological significant features or horizons were located within the trench.

Plate 19: Trench 15, looking north-east

Plate 20: South-west facing section of Trench 15, looking north-east

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4.2.18 Trench 16 was aligned north-west/south-east to the east of the central area of the development site (Fig 2; Plate 21). The trench measured 50m in length and was excavated to a maximum depth of 1.20m. It was positioned across a former north-east/south-west aligned field boundary bank. The field boundary, which was present as a prominent lynchet-like earthwork, was previously lined with elm trees and hawthorn.

Plate 21: Trench 16, looking south-east, showing the field boundary in the background

4.2.19 Above the glacial till, ***1602***, and within the line of the boundary, a layer of stone, ***1601***, measuring 0.85m thick was present (Plate 22). The trench at this location measured 1.2m in depth, and due to the very loose nature of ***1601*** was highly prone to collapse. For health and safety reasons, a rapid record of the section was made from current ground level. The stone may have resulted from a natural accumulation of material along the slope of the field, although it is more likely to be erosion material from the field boundary bank. The bank was also observed in Trench 20 (*Section 4.2.23, below*) In total, six oyster shells, an animal bone, and a fragment of nineteenth to early twentieth century glass was recovered from layer ***1601***.

*Plate 22: South-west facing section of Trench 16, showing deposit **1601**, looking north-east*

4.2.20 Trench 17 was aligned east/west in the north-eastern part of the development site (Fig 2; Plate 23). The trench measured 50m in length and was excavated to a maximum depth of 1.10m.

Plate 23: Trench 17, looking east

4.2.21 Trench 18 was aligned east/west in the north-eastern part of the development site (Fig 2; Plate 23). It measured 50m in length and was excavated to a maximum depth of 0.75m.

Plate 24: Trench 18, looking east

4.2.22 Trench 19 was aligned north-east/south-west in the north-eastern part of the development site (Fig 2; Plate 25). It measured 50m in length and was excavated to a maximum depth of 0.95m.

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Plate 24: Trench 19, looking south-east

4.2.23 Trench 20 was aligned north-west/south-east in the north-eastern part of the development site (Fig 2; Plate 26). It was located across the line of a former north-east/south-west aligned field boundary (*Section 4.2.19*). The trench measured 50m in length and was excavated to a maximum depth of 1.0m.

4.2.24 Topsoil, ***2000***, was excavated to a depth of 0.28m whereupon glacial till, ***2002***, was located. The former field boundary was evident as a concentration of stone, ***2001***, within the topsoil (Fig 4; Plate 27). This feature also survives as a low earthwork to the north of the development area. No finds were recovered from ***2001***. Pit ***2003*** was located at the north-western end of the trench, and machine-excavated to a depth of 1.10m (Plate 28). This had every appearance of being a very recent event, almost certainly a geotechnical pit.

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Plate 25: Trench 20, looking south-east

*Plate 26: North-east facing section of Trench 20, showing field boundary **2001**, looking south-west*

*Plate 27: North-east facing section of Trench 20, showing a geotechnical pit, **2003**, looking south-west*

4.3 FINDS

4.3.1 In all, 19 fragments of artefacts and ecofacts were recovered, ten of which were from topsoil (***200***, ***400***, ***500***, ***600***, and ***1700***) and can be dated to the late nineteenth or early twentieth century.

4.3.2 Stratified material comprised a single small fragment of black-glazed redware from ***802***, which falls into the same date range, and a fragment of a colourless leaded glass from ***1601***. This is also most likely to date from the late nineteenth to early twentieth century, although there is a possibility that it could be marginally earlier. The remainder of the finds from ***1601*** were a bone (first phalanx) of a sheep or goat, and six oyster shells.

4.3.3 The finds have no further potential for analysis and can be discarded.

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5. DISCUSSION

5.1 CONCLUSION

5.1.1 In total, 20 trenches were excavated across the proposed development site. Archaeological remains were present within three of the trenches (Trenches 8, 16 and 20). Despite the rapid research having highlighted the potential for remains from the prehistoric to medieval periods to be present, the few archaeological features observed are likely to date from the post-medieval period.

5.1.2 A boundary ditch containing nineteenth to early twentieth century pottery was observed in Trench 8. This almost certainly formed part of the boundary with Kellet Road, prior to changes made to the surrounding area when the M6 motorway was constructed in the 1950s. Trenches 16 and 20 were positioned over a former field boundary, which had taken advantage of a natural rise in the downslope of the site. A deposit of stone containing nineteenth to early twentieth century glass was located within Trench 16. It is likely that this stone represented the original the field boundary bank. The base of the stone bank was also observed in Trench 20.

5.1.3 The results of the rapid research do not indicate the presence of anything other than agricultural-type features within the study area, and these mostly being of post-medieval date, although the township boundary is likely to be earlier. This suggests that the potential for further archaeological remains to be present is low. The results of the fieldwork show that the archaeological remains present within the development site are of a low significance, being only of local importance. On this basis, no recommendations for further work are offered.

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6. BIBLIOGRAPHY

6.1 PRIMARY SOURCES

OS 1848, 6" : 1 Mile, Lancashire sheet 24, first edn

OS 1891, 25" : 1 Mile, Lancashire sheet 24.8, first edn

OS 1910, 6" : 1 Mile, Lancashire sheet 24, third edn

OS 1913, 25" : 1 Mile, Lancashire sheet 24.8, third edn

OS 1916-19, 6" : 1 Mile, Lancashire sheet 24

OS 1930-8, 6" : 1 Mile, Lancashire sheet 24

OS 1956, 6" : 1 Mile

OS 1962-4, 6" : 1 Mile

OS 1988, 1 : 10000

6.2 SECONDARY SOURCES

Barrowclough, D, 2008 *Prehistoric Lancashire*, Stroud

British Geological Survey, 1977 *1:625,000 Geological Survey, South Sheet (Quaternary),* 1st edn, Southampton

Countryside Commission, 1998 *Countryside Character, Volume 2: North West*, Cheltenham

Cowell, R, 1996 The Upper Palaeolithic and Mesolithic, in R Newman (ed) *The archaeology of Lancashire, present state and future priorities*, Lancaster, 19-34

English Heritage, 2006 *Management of Research Projects in the Historic Environment (MoRPHE)*, London

Farrer, W, and Brownbill, J, (ed), 1914 *The Victoria History of the County of Lancaster*, **8**, London

Field, J, 1971 *English place-names, a dictionary*, Newtown Abbot

Hodgson, J and Brennand, M, 2006 The prehistoric period resource assessment, in M Brennand (ed) 2006 *The Archaeology of North West England: an archaeological research framework for North West England: volume 1, resource assessment*, Archaeol North West, **8**, Manchester, 23–58

Institute for Archaeologists (IfA), 2001 *Standards and Guidance for Archaeological Desk-Based Assessment*, Reading

Institute for Archaeologists (IfA), 2008a *Standards and Guidance for Archaeological Field Evaluation*, Reading

Institute for Archaeologists (IFA), 2008b *Standards and guidance for the collection, documentation, conservation and research of archaeological materials*, Reading

Lewis, S, (ed), 1848 *A Topographical Dictionary of England*, London

Lucas, J, 1744 *A Topographical Description of the Parish of Warton, and Some Parts Adjacent in the County Palatine of Lancaster and the Diocese of Chester, 1710-44*, J Rawlinson Ford and JA Fuller-Maitland (eds), Kendal

Middleton, R, 1996 The Neolithic and Bronze Age, in R Newman (ed) *The archaeology of Lancashire, present state and future priorities*, Lancaster, 35–60

Newman, R, 2006 The early medieval period resource assessment, in M Brennand (ed) 2006 *The Archaeology of North West England: an archaeological research framework for North West England: volume 1, resource assessment*, Archaeol North West, **8**, Manchester, 91-114

Parker Pearson, M, 2000 *Bronze Age Britain*, London

Philpott, R, 2006 The Romano-British period resource assessment, in M Brennand (ed) 2006 *The Archaeology of North West England: an archaeological research framework for North West England: volume 1, resource assessment*, Archaeol North West, **8**, Manchester, 59-91

Priestly, J, 1969 *Navigable rivers and canals*, Newton Abbot

Swain, and Swan, 1995 Thwaite House Moss, in R Middleton, CE Wells, and E Huckerby 1995 *The wetlands of North Lancashire*, North West Wetlands Survey, **3**, 183-9

United Kingdom Institute for Conservation (UKIC), 1984 *Environmental standards for the permanent storage of material from archaeological sites*, London

Waddell, J, 2000 *The prehistoric archaeology of Ireland*, Bray

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7. ILLUSTRATIONS

7.1 LIST OF FIGURES

Figure 1: Site location map

Figure 2: Trench location plan

Figure 3: Plan and west facing section of Trench 8, showing ditch ***803***

Figure 4: North-east facing section of Trench 20, showing field boundary ***2001***

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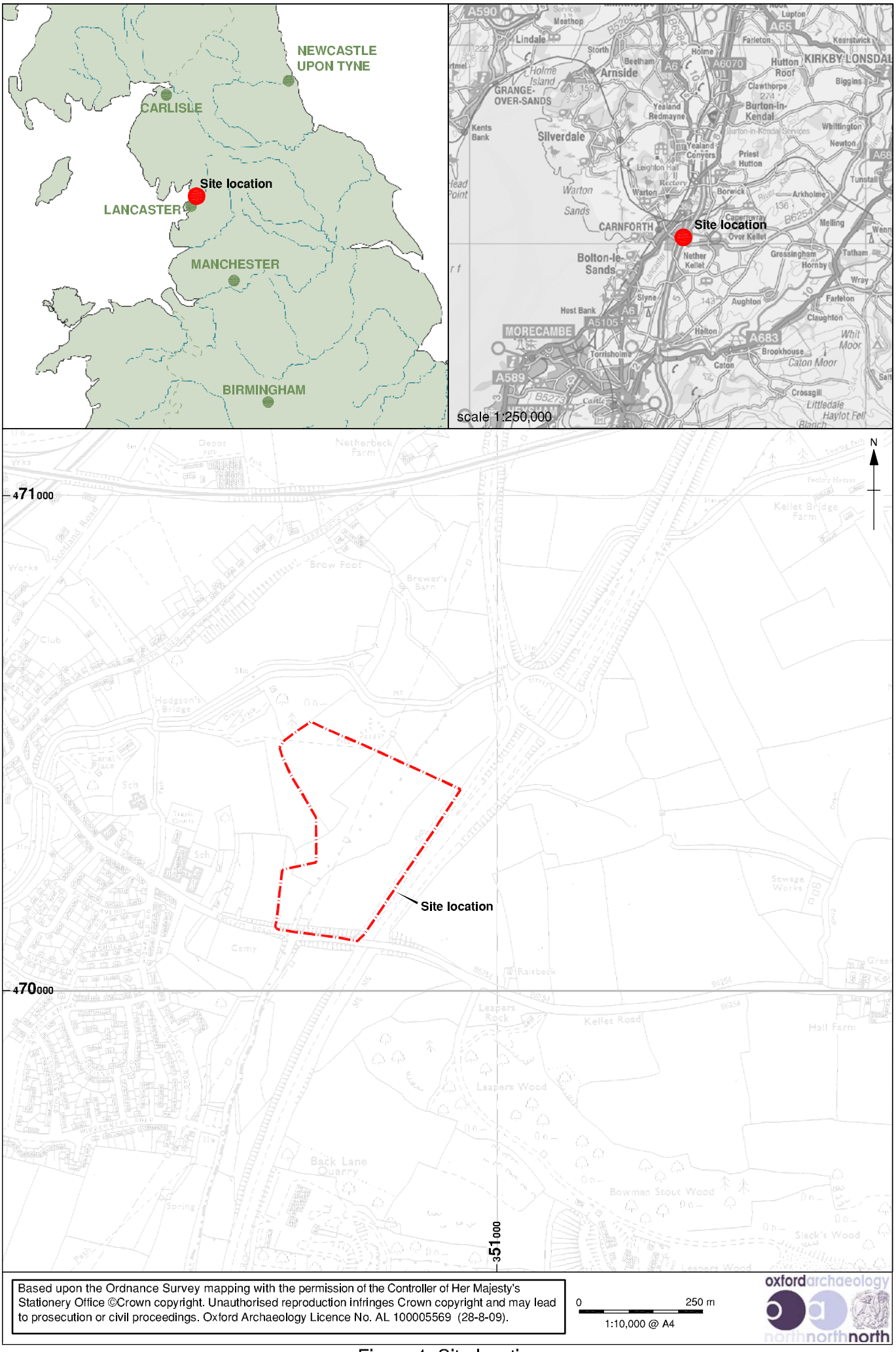

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Figure 1: Site location

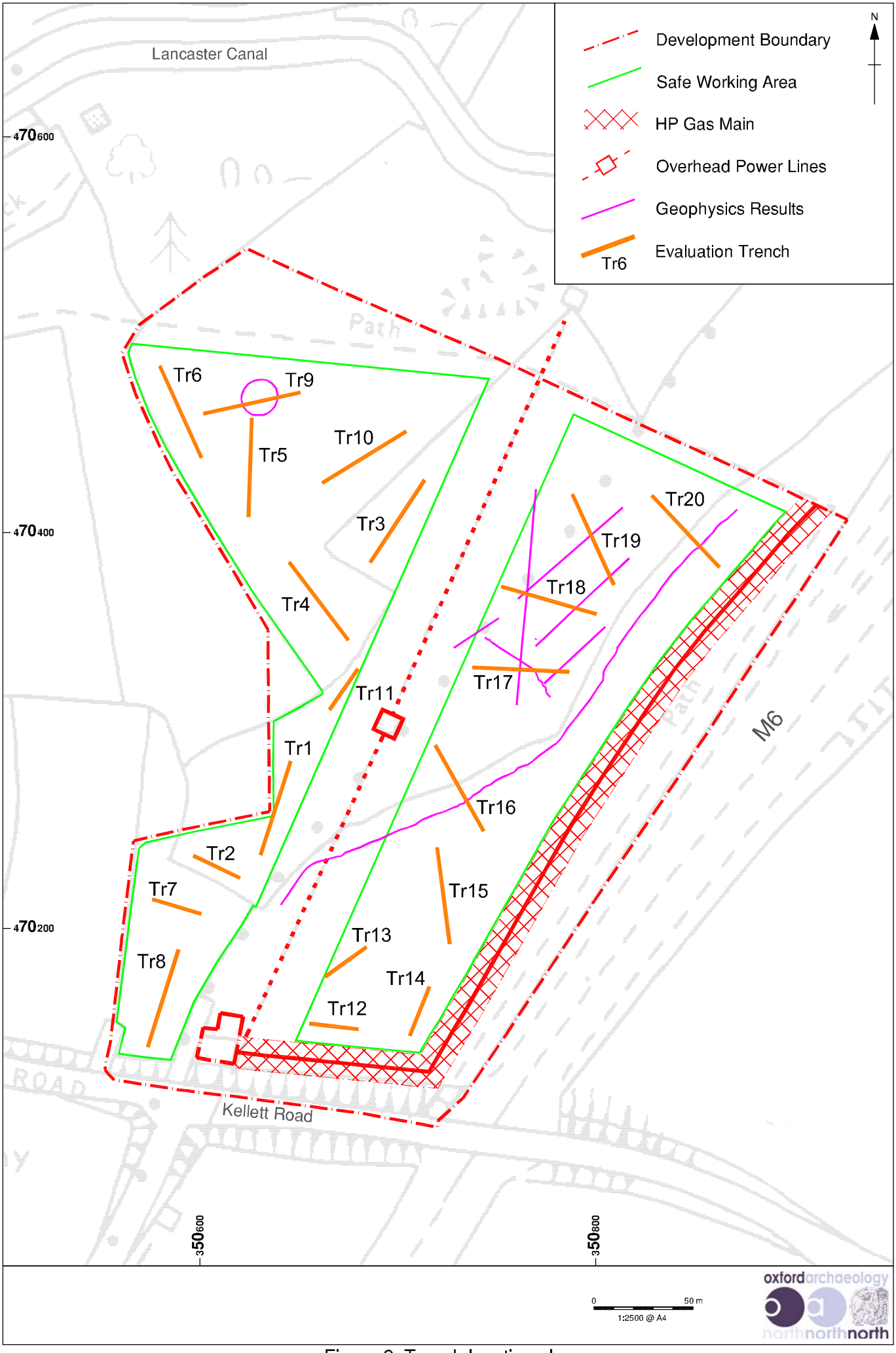

Figure 2: Trench location plan

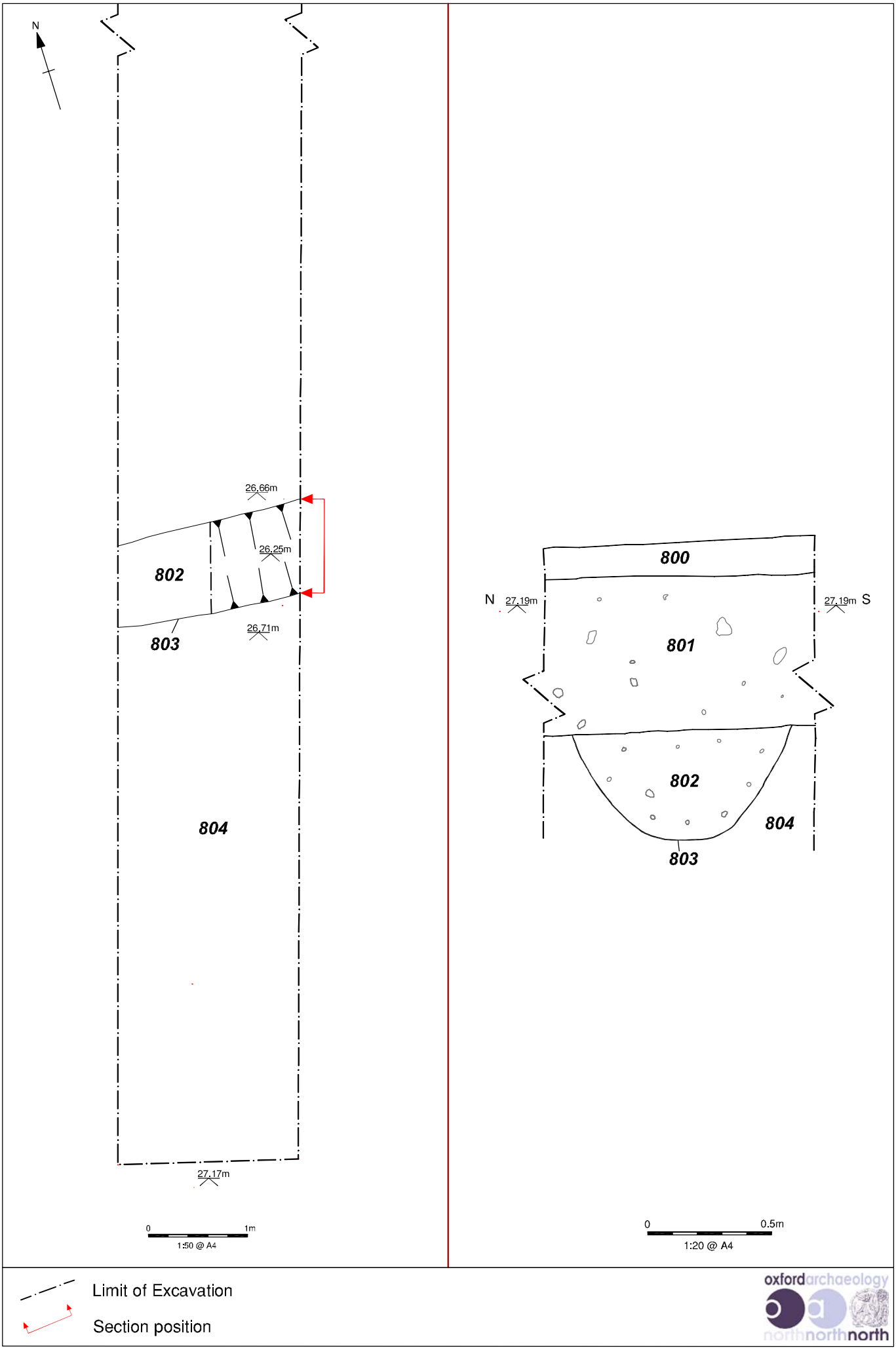

Figure 3: Plan and west-facing section of Trench 8, showing ditch ***803***

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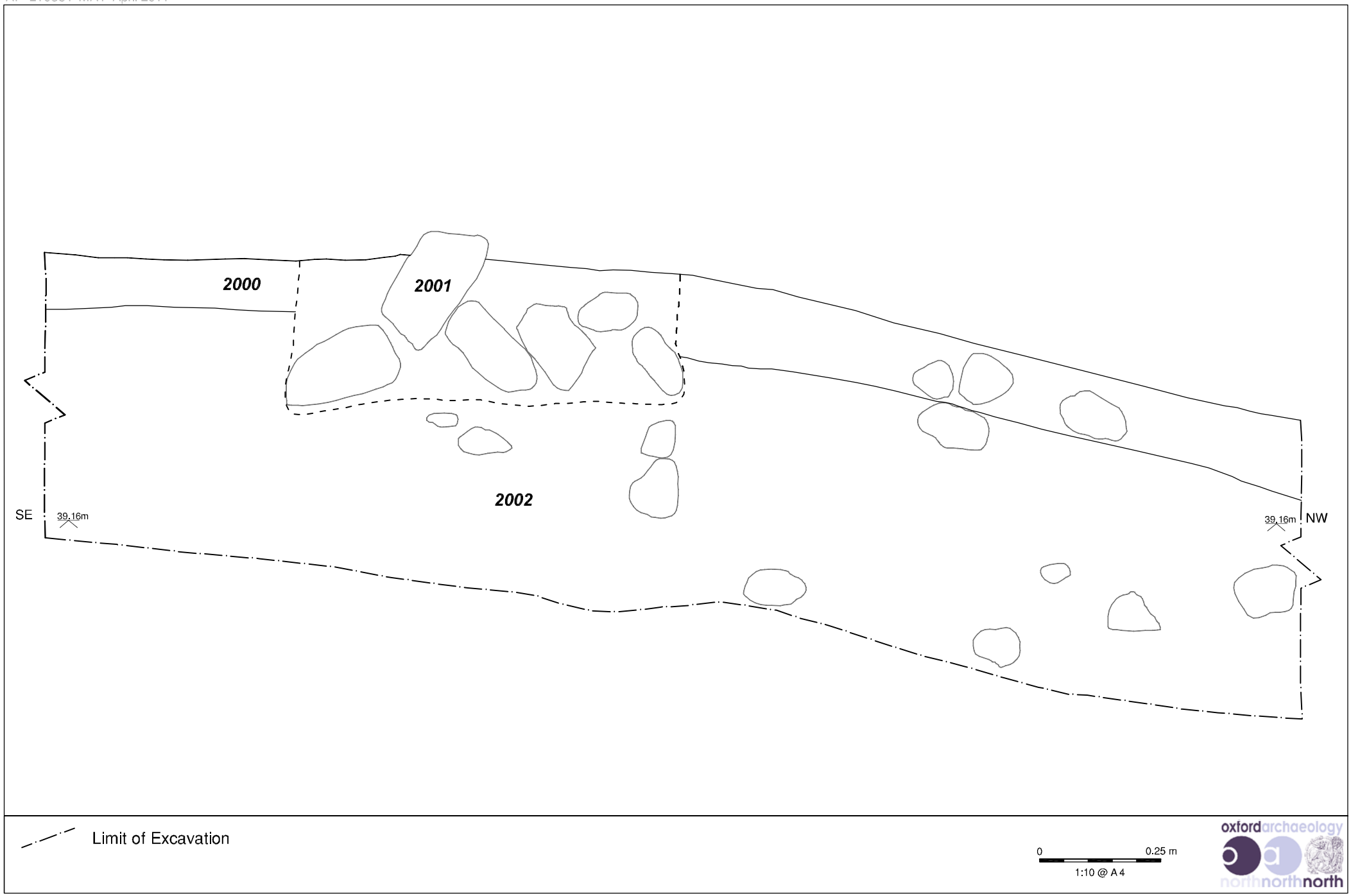

Figure 4: North-east facing section of Trench 20, showing field boundary ***2001***

APPENDIX 1: WRITTEN SCHEME OF INVESTIGATION

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CARNFORTH BUSINESS PARK, CARNFORTH

LANCASHIRE

Archaeological Evaluation Written Scheme of Investigation

Oxford Archaeology North

March 2011

Strong Developments Ltd

OA North Ref: L10351
NGR: SD 50696 70304

1. INTRODUCTION

1.1 PROJECT BACKGROUND

1.1.1 Strong Developments Ltd has requested that Oxford Archaeology North (OA North) submit proposals for a programme of evaluation trenching at a site outlined for industrial development adjacent to Carnforth Business Park, Carnforth, Lancashire.

1.1.2 In order to determine the presence or otherwise of archaeological features within the development site, the Planning Archaeologist at Lancashire County Archaeology Service (LCAS) has requested that a programme of desk-based research and evaluation trenching is undertaken. The following proposals are compiled following the receipt of verbal comments from LCAS.

1.1.3 The area around Carnforth has produced some evidence for human activity from the prehistoric period, in the form of Neolithic stone axes. It is considered that the development site could have the potential to contain archaeological deposits relating to human activity in the past.

1.2 OXFORD ARCHAEOLOGY

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

1.2.2 Oxford Archaeology North (OA North) has considerable experience of the assessment of sites of all periods, having undertaken a great number of small and large-scale projects during the past 30 years. Such projects have taken place within the planning process, to fulfil the requirements of clients and planning authorities, to very rigorous timetables.

2. OBJECTIVES

2.1 The following programme has been designed to investigate and evaluate the proposed development in advance of construction works taking place. It will aim to determine the origins, quality, extent and importance of any archaeological remains on the site.

2.2 The fieldwork will be carried out in line with current IfA guidelines and in line with the IfA Code of Conduct. It will be conducted within the general parameters defined by PPS5 ‘Planning for the Historic Environment’ and current English Heritage guidelines.

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3. METHOD STATEMENT

3.1 HEALTH AND SAFETY

3.1.1 ***Risk Assessment:*** OA North provides a Health and Safety Statement for all projects and maintains a Unit Safety policy. OA North will liase with the client to ensure all health and safety regulations are met. The outline risk assessment to accompany these proposals will be updated in advance of any on-site works, with continuous monitoring during the fieldwork. All mechanical plant hire certificates will be inspected, and the driver inducted using the OA North Risk Assessment.

3.1.2 ***Known Hazards:*** high voltage electricity pylons run through the centre of the site, and a high pressure gas main runs along the southern and eastern extents of the site. There is also a footpath along the northern extent and eastern side of the site.

3.1.3 A no dig exclusion zone will be established along the length of the gas main (8m either side), and a 12m no working zone will be fenced-off along the length of the outer span of the electricity cables. The site will be worked in two halves to restrict the necessity for plant to cross under the pylons, and when this does occur height restricting goal posts will be erected. Neither trenches nor spoil heaps will be positioned close to the route of the footpath.

3.1.4 ***Staff Issues:*** all project staff will be Construction Skills Certification Scheme (CSCS) qualified, proof of which can be provided in the form of CSCS cards.

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

3.1.6 ***Contamination:*** any contamination issues must also be made known to OA North in order that adequate PPE can be supplied prior to commencement. Should any presently unknown contamination be discovered during excavation, it may be necessary to halt the works and reassess the risk assessment. Any specialist safety requirements may be costed as a variation.

3.1.7 ***Services/Utilities:*** full regard will be given to all constraints (services etc) during the excavation as well as to all Health and Safety considerations. As a matter of course the field excavation team will use a CAT and generator prior to any excavation to test for services. However, these are only approximate location tools. Any **information regarding services**, ie 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 Senior Project Manager prior to the commencement of the evaluation.

3.1.8 ***Fencing Requirements:*** similarly, the trenches and any areas of archaeological sensitivity will be protected with nylon safety netting whilst open, and any appropriate signage displayed. Whenever possible the trenches will be opened and backfilled within the same day for purposes of site security and health and safety reasons, once archaeological recording has

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been completed. Any other requirements for fencing at the client's request (eg Heras-type security fencing) would need to be charged as a variation.

3.2 HISTORICAL RESEARCH

3.2.1 The scope of the desk-based research would conform entirely to the standards set by the Institute for Archaeologists (IfA) in their 1994 guidance paper, updated in 2001 *(Standards and Guidance for Archaeological Desk-Based Assessment*), and to other standards as relevant. All relevant and accessible archival and historic sources would be examined including the Flintshire Record Office and the Historic Environment Record. In addition providing an historical context for the study area the research would aim to:

(i) describe the nature, character, condition, survival, significance and extent of known archaeological or historic features within the site, taking into account any past impacts which may have affected the survival of any archaeology present;

(ii) identify any potential cultural heritage constraints to the future development on the site;

(iii) provide an assessment of the presence or absence of an archaeological impact of the proposed ground works;

(iv) present outline proposals for the most likely strategy for any further evaluation or mitigation of any such impact defined.

3.2.2 All relevant and accessible archival and historic sources, including the Flintshire Records Office, and the Historic Environment Record would be consulted. A full map regression analysis would be undertaken.

3.3 GEOPHYSICAL SURVEY

3.3.1 A 40% sample of the area is 38,059 sq.m, or 3.8ha. This will be covered by 43 grid squares of 30 x 30 m.

3.3.2 ***Date and Duration:*** the survey will be undertaken on a date to be specified in consultation with Oxford Archaeology North. It is envisaged that the survey will take 4 working days to complete with additional time for report preparation.

3.3.3 ***Geo-location*****:** the survey area will be marked with temporary markers on the day of survey, and provided with OS National Grid coordinated using Leica TCR705 total station equipment.

3.3.4 ***Magnetometry:*** *this will utilise a* Geoscan FM256 gradiometer and be undertaken in the following manner:

- 1 m traverse interval;
- 0.25m sample interval;
- automatic trigger; log zero drift; 0.1 nT resolution.

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3.3.5 ***Rationale:*** the proposed survey area presents several constraints on the location of the 43 grids required to fulfil the 40% sample. The proximity of the M6 along the eastern edge of the area renders disturbance in this area likely; the pylon in the centre of the area must be avoided by magnetic equipment, as must the area immediately beneath the high voltage cable the area surrounding the gas regulator is likely to be disturbed; several field boundaries will require the survey to be undertaken in two separate units.

3.4 ARCHAEOLOGICAL TRIAL TRENCHING

3.4.1 Either 3% or 5% of the development area will be subject to evaluation trenching, and this will be determined by the results of the geophysical survey. The 3% option equates to approximately fourteen 80 x 2m trenches, and the 5% option 18 trenches of similar dimensions. Where possible (health and safety permitting) the trenches will target features identified by the geophysics. The trial trenches will enable the date, nature, depth and quality of preservation of the remains, and establish the requirements for any further mitigation work.

3.4.2 The trenches will be located by 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.

3.4.3 ***Methodology:*** topsoil and modern overburden will be removed by a mechanical excavator (fitted with a toothless ditching bucket) under archaeological supervision to the surface of the first significant archaeological deposit. 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 by LCAS.

3.4.4 All trenches will be excavated in a stratigraphical manner, whether by machine or by hand. They will not be excavated deeper than 1.2m to accommodate health and safety constraints, without shoring or stepping out of the trench sides. All overburden will be stored at a safe working distance from each trench.

3.4.5 Any investigation of intact archaeological deposits will be exclusively manual. Selected pits 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*.

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

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3.4.7 Results of all field investigations will be recorded on *pro forma* context sheets. The site archive will include both a photographic record and accurate large scale plans and sections at an appropriate scale (1:50, 1:20 and 1:10). The photographic record will utilise both 35mm black and white photography and a high-resolution digital camera. All artefacts and ecofacts will be recorded using the same system, and will be handled and stored according to standard practice (following current Institute of Field Archaeologists guidelines) in order to minimise deterioration.

3.5 GENERAL PROCEDURES

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

3.5.2 Neither artefacts nor ecofacts will be collected systematically during the mechanical excavation of the topsoil. Finds recovered during the removal of overburden will be retained only if of significance to the dating and/or interpretation of the site.

3.5.3 Otherwise, artefacts and ecofacts will be collected and handled as per specification. All material will be collected and identified by stratigraphic unit during the evaluation trenching process.

3.5.4 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.

3.5.5 ***Environmental Sampling:*** samples (bulk samples of 40-litre volume, to be sub-sampled at a later stage) will be collected from stratified undisturbed deposits as appropriate, and will particularly target negative features (gullies, pits and ditches). These will be returned to OA North's offices for processing. Deposits of particular interest may incur additional sampling, on advice from the appropriate in-house specialist. The location of all samples will be recorded on drawings and sections with heights OD etc.

3.5.6 Between 50%-100% of bulk samples shall be selected for processing, based on the advice from OA North's in-house environmental manager. However, the basis of the advice will be agreed with CPAT and the client prior to processing commencing, and will be subject to a separate cost. An assessment of the environmental potential 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.

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3.5.7 In order to achieve the aims of the programme of work, it may be required to obtain dating evidence through radiocarbon dating, dendrochronological or other such techniques. This would only be undertaken in consultation with the client, and would be subject to a separate cost.

3.5.8 ***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. The client, curator 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.

3.6 REPORT

3.6.1 ***Archaeological Evaluation:*** one bound copy of a written synthetic report will be submitted to the client, together with a pdf version on CD. A pdf version of the report will also be forwarded to the LCAS HER within eight weeks of completion of the fieldwork, unless an alternative deadline is agreed with the client beforehand. It will present, summarise, and interpret the results of the programme detailed above in order to come to as full an understanding as possible of the archaeology of the development area. The report will include;

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

3.6.2 ***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.

3.7 ARCHIVE

3.7.1 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 (*Management of Archaeological Projects*, Appendix 3, 2nd edition, 1991). The archive will contain site matrices, and summary reports of the artefact record, context records, and any other records or materials recovered.

3.7.2 This archive will be provided in the English Heritage Centre for Archaeology format and a synthesis will be submitted to the Lancashire HER (the index to the archive and a copy of the report). OA North will deposit the original record archive of projects (paper, magnetic and plastic media), and a full copy of the record archive (microform or microfiche) will be deposited with the County record office (Preston). The material archive will be submitted to the relevant museum.

4. OTHER MATTERS

4.1 WORK TIMETABLE

4.1.1 ***Historic Research:*** two days will be required to undertake research into the development site.

4.1.2 ***Magnetometer Survey:*** three days will be required to complete the survey.

4.1.3 ***Archaeological Trial Trenching:*** Option A (3%) will take in the region of 14 days in the field. Option B (5%) would require up to eighteen days.

4.1.4 ***Interim Statement of Results:*** if required this will be produced within two weeks of completion of the fieldwork.

4.1.5 ***Final Evaluation Report and Archive:*** the report and archive will be produced following the completion of all fieldwork. The final report will be available within eight weeks of completion of the fieldwork (subject to specialist reports). The archive will be deposited within six months.

4.1.6 ***Notification of work:*** in order that OA North can schedule the work as above, one week's notice is required from the receipt of a purchase order/commissioning letter. LCAS also require at least one week's notice prior to commencement for monitoring purposes.

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4.2 PROJECT MONITORING

4.2.1 Whilst the work is undertaken for the client, monitoring of the archaeological investigations will be undertaken by LCAS on behalf of the county planning authority who will be afforded access to the site at all times. LCAS require that notification of site work is provided at least one week prior to its commencement.

4.2.2 OA North will ensure that any significant results are brought to the attention of the client and LCAS as soon as is practically possible.

4.3 STAFFING

4.3.1 The project will be under the direct management of **Alison Plummer BSc (Hons)** (OA North Senior Project Manager) to whom all correspondence should be addressed.

4.3.2 The trial trenching would be supervised by **Andrew bates** (OA North Project Officer) who is experienced in this type of project. All OA North project officers are experienced field archaeologists capable of carrying out projects of all sizes. Andy will be assisted by a field archaeologist.

4.3.3 The site team will be supported by specialist staff based both on site and in the office in Lancaster. Finds management will be undertaken by **Christine Howard-Davis** who will also provide specialist input on certain finds categories. Environmental management will be undertaken by **Elizabeth Huckerby**, who will also provide specialist input on charred remains and pollen. Elizabeth will advise on site sampling procedures and co-ordinate the processing of samples and organise internal and external specialist input as required.

4.4 INSURANCE

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

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APPENDIX 2: TRENCH DESCRIPTIONS

Trench 1 **Dimensions: 50.0m by 2.0m** **Orientation: North-East/South-West**

Context	Category	Description	Depth
100	Layer	Topsoil. A very dark grey fine sandy-silt.	0.35m
101	Layer	Subsoil. A mid-yellowish brown sandy-silt with *c* 10% small stone inclusions.	0.35m
102	Layer	Natural geology. Varied between a light yellowish orange clayey medium sand to a mid-yellowish brown loose sand with *c* 40% sub-rounded tone inclusions a maximum of 0.18m by 0.15m by 0.12m in size.	Unknown

Trench 2 **Dimensions: 25.0m by 2.0m** **Orientation: East-North-East/West-South-West**

Context	Category	Description	Depth
200	Layer	Topsoil. A dark brown grey fine sand- silt.	0.35m
201	Layer	Natural geology. A Mid- to light yellowish brown, friable, medium sand clay, with *c* 10% to 20% sub-rounded stone inclusions a maximum of 0.15m by 012m by 0.12m in size	Unknown

Trench 3 **Dimensions: 50.0m by 2.0m** **Orientation: North-North-East/South-South-West**

Context	Category	Description	Depth
300	Layer	Topsoil. A dark brown grey fine sandy-silt.	0.21m
301	Layer	Natural geology. A mid-orangey brown to light grey clayey medium sand, with *c* 40 sub-rounded stone inclusions a maximum of 0.18m by 0.17m by 0.10m.	Unknown

Trench 4 **Dimensions: 50.0m by 2.0m** **Orientation: North-East/South-West**

Context	Category	Description	Depth
400	Layer	Topsoil. A dark brown fine sandy silt.	0.30m
401	Layer	Natural geology. A mid- to light orangey brown sandy clay with *c* 10% to 20% sub-rounded stone a maximum of 0.22m by 017m by 0.14m	Unknown

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Trench 5 **Dimensions: 50.0m by 2.0m** **Orientation: North-North-West/South-South-East**

Context	Category	Description	Depth
500	Layer	Topsoil. A dark brown fine sandy-silt.	0.20m
501	Layer	Natural geology. A mid- to light orangey red clayey medium sand, with *c* 40 to 50% sub-rounded stone inclusions a maximum of 0.17m by 0.15m by 0.09m in size.	Unknown

Trench 6 **Dimensions: 50.0m by 2.0m** **Orientation: North-West/South-East**

Context	Category	Description	Depth
600	Layer	Topsoil. A dark brown fine sandy-silt.	0.25m
601	Layer	Natural geology. A mid- to light orangey red silt medium sand with *c* 15% sub-rounded stone inclusions a maximum of 0.15m by 0.14m by 0.09m	Unknown

Trench 7 **Dimensions: 25.0m by 2.0m** **Orientation: East-North-East/West-South-West**

Context	Category	Description	Depth
700	Layer	Topsoil. A dark brown fine sandy-silt.	0.24m
701	Layer	Natural geology. A light yellowish orange clayey medium sand, with c 5% sub-rounded stone inclusions a maximum of 80mm by 70mm by 20mm in size.	Unknown
702	Layer	Subsoil? A dark brownish orange silt medium sand with *c* 1% to 5% sub-rounded stone a maximum of 0.12m by 0.08m by 0.05m in size.	0.43m

Trench 8 **Dimensions: 50.0m by 2.0m** **Orientation: North-North-East/South-South-West**

Context	Category	Description	Depth
800	Layer	Topsoil. A dark grey fine sandy-silt.	0.19m
801	Layer	Subsoil. A mid-light reddish range sandy-silt, with *c* 20% sub-rounded stone inclusions a maximum of 80mm by 80mm by 50mm in size.	0.51m
802	Fill	Fill of ***803***. A dark-grey, silty, fine sand with *c* 10% sub-rounded stone inclusions a maximum of 40mm by 30mm by 30mm.	0.45m
803	Cut	Ditch. An east/west aligned U-shaped linear feature measuring	0.45m

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		1.05m wide, with steep concave sides and a concave base.	
804	Layer	Natural geology. Varied between a light yellowish orange sandy-clay and light grey and a light grey medium sandy gravel with 90% stone inclusions a maximum of 0.12m by 0.09m by 0.07m	Unknown

Trench 9 **Dimensions: 50.0m by 2.0m** **Orientation: North-East/South-West**

Context	Category	Description	Depth
900	Layer	Topsoil. A dark grey fine sandy silt.	0.18m
901	Layer	Natural geology. Varied between a light yellowish grey and a mid-reddish orange silty medium sand with *c* 20 to 50% sub-rounded stone inclusions a maximum of 0.22m by 0.18m by 0.11m in size. The natural geology contained lenses of mid-yellowish orange sand.	Unknown

Trench 10 **Dimensions: 50.0m by 2.0m** **Orientation: North-East/South-West**

Context	Category	Description	Depth
1001	Layer	Topsoil. A very dark grey fine sand clayey-silt.	0.40m
1002	Layer	Natural geology. A coarse gravel silty-clay with *c* 50% to 70% sub-rounded stone a maximum of 035m by 0.28m by 0.25m is size.	Unknown

Trench 11 **Dimensions: 25.0m by 2.0m** **Orientation: North-East/South-West**

Context	Category	Description	Depth
1101	Layer	Topsoil. A very dark grey fine sand silt.	0.36m
1102	Layer	Natural geology. A medium sand gravel with *c* 60% to 70% sub-rounded stone inclusions a maximum of 0.19m by 0.17m by 0.16m in size.	Unknown

Trench 12 **Dimensions: 25.0m by 2.0m** **Orientation: East/West**

Context	Category	Description	Depth
1200	Layer	Topsoil. A very dark grey fine sand silt.	0.50m
1201	Layer	Natural geology. A silty medium sand with *c* 10% to 20% sub-rounded stone inclusions a maximum of 0.13m by 0.10m by 0.09m in size.	Unknown

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Trench 13 **Dimensions: 25.0m by 2.0m** **Orientation: North-East/South-West**

Context	Category	Description	Depth
1300	Layer	Topsoil. A very dark grey fine sand silt.	0.30m
1301	Layer	Natural geology. A silty, medium sand with *c* 10% to 20% sub-rounded stone inclusions a maximum of 0.15m by 0.08m by 0.08m in size.	Unknown

Trench 14 **Dimensions: 25.0m by 2.0m** **Orientation: North-North-East/South-South-West**

Context	Category	Description	Depth
1400	Layer	Topsoil. A very dark grey fine sand silt.	0.30m
1401	Layer	Natural geology. A silty medium sandy gravel with *c* 90% sub-rounded stone inclusions a maximum of 0.45m by 0.35m by 0.25m in size.	Unknown

Trench 15 **Dimensions: 50.0m by 2.0m** **Orientation: North-West/South-East**

Context	Category	Description	Depth
1500	Layer	Topsoil. A very dark grey fine sand silty-clay. Within the southern 25m of the trench was a lens of stone 80mm below the turf, 90mm thick, comprised of 90% sub-rounded stones a maximum of 0.15m by 0.10m by 0.07m in size.	0.45m
1501	Layer	Natural geology. A silty medium sandy-gravel with *c* 60% sub-rounded stone inclusions a maximum of 0.13m by 0.12m by 0.10m in size.	Unknown

Trench 16 **Dimensions: 50.0m by 2.0m** **Orientation: North-West/South-East**

Context	Category	Description	Depth
1600	Layer	Topsoil. A very dark grey fine sand silty-clay, with *c* 5% sub-rounded stone inclusions a maximum of 0.13m by 0.12m by 0.05m	0.35m
1601	Layer	Comprised *c* 95% sub-rounded sub-rounded stone inclusions a maximum of 0.33m by 0.28m by 0.18m in size.	0.85m
1602	Layer	Natural geology. A medium sandy-clay with *c* 20% to 70% sub-rounded stone inclusions a maximum of 0.28m by 0.27m by 0.09m in size.	Unknown

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Trench 17 **Dimensions: 50.0m by 2.0m** **Orientation: East/West**

Context	Category	Description	Depth
1700	Layer	Topsoil. A very dark grey fine sand silty-clay, with *c* 5% sub-rounded stone inclusions a maximum of 0.18m by 0.17m by 0.04m	0.40m
1701	Layer	Natural geology. The natural varied from a mid-orangey brown clay medium sand with *c* 10% sub-rounded stone inclusions a maximum of 0.10m by 0.08m by 0.03m, to a coarse gravel with *c* 95% sub-rounded stone a maximum of 0.41m by 0.35m by 0.28m.	Unknown

Trench 18 **Dimensions: 50.0m by 2.0m** **Orientation: East/West**

Context	Category	Description	Depth
1800	Layer	Topsoil. A dark brown grey fine sand silty-clay.	0.19m
1801	Layer	Natural geology. A light to mid-orangey red clayey medium sand, with *c* 15% sub-rounded stone inclusions a maximum of 0.22m by 0.15m by 0.08m	Unknown

Trench 19 **Dimensions: 50.0m by 2.0m** **Orientation: North-West/South-East**

Context	Category	Description	Depth
1900	Layer	Topsoil. A dark brown grey fine sand silty-clay.	0.35m
1901	Layer	Natural geology. Varied from a mid-brown orange medium sand with *c* 50% sub-rounded stone inclusions a maximum of 0.18m by 0.17m by 0.13m in size to a light grey to mid-orange coarse gravel containing 95% sub-rounded stone inclusions a maximum of 0.35m by 0.33m by 0.28m in size.	Unknown

Trench 20 **Dimensions: 50.0m by 2.0m** **Orientation: North-West/South-East**

Context	Category	Description	Depth
2000	Layer	Topsoil. A dark brown grey fine sand silty-clay.	0.28m
2001	Structure	Stone bank measuring 0.80m wide. It comprised sub-rounded stone a maximum of 023m by 0.18m by 0.09m in size.	0.30m
2002	Layer	Natural geology. A mid- to light orangey brown clayey medium sand, with *c* 20% sub-rounded stone inclusions a maximum of 0.16m by 0.15m by 0.08m in size, with areas of gravel comprised *c* 95% sub-rounded stone of the same size.	Unknown
2003	Cut	Geotechnical pit.	1.2m+

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2004	Fill	A mixed deposit derived from topsoil and the varying natural geological backfilled into pit ***2003***. Comprised a mid-orangey grey clay, a mid-orangey brown medium sand, and a dark grey clayey-silt with 10% to 20% sub-rounded stone inclusions a maximum of 0.17m by 0.16m by 0.10m in size.	1.2m+

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APPENDIX 3: GEOPHYSICAL SURVEY REPORT

Magnetic (Gradiometer) Survey Report Carnforth Business Park

Dr Ben Edwards, University of Liverpool
on behalf of: Oxford Archaeology North

CBP11 – R
1st April 2011

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1. Summary

1.1. This report comprises the results and interpretation of a gradiometer survey carried out by the author on behalf of Oxford Archaeology North, at the site known as Carnforth Business Park (OS: 350760, 470290). The survey was undertaken between 21st and 23rd March 2011. The objective of the survey was to identify and characterise magnetic anomalies that may represent features of archaeological interest, in advance of archaeological evaluation by the client. The verbal brief from the client required that a 40% sample of the 95,147 sq.m site be surveyed in order to demonstrate the presence or of absence of potential archaeological anomalies. This objective was successfully accomplished, with a series of anomalies identified, including a sub-circular ditched feature, and a series of boundaries potentially representative of relict field or drainage systems.

1.3 *NOTE: Geophysical survey methods do not provide 100% assurance of the presence or absence of archaeological remains within a given area. The results of geophysical investigations can be affected by a large number of factors, many of which cannot be quantified, which include but are not limited to: the geophysical visibility of anomalies; local weather; local geology; drainage and soil moisture; short-duration solar magnetic fluctuations; diurnal magnetic fluctuations; land-use history; and the presence of buried services. As such, the results of any geophysical survey should be used as a guide to inform the likelihood of encountering archaeological features of a type liable to be detected by the survey method deployed. The author of this report has taken all reasonable measures to limit the effect of these sources of error or account for them in this report. However, the author accepts no responsibility for costs arising from the discovery of archaeological features or material not detected during the course of this geophysical survey.*

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2. Introduction

2.1. *Site Location*

The site is located at OS grid reference E 350760, N 470290, covering an area of 9.5 ha across two fields immediately adjacent to the M6 motorway and the B6254 Kellet Road, to the east of the settlement of Carnforth, Lancashire.

2.2. *Site Background*

Both fields surveyed are currently under pasture, with field 1 (see figure 1) showing no evidence for earlier agricultural practices, and field 2 displaying significantly reduced ridge and furrow, only visible at sunset. Field 1 contains a relict field and parish boundary, running with some deviation approximately SW to NE. This is clearly visible on the surface as a stone and earth bank between 0.5 and 1.5 metres in height, studded with large deciduous trees, some dead. There is also a high voltage electricity line, suspended from pylons, running SSW to NNE across this field, though this had little or no effect on the results of the magnetometry. At several points across both fields ferrous ventilation pipes protrude c.0.3m above the ground surface – the function of these objects is unknown.

2.3. The bedrock on the site is carboniferous limestone, with overlying Devensian sand and gravel glaciofluvial drift deposits. Limestones generally provide good magnetic contrast as they contain few iron or otherwise heat-affected elements. Sand and gravel drift can be variable in its effect on magnetic surveying: if the component rocks are of igneous or metamorphic origin, the amount of magnetic interference can be severe. However, in this case, the drift deposits appear to be derived from non-magnetic rocks, potentially the limestone bedrock of the area, and as such have not negatively affected the results of the survey.

2.4. At the time of the survey the weather was dry and clear, following recent rain; the ground was damp without waterlogging.

2.5. *Survey Aims*

- To undertake a 40% sample (c.38ha) magnetometer survey of the site known as Carnforth Business Park

- To identify magnetic anomalies of anthropological origin and archaeological interest on behalf of the client Oxford Archaeology North

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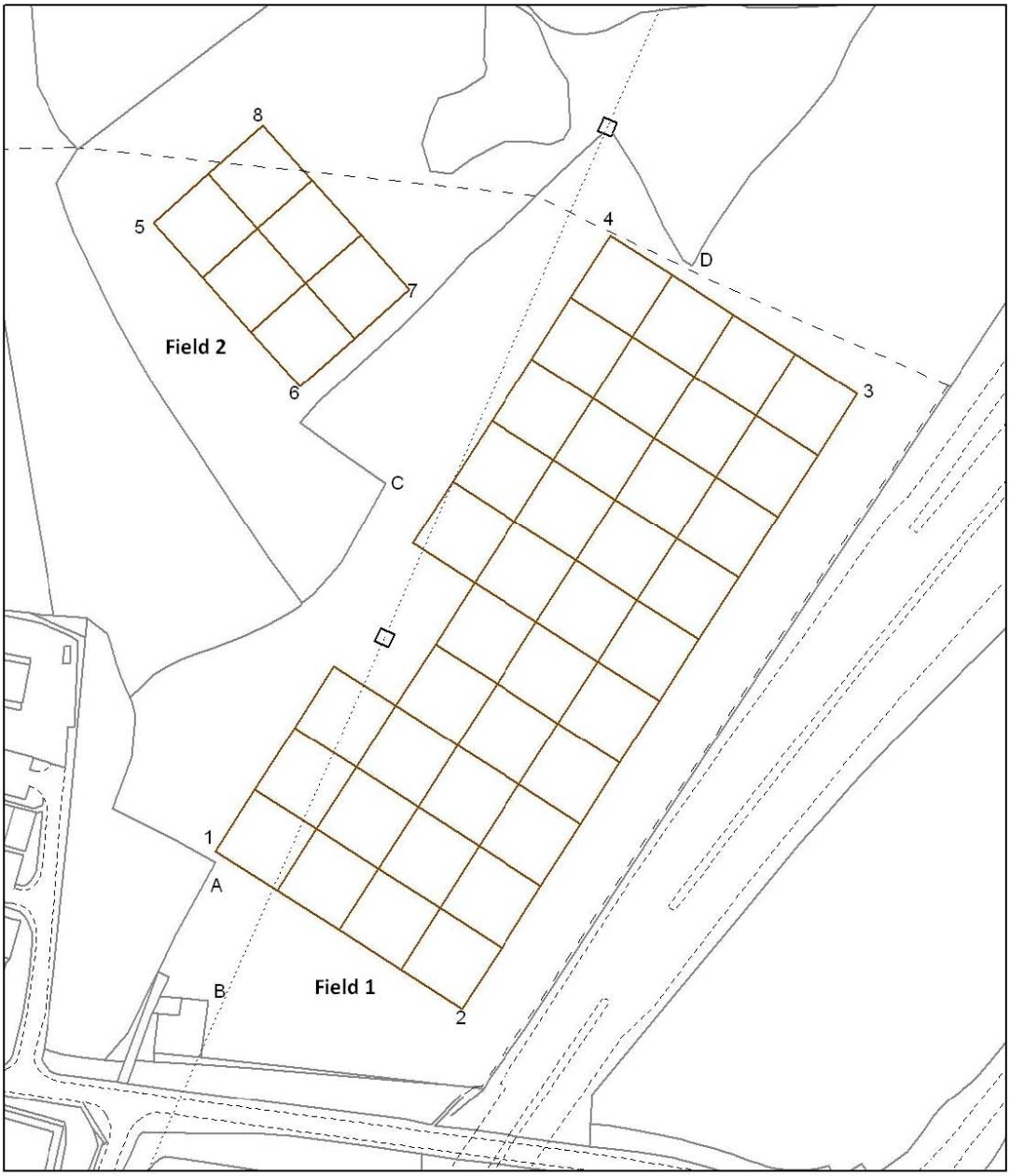

0 20 40 80 120 Meters

Carnforth Business Park: Gradiometer Survey

Figure 1 - Grid Location

Survey Location	Fixed Points
1 - 350631,470219	A - 350631,470214
2 - 350732,470156	B - 350629,470158
3 - 350893,470408	C - 350700,470370
4 - 350793,470473	D - 350856,470461
5 - 350605,470476	
6 - 350663,470409	
7 - 350708,470449	
8 - 350649,470514	

Dr Ben Edwards 24/3/2011

3. Methods

3.1. *Technical Information*

Magnetometer (Gradiometer) Survey	
Area	38,700 sq. m (3.87ha) in 2 blocks
Equipment	FM256 Geoscan Gradiometer
Sample Interval	0.25m
Traverse Interval	1m
Grid Unit Size	30 x 30m
Number of Grid Units	43
Log Zero Drift	Off
Trigger Type	Automatic
Resolution	0.1nT
Geo-location & Set-Out	Leica TCR705
Date(s) of Fieldwork	21-23/3/2011
Data Processing	Geoplot 3.0
Map Data	OS Mastermap Multiscale
Dates of Processing	24-25/3/2011

3.2. The survey was undertaken to the above specification at the request of the client, as an appropriate methodology to comprehensively survey the area required in the time available. Time and cost pressures dictated that a combined magnetic and earth resistance survey, recommended by the author, could not be undertaken. The methodology for this magnetic survey was designed in accordance with appropriate guidance (English Heritage 2008: *Geophysical Survey in Archaeological Field Evaluation*).

3.3. The survey area presented several constraints on the location of the 43 grids required to fulfill the 40% sample. The proximity of the M6 along the eastern edge of the area rendered disturbance in the area likely; the pylon in the centre of the area was avoided; and several field boundaries required the survey to be undertaken in two separate blocks (fields 1 & 2).

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4. Results & Interpretation

4.1. This section is concerned with the identification and description of the magnetic anomalies detected during the survey. The separation between data and interpretation is made clear throughout. For a geo-referenced image of the processed plots see figure 2 (following page).

4.2. Field 1 (figure 3) – General Remarks

Figure 3 displays the gradiometer data from field 1 following a series of processing steps: *zero mean grid, zero mean traverse, interpolation*. The areas of [no data] visible on the plot (aside from the absent gird units surrounding a pylon) correspond with points on the relict field boundary where fallen trees prevented the successful completion of traverses. A large number of iron spikes are present (not numbered), which concentrate along the line of the trackway into the field and the relict boundary. A pronounced service is evident, along the SE edge of the plot, parallel with the M6; this likely represents an electrical cable or metal pipe.

4.3. Field 1 (figure 3) – Anomalies

1) Curvilinear anomaly running broadly SW-NE; intensity 2-5nT; matching negative anomaly to north indicates feature derived from concentration of magnetically susceptible soil elements.

   This anomaly represents the course of the relict field and parish boundary running through the centre of the survey area. It is clearly visible on the surface.

2-6) A series of broadly parallel narrow positive linear anomalies aligned SW-NE, with a separation of 15-20m; apparent width of 1-2m; intensity 2-5nT; matching negative anomalies to the north indicates features derived from concentration of magnetically susceptible soil elements.

   These anomalies appear to represent narrow ditch features. Their function cannot be determined without excavation, but it is plausible to suggest either a drainage function (this area of the site is the lowest lying), or some form of land division.

7) A linear anomaly aligned N-S; apparent width c.4m; intensity 2-5nT. Weak response indicates concentration of magnetically susceptible soil elements.

   This anomaly appears to represent a further ditch feature of unknown purpose.

8-9) A pair of positive curvilinear anomalies; apparent width 4m; intensity c.5nT; matching negative anomalies to the north indicates features derived from concentration of magnetically susceptible soil elements.

10-11) One strongly positive and one strongly negative dipole anomaly; intensity of 200nT.

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These anomalies correspond to ferrous ventilation pipes that protrude from the ground surface. They are not thought to be of archaeological interest, though may indicate the location of services that do not create a strong magnetic response.

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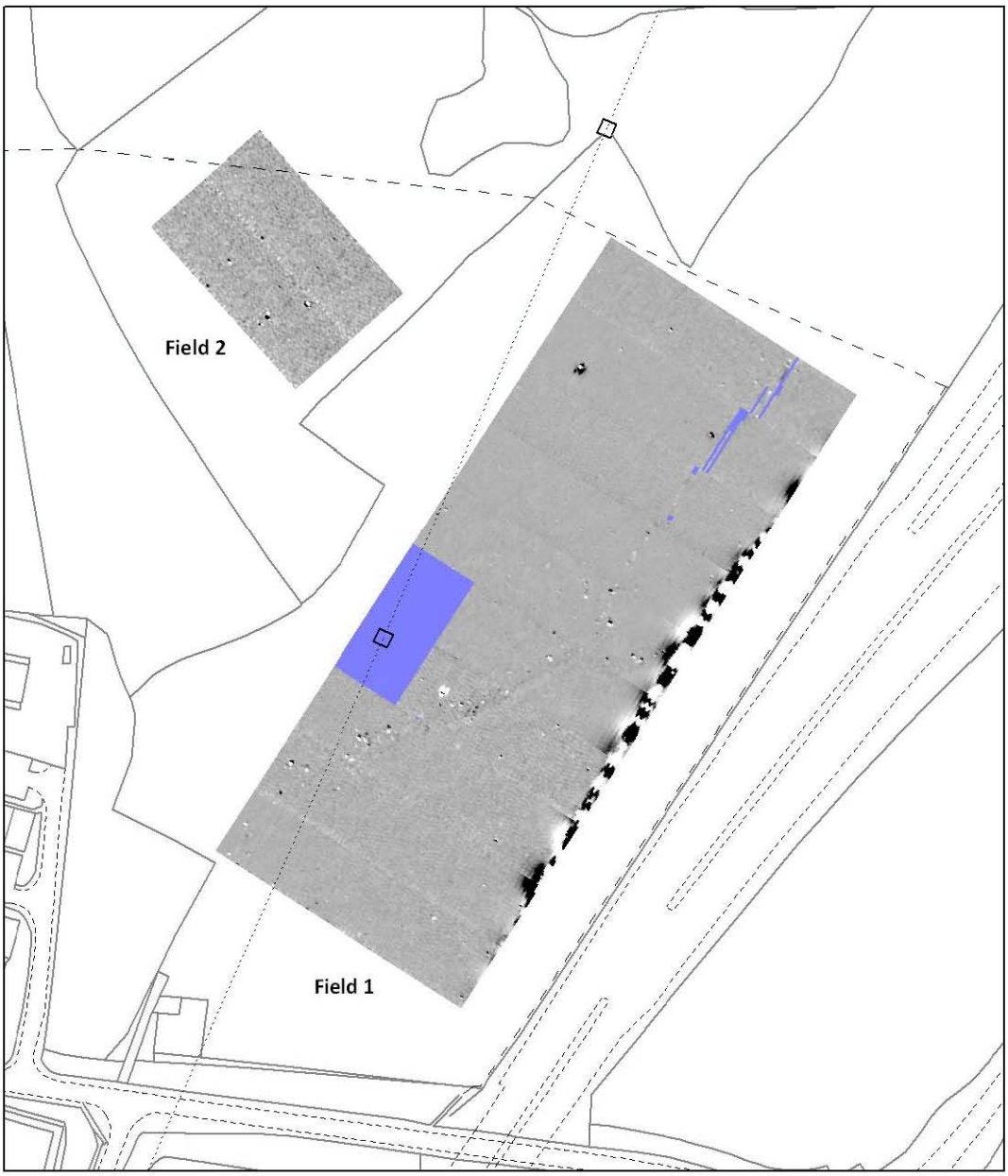

Carnforth Business Park: Gradiometer Survey

Figure 2 - Processed Results

Dr Ben Edwards 24/3/2011

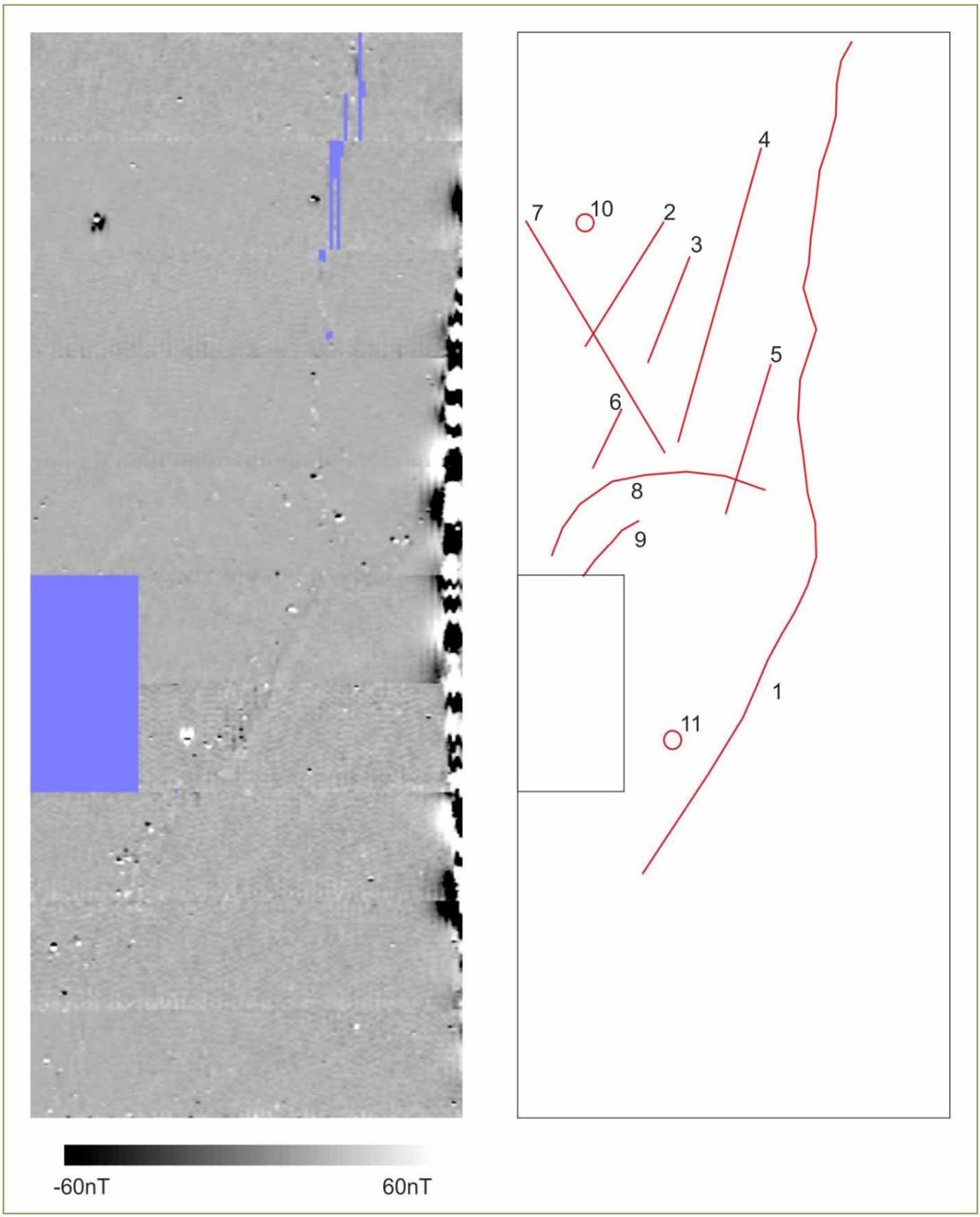

Figure 3: Plot of field 1, following processing, with transcription of anomalies

4.4. *Field 2 (figure 4) – General Remarks*

Figure 4 displays the gradiometer data from field 2 following a series of processing steps: *zero mean grid, zero mean traverse, interpolation*. This plot suffers from a considerable amount of magnetic interference or 'noise' in comparison with figure 3. This appears to result from a different history of land-use. It appears that field 2 contains the remnants of ridge and furrow cultivation, and the increase in noise could result from manuring practices associated with medieval and later cultivation introducing household waste to the soil.

4.5. *Field 2 (figure 4) – Anomalies*

The only visible anomaly on this plot is a sub-circular feature, of 1m apparent width; intensity c.5nT; overall diameter c.20m; enlarged northern terminal. NOTE: The amount of magnetic interference in this area weakens the reliability of this identification.

This anomaly appears to represent a ring-ditch – a circular space defined by a narrow ditch, not necessarily associated with a corresponding bank – which is not diagnostic of a particular period or type of activity. There is evidence for an enlarged northern terminal associated with the entrance, which is west facing.

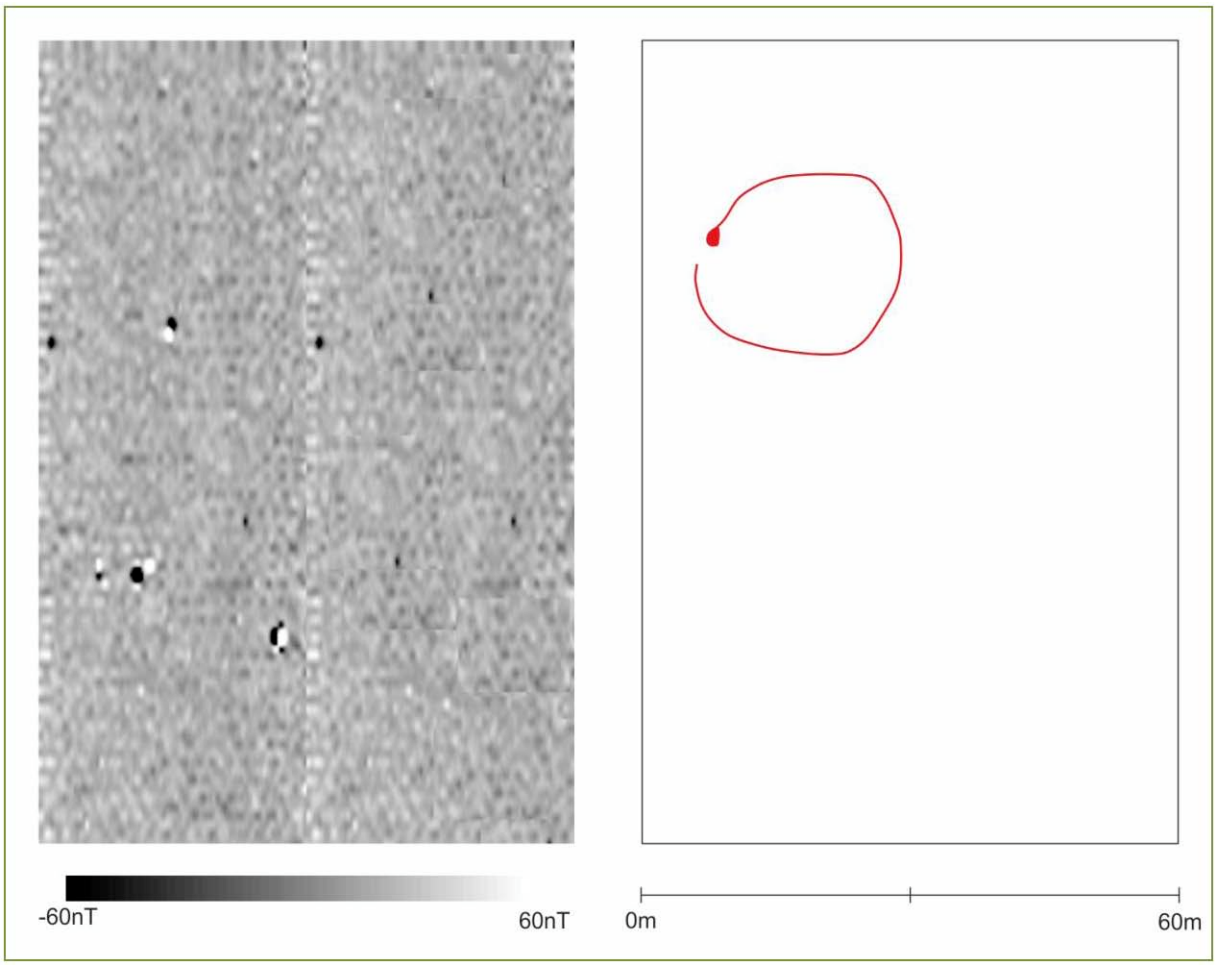

Figure 4: Plot of field 2, following processing, with transcription of anomalies

5. Summary & Recommendations

5.1. The gradiometer survey has not produced a large number of features of high archaeological importance. The verbal brief from Oxford North indicated that the results of the geophysical survey would be used to inform the location and number of later evaluative excavations. In light of this, it is recommended that the a representative sample of the linear features in field 1 be investigated to determine their character, and whether they are indeed related to field drainage or division. In field 2, it is recommended that the potential ring-ditch feature be investigated to confirm or deny its existence, given the difficulties with magnetic interference in this area of the survey.

Report completed: 1st April 2011 Dr Ben Edwards

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