Burbo Bank Extension Offshore Wind Farm

Denbighshire

Archaeological Assessment Report

Oxford Archaeology North

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Dong Energy Burbo Bank Extension (UK) Ltd

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SUMMARY

Oxford Archaeology North (OA North) was commissioned by DONG Energy Burbo Bank Extension (UK) Ltd to undertake a programme of archaeological investigation on the proposed cable route for the extension to the existing Burbo Bank Offshore Windfarm in Liverpool Bay. The onshore export cable route extends from a landfall between Rhyl and Prestatyn on the coast of North Wales to a new substation at Bodelwyddan (SJ 0365 8250 - SJ 0210 7345). Following a programme of trial trenching, a Written Scheme of Investigation (WSI) provided by RPS on behalf of the client stipulated that detailed archaeological investigation should be conducted on features identified in the trial trenching, as well as geoarchaeological investigations at a number of locations along the cable route.

The archaeological trial trenching was undertaken partially in 2014, with the remainder completed in 2015. Initially, 61 trenches were proposed; some of the trenches targeted geophysical anomalies, and the rest were placed along the route to provide uniform coverage. In addition, eight more trenches were required by the Development Control Officer for Denbighshire County Council; these were situated in areas of additional planning consent, that had not been subject to geophysical survey, and where there were gaps in the trial trench coverage. In the end, 62 of the 69 trenches were excavated, one trench, in an area crossed by services being abandoned on health and safety grounds. Access to four others was denied, as this was part of the construction area that was closed to other contractors. Finally, two others proved unnecessary, as an aluminium track had been installed, negating the need for trenching since the area would not be disturbed.

Of the trial trenches excavated, 43 did not reveal any archaeological features, but seven contained features such as pits, ditches and gullies. One pit (Trench 8) contained a large proportion of burnt material, from which a radiocarbon date in the early Bronze Age was obtained, and the fill of a gully in Trench 2 also produced a similar radiocarbon date. Other trenches contained gullies/ditches and possible rubbish pits, which were/remain undated, some containing fire-cracked stone. This therefore might have been the site of a settlement. Approximately 2.4km inland (Trench 15), putative field boundaries were identified, with more substantial ditches to the south-west.

Many of the boundary features observed were either parallel or perpendicular to those in use today. Whilst the majority of these ditches and gullies remain undated, a radiocarbon date was obtained from one, which produced an early medieval date. This would suggest that the modern field system was based on a broad pattern of land divisions from the early medieval period, and potentially earlier. Certainly, many of the ditches had been recut several times, suggesting that they had been in use for an extended period, and these proved to have been part of a system of drainage, leading to the River Clwyd, probably associated with the reclamation of boggy land for agriculture. There were also some ditches which appear to have been in use only in the post-medieval period, corresponding to boundaries shown on nineteenth-century mapping.

In light of these results, the Development Control Officer for Denbighshire County Council stipulated that the area around Trenches 2, 8-11, 15, 16, 18, 39 and 41 be subject to a strip and record investigation to determine their extent and the significance of the features identified, and as mitigation for their loss. This work was completed in May and June 2015.

In the course of these mitigation excavations, further archaeological remains were observed and investigated. At the northern end of the route, all the trenches revealed features that could possibly be interpreted as of Bronze Age date. The largest concentration of features was in Trench 9, where several gullies seemed to have been structural, and large pits full of gravel suggested that some process was taking place on the site, possibly industrial. Other gullies and ditches observed in Trenches 2 and 15 were probably agricultural in origin. Three pits, which contained burnt material, were observed in Trenches 8, 10, and 15, suggesting that domestic activity was taking place in the vicinity, although no direct evidence for settlement was observed.

There was also the potential for surviving dry-land surfaces and wetland/dry-land edges beneath tidal-flat deposits. The trial trenching programme had identified such deposits, and a series of geoarchaeological boreholes was proposed. The boreholes were intended to allow analysis and dating of the peat and other sediments in these areas. Boreholes were undertaken in four locations, in the vicinity of Trenches 6, 21, 25 and 41, although the results were variable, with good sequences of sediments and peat deposits observed in only two. Radiocarbon dates place these deposits in the Neolithic to Bronze Age, however, with medieval deposits in one.

This assessment has examined all categories of data recovered. It is considered that the potential to sustain analysis of the sites and features investigated along the route is reasonable. Analysis would add to the understanding of Bronze Age activity occurring in the vicinity, and analysis of those elements dating from the early medieval period, would be particularly valuable, given the paucity of such sites in the Welsh archaeological record.

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Becky Wegiel supervised the trial trenching and mitigation excavation, with the assistance of Mikey Castle, Gary Crawford-Coupe, Nicky Herring, Matthew McVey, Sarah Mottershead, Jon Onraet, Aidan Parker, Lewis Stitt and Mike Tunnicliffe. The geoarchaeological boring was undertaken by Mairead Rutherford, with the aid of Aidan Parker. Sandra Bonsall processed and carried out the preliminary palaeoenvironmental assessment of the plant remains; Denise Druce completed the assessment of the plant remains and charcoal, and wrote the report; Chris Howard-Davis undertook the finds assessment. Becky Wegiel wrote the report and Mark Tidmarsh and Anne Stewardson produced the drawings. Jamie Quartermaine managed the project and also edited the report.

1. INTRODUCTION

1.1 CIRCUMSTANCES OF PROJECT

1.1.1 Oxford Archaeology North (OA North) was invited by DONG Energy Burbo Bank Extension (UK) Ltd to undertake a programme of archaeological investigation in advance of the laying of the onshore export cable as part of an extension to the existing Burbo Bank Offshore Windfarm in Liverpool Bay. The onshore export cable route extends from a landfall between Rhyl and Prestatyn on the coast of North Wales to a new substation at Bodelwyddan (SJ 0365 8250 - SJ 0210 7345, Fig 1); the onshore export cable route had a *c* 25m-wide working corridor and was *c* 11km in length. A Written Scheme of Investigation (WSI) produced by RPS on behalf of the Client (DONG Energy 2014; *Appendix 1*) for a programme of archaeological works was agreed with the Development Control Officer for Denbighshire County Council. This recommended elements of desk-based work, field boundary survey, intertidal walkover and trial trenching. In response to this, a project design was prepared by OA North (*Appendix 2*; OA North 2015). Mitigation excavations were completed in those areas where archaeological potential was deemed high, following the trial trenching, along with a series of geoarchaeological boreholes.

1.1.2 The present report describes the potential of the archive to warrant further work. It then lays out proposals for post-excavation works and publication of the results of both the trial trenching and the mitigative excavations.

1.2 PLANNING BACKGROUND

1.2.1 An Environmental Statement produced in support of the planning application for the onshore works included a desk-based assessment (RPS 2012) and a geophysical survey report; the latter covered approximately 9km of the 11km total route. The desk-based assessment provided a general overview of the heritage resource, sufficient to inform the process of determining the route, but a need for further, more detailed, documentary work remained, to inform the process of trial trenching and the mitigation stages. Surveys of field boundaries and the intertidal zone, and the intrusive evaluation of the archaeological resource along the line of the route were undertaken in 2014 (OA North 2014).

1.3 LOCATION, TOPOGRAPHY AND GEOLOGY

1.3.1 From the proposed landfall, between the towns of Rhyl and Prestatyn, the onshore export cable route of the Burbo Bank Extension Offshore Wind Farm (Burbo Bank EOW) extends south (Fig 2) through an area of low-lying, poorly drained, land, where several deep drains cut through it. This area has clearly been improved in the post-medieval period. The route steadily climbs to an altitude of about 15m above Ordnance Datum (AOD) near Rhydorddwy Goch Farm, about 1.5m from the shore and to the south-east of Rhyl, where it crosses the Dyserth Road into an area of irregular, smaller, fields that are indicative of an older pastoral landscape. The route extends around the west side of Bodrhyddan Hall park (about 4km south of the shore and to the east of Rhuddlan) and through an area of low-lying, small pastoral fields, before crossing the River Clwyd and the A525 St Asaph Road to the south of

Rhuddlan (Fig 2). In the river floodplain, the ground is again generally low-lying and poorly drained, the route extending through a series of large fields with straight boundaries. To the south of Gwernigron Farm, to the north-west of St Asaph, the ground steadily rises again and the smaller, irregular and better-drained fields re-appear, indicative of an older, pastoral landscape The route then turns west near Coed yr Esgob, to the south-west of St Asaph, to terminate at the proposed sub-station location, which is immediately south of the St Asaph Business Park.

1.3.2 ***Geology:*** in the northern part of the route, at the landfall, the base geology is Scythian sandstone of the Kinnerton Formation, overlain by Holocene sands and silts (RPS 2012). To the south of Rhyddarddwy Farm, there is a change to a Devensian till overlying the sandstone. In the area of the River Clwyd floodplain, there are Early Permian mudstones, siltstones and sandstones of the Warwickshire Group, overlain by Flandrian alluvium (*ibid*). On the higher, better-drained ground to the south of the A55, the Early Permian rock is overlain by Devensian till.

1.4 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

1.4.1 This background provides a general context to the archaeology and history of the proposed onshore export cable route. It is largely based on the desk-based assessment undertaken by RPS Planning and Development (RPS 2012).

1.4.2 ***Palaeolithic, Mesolithic, and Neolithic activity (c 12,000– c 2500 BC)***: the Vale of Clwyd has a long history of human activity, with evidence of early prehistoric habitation from several caves, dating as far back as the Lower Palaeolithic period (Aldhouse-Green *et al* 1996). Though there has been survival of early material from these caves in the higher limestone uplands, advances and retreats of ice sheets have affected the lower-lying parts of the landscape.

1.4.3 Following the end of the most recent glacial episode (12,000 BP; *c* 10,000 BC), sea levels started to rise quickly and there were many periods of marine transgression and regression, with a maximum at about 2300 BP (*c* 350 BC) before beginning to fall back again (Tooley 1978; 1985). During the periods of stability, land surfaces would have developed, only to be inundated; evidence for these sequences is present in the form of Holocene peat deposits at depths of 10m and 13m below current ground level near to the mouth of the River Clwyd. Peat beds on the foreshore at Rhyl are exposed at low tide and provide valuable evidence of human activity, both through the preservation of organic artefacts and the palaeoenvironmental record.

1.4.4 It is apparent that there was considerable Mesolithic activity within and around Rhuddlan, finds including worked flint, hazelnut shells and other charred plant remains, some of which came from small pits (Quinnell and Blockley 1994). Worked flint and chert of Mesolithic date has been recovered from several locations around Prestatyn, and shell middens have also been identified, demonstrating the consumption of mussels.

1.4.5 Neolithic worked flint from small pits has been recorded at Rhuddlan, and other potential occupation sites have been identified at Dyserth and Prestatyn; caves or rock-shelters have also been identified at Nant y Craig and Nant-y-fuach (RPS 2012). Within the study areas, the only site of Neolithic date is a chambered tomb at Tyddyn Bleiddyn (HER 102113), possibly of the Cotswold-Severn group (Lynch 2002). This was excavated in 1869.

1.4.6 ***Bronze Age and Iron Age Activity (c 2500 BC- AD 43):*** most of the material found on the foreshore at Rhyl is broadly attributable to the Neolithic and Bronze Age, and round barrows and cairns have been recorded on the higher uncultivated ground. Within the study area, a cairn of possible Bronze Age date has been identified from documentary sources near to Plas Newydd farm (HER 102180), but no evidence of such a feature survived.

1.4.7 Iron Age activity in the general area is represented by promontory hillforts, such as that at Bedd-y-Cawr (HER 102131), and Graig Fawr and Moel Hiraddug, near Dyserth (RPS 2012). A large rectangular enclosure identified (by aerial photography) as a cropmark, on higher ground close to Rhyd Farm (National Monument Record (NMR) 86818), is classed as 'undated' by the NMR, but a later prehistoric date for this feature may be possible.

1.4.8 ***Roman activity (c AD 43-410)***: the major Roman road leading west from the legionary fortress of *Deva* (Chester) to the forts at *Canovium* (Conway) and *Segontium* (Caernarvon) extends through the study area along the line of the Glascoed Road (HER 46825). St Asaph may potentially be the site of the documented Roman fort of *Varae*, since this coincides with the crossroads east/west and a north/south Roman roads (HER 93608), which link an occupation site/fort at Prestatyn (HER 102196) with Denbigh and Ruthin (Silvester 2003). There is no visible evidence of the *Deva-Canovium* road, although visits by Ordnance Survey personnel have identified a *c* 5m-wide ridge that may be an *agger*. Otherwise, the only possible Roman site within the study area is a univallate polygonal enclosure, seen as a cropmark on aerial photography (HER 102650), to the west of Long Covert. Roman settlement at Rhuddlan is indicated by the identification of Roman features, but the nature of the remains is unclear (Manley 1985).

1.4.9 ***Medieval activity (c AD 410-1500)***: Rhuddlan and St Asaph apparently continued to develop as the principal centres of activity within the study area, and the burh of *Cledemutha* is documented as having been constructed by Edward the Elder in AD 921, with the name deriving probably from 'Clwydmouth' (HER 13116). Excavations have indicated that land at Rhuddlan enclosed within a substantial earthwork ditch and bank, to the south-east of the town (known as the Town Ditch), is likely to represent a Late Saxon burh (Manley 1985; 1987). These excavations, across the bank and ditch, indicated that it had tenth-century origins. Given the evidence for Roman activity, Rhuddlan may have been an important early medieval centre prior to the creation of the burh (*ibid*).

1.4.10 A much smaller Norman borough was established in the latter part of the eleventh century in the north-western part of the Saxon burh (HER 21899); a motte and bailey castle (Twt Hill – HER 102026/7) was also built in *c* AD 1073 by Robert of Rhuddlan. A period of Welsh resurgence started in AD 1094, but Edward I defeated Gruffydd ap Llywelyn at Rhuddlan in AD 1277. To reinforce his hold on the area, Edward built a large stone castle in the north-western corner of the Saxon defensive circuit (HER 102031), and established a new town. A channel was cut to straighten the course of the River Clwyd between Rhuddlan and the sea, allowing the passage of seagoing vessels to the town, which could therefore serve as a port (Manley 1989).

1.4.11 A monastery and episcopal see may have been founded at St Asaph as early as AD 560 by St Kentigern, with St Asaph succeeding Kentigern as bishop (Pritchard

1997). In Domesday Book, the settlement was referred to as *Llanuile* (Llanelwy), but its name was changed to St Asaph around the middle of the twelfth century. The construction of the cathedral was started by AD 1239 but it was burned by troops of Edward I in 1282 (*ibid*). Other medieval sites include the castle at Dyserth (HER 102059/60), which was completed by AD 1250 and destroyed in AD 1263, after an attack by Llewellyn ap Gruffyd.

1.4.12 ***Post-medieval and modern activity (c AD 1500-present)***: during the post-medieval period, settlements within the Vale of Clwyd continued to evolve, with the development of hamlets into villages. One of the major developments within this period was the large-scale drainage and reclamation of marshes along the coast (Jones 2002). The Rhuddlan Marsh Embankment Trust was established in 1794 to reclaim the marshes of Morfa Rhuddlan and drainage continued into the nineteenth century; Cwybr Marsh was enclosed in 1815 and Rhyl Marsh in 1842 (*ibid*).

1.5 PREVIOUS PALAEOENVIRONMENTAL WORK

1.5.1 The Holocene vegetation history, derived from pollen analysis of sediments from Llyn Corcorion, east of Bangor, provides a reference profile for lowland North Wales (Watkins *et al* 2007). At Llyn Corcorion, local disturbance is interpreted as facilitating the spread of alder, and lime was a common component of the forest by the end of the Mesolithic period. Pollen and charcoal records suggest that, by the early Iron Age, there was progressive deforestation, an increased use of fire, a spread of grassland, and the appearance of the first cereal grains.

1.5.2 'Fossil forests', of variable Mesolithic age, have been described from the Welsh coastline, for example at Borth, Cardigan Bay, and Conwy (Heyworth 1985; Haynes *et al* 1977; Caseldine 1990). These forests were present along the coast of Wales for around 2000 years during the mid-Holocene, in areas that are now only exposed at low tide. Peat beds outcrop on the foreshore at Rhyl and are exposed at low tide (Bibby 1940), and prehistoric objects of bone, shell and bronze, found on the foreshore, are broadly attributable to the Neolithic and Bronze Age (RPS 2015).

1.5.3 Seismic and core data from the north-east Menai Straits contain a long record of relative sea level change (Roberts 2006), which has been integrated with dated peat horizons and estuarine and marine sediments, to produce a sea-level curve for North-West Wales (Roberts *et al* 2011). This has particular reference for the Late-glacial and early Holocene time periods.

2. ARCHAEOLOGICAL TRIAL TRENCHING: RESULTS

2.1 INTRODUCTION

2.1.1 The archaeological trial trenching significantly contributed to an understanding of the archaeological resource along the line of the cable route. It has therefore been assessed, alongside the mitigation trenches (*Section 3*), for its potential for analysis.

2.1.2 In total, 69 trenches were proposed along the route of the onshore export cable (DONG Energy 2014; Fig 2). During the fieldwork in 2014, three trenches were not excavated. Access to Trenches 25 and 26 was not available at the time of the first or second phases of trial trenching. The proposed Trench 53 was located over a gas pipeline; other adjacent services and newt fencing made it impossible to move the trench to a nearby location. Otherwise the trenches were positioned as defined.

2.1.3 In addition to those, a further eight trenches (each measuring 25 x 1.8m) were later proposed, to be excavated in 2015 (Trenches 62-69; RPS 2015). These were positioned to fill in perceived gaps in the 2014 trenching. Two of these (Trenches 62 and 63) were to be placed along the route of a proposed access, which in the event entailed the laying of a metal track on top of the ground, and thus trenching was not required. At the time of the second phase of trial trenching, a 500m section of cable was set out along the easement adjacent to Fford-y-criccin, and to the east of the River Clwyd (Fig 2). It was therefore agreed with the Development Control Archaeologist for Denbighshire County Council that the proposed trenches (66-69) would not be excavated, given that the earlier trenching in this section (Trenches 30-34) had identified minimal archaeological remains. The results of the trenching are outlined below and a context list is provided in *Appendix 3*.

2.2 METHODOLOGY

2.2.1 An initial programme of trial trenching was implemented which entailed the excavation of 55 25 x 1.8m trenches, five 50 x 1.8m trenches and one 60 x 1.8m trench (61 trenches in total), defined within the mapping provided with the two Written Schemes of Investigation (Dong Energy 2014; RPS 2015). In a limited number of instances, the trenches had to be moved to accommodate access restrictions or services, or access was not available (*Section 2.1.2*). The trial trenching was intended to establish the presence or absence of any previously unsuspected archaeological deposits and then test the date, nature, complexity, depth and quality of preservation, of any revealed.

2.2.2 The topsoil and any modern overburden was removed in 0.1m thick spits using an 8 ton, 360 degree excavator (fitted with a toothless ditching bucket), under archaeological supervision, to the surface of the first significant archaeological deposit or to the level of the natural subsoil. This deposit was cleaned by hand, using either hoes or shovel scraping, and inspected for archaeological features. All features of archaeological interest were investigated and recorded. All trenches were excavated in a stratigraphical manner, whether by machine or by hand. The investigation of intact archaeological deposits was exclusively manual, and while small pits and postholes were fully excavated, larger features were half-sectioned, and linear features were subject to no more than a 10% sample.

2.2.3 All information identified in the course of the site works was recorded stratigraphically, using a system, adapted from that used by the former Centre for Archaeology of English Heritage, with sufficient pictorial record (plans and sections) to identify and illustrate individual features. Results of all the field investigations were recorded on *pro-forma* context sheets; where the trench did not reveal any features, the trench was recorded using a single trench record sheet. The site archive includes both a photographic record and accurate large-scale plans and sections at an appropriate scale (1:50, 1:20 and 1:10). Trenches were located by use of a differential Global Positioning System (dGPS), and altitude information was established with respect to Ordnance Survey Datum.

2.2.4 ***Finds:*** all artefacts and ecofacts were handled and stored according to standard practice (following current Chartered Institute for Archaeologists guidelines (2015) in order to minimise deterioration.

2.2.5 ***Palaeoenvironmental Sampling:*** a targeted programme of palaeoenvironmental sampling was implemented in accordance with the Oxford Archaeology *Environmental Guidelines and Manual* (OA 2005), and in line with the English Heritage paper on Environmental Archaeology (Campbell *et al* 2011). In general, one bulk sample measuring 30 litres was taken where appropriate, which allowed for sub-sampling as part of the process of environmental assessment.

2.3 SUMMARY OF RESULTS

2.3.1 Where possible, the trenches were located so as to examine geophysical anomalies, accounting for 22 of the trenches (Table 1). The remaining 38 trenches were systematically placed along the easement corridor, at intervals that were designed to give maximum coverage of the route.

Trench No	Dimensions (as excavated)	Depth	Geophysical anomalies?	Archaeology present?
1	25 x 1.8m	0.30m	No	No
2	25 x 1.8m	0.50m	No	Yes
3	25 x 1.8m	0.30m	No	No
4	25 x 1.8m	0.45m	No	No
5	25 x 1.8m	0.45m	No	No
6	***50 x 1.8m***	0.50m	No	No
7	25 x 1.8m	0.50m	No	No
8	25 x 1.8m	0.55m	No	Yes
9	25 x 1.8m	0.60m	No	Yes
10	25 x 1.8m	0.40m	No	Yes
11	25 x 1.8m	0.40m	No	Yes
12	25 x 1.8m	0.70m	Yes	No
13	25 x 1.8m	0.70m	No	No
14	25 x 1.8m	0.60m	No	Yes
15	50 x 1.8m	0.50m	Yes	Yes
16	50 x 1.8m	0.70m	Yes	Yes
17	25 x 1.8m	0.50m	Yes	No
18	45 x 1.8m	0.70m	Yes	Yes
19	20 x 1.8m	0.40m	Yes	No
20	60 x 1.8m	0.60m	Yes	No
21	25 x 1.8m	1.00m	Yes	Yes
22	25 x 1.8m	0.45m	Yes	No
23	25 x 1.8m	0.45m	No	No

Trench No	Dimensions (as excavated)	Depth	Geophysical anomalies?	Archaeology present?
24	25 x 1.8m	0.55m	Yes	No
25	Not excavated	N/A	Yes	N/A
26	Not excavated	N/A	Yes	N/A
27	25 x 1.8m	0.70m	No	Yes
28	25 x 1.8m	0.80m	No	No
29	25 x 1.8m	0.70m	No	No
30	25 x 1.8m	0.70m	Yes	No
31	25 x 1.8m	0.65m	No	Yes
32	25 x 1.8m	0.60m	No	No
33	25 x 1.8m	0.50m	Yes	No
34	25 x 1.8m	0.65m	Yes	No
35	25 x 1.8m	0.40m	No	No
36	25 x 1.8m	1.00m	No	Yes
37	25 x 1.8m	0.45m	No	No
38	25 x 1.8m	0.60m	Yes	No
39	25 x 1.8m	0.50m	Yes	Yes
40	25 x 1.8m	0.45m	Yes	No
41	25 x 1.8m	0.35m	Yes	Yes
42	25 x 1.8m	0.35m	No	No
43	25 x 1.8m	0.30m	No	No
44	25 x 1.8m	0.45m	No	No
45	25 x 1.8m	0.45m	No	No
46	25 x 1.8m	0.70m	No	No
47	25 x 1.8m	0.30m	No	No
48	25 x 1.8m	0.40m	No	No
49	25 x 1.8m	0.40m	No	No
50	25 x 1.8m	0.40m	No	No
51	25 x 1.8m	0.40m	No	Yes
52	25 x 1.8m	0.50m	No	No
53	Not excavated	N/A	No	N/A
54	25 x 1.8m	0.40m	No	No
55	25 x 1.8m	0.45m	No	No
56	25 x 1.8m	0.50m	No	No
57	25 x 1.8m	0.45m	No	No
58	25 x 1.8m	0.60m	No	No
59	25 x 1.8m	0.50m	No	No
60	25 x 1.8m	0.55m	No	No
61	25 x 1.8m	0.40m	No	No
62	Not excavated	N/A	No	N/A
63	Not excavated	N/A	No	N/A
64	30 x 2m	0.70m	No	Yes
65	30 x 2m	0.60m	No	Yes
66	Not excavated	N/A	Yes	N/A
67	Not excavated	N/A	No	N/A
68	Not excavated	N/A	Yes	N/A
69	Not excavated	N/A	Yes	N/A

Table 1: Summary of Trial Trenches

2.3.2 All of the trenches had varying depths of topsoil and subsoil, and were excavated to the level of the natural alluvium, sands and gravels (generally approximately 0.3-0.6m below the ground level). A summary of the results for the trenches where archaeological features were identified is presented below (highlighted in Table 1), and a context list is provided in *Appendix 3*, which also describes deposits revealed in the trenches that did not identify archaeological features.

2.3.3 ***Trench 2***: Trench 2 was situated at the northernmost end of the onshore export cable route (Fig 2), and was placed on a ridge of ground, where the natural geology comprised a silty-sandy-gravel, surrounded by alluvial silt and clay (Fig 3). A gully (***207***) traversed the trench on an east/west alignment; it had a shallow U-shaped profile and was 0.15m deep. The silty fill (***206***) suggested that it had a drainage function, and a charred fragment of roundwood yielded a date of 1431-1283 cal BC (3100±30BP; Beta-396127). To the south of gully ***207***, two pits were observed. The larger, ***203***, was only partially visible, the remainder being beyond the eastern edge of the trench; it was 1.30 x >0.55m, and 0.15m deep. The silty fill suggested that it was a natural accumulation in wet conditions. The smaller pit, ***205***, was again only partially visible in the western side of the trench, and measured 0.30 x >0.50m, being 0.15m deep. The fill contained fire-cracked stone, suggesting that it had filled with general waste.

2.3.4 ***Trench 5***: Trench 5 was within an area of reclaimed ground to the west of Pydew Farm. It was archaeologically blank, but a palaeochannel (***503***) was observed (Fig 3); a machine-excavated sondage showed this to be approximately 1.5m deep. The channel was also evident as a slight depression in the landscape.

2.3.5 ***Trench 8***: Trench 8 was on the edge of higher ground east of Rhydorddwy Farm. A single pit, ***804***, which was 0.80 x >0.35m, but only 0.20m deep (Plate 1), was observed (Fig 3). The dumped fills were charcoal-rich, and contained fragments of burnt clay; it is possible that this was a rubbish pit. A fragment of apparent oak (*Quercus* sp) from fill ***803*** yielded a radiocarbon date of 1737-1534 cal BC (3350±30BP; Beta-395347).

*Plate 1: Pit **804** in Trench 8, facing west*

2.3.6 ***Trench 9***: Trench 9, in a similar topographic context to Trench 8, also contained pit-like features, although they were of a different character to those in Trench 8.

Pits ***906*** (0.95 x >0.5m, 0.1m deep), ***908*** (1.40 x 0.56m, 0.15m deep) and ***910*** (1.00 x 0.65m, 0.1m deep; Fig 3) were all filled by similar clay deposits, which appear to have been formed as a result of natural silting. A posthole, ***904***, was also observed to the north, which had a diameter of 0.25m, and was 0.20m deep. Evidence suggested that the post had been removed before the hole had silted up naturally.

2.3.7 ***Trench 10***: Trench 10 was on slightly raised ground to the south-east of Rhydorddwy Farm. Two north-east/south-west-aligned parallel ditches were observed (Fig 3), the larger, ***1007***, being 1.8m wide, with a U-shaped profile (0.5m deep); it had filled with an homogeneous silt. The smaller ditch, ***1004***, to the north, was 0.55m wide, and 0.15m deep; it also seemed to have silted up naturally.

2.3.8 ***Trench 11***: Trench 11, on level, naturally drained ground north of Four Winds Farm, contained a single north-west/south-east-aligned gully, ***1108***, at its south-western end (Fig 4). The gully, which was 0.45m wide, and 0.3m deep, seemed to have silted up naturally. Several pits were identified; one, ***1104,*** in the southern part of the trench, near gully ***1108***, was irregular in plan, and 0.4 x 0.6m in size, with a depth of 0.1m. Pit ***1106,*** in the northern part of the trench, was of similar dimensions (0.55m in diameter, 0.15m deep), but was much more regular in plan and profile.

2.3.9 ***Trench 13***: Trench 13, on moderately drained ground to the west of Four Winds Farm, was traversed by a north-west/south-east-aligned gully (Fig 4). Gully ***1304*** was 0.85m wide and 0.3m deep; the secondary silt fill contained post-medieval/modern finds, but seemed to have been a natural accumulation.

2.3.10 ***Trench 14***: Trenches 14 and 15 were placed on an area of level ground adjacent to a canalised stream, where there were well-drained sandy soils. Pit ***1404*** was the only feature observed in Trench 14 (Fig 4). This had a diameter of 1.5m and was 0.3m deep; it seemed to have silted up naturally.

2.3.11 ***Trench 15***: several linear features were observed in Trench 15 (Fig 4). Three were on an east-south-east/west-north-west alignment, with another possible two on the same alignment seemingly branching off a north-north-east/south-south-west-aligned ditch at the north end of the trench. The southernmost ditch, ***1506*** (1.1m wide), was shallow (0.1m deep), and had silted up naturally. To the north, ditch ***1508*** was perhaps curvilinear, and appeared to be trending to the north. Measuring 1m wide and 0.35m deep, its U-shaped profile had clearly silted up in three separate events from the southern (outer) edge of the ditch, these being evident in the section. Gully ***1510*** was located to the north of ditch ***1508***; it was 0.3m wide and only 0.05m deep, having been heavily truncated by ploughing. It had filled with material that had been washed into the ditch over time. A north-north-east/south-south-west-aligned gully was situated to the north of gully ***1510***. Gully ***1502*** extended along the trench for approximately 11m, and was 0.20m wide. The shallow U-shaped profile was 0.2m deep, and had apparently silted up naturally. A possible break in the gully was observed, which may have been created by ditch ***1504***, again aligned east-north-east/west-south-west, which curved to the north-north-east, although this could not be established with certainty, given the shallow nature of the features at the northern end of the trench. Gully ***1504*** was found to be 0.2m wide and 0.05m deep, and, as with gully ***1502***, had seemingly silted naturally. A fragment of oak from fill ***1505*** produced a date of 1226-1006 cal BC (2921±38BP; SUERC-56391).

2.3.12 ***Trench 16***: Trenches 16 and 18 were excavated on a spit of land between two canalised streams to the west of Aberkinsey Farm. Trench 16 contained a single east/west-aligned ditch, ***1603*** (Fig 5). It was 1.70m wide, and had a U-shaped profile (0.25m deep), having apparently silted naturally.

2.3.13 ***Trench 18***: two ditches were observed towards the centre of Trench 18 (Fig 5). Ditch ***1803*** seemed curvilinear and was 0.9m wide and 0.2m deep; it was the more substantial of the two. Ditch ***1812*** was 1.14m wide and seemingly straight, but only 0.1m deep; both had seemingly silted naturally.

2.3.14 Putative pits ***1809*** (>1.5 x >0.45m in plan, 0.3m deep) and ***1807*** (>1.5 x >0.3m in plan, 0.15m deep), to the south of ditch ***1812***, were only partially visible in the trench, continuing beyond the eastern and western edges respectively. The fills of the pits were characterised by fine greyish-blue clay deposits. To the south was a network of linear features (***1805***); these comprised two roughly east/west-aligned components, connected by a north/south-aligned linear feature (Plate 2). They were 0.5-0.75m wide, approximately 0.4m deep, and appeared to be contemporaneous. As with the pits, these features were characterised by fine greyish-blue clay deposits.

*Plate 2: Partially excavated network of linear features, **1805**, Trench 18, looking south*

2.3.15 ***Trench 21***: Trench 21 was on a spit of low-lying ground between two canalised streams to the east of Pentre Mill Farm. A layer of peat (***2104***) was observed at approximately 1m below the ground level (14.4m OD). This was only 0.1m thick and extended across the whole trench. No features were visible within this.

2.3.16 ***Trench 27***: Trench 27 was excavated on slightly raised ground to the south of Bodrhyddan Park. Its entire northern end comprised a >2m deep modern dumped deposit, ***2705***, which appeared to have been bounded to the south by modern ditch ***2704*** (Fig 5). The ditch, which was on a north-east/south-west alignment, was 1.15m wide and 0.1m deep, and had been backfilled with remnants of dumped material and topsoil.

2.3.17 ***Trench 31***: Trench 31 was placed on raised ground above the River Clwyd, to the east, and within an area of small ancient fields. A ditch, ***3104*** (0.7m wide, and 0.15m deep), was situated at its north-eastern end (Fig 5). This had a shallow U-shaped profile and had apparently silted up naturally over time.

2.3.18 ***Trench 36***: Trench 36 was situated just above the flood plain of the River Clwyd, to the north of Bryn Gwyn Farm, and was set across an extant field boundary. The ground sloped abruptly away to the north-east of this boundary, from 5.50m OD to 4.65m OD, over a distance of 8m, which would suggest that it had a lynchet profile as a result of historical arable farming. Two dumped deposits had been placed up against the west side of the boundary; the first, layer ***3604*** (Fig 6), was 0.5m thick, and comprised modern bricks, stones, glass and pottery. This was overlain by ***3603***, which comprised redeposited natural clay (0.5m thick).

2.3.19 ***Trench 39***: Trench 39 was excavated on low-lying, artificially drained, ground to the west of the River Clwyd. A series of parallel ditches was observed crossing it on a north-east/south-west alignment (Fig 6). At the south-east extent, ditch ***3905*** (1.45m wide, 0.85m deep) had a deep V-shaped profile. It had a waterlogged basal deposit, which had probably built up whilst the ditch was in use, and it had then silted up over time. A fragment of roundwood from the basal fill (***3904)*** yielded a date of cal AD 420-565 (1560±30BP; Beta-396128).

2.3.20 To the north-west of ditch ***3905***, ditch ***3909*** had been recut (***3907***) (Plate 3). The original ditch was >1.85m wide and 0.65m deep; it appeared to have silted up in very wet conditions, and the fills included lenses of waterlogged silts. Ditch ***3907*** was cut after ditch ***3909*** had silted completely; it was 1.85m wide and 0.65m deep, and had filled with soils from the surrounding area.

*Plate 3: South-west-facing section through ditches **3907** (to left), and **3909**, Trench 39*

2.3.21 ***Trench 41***: Trench 41 was placed in an area of artificially drained land to the west of Glyn Derw Farm. It contained three ditches, ***4104***, ***4106*** and ***4107***, which traversed the trench on an east-north-east/west-south-west alignment (Fig 6); they were only recognisable as cuts in a machine-excavated section through what appeared to be a 8m-wide layer of waterlogged clay. The ditches were between 1.30m and 1.45m wide, and were between 0.20m and 0.3m deep; all had silted up in wet conditions, and had very similar fills.

2.3.22 ***Trench 51***: Trench 51 was on a raised spur of generally well-drained land to the west of Pen-y-Bryn Farm. A single ditch, ***5104***, was observed on a north-east/south-west-alignment; it was 0.6m wide and 0.2m deep. The single fill appeared to be a dumped deposit, and contained post-medieval pottery.

2.3.23 ***Trench 64***: Trenches 64 and 65 were excavated on slightly raised ground within small, apparently ancient, fields to the south of Bodrhyddan Park (Fig 2). Trench 64 contained a north-west/south-east-aligned ditch (***6403***), which was 0.8m wide and 0.3m deep, and had apparently silted naturally (Fig 7). To the west of the ditch, two features were observed. Posthole ***6405*** had a diameter of 0.3m, and was 0.2m deep. It appeared to have silted up after the post had been removed. The second feature (***6407***) was only partially visible within the trench, and seems to have been formed by roots.

2.3.24 ***Trench 65***: ditch ***6503*** was on an east/west alignment at the northern end of the trench. It was 1.3m wide, 0.3m deep, and seems to have silted naturally (Fig 7), being cut by a modern field drain.

3. THE MITIGATION EXCAVATIONS: RESULTS

3.1 INTRODUCTION

3.1.1 The route of the Burbo Bank EOW onshore cable had been shown to have a high potential for prehistoric remains, previous works providing evidence of human activity dating from the Palaeolithic period onwards, concentrated mainly towards the north (*Section 1.4*). The Roman period had been shown to be less well represented, although the nearby towns of Rhuddlan and St Asaph probably originated in this period, and flourished through medieval times (*Section 1.4*).

3.1.2 The trial trenching (*Section 2*) identified a number of cut features, most of which seemed to be buried boundaries, which, for the most part, were aligned approximately parallel or perpendicular to extant boundaries; of these, the earliest was a ditch which produced an early medieval date (***3904***, Trench 39, *Section 2.3.19*). This would perhaps suggest that the modern field system was a continuation of a much earlier pattern. Other features in the northern part of the route were broadly dated to the Bronze Age. These features had shallow profiles and relatively sterile fills, however, and did not correspond to any features extant in the landscape. The Development Control Archaeologist for Denbighshire County Council therefore requested that ten areas be subject to further excavation (Table 2; Fig 8). These were based on the trial trenches that identified archaeological remains, and are numbered accordingly.

Trench	Dimensions (as excavated)
2	30 x13m
8	30 x13m
9	60 x13m
10	30 x13m
11	30 x13m
15	60 x 13m
16	60 x 13m
18	60 x 13m
39	30 x13m
41	30 x13m

Table 2: Extent of Excavation areas

3.2 METHODOLOGY

3.2.1 A written scheme of investigation (WSI) (*Appendix 1*) was submitted by RPS Planning and Development in response to a request by Dong Energy Burbo Bank Extension (UK), following a brief compiled by the Development Control Archaeologist for Denbighshire County Council. Following the trial trenching phase of work, a project design was prepared by OA North (*Appendix 2*; OA North 2015). The project design was adhered to in full, and the work was consistent with the relevant CIfA and Historic England guidelines (Chartered Institute for Archaeologists 2014a; 2014b; 2014c; English Heritage 2006).

3.2.2 The ten areas were excavated by a process of strip and record. The topsoil and any modern overburden was removed in 0.2m-thick spits using a 12 ton, 360° excavator (fitted with a toothless ditching bucket), under archaeological supervision, to the

surface of the uppermost significant archaeological deposit, or to the level of the natural subsoil. This deposit was cleaned by hand, using either hoes or shovel scraping, and inspected for archaeological features. All features of archaeological interest were investigated and recorded. All trenches were excavated in a stratigraphical manner, whether by machine or by hand. The investigation of intact archaeological deposits was exclusively manual, and while small pits and postholes were fully excavated, larger features were half-sectioned, and linear features were subject to no more than a 10% sample.

3.2.3 All information identified in the course of the site works was recorded stratigraphically, using a system adapted from that used by the former Centre for Archaeology of English Heritage, with sufficient pictorial record (plans and sections) to identify and illustrate individual features. Results of all the field investigations were recorded on *pro-forma* context sheets. The site archive includes both a photographic record and accurate large-scale plans and sections at an appropriate scale (1:50, 1:20 and 1:10). Trenches were located by use of a differential Global Positioning System (dGPS), and altitude information was established with respect to Ordnance Survey Datum.

3.2.4 In the course of the excavation of Trench 9, a series of curvilinear ditches was identified, which had the potential to be domestic features. At the request of the Development Control Officer for Denbighshire County Council, the trench was therefore extended by 30m to the north.

3.2.5 ***Finds:*** all artefacts and ecofacts were handled and stored according to standard practice (following current Chartered Institute for Archaeologists guidelines (2015) in order to minimise deterioration.

3.3 RESULTS

3.3.1 ***Trench 2***: Trench 2 was situated at the northernmost end of the onshore export cable route, and was on a ridge, where the natural geology comprised a silty-sandy-gravel, surrounded by alluvial silt and clay (natural geology ***7001***). It was centred on Trial Trench 2, which was re-excavated. Archaeological features were observed at a depth of 0.5m below the modern ground level, the earliest phase of activity identified being a gully and two pits. Although gully ***207***, identified by the trial trench, was not identified again, a second gully, ***7009*** (Fig 9), had similar dimensions and was located to the south. Ditch ***7009*** (1m wide and 0.15m deep) had a shallow U-shaped profile, and appeared to have silted naturally; it was probably a boundary ditch. A pit, ***7004***, was situated in the west of the trench to the north of the gullies; this was 1.05 x 0.6m, and 0.2m deep. A dump of material, containing a large proportion of animal bone, had filled this pit and it was probably a rubbish pit. In addition to these features, two small pit-like features were recorded, ***7003*** and ***7007***, but they seem to have been created either by natural bioturbation or animal burrowing. The features were sealed by topsoil ***7000***.

3.3.2 ***Trench 8***: Trench 8 was on the edge of higher ground east of Rhydorddwy Farm. The features were observed cut into the natural substrate, ***7102***, at a depth of 0.55m at the northern end of the trench. A pit, ***804***, observed in the trial trench (*Section 2.3.6*), had been half-sectioned. The other half of the pit was excavated during the mitigation excavation as pit ***7100*** (Fig 10). The overall diameter was found to be 0.8m, and it was 0.2m deep; it had been filled by a dump of burnt material, and was

possibly a rubbish pit. A second pit, ***7110***, was located on the eastern edge of the trench; the portion of the feature that was visible measured 1.4 x 0.8m and was 0.15m deep. Unlike pit ***7100***, this seemed to have silted naturally.

3.3.3 Several gullies were investigated. One, aligned east/west, ***7111***, was situated in the centre of the trench, and was 0.5m wide and 0.2m deep; it seemed to have silted naturally. At the north end of the trench, two further north-east/south-west-aligned gullies were recorded; gully ***7105*** was 0.45m wide and 0.2m deep, and ***7107*** was 0.7m wide and 0.2m deep. Gully ***7107*** cut the northern terminus of gully ***7105***, and was probably a boundary ditch. Again, both seemed to have silted naturally over time; subsoil ***7114*** and topsoil ***7113*** sealed all the features.

3.3.4 ***Trench 9***: Trench 9 was on the edge of higher ground to the east of Rhydorddwy Farm. Its natural geology comprised alluvial silt, ***7202***, and features were observed at a depth of 0.6m below ground level. There were two distinct categories of features observed. The northern end of the trench contained a series of large pits, some of which were reasonably deep; these were generally filled with gravel. Smaller pits in the area appeared to have silted naturally, with clay and silt deriving from the surrounding subsoils. To the south were several gullies, which were somewhat irregular, and there was some limited evidence that they were structural in nature.

3.3.5 Two curvilinear ditches extended from under the western edge of the excavation (Fig 11); Gully ***7205*** (1.1m wide and 0.2m deep) formed a tight curve (the outer diameter of the projected circle would be approximately 8.5m), and to the north was another curvilinear feature, ***7285*** (0.5m wide, 0.2m deep on average). If this latter curvilinear feature did form a circle, then the outer diameter would have been approximately 11.5m; however, it was increasingly patchy and ephemeral towards the south.

3.3.6 Three other gullies were situated to the north-east of ***7285***. Gully ***7233*** was on a slightly sinuous, broadly north-west/south-east alignment, and was 0.3m wide, and 0.2m deep. Parallel to this was gully ***7214*** (0.55m wide, 0.5m deep), which was crossed by curvilinear gully ***7284*** (0.65m wide, 0.4m deep). Gully ***7224***, to the south, was probably a continuation of gully ***7214***. The majority of the fills in these gullies appeared to have accumulated naturally; however, in some places (slot ***7208*** in gully ***7214***; Plate 4), there was evidence of postholes, suggesting a possible palisade arrangement. The post in slot ***7208*** produced a radiocarbon date of 1699-1615 cal BC ((3372±26BP; SUERC-63769).

*Plate 4: Posthole, providing evidence for a possible palisade in gully **7214**, Trench 9, facing south*

3.3.7 The large gravel-filled pits in the north of the trench, (from north to south) ***7259***, ***7283***, ***7281***, ***7242***, ***7240***, and ***7263***, formed an apparent group. The most substantial was ***7242***, which was 1.95 x 1.35m, and was 0.6m deep (Fig 12). A further group of pits (from north to south, ***7278***, ***7261***, ***7248***, ***7257***, ***7245***, and ***7271***) were filled with clay. The largest of these, ***7278***, was 1.3 x 0.85m, and 0.12m deep. Two postholes towards the south of the groups of pits were also observed: ***7275*** (0.3m in diameter, 0.1m deep) and ***7277*** (0.2m in diameter, 0.1m deep); these had apparently filled after the post had been removed. The features were sealed by subsoil ***7201*** and topsoil ***7200***.

3.3.8 The pits formed a series of approximate alignments, one orientated north-west/south-east (***7259***, ***7283***, ***7261***, ***7242*** and ***7240***), and two parallel, north-east / south-west lines (***7261***, ***7281*** and ***7278*** and ***7240***, ***7257*** and ***7245***, respectively). These pits and associated postholes may have been parts of a structure, the difference in fills perhaps reflecting different phases of construction. At present, none of these features is dated, but it is possible that they relate to another phase of activity to the curvilinear features to the south.

3.3.9 ***Trench 10***: Trench 10 was on slightly raised ground to the south-east of Rhydorddwy Farm. Its natural geology, ***7321***, was alluvial silt, and features were observed cut into it at a depth of 0.4m below ground level. At the north end of the trench, a pit, ***7300*** (Fig 13), was 1.6m in diameter, and 0.25m deep, and had been filled with burnt material, which produced a radiocarbon date of 1611-1530 cal BC (3287±29BP; SUERC-63768). A second, smaller, pit, ***7306***, was observed to the south, and was 0.85 x 0.3m, and 0.1m deep; this seemed to have silted naturally.

3.3.10 The southern end of the trench was characterised by a series of north-east/south-west-aligned ditches and gullies; three gullies were identified for the first time in addition to those revealed by the trial trenching (*Section 2.3.7*). The northernmost gully, ***7316***, only survived as a shallow (0.08m deep) feature, 3.6m long and 1.7m wide. The southernmost ditch, ***7318***, had also been heavily truncated, and survived

as a 5m long, 0.6m wide and 0.2m deep section. Ditch ***7312*** traversed the trench, and was 0.4m wide and 0.14m deep. A small pit, ***7314***, was situated on the edge of this, and, although there is some uncertainty in the relationship, it appeared to cut the gully. Pit ***7314*** had a diameter of 0.4m but was only 0.05m deep. The most substantial of the ditches was ***7302***, which was 1.7m wide and 0.55m deep. All had apparently filled naturally, and were sealed by subsoil ***7320*** and topsoil ***7319***.

3.3.11 ***Trench 11***: Trench 11, on level, naturally drained ground to the north of Four Winds Farm, contained a group of irregular linear features cut into the natural geology, ***7402***, at a depth of 0.4m below ground level. A north-west/south-east-trending curvilinear ditch, ***7420*** (Fig 14; 0.45m wide, 0.25m deep), and north/south-trending ditch, ***7421*** (0.25m wide, 0.2m deep), were situated in the south of the trench, forming a rough T-shape. Both had apparently filled naturally and were seemingly related features. Slightly to the south, ditch ***7423*** was identified on a north-west/south-east alignment, and was 0.25m wide and 0**.**1m deep. Parallel to this was a fourth ditch, ***7407***, probably forming a boundary, slightly further to the north, on a north-west/south-east alignment; this was 0.3m wide and 0.3m deep. Ditches ***7407*** and ***7423*** were noticeably straight and had apparently filled naturally; they were thus probably contemporary drainage features.

3.3.12 Four pits (***7411, 7425, 7403, 7408***) were identified, of which ***7411*** and ***7425*** had been identified by the trial trenching (*Section 2.3.8*). Pits ***7408*** and ***7403*** were 0.8m and 1.25m in diameter respectively, and 0.4m and 0.2m deep. Pit ***7403*** had apparently filled naturally, but pit ***7408*** had a burnt fill. The features were all sealed by subsoil ***7401*** and ***7400***.

3.3.13 ***Trench 15***: Trench 15 was excavated on an area of level ground adjacent to a canalised stream, and the natural substrate, ***7502***, comprised well-drained sands and silts. Features were observed cutting into the natural geology at a depth of 0.5m below ground level. Two parallel, meandering, gullies, approximately 1m apart, were observed; the easternmost, ***7529*** (Fig 15), was 0.55m wide and 0.15m deep, and that to the west (***7528***) was 0.5m wide and 0.15m deep. These probably once contained a bank, now totally degraded, forming a boundary.

3.3.14 Pit ***7508*** was situated at the southern end of the trench. Measuring 4.14m long by 0.85m wide, and 0.2m deep, it had partially silted before burnt material had been dumped in the top. Two other pits were identified, ***7541*** and ***7517***, some metres to the north; the larger of these, ***7517***, was 1.7 x 1m, and was 0.35m deep. Two postholes, ***7535***, ***7536*** (Fig 16), were also observed; each had a similar stepped profile, and were 1.05m and 1.32m in diameter respectively, both being 0.4m deep. Both had filled after the post had been removed. Feature ***7514/7516*** was a short section of gully, and was 1.84m wide and 0.3m deep. All the features were sealed by subsoil ***7501*** and topsoil ***7500***. The alignment of the two postholes is approximately parallel to that of the gully and it is likely that they were related features, perhaps forming part of a structure.

3.3.15 ***Trench 16***: Trench 16 was placed on a spit of land between two canalised streams to the west of Aberkinsey Farm. The only feature identified was a continuation of the ditch observed in the trial trenching (*Section 2.3.12*). Ditch ***7610*** (Fig 17) was at least 7.95m long and 2.24m wide and probably had not silted completely when it was subsequently recut (***7605***). Both phases of the ditch had been cut into natural geology, ***7602,*** at a depth of 0.5m below ground level, and were sealed by subsoil ***7601*** and topsoil ***7600***. It probably formed a boundary feature.

3.3.16 ***Trench 18***: Trench 18 was excavated on a spit of land between two canalised streams to the west of Aberkinsey Farm. A 0.5-1.0m thick deposit of levelling material, ***7702***, overlay the natural geology, ***7703***, at a depth of 0.5m below ground level. Subsoil ***7701*** and topsoil ***7700*** sealed this levelling deposit. The excavation re-examined the features identified during the evaluation and confirmed that they were either geological features, tree throws or modern drainage ditches. No significant archaeological features were identified within the trench.

3.3.17 ***Trench 39***: Trench 39 was on low-lying, artificially drained, ground to the west of the River Clwyd. The natural geology was a sandy-silt, ***7802***, encountered at a depth of 0.5m below ground level. The main features observed were ditches ***7807***, ***7809*** and ***7816*** (Fig 18). Stratigraphically, the earliest ditch, ***7809***, was >1.6m wide and 0.7m deep, and had become completely filled before ditch ***7807*** was cut into its northern side (Fig 19); ditch ***7807*** was 2m wide and 0.9m deep. To the south, ditch ***7816*** had been cut into deposited layers ***7813*** which was above layer ***7810***. Ditch ***7816*** was up to 6m wide and 0.9m deep, which cut layers ***7818***, ***7817*** and ***7811,*** to the south. The features were sealed by subsoil ***7801*** and topsoil ***7800***.

3.3.18 ***Trench 41***: Trench 41 was excavated in an area of artificially drained land to the west of Glyn Derw Farm. The natural substrate was a sandy-silt, ***7902***, and cut features were observed at a depth of 0.35m below ground level. Ditch ***7909*** (Fig 20) was aligned east/west, was 3.3m wide, and 0.3m deep; there was some evidence of primary silting on the northern edge, perhaps suggesting the presence of a bank on that side. The ditch seemed to have silted naturally. A north-north-west/south-south-east-aligned ditch, ***7910***, 0.85m wide and 0.2m deep, seemed to link with ***7909*** on its southern side. A second, north-north-west/south-south-east-aligned ditch, ***7912***, was observed, which petered out just short of ***7909***. Ditch ***7912*** was 0.85m wide and 0.2m deep. All the features were sealed by subsoil ***7901*** and topsoil ***7900***.

4. GEOARCHAEOLOGICAL AND PALAEOENVIRONMENTAL TESTING

4.1 INTRODUCTION

4.1.1 A limited amount of geoarchaeological test pitting was carried out on the line of the cable route. These allowed palaeoenvironmental sampling to take place. Geoarchaeological investigations were undertaken, from north to south, in the positions as agreed in the WSI (*Appendix 1*) (Fig 8):

- four sample points in the vicinity of Trench 6 (extending to 1.5m below ground level);
- four sample points in the vicinity of Trench 21 (extending to 1.5m below ground level);
- one sample point in the vicinity of Trench 25 (extending to 1.5m below ground level) (three cores could not be taken because of stiff clay);
- four sample points adjacent to Trench 41 (extending to 1.5m below ground level).

4.2 GEOARCHAEOLOGY METHODOLOGY

4.2.1 The survey comprised the excavation of trial pits using a tracked mini-excavator, the trial pits being 1.8 x 2 x 1m deep. The full stratigraphy of the deposits at each of three locations was established by examination of the exposed section and also by coring, with a 300mm gouge auger, through the base of each trial pit, to a depth of 1.5m below the ground level. Where possible, three gouge cores, spaced approximately 0.5m apart, were taken through the base of each pit. In addition peats or dry-land / wetland interfaces identified beneath the exposed sediments were sampled using a 600mm-diameter hand-operated Eijkelkamp (Russian) auger in Pits 6 and 21. Each core was located using a survey-grade GPS, and a photographic record was taken of the deposits.

4.2.2 Each profile was recorded in a field notebook and the data transferred to *pro forma* lithology tables, with significant layers identified (*Appendix 5*). Relative depths were noted and a description of the deposits, using standard terminology (colour, texture, compaction and inclusions), has been made. This follows the English Heritage geoarchaeology and *Environmental Archaeology Guidelines* (Historic England 2015; Campbell *et al* 2011).

4.3 PALAEOENVIRONMENTAL METHODOLOGY

4.3.1 The sediments in the core samples were cleaned and described prior to sub-sampling for pollen. Volumetric samples were taken from six sub-samples from a Russian core from Pit 6 and eight sub-samples from a Russian core from Pit 21. One tablet, containing a known number of *Lycopodium* spores, was added so that pollen concentrations could be calculated (Stockmarr 1972). The samples were prepared using a standard chemical procedure (method B of Berglund and Ralska-

Jasiewiczowa 1986), using HCl, NaOH, sieving, HF, and Erdtman's acetolysis, to remove carbonates, humic acids, particles >170µm, silicates, and cellulose, respectively. The samples were then stained with safranin, dehydrated in tertiary butyl alcohol, and the residues were mounted in 2000cs silicone oil. Slides were examined at a magnification of x400 by ten equally spaced traverses across two slides to reduce the possible effects of differential dispersal on the slides (Brooks and Thomas 1967) or until at least 100 total land pollen and spores were counted. Pollen identification was made following the keys of Moore *et al* (1991), Faegri and Iversen (1989), and a modern reference collection; plant nomenclature follows Stace (2010). Charcoal particles greater than 5µm were recorded (Peglar 1993); non-pollen palynomorph (NPP) nomenclature follows van Geel (1978). The preservation of the pollen was noted and an assessment was made of the potential for analysis.

4.4 RADIOCARBON (AMS) DATING: METHODOLOGY FOR SELECTION

4.4.1 The cores retrieved from Pits 6 and 21 were used to select sub-samples for AMS dating of the organic sediments and peat (in accordance with English Heritage guidelines (Campbell *et al* 2011)). The samples for dating were selected to provide range finder dates for the top and bottom of the profiles. For the Russian core sample from Pit 6, indeterminate sapwood from the bottom of the peat (at 1.49-1.50m) has been selected, but no suitable plant macrofossil or woody remains were present within the upper part of the deposit, so a humin/humic acid date was required to date the upper part of the peat (1.27-1.28m). Sub-samples for humin/humic acid dating were also selected from the highly humified organic deposits at the top and bottom of the profile in Pit 21. Thus, seven sub-samples for AMS dating were submitted to the Scottish Universities Environmental Research Centre (SUERC) for dating.

4.5 GEOARCHAEOLOGICAL RESULTS

4.5.1 ***Description:*** the results of the lithological survey of four pits are presented in tabular form in *Appendix 5*. The data show that two of the pits (6 and 21) contained organic-rich/peat deposits at 1.0-1.50m below ground level, though the others did not.

4.5.2 The record from Pit 6 shows approximately 0.20m of peat sandwiched beneath a stiff minerogenic clay and above grey sand (Plate 5); this peat was collected using a Russian auger. Its thickness varied across the three cores, with thinner peat (0.07m) present in the southern part of the pit, but up to 0.28m of peat was recorded towards the northern end.

Note: scale indicates thickness only, not depth beneath surface

Plate 5: Pit 6, showing peat sandwiched between lower grey sand and overlying thicker grey clay unit

4.5.3 The record from Pit 21 shows a series of thin peaty deposits separated by organic-rich clays, at 1.0-1.5m below ground level (Plate 6). The organic deposits were collected using a Russian auger. Although variations in thickness occur, the sequence of peats, alternating with organic-rich clays, was present in all three cores at this site.

Note: scale indicates thickness only, not depth beneath surface

Plate 6: Pit 21, showing two peat units separated by clays, in gouge core 1

4.5.4 Extremely stiff brown clay was present in Pit 25, beneath topsoil and stones. The gouge core retrieved the clay at 1.00-1.50m at one location only (Core 1, Plate 7). No attempt was made to collect Cores 2 and 3 using the gouge core, as the clays proved too stiff, but the mechanical excavator was used to excavate down to

1.50m so that the sediments could be described. No peat or organic-rich clays were encountered.

Plate 7: Pit 25, gouge core showing recovery of stiff clays, gouge core location 1

4.5.5 At Pit 41, stiff brown and grey clays were exposed by the mechanical excavator. A layer of woody debris was encountered at a depth of 1m (Plate 8). The clays proved too stiff for the gouge auger to be used, but the excavator exposed a further 0.50m, although no organic sediments were revealed. Monolith tins were used to provide a record of the woody debris layer within the clays.

Plate 8: Pit 41, showing exposed wood at the base of excavated section, gouge core location 1

4.5.6 ***Interpretation:*** the sedimentological record for each of the four pits is different, the only correlation potential being the dated Early Neolithic basal peat units (Table 3) that were observed in Pits 6 and 21:

- **Pit 6:** the peaty lithologies, approximately 0.20m thick, suggest terrestrial deposition, dated to the Neolithic/early Bronze Age, which were subsequently covered by possible alluvial clays following an apparent sea-level transgression at some point after the early Bronze Age;
- **Pit 21:** the organic-rich sediments (approximately 0.50m thick) spanned the time period from the Neolithic (deepest peat bed) to the medieval period (top peat unit). It is, however, unlikely that the entire sequence from the Neolithic to the medieval period is present in sediments of only 0.50m thickness. The peats may therefore represent possible remnant peats. It is likely that sea-level palaeogeographic changes may have contributed to the sediment sequence seen at this site. Further work and dating of the 'middle' peat would help understand the sedimentary sequence.
- **Pit 25:** the exposed section revealed a sequence of stiff clays and sands with no development of organic-rich sediments. The sediment accumulation may have resulted in part from farming methods involving deep ploughing.
- **Pit 41:** the 1.5m of exposed grey clays probably represent deposition of alluvial sediments. The single layer of woody material at 1.0m, together

with rounded pebbles, suggests potential detrital inwashing within a possible alluvial depositional setting.

Depth (m)	Feature	Lithology	Fraction or object	Date @ 95% probability	Date BP	Period	SUERC
1.49-1.50	Pit 6	Peat	Sapwood	3953-3715 cal BC	5041±36	Early Neolithic	61959
1.27-1.28	Pit 6	Peat	Humic	2464-2208 cal BC	3863±36	Early Bronze Age	61960
1.27-1.28	Pit 6	Peat	Humin	2458-2200 cal BC	3838±36	Early Bronze Age	61964
1.48-1.50	Pit 21	Peat	Humic	3519-3356 cal BC	4642±36	Mid-late Neolithic	61965
1.48-1.50	Pit 21	Peat	Humin	3960-3771 cal BC	5056±36	Early Neolithic	61966
1.11-1.13	Pit 21	Organic clay/silt	Humic	cal AD 891-1119	1035±36	Early medieval	61967
1.11-1.13	Pit 21	Organic clay/silt	Humin	cal AD 997-1157	973±36	Early medieval	61968

Table 3: Radiocarbon AMS range finder dates for organic sediments extracted from Pits 6 and 21

4.6 POLLEN - PIT 6

4.6.1 Six sub-samples were examined for pollen from Pit 6 (*Appendix 5*). These sub-samples were taken from organic-rich peaty deposits between 1.28m and 1.48m below ground level.

4.6.2 ***Description:*** the assemblages are dominated by tree and shrub pollen, in particular pollen of alder (*Alnus*) and hazel-type (*Corylus*-type), with oak (*Quercus*), birch (*Betula*) and lime (*Tilia*) variably common, but with lesser quantities and more sporadic occurrences for pollen of ash (*Fraxinus*), pine (*Pinus*), elm (*Ulmus*), willow (*Salix*), heather (*Calluna*), holly (*Ilex*) and ivy (*Hedera*). The pollen of herbs is present in very low numbers, including taxa such as Rubiaceae (bedstraw family), Caryophyllaceae (pinks family) and Amaranthaceae (goosefoot family). The fern spores include occurrences of polypody ferns (*Polypodium vulgare*) and monolete fern spores (Pteropsida). Only very low levels of microcharcoal were present.

4.6.3 ***Interpretation:*** although counts of only 100 grains have been recorded (which is insufficient for a confident interpretation), the pollen data suggest the possible development of alder carr at or adjacent to the site. Mixed deciduous woodland, comprising hazel-type, birch, oak and lime, was probably also present either regionally or locally. These assemblages are typical of woodland assemblages described from upland and lowland sites in the UK, following the rise in alder and the decline in elm pollen (Peglar 1993; Watkins *et al* 2007). The assessment data show little evidence of disturbance, in terms of increased herb pollen and decreases in tree pollen, although the abundance of alder may be a response to local disturbance events. Detailed, closely spaced analytical work may reveal human or climatic impact on the vegetation. Radiocarbon AMS dates for the bottom and top of the peat profile show a span in ages from the early Neolithic period (3953-3715 cal BC; 5041±36 BP; SUERC-61959) to the Bronze Age (2464-2208 cal BC; 3863±36 BP; SUERC-61960).

4.7 POLLEN - PIT 21

4.7.1 Eight sub-samples were examined from organic-rich peat and clay deposits. This showed that two main assemblages are present, firstly at 1.48-1.40m below ground level, with a change apparent at 1.32m, and then at 1.28-1.08m below ground level.

4.7.2 ***Description, 1.48-1.40m:*** tree and shrub pollen dominate the assemblages, in particular pollen of alder and hazel-type, with fewer occurrences of oak, birch, elm, pine and lime. Less alder and greater numbers of hazel-type pollen is present at 1.40m, than in the deeper sub-samples (1.44m and 1.48m). Pollen of several herb species were recorded, including sedges (Cyperaceae), grasses (Poaceae) and dandelion-type (*Taraxacum*-type), as well as sporadic occurrence of pollen of the pinks family, goosefoot family, buttercup-family (Ranunculaceae), mugworts (*Artemisia*), ribwort plantain (*Plantago lanceolata*), daisy-family (Asteraceae) and devil's bit scabious (*Succisa pratensis*). Fern spores present include those of polypody ferns, common monolete ferns and rare spores of bracken (*Pteridium*). Freshwater algae, including *Pediastrum* (HdV-760) and *Botryococcus* (HdV-766), were recorded, as well as occurrences of *Sphagnum* moss spores. Very low counts for microcharcoal particles are recorded, but the number increases at 1.40m, although it is still relatively low.

4.7.3 ***Description 1.32m:*** at this depth, tree pollen values appear to decline; for example, values for alder pollen and hazel-type are reduced relative to the numbers recovered from the deeper sub-samples (*Section 4.7.2*). In addition, very low numbers of oak, lime, willow and ivy were recorded. In contrast, the pollen of herbs was seen to increase, and in particular the pollen of sedges. Fern spores occur frequently and a rise in numbers of bracken spores was recorded. Of interest was an increase in the numbers of the freshwater alga *Botryococcus* (HdV-766). Microcharcoal counts remain low.

4.7.4 ***Description 1.28m-1.08m:*** the pollen assemblages are dominated by herbs, in particular sedges and grasses. Other herbs present include pollen of dandelion-type, ribwort plantain, daisy-type, bedstraws, cinquefoils (*Potentilla*-type) and meadowsweet (*Filipendula*). Tree and shrub pollen is very scarce, with just a few occurrences of pollen of alder, oak and hazel-type. At 1.28m only, abundant pollen of the aquatic plant, lesser bulrush (*Typha angustifolia*), was recorded, as well as an abundance of the freshwater alga, *Botryococcus* (HdV-766). Fern spores present include a consistent occurrence of bracken, with reduced numbers of monolete ferns and sporadic occurrences of polypody ferns. Non-pollen palynomorphs are present in all four sub-samples (1.28m, 1.24m, 1.12m and 1.08m) and include *Glomus* (HdV-207), *Spirogyra* (HdV-130), *Mougeotia* (HdV-313) and *Zygnema* (HdV-314).

4.7.5 ***Interpretation:*** the sub-samples examined appear to show a transition from alder carr to sedge fen. An already damp palaeoenvironment, within which possible alder carr may have been established, would appear to have become wetter, the carr being replaced by sedges, grasses, herbs of wet places (for example, meadowsweet) and aquatic plants (for example, bulrush and lesser bulrush). Evidence for wetness is already present within the lowest sub-sample (1.48m), in which several specimens of the freshwater/brackish water alga, *Pediastrum* (HdV-760), was recorded. The purely freshwater alga, *Botryococcus* (HdV-766), reaches an apparent peak in abundance at 1.28m, along with a peak occurrence of lesser bulrush, which is an aquatic plant. Such an increase in freshwater

palaeoenvironments may be related to sea-level rise. Range-finder radiocarbon AMS dates were obtained for the top and bottom of the organic deposits and show that the deepest organic deposits date to the Neolithic period, whereas the uppermost organic deposits are of early medieval date (Table 3). It is, however, unlikely that a 0.50m core would contain sediments that span the entire period between the Neolithic and medieval periods, and it may be that sea-level rise at some point after the Neolithic period may have resulted in a cessation or even erosion of deposition, to be subsequently renewed during a medieval depositional phase.

5. THE ASSESSMENT

5.1 AIMS AND OBJECTIVES

5.1.1 The aim of the assessment, in accordance with Historic England MoRPHE guidelines (English Heritage 2006), was to evaluate all classes of data from the investigations, so that a project design for an appropriate programme of analysis could be compiled, together with a proposal for dissemination appropriate to the potential demonstrated by the site archive. A statement of the significance of the results from each element of the archive has been compiled. The quantification and assessments represent an amalgamation of the total body of work carried out during the trial trenching, mitigation excavation and the palaeoenvironmental investigations. The objectives of this assessment are:

- to assess the quantity, provenance and condition of all classes of material; whether stratigraphical, artefactual or environmental;
- to comment on the range and variety of that material;
- to assess the potential of the material to address questions raised in the course of the project;
- to formulate any further questions arising from the assessment of the material.

5.1.2 This assessment will present:

- a factual summary, characterising the quantity and perceived quality of the data contained within the site archive;
- a statement of the academic potential of the data;
- any further work required to complete the project, including publication;
- recommendations for the storage and curation of the data.

5.2 STRATIGRAPHIC DATA

5.2.1 ***Quantification:*** in all, 512 stratigraphic units were excavated and recorded, the majority of the features being cut into the natural substrate and sealed by subsoil and topsoil. The majority of these originate from the mitigation excavation on Trenches 9 and 15. In total, 259 contexts were assigned during the trial trenching (Table 4).

	Contexts	**Plans**	**Sections**	**Digital Photographs**	**Environmental Samples**
Trial Trenching	259	24	39	320	27
Trench 2	13	5	4	25	4
Trench 8	15	7	7	68	5
Trench 9	85	33	37	62	30
Trench 10	22	6	7	27	8
Trench 11	27	9	9	113	12
Trench 15	42	11	11	58	13
Trench 16	11	1	1	5	1
Trench 18	4	1	0	7	0

Trench 39	21	1	2	56	0
Trench 41	13	4	4	32	5
Total	**512**	**102**	**121**	**773**	**105**

Table 4: Quantification of the archive

5.2.2 Some 1439 images were taken. This comprised 1156 digital photographs from the mitigation excavations, which included 663 photogrammetric photographs taken of Trenches 15 and 16; in addition, there were 283 photographs from the trial trenching. The photographs cover each of the main areas of work, including detailed record sheets of features and general images of the site.

5.2.3 In total, 160 drawings were made during the mitigation excavations, comprising 82 section drawings and 78 plans. From the trial trenching, there was a total of 17 drawings, comprising nine plans and eight sections.

5.2.4 ***Assessment:*** the context record has allowed a broad phasing to be established for the whole of the scheme. This has established that there were three main phases of activity which, at this stage of the post-excavation programme, are only broadly defined:

- Phase 1: Bronze Age
- Phase 2: Early medieval
- Phase 3: Post-medieval

5.2.5 The Bronze Age activity was concentrated in the northernmost part of the route, near the shore, and comprised mainly boundary ditches and scatters or groups of pits, many of which contained burnt material. Representative examples of both the pits and the ditches were dated by radiocarbon assay, all producing Bronze Age dates. The pits within Trench 9 formed a rectangular pattern and several postholes were also associated. It is possible that this was an indication that domestic structures were in the vicinity, although this could not be confirmed. The dating of these features is particularly crucial, given both the curvilinear and rectangular alignments visible in this trench.

5.2.6 In Trenches 39 and 41, to the south of Rhuddlan, and adjacent to the River Clwyd flood plain, a series of large drainage ditches ultimately fed into the river. These had been recut on a number of subsequent occasions. Samples from the base of the earliest ditch in Trench 39 provided a fifth-sixth-century AD date, which raises the prospect that this was originally an early land reclamation ditch and that the adjacent area may have been cultivated. The numerous recuts of this ditch indicate that the drainage feature had an extended life, although it has yet to be established how long this was.

5.2.7 The evaluation identified a number of post-medieval field-boundary ditches along the length of the route, their dating being based upon a limited number of artefacts within the fill, and their presence on OS First Edition mapping (Ordnance Survey 1878). Some were parallel to boundaries depicted on this nineteenth-century mapping.

5.2.8 The stratigraphic data thus has the potential to add to an understanding of landscape development from the prehistoric period to the present. This understanding can be enhanced when this information is integrated with palaeoenvironmental data, allowing a suite of samples to be dated by radiocarbon assay.

5.3 ARTEFACTS

5.3.1 ***Quantification***: eleven artefacts were recovered from three stratified contexts in the trial trenching, mostly from the fill ***2703*** of ditch ***2704*** (Trench 27). The artefacts comprised pottery, clay tobacco pipe, glass and ceramic building material. The mitigation excavations produced a relatively small assemblage of 12 fragments of artefacts, with, in addition, a considerable amount of animal bone, some 178 fragments (OR 1005; Table 5), all from backfill ***7005*** of pit ***7004***, in Trench 2.

Context	OR number	Material	Category	Qty	Description	Date
7000	1003	Stone	flint	1	Cortical flake, dark brown mottled flint, probably natural.	
7005	1005	Bone	animal	178	Immature sheep/goat bones, more than one individual. All body parts probably represented.	Modern?
7008	1002	Stone	flint	1	Debitage, snapped from upper part of blade. Poor-quality greyish-beige flint. L: 23mm; W: 19.5mm; Th: 4mm.	Mesolithic?
7008	1002	Stone	flint	1	Debitage. Possible trimming flake from small core in opaque pinkish-brown flint. L: 30mm; W: 14mm; Th: 7mm.	Late Mesolithic?
7301	1000	Glass	vessel	2	Body fragments, colourless machine-blown milk bottle.	*c* 1950-2015
7304	1001	Ceramic	vessel	1	Small body fragment, black-glazed redware.	Nineteenth century?
7304	1001	Ceramic	vessel	1	Small body fragment refined white earthenware.	Nineteenth century?
7903	1006	Ceramic	building material	5	Undiagnostic fragments of thin sand-cast tile.	Post-medieval

Table 5: Excavation Finds

5.3.2 ***Assessment***: the pottery from the trial trench comprises fragments of a rolled rim from a dark glazed earthenware jar, an eighteenth-century fragment of tin-glazed earthenware and a fragment of whiteware (post-1820). An undiagnostic fragment of blue glass, probably from a poison or cosmetic bottle, was also recovered, as was a single ceramic tobacco-pipe stem. The presence of a fragment of modern, machine-made, white glazed tile would suggest that the ditch was silting up over at least 200 years. Two adjoining fragments from a bottle with a punted base and a rounded pontil were retrieved from gully fill ***1303*** (Trench 13); the bottle pre-dates *c* 1860. A fragment of tile/land drain was also recovered. A sliver of animal bone was too small to identify. Ditch fill ***1006*** produced a near-complete hand-made brick, the surviving dimensions of which were 110 x 70mm.

5.3.3 Three fragments of flint were recovered from Trench 2: one from topsoil ***7000*** and two from fill ***7008*** (ditch ***7009***). The former (OR 1003), an unmodified cortical flake from a battered nodule, is probably natural in origin, whilst the other two (OR 1002), although both in poor-quality flint, are probably of anthropogenic origin, one being debris from blade production, the other possibly a core-trimming flake. Although scant, the debitage would seem most likely to reflect Mesolithic activity in the locality. The remainder of the material is modern, comprising two fragments of post-medieval or later pottery, both from fill ***7304*** (ditch ***7302*** in Trench 10; OR 1001), and both probably of nineteenth-century date, five undiagnostic fragments of

ceramic building material (OR 1006) from layer ***7903*** (Trench 41), probably from sand-cast roofing tiles of late date, and two fragments of colourless machine-blown glass (OR 1000), probably from a milk bottle dating to the later twentieth or early twenty-first century (glass milk bottles effectively went out of production in 2015 (www.telegraph.co.uk), from burnt fill ***7301*** (pit ***7300*** in Trench 10).

5.3.4 There were, in addition, numerous fragments of sheep bone, representing at least two, and probably more, immature animals. These again were probably of relatively recent date.

5.3.5 The artefact assemblage from the excavations is very small in size and it is not considered there is a need for analysis. Most of the assemblage can be discarded.

5.4 PALAEOENVIRONMENTAL MATERIAL

5.4.1 ***Quantification***: 27 bulk environmental samples, 10-40 litres in volume, were taken from a variety of contexts from the trial trenching, for the assessment of charred and waterlogged plant remains and charcoal. The samples were taken from drainage ditches/gullies, pits (***804*** (Trench 8), ***203*** (Trench 2), ***205*** (Trench 2), and ***1404*** (Trench 14)) or putative pits (***1809*** (Trench 18), ***906*** (Trench 9), ***908*** (Trench 9), and ***910*** (Trench 9)), a posthole (***904*** (Trench 9)) and a layer of peat (***2104*** (Trench 21)). They were processed in order to assess the potential for the survival of plant remains, which could provide information about the environment and economy of the site, and could also be suitable material for radiocarbon dating.

5.4.2 Ten litres of material from just over half (47) of the 80 environmental bulk samples (between 10 litres and 40 litres in size) taken during the archaeological mitigation work at Burbo Bank EOW onshore cable route were assessed for charred and waterlogged plant remains and charcoal. These 47 samples comprise primarily pit, gully and ditch fills from features identified in Trenches 2, 8, 9, 10, 11, 15, and 41. The fills of several natural features were also assessed for their palaeoenvironmental potential.

5.4.3 ***Methodology:*** the samples were hand-floated and the flots collected on a 250µm (0.25mm) mesh and air-dried. The flots were scanned with a Wild M3Z stereo-microscope and the plant material and charcoal quantified and provisionally identified. Botanical nomenclature follows Hather (2000) and Stace (2010). The plant remains and charcoal were scored on a scale of abundance, where + is rare (up to five items) and ++++ is abundant (>100 items). The components of the matrix, including modern roots, calcined bone, coal, and HAVM (heat-affected vesicular material) were also noted and quantified (Table 6).

Sample no	Context	Feature	Trench	Sample size litres	Flot size ml	Matrix	Plant remains	Charcoal	Potential for analysis	Potential for C14 dating
7000	***7005***	Pit ***7004***	2	10	<5	Charcoal ++, >2mm ++, Modern roots +++, Insect fragments +, Bone +++	WPR (++): *Rubus* Sect. 2 *Glandulosus, Stellaria* sp, *Comarum palustre, Juncus, Alnus/Betula*. CPR (+): Woody rhizome/tuber fragments, stem fragments, Poaceae seed	Cf Leguminosae	no	yes
7004	***7101***	Pit ***7100***	8	10	500	Charcoal ++++, >2mm ++++		*Quercus*	no	yes - but old wood effect
7007	***7108***	Gully ***7107***	8	10	<5	Charcoal +, >2mm +, Modern roots +++, Coal +	WPR (+): *Juncus*	Cf *Prunus* sp, *Quercus*	no	yes
7011	***7203***	Ditch ***7204***	9	10	25	Charcoal +, Modern roots ++++			no	no
7012	***7206***	Gully ***7207***	9	10	40	Modern roots ++++			no	no
7025	***7209***	Remains of putative post in gully ***7208***	9	10	<5	Charcoal ++, >2mm +, Modern roots +++, Insect egg cases +, Flint gravel +, Coal +		*Quercus*	no	yes - but old wood effect
7032	***7215***	Natural feature ***7216***	9	10	20	Modern roots ++++			no	no
7035	***7228***	Gully ***7229***	9	10	25	Modern roots ++++, Coal +	WPR (+): *Rumex acetosella*		no	no
7033	***7222***	Pit ***7221***	9	10	10	Charcoal +, Modern roots ++++	WPR (+): *Rumex acetosella*		no	no
7036	***7232***	Gully ***7231***	9	10	20	Modern roots ++++, Coal +			no	no
7037	***7235***	Gully ***7236***	9	10	15	Modern roots ++++			no	no
7038	***7234***	Gully ***7233***	9	10	10	Modern roots ++++, Coal ++			no	no
7039	***7238***	Gully ***7237***	9	10	30	Modern roots ++++, Insect egg case +			no	no
7041	***7212***	Ditch ***7213***	9	10	30	Modern roots ++++			no	no
7062	***7243***	Pit ***7242***	9	10	50	Modern roots ++++			no	no
7063	***7244***	Pit ***7245***	9	10	50	Charcoal +, Modern roots ++++, Coal +			no	no
7064	***7249***	Posthole/ natural feature ***7248***	9	10	100	Charcoal ++, Coal +			no	no
7065	***7246***	Gully terminus ***7247***	9	10	50	Modern roots +++			no	no
7066	***7251***	Gully ***7250***	9	10	40	Modern roots ++++, Coal +, Earthworm egg cases +			no	no
7067	***7253***	Pit ***7252***	9	10	20	Modern roots ++++, Coal +, Earthworm egg cases +			no	no
7068	***7256***	Pit ***7257***	9	10	10	Modern roots +++			no	no
7069	***7260***	Pit ***7261***	9	10	120	Charcoal ++, Modern roots ++++, Coal +			no	no
7071	***7270***	Natural feature ***7271***	9	10	25	Modern roots ++			no	no
7072	***7274***	Posthole ***7275***	9	10	25	Modern roots +++, Coal +			no	no

Sample no	Context	Feature	Trench	Sample size litres	Flot size ml	Matrix	Plant remains	Charcoal	Potential for analysis	Potential for C14 dating
7073	***7268***	Natural feature ***7269***	9	10	40	Charcoal +, Modern roots +++			no	no
7074	***7272***	Natural feature ***7273***	9	10	20	Modern roots +++			no	no
7075	***7276***	Posthole ***7277***	9	10	10	Modern roots +++			no	no
7076	***7280***	Pit ***7281***	9	10	25	Modern roots +++, Coal ++			no	no
7077	***7282***	Pit ***7283***	9	10	40	Modern roots +++			no	no
7078	***7279***	Pit ***7278***	9	10	100	Modern roots +++, Earthworm egg case +			no	no
7079	***7520***	Gully ***7521***	9	10	20	Charcoal +, Modern roots ++++	WPR (+): *Chenopodium album*		no	no
7009	***7301***	Pit ***7300***	10	10	700	Charcoal ++++, >2mm ++++	CPR (+): *Triticum* sp cereal grain	*Quercus*	no	yes
7010	***7301***	Pit ***7300***	10	10	700	Charcoal ++++, >2mm ++++	CPR (+): Indeterminate cereal grain fragment, Poaceae, *Rumex obtusifolius*, *Corylus avellana* nut shell fragment	Mostly *Quercus*, few *Alnus/Corylus*	no	yes
7014	***7409***	Pit ***7408***	11	10	<5	Charcoal +, Modern roots +++, Insects +			no	no
7023	***7414***	Pit ***7411***	11	10	<5	Charcoal +, Modern roots +++, Insects +, Coal +			no	no
7056	***7510***	Pit ***7508***	15	10	90	Charcoal +++, >2mm ++++	WPR (+): *Chenopodium album*	*Quercus*	no	yes - but old wood effect
7057	***7509***	Pit ***7508***	15	10	10	Modern roots ++++			no	no
7080	***7522***	Gully ***7523***	15	10	15	Modern roots +++			no	no
7081	***7525***	Gully ***7524***	15	10	15	Modern roots +	WPR (+): *Chenopodium album*		no	no
7082	***7527***	Gully ***7526***	15	10	5	Modern roots +++, Insect egg case +	WPR (+): *Chenopodium album*		no	no
7083	***7531***	Gully ***7530***	15	10	5	Modern roots ++			no	no
7084	***7532***	Gully ***7533***	15	10	25	Charcoal +, Modern roots +++	WPR (+): *Chenopodium album*		no	no
7048	***7903***	?	41	10	75	Charcoal +, Modern roots ++++, Wood +++	WPR (+++): *Rubus* Sect 2 *Glandulosus*, *Rumex acetosella, Carex, Rumex acetosa, Juncus*		no	yes (wpr)
7049	***7904***	?	41	10	50	Charcoal >2mm +, Modern roots ++++	WPR (+++): *Juncus*		no	no
7050	***7906***	?	41	10	50	Charcoal +, Modern roots ++++, Earthworm egg case +	WPR (+++): *Juncus*		no	no

Sample no	Context	Feature	Trench	Sample size litres	Flot size ml	Matrix	Plant remains	Charcoal	Potential for analysis	Potential for C14 dating
7051	***7911***	Ditch ***7912***?	41	10	20	Charcoal >2mm +, Modern roots ++++	WPR (++++) *Juncus, Rubus* Sect 2 *Glandulosus, Rumex acetosa, Carex* (possibly modern)	*Alnus/Corylus*	no	yes - but possibly unreliable
7052	***7902***	Natural substrate	41	10	5	Amorphous organic +++	WPR (++++): *Juncus*		no	no

Note: Plant remains are record quantified as follows: rare (+), frequent (++), common (+++), or abundant (++++). WPR = waterlogged plant remains, CPR = charred plant remains. Plant remains are seeds or fruits unless otherwise stated.

Table 6: Bulk samples taken during the archaeological mitigation works

5.4.4 Charcoal fragments greater than 2mm were scanned under a binocular microscope at x20 magnification to assess overall preservation and diversity. The suitability of any of the charcoal or organic material for radiocarbon dating was also assessed. Plant nomenclature follows Stace (2010). The results were recorded on a *pro forma* sheet, which is kept with the site archive.

5.4.5 ***Assessment:*** the samples from the trial trenching produced very little in the way of charred plant remains (CPR), though a few contained abundant waterlogged plant remains (WPR) and charcoal. Given the large amount of modern roots in many of the samples, it is possible that some of the WPR consists of modern material. However, one fill, ***3904*** (the basal fill of ditch ***3905***; Trench 39), also contained abundant amorphous organic remains and wood, and the presence of this material is more indicative of preservation under anaerobic conditions. Indeed, a fragment of indeterminate sapwood from this sample supported its antiquity, as it returned an early medieval date (*Section 2.3.19*).

5.4.6 The presence of a single waterlogged cultivated flax (*Linum usitatissium*) seed in ***206*** (gully ***207***; Trench 2) is of potential interest, as an indeterminate charred twig fragment from the same context produced a Bronze Age date (*Section 2.3.3*). Although not considered a native plant (Stace 2010), cultivated flax has often been found in prehistoric contexts (Greig 1991).

5.4.7 Many of the contexts produced rare to frequent >2mm identifiable charcoal fragments that were dominated by oak (*Quercus* sp). Although mature oak is not considered a suitable choice for radiocarbon dating, due to the 'old-wood' effect, small oak roundwood or twigs are, and many of the samples did contain this type of material.

5.4.8 Four of the features, gullies ***1504*** (Trench 15) and ***1004*** (Trench 10), and pits ***804*** (Trench 8) and ***205*** (Trench 2), contained larger charcoal assemblages. Only one, however, (pit ***804***) produced an assemblage that was not dominated by oak taxa; its fill, ***803***, produced a large flot of well-preserved charcoal from short-lived wood, including hazel (*Corylus avellana*), a fragment of the latter providing a Bronze Age date (*Section 2.3.11*). Other remains were rare, and included calcined bone in gully ***1502*** (Trench 15) and ditch ***1603*** (Trench 16), and rare to common coal fragments and HAVM (heat-affected vesicular material).

5.4.9 The samples from the mitigation excavation produced very little in the way of charred plant remains (CPR), which was limited to rare woody rhizome/tuber fragments in pit ***7004*** (Trench 2), and a single wheat (*Triticum* sp) cereal grain and

grain fragment, and rare weed seeds and hazelnut (*Corylus avellana*) shell fragments, from pit ***7300*** (Trench 10). Many of the samples did contain waterlogged plant remains (WPR), comprising rare seeds of rushes (*Juncus* sp), sheep's sorrel (*Rumex acetosella*), and fat-hen (*Chenopodium album*). The WPR assemblages from pit ***7004*** (fill ***7903***; Trench 10) and ditch ***7912*** were slightly richer, and included bramble (*Rubus* Sect 2 *Glandulosus*), stitchwort (*Stellaria* sp), marsh cinquefoil (*Comarum palustre*), alder/birch (*Alnus glutinosa/Betula* sp), common sorrel (*Rumex acetosa*) and sedge (*Carex* sp). Apart from fill ***7903***, which contained frequent waterlogged wood, and ***7902*** (Trench 41), which produced common amorphous organic material, none of the samples appeared to be particularly waterlogged. Given the abundant modern roots in many of the samples, it is possible that many of the waterlogged seeds and fruits comprise modern material.

5.4.10 Many of the samples produced comminuted charcoal fragments, but only eight produced fragments large enough for firm identification (generally >2mm in size). As with the charcoal recovered during the archaeological trial trenching (*Section 5.4.8*), much of it comprised oak (*Quercus* sp); however, pit ***7300*** (Trench 10) and ditch ***7912*** (Trench 41) produced alder/hazel (*Alnus glutinosa/Corylus avellana*). Gully ***7107*** (Trench 8) produced blackthorn/wild or bird cherry (*Prunus* sp), and pit ***7004*** (Trench 2) produced cf Leguminosae charcoal, which, given their anatomical similarity, may include several species, including broom (*Cytisus scoparius*) and gorse (*Ulex* sp). Other remains included rare coal fragments in many of the samples, and frequent bone fragments in pit ***7004*** (Trench 2).

5.5 RADIOCARBON DATING

5.5.1 Samples from four features excavated in the trial trenching phase (gullies ***207*** (Trench 2) and ***1504*** (Trench 15), ditch ***3905*** (Trench 39) and pit ***804*** (Trench 8)), were submitted for radiocarbon dating (Table 7). These produced three dates in the Bronze Age (from ***207***, ***1504***, and ***804***), and one early medieval date (ditch ***3905***; Table 8). Samples from two further features (posthole ***7209*** and pit ***7300***) ditch ***3905*** and pit ***804***), were submitted for radiocarbon dating following the mitigation excavations. These again produced dates in the Bronze Age (Table 9):

Sample ID	Trench	Sample Type	Dated Species	Context	Description
4	15	Charcoal	*cf Quercus* sp twig fragment	***1505***	Single, secondary fill of gully ***1504***, 0.06m thick
10	8	Charcoal	*Corylus avellana*	***803***	Burnt fill of pit ***804***, 0.25m thick
20	2	Charcoal	Indeterminate twig fragment	***206***	Single fill of gully ***207***, 0.2m thick
22	39	Wood	Indeterminate sap wood	***3904***	Basal fill of ditch ***3905***, 0.15m thick

Table 7: Trial Trenching Phase Dating Samples

Sample ID	Trench	Context	Radiocarbon Age BP	Calibrated Date (2 sigma 95.4% Probability)	Lab Code
4	15	***1505***	2921 ± 38	1226-1006 cal BC	SUERC-56391
10	8	***803***	3350 ± 30	1737-1534 cal BC	Beta-395347
20	2	***206***	3100 ± 30	1431-1283 cal BC	Beta-396127
22	39	***3904***	1560 ± 30	cal AD 420-565	Beta-396128

Table 8: Trial Trenching Phase Radiocarbon Dates

Sample ID	Trench	Sample Type	Dated Species	Context	Description	Radiocarbon Age BP	Calibrated Date (2 sigma 95.4% Probability)	Lab Code
7009	10	Charred cereal grain	*Triticum* sp	***7301***	Single fill of gully ***1504***, 0. 25m thick	3287 ± 29	1611-1530 cal BC	SUERC-63768
7025	9	Charcoal	*Quercus* sp	***7209***	Remains of post in gully ***7208***, 0.5m thick	3372 ± 26	1699-1615 cal BC	SUERC-63769

Table 9: Samples dated by radiocarbon assay

6. CURATION AND DEPOSITION

6.1 RECIPIENT MUSEUM

6.1.1 OA North will coordinate the deposition of the archive and the finds will be deposited with the Denbighshire Museum and Heritage Service:

> Denbighshire Museum and Heritage Service, County Hall, Wynnstay Road, Ruthin, LL15 1YN
>
> Tel: 01824 706101

6.1.2 Paper and digital copies of issued reports will be deposited with the Clwyd HER:

> Clwyd-Powys Archaeological Trust, 41 Broad Street, Welshpool, Powys, SY21 7RR
>
> Tel. 01938 553670.

6.2 STORAGE

6.2.1 The complete project archive, which will include written records, plans, digital plans and photographs, artefacts, ecofacts and sieved residues, will be prepared following the guidelines set out in *Environmental standards for the permanent storage of excavated material from archaeological sites* (UKIC 1984), the *Guidelines for the preparation of excavation archives for long-term storage* (Walker 1990), and the CIfA *Standards and guidance on the creation, compilation, transfer and deposition of archaeological archives* (CIfA 2014d), prior to deposition.

6.2.2 The digital data are temporarily stored on the server at OA North, which is backed up on a daily basis. For long-term storage of the digital data, CDs will be used, the content including the reports, plans, scanned images and digital photographs. Each CD will be fully indexed and accompanied by the relevant metadata as provenance. The digital record should ideally be duplicated as a paper record for long-term archiving, including comprehensive printouts of photographs and survey plots, and should be labelled and summarised. The palaeoenvironmental cores are stored in the offices of Oxford Archaeology North in Lancaster, for potential future analysis.

6.3 DISCARD POLICY

6.3.1 A Discard Policy will be prepared, in consultation with the recipient museum, Denbighshire Museum and Heritage Service. Material of no discernible long-term archaeological potential will be discarded, following appropriate analysis, with the Museum's agreement.

7. STATEMENT OF POTENTIAL

7.1 INTRODUCTION

7.1.1 The evaluation and excavation identified three main periods of activity: a significant amount of Bronze Age activity in the northern section of the cable route; early medieval agricultural activity, identified to the south of Rhuddlan; and post-medieval agricultural features extending across the full length of the route.

7.2 PREHISTORIC / BRONZE AGE ACTIVITY

7.2.1 Seemingly contemporary gullies and pits were identified in the northern part of the route. These had comparable fills, were devoid of artefacts and appeared to form a coherent group. Radiocarbon assays from a limited number of both the pits and gullies were consistent in providing Bronze Age dates. The sample from pit ***7300***, Trench 10, was from a shallow deposit, formed by a dump of apparently domestic material, and was probably contemporary with the creation of the pit. The remnants of a palisade post in gully ***7209***, Trench 9, which had rotted *in situ*, also produced a date, which can possibly be equated with the final stages of decay of the palisade.

7.2.2 The gullies were, for the most part, probably agricultural in nature and may be an indication of former field boundaries. Many pits were full of burnt material, suggesting that domestic activity had been occurring in the vicinity. The main concentration of the activity was centred around Trench 9, although isolated burnt pits containing burnt material were observed in several places along the cable route. The best evidence for domestic activity was from Trench 9 (Fig 12), where there was a series of narrow interlinked curvilinear gullies and a rectangular arrangement of pits and postholes, although these have not been firmly identified as actual domestic structures. Features of potential Bronze Age date were also encountered within Trenches 2, 8-11, 15 and 16, a 2km-long section of the route, which would suggest that Bronze Age agricultural activity extended across an extensive area just in from the present shoreline. This is potentially very significant and warrants spatial and palaeoenvironmental analysis, as well as further dating, where possible.

7.2.3 Although the excavations have not been able to confirm the existence of domestic remains, this is, perhaps, not surprising, given that such activity could be relatively localised within the area, and thus there was little likelihood of precisely locating it within the relatively small excavation areas opened. Whilst there is no apparent pattern in this activity in the landscape, the information gathered will add to an understanding of the type of agricultural activity taking place in the area during the Bronze Age.

7.2.4 ***Environmental Context:*** the present Bronze Age sites are the latest in an environmental sequence that extends back to the Mesolithic period, demonstrated by coastal palaeoenvironmental work in the locality. Sedimentary sequences from intertidal and coastal wetland sites in the Prestatyn area of North Wales contain evidence of Mesolithic and Neolithic activity, including important finds, such as a Mesolithic antler mattock (from Splash Point, Rhyl; dated 5640-5360 cal BC (6560±80 BP; OxA-1009)) from beneath a submerged forest at Rhyl, a human skeleton from peat at Prestatyn, dated to the Mesolithic/Neolithic transition, and deposits of shell middens spanning the Mesolithic/Neolithic transition (Armour-

Chelu *et al* 2007). Archaeological sites at Rhuddlan and at Rhyl have provided significant evidence for Mesolithic activity. Assemblages of hazelnuts from a number of sites at Rhuddlan are associated with radiocarbon dates of 8200-7550 cal BC (8739±86 BP; BM-691) and 7730-7450 cal BC (8528±73 BP; BM-822; Berridge 1994).

7.2.5 Palaeoenvironmental analysis and interpretation of sea-level changes show that, during the time of early Mesolithic activity at Rhuddlan, the main coastline was about 10km to the north, such that estuarine environments are likely to have had an impact on sedimentation; when the Mesolithic mattock was deposited, a marine/estuarine depositional environment probably existed. A subsequent marine regressive phase is interpreted as having resulted in the inception of peat at *c* 3700 cal BC in the Prestatyn area (Armour-Chelu *et al* 2007, 309). Pollen data from Prestatyn show an early to mid-Holocene estuarine and saltmarsh-coastal fringe vegetation sequence, followed by development of mid-Holocene reed swamp communities and the subsequent establishment of alder carr. The 'Elm Decline' and the spread of alder at Prestatyn have been dated to 3950-3510 cal BC (4900±80 BP; CAR-1427; Armour-Chelu *et al* 2007). A post-woodland vegetation phase was replaced by sedge- and fern-dominated communities; the reduction in alder may reflect the *in-situ* demise of the woodland, or could be associated with increased agricultural activity. Sedge peats were overlain by clay-loam deposits dated to around 800-410 cal BC (2520±70 BP; CAR-1484), with increases in cereal-type pollen and cannabis-type pollen providing evidence for cultivation (*ibid*).

7.2.6 ***Regional Context*:** there is little direct comparison with the remains identified at Burbo Bank EOW with other sites in the region, seemingly reflecting how little archaeological investigation has been undertaken in this part of North-east Wales. The *Research Framework for the Archaeology of Wales* (Gale 2003) has shown that recorded domestic sites from the Bronze Age and early Iron Age tend to be enclosed hilltop settlements and defended settlements and, by contrast, undefended (unenclosed) occupation sites are relatively rare; this may reflect the fact that such sites, particularly within lowland contexts, are more difficult to recognise. Little is known in detail about these enclosed settlements, and whether they were seasonal or permanently inhabited, or even whether the known sites are a true representation of distribution (*ibid*). At the time that the framework was compiled, only 12 field systems had been recorded, of which only one had been excavated. Also, only a small amount of environmental sampling has been undertaken, so that there are still many gaps in our knowledge about food production, landscape, diet, and use of organic materials (*ibid*).

7.2.7 Within this context, the Bronze Age features from Burbo Bank EOW that seemed to have formed elements of a field system are regionally important since few such sites have been subject to excavation; whilst there is no apparent pattern in this activity in the landscape on the Burbo Bank EOW onshore cable route, the information gathered will add to an understanding of the type of agricultural activity taking place in the area during the Bronze Age. It has not been possible to confirm the existence of domestic structures associated with these field systems, but domestic activity is seemingly represented by the pits containing burnt material in Trenches 8, 9, 10, 11 and 15; again, such remains are rare within the regional context of North-east Wales. Analysis of these features should allow some understanding of the environmental conditions during the time they were in use. It is particularly important that further work takes place on the material from Trench

9, as there, seemingly curvilinear and rectilinear features may suggest multi-period activity.

7.3 EARLY MEDIEVAL ACTIVITY

7.3.1 The excavation of Trenches 39 and 41 to the south of Rhuddlan has revealed substantial drainage ditches, which were dated to the early medieval period (cal AD 420-565 (1560 ± 30 BP; Beta-396128). It is likely that they were associated with the land reclamation, given that small ditches were linked at right-angles to larger ditches, which led towards the nearby River Clywd. The ditches had evidently been recut and maintained over a seemingly long period of time, and this may reflect the continued improvement of the agricultural land.

7.3.2 The ditches that have been dated to the early medieval period, in Trenches 39 and 41, are of considerable interest, since they indicate the possible drainage and reclamation of land on the flood plain of the River Clywd. The dating would suggest that they were created in the period following the withdrawal of Roman governance, and they were seemingly recut over subsequent periods. They potentially indicate an episode of active land improvement, during a period that is more often perceived as being one of agricultural decline.

7.3.3 ***Regional Context:*** the regional context for early medieval sites in North-east Wales is provided by *the Research Framework for the Archaeology of Wales* (Edwards *et al* 2010), which highlights that this period in this part of Wales is not well represented at all. There is a dearth of known sites; indeed, there are only 311 records of early medieval sites in the north-east and east of Wales (Bapty 2004). Those that have been identified have rarely been investigated fully, if at all. It is assumed that, perhaps, early medieval sites are 'hidden' within sites that have traditionally been assigned a Roman, or even prehistoric date (Edwards *et al* 2010). Significantly, one of the few early medieval sites that has been excavated was at Rhuddlan (excavated in the late 1960s and the 1970s), which produced evidence of early medieval settlement, including *grubenhauser*; this has been associated with the burh of *Cledemutha*, established in AD 921 by Edward the Elder (Quinnell and Blockley 1994; Bapty 2004). The dated early medieval ditches in Trenches 39 and 41 are only 1.4km to the south of Rhuddlan, and this very early episode of land improvement on the fertile flood plain may provide further indications that Rhuddlan, with its agricultural catchment, was an important settlement centre during this period. This potential association with Rhuddlan further reinforces the importance of the sites, and provides an additional impetus for analysis of these remains.

7.3.4 ***Environmental Context:*** the Llyn Cororion (SH 597688) pollen sequence is a continuous reference profile for the Holocene vegetation history of North Wales (Watkins *et al* 2007), and provides supporting evidence for agricultural activity in the area during this period. Detailed pollen analysis shows a progressive decline in woodland pollen during the later part of the Iron Age. Extensive and deliberate clearance can be inferred from a rapid decline in major tree taxa in *c* 407-171 cal BC (*c* 2250 BP) and 167 cal BC- cal AD 125 (*c* 2000 BP) (*ibid*). In *c* cal AD 143-534 (*c* 1700 BP), there was another major tree decline, affecting mostly hazel and oak. By *c* cal AD 657-939 (1250 BP), the decline in local woodlands corresponded to a rapid rise in open ground and herbaceous communities. Tree pollen, including

alder, oak and birch, was still present, but the vegetation was dominated by grasses, sedges, cereals and ribwort plantain, indicative of a mixed economy of arable and pastoral farming (*ibid*). By *c* cal AD 1046-1294 (*c* 800 BP), the landscape was effectively treeless.

7.3.5 This would suggest that the decline in woodland seen in the Roman period extended into the sixth century, and thus it may be equated with the date provided by the ditch in Trench 39. From the latter half of the seventh century, there was further woodland clearance, which could provide support for the later recutting of the ditch.

7.3.6 The period represented by both the creation of the pattern of ditches, and presumably also by their recutting, is one where there are few archaeological remains. This means that these dates are significant at both a regional and potentially national level. Environmental samples may be able to answer questions on the wider environmental context of the early medieval landscape, and further radiocarbon dating would provide a stronger chronology for the site, potentially enabling contemporaneous connections with the settlement at Rhuddlan to be established.

7.4 POST-MEDIEVAL ACTIVITY

7.4.1 Relatively large numbers of post-medieval field boundaries were observed in the evaluation phase of the project. Interpretation and dating of the features was largely on the basis of orientation (features parallel or perpendicular to existing boundaries), or how these corresponded to features shown on nineteenth-century mapping. A few of the ditches yielded datable finds (*Section 5.3*).

7.4.2 The presence of redundant field boundaries can be useful in the mapping of landscape change, including the development of farming practices and cultivation. Post-medieval agriculture is generally overlooked in archaeological projects, as it lacks a clear intellectual focus. The post-medieval agricultural remains are therefore of local significance, the information gleaned from them contributing to a study of post-medieval agriculture in North-east Wales.

7.5 THE PALAEOENVIRONMENT

7.5.1 ***Charred and Waterlogged Plant Remains:*** the assessment of the plant remains and charcoal from the trial trenching phase of the Burbo Bank EOW onshore cable route has demonstrated that, although there is limited potential for the survival of charred plant remains (CPR), there was evidence for burning activities evidenced by the presence of charcoal, particularly in pit ***7300*** (Trench 10) and pit ***7508*** (Trench 15). Conditions existed for the preservation of waterlogged remains; however, these were not sufficiently abundant to warrant analysis.

7.5.2 The waterlogged plant remains (WPR) recovered from several of the features (pit ***7004***, fill ***7903***, and ditch ***7912*** in particular) during the mitigation excavations indicate a damp/wet environment with scrub/woodland. Indeed, the waterlogged basal fill of ditch ***3905*** (Trench 39) produced a relatively diverse range of fruits/seeds typical of open, damp/wet grassland with some scrub/trees (Table 10), and was dated to cal AD 420-565 (1600±30BP; Beta-396128). The presence of henbane (*Hyoscyamus niger*) is notable in a coastal context, given that it likes to

grow on maritime sand and shingle, and a pastoral environment is also indicated, given that henbane also prefers manured ground. There is no reason to suggest that the environment differed markedly once sea-level rise had reached a plateau at around 4000 cal BP (Roberts *et al* 2011).

WPR		**Environment (after Stace 2010)**
Alnus glutinosa/Betula sp	alder/birch	Woodland
Rubus Sect 2 *Glandulosus*	bramble	Scrub/waste ground
Potentilla erecta	tormentil	Grassland and dwarf-scrub on heaths, moors, bogs or pastures
Hyoscyamus niger	henbane	Archaeophyte on maritime sand and shingle, inland rough and waste ground, especially manured by rabbits or cattle
Filipendula ulmaria	meadowsweet	All sorts of wet and damp places
Rumex acetosa	common sorrel	Wide range of grassy places
Rumex obtusifolius	broad-leaved dock	Grassland, waste and cultivated ground
Ranunculus repens-type	buttercups	Range of habitats including grassland, woods, streamsides, marshes and duneslacks

*Table 10: The waterlogged plant remains (WPR) recorded in the basal fill of ditch **3905** (Trench 39)*

7.5.3 The recovery of a single waterlogged cultivated flax (*Linum usitatissium*) seed from gully ***207*** (Trench 2) is of potential interest, given that a charred twig fragment from the same fill produced a Bronze Age date (*Section 5.5.1*). Although not considered a native plant (Stace 2010), seeds of cultivated flax have been found in Bronze Age contexts in other parts of Britain (Greig 1991).

7.5.4 Both the WPR and charcoal indicate the local presence of bramble, elder (*Sambucus nigra*), alder/birch (*Alnus glutinosa/Betula* sp), hazel (*Corylus avellana*), blackthorn or wild/bird cherry, and possible broom or gorse. The recovery of oak charcoal from many of the features also indicates that oak woodland was likely to have existed on nearby drier areas, and appears to have been targeted to provide fuel.

7.5.5 Although charred plant remains were poorly represented, the presence of charred cereal remains in pit ***7300*** (Trench 10), and the recovery of charcoal from many of the features, suggests that burning activity did take place relatively nearby. At present, there is evidence for this taking place during the Bronze Age and early medieval periods. This activity, however, was unlikely to have been intensive, and did not necessarily reflect permanent settlement. Rather, as is probably the case today, the area was sparsely settled and the landscape was enclosed grassland/pasture with areas of scrub. The abundant taxa typical of damp/wet conditions, together with the coastal location, means that the area was prone to flooding.

7.5.6 Analysis of pollen samples derived from the peat cores have the potential to add to knowledge and understanding of changes in the Bronze Age and early medieval landscape and how it was exploited. It is particularly important as no regional cores have been produced for this part of North-east Wales. Additional dates would be necessary in order to strengthen the chronology of the core and thereby better understand the development of the palaeoenvironment.

7.6 RADIOCARBON DATING

7.6.1 The radiocarbon dating undertaken to date has highlighted the considerable importance of the Bronze Age features in the northern part of the route, and the potential for early medieval land reclamation to the south of Rhuddlan. However, the assessment has also highlighted that there is a need to increase the granularity of the chronology of each trench in order to understand better the development of the respective sites. In particular, there is an implication of multiple phasing of the pits and curvilinear features in Trench 9, which might be adequately resolved with additional dates. Similarly the duration of land improvement and reclamation in Trenches 39 and 41 would be better understood if the dating could be refined.

8. UPDATED PROJECT DESIGN

8.1 INTRODUCTION

8.1.1 The assessment of the material from the work along the Burbo Bank EOW onshore cable route has demonstrated that there is potential for further work. The results of the trial trenching and excavations should also be placed in the public domain by publication; a synthesis of the work should be placed in the Clwyd Powys Historic Environment Record. A suitable vehicle for publication would be an article in *Archaeologia Cambrensis*.

8.2 AIMS AND OBJECTIVES OF THE PROGRAMME OF ANALYSIS

8.2.1 This section follows the guidance of English Heritage regarding the formulation of updated research aims (English Heritage 2006). The original aims for the project remain valid (*Appendix 2*), but have been updated with new objectives, following this assessment. The aims and objectives of the project may be summarised as follows:

Aim 1: to contribute to an understanding of the landscape along the line of the Burbo Bank EOW onshore cable route, including settlement remains and their relationship to field systems:

- Objective 1.1: to identify, record, and establish the form and date of domestic and agricultural features and deposits relating to the Bronze Age and early medieval periods along the Burbo Bank EOW onshore cable route;
- Objective 1.2: to examine the development of the landscape, and the extent to which there has been continuity of field systems from the Bronze Age to the present day;
- Objective 1.3: to examine the development of the palaeoenvironment in relation to the identified sites and agricultural systems;
- Objective 1.4: to examine how local systems of agricultural production were organised, and how subsistence and other aspects of economic production were practised in relation to other environments in Wales?

Aim 2: to relate the historical development of sites along the Burbo Bank EOW onshore cable route to the historical development of the surrounding settlements:

- Objective 2.1: to contribute to answering issues raised by the agenda of the *Framework for the Archaeology of Wales*;
- Objective 2.2: to examine the development of agricultural systems identified in Trenches 39 and 41, in relation to the early medieval and later settlement at nearby Rhuddlan.

Aim 3: to disseminate the results of the excavations:

- Objective 3.1: to deposit the archival record of the archaeological remains within the development area with the Clwyd Museums Service;
- Objective 3.2: to compile an article to be published within a regional journal.

8.3 UPDATED METHODOLOGY

8.3.1 The post-excavation programme will be divided into the following stages:

- analysis;
- synthesis;
- preparation of draft text and illustrative material;
- publication;
- archive deposition.

8.3.2 ***Management, Monitoring and Review***: management and monitoring tasks have been built into the project. These tasks will include project monitoring, advice and co-ordination, problem solving, and conducting meetings with project staff and all interested external parties.

8.3.3 Review meetings will comprise the OA North staff who are undertaking the analysis. The meetings will provide an opportunity for all involved to present and receive information, to discuss the research aims, and permit the exchange of ideas.

8.3.4 ***Stratigraphy, Analysis and Synthesis*:** finds that are to be retained will be marked to allow integration into the site database. This is also a prerequisite for archiving and submission to the receiving museum.

8.3.5 The stratigraphic data will be analysed to refine the provisional phasing. Amended phasing will be compiled, and those contexts which could not be resolved at the assessment stage will be studied and phasing ascribed to them. Once the data from all the areas have been analysed, a stratigraphic narrative will be completed for each trench, and phase plans will be prepared.

8.3.6 ***Digital Data in the Analysis Phase:*** a basic Microsoft *Access* database was set up at the commencement of the project to record finds and archaeological contexts, as well as create a CAD environment, in which all plans and sections could be placed to produce an up-to-date composite view of the site. The context data will be updated upon completion of the analysis. The database structure developed by OA North is in accordance with national data standards (English Heritage 2012), and has been rigorously tested and refined, ensuring it is flexible enough to guarantee compatibility with all organisations which might require access. Standardised terminology will be applied, both for field names and data. This may include the use of MIDAS (*ibid*) and the NMR *Monument Type Thesaurus* (English Heritage 1998), along with the FISH word lists (Forum on Information Studies in Heritage [www.mda.org.uk/fish]). The database will link into plans of features and the overall site plan.

8.3.7 ***Finds:*** no elements of the finds assemblage warrants further study, but the results of the assessment will be integrated with the results of the stratigraphic analysis and palaeoenvironmental material to maximise the dating evidence.

8.3.8 ***Charred and Waterlogged Plant Remains***: a detailed assessment of the charcoal and waterlogged plant remains has been undertaken as part of the present programme, and it is therefore considered that there is no need for further work. The results of this earlier work will be integrated with the results of the stratigraphic analysis and the scientific dating.

8.3.9 ***Palaeoenvironmental Analysis:*** a programme of detailed palaeoenvironmental analysis will be undertaken on the peat deposits identified in Pit 6 and Pit 21 of the geoarchaeological test pitting. This will entail sampling the deposits from both pits at 0.02m intervals, which should result in a detailed palaeoenvironmental vegetational history of each site. It will also track the impact of potential human, climatic and sea-level changes on the vegetation, during the Neolithic to Bronze Age. Further radiocarbon dating will be obtained, particularly for the deposits from Pit 21.

8.3.10 ***Scientific Dating:*** a programme of radiocarbon dating of selected ditch fills will be undertaken. Samples will be processed and fragments of charcoal will be assessed for species identification and submitted for radiocarbon assay. In addition, dates will be obtained from the peat identified in the geoarchaeological test pitting.

8.3.11 ***Integration of Datasets and Synthesis:*** the information gathered will be reviewed and integrated into the stratigraphic site narrative. This will allow re-interpretation of the site using a more thematic approach.

8.3.12 ***Illustrations:*** illustrations of appropriate sections and phase plans will be compiled. Illustrations will be produced by experienced illustrators, using standard conventions.

8.3.13 ***Archive/Client Report:*** it is proposed that a client report is produced, formatted for limited distribution in paper copy to local libraries, the Record Office, and the HER.

8.3.14 ***Publication:*** a journal article will present the results in an easily accessible narrative style, with high-quality illustrations. It is intended that this should be submitted for inclusion in *Archaeologia Cambrensis*. It should incorporate an historical background of the area, as well as the results of the trial trenching and excavation. The publication will be succinct and should not exceed *c* 4-5000 words (Table 11):

Section		**Word Length**
Introduction	Location of site Context and circumstances of project	*c* 2-400 words
Archaeological and Historical background	Background to the Burbo Bank EOW offshore cable route	*c* 600 words
Archaeological results	Phase 1: Bronze Age features Phase 2: Early medieval features	*c* 1000 words
Artefacts, Scientific Dating, and palaeoenvironmental analysis	Finds, Scientific Dating and Environmental results	*c* 1000 words
Regional palaeoenvironmental assessment	The palaeoenvironment of the area will be presented in relation to the	*c* 1000 words

	analysis of cores from two pits	
Discussion and conclusions	Brief synoptic review of the archaeological results and their relevance to the local and regional context	*c* 600-1000 words
	Summary, acknowledgements, bibliography	
	Five figures, eight plates	

Table 11: Publication outline

8.3.15 ***Archive:*** OA North undertakes to liaise throughout the project with the receiving museum to meet its deposition policies. On completion of the analysis, a discard policy will be implemented (*Section 6.3*). The archive will be updated as necessary and the receiving museum will be contacted to obtain the latest information on its deposition arrangements. Material in files and boxes will be checked, and indices and box lists will be compiled and appended.

8.3.16 ***Digital Archive:*** the digital archive will be checked and indexed, and hard copies will be made of the data if required by the recipient museum. The digital data will be accompanied by metadata, which will explain the origin and accuracy of the data. OA's digital archiving approach is broadly compliant with OASIS guidelines (www.oasis.ac.uk/pages/wiki/main).

9. RESOURCES AND PROGRAMMING

9.1 NAMED PROJECT TEAM

9.1.1 The team consists of internal OA North staff, managed by Jamie Quartermaine (Table 12).

Name	Tasks
Jamie Quartermaine	Project manager, contribution to publication
Becky Wegiel	Stratigraphic analysis, compilation of site narrative, and contribution to publication
Richard Gregory	Contribution to publication
Rachel Newman	Internal quality control and academic editing
Mairead Rutherford	Palaeoenvironmental analysis
Sandra Bonsall	Processing samples
Marie Rowland	Illustrations
Unallocated archaeologist	Various administrative tasks

Table 12: Project Team

9.2 MANAGEMENT STRUCTURE

9.2.1 OA North operates a project management system. The team is headed by the Project Manager, who assumes ultimate responsibility for the implementation and execution of this programme of work, and the achievement of performance targets, be they academic, budgetary, or timetable-related. The Project Manager will delegate specific aspects of the project to other key staff, who both supervise others and have a direct input into the compilation of the report. The Project Manager will define and control the scope and form of the post-excavation programme.

9.2.2 Communication between all concerned in the post-excavation programme is of paramount importance. To this end, regular meetings and reviews are envisaged between all project staff. All information will be disseminated at regular intervals, thus ensuring that all concerned are aware of current progress, strategy and thinking.

9.3 HEALTH AND SAFETY

9.3.1 All OA North post-excavation work will be carried out under relevant Health and Safety Legislation, including the Health and Safety at Work Act (1974). A copy of the Oxford Archaeology Health and Safety Policy can be supplied on request. The nature of the work means that the requirements of the following legislation are particularly relevant:

- Workplace (Health, Safety and Welfare) Regulations (1992): offices and processing areas;
- Manual Handling Operations Regulations (1992): transport of bulk finds and samples;
- Health and Safety (Display Screen Equipment) Regulations (1992): use of computers for word-processing and database work;
- COSSH (1998): finds conservation and environmental processing / analysis.

9.4 TOTAL COSTS

9.4.1 The total costs for the analysis stage and report production are set out in *Appendix 7*.

9.5 COPYRIGHT

9.5.1 All records created during the course of the work for OA, of whatever nature, are the property of Oxford Archaeology Ltd. Intellectual property rights, including copyright of all such material, whether it be written, drawn, photographic or digital, will be that of the organisation.

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APPENDIX 1: WRITTEN SCHEME OF INVESTIGATION

1 SCHEME BACKGROUND

1.1 DONG Energy Burbo Bank Extension (UK) Ltd is seeking to construct an extension to the existing Burbo Bank Offshore Wind Farm (OWF), which is located approximately 7km north of Hoylake and Meols in the Wirral, 8.5 km from Crosby beach and 12.2km from Point of Ayr in Wales.

1.2 The extension to the OWF requires a connection to the National Grid. In this case, a connection agreement between National Grid and the applicant would allow connection of the extension to the OWF to a new substation located near to the existing National Grid 400 kV substation at Bodelwyddan, in Denbighshire, North Wales.

1.3 Planning consent has been granted by Denbighshire County Council with regard to the works landward of Mean Low Water (MLW). These works principally comprise:

- Installation of the export cable through the intertidal zone (between Mean Low Water and Mean High Water). This will be undertaken via horizontal directional drilling (HDD) and will utilise a pre-installed duct beneath the sea wall;
- A landfall site with associated jointing between the offshore and onshore cable;
- An onshore underground cable route of approximately 12km in length, with HDD required in order to cross major roads and rivers;
- A new onshore substation at Bodelwyddan; and
- An underground cable route linking the new Burbo Bank Extension onshore substation with the National Grid Bodelwyddan substation.

1.4 The cable route starts at a location between Rhyl and Prestatyn on the coast of north Wales (NGR SJ 0365 8250), and ends at the site of the new Bodelwyddan substation (NGR SJ 0210 7345).

1.5 The cable route will be up to 25m wide during construction, with a permanent easement of 14m. Up to two 275 kV cable circuits will be placed in a single trench with a working width up to 4m wide and approximately 1.5m deep. For the short section of 400 kV cable/s between the new Bodelwyddan substation and the National Grid Bodelwyddan substation, the cable trench will be up to 4m wide and approximately 1.5m deep. Land use over the cable routes would be reinstated after cable laying and hedgerows would be replanted.

1.6 The planning consent issued by Denbighshire County Council in November 2013 includes a condition relating to further archaeological investigation. Condition 9 states:

No development shall take place within the application area until the applicant has secured the implementation of a programme of archaeological work in accordance with a written scheme of investigation, which has been submitted by the applicant and approved by the archaeological curator for the Local Planning Authority. The archaeological programme of work will be undertaken and completed in accordance with the standards laid down by the institute of archaeologists and MoRPHE (2006). On completion appropriate reports and an archive assessment will be submitted for approval to the Local Planning Authority.

1.7 A detailed Written Scheme of Investigation (WSI) in line with that referred to in Condition 9 of the planning consent was submitted to, and agreed with, Denbighshire County Council, with input from Clwyd Powys Archaeological Trust (CPAT) who are advisors to Denbighshire County Council (and are referred to in Condition 9 of the consent as the archaeological curator).

1.8 The work described in the agreed WSI was undertaken by Oxford Archaeology North (OA North) on behalf of DONG Energy Burbo Bank Extension (UK) Ltd during the period September-December 2014 and was subsequently the subject of a detailed report (OA

North 2015). It comprised additional desk-based research, a field boundary study, an intertidal walkover survey and a programme of trial trenching.

1.9 Following the monitoring by CPAT and by DONG Energy Burbo Bank Extension (UK) Ltd of the archaeological works described in the agreed WSI, it has been agreed that further archaeological investigation is required at several locations along the onshore cable route.

1.10 This current document represents the WSI required for the programme of further archaeological investigation. It addresses the detailed examination of archaeological features identified during the preceding phase of investigation, along with geoarchaeological investigations at a number of specific locations and also some additional trial trenching. This second WSI will be agreed with CPAT prior to the commencement of the works described herein.

2 ARCHAEOLOGICAL AND GEOARCHAEOLOGICAL BACKGROUND

2.1 The planning application for the consented works was accompanied by an Environmental Statement (ES) which examined the likely significant environmental effects of the works. Chapter 29 of the ES addressed the likely effects on cultural heritage resources and was accompanied by two annexes:

- Annex 6.6.1 – Historic Environment Desk Based Assessment (DBA); and
- Annex 6.6.2 – Geophysical Survey Report (ArchaeoPhysica Ltd).

2.2 This DBA identified known cultural heritage sites and features within a defined study area encompassing the landfall, cable route and onshore substation location. This information was used in the scheme design process to ensure that the effects on any of these known cultural heritage sites and features was minimised.

2.3 The geophysical survey covered a considerable part of the onshore cable route and identified potential archaeological features at a number of locations. These were subsequently examined by means of trial trenches; the results were then correlated with available desk-based information regarding historic field boundaries and land-use (OA North 2015).

2.4 Evidence of Bronze Age activity was identified at several locations. This was in the form of small numbers of linear features and also pits which contained material that produced radiocarbon dates suggesting a Bronze Age date for the activity. It is possible that some activities could be settlement-related. Features of definite or likely Bronze Age date were identified in Trenches 2, 8 and 9 towards the northern end of the onshore cable route and also in Trench 15 to the south of the B5119 road.

2.5 Trench 2 lies within the area of reclaimed land behind the sea wall but the features appeared to be located within a higher ridge of gravel that may represent an area of formerly dry land surrounded by tidal mudflats. Nearby to the south the trial trenching also identified a former palaeochannel crossing the former tidal mudflats (Trench 5).

2.6 Trenches 8 and 9 are located just where the land begins to rise up from the reclaimed former tidal mudflats and may therefore have formerly been coastal; features were also found in the nearby Trench 11 but remain undated. Trench 15 lies well into the area of slightly higher ground south of the reclaimed former tidal mudflats.

2.7 In another couple of locations, linear features were identified that indicate field boundaries or other land divisions that may be the precursors of the present field patterns in these areas. A radiocarbon date in the 5th-6th centuries AD (calibrated) was obtained from one of these linear features. This was in Trench 39 which was located within the floodplain of the River Clwyd, west of the current course of the river and south of Rhuddlan. The feature was one of a number of parallel ditches within this trench and more features on a similar alignment were identified within Trench 41 not far to the south, although these remain undated.

2.8 A section of text within the DBA described how advances and retreats of ice sheets during the Quaternary period have affected the landscape, particularly with regard to the lower-

lying parts of the area. At the end of the most recent glacial episode at about 12,000 BP, sea levels rose quite quickly and much of what had been dry land became inundated. Studies of the Liverpool Bay area suggest a high stand (maximum peak sea level) at around 2,300 BP with a slight fall from then until the present day (Tooley 1978; 1985).

2.9 The higher ground at Rhuddlan is set on a bluff of boulder clay and sand. This would have remained above the sea level high stands and probably represents the most seaward habitable land at such times (Murphy 2002). Evidence of Mesolithic activity has been identified at a number of locations in and around Rhuddlan (*cf*. Quinnell & Blockley 1994), not just from the higher ground but also from lower-lying locations including the route of the A525 Rhuddlan Bypass.

2.10 However, the process of sea level rise and subsequent fall was not a constant process; there would have been numerous stages of marine transgression and regression. During more stable times, land surfaces would have developed, only to be inundated and covered (and possibly eroded through subsequent regressive stages). Evidence for these sequences is in the form of Holocene peat deposits that have been found at depths of 10m and 13m below current ground level close to the mouth of the River Clwyd.

2.11 Peat beds outcrop on the foreshore at Rhyl and are exposed at low tide; these have been the subject of scientific appraisal for several decades (cf. Neaverson 1936; Bibby 1940), although no scientific dates have yet been established. The peat deposits represent an important resource for evidence of human activity, both through the preservation of organic artefacts that would not survive in other environments and also through the palaeoenvironmental record that can be obtained, examined and dated.

2.12 More than 70 prehistoric objects of bone, shell and even bronze have been recovered from the foreshore in this area. Most of the material found is broadly attributable to the Neolithic and Bronze Age periods. However an antler mattock from here has been recently dated to *c*. 4,560 BC and it is increasingly clear that there was a considerable amount of activity in the area during the Mesolithic period (*c*. 8,500-4,000 BC).

2.13 Manley (1989) describes the results of a series of boreholes undertaken in the Rhyl urban area ahead of a proposed drainage scheme. This work identified two separate peat deposits: an upper peat at *c*. 2m aOD and a lower peat at *c*. -1 to -2m aOD. The upper peat was found to be more extensive and was concentrated within a 'landward' zone, i.e. it was not present within the more seaward boreholes. The lower peat was intermittently present in the seaward and landward boreholes. Manley postulated an Early Neolithic date (*c*. 4,000 – 3,000 BC) for the formation of the upper peat, which was *c*. 0.9m thick.

2.14 More recently, archaeological work associated with the Kinmel Bay Rising Main Replacement scheme has identified peat deposits in a number of locations on the eastern side of the River Clwyd at Rhyl (Dr Martin Bates *pers. comm.*) Again there were two peat deposits, both intermittently present and both as yet undated.

2.15 A programme of geotechnical investigation along the Burbo Bank Extension onshore cable route and within the substation site has recently been completed (Listers 2014), and there is also some borehole data available from the area around the proposed landfall (Dunelm 2013).

2.16 `Immediately behind the sea wall a scheme borehole (BH02) identified topsoil and then blown sand to a depth of 1.7m, followed by tidal flat deposits to 4.8m. These tidal flat deposits comprised bands sandy and silty clays with some organic fibres noted. A borehole just to the north of the A458 Victoria Road (BH03) showed a similar sequence with blown sand to 2.3m and then tidal flat deposits to 4.4m. A third borehole just south of the railway did not include any blown sand at all, but instead identified tidal flat deposits from 0.3m to 2.0m. In all of these boreholes the tidal flat deposits directly overlie glacial till of the St Asaph Formation.

2.17 Further south, a borehole (BH6) on the northern side of the drainage feature known as The Cut showed tidal flat deposits from 0.25m to 3.4m. Another borehole 80m further along the cable route and on the south side of The Cut (BH07) identified tidal flat deposits from 0.2m to 5.1m, within which was a single deposit of peat at 1.2m to 1.5m below current ground level. It is not known if this correlates with the upper or the lower peat as

previously identified. This is the only location along the cable route where peat has been recorded during the geotechnical work associated with the current scheme, as the next borehole along the cable route was located approximately 550m further south and this found no tidal flat deposits, with topsoil directly over glacial till (BH08).

2.18 Further south again, where the cable route passes to the south-west of a farm known as Aberkinsey, the geotechnical survey identified a wide, shallow area of alluvium representing a valley that has subsequently been almost completely filled. The alluvium was up to 4m thick and comprised bands of silty and sandy clays and also gravels. There is still a minor drainage ditch running through this area but this was a more significant channel until quite recently, as indicated by the presence of two watermills in close proximity along this part of its route – Pentre Mill and Llewerllyd Mill. During the recent programme of trial trenching a layer of peat 0.1m thick was found here at a depth of *c*. 1.0m below current ground level. It extended along the full length of a single trench (Trench 21) and this was the only place that peat was encountered during the trial trenching.

2.19 A second area of alluvium was found at the point where the cable route crosses the A5151 road east of Rhuddlan. Boreholes on either side of the road here found alluvium up to 2m in thickness associated with the presence here of the Strip Brook.

2.20 At the point where the cable route crosses the River Clwyd to the south of Rhuddlan, a borehole (BH23) on the eastern side of the river found alluvium from 0.35m to 3.0m, lying directly over glacial till. On the west side of the river here another borehole (BH24) found tidal flat deposits from 0.7m to 1.8m, with no alluvium present. These tidal flat deposits were recorded on both sides of the A525 St Asaph Road; on the east side of the road the deposits extended to 6m below current ground level (BH25) whilst on the western side they extended to only 1.75m but overlay alluvium that extended to 5m (BH26). This alluvium was present within the floodplain here as far south as Gwernigron Farm and at depths consistently greater than 4m below current ground level.

2.21 There is no current data regarding the intertidal area where it is crossed by the cable route, i.e. seaward of the sea wall at Rhyl. A walkover survey of the intertidal zone included within the redline boundary for the scheme found a thin band of peat outcropping intermittently at a distance of 120-160m from the sea wall (OA North 2015). These were sealed beneath a low ridge of sand and may extend further towards the sea wall beneath this low ridge. No artefacts were identified during the course of the intertidal walkover survey.

2.22 A transect of boreholes was undertaken in 1963 approximately 700m to the west for a Welsh Water scheme known as the Rhyl Cut Improvement Scheme (BGS online). A borehole adjacent to the A458 Victoria Road identified a single peat deposit *c*. 1.6-2.0m below current ground level. A second borehole just on the landward side of the sea wall found a single peat deposit 2.6-2.9m below current ground level. No peats were identified within the remaining boreholes across the golf course or those across the sands on the seaward side of the sea wall. Bibby (1940) describes the results of a borehole taken '*at the seaward edge of the Rhyl Golf Links*'. This identified an 'Upper Bed' of peat 1.8-2.1m below current ground level and a 'Lower Bed' of peat and peaty silt at a depth of *c*. 4m.

2.23 The overall picture that emerges with regard to the deposit sequence is one of lateral (and vertical) complexity. There are clearly two episodes of peat formation on the eastern side of the River Clwyd at Rhyl. However the lateral extent of the peats relating to both of these episodes is very intermittent. In some locations, boreholes very close together show very different deposit sequences; sometimes with both layers of peat, or just one, or neither. This could be the result of post-deposition removal as a result of fluvial activity or other means, but is more likely to be an indication that the peats formed in small shallow basins on top of underlying tidal flat deposits, rather than as an extensive layer covering a wider area. This latter interpretation has been discussed with Dr Martin Bates (University of Wales Trinity St Davids) and has been agreed as the more likely scenario.

2.24 The geotechnical surveys undertaken with regard to the current scheme indicate that tidal flat deposits are present to a point somewhere between The Cut and Four Winds Farm. These deposits represent coastal wetlands subject to regular inundation within which

dryland surfaces could have formed at any time, occasionally manifested as peat where the circumstance were suitable for such material to form.

2.25 Two small alluvium-filled valleys have also been identified further to the south. The alluvium could be of fairly late Holocene date, possibly linked to localised changes in drainage resulting from deliberate changes to the alignment of the River Clwyd and also to the enclosure of the coastal wetlands.

2.26 The deposits identified within the floodplain of the River Clwyd to the south of Rhuddlan indicate that this was once a fairly extensive area of tidal marshland. As with the coastal area, dryland surfaces could have formed at any time within the sequence of deposition.

3 FURTHER INVESTIGATIONS

3.1 The programme of further archaeological investigation (including the geoarchaeological works) described within this WSI will be undertaken by a suitably experienced specialist contractor appointed by DONG Energy Burbo Bank Extension (UK) Ltd. It will be monitored by the nominated Archaeology Project Manager (currently Mick Rawlings MCIfA (RPS Group) who is the primary contact for all archaeological works at the site) and by Denbighshire County Council, CPAT and the Client.

3.2 Access for any part of the fieldwork will be arranged by agents appointed by DONG Energy Burbo Bank Extension (UK) Ltd.

3.3 The provisional locations and extent of the further investigations were discussed with CPAT towards the conclusion of the trial trenching and can now be refined in the light of the report on the results of that work (OA North 2015).

3.4 Investigation will be undertaken at the locations of Trenches 2, 8-11, 15-16, 18, 39 and 41. At each location, the land within the cable construction easement will be stripped of topsoil along a length extending to 5m beyond the each end of the former trench and for a width of *c*. 13m. This represents that part of the easement which will need to be stripped for construction purposes. The easement will be fully delineated and fenced by the Client prior to the commencement of the programme of archaeological investigation.

3.5 There will be contingency arrangements for additional land to be stripped along the easement if archaeological features are found to extend beyond the area initially stripped. Any use of the contingency arrangement will be based on consultation with the Client, CPAT and the nominated RPS Archaeological Project Manager.

3.6 The Client will be asked to provide all information relating to the known location of buried services; however the locations of the further investigations will be scanned with a Cable Avoidance Tool prior to the commencement of any fieldwork.

3.7 All work will be undertaken in full compliance with the guidelines set out in the Chartered Institute for Archaeologists' (CIfA) *Standard and Guidance for Archaeological Excavation* (revised November 2013).

3.8 Within each area of further investigation, the topsoil and any overburden will be removed using mechanical plant equipped with a toothless ditching bucket. The plant will operate under the constant supervision of appropriately qualified and experienced archaeologists.

3.9 Overburden and made ground will be removed in level spits of no more than 100 mm down to the level of significant archaeological remains or to natural subsoils/bedrock, whichever is encountered first. If significant archaeological remains are encountered, all subsequent examination and excavation will be by hand. Some further use of the mechanical excavator may be permitted on homogenous low-grade archaeological deposits, but this will only be undertaken with the consent of the nominated RPS Archaeology Project Manager and CPAT.

3.10 Spoil from the areas of further investigation will be stored at a safe distance, at least 1.0 m from the edge of the stripped area. Any deeper excavated features (> 0.5m deep) left open overnight should be enclosed within Netlon fencing hung on road pins or similar.

3.11 Where archaeological features and deposits are encountered, these will be cleaned and planned. Archaeological layers, features, deposits and structures requiring clarification will

be excavated by hand. As a general principle, discrete features such as pits and post-holes will be half-sectioned and at least one section will be excavated through any linear features.

3.12 In the event of the discovery of human remains, these will be left *in situ* and not further examined. The nominated RPS Archaeology Project Manager will be informed immediately, also the Client, CPAT, the Coroner and the Police. A recognised specialist should visit the site to provide further advice.

3.13 If removal of human remains is necessary, a license will be obtained from the appropriate authorities (currently the Ministry of Justice) by the contractor and all conditions attached to that license will be complied with. All excavation and post-excavation work regarding human remains will be undertaken in line with the standards set out in CIfA Technical Paper No. 13 *Excavation and post-excavation treatment of cremated and inhumed remains* and *Guidance for best practice for treatment of human remains excavated from Christian burial grounds in England* (English Heritage 2005).

3.14 A context-based recording system acceptable to CPAT will be used to record all archaeological deposits, features etc. Pro-forma sheets will be used to record all relevant information.

3.15 Location plans will be produced that show the position of all areas of investigation; these will be tied in to the Ordnance Survey National Grid. Areas of investigation will be plotted in relation to the National Grid to a minimum accuracy of ± 1.0m. Feature plans and sections will be drawn at appropriate scales; all site drawings will include relevant information including site name, number and/or code, scale, drawing number, orientation, date and name of compiler. Drawings will also show absolute heights derived from Ordnance Datum (Newlyn).

3.16 The photographic record of the investigations will be in digital format, resulting in high resolution TIFF (uncompressed) images. Photographs will illustrate both the detail and context of the archaeological features discovered. 35 mm format colour transparencies and monochrome images may also be created. All photographic records will include information detailing: site name and number/code, date, context, scale and orientation. The monochrome negatives and contact prints will be filed in appropriate media, and the transparencies will be mounted in appropriate hard cases. All photographs will be cross-referenced onto the context records.

3.17 Environmental sampling will be targeted upon potentially significant archaeological deposits or features, and will predominantly examine sealed and well-dated contexts. Sample size will take into account the frequency with which material appropriate for sampling will occur, but bulk samples will normally be a minimum of 30 litres. Sampling strategy (on- and off-site) will principally derive from the document *Environmental Archaeology: A guide to the theory and practice of methods from sampling and recovery to post excavation* (English Heritage 2011).

3.18 If features and/or deposits are identified as having significant potential for the presence of palaeoenvironmental material, advice will be taken from CPAT on the need to extract, process and further examine environmental samples. A contingency sum will be identified in the project budget to allow for specialist advice on sampling and for the extraction, processing and examination of such samples. Bulk sampling may also be used to collect charcoal for C14 dating where appropriate.

3.19 All artefacts and animal bones will be recorded, collected and labelled according to their individual stratigraphical context. Artefacts of clearly modern date will be recorded but not retained for off-site assessment. Finds from each archaeological context will be allocated an individual finds tray/bag and waterproof labels will be used for each tray/bag to identify unique individual contexts.

3.20 Conservation advice may be necessary on site prior to lifting of and initial treatment of fragile objects. All finds and samples will be exposed, lifted, cleaned, conserved, marked, bagged and boxed according to the United Kingdom Institute for Conservation's *Conservation Guidelines No. 2,* the Council for British Archaeology's *First Aid for Finds* (Second Edition, 1987) and the CIfA *Guidelines for Finds Work* (1992). Iron finds may

require X-rays prior to conservation and similarly residues on pottery may require study ahead of any conservation, which may be appropriate.

3.21 Where there is evidence for industrial activity, macroscopic technical residues (or a sample of them) will be collected by hand. Separate samples (*c*. 10 ml) will be collected for micro-slags (hammerscale and spherical droplets). Collection and treatment will be in accordance with *Archaeometallurgy* (CfA Guidelines, English Heritage 2001). X-radiography of a sample of industrial debris will be carried out during the post-fieldwork stage of the work.

3.22 In the event of the discovery of an artefact that may fall within the remit of the *Treasure Act* 1996, the Coroner, the Client and the nominated RPS Archaeology Project Manager will be informed immediately. All finds of potential treasure will be removed to a safe place. The definition of treasure is provided in the Code of Practice of the above act and primarily refers to items of gold or silver.

Additional trial trenches

3.23 The area to the south and east of Rhuddlan is noted as having enhanced archaeological potential, particularly with regard to remains of prehistoric date. Consequently it is proposed that a number of additional trial trenches should be excavated in this area in order to further examine this potential. The additional trial trenches measure 25m x 1.8m.

3.24 It should be noted that Trenches 25, 26 and 29 have yet to be excavated – due to access issues that could not be completed within the previous programme of trial trenching along the cable route.

3.25 The proposed additional trial trenches 62 and 63 are located along the route of a proposed access track that would be required for construction in this area. Separate planning permission is being sought for this proposed access track therefore excavation of these trial trenches is conditional on planning consent being granted for the establishment of the access track here.

3.26 Additional trial trenches 64 and 65 are located in a section of the cable route that was not subject to advance geophysical survey and thus for which less information regarding archaeological potential is currently available – especially as Trench 29 has not yet been excavated.

3.27 Additional trial trench 66 is located within a field that produced a complex geophysical response, although it should be noted that Trench 30 was located within the same field a and no archaeological features were identified within this trial trench. Additional trial trenches 67- 69 are located just to the south of the walled town of Rhuddlan and are intended to infill any perceived gaps in the trial trench coverage of this area.

3.28 All of the work associated with the additional trial trenches will be undertaken in line with the methodologies set out in the agreed WSI for archaeological evaluation. If any further archaeological investigation is considered to be required with regard to one or more of the additional trial trenches, the scope and extent of the investigation(s) will be agreed with CPAT and undertaken in line with the procedures set out in this WSI for archaeological excavation and geoarchaeological survey.

Geoarchaeological investigations

3.29 With regard to the requirements for geoarchaeological investigations, appraisal of the available information regarding the sequence of the subsurface deposits along the cable route has identified the following:

- From the sea wall south to a point somewhere between The Cut and Four Winds Farm are extensive tidal flat deposits, overlain in the area between the sea wall and the A548 road by blown sand which is almost certainly of very recent date, with peat in at least one location (BH 07);
- An alluvium-filled valley, with peat in at least one location (Trench 21), between Aberkinsey and the A457 road;
- A smaller alluvium-filled valley bisected by the A5151 road; and
- Extensive tidal flat deposits within the floodplain of the River Clwyd to the south of Rhuddlan, with some alluvium on the eastern side of the present course of the river at the location where it is crossed by the cable route.

3.30 Within the tidal flat deposits and also within the alluvium there is the potential for dryland surfaces and wetland/dryland edge situations to occur. Dryland surfaces could survive as buried soils or in some places as peats (where conditions were appropriate). These dryland surfaces may well be quite restricted laterally, as indicated by the intermittent nature of the peats recorded in the general area around Rhyl.

3.31 An updated *Research Framework for the Archaeology of Wales* has been published online. The final paper on Maritime and Intertidal Archaeology (Version 02, February 2011) identifies a number of research priorities, including:

- Surveying, mapping and understanding palaeo-landscapes now submerged or intertidal, and identifying areas of archaeological sensitivity and potential.

3.32 The potential methodologies for geoarchaeological investigation have been discussed with a recognised specialist geoarchaeologist with specific experience of the valley of the River Clwyd – Dr Martin Bates of the University of Wales Trinity St Davids (Lampeter Campus). It is agreed that the restricted lateral extent of the deposits means that any transect of boreholes would need to be very closely spaced in order to create meaningful sections. A preferred approach would be to identify areas of particular interest (such as wetland/dryland interfaces and then recover samples from these locations. Sample recovery could be by boreholes drilled using suitable equipment or a better option would be through open excavation which would allow greater understanding of the deposit sequence at that location.

3.33 Potential wetland/dryland interfaces were identified during the caesium vapour magnetometer survey that was undertaken along much of the cable route and these locations were targeted within the completed programme of archaeological trial trenching. The trenching did not identify any distinct wetland/dryland interfaces and peat was found in just one of the trenches – Trench 26 (OA North 2015).

3.34 The construction trench within which the cable will be placed is to be excavated to a depth of 1.5m below current ground level and that depth therefore represents the limit of scheme impact. Locations where the impact will extend to a greater depth include: the HDD entry pit for the cable landfall on the seaward side of the sea wall which will extend to a depth of *c*. 2m; the HDD reception pit at the cable landfall site (just to the south of the railway) which will extend to a depth in excess of 2m; and also the HDD entry pit for the River Clwyd crossing which will extend to a depth of c. 2m.

3.35 Along the cable route south of the railway, further geoarchaeological investigation is proposed at the following locations:

- Adjacent to Trench 2 and within area of detailed archaeological investigation – total of 3 investigation points extending (if possible) to 2m below ground level (this is close to the HDD reception pit for the cable landfall);

- South of The Cut and in the vicinity of Trench 6 – total of 3 investigation points extending (if possible) to 1.5m below ground level (this is close to the location of BH 07, where peat was identified at 1.2-1.5m below ground level);
- Adjacent to Trench 21 – total of 3 investigation points extending (if possible) to 1.5m below ground level (peat was identified here at 1.0-1.1m below ground level);
- South east of proposed Trench 25 – total of 3 investigation points extending (if possible) to 1.5m below ground level (this trench has not yet been excavated and the geophysical survey results indicate some potential for wetland/dryland interfaces); and
- Adjacent to Trench 41 and within area of detailed archaeological investigation – total of 3 investigation points extending (if possible) to 1.5m below ground level.

3.36 The Client will be asked to provide all information relating to the known location of buried services; however the locations of the further investigations will be scanned with a Cable Avoidance Tool prior to the commencement of any fieldwork.

3.37 In each case the exact location of the investigation points will be agreed on site by the archaeological contractor, the nominated Archaeological Project Manager and CPAT.

3.38 The investigation will be undertaken using a combination of tracked excavator and 30mm diameter gouge auger. At each investigation point an initial trial pit will be excavated by a tracked excavator equipped with a 1.8m wide toothless (ditching) bucket. This trial pit will be 1.8m x 2.0m long and will be excavated to a depth of 1.0m.

3.39 A suitably experienced geoarchaeologist will examine the section of each trial pit and create an appropriate record of the observed sequence. If peats or dryland/wetland interfaces are identified then samples will be taken using Kubiena tins pushed into the sediment sequence. These tins will be of a suitable length such that the retained sample includes at least 50mm of sediment from both above and below the material that is considered to be of interest. A drawn and photographic record will be maintained that shows the position within the sediment sequence from which the sample was extracted. Samples will be sealed within cling film with the top and bottom clearly marked and will be stored at an appropriate location prior to further examination.

3.40 Subsequent fieldwork will comprise the use of a 300mm gouge auger within the base of the trial pit - this auger can extract undisturbed samples of 500mm length to a maximum depth of 10m, although the coring will only be to the depths specified above. If the sediment sequence proves to be unsuitable for this auger type, a 600mm diameter Russian auger may be used. This work will be carried out by a suitably experienced geoarchaeologist.

3.41 The core samples will be examined and described in the field according to standard geological criteria (e.g. Tucker 1982; Jones *et al*. 1999). Descriptions will include allocation of colour (Munsell Color 2000). Each core sample will be photographed using digital images and also 35 mm colour transparencies. Subsamples will be taken as appropriate in order for the sediment sequence to be adequately characterised.

3.42 If peat is found to be present, the depth, surviving condition and nature will be recorded. Subsamples of suitable size will be taken from the basal and upper layers of the peat for AMS radiocarbon dating. Additional subsamples will also be taken for further analysis of the nature of the peat.

3.43 A different approach is required to address the geoarchaeological potential within the intertidal zone. The installation of the cable through the intertidal zone will be by ploughing or open cut excavation. This will be subject to an archaeological watching brief. In the event that peats or similar organic deposits are identified during the watching brief, their location will be accurately recorded and their depth/thickness will be estimated. Subsequently a number of auger samples will be taken at appropriate intervals along a transect adjacent to, but at a safe distance from, the cable route. These will aim to recover the identified peats/organic deposits as well as the deposit sequence from above and beneath the peats.

Reporting

3.44 Following completion of the on-site works, the contractor will produce an assessment report regarding the programme of further archaeological investigation (including the geoarchaeological work and the additional trial trenches). This report will describe the programme of work undertaken including any sampling that was carried out. Samples will be quantified and a selection of samples will be assessed in order to provide information on their potential for further detailed analysis. The assessment report will include recommendations for further analysis and for any scientific dating that may be appropriate.

3.45 The assessment report will be produced within six weeks of the completion of the final part of the programme of work identified within this WSI. Following agreement of the report(s) with the nominated Archaeological Project Manager and the Client, copies will be provided to CPAT/Denbighshire County Council.

3.46 Copyright of any report will be retained by the contractor under the terms of the *Copyright, Designs and Patents Act* (1988) with all rights reserved, excepting that the contractor provides an exclusive licence to the respective client and to the local planning authority for the use of the report in all matters relating to the proposed development.

3.47 Copies of all reports will be deposited with CPAT/Denbighshire County Council where they can be freely copied without reference to the authors for archaeological research or for Development Control within the planning process. A digital copy of the report will also be deposited with the Regional Historic Environment Record on the understanding that this digital copy may in future be made available via a web-based version of the Historic Environment Record.

3.48 A copy of the report will be placed in the overarching project archive, for eventual deposition with the appropriate recipient museum.

Archive preparation

3.49 The information regarding the programme of archaeological work will be entered onto the relevant *Online Access to the Index of Archaeological Investigations* (OASIS) form and submitted to the OASIS database by the contractor. Electronic copies of any reports generated will be attached to the form.

3.50 The project archive consists of the records relating to the programme of archaeological work, including written records, photographs, drawings and artefacts. The contractor(s) will ensure that the archive is fully catalogued, indexed, cross-referenced and checked for consistency.

3.51 The archive will be prepared in accordance with procedures outlined in *Standards in the Museum Care of Archaeological Collections* (Museums and Galleries Commission 1992) and any procedures adopted by the recipient museum.

3.52 The retained artefacts remain the property of the landowner with the exception of human remains and any artefacts that fall within the remit of the *Treasure Act* 1996. Subject to obtaining written consent from the landowner, the artefacts will be deposited along with the rest of the archive. Arrangements for the finds to be viewed by the landowner will be made on request. If ownership of all or any of the finds is to remain with the landowner, efforts will be made to ensure provision for the time-limited retention of the material and its full analysis and recording by appropriate specialists.

General

3.53 Any variation or modification to the methods described above (including the reporting) will be fully discussed in advance and agreed by the archaeological contractor, the nominated Archaeological Project Manager, the Client's representative and CPAT/Denbighshire County Council.

3.54 The programme of archaeological work will be monitored on behalf of DONG Energy Burbo Bank Extension (UK) Ltd by the nominated Archaeological Project Manager (Mick Rawlings MCIfA (RPS), who is currently the primary contact for all archaeological works at

the Site) and by CPAT/Denbighshire County Council. The timing and frequency of each monitoring visit will be agreed in advance with all parties.

3.55 Monitoring will continue until the deposition of the site archive and finds and the satisfactory completion and submission of an OASIS report.

3.56 Should particularly significant remains, finds and/or deposits be encountered, and should the investigations described here be likely to represent the only level of archaeological work undertaken on such remains, then these investigations may merit wider publication in line with government guidance on planning and the historic environment. If such remains are encountered, the publication requirements – including any further analyses that may be necessary – will be confirmed with CPAT/Denbighshire County Council.

3.57 Enquiries or releases through the media on archaeological finds and material found during the programme of archaeological works will, in the first instance, be directed through DONG Energy Burbo Bank Extension (UK) Ltd. It is recommended that relevant information is released after completion of all stages of archaeological fieldwork in order to ensure that the integrity of the resource is maintained.

3.58 It is the archaeological contractor's responsibility – in consultation with RPS Planning & Development and with DONG Energy Burbo Bank Extension (UK) Ltd - to ensure that the undertaking of the archaeological works described in this WSI does not conflict with any statutorily protected sites and should also consider any biodiversity issues as covered by the *NERC Act* 2006. In particular, such conflicts may arise where geoarchaeological investigations have the potential to impact on protected species and/or natural habitats e.g. SSSIs, National Nature Reserves, Special Protection Areas, Special Areas of Conservation, Ramsar sites, County Wildlife Sites etc.

APPENDIX 2: OA NORTH PROJECT DESIGN

1. INTRODUCTION

1.1 PROJECT BACKGROUND

1.1.1 Dong Energy Burbo Bank Extension (UK) Ltd (hereafter the 'Client'), have requested that Oxford Archaeology North (OA North), in accordance with a Written Scheme of Investigation (WSI) (RPS 2015), submit a design for a programme of archaeological excavation, evaluation and geoarchaeological survey to be undertaken in advance of, and during, the laying of an electricity cable between Rhyl / Prestatyn and Bodelwyddan substation (SJ 0365 8250 - SJ 0210 7345). The WSI stipulates that the programme of archaeological works should include the excavation of ten open areas, a geoarchaeological survey and a limited number of evaluation trenches; the following document outlines the methodology for these works and for the production of a report and publication.

1.1.2 The scheme comprises the construction of an extension to the existing Burbo Bank Extension Offshore Windfarm in Liverpool Bay. The onshore cable route extends from a landfall between Rhyl and Prestatyn on the coast of North Wales to a new substation at Bodelwyddan. The cable route will have a *c* 25m wide working corridor and would be *c* 12km in length.

1.2 ARCHAEOLOGICAL BACKGROUND

1.2.1 ***Environmental Statement:*** an Environmental Statement produced in support of the planning application for the onshore works included a Historic Environment Desk Based Assessment and a Geophysical Survey Report; the latter covered approximately 9km of the 12km total route. This application has been consented.

1.2.2 ***Planning Condition 9:*** Planning consent was granted in November 2013 subject to the discharge of a number of Planning Conditions of which Condition 9 is applicable to this Report. Condition 9 is set out below:

'No development shall take place within the application area until the Applicant, has secured the implementation of a programme of work in accordance with a written scheme of investigation, which has been submitted by the Applicant and approved by the archaeological curator for the Local Planning Authority. The archaeological programme of work will be undertaken and completed in accordance with the standards laid down by the institute of archaeologists and MoRPHE (2006). On completion appropriate reports and an archive will be submitted for approval to the Local Planning Authority'.

1.2.3 ***Archaeological Evaluation and Survey:*** in 2014 a programme of archaeological evaluation, a documentary study, a foreshore survey, and a boundary survey were undertaken (OA North 2015). The programme of evaluation identified a number of potentially early boundary features and Clwyd Powys Archaeological Trust (CPAT), acting as archaeological adviser to Denbighshire County Council (DCC) required that a programme of open area archaeological excavation be undertaken on the land that will be impacted by the proposed cable laying operations in each of these areas. A Written Scheme of Investigation (WSI) was compiled by RPS Planning and Development (RPS 2015) for the programme of mitigative works and this defined the requirements for the excavation of ten open areas, a programme of geoarchaeological survey in areas where there is the potential for peat or waterlogged deposits, and a limited number of targeted evaluation trenches. The WSI was approved by CPAT on behalf of DCC. The present project design is informed by the WSI and provides a method statement for the programme of mitigation recording.

2. QUALITY MANAGEMENT AND ASSURANCE PROCEDURES

2.1 QUALITY ASSURANCE

2.1.1 OA is a Registered Archaeological Organisation with the Chartered Institute for Archaeologists (no 17). OA is not at present ISO certified but operates an internal QA system governed by standards and guidelines outlined by English Heritage and the Chartered Institute of Archaeologists (CIfA).

2.1.2 ***Standards:*** it is OA's stated policy to adhere to current professional standards set by CIfA, English Heritage, Association of Local Government Archaeological Officers, Museums Organisations.

2.1.3 OA helps the profession to develop and establish standards by serving on national working parties (eg recently on archives).

2.1.4 OA conforms with current legislation and national and local policy standards for archaeology health and safety and other relevant matters. Details of OA's approach to health and safety with regard to road schemes are given below in *Section 5*.

2.1.5 OA has established technical manuals, procedures and policies which control its work covering field recording, finds retention and discard, finds storage and handling, environmental sampling and processing, archiving and post-excavation. These have been developed to conform with best professional practice.

2.1.6 ***Staff:*** OA ensures that its staff are fairly recruited, fairly employed, and properly qualified for their work whether by formal qualification or by established and verifiable experience.

2.1.7 OA ensures that staff remain committed and enhance their abilities using annual staff appraisals, supporting formal and informal training and educational courses.

2.1.8 OA have established terms and conditions of employment and a system of staff representation to ensure regular consultation on employment matters.

2.1.9 To ensure that staff are kept informed of OA's activities OA has a quarterly staff newsletter and regular meetings of staff at all levels to deal with issues of technical quality control and management.

2.1.10 ***Procurement of services and materials:*** OA procures subcontracted work on the basis of value for money, considering quality, track record and service, as well as cost. OA regularly reviews quality of subcontracted work and uses tendering procedures for major sub-contracts.

2.1.11 Procurement of materials is on the basis of quality and availability, as well as cost, especially in respect of long-term storage of archives (OA adheres to archive quality photographic materials and processes, archive quality boxes etc).

2.1.12 ***Working Practices:*** management procedures ensure that all work conducted within the Company and all end product reports to clients are monitored and evaluated whilst they are in progress, during compilation, and after completion.

2.1.13 ***Data Acquisition and Security:*** in gathering data from other sources OA has procedures to ensure that a record is made of all sources consulted (whether productive of information or not), the limits of search, and the date of search. Data is filed according to the project to which it relates.

2.1.14 For fieldwork projects OA always removes records and finds from site every day, and ensures equipment is secured.

2.1.15 OA has a networked computer system. In addition to providing standardised software suites for use by all personnel, the computer administration facility monitors logs and checks all activity on the network to ensure that operating quality is maintained. OA has daily backup of all computer systems and up-to-date anti-virus software. OA routinely arranges for microfilming of primary fieldwork archives.

2.1.16 ***Artefact Security:*** OA handles, temporarily stores and co-ordinates internal and external specialist research on many thousands of artefacts and antiquities of interpretative and intrinsic value.

2.1.17 OA has unique numbering systems, check-lists, and transit forms and procedures to ensure that all artefacts or groups of objects are adequately logged, individually identifiable and their location known as they proceed through the analysis and reporting stages of archaeological projects.

2.1.18 OA has a specialist secure storage racking system and other secure storage facilities for storage of all intrinsically valuable artefacts.

2.1.19 ***Archives:*** OA has standard procedures for archiving records to professional archival standards, and has well established procedures for making arrangements with landowners and recipient institutions for the deposit of archives and finds in appropriate publicly accessible institutions.

2.1.20 ***Post-excavation and Publication of Field Projects:*** OA has written procedures and guidelines for the execution of post-excavation projects, and each project is divided into specific tasks which are rigorously defined on the basis of their contributing to the final product. Gantt charts are produced for each project, providing OA with the ability to track each project in detail, ensuring that work is completed to the requisite professional standard and within time and budgetary constraints.

2.2 MANAGEMENT STRUCTURE AND RESPONSIBILITIES

2.2.1 OA is governed by a Board of Trustees, to whom the Director and Chief Executive reports. The Director and Chief Executive leads a Group Senior Management Team consisting of Director: Finance and Administration; Director: Business Development and Operations. The Group Senior Management Team oversees the activities of all OA offices, including the Lancaster Office (OA North) Senior Management Team.

2.2.2 Each project is assigned to a Project Manager, who on larger projects reports to a designated Overall Project Champion, and may be assisted by a Project Administrative Manager. On projects like the Burbo Bank Extension Offshore Wind Farm a Senior Project Officer is appointed to work alongside the Project Manager; he/she is usually the person who directs work in the field, assisted by other project officers, supervisors and technicians, as appropriate.

2.2.3 Finds, Environmental and Graphics staff provide back-up services, and where workloads justify, they may be dedicated full time to single projects.

2.2.4 Given the location of the proposed development, the project will be administered from the Lancaster Office. The Lancaster Office (OA North) Senior Management Team hold regular Project Review meetings to monitor the progress of all projects, as well as numerous *ad hoc* meetings to deal with immediate requirements.

3. METHOD STATEMENT

3.1 STRIP, MAP AND RECORD PROGRAMME

3.1.1 ***Introduction:*** the following work programme is submitted in accordance with the WSI (RPS 2015), and which has been approved by CPAT on behalf of DCC. There is a requirement for the open area excavation of ten sites each centred on evaluation trenches: 2, 8-11, 15, 16, 18, 39 and 41. Each will be 13m wide and will extend 5m beyond the length of each evaluation trench. This will entail the excavation of seven 35m x 13m areas, two 60m x 13m areas, and one 55m x 13m area. If significant archaeological remains are identified which extend beyond the area initially stripped then a contingency will provide for the expansion of the stripped area. Any recourse to contingency will be subject to consultation with the Client, , the RPS Consultant and CPAT.

3.1.2 ***Site set-up and welfare facilities:*** each of the excavation areas is dispersed along the length of the 12km long cable route, and this will entail a certain degree of portability of infrastructure; the mechanical excavator will need to be transported by low loader between excavation sites, and the welfare units will need to be mobile. It is proposed to use ground hog welfare units which will be towed between each site by a project 4 x 4 vehicle, and it is anticipated that more than one will be required as OA North staff will be working on different sites at the same time.

3.1.3 ***Fencing requirements:*** it is hoped, but not relied upon, that the easement corridor for the cable route will be fenced off by the client in advance of the excavation works. However, it is anticipated that some and potentially all of the excavation areas will not have been contained within easement fencing at the time of the excavation. To that end it is proposed to establish stock proof netlon fencing around each of the excavation areas prior to the initial stripping works.

3.2 STRIP, MAP AND RECORD

3.2.1 ***Strip, map and record:*** the programme of strip, map and record will accurately record the location, extent, and character of any surviving archaeological features and/or deposits within the ten excavation areas, which were defined following synthesis of the results of the archaeological evaluation and subsequent consultation between CPAT, the RPS Consultant, OA North and the Client.

Evaluation Trench No	Dimensions	Area
Trench 2	35m x 13m	455sqm
Trench 8	35m x 13m	455sqm
Trench 9	35m x 13m	455sqm
Trench 10	35m x 13m	455sqm
Trench 11	35m x 13m	455sqm

Trench 15	55m x 13m	715sqm
Trench 16	60m x 13m	780sqm
Trench 18	60m x 13m	780sqm
Trench 39	35m x 13m	455sqm
Trench 41	35m x 13m	455sqm

3.2.2 ***Plant:*** the strip, map and record exercise will utilise tracked 360° mechanical excavators fitted with wide (minimum 1.8m) toothless ditching buckets and will be 15 ton machines, which is a compromise between size and portability, allowing movement of plant between sites using low loaders. Such a machine is considered appropriate for the ground conditions, but must be capable of sensitive excavation. Given the size of the areas spoil can be deposited at the edge of the excavation areas without the need for dumpers. All mechanical excavation will take place under the supervision of suitably experienced archaeologists, the number of whom will be dictated by the number and dispersal of the operating excavators.

3.2.3 ***Stripping techniques:*** where using a 360° mechanical excavator, the topsoil will be removed in 100mm spits down to the level of significant archaeological remains or natural sub-soils and the final 'take' should aim to leave a smooth, even and clean surface, with a minimum of smearing, polishing and rutting, across a wide area which can then be inspected by the attendant archaeologist for any features of archaeological interest. Spoil will be deposited at least 1m from the edge of the excavated area.

3.2.4 Excavated arisings will be inspected in order to collect any topsoil finds. Where there is a subsoil interface horizon above the surface of the natural subsoils, this too will be removed (by the 360° mechanical excavator), ensuring that the final 'take' leaves the uppermost surface of the natural subsoils, clay smooth, even and clean, with a minimum of smearing, polishing and rutting. Topsoil and subsoil will be removed and stored separately.

3.2.5 Where appropriate, the surface of the natural geology will be cleaned by hand, using either hoes, shovel scraping, and/or trowels, depending on the subsoil conditions, and inspected for archaeological features. 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 (ie, rust) upon exposure to the air. This means that features such as ditches, pits and the gullies of timber houses 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.

3.2.6 It has not been determined to date if there will be a requirement to backfill the excavation areas or if these areas will become part of the stripped easement corridor.

3.2.7 ***Archaeological supervision and discoveries:*** putative archaeological features and/or deposits identified, together with the immediate vicinity of any such features, will be cleaned by hand, using either hoes, shovel scraping, and/or trowels depending on the soil conditions. These features will be planned using a differential GPS, which is accurate to +/- 0.01m, or Total Station or by photogrammetry using a UAV for areas with complicated remains. Altitude information will be established with respect to Ordnance Survey (OS) Datum (Newlyn). A selection of the features will be sample-excavated in order to ascertain depths, state of preservation, complexity, function, date and significance.

3.2.8 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 (ie, half-sectioned) in the first instance, linear features will be subject to a 20% sample with slots a minimum of 1m wide.

3.2.9 ***Recording strategy:*** all information identified in the course of the site works will be recorded stratigraphically, using a system, adapted from that used by the former Centre for Archaeology Service (CAS) of English Heritage, with sufficient pictorial record (plans, sections, and digital 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 high-resolution 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 CIfA guidelines) in order to minimise deterioration.

3.2.10 ***Significant archaeological findings:*** following the exploratory investigation of the features, should it be found that the archaeological remains are of high significance, it is likely that CPAT 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 agreed with the RPS Consultant and submitted to the Client as a resource variation to the present scope of works.

3.2.11 ***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.

3.2.12 ***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. The Client and the RPS consultant will also be informed. Where removal cannot take place on the same working day as discovery, suitable security will be employed to protect the finds from theft.

3.2.13 ***Human Remains:*** any human remains revealed by the works 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 local Coroner, the Client, the RPS consultant and, will be informed immediately. If removal is essential, the exhumation of any funerary remains will require the provision of a Ministry of Justice license, under section 25 of the Burial Act of 1857. An application will be made by OA North for the site area on discovery of any such remains and the removal will be carried out with due care and sensitivity under the environmental health regulations. The cost of removal or treatment will be agreed with the client and costed as a variation.

3.2.14 ***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.

3.2.15 ***Samples for scientific 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. Samples for dendrochronological or archaeomagnetic dating would be taken in conjunction with specialist advice, for example if any core structural stones demonstrably associated with hearth, kiln or furnace features were identified during the course of archaeological site works.

3.3 EVALUATION TRENCHING

3.3.1 Eight evaluation trenches are required to be excavated to the south and east of Rhuddlan, and comprise Trenches 25, 26 and 29 which could not be excavated previously because of access restrictions. However, there is also a number of new trenches: Trenches 62-3 which are on the line of a proposed access track, and will only be examined pending grant of Planning Permission for the Additional Accesses and Working Compounds (31/2014/1366). Trenches 64-69 are additional trenches proposed in a previously investigated area. The trenches are arranged within the spaces of the previous evaluation of Trenches 27-35; further investigation is deemed to be warranted by CPAT. The locations of these trenches are as defined on Fig 7 of the WSI (RPS 2015). The trenches will be 25m x 1.8m in extent.

3.3.2 The work would be undertaken in accordance with CIfA guidance (IFA 2013). The evaluation will establish the presence or absence of any previously unsuspected archaeological deposits and, if established, will then test their date, nature, complexity, depth and quality of preservation. The results of the evaluation will form the basis of an assessment of the potential and significance of the identified archaeological features, deposits and finds within a local, regional and, where appropriate, national, context and of the scope and scale of further mitigative investigation and recording of the site.

3.3.3 ***Methodology:*** the topsoil and any modern overburden will be removed in 0.1m thick spits by a machine (fitted with a toothless ditching bucket) under archaeological supervision to the surface of the first significant archaeological deposit or to the level of the natural subsoil. 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 must be investigated and recorded unless otherwise agreed by the RPS Consultant and CPAT. The trenches will not initially be excavated deeper than 1.2m to accommodate health and safety constraints; any requirements to excavate below this depth will involve stepping-out of the sides and recourse to an agreed costed variation.

3.3.4 All trenches will be excavated in a stratigraphical manner, whether by machine or by hand. Trenches will be located by use of GPS equipment, which is accurate to +/- 0.025m, or Total Station. Altitude information will be established with respect to OS Datum (Newlyn).

3.3.5 Any investigation of intact archaeological deposits will be exclusively manual. Selected small pits and postholes will be fully excavated, but initially half-sectioned, larger features will 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*.

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

3.3.7 Results of all field investigations will be recorded on *pro-forma* context sheets that will be deemed to be acceptable to CPAT. 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 CIfA guidelines (IFA 2013) in order to minimise deterioration. Where the trench does not reveal any features, the trench will be recorded using a single trench record sheet, and a representative section will be drawn to record the stratigraphy.

3.3.8 ***Photographic Recording:*** a fully indexed photographic record will be maintained for each trench and feature using digital photography (minimum of 16 megapixel digital SLR camera). In addition a 35mm SLR camera will be used to create archivally stable black and white prints on silver-based film. The location of photographs will be indicated on a site plan. As well as detailed shots of features, which will include a suitable-sized graduated scale, the record will also include general shots that will aid the contextualisation of features and specific details within the wider landscape.

3.3.9 ***Reinstatement:*** on completion of the recording the trenches will be backfilled so that the topsoil is laid on the top, and the ground will be roughly graded with the machine.

3.3.10 ***Fencing/hoarding requirements***: spoil will be kept a safe distance from the trenches - at least 1m. Orange netlon barrier fencing will be installed around trenches and spoil mounds and such fencing will be maintained around any partially backfilled trenches.

3.3.11 ***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). Any assessment of the environmental potential of the site would be undertaken through the examination of suitable deposits by the in-house palaeoecological specialist, who will examine the potential for further analysis. Environmental samples will be stored in lidded plastic tubs in a cool, dark location.

3.3.12 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.

3.3.13 A contingency sum has been identified for palaeoecological assessment and will only be called into effect if good deposits are identified and will be subject to the agreement of the Client and CPAT.

3.3.14 ***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.

3.3.15 ***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 local Coroner, the Client, the RPS Consultant and CPAT will be informed immediately. If removal is essential the exhumation of any funerary remains will require the provision of a burial license from the Ministry of Justice, 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. The cost of removal or treatment will be agreed with the client and costed as a variation.

3.3.16 ***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 iron and a selection of non-ferrous finds, together with selected industrial debris from stratified deposits will be x-rayed. The cost of conservation has been included as a contingency, which will be agreed with the client. All finds will be delivered and logged-in to the office at the end of each working day, where any valuable small finds will be transferred to secure storage. On site, any such finds will be carefully wrapped and kept in a secure, locked location away from public view.

3.3.17 ***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. The Client and the RPS Consultant will also be advised. Where removal cannot take place on the same working day as discovery, suitable security will be employed to protect the finds from theft.

3.4 GEOARCHAEOLOGICAL SURVEY

3.4.1 ***Introduction:*** it is proposed to undertake geoarchaeological investigations at the following locations and are indicated in Figs 3-6 of the WSI (RPS 2015):

- Three sample points adjacent to Trench 2 (within the excavation area)
- Three sample points in the vicinity of Trench 6 (extending to 1.5m below ground level)
- Three sample points in the vicinity of Trench 21 (extending to 1.5m below ground level)
- Three sample points in the vicinity of Trench 25 (extending to 1.5m below ground level)
- Three sample points adjacent to Trench 41 (within the excavation area)

3.4.2 The survey will comprise the excavation of initial trial pits using a tracked mini excavator, which will be 1.8m x 2m x 1m deep, and then the full stratigraphy of the deposits at each location will be established by examination of the exposed section and by coring with a 300mm gouge auger through the base of the trial pit. If peats or dryland / wetland interfaces are identified then the stratigraphy will be sampled using Kubiena tins pushed into the deposits, and the lower deposits will be sampled using a 600mm diameter Russian auger.

3.4.3 Where the trenches will be within the area of archaeological excavations, the samples will be taken against an exposed section and will be continued beneath the floor of the excavation area using the gouge auger.

3.4.4 Each location will be recorded in three dimensions either with a GPS or total station. The equipment will comprise a standard hand operated Eijkelkamp soil auger, and it is anticipated that the 30mm gouge auger head will be employed, but other heads will be available to deal with a variety of sediment types (eg Screw auger head). At each auger location a depth of 1.5m will be examined and recorded.

3.4.5 Each profile will be recorded on a summary *pro forma* sheet and significant layers identified. In the first instance, the depth and extent of any peat deposits will be recorded and the data will be included in the site report. Relative depths will be noted and a description of the deposits using standard quaternary (Late Devensian and Holocene) terminology (colour texture, compaction and inclusions) will be made. This will follow the English Heritage geoarchaeology and Environmental Archaeology Guidelines (Historic England 2015; IfA 2008; Campbell *et al* 2011).

3.4.6 ***Retrieval of Cores for Palaeoenvironmental assessment, and Scientific dating:*** if peat deposits are identified, a selection of cores would be sampled for palaeoenvironmental assessment and scientific dating. Cores would be taken at selected locations to retrieve peat for AMS dating, environmental assessment and

analysis of pollen and other biological indicators. Cores would be taken using a hand-held Russian-type peat corer or Kubiena tins.

3.4.7 Stratigraphic Processing: if peat deposits are recorded the data from the coring survey could be entered into specialist computer software (Rockworks 14 and Logplot) and the relevant diagrams would be produced. These diagrams would be used by the OA North's environmental archaeologists to interpret the lithology of the study area.

3.4.8 ***Intertidal Zone:*** where the cable extends through the intertidal zone, there will be an open cut excavation, and ground works will be subject to an archaeological watching brief. If peats are identified, their locations will be recorded by GPS survey, and gouge auger / Russian auger samples will be taken at appropriate intervals adjacent to the cable route, but at a safe distance from it. These will be intended to establish the depositional sequence.

3.4.9 ***Sub-surface Deposit Model:*** a GIS (ArcGIS) project could be established, incorporating all available base-mapping data and the proposed borehole locations. Ascii LiDAR data for the site will be used to provide the topographic context; the data will be built into the GIS project and used to construct a DTM surface model in order to provide a wider topographical context for the borehole transects.

3.4.10 The lithostratigraphic information collected during the auger survey would be input, as depths below ground level, into specialist computer applications (Rockworks 14 and Logplot). This would enable the correlation of the major lithostratigraphic units between data points, using an appropriate interpolation (*ie* Inverse distance). It would then be possible to use the model to generate cross-sections or thickness plots along any transects or between the three sample points at each site. Should the data be of sufficient quality to sustain this, the spatial distribution of deposits and buried topography across the study area could be modelled as two-dimensional or three-dimensional views, exportable to GIS.shp file. The interpreted dataset would be used to reconstruct the extent of the peat deposits.

3.4.11 ***Environmental assessment*:** an assessment of the environmental potential of the site will be undertaken through the examination of suitable deposits by the in-house environmental archaeologists, who will examine the potential for further analysis. This will be undertaken, if commissioned, in accordance with English Heritage Guidelines (Campbell *et al* 2011).

3.4.12 Material would be selected for AMS dating. The position of the dates will be selected to provide range finder dates for the top and bottom of the profiles, a total of two dates for each core. If no suitable plant macrofossils were identified in the peat, it might be necessary to date the humin and humic acid fractions at each level and would result in a minimum of four dates at each coring location. The material will be submitted to Dr Gordon Cook at Scottish Universities Environmental Research Centre (SUERC) for dating.

3.4.13 The cores would be stored in the offices of Oxford Archaeology North in Lancaster for future analysis. The site archive will include both a photographic record and maps showing the locations of the cores.

3.5 ARCHIVE, REPORTING AND POST-EXCAVATION ASSESSMENT

3.5.1 ***Archive:*** the results of the fieldwork will form the basis of a full archive to professional standards, in accordance with current English Heritage guidelines (1991). The project archive represents the collation and indexing of all the data and material gathered during the course of the project. It will include summary processing and analysis of all features, finds, or palaeoenvironmental data recovered during fieldwork, which will be catalogued by context. This archive can be provided in the English Heritage Centre for Archaeology format and a synthesis will be included in the Denbighshire Historic Environment Record (HER). A copy of the archive can also be made available for deposition with the NMR.

3.5.2 ***Post-Excavation Assessment:*** an assessment of the archive will be undertaken, and this will assess the resource requirements for analysis and publication will be defined; the process is in accordance with English Heritage guidelines (English Heritage 2006). This would involve an assessment of the dataset generated by the excavation, the evaluation trenching and the Geoarchaeological survey, followed by a review of the excavation archive to establish the potential for further analysis. This assessment will take place in close consultation with the client and the format for the final report will also be agreed at this stage of the work. The Harris Matrix, largely produced during the excavation programme, will be completed and checked as part of the assessment. The assessment will involve the compilation of a brief archive report, detailing the stratigraphic history of the site, and outlining the significance of the structural, artefactual and environmental evidence.

3.5.3 Following the excavation the finds will be processed, and will be washed, dried, repackaged and catalogued. Once the finds have been processed, the OA North finds manager will undertake a detailed assessment of the whole assemblage to determine the requirements for post-excavation and conservation.

3.5.4 The project assessment will include an updated project specification, which will comprise a full project design for a programme of full analysis and publication, and will be in accordance with MoRPHE guidelines (English Heritage 2006). This document will be agreed with the Client and the RPS Consultant and submitted to CPAT within three months of the completion of the fieldwork.

3.5.5 ***Analysis and Publication:*** an appropriate programme of analysis should then be undertaken to prepare a research archive, as detailed in English Heritage English Heritage's MoRPHE guidance (English Heritage 2006). Following the analysis of the excavation results, a report will be written which will present, summarise, and interpret the results of the programme and will incorporate specialist reports on artefact assemblages and environmental reports. It will include an index of archaeological features identified in the course of the project, with an assessment of the site's development. It will incorporate appropriate illustrations, including copies of the site plans and section drawings all reduced to an appropriate scale.

3.5.6 The results of the programme of works detailed above should be placed in the public domain by a number of routes, firstly by publication and secondly by deposition of the archive in an appropriate museum. A synthesis of the work should also be placed in the Denbighshire HER. A publication will be compiled as an article for a local Journal or other appropriate publication. The analytical and publication stage of the programme is essential to the completion and dissemination of the results, and the planning condition will not be discharged until this has been satisfactorily completed.

3.5.7 ***OASIS:*** there is a requirement to complete the OASIS online form (http://ads.ahds.ac.uk/project/oasis/), which will, on validation by CPAT, be entered into the public domain via the OASIS website.

4. OTHER MATTERS

4.1 RISK ASSESSMENT AND HEALTH AND SAFETY

4.1.1 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 (SCAUM 1997). OA North will liaise with the client and/or on-site contractors to ensure all health and safety regulations are met. A detailed risk assessment will be completed in advance of any on-site works, with continuous monitoring and updating during the fieldwork. This can be supplied to all interested parties on request. All staff will attend a health and safety induction arranged by the lead contractor at the beginning of the project, and will be subject to defined site rules and monitoring.

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

4.2 SERVICES

4.2.1 Full regard will, of course, be given to all constraints (services etc.) during the fieldwork as well as to all Health and Safety considerations. As a matter of course the field team will use a Cable Avoidance Tool (CAT) 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.

4.3 STAFF ISSUES

4.3.1 All project staff will wear full basic PPE whilst on site, to include safety helmets, safety boots and high-visibility jackets, and will be CSCS certified. Noise defenders and eye protectors will be made available to staff as necessary. It will be ensured that drivers of plant contracted by OA North will be CITB certified, or equivalent, and that the plant will have the appropriate certification. Staff working in the vicinity of the onshore works to will have PPE including gloves, eyewear and flame retardant overalls.

4.3.2 A toilet and hand washing facilities, together with a messing facility and tool storage area are required during the fieldwork, and a mobile welfare unit will be provided.

4.4 PROJECT MONITORING

4.4.1 CPAT will be kept fully informed of the work and its results. Liaison with CPAT and DCC will be undertaken by the RPS Consultant. An appropriate programme of fieldwork monitoring will be agreed ahead of commencement.

4.5 ARCHIVE

4.6.1 This archive will be collated in accordance with the relevant CIfA guidelines and a synthesis will be submitted to the 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 together with the with material archive (artefacts, ecofacts, and samples) to Denbighshire County Museum and Archives, the Old Gaol, Ruthin, and if the archive facility is unavailable then submission to the RCAHMW NMR will be investigated.

5. STAFFING

5.1 The project will be under the direct management of **Jamie Quartermaine** (OA North Senior Project Manager) to whom all correspondence should be addressed.

5.2 The field excavation will be directed by **Becky Weigel** (OA North Project Officer), who is a highly experienced field archaeologist, with 15 years spent working in the commercial sector, 10 of which in a supervisory capacity, and having worked across a range of archaeological periods from prehistoric to Industrial ages, as well as rural to urban deeply stratified sites. She is used to working with on-site plant, and capable of running sites of all sizes. Becky will be accompanied by a team of up to four additional 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. Health and Safety advice will also be provided by **Alan Lupton** the OA North Health and Safety Officer.

5.3 Any finds will be processed, studied and reported upon, either by, or under the guidance, of **Chris Howard-Davies** (OA North Finds Manager) who has extensive experience of finds from all periods, but particularly prehistoric and Roman material.

5.4 All environmental sampling and assessment will be undertaken under the auspices of **Denise Druce** (OA North Environmental Manager) who has unparalleled experience of palaeoenvironmental work in the North West region

APPENDIX 3: TRIAL TRENCH CONTEXT LIST

Trench No	Context No	Context Type	Description
Tr 1	***100***	Deposit	Topsoil; mid-brownish-grey silty-loam, 0.15m thick
Tr 1	***101***	Deposit	Natural geology; mid-yellowish-grey, friable silty-gravel
Tr 1	***102***	Deposit	Natural geology; light greyish-brown, hard silt
	103-99		Not used
Tr 2	***200***	Deposit	Topsoil; dark greyish-brown, friable silty-clay, 0.3m thick
Tr 2	***201***	Deposit	Natural geology; light yellowish-brown friable silty-sand gravel
Tr 2	***202***	Deposit	Fill of pit ***203***, secondary silting in wet conditions
Tr 2	***203***	Cut	Cut of pit
Tr 2	***204***	Deposit	Fill of pit ***205***. Dumped material, containing fire-cracked stones
Tr 2	***205***	Cut	Cut of pit
Tr 2	***206***	Deposit	Fill of gully ***207***, secondary silting from the surrounding area
Tr 2	***207***	Cut	Cut of gully, possible drainage function
	208-99		Not used
Tr 3	***300***	Deposit	Topsoil; greyish-brown friable silty-clay, 0.2m thick
Tr 3	***301***	Deposit	Natural geology; greyish-brown firm clay
	302-99		Not used
Tr 4	***400***	Deposit	Topsoil; light brownish-grey, weakly cemented silt loam, 0.35m thick
Tr 4	***401***	Deposit	Natural geology; light orange brown, hard silty-clay
	402-99		Not used
Tr 5	***500***	Deposit	Topsoil; mid-greyish-brown, weakly cemented silt loam, 0.3m thick
Tr 5	***501***	Deposit	Subsoil; bluish-grey, weakly cemented silt, 0.15m thick
Tr 5	***502***	Deposit	Natural geology; mid-brownish-red, hard clay
Tr 5	***503***	Cut	Palaeochannel
	504-99		Not used
Tr 6	***600***	Deposit	Topsoil; dark brown, friable loamy-silt, 0.25m thick
Tr 6	***601***	Deposit	Subsoil; mid-yellowish-brown, very firm clay silt, 0.15m thick
Tr 6	***602***	Deposit	Natural geology; mid-brownish-pink, very firm clay silt, with bands of light bluish-grey silt
	603-99		Not used
Tr 7	***700***	Deposit	Topsoil; mid-blackish-brown, friable silt loam, 0.15m thick
Tr 7	***701***	Deposit	Subsoil; mid-yellowish-brown, friable silt, 0.15m thick
Tr 7	***702***	Deposit	Natural geology; mid-brownish-red, firm clay silt, with patches of mottled orange red silty-clay
	703-99		Not used
Tr 8	***800***	Deposit	Topsoil; mid-greyish-brown, friable silty-sand, 0.2m thick
Tr 8	***801***	Deposit	Subsoil; mid-brown, friable silty-clay, 0.2m thick
Tr 8	***802***	Deposit	Natural geology; orange brown, firm clay-silt
Tr 8	***803***	Deposit	Fill of pit ***804***, dumped burnt material
Tr 8	***804***	Cut	Cut of pit
	805-99		Not used
Tr 9	***900***	Deposit	Topsoil; mid-brownish-grey, friable silty-sand, 0.2m thick
Tr 9	***901***	Deposit	Subsoil; mid-brown, friable silty-sand, 0.3m thick
Tr 9	***902***	Deposit	Natural geology; mid-brownish-orange, firm silty-clay
Tr 9	***903***	Deposit	Fill of posthole ***904***
Tr 9	***904***	Cut	Cut of posthole
Tr 9	***905***	Deposit	Fill of putative pit ***905***, secondary silting

Tr 9	***906***	Cut	Cut of putative pit
Tr 9	***907***	Deposit	Fill of putative pit ***908***, secondary silting
Tr 9	***908***	Cut	Cut of putative pit
Tr 9	***909***	Deposit	Fill of putative pit ***910***, secondary silting
Tr 9	***910***	Cut	Cut of putative pit
	911-99		Not used
Tr 10	***1000***	Deposit	Topsoil; light brown, firm silty-clay, 0.1m thick
Tr 10	***1001***	Deposit	Subsoil; light brown, firm silty-clay, 0.2m thick
Tr 10	***1002***	Deposit	Natural geology; mid-yellowish-brown, firm clay
Tr 10	***1003***	Deposit	Fill of gully ***1004***, secondary silting
Tr 10	***1004***	Cut	Cut of gully
Tr 10	***1005***	Deposit	Final fill of ditch ***1007***, charcoal-rich dumped deposit
Tr 10	***1006***	Deposit	Secondary silting of ditch ***1007***
Tr 10	***1007***	Cut	Cut of ditch, probably a boundary
	1008-99		Not used
Tr 11	***1100***	Deposit	Topsoil; light brown, firm silty-sand, 0.15m thick
Tr 11	***1101***	Deposit	Subsoil; light brown, firm silty-sand, 0.1m thick
Tr 11	***1102***	Deposit	Natural geology; light brownish-yellow, firm clay
Tr 11	***1103***	Deposit	Fill of pit ***1104***, dumped deposit
Tr 11	***1104***	Cut	Cut of pit
Tr 11	***1105***	Deposit	Dumped deposit in pit ***1106***
Tr 11	***1106***	Cut	Cut of pit
Tr 11	***1107***	Deposit	Fill of possible gully ***1108***
Tr 11	***1108***	Cut	Cut of possible gully
	1109-99		Not used
Tr 12	***1200***	Deposit	Topsoil; dark brown, firm silt loam, 0.3m thick
Tr 12	***1201***	Deposit	Subsoil; brownish-orange, firm silty-clay, 0.15m thick
Tr 12	***1202***	Deposit	Natural geology; orange brown, firm silty-clay
	1203-99		Not used
Tr 13	***1300***	Deposit	Topsoil; dark brown, friable silty-clay, 0.30m thick
Tr 13	***1301***	Deposit	Subsoil; mid-yellowish-brown, firm silty-clay, 0.15m thick
Tr 13	***1302***	Deposit	Natural geology; reddish-brown, firm clay
Tr 13	***1303***	Deposit	Fill of ditch ***1304***, secondary silting of the ditch after it had gone out of use
Tr 13	***1304***	Cut	Cut of ditch, probably a boundary
	1305-99		Not used
Tr 14	***1400***	Deposit	Topsoil; dark brown, friable silt, 0.3m thick
Tr 14	***1401***	Deposit	Subsoil; mid-yellowish-orange, firm sandy-silt, 0.2m thick
Tr 14	***1402***	Deposit	Natural geology; mid-yellowish-orange, firm silty-sand
Tr 14	***1403***	Deposit	Fill of pit ***1404***, silting from the surrounding soils over a long period of time
Tr 14	***1404***	Cut	Cut of pit
	1405-99		Not used
Tr 15	***1500***	Deposit	Topsoil; mid-brown friable silt loam, 0.3m thick
Tr 15	***1501***	Deposit	Subsoil, mid-brown friable silt, 0.1m thick
Tr 15	***1502***	Cut	Cut of gully, possible drainage function
Tr 15	***1503***	Deposit	Fill of gully ***1502***, secondary silting after the gully went out of use
Tr 15	***1504***	Cut	Cut of gully
Tr 15	***1505***	Deposit	Fill of gully ***1504***, secondary silting from the surrounding soils
Tr 15	***1506***	Cut	Cut of ditch, probably a boundary
Tr 15	***1507***	Deposit	Fill of gully ***1506***, secondary silting from the surrounding soils
Tr 15	***1508***	Cut	Cut of ditch, apparently for drainage

Tr 15	***1509***	Deposit	Secondary silting of ditch ***1508***, after the feature went out of use
Tr 15	***1510***	Cut	Cut of gully, apparently for drainage
Tr 15	***1511***	Deposit	Secondary silting of gully ***1510***, from the southern edge
Tr 15	***1512***	Deposit	Natural geology
Tr 15	***1513***	Deposit	Secondary silting of gully ***1510***, from the southern edge
Tr 15	***1514***	Deposit	Uppermost secondary silting of gully ***1510***, from the southern edge
	1515-99		Not used
Tr 16	***1600***	Deposit	Topsoil; dark to mid-brown, friable silty-sand, 0.2m thick
Tr 16	***1601***	Deposit	Subsoil; mid-brown, compact silty-clay, 0.2m thick
Tr 16	***1602***	Deposit	Secondary silting of ditch ***1603***
Tr 16	***1603***	Cut	Cut of ditch, probably a boundary
Tr 16	***1604***	Deposit	Natural geology; mid-brown, firm clay
	1605-99		Not used
Tr 17	***1700***	Deposit	Topsoil; mid-brown, friable silt loam, 0.15m thick
Tr 17	***1701***	Deposit	Subsoil; mid-brown, firm silty-sand, 0.25m thick
Tr 17	***1702***	Deposit	Natural geology; yellowish-brown, firm clay with patches of gravel
	1703-99		Not used
Tr 18	***1800***	Deposit	Topsoil; dark to mid-brown, friable silty-sand, 0.2m thick
Tr 18	***1801***	Deposit	Subsoil; mid-brown, compact silty-clay, 0.2m thick
Tr 18	***1802***	Deposit	Secondary silting of ditch ***1803***, in wet conditions
Tr 18	***1803***	Cut	Cut of ditch, probably a boundary
Tr 18	***1804***	Deposit	Natural geology; mid-brownish-orange, firm clay
Tr 18	***1805***	Cut	Cut of possible natural geological feature
Tr 18	***1806***	Deposit	Clay fill of feature ***1805***
Tr 18	***1807***	Cut	Cut of possible pit or geological feature
Tr 18	***1808***	Deposit	Clay fill of feature ***1807***
Tr 18	***1809***	Cut	Cut of possible pit or geological feature
Tr 18	***1810***	Deposit	Clay fill of feature ***1809***
Tr 18	***1811***	Deposit	Fill of feature ***1812***, gradually accumulated silt
Tr 18	***1812***	Cut	Cut of feature, possibly a ditch
	1813-99		Not used
Tr 19	***1900***	Deposit	Topsoil; dark brown, loose silty plough soil, 0.25m thick
Tr 19	***1901***	Deposit	Natural geology; orange-brown sand and gravel, with patches of light grey, fine gravel
	1902-99		Not used
Tr 20	***2000***	Deposit	Topsoil; mid-greyish-brown, friable silty-sand, 0.3m thick
Tr 20	***2001***	Deposit	Subsoil; mid-brown, friable silty-sand, 0.25m thick
Tr 20	***2002***	Deposit	Natural geology; brownish-orange, loose sandy-silty-gravel, with bands of reddish-brown clay
	2003-99		Not used
Tr 21	***2100***	Deposit	Topsoil; dark greyish-brown, friable silty-sand, 0.25m thick
Tr 21	***2101***	Deposit	Subsoil; mid-brown, friable silty-sand, 0.15m thick
Tr 21	***2102***	Deposit	Subsoil; reddish-brown, soft sandy-silt, 0.3m thick
Tr 21	***2103***	Deposit	Subsoil; dark grey, soft silty-clay, 0.45m thick
Tr 21	***2104***	Deposit	Peat layer, very dark brown, soft, >0.1m thick
	2105-99		Not used
Tr 22	***2200***	Deposit	Topsoil; dark brown, friable silty-sand, 0.25m thick
Tr 22	***2201***	Deposit	Subsoil; mid-brown, firm silty-sand, 0.2m thick
Tr 22	***2202***	Deposit	Natural geology; brownish-orange, friable sandy-silty-gravel
	2203-99		Not used
Tr 23	***2300***	Deposit	Topsoil; greyish-brown, friable silty-sand, 0.2m thick
Tr 23	***2301***	Deposit	Subsoil; mid-brown, firm silty-sand, 0.25m thick

Tr 23	***2302***	Deposit	Natural geology; mid-orange brown, firm clay silt
	2303-99		Not used
Tr 24	***2400***	Deposit	Topsoil; mid-greyish-brown, friable silty-sand, 0.2m thick
Tr 24	***2401***	Deposit	Subsoil; mid-brown, firm silty-clay, 0.15m thick
Tr 24	***2402***	Deposit	Natural geology; reddish-brown, firm clay silt
	2403-699		Not used
Tr 27	***2700***	Deposit	Topsoil; mid-greyish-brown, friable sandy-silt, 0.2m thick
Tr 27	***2701***	Deposit	Subsoil; mid-brown, firm silty-clay, 0.15m thick
Tr 27	***2702***	Deposit	Natural geology; reddish-brown, firm clay
Tr 27	***2703***	Deposit	Fill of ditch ***2704***, gradual secondary silting
Tr 27	***2704***	Cut	Cut of ditch, probably a boundary
Tr 27	***2705***	Deposit	Modern dumped deposit
	2706-99		Not used
Tr 28	***2800***	Deposit	Topsoil; mid-brown, friable sandy-silt, 0.2m thick
Tr 28	***2801***	Deposit	Subsoil; mid-brown, friable sandy-silt, 0.1m thick
Tr 28	***2802***	Deposit	Natural geology; light grey with reddish-brown mottling, friable sand, with patches of dark blackish-brown friable sand
	2803-99		Not used
Tr 29	***2900***	Deposit	Topsoil, grey-brown, silty-sand
Tr 29	***2901***	Deposit	Subsoil, orange-brown silty-sand, 0.2m thick
Tr 29	***2902***	Deposit	Natural geology; light grey friable sand
	2903-99		Not used
Tr 30	***3000***	Deposit	Topsoil; mid-greyish-brown, friable silty-sand, 0.2m thick
Tr 30	***3001***	Deposit	Subsoil; mid-brown with orange brown mottling, friable silty-sand, 0.4m thick
Tr 30	***3002***	Deposit	Natural geology; orange brown, with patches of mid-grey, friable sandy-silty-clay
	3003-99		Not used
Tr 31	***3100***	Deposit	Topsoil; mid-brown, soft sandy-silt, 0.25m thick
Tr 31	***3101***	Deposit	Subsoil; brownish-orange, firm sandy-clay, 0.25m thick
Tr 31	***3102***	Deposit	Natural geology; pinkish-brown, firm clay
Tr 31	***3103***	Deposit	Secondary silting of ditch ***3104***
Tr 31	***3104***	Cut	Cut of ditch, probably for drainage
	3105-99		Not used
Tr 32	***3200***	Deposit	Topsoil; mid greyish-brown, friable silty-sand, 0.2m thick
Tr 32	***3201***	Deposit	Subsoil; mid-brown, friable silty-sand, 0.1m thick
Tr 32	***3202***	Deposit	Natural geology; reddish-brown, firm clay silt
	3203-99		Not used
Tr 33	***3300***	Deposit	Topsoil; greyish-brown, friable silty-sand, 0.2m thick
Tr 33	***3301***	Deposit	Subsoil; mid-brown, friable silty-sand, 0.1m thick
Tr 33	***3302***	Deposit	Natural geology, mid-reddish-brown, firm clay silt
	3303-99		Not used
Tr 34	***3400***	Deposit	Topsoil; mid-greyish-brown, friable silty-sand, 0.25m thick
Tr 34	***3401***	Deposit	Subsoil; light reddish-brown, friable silty-sand, 0.2m thick
Tr 34	***3402***	Deposit	Natural geology; brownish-orange with light grey patches, firm clay silty-sand
	3403-99		Not used
Tr 35	***3500***	Deposit	Topsoil, mid-brown, friable silt loam, 0.1m thick
Tr 35	***3501***	Deposit	Alluvium; mid-brown, firm clay silt, 1m thick
Tr 35	***3502***	Deposit	Alluvial clay; light bluish-grey, soft clay, >0.3m thick
	3503-99		Not used
Tr 36	***3600***	Deposit	Topsoil; mid-greyish-brown, loose silty-clay, 0.2m thick
Tr 36	***3601***	Deposit	Made ground; light grey, firm grey, average thickness of 0.5m
Tr 36	***3602***	Deposit	Made ground; dark brown, soft silty-clay, 0.2m thick

Tr 36	***3603***	Deposit	Natural geology; mid-grey with orange mottling, firm clay silt
Tr 36	***3604***	Deposit	Dump of material, comprising reddish-brown, firm clay silt, with frequent brick, glass and metal fragments, 0.5m thick
	3605-99		Not used
Tr 37	***3700***	Deposit	Topsoil; mid-greyish-brown, friable silty-clay, 0.2m thick
Tr 37	***3701***	Deposit	Natural geology; mid-yellowish-grey, firm clay
	3702-99		Not used
Tr 38	***3800***	Deposit	Topsoil; mid-greyish-brown, friable silty-clay, 0.2m thick
Tr 38	***3801***	Deposit	Subsoil; mid-brown, friable silty-clay, 0.1m thick
Tr 38	***3802***	Deposit	Natural geology; light yellowish-grey, firm clay
	3803-99		Not used
Tr 39	***3900***	Deposit	Topsoil; mid greyish-brown, friable silty-clay, 0.25m thick
Tr 39	***3901***	Deposit	Subsoil; mid-greyish-brown, firm silty-clay, 0.15m thick
Tr 39	***3902***	Deposit	Natural geology; light orange grey, firm clay
Tr 39	***3903***	Deposit	Fill of ditch ***3905***, secondary silting
Tr 39	***3904***	Deposit	Secondary silting of ditch ***3905***, in very wet conditions
Tr 39	***3905***	Cut	Cut of possible enclosure ditch
Tr 39	***3906***	Deposit	Waterlogged secondary silting in ditch ***3907***
Tr 39	***3907***	Cut	Cut of ditch, probably a boundary
Tr 39	***3908***	Deposit	Secondary silting from surrounding soils in ditch ***3909***
Tr 39	***3909***	Cut	Recut of ditch ***3907***
	3910-99		Not used
Tr 40	***4000***	Deposit	Topsoil; mid-greyish-brown, loose clay silt, 0.3m thick
Tr 40	***4001***	Deposit	Natural geology; light grey with orange brown mottling, firm clay
	4002-99		Not used
Tr 41	***4100***	Deposit	Topsoil; mid-greyish-brown, loose silty-clay, 0.3m thick
Tr 41	***4101***	Deposit	Fill of ditch ***4107***, secondary silting in wet conditions
Tr 41	***4102***	Deposit	Natural geology; light grey with orange mottling, firm clay
Tr 41	***4103***	Deposit	Fill of ditch ***4104***, secondary silting in wet conditions
Tr 41	***4104***	Cut	Cut of ditch, probably a boundary
Tr 41	***4105***	Deposit	Fill of ditch ***4106***, secondary silting in wet conditions
Tr 41	***4106***	Cut	Cut of ditch, probably a boundary
Tr 41	***4107***	Cut	Cut of ditch, probably a boundary
	4108-99		Not used
Tr 42	***4200***	Deposit	Topsoil; mid-greyish-brown, firm silt, 0.3m thick
Tr 42	***4201***	Deposit	Natural geology; mid-whitish-brown, firm silt
	4202-99		Not used
Tr 43	***4300***	Deposit	Topsoil; mid-brownish-grey, firm silt, 0.3m thick
Tr 43	***4301***	Deposit	Natural geology; light greyish-brown firm silt
	4302-99		Not used
Tr 44	***4400***	Deposit	Topsoil; mid-greyish-brown, loose silty-clay, 0.3m thick
Tr 44	***4401***	Deposit	Subsoil; mid-brown, friable silty-clay, 0.15m thick
Tr 44	***4402***	Deposit	Natural geology; light grey with orange brown mottling, firm clay silt
	4403-99		Not used
Tr 45	***4500***	Deposit	Topsoil; mid-greyish-brown, loose silty-clay, 0.3m thick
Tr 45	***4501***	Deposit	Subsoil; mid-brown, friable silty-clay, 0.15m thick
Tr 45	***4502***	Deposit	Natural geology; light grey with orange brown mottling, friable silty-clay
	4503-99		Not used
Tr 46	***4600***	Deposit	Topsoil; dark greyish-brown, loose silty-clay, 0.25m thick
Tr 46	***4601***	Deposit	Subsoil; reddish-brown, firm silty-clay, 0.45m thick

Tr 46	***4602***	Deposit	Natural geology; light grey with orange mottling, firm clay silt
	4603-99		Not used
Tr 47	***4700***	Deposit	Topsoil; mid-greyish brown, friable silty-clay, 0.3m thick
Tr 47	***4701***	Deposit	Natural geology; reddish-brown, firm clay
	4702-99		Not used
Tr 48	***4800***	Deposit	Topsoil; greyish-brown, friable silty-sand, 0.3m thick
Tr 48	***4801***	Deposit	Natural geology; reddish brown, firm clay
	4802-99		Not used
Tr 49	***4900***	Deposit	Topsoil; mid-greyish-brown, loose silty-sand, 0.1m thick
Tr 49	***4901***	Deposit	Subsoil; mid-greyish-brown, loose silty-sand, 0.2m thick
Tr 49	***4902***	Deposit	Natural geology; yellowish-brown, firm clay
	4903-99		Not used
Tr 50	***5000***	Deposit	Topsoil; mid-brown, friable silty-sand, 0.25m thick
Tr 50	***5001***	Deposit	Subsoil; light brown, friable silty clay, 0.15m thick
Tr 50	***5002***	Deposit	Natural geology; orange brown, firm clay silt
	5003-99		Not used
Tr 51	***5100***	Deposit	Topsoil; light greyish-brown silty-clay, 0.05m thick
Tr 51	***5101***	Deposit	Subsoil; light greyish-brown silty-clay, 0.2m thick
Tr 51	***5102***	Deposit	Natural geology; brownish-yellow firm clay
Tr 51	***5103***	Deposit	Dumped material in ditch ***5104***
Tr 51	***5104***	Cut	Cut of ditch, probably for drainage
	5105-99		Not used
Tr 52	***5200***	Deposit	Topsoil; mid-greyish-brown, loose silty-sand, 0.1m thick
Tr 52	***5201***	Deposit	Topsoil; mid-greyish-brown, loose silty-sand, 0.15m thick
Tr 52	***5202***	Deposit	Natural geology; yellowish-brown, firm clay
Tr 52	***5203***	Deposit	Natural geology; mid-brown firm clay
	5203-399		Not used
Tr 54	***5400***	Deposit	Topsoil; mid-greyish-brown, friable silty-clay, 0.2m thick
Tr 54	***5401***	Deposit	Subsoil; mid-brown, friable silty-clay, 0.1m thick
Tr 54	***5402***	Deposit	Natural geology; reddish-brown, firm clay
	5403-99		Not used
Tr 55	***5500***	Deposit	Topsoil; mid-brown, friable silty-sand, 0.2m thick
Tr 55	***5501***	Deposit	Subsoil; mid-orange brown, soft clay silt, 0.1m thick
Tr 55	***5502***	Deposit	Natural geology; light orange brown with light grey patches, firm clay silt
	5503-99		Not used
Tr 56	***5600***	Deposit	Topsoil; mid- to dark brown, loose silty-loam, 0.2m thick
Tr 56	***5601***	Deposit	Subsoil; yellowish-brown firm clay, 0.1m thick
Tr 56	***5602***	Deposit	Natural geology; mid-brown, firm clay
	5603-99		Not used
Tr 57	***5700***	Deposit	Topsoil; mid-brown, friable silty-sand, 0.2m thick
Tr 57	***5701***	Deposit	Subsoil; greyish-brown, friable silty-clay, 0.2m thick
Tr 57	***5702***	Deposit	Natural geology; orange brown, firm silt clay
	5703-99		Not used
Tr 58	***5800***	Deposit	Topsoil; mid-brown, friable silt, 0.1m thick
Tr 58	***5801***	Deposit	Subsoil; light brownish-grey, firm silty-clay, 0.2m thick
Tr 58	***5802***	Deposit	Subsoil; light grey, firm clay, 0.1m thick
Tr 58	***5803***	Deposit	Subsoil; yellowish-brown, firm clay, 0.1m thick
Tr 58	***5804***	Deposit	Natural geology; mid-reddish-brown, firm clay
	5805-99		Not used
Tr 59	***5900***	Deposit	Topsoil; mid-brown, friable clay silt, 0.3m thick
Tr 59	***5901***	Deposit	Natural geology; mid-pinkish-brown and yellowish brown, firm silty-clay
	5902-99		Not used
Tr 60	***6000***	Deposit	Topsoil; mid-brown, loose to friable silt, 0.3m thick
Tr 60	***6001***	Deposit	Natural geology; mid-pinkish-brown, firm silty-clay
	6002-99		Not used

Tr 61	***6100***	Deposit	Topsoil; mid-brown, loose silt, 0.3m thick
Tr 61	***6101***	Deposit	Natural geology; mid-yellow gravel and mid-pinkish-brown silt clay
	6102-6399		Not used
Tr 64	***6400***	Deposit	Topsoil; mid-brown, friable silt, 0.2m thick
Tr 64	***6401***	Deposit	Subsoil; mid-brown, friable silty-clay, 0.2m thick
Tr 64	***6402***	Deposit	Natural geology; mid-yellow gravel and brown silt clay
Tr 64	***6403***	Cut	Cut of ditch
Tr 64	***6404***	Deposit	Secondary silting of ditch ***6403***
Tr 64	***6405***	Cut	Cut of posthole
Tr 64	***6406***	Deposit	Fill of posthole ***6405***
Tr 64	***6407***	Cut	Tree throw/rooting
Tr 64	***6408***	Deposit	Fill of tree throw/rooting ***6407***
	6409-99		Not used
Tr 65	***6500***	Deposit	Topsoil; mid-brown, loose silty-loam, 0.2m thick
Tr 65	***6501***	Deposit	Subsoil; yellowish-brown, friable silty-clay, 0.2m thick
Tr 65	***6502***	Deposit	Natural geology; mid-yellow gravel and pinkish-brown silt clay
Tr 65	***6503***	Cut	Cut of ditch
Tr 65	***6504***	Deposit	Fill of ditch ***6503***, secondary silting
Tr 65	***6505***	Deposit	Fill of ditch ***6503***, secondary silting
Tr 65	***6506***	Deposit	Fill of ditch ***6503***, secondary silting

APPENDIX 4: MITIGATION TRENCHING CONTEXT LIST

Context	Trench	Group	Type	Description
7000	Tr 2		Deposit	Topsoil; dark greyish-brown, friable silty-clay, 0.3m thick
7001	Tr 2		Deposit	Natural geology; light yellowish-brown friable silty-sand gravel
7002	Tr 2		Deposit	Fill of natural feature ***7003***
7003	Tr 2		Cut	Cut of natural feature
7004	Tr 2		Cut	Cut of pit
7005	Tr 2		Deposit	Single backfill deposit in pit ***7004***, contained a high proportion of animal bone
7006	Tr 2		Deposit	Fill of natural feature ***7007***
7007	Tr 2		Cut	Cut of natural feature
7008	Tr 2		Deposit	Fill of ditch ***7009***, primary stabilisation of the feature
7009	Tr 2		Cut	Cut of ditch, probably a boundary
7010	Tr 2			Not used
7011	Tr 2		Deposit	Uppermost fill of ditch ***7009***, secondary silting
7012	Tr 2		Deposit	Fill of ditch ***7009***, secondary silting
7013-99				Not used
7100	Tr 8		Cut	Cut of pit
7101	Tr 8		Deposit	Fill of pit ***7100***, material burnt *in situ*
7102	Tr 8		Deposit	Natural geology
7103	Tr 8		Cut	Cut of linear feature, probably natural in origin
7104	Tr 8		Deposit	Fill of feature ***7103***
7105	Tr 8		Cut	Cut of gully
7106	Tr 8		Deposit	Fill of gully ***7105***, secondary silting
7107	Tr 8		Cut	Cut of gully
7108	Tr 8		Deposit	Mottled fill of gully ***7107***, secondary silting in wet conditions
7109	Tr 8		Deposit	Fill of pit ***7110***, secondary silting
7110	Tr 8		Cut	Cut of pit
7111	Tr 8		Cut	Cut of gully
7112	Tr 8		Deposit	Fill of gully ***7111***, secondary silting
7113	Tr 8		Deposit	Topsoil; mid-greyish-brown, friable silty-sand, 0.2m thick
7114	Tr 8		Deposit	Subsoil; mid-brown, friable silty-sand, 0.3m thick
7115-99				Not used
7200	Tr 9		Deposit	Topsoil; mid-brownish-grey, friable silty-sand, 0.2m thick
7201	Tr 9		Deposit	Subsoil; mid-brown, friable silty-sand, 0.3m thick
7202	Tr 9		Deposit	Natural geology; mid-brownish-orange, firm silty-clay
7203	Tr 9	***7205***	Deposit	Fill of curvilinear ditch ***7204***, secondary silting from the surrounding area
7204	Tr 9	***7205***	Cut	Cut of curvilinear ditch
7205	Tr 9	***7205***	Group	Curvilinear ditch group
7206	Tr 9	***7214***	Deposit	Secondary silting of curvilinear gully ***7207***
7207	Tr 9	***7214***	Cut	Cut of curvilinear gully
7208	Tr 9	***7214***	Cut	Cut of gully
7209	Tr 9	***7214***	Deposit	Remains of a putative post in gully ***7208***
7210	Tr 9	***7214***	Deposit	Possible backfill around post ***7209*** in gully ***7208***
7211	Tr 9	***7214***	Deposit	Possible backfill around post ***7209*** in gully ***7208***
7212	Tr 9	***7205***	Deposit	Fill of curvilinear ditch ***7213***, secondary silting from the surrounding soils
7213	Tr 9	***7205***	Cut	Cut of curvilinear ditch

7214	Tr 9	***7214***	Group	Gully group
7215	Tr 9		Deposit	Fill of natural feature ***7216***, secondary silting from surrounding soils
7216	Tr 9		Cut	Cut of natural feature
7217	Tr 9	***7284***	Cut	Cut of gully
7218	Tr 9	***7284***	Deposit	Possible backfill around post ***7220*** in gully ***7217***
7219	Tr 9	***7284***	Deposit	Possible backfill around post ***7220*** in gully ***7217***
7220	Tr 9	***7284***	Deposit	Putative post in gully ***7217***
7221	Tr 9		Cut	Cut of pit
7222	Tr 9		Deposit	Secondary silting in pit ***7221***
7223	Tr 9		Deposit	Fill of putative gully ***7224***, secondary silting
7224	Tr 9		Cut	Cut of putative gully
7225	Tr 9	***7214***	Cut	Cut of gully
7226	Tr 9	***7214***	Deposit	Fill of gully ***7225***, secondary silting
7227	Tr 9	***7214***	Deposit	Fill of gully ***7225***, secondary silting
7228	Tr 9	***7284***	Deposit	Fill of gully ***7229***, secondary silting from surrounding soils
7229	Tr 9	***7284***	Cut	Cut of gully
7230	Tr 9		Deposit	Fill of pit ***7221***, silting in wet conditions
7231	Tr 9		Cut	Cut of gully
7232	Tr 9		Deposit	Secondary silting in gully ***7231***
7233	Tr 9		Cut	Cut of gully
7234	Tr 9		Deposit	Secondary silting of gully ***7233***
7235	Tr 9	***7284***	Deposit	Fill of gully ***7236***, secondary silting from surrounding soils
7236	Tr 9	***7284***	Cut	Cut of gully
7237	Tr 9		Cut	Cut of curvilinear gully
7238	Tr 9		Deposit	Fill of curvilinear gully ***7237***, secondary silting from the surrounding soils
7239	Tr 9		Deposit	Fill of curvilinear gully ***7237***, secondary silting from the surrounding soils
7240	Tr 9		Cut	Cut of pit
7241	Tr 9		Deposit	Deliberate backfill in pit ***7240***
7242	Tr 9		Cut	Cut of pit
7243	Tr 9		Deposit	Fill of pit ***7242***, origins unknown
7244	Tr 9		Deposit	Fill of pit ***7245***, secondary silting from the surrounding area
7245	Tr 9		Cut	Cut of pit
7246	Tr 9		Deposit	Fill of gully terminus ***7247***, secondary silting from the surrounding area
7247	Tr 9		Cut	Cut of gully terminus
7248	Tr 9		Cut	Cut of posthole/natural feature
7249	Tr 9		Deposit	Homogeneous fill of posthole/natural feature ***7248***
7250	Tr 9		Cut	Cut of curvilinear gully
7251	Tr 9		Deposit	Mottled fill of gully ***7250***, possible backfill
7252	Tr 9		Cut	Cut of pit
7253	Tr 9		Deposit	Fill of pit ***7252***
7254	Tr 9			Not used
7255	Tr 9			Not used
7256	Tr 9		Deposit	Fill of pit ***7257***, secondary silting from the surrounding soils
7257	Tr 9		Cut	Cut of pit
7258	Tr 9		Deposit	Gravel fill of pit ***7259***
7259	Tr 9		Cut	Cut of pit
7260	Tr 9		Deposit	Fill of pit ***7261***, secondary silting from the surrounding soils
7261	Tr 9		Cut	Cut of pit

7262	Tr 9		Deposit	Fill of pit ***7263***, secondary silting from the surrounding soils
7263	Tr 9		Cut	Cut of pit
7264	Tr 9		Deposit	Fill of gully ***7265***, secondary silting from the surrounding soils
7265	Tr 9		Cut	Cut of gully
7266	Tr 9		Cut	Cut of pit/posthole
7267	Tr 9		Deposit	Gravel fill of pit/posthole ***7267***
7268	Tr 9		Deposit	Fill of natural feature ***7269***
7269	Tr 9		Cut	Cut of natural feature
7270	Tr 9		Deposit	Fill of natural feature ***7271***
7271	Tr 9		Cut	Cut of natural feature
7272	Tr 9		Deposit	Fill of natural feature ***7273***
7273	Tr 9		Cut	Cut of natural feature
7274	Tr 9		Deposit	Fill of posthole ***7275***, secondary silting after the post had been removed
7275	Tr 9		Cut	Cut of posthole
7276	Tr 9		Deposit	Fill of posthole ***7277***, secondary silting after the post had been removed
7277	Tr 9		Cut	Cut of posthole
7278	Tr 9		Cut	Cut of pit
7279	Tr 9		Deposit	Fill of pit ***7278***, secondary silting from surrounding soils
7280	Tr 9		Deposit	Fill of pit ***7281***
7281	Tr 9		Cut	Cut of pit
7282	Tr 9		Deposit	Fill of pit ***7283***, secondary silting from the surrounding soils
7283	Tr 9		Cut	Cut of pit
7284	Tr 9	***7284***	Group	Gully group
7285-99				Not used
7300	Tr 10		Cut	Cut of pit
7301	Tr 10		Deposit	Burnt fill of pit ***7300***
7302	Tr 10	***7305***	Cut	Cut of ditch, probably a boundary
7303	Tr 10	***7305***	Deposit	Uppermost tertiary silting of ditch ***7302***
7304	Tr 10	***7305***	Deposit	Fill of ditch ***7302***, silting from the surrounding soils
7305	Tr 10	***7305***	Group	Ditch group
7306	Tr 10		Cut	Cut of pit
7307	Tr 10		Deposit	Fill of pit ***7306***, stony backfill
7308	Tr 10	***7318***	Cut	Cut of ditch, probably a boundary
7309	Tr 10	***7318***	Deposit	Fill of ditch ***7308***, silting from the surrounding soils
7310	Tr 10	***7318***	Cut	Cut of ditch, probably a boundary
7311	Tr 10	***7318***	Deposit	Fill of ditch ***7310***, silting from the surrounding area, in wet conditions
7312	Tr 10		Cut	Cut of ditch, probably a boundary
7313	Tr 10		Deposit	Fill of ditch ***7312***, silting from the surrounding area
7314	Tr 10		Cut	Cut of pit
7315	Tr 10		Deposit	Fill of pit ***7314***, silting from the surrounding area
7316	Tr 10		Cut	Cut of ditch, probably a boundary
7317	Tr 10		Deposit	Fill of ditch ***7316***, silting from the surrounding soils
7318	Tr 10	***7318***	Group	Ditch group
7319	Tr 10		Deposit	Topsoil; light brown, firm silty-clay, 0.1m thick
7320	Tr 10		Deposit	Subsoil; light brown, firm silty-clay, 0.2m thick
7321	Tr 10		Deposit	Natural geology; mid-yellowish-brown, firm clay
7322-99				Not used
7400	Tr 11		Deposit	Topsoil; light brown, firm silty-sand, 0.15m thick
7401	Tr 11		Deposit	Subsoil; light brown, firm silty-sand, 0.1m thick
7402	Tr 11		Deposit	Natural geology; light brownish-yellow, firm clay

7403	Tr 11		Cut	Cut of pit
7404	Tr 11		Deposit	Fill of pit ***7403***, silting from the surrounding area in wet conditions
7405	Tr 11		Deposit	Fill of pit ***7403***, silting from the surrounding soils
7406	Tr 11		Deposit	Fill of gully ***7407***, silting from the surrounding area
7407	Tr 11		Cut	Cut of gully
7408	Tr 11		Cut	Cut of pit
7409	Tr 11		Deposit	Backfill of burnt material within pit ***7408***
7410	Tr 11		Deposit	Fill of pit ***7408***, silting of the pit from surrounding soils
7411	Tr 11		Cut	Cut of pit
7412	Tr 11	***7423***	Cut	Cut of gully
7413	Tr 11	***7423***	Deposit	Fill of gully ***7412***, possible backfill or dumped deposit
7414	Tr 11		Deposit	Fill of pit ***7411***, possible dumped deposit
7415	Tr 11		Deposit	Fill of pit ***7411***, secondary silting in wet conditions
7416	Tr 11	***7423***	Cut	Cut of gully
7417	Tr 11	***7423***	Deposit	Fill of gully ***7416***, secondary silting from the surrounding soils
7418	Tr 11		Deposit	Fill of gully ***7420***, secondary silting from the surrounding soils
7419	Tr 11		Deposit	Fill of gully ***7420***, primary silting/stabilisation of the north-eastern edge of the feature
7420	Tr 11		Cut	Cut of gully
7421	Tr 11		Cut	Cut of gully
7422	Tr 11		Deposit	Fill of gully ***7421***, secondary silting from the surrounding area
7423	Tr 11	***7423***	Group	Gully group
7424	Tr 11			Not used
7425	Tr 11		Cut	Cut of pit
7426	Tr 11		Deposit	Fill of pit ***7425***, secondary silting from the surrounding area
7427-99				Not used
7500	Tr 15		Deposit	Topsoil; mid-brown friable silt loam, 0.3m thick
7501	Tr 15		Deposit	Subsoil, mid-brown friable silt, 0.1m thick
7502	Tr 15		Deposit	Natural geology; mid-brown, firm clay
7503	Tr 15		Cut	Cut of field drain
7504	Tr 15		Deposit	Fill of ditch ***7507***, backfill/dumped deposit
7505	Tr 15		Cut	Cut of field drain
7506	Tr 15		Deposit	Lower fill of ditch ***7507***, waterborne deposit
7507	Tr 15		Cut	Cut of ditch
7508	Tr 15		Cut	Cut of pit
7509	Tr 15		Deposit	Fill of pit ***7508***, primary silting in wet conditions
7510	Tr 15		Deposit	Dump of burnt clay in pit ***7508***
7511	Tr 15		Cut	Cut of field drain
7512	Tr 15		Deposit	Backfill of field drain ***7511***
7513	Tr 15		Deposit	Fill of curvilinear ditch ***7514***, secondary silting
7514	Tr 15		Cut	Cut of curvilinear ditch
7515	Tr 15		Deposit	Fill of ditch ***7516***, secondary silting from surrounding soils
7516	Tr 15		Cut	Cut of ditch terminus
7517	Tr 15		Cut	Cut of pit
7518	Tr 15		Deposit	Lower fill of pit ***7517***, natural silting
7519	Tr 15		Deposit	Upper fill of pit ***7517***, natural silting
7520	Tr 15	***7528***	Deposit	Fill of gully ***7521***, secondary silting from surrounding soils
7521	Tr 15	***7528***	Cut	Cut of gully

7522	Tr 15	***7529***	Deposit	Fill of gully ***7523***, secondary silting from surrounding soils
7523	Tr 15	***7529***	Cut	Cut of gully
7524	Tr 15	***7529***	Cut	Cut of gully
7525	Tr 15	***7529***	Deposit	Fill of gully ***7524***, secondary silting from surrounding soils
7526	Tr 15	***7528***	Cut	Cut of gully
7527	Tr 15	***7528***	Deposit	Fill of gully ***7526***, secondary silting from surrounding soils
7528	Tr 15	***7528***	Group	Gully ***7526*** group
7529	Tr 15	***7529***	Group	Gully ***7531*** group
7530	Tr 15	***7529***	Deposit	Fill of gully ***7531***, secondary silting from surrounding soils
7531	Tr 15	***7529***	Cut	Cut of gully
7532	Tr 15	***7528***	Deposit	Fill of gully ***7533***, secondary silting from surrounding soils
7533	Tr 15	***7528***	Cut	Cut of gully
7534	Tr 15		Deposit	Fill of pit/posthole ***7535***, secondary silting from surrounding soils?
7535	Tr 15		Cut	Cut of pit/posthole
7536	Tr 15		Cut	Cut of pit
7537	Tr 15		Deposit	Fill of pit ***7536***, secondary silting from surrounding soils?
7538	Tr 15	***7529***	Deposit	Fill of gully ***7539***, secondary silting from surrounding soils
7539	Tr 15	***7529***	Cut	Cut of gully
7540	Tr 15		Deposit	Fill of pit ***7541***, secondary silting from surrounding soils
7541	Tr 15		Cut	Cut of pit?
7542-99				Not used
7600	Tr 16		Deposit	Topsoil; dark to mid-brown, friable silty-sand, 0.2m thick
7601	Tr 16		Deposit	Subsoil; mid-brown, compact silty-clay, 0.2m thick
7602	Tr 16		Deposit	Natural geology; mid-brown, firm clay
7603	Tr 16		Deposit	Fill of gully ***7605***, tertiary silting
7604	Tr 16		Deposit	Fill of gully ***7605***, secondary silting from surrounding soils
7605	Tr 16		Cut	Cut of gully
7606	Tr 16		Deposit	Fill of ditch ***7610***, tertiary silting
7607	Tr 16		Deposit	Fill of ditch ***7610***, secondary silting in wet conditions
7608	Tr 16		Deposit	Fill of ditch ***7610***, secondary silting from surrounding soils
7609	Tr 16		Deposit	Primary stabilisation of the northern edge of ditch ***7610***
7610	Tr 16		Cut	Cut of ditch, probably a boundary
7611-99				Not used
7700	Tr 18		Deposit	Topsoil; dark to mid-brown, friable silty-sand, 0.2m thick
7701	Tr 18		Deposit	Subsoil; mid-brown, compact silty-clay, 0.2m thick
7702	Tr 18		Deposit	Make-up layer
7703	Tr 18		Deposit	Natural geology; mid-brownish-orange, firm clay
7704-99				Not used
7800	Tr 39		Deposit	Topsoil; mid greyish-brown, friable silty-clay, 0.25m thick
7801	Tr 39		Deposit	Subsoil; mid-greyish-brown, firm silty-clay, 0.15m thick
7802	Tr 39		Deposit	Natural geology; light orange grey, firm clay

7803	Tr 39		Deposit	Fill of ditch ***7804***, secondary silting from the surrounding subsoils
7804	Tr 39		Cut	Cut of ditch, probably for drainage
7805	Tr 39		Deposit	Upper fill of ditch ***7807***, secondary silting from the surrounding area
7806	Tr 39		Deposit	Primary slumping within ditch ***7807***
7807	Tr 39		Cut	Cut of ditch, probably for drainage
7808	Tr 39		Deposit	Fill of ditch ***7809***, secondary silting from the surrounding subsoils
7809	Tr 39		Cut	Cut of ditch, probably for drainage
7810	Tr 39	***7810***	Deposit	Layer: mid to dark-brown silt
7811	Tr 39	***7810***	Deposit	Layer: blue-grey silty clay
7812	Tr 39	***7810***	Deposit	Layer: blue sticky clay
7813	Tr 39	***7810***	Deposit	Layer: light-grey brown mottled silt
7814	Tr 39		Deposit	Secondary silting of ditch ***7816***, from the surrounding subsoils
7815	Tr 39		Deposit	Fill of ditch ***7816***, secondary silting from surrounding subsoils
7816	Tr 39		Cut	Cut of ditch, probably for drainage
7817	Tr 39	***7810***	Deposit	Layer: mid-grey-brown silt
7818	Tr 39	***7810***	Deposit	Layer: light-grey brown silt
7819-99				Not used
7900	Tr 41		Deposit	Topsoil; mid-greyish-brown, loose silty-clay, 0.3m thick
7901	Tr 41		Deposit	Subsoil; mid-brown, friable silty-clay, 0.15m thick
7902	Tr 41		Deposit	Natural geology; light grey with orange mottling, firm clay
7903	Tr 41	***7909***	Deposit	Secondary silting of ditch ***7905***, from the surrounding subsoils
7904	Tr 41	***7909***	Deposit	Primary silting of ditch ***7905***
7905	Tr 41	***7909***	Cut	Cut of ditch, probably for drainage
7906	Tr 41	***7910***	Deposit	Secondary silting of ditch ***7908***, from the surrounding subsoils
7907	Tr 41			Not used
7908	Tr 41	***7910***	Cut	Cut of ditch, probably for drainage
7909	Tr 41		Cut	Cut of ditch
7910	Tr 41		Cut	Cut of ditch
7911	Tr 41		Deposit	Fill of ditch ***7912***, secondary silting from the surrounding subsoils
7912	Tr 41		Cut	Cut of ditch, probably for drainage

APPENDIX 5: BOREHOLE LITHOLOGIES

BOREHOLE RECORDING SHEET					
SUMMARY DETAILS					
Site code	Burbo Bank Site 6	**Excavated 1m and Gouge Core from 1.00- 1.16m**			
Borehole No.	1				
Easting					
Northing					
GL ELEV (m aOD)		**Logged by**	Mairead Rutherford		
Total depth (m)	1.16 m	**Date**	21/06/2015		

COMPOSITE LITHOLOGICAL LOG				
Depth (m)		**Keyword**	**Upper contact**	**Description**
From	**To**			
0	0.20	Topsoil		
0.20	1.05	Clay	Gradual	Stiff, grey, iron staining
1.05		Wood	Exposed	Large chunks of wood (collected)
1.05	1.12	Peat	Sharp	Dark brown, humified, woody
1.12	1.16	Sand	Sharp	Grey sand
1.16	-			Core refusal

BOREHOLE RECORDING SHEET					
SUMMARY DETAILS					
Site code	Burbo Bank Site 6	**Excavated 1m and Gouge Core from 1.00-1.50m Plate 5**			
Borehole No.	2				
Easting					
Northing					
GL ELEV (m aOD)		**Logged by**	Mairead Rutherford		
Total depth (m)	1.50 m	**Date**	21/06/2015		

COMPOSITE LITHOLOGICAL LOG				
Depth (m)		**Keyword**	**Upper contact**	**Description**
From	**To**			
0	0.20	Topsoil		
0.20	1.05	Clay	Gradual	Stiff, grey, iron staining
1.05	1.27	Clay	Gradual	Stiff, grey
1.27	1.47	Peat	Sharp	Dark brown, humified, woody
1.47	1.50	Sand	Sharp	Grey sand

BOREHOLE RECORDING SHEET				
SUMMARY DETAILS				
Site code	Burbo Bank Site 6	**Excavated 1m and Gouge Core from 1.00-1.50m**		
Borehole No.	3			
Easting				
Northing				
GL ELEV (m aOD)		**Logged by**	Mairead Rutherford	
Total depth (m)	1.50 m	**Date**	21/06/2015	

COMPOSITE LITHOLOGICAL LOG				
Depth (m)		**Keyword**	**Upper contact**	**Description**
From	**To**			
0	0.20	Topsoil		
0.20	1.05	Clay	Gradual	Stiff, grey, iron staining
1.05	1.25	Clay	Gradual	Stiff, grey
1.25	1.43	Peat	Sharp	Dark brown, humified, woody
1.43	1.53	Organic clay	Gradual	Dark brown, organic-rich
1.53	1.55	Sand	Sharp	Grey

BOREHOLE RECORDING SHEET				
SUMMARY DETAILS				
Site code	Burbo Bank Site 6	**Excavated 1m and Russian auger from 1.05-1.55m**		
Borehole No.	Adjacent to borehole 3			
Easting				
Northing				
GL ELEV (m aOD)		**Logged by**	Mairead Rutherford	
Total depth (m)	1.50 m	**Date**	21/06/2015	

COMPOSITE LITHOLOGICAL LOG				
Depth (m)		**Keyword**	**Upper contact**	**Description**
From	**To**			
0	0.20	Topsoil		
0.20	1.05	Clay	Gradual	Stiff, grey, iron staining
1.05	1.27	Clay	Gradual	Stiff, grey
1.27	1.43	Peat	Sharp	Dark brown, humified, woody – dated (*Section 4.5.6*)
1.43	1.50	Organic clay	Gradual	Dark brown, sticky, woody - dated

BOREHOLE RECORDING SHEET				
SUMMARY DETAILS				
Site code	Burbo Bank Site 21	**Excavated 1m and Gouge Core from 1.00-1.50m**		
Borehole No.	1			
Easting				
Northing				
GL ELEV (m aOD)		**Logged by**	Mairead Rutherford	
Total depth (m)	1.50 m	**Date**	25/06/2015	

COMPOSITE LITHOLOGICAL LOG				
Depth (m)		**Keyword**	**Upper contact**	**Description**
From	**To**			
0	0.30	Topsoil		
0.30	1.00	Clay	Gradual	Stiff, grey/light brown
1.00	1.10	Peat	Sharp	Dark brown/black, wet
1.10	1.19	Clay/silt	Sharp	Soft, light brown, organic
1.19	1.25	Peat	Sharp	Dark brown, humified
1.25	1.32	Clay	Sharp	Stiff, light grey/brown, organic
1.32	1.35	Peaty clay	Sharp	Brown
1.35	1.50	Clay	Sharp	Stiff, grey

BOREHOLE RECORDING SHEET				
SUMMARY DETAILS				
Site code	Burbo Bank Site 21	**Excavated 1m and Gouge Core from 1.00-1.50m Plate 6**		
Borehole No.	2			
Easting				
Northing				
GL ELEV (m aOD)		**Logged by**	Mairead Rutherford	
Total depth (m)	1.50 m	**Date**	25/06/2015	

COMPOSITE LITHOLOGICAL LOG				
Depth (m)		**Keyword**	**Upper contact**	**Description**
From	**To**			
0	0.30	Topsoil		
0.30	1.06	Clay	Gradual	Stiff, grey/light brown
1.06	1.10	Peat	Sharp	Dark brown/black, wet
1.10	1.19	Clay/silt	Sharp	Soft, light brown, organic
1.19	1.24	Peat	Sharp	Dark brown, humified
1.24	1.43	Clay	Sharp	Stiff, light grey/brown, organic
1.43	1.46	Peaty clay	Sharp	Brown
1.46	1.50	Clay	Sharp	Stiff, grey

BOREHOLE RECORDING SHEET					
SUMMARY DETAILS					
Site code	Burbo Bank Site 21	**Excavated 1m and Gouge Core from 1.00-1.50m**			
Borehole No.	3				
Easting					
Northing					
GL ELEV (m aOD)		**Logged by**	Mairead Rutherford		
Total depth (m)	1.50 m	**Date**	25/06/2015		

COMPOSITE LITHOLOGICAL LOG				
Depth (m)		**Keyword**	**Upper contact**	**Description**
From	**To**			
0	0.30	Topsoil		
0.30	1.06	Clay	Gradual	Stiff, grey/light brown
1.06	1.10	Peat	Sharp	Dark brown/black, wet
1.10	1.19	Clay/silt	Sharp	Soft, light brown, organic
1.19	1.24	Peat	Sharp	Dark brown, humified
1.24	1.43	Clay	Sharp	Stiff, light grey/brown, organic
1.43	1.46	Peaty clay	Sharp	Brown – fell out of auger
1.43	1.50	Clay	Sharp	Stiff, grey – lost from auger

BOREHOLE RECORDING SHEET					
SUMMARY DETAILS					
Site code	Burbo Bank Site 21	**Excavated 1m and Russian core from 1.00-1.50m**			
Borehole No.	Adjacent to borehole 2				
Easting					
Northing					
GL ELEV (m aOD)		**Logged by**	Mairead Rutherford		
Total depth (m)	1.50 m	**Date**	25/06/2015		

COMPOSITE LITHOLOGICAL LOG				
Depth (m)		**Keyword**	**Upper contact**	**Description**
From	**To**			
0	0.30	Topsoil		
0.30	1.00	Clay	Gradual	Stiff, grey/light brown
1.00	1.09	Clay	Gradual	Soft, light brown herbaceous debris
1.09	1.15	Peat	Sharp	Dark brown/black, wet – dated (*Section 4.5.6*)
1.15	1.24	Clay/silt	Sharp	Soft, light brown, organic

1.24	1.29	Peat	Sharp	Black, woody fragments
1.29	1.43	Clay	Sharp	Grey, stiffer
1.43	1.50	Peaty clay	Sharp	Dark brown, highly humified - dated

BOREHOLE RECORDING SHEET					
SUMMARY DETAILS					
Site code	Burbo Bank Site 25	**Excavated 1m and Gouge Core 0.50m Note: cores 2 and 3 not taken due to stiff nature of clay, digger excavated down to 1.50m at locations 2 and 3, excavation showed stiff clay at all locations to 1.50m.**			
Borehole No.	1				
Easting					
Northing					
GL ELEV (m aOD)		**Logged by**	Mairead Rutherford		
Total depth (m)	1.50 m	**Date**	25/06/2015		

COMPOSITE LITHOLOGICAL LOG				
Depth (m)		**Keyword**	**Upper contact**	**Description**
From	**To**			
0	0.50	Clay		Topsoil and stones
0.50	1.09	Clay	Gradual	Stiff, brown
1.09	1.10	Sand	Sharp	Coarse, light brown
1.10	1.50	Clay	Sharp	Very stiff, brown, stones

BOREHOLE RECORDING SHEET					
SUMMARY DETAILS					
Site code	Burbo Bank Site 41	**Excavated 1m; gouge cores 1-1.50m**			
Borehole No.	1				
Easting					
Northing					
GL ELEV (m aOD)		**Logged by**	Mairead Rutherford		
Total depth (m)	1.50 m	**Date**	26/06/2015		

COMPOSITE LITHOLOGICAL LOG				
Depth (m)		**Keyword**	**Upper contact**	**Description**
From	**To**			
0	0.25	Topsoil		
0.25	0.60	Clay	Gradual	Light brown
0.60	1.00	Clay	Sharp	Plastic, blue/grey, iron staining
1.00		Wood		Brown, detrital wood layer
1.00	1.50	Silt/sand	Gradual	Grey soft silt grading to sand

BOREHOLE RECORDING SHEET					
SUMMARY DETAILS					
Site code	Burbo Bank Site 41	**Excavated 1m; gouge cores 1-1.50m**			
Borehole No.	2				
Easting					
Northing					
GL ELEV (m aOD)		**Logged by**	Mairead Rutherford		
Total depth (m)	1.50 m	**Date**	26/06/2015		

COMPOSITE LITHOLOGICAL LOG				
Depth (m)		**Keyword**	**Upper contact**	**Description**
From	**To**			
0	0.25	Topsoil		
0.25	0.60	Clay	Gradual	Light brown
0.60	1.00	Clay	Sharp	Plastic, blue/grey, iron staining
1.00		Wood		Brown wood debris layer, detrital
1.00	1.50	Silt/sand	Gradual	Grey, rare herbaceous debris

BOREHOLE RECORDING SHEET					
SUMMARY DETAILS					
Site code	Burbo Bank Site 41	**Excavated 1m; gouge cores 1-1.50m**			
Borehole No.	3				
Easting					
Northing					
GL ELEV (m aOD)		**Logged by**	Mairead Rutherford		
Total depth (m)	1.50 m	**Date**	26/06/2015		

COMPOSITE LITHOLOGICAL LOG				
Depth (m)		**Keyword**	**Upper contact**	**Description**
From	**To**			
0	0.25	Topsoil		
0.25	0.60	Clay	Gradual	Light brown
0.60	1.00	Clay	Sharp	Plastic, blue/grey, iron staining
1.00		Wood		Brown wood detrital layer
1.00	1.10	Silt	Gradual	Grey, herbaceous debris, woody
1.10	1.20	Sand	Sharp	Grey, herbaceous debris, woody
1.20	1.50	Sand	Gradual	Coarse-fine, wet, grey

BOREHOLE RECORDING SHEET					
SUMMARY DETAILS					
Site code	Burbo Bank Site 41	**Excavated 2m; Monoliths from exposed section, 0.60-1.10m and horizontally along 1.10m (collected for lithological context for woody detritus layer)**			
Exposed	Section				
Easting					
Northing					
GL ELEV (m aOD)		**Logged by**	Mairead Rutherford		
Total depth (m)	1.10 m	**Date**	26/06/2015		

COMPOSITE LITHOLOGICAL LOG				
Depth (m)		**Keyword**	**Upper contact**	**Description**
From	**To**			
0.60	1.00	Clay	Sharp	Plastic, blue/grey, iron staining
1.00		Wood		Brown woody detrital layer
1.00	1.10	Silt	Gradual	Grey, herbaceous debris, woody

APPENDIX 6: RAW POLLEN COUNTS

Sample/Site		**6**	**6**	**6**	**6**	**6**	**6**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**
Preservation		Good	Good	Good	Good	Good	Good	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed	Good
Potential		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Depth (m)		1.28	1.32	1.36	1.40	1.44	1.48	1.08	1.12	1.20	1.28	1.32	1.40	1.44	1.48
Trees/Shrubs															
Alnus	Alder	74	49	75	75	80	65	4	1	3	2	32	48	72	77
Betula	Birch	1	15	10	2	1	3						1	1	2
Quercus	Oak	4	19	7	11	8	13	1	1		2	2	4	14	8
Corylus avellana-type	Hazel-type	20	33	21	14	17	25	6	1	1	2	17	24	18	12
Fraxinus	Ash		1	1	1										
Ilex	Holly		2			1			1				1		
Pinus	Pine		1	1	1								3	2	1
Ulmus	Elm				3								1		2
Tilia	Lime	2	1	1	6	1	8					1	1	3	3
Prunus-type	Cherry-type				1										
Rosaceae	Wild roses							1	1					1	
Salix	Willow			1			1	1				1	2		
Calluna	Heather	3		1		1								1	
Crataegus-type	Hawthorn-type		1	1											
Hedera	Ivy	1			2							1		1	1
Large grasses															
Cereal/*Glyceria*-type	Large grasses							1			1		1		
Herbs															
Amaranthaceae	Goosefoot family						2					1			1
Apiaceae	Carrot family			1				3		3			1		
Artemisia	Mugworts												1		1
Asteraceae	Daisy family							1	1	2	3		2		
Brassicaceae	Cabbage family							1							1
Caryophyllaceae	Pinks family				1				1		1	1		1	1
Centaurea nigra	Common knapweed								3						
Cyperaceae	Sedges							24	42	56	40	28	4	2	1
Filipendula	Meadowsweet							1	1	2	2				
Lotus-type	Bird's-foot-trefoils											1			
Mentha-type	Mints							1							

Sample/Site		**6**	**6**	**6**	**6**	**6**	**6**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**
Preservation		Good	Good	Good	Good	Good	Good	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed	Good
Potential		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Depth (m)		1.28	1.32	1.36	1.40	1.44	1.48	1.08	1.12	1.20	1.28	1.32	1.40	1.44	1.48
Plantago lanceolata	Ribwort plantain			1				4	1	1	1	2	2	1	
Plantago spp	Plantains							2		1	1	1		1	
Poaceae	Grasses		2			1	1	36	29	19	37	2	5	2	1
Polygonum aviculare	Knotgrass							1				1			
Polygonum persicaria	Redshank							1	1	4					
Potentilla-type	Cinquefoils							2		1					
Ranunculaceae	Buttercups							2				1	1	1	
Rubiaceae	Bedstraws		1						3	3	2				
Rumex spp	Docks/Sorrels							2						1	
Rumex obtusifolius	Broad-leafed dock			1											
Succisa pratensis	Devil's Bit Scabious												1		
Taraxacum-type	Dandelion-type							10	14	8	5	9	2	1	1
	Indeterminate herbs		1	1	3			2	2	2	3	1			
	Total land pollen	**105**	**126**	**123**	**120**	**110**	**118**	**107**	**103**	**106**	**102**	**102**	**105**	**123**	**113**
	Number of traverses	1	1	1	1	1	1	8	6	6	2	5	1	1	1
Lycopodium	Exotic	8	4	2	2	0	2	16	32	5	10	10	5	1	2
Ferns and Mosses															
Equisetum	Horsetails							1							
Polypodium	Polypodies	1	2	1	1	1	2	1			1	5	1	10	5
Pteridium	Bracken	1						4	4	4	8	14	2	1	
Pteropsida	Monolete ferns	2	1	5	1		2	4	1	1	1	6	9	8	3
Thelypteris palustris	Marsh fern								1						1
Sphagnum	Bog-moss spores							1						1	1
Aquatics															
Potamogeton	Pondweed									1	1				
Typha angustifolia	Lesser Bulrush										23				
Typha latifoflia	Bulrush										1				

Sample/Site		**6**	**6**	**6**	**6**	**6**	**6**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**
Preservation		Good	Good	Good	Good	Good	Good	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed	Good
Potential		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Depth (m)		1.28	1.32	1.36	1.40	1.44	1.48	1.08	1.12	1.20	1.28	1.32	1.40	1.44	1.48
Algae															
Pediastrum-HdV-760	Colonial alga										1	1	3	1	8
Botryococcus-HdV-766	Colonial alga							2	4	7	25	17	1	1	2
Operculodinium centrocarpum	Dinoflagellate cyst							1							
Microscopic charcoal		9	1	2	4	1	0	89	114	210	38	37	40	7	1
NPP*															
Algal cysts indeterminate								2							
Fungal spores indeterminate								3							
Glomus-HdV-207								1	2	9					
Mougeotia HdV-313								1							
Podospora HdV-386								1							
Sordaria HdV-55A/B								3	2						
Spirogyra HdV-130								1	9	1	5				
Zygnema HdV-314								2	5	1	2				
HdV-128									3	1	3	1			
Broken grains		3	2		1	1		8	3	3	4	6	3	1	1
Concealed grains		5	3	30	13		7	5	11	5	26	5	13	25	2
Crumpled grains		14	1				6	11	3	12	13	10	6	5	11

*NPP = non-pollen palynomorphs

APPENDIX 7: FINANCIAL BREAKDOWN

FINANCIAL RESOURCES

The costs below outline the resources required for post-excavation analysis and publication for all elements of the archaeological post excavation.

The total cost quoted for the post-excavation work is a fixed price which is inclusive of all management, overheads, and other disbursement costs (travel and expenses). Any other variations from this programme of work at the client's direction will require recosting. All staff costs are inclusive of holiday entitlement, as well as NI and Superannuation.

The costs for publication include page costs to the journal.

Set-up / management / travel costs	£ 2800.00
Creation of GIS dataset	£ 1004.00
Post-excavation analysis: Stratigraphy	£ 6165.00
Charred and Waterlogged Plant Remains Analysis:	£ 1220.00
Finds Analysis	£ 600.00
Palaeoenvironmental Analysis of Cores 21	£ 6856.00
Palaeoenvironmental Analysis of Cores 6	£ 4996.00
Radiocarbon Dates x 10	£ 3150.00
Archive report preparation	£ 5702.00
Publication Preparation	£ 6030.00
Archive	£ 1345.00
Total	**£ 39,868.00**

Notes:
1.Salaries and wages inclusive of NI and Superannuation
2.Costs incorporate all office work necessary to produce the report
3.Costs are at 2015-16 prices
4.Costs are exclusive of VAT

ILLUSTRATIONS

FIGURES

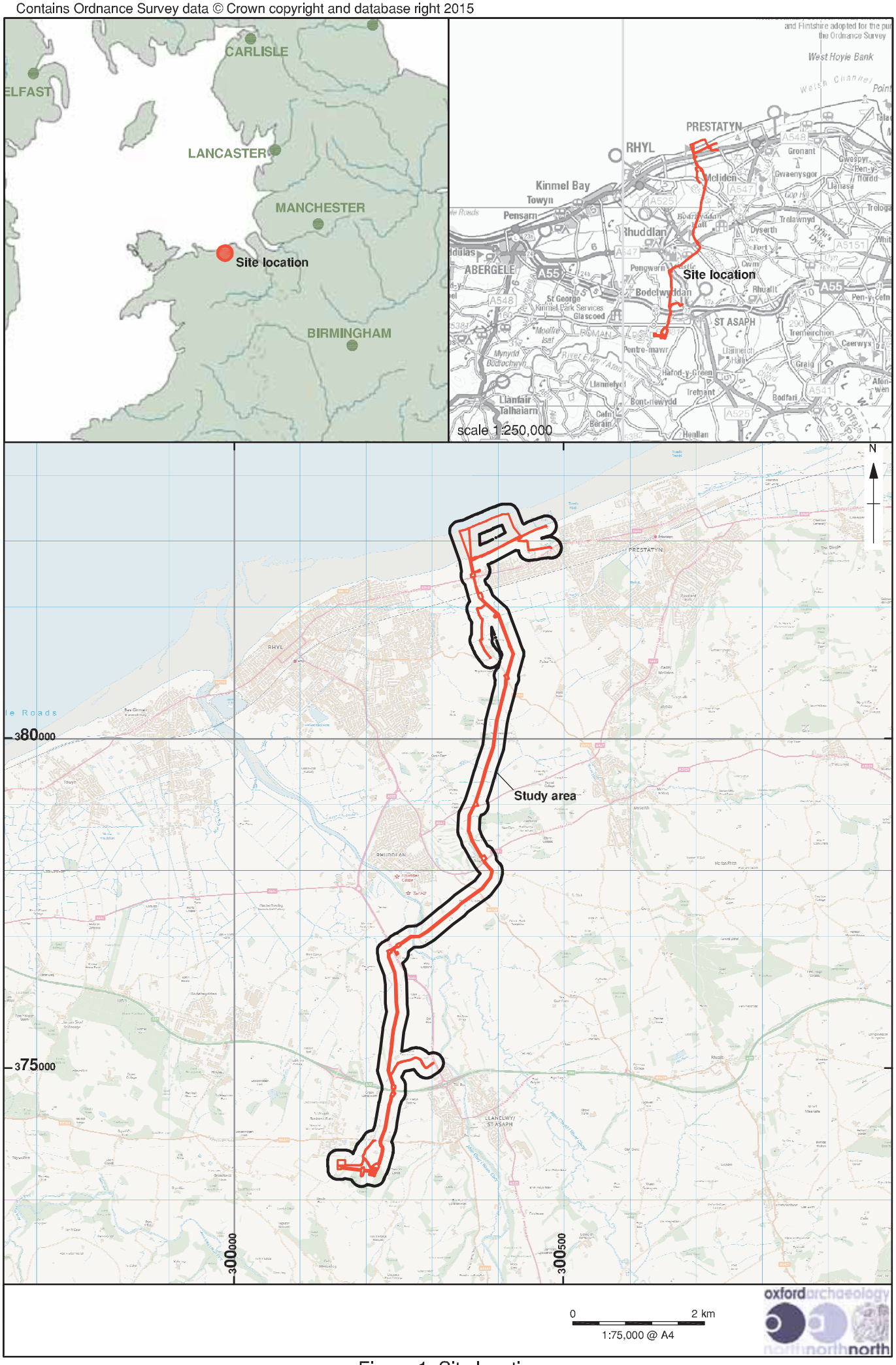


Figure 1: Site location

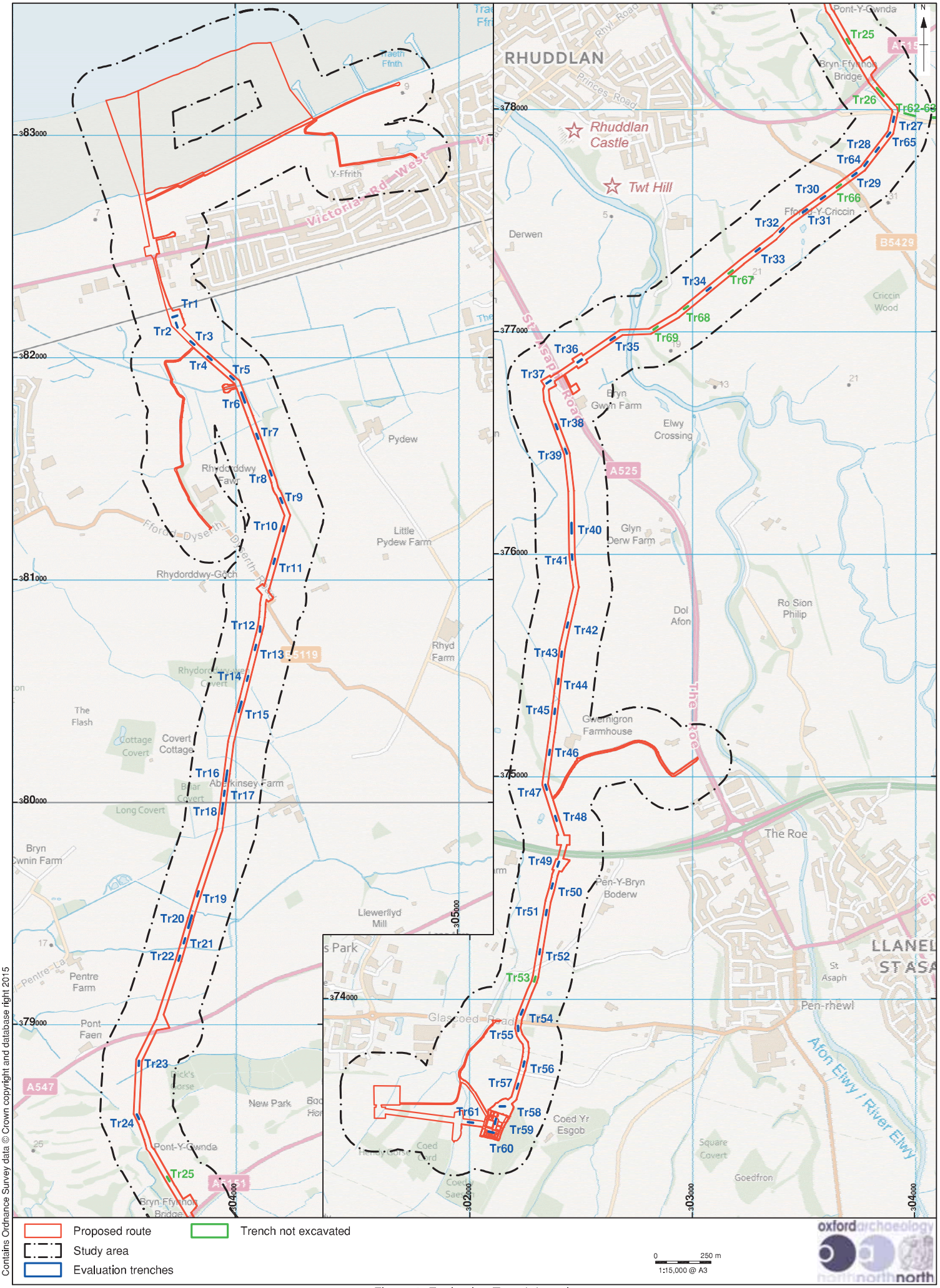


Figure 2: Evaluation Trench Location

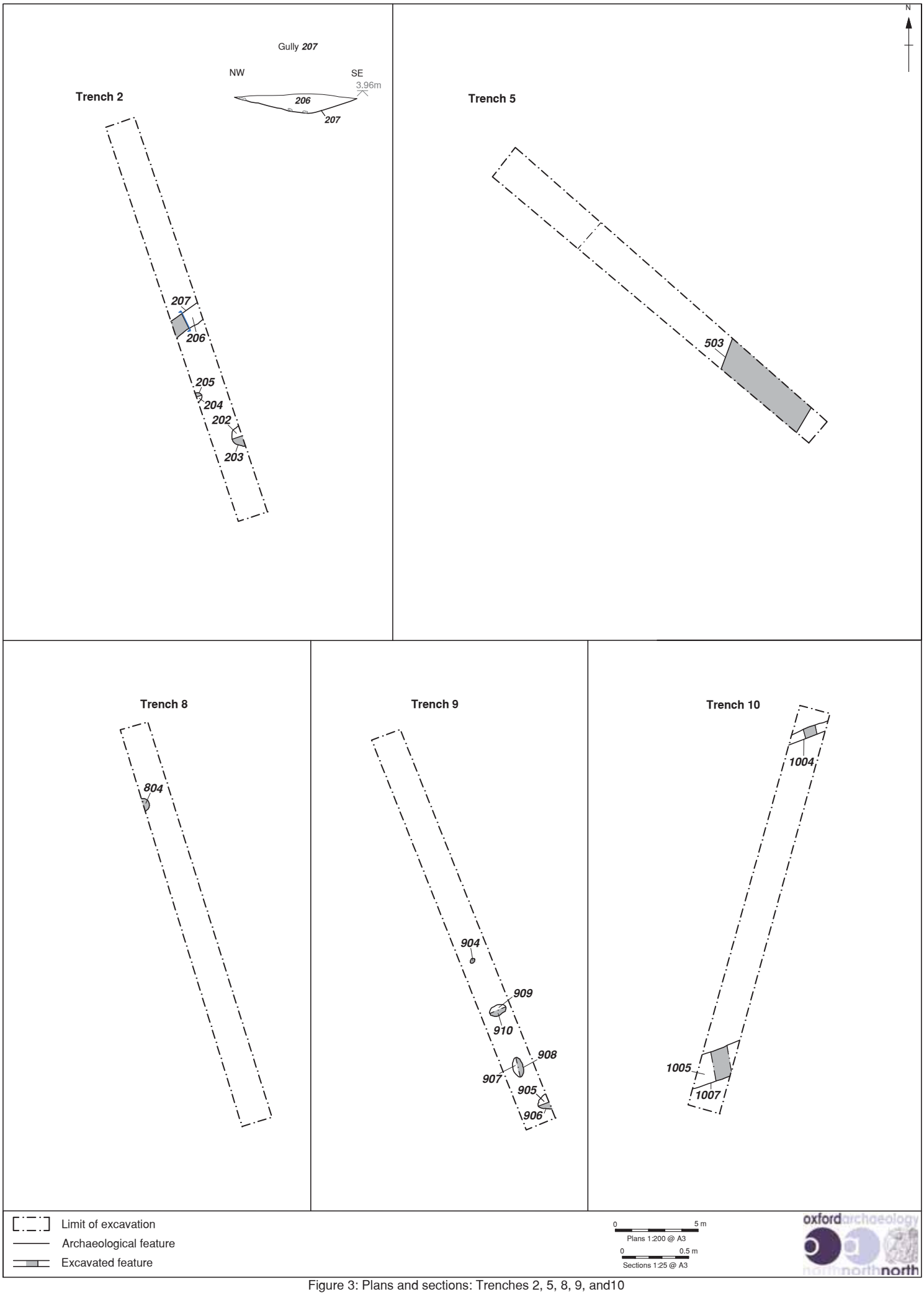
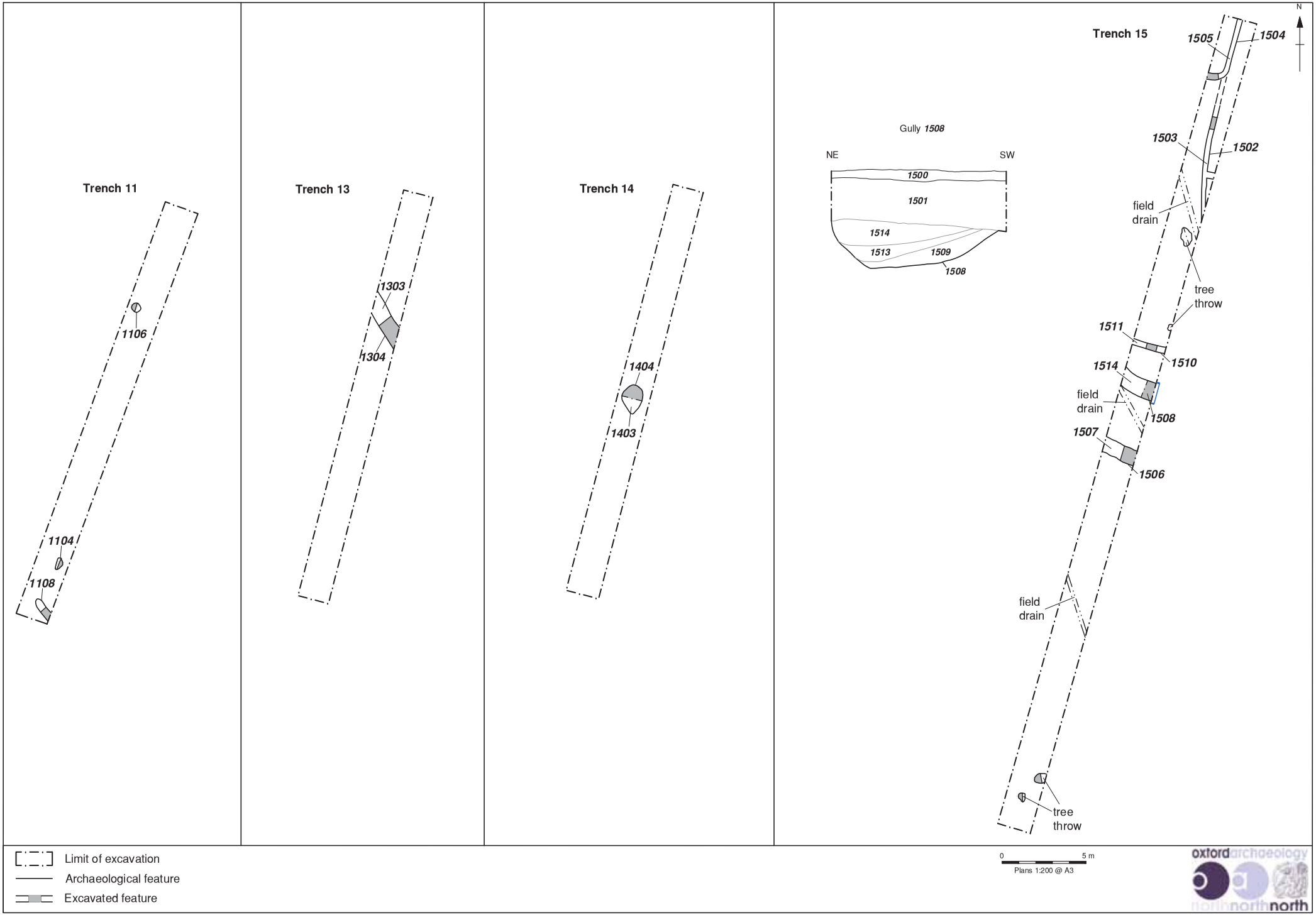


Figure 3: Plans and sections: Trenches 2, 5, 8, 9, and10



JQ'L10854*AMS*131114

Figure 4: Plans: Trenches11, 13, 14, and 15

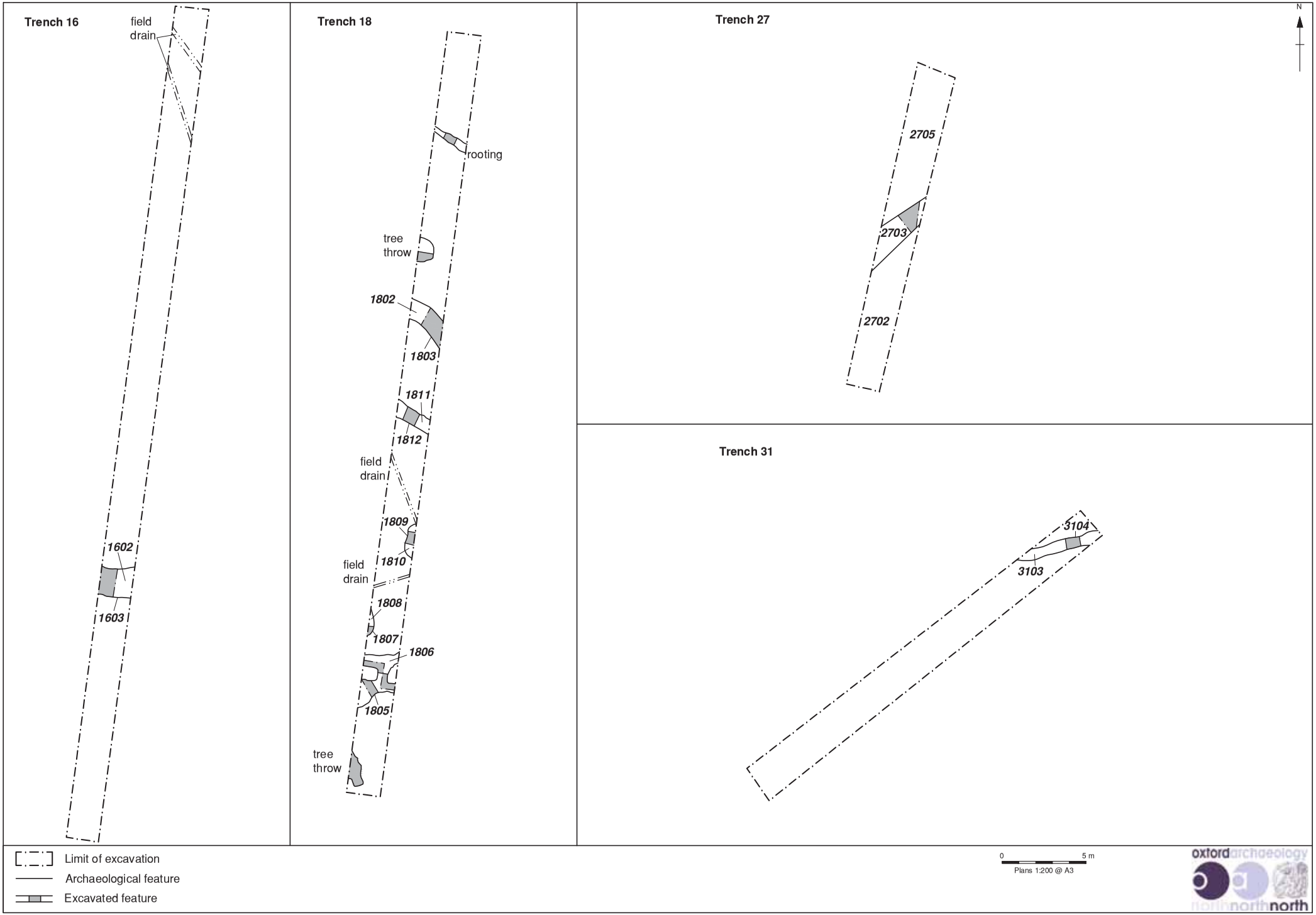
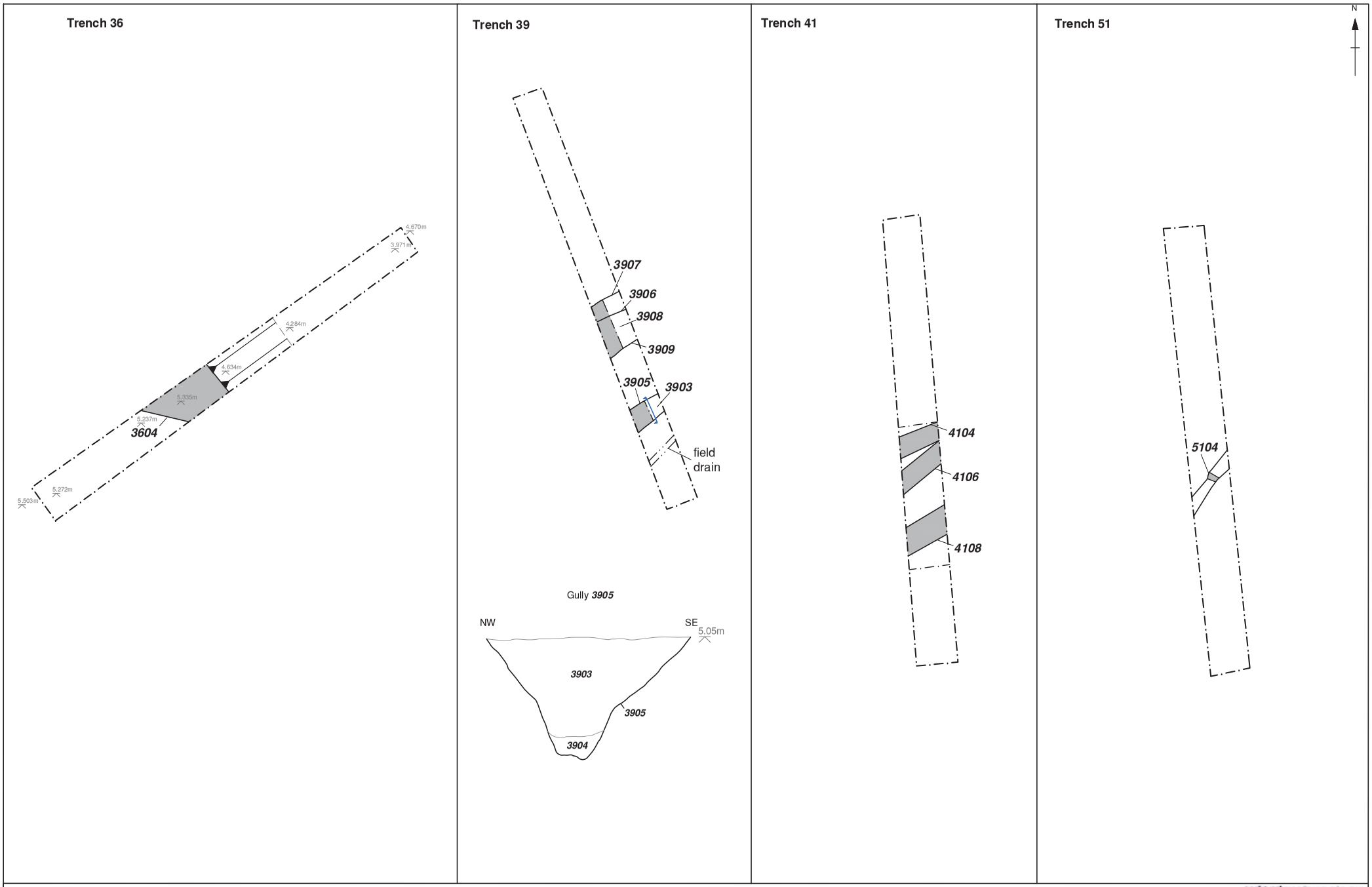


Figure 5: Plans: Trenches16, 18, 27, and 31



JQ'L10854*AMS*131114

Figure 6: Plans and section: Trenches 36, 39, 41, and 51

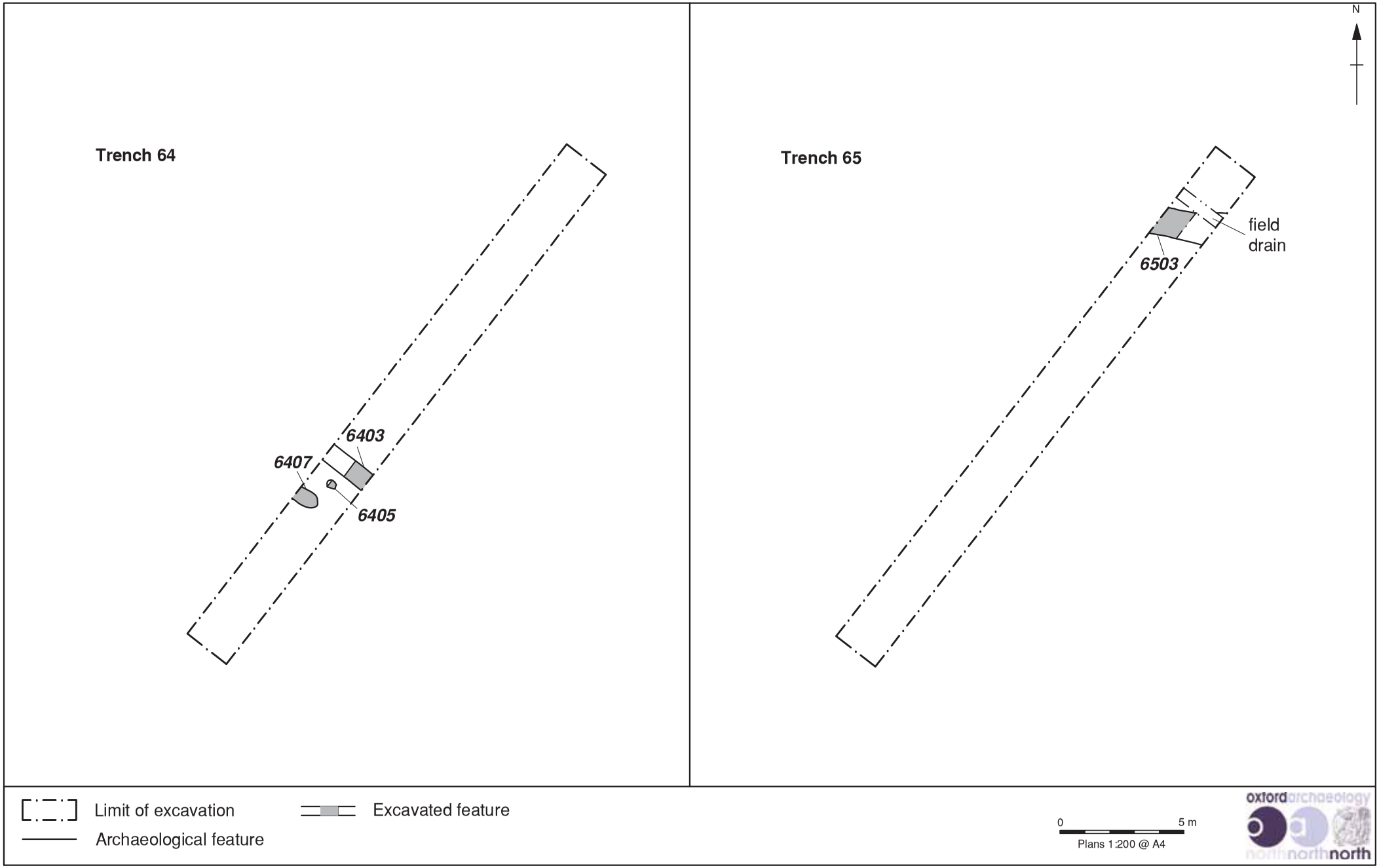


Figure 7: Plans: Trenches 64 and 65

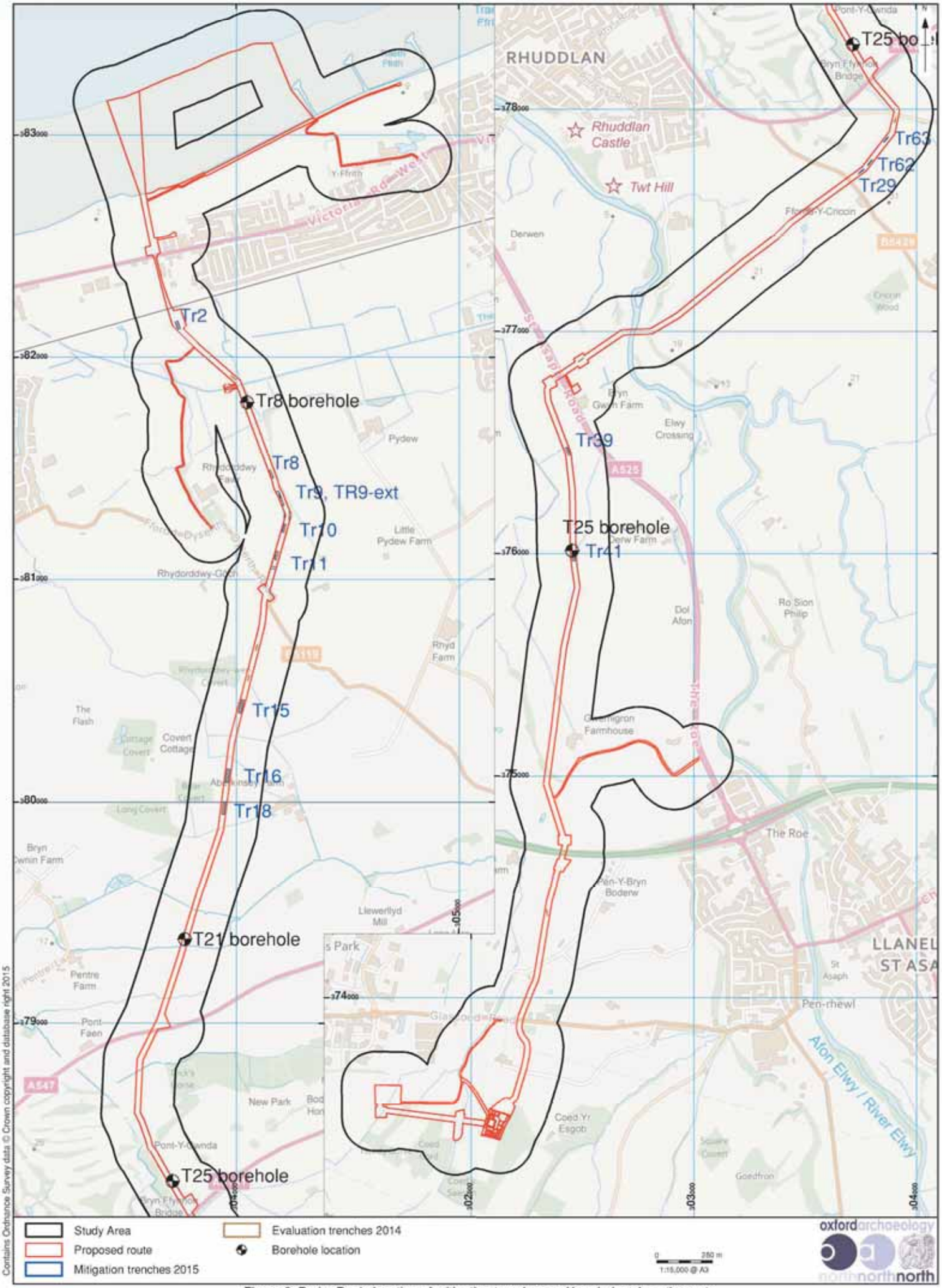


Figure 8: Burbo Bank: location of mitigation trenches and boreholes along the route

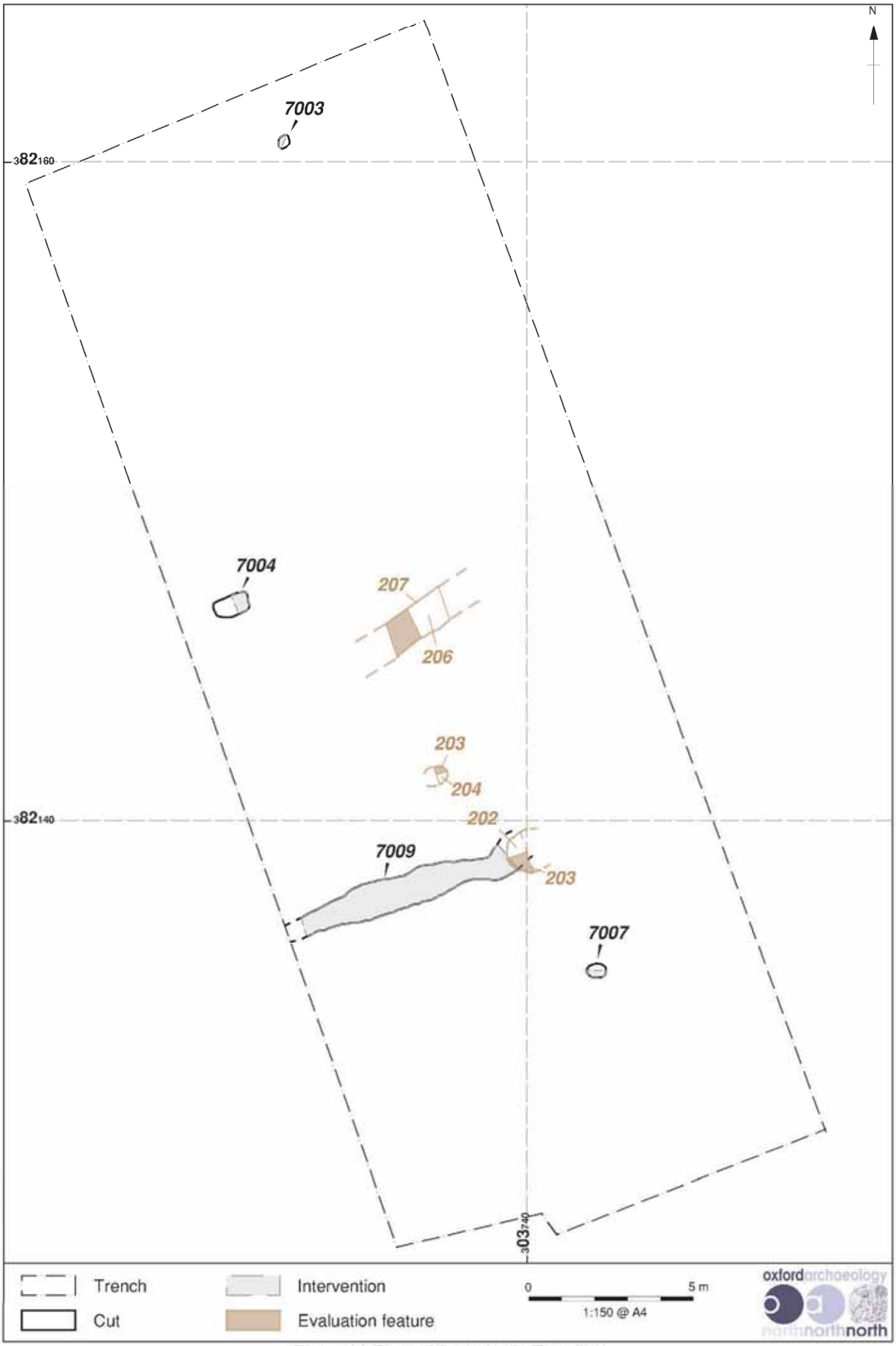


Figure 9: Plan of features in Trench 2

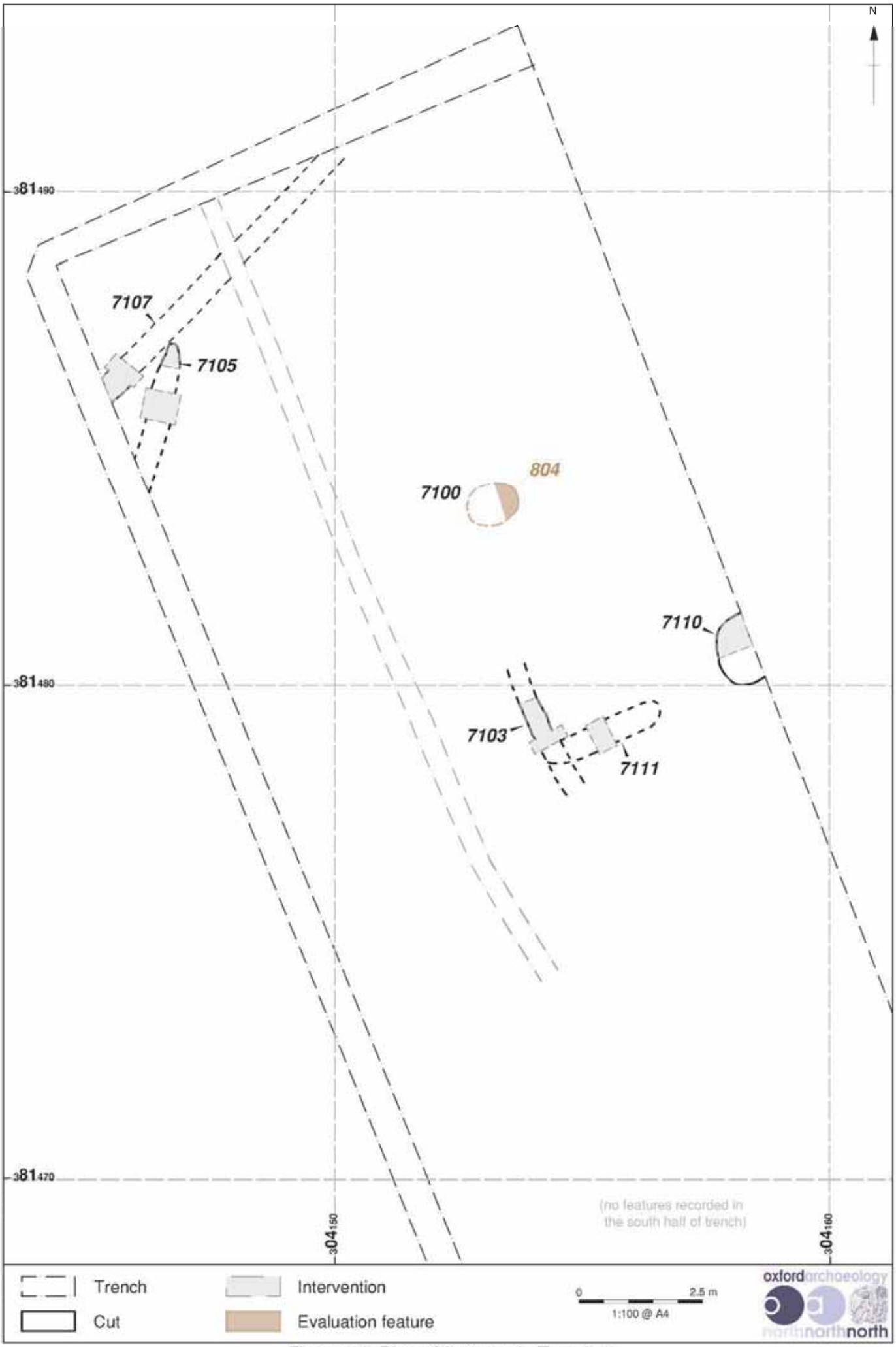


Figure 10: Plan of features in Trench 8

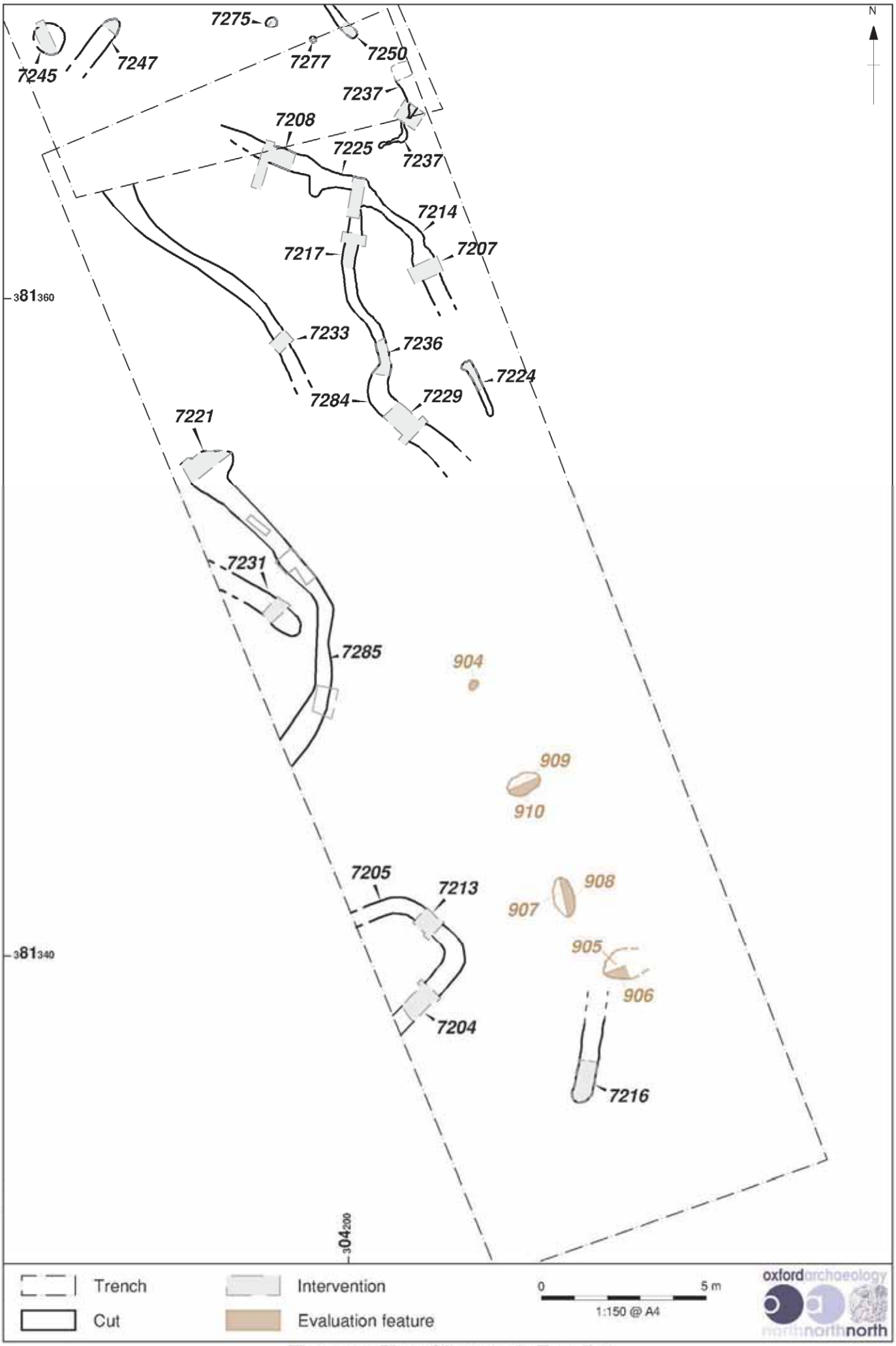


Figure 11: Plan of features in Trench 9

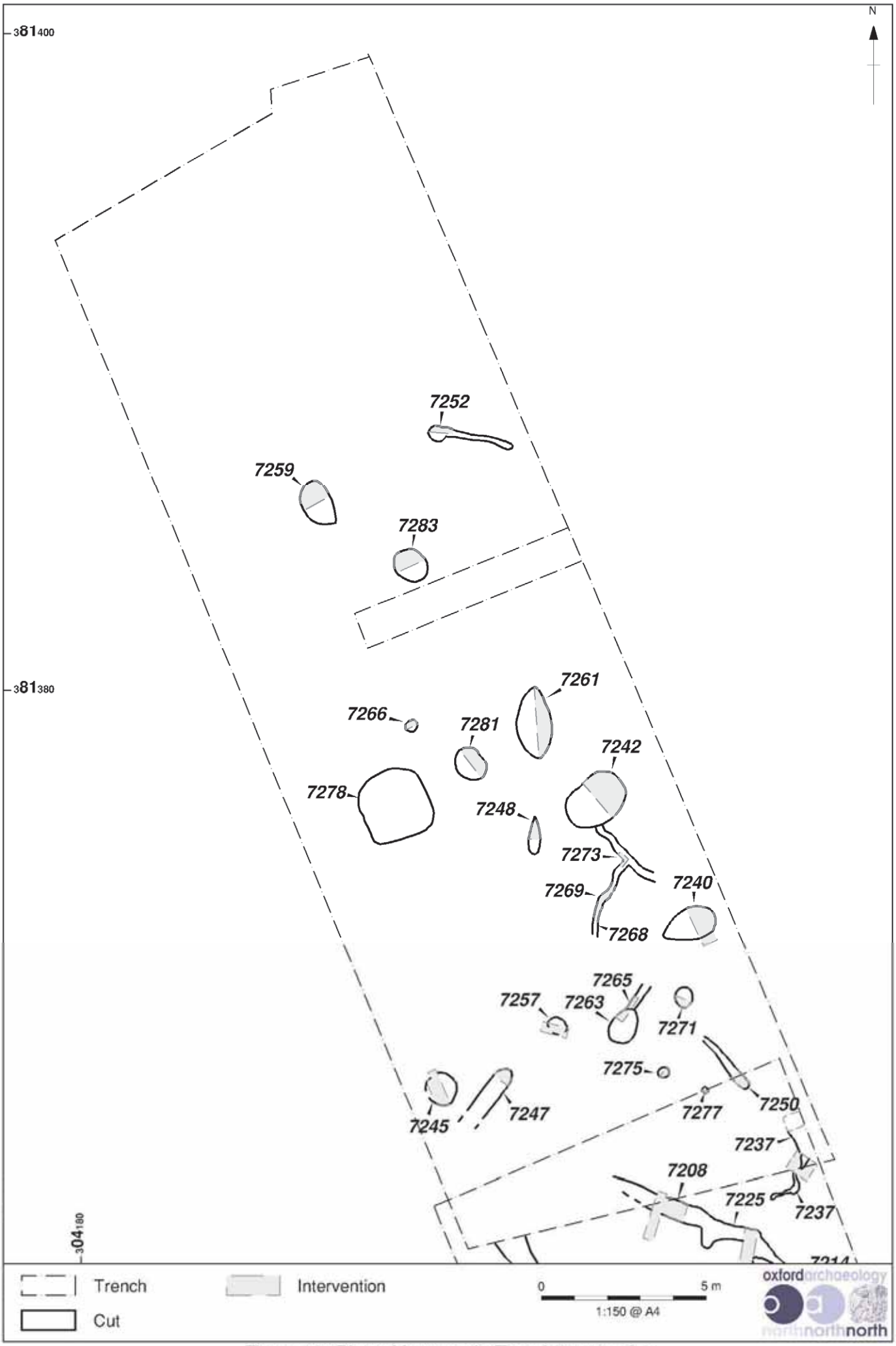


Figure 12: Plan of features in Trench 9 extension

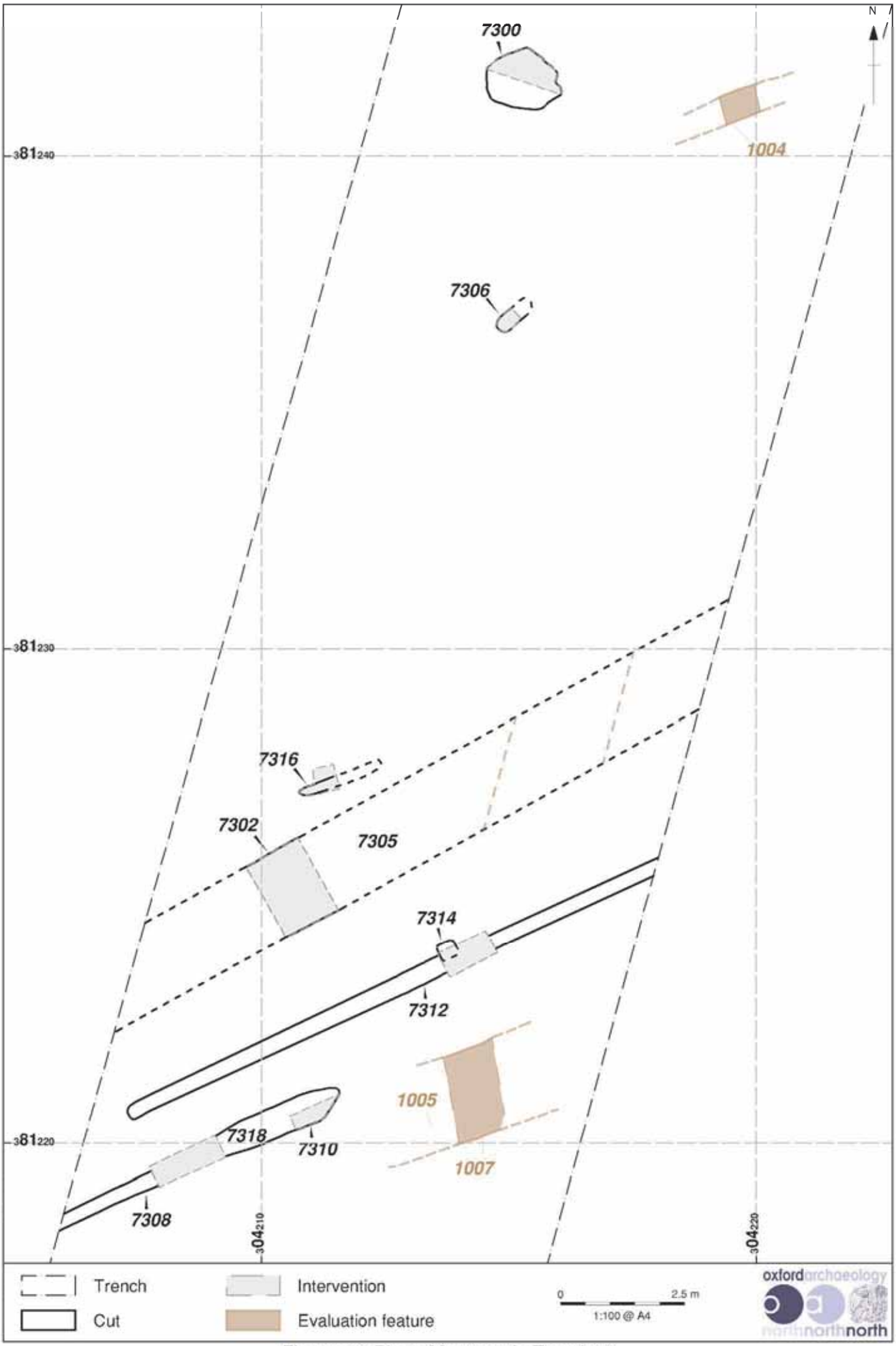


Figure 13: Plan of features in Trench 10

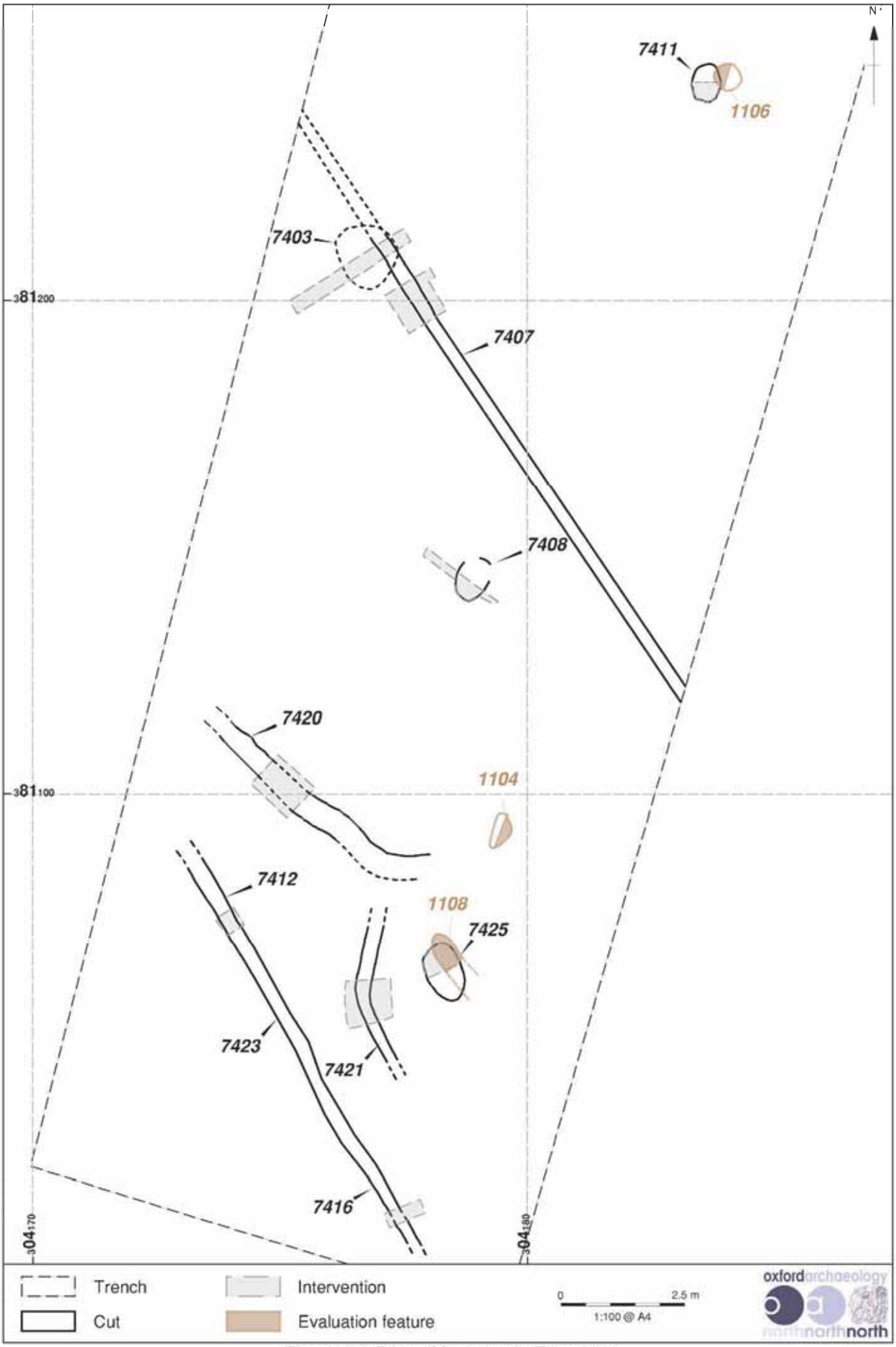


Figure 14: Plan of features in Trench 11

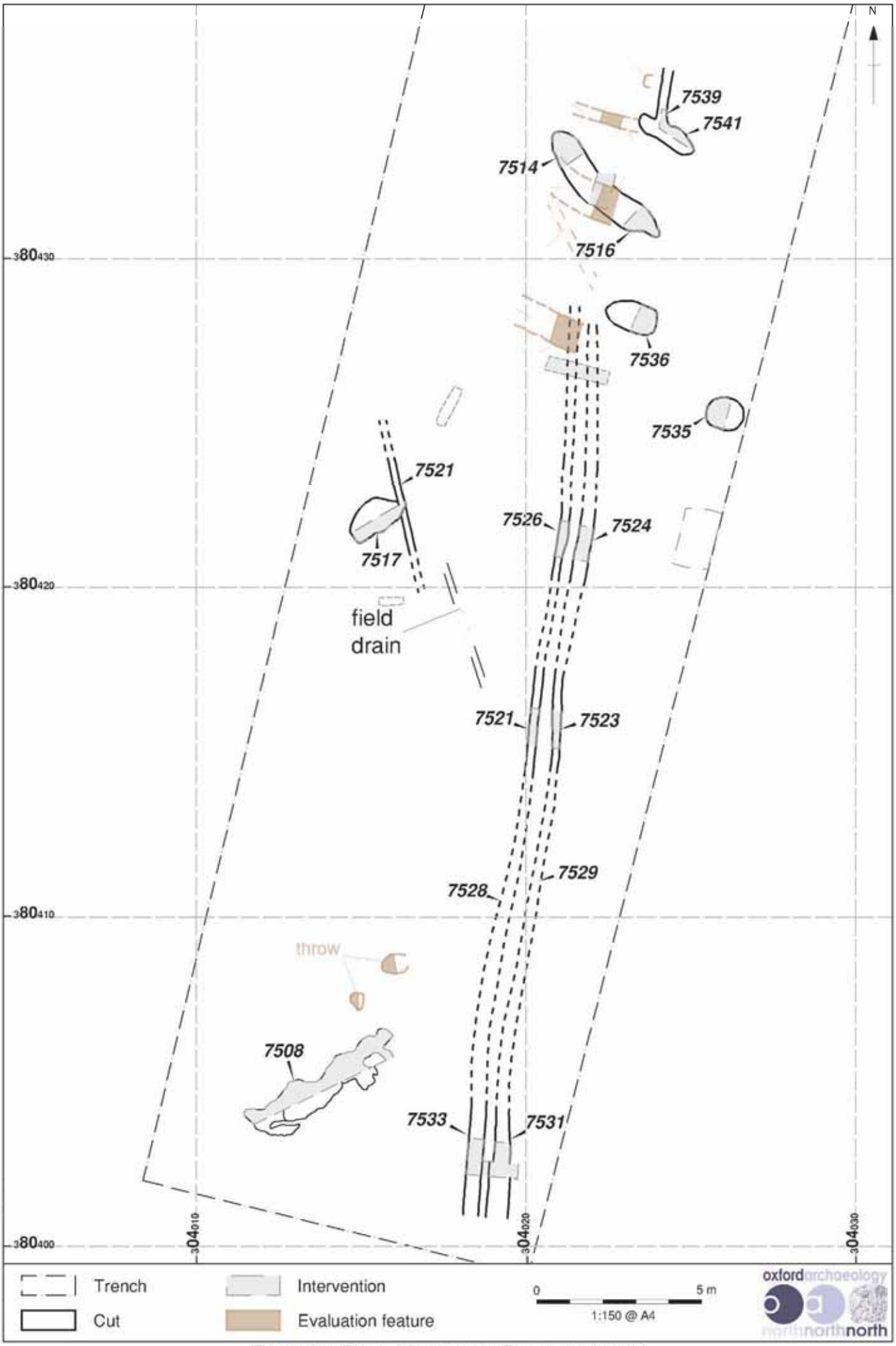


Figure 15: Plan of features in Trench 15 (south)

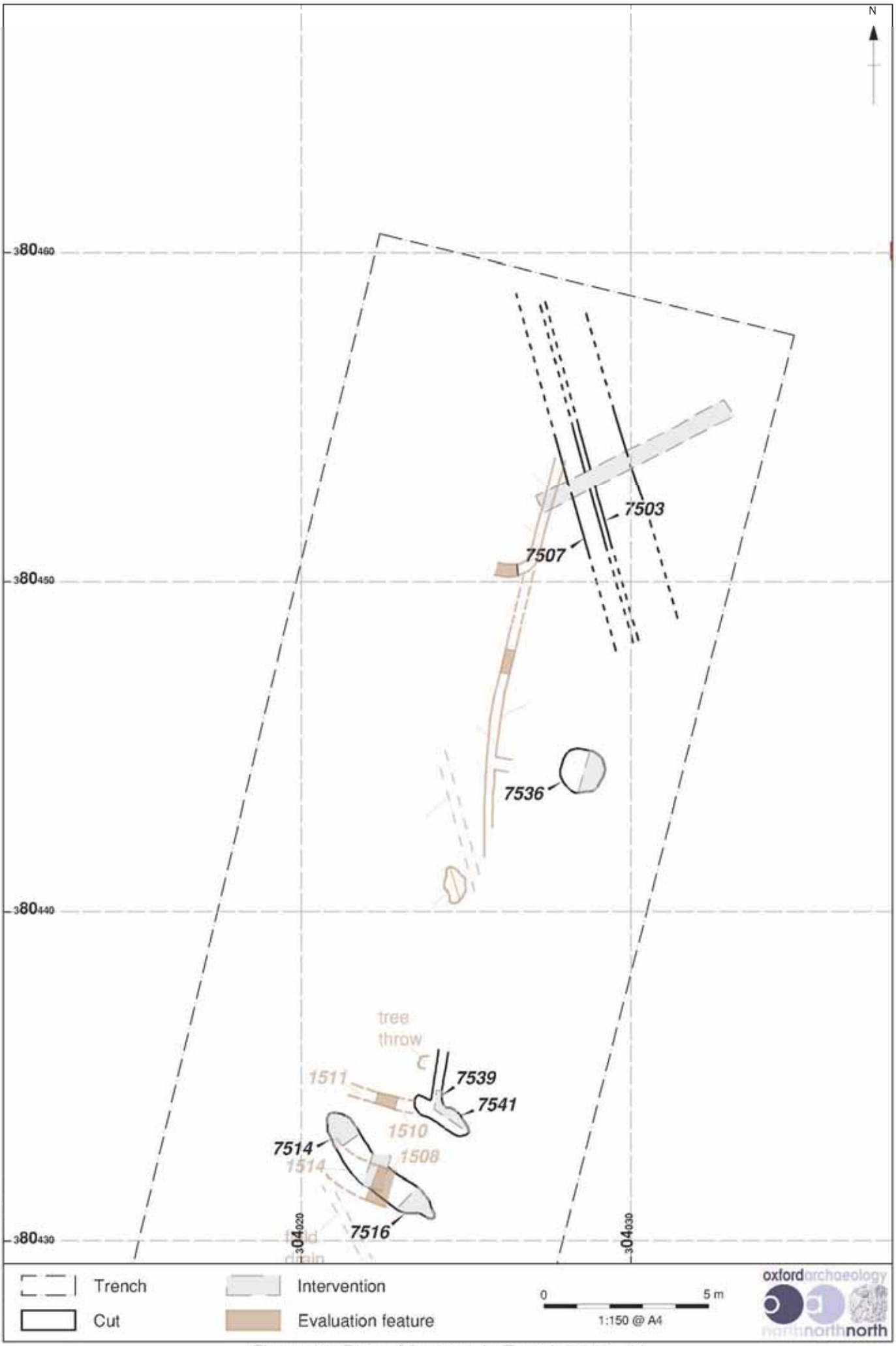


Figure 16: Plan of features in Trench 15 (north)

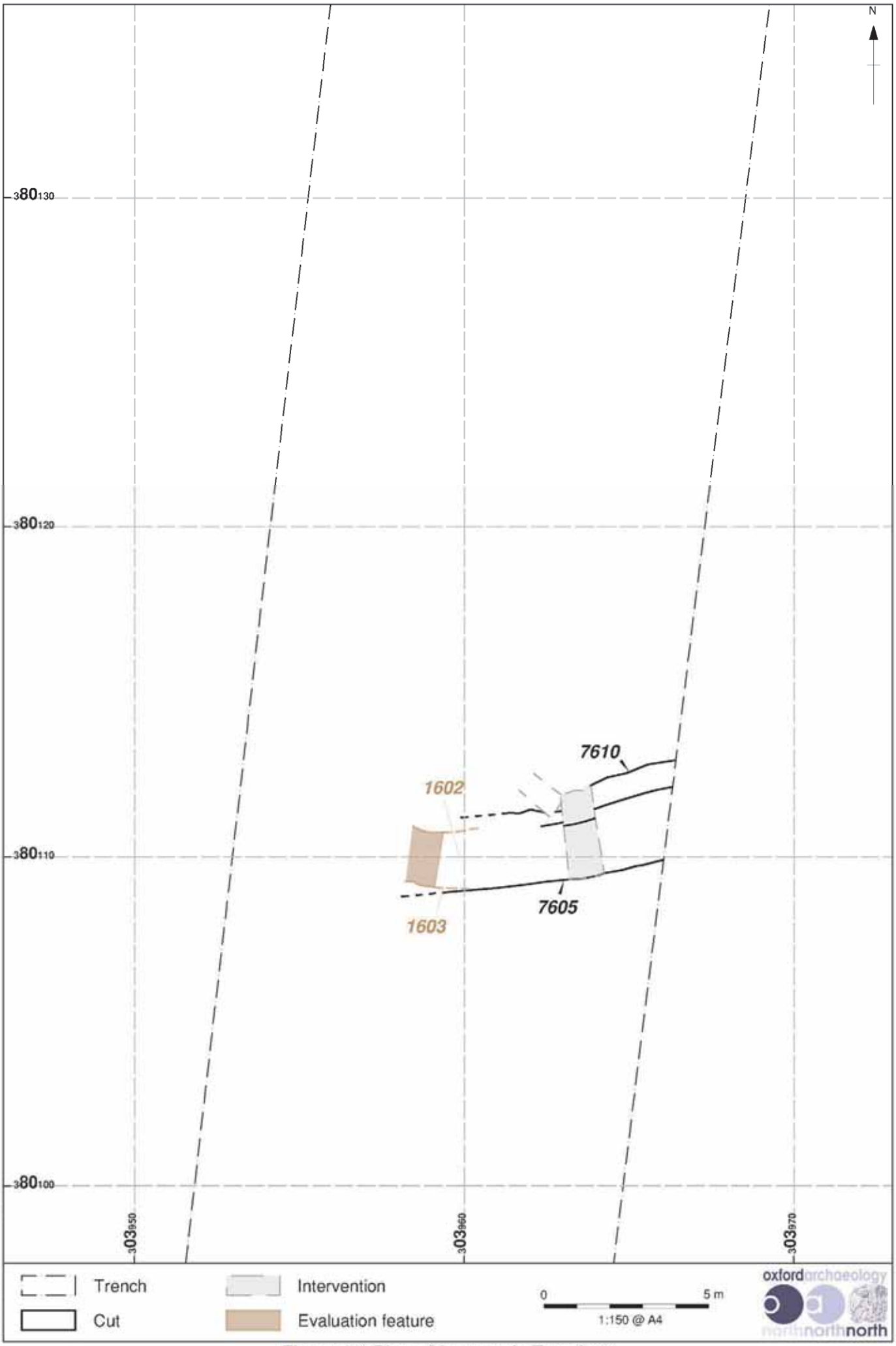


Figure 17: Plan of features in Trench 16

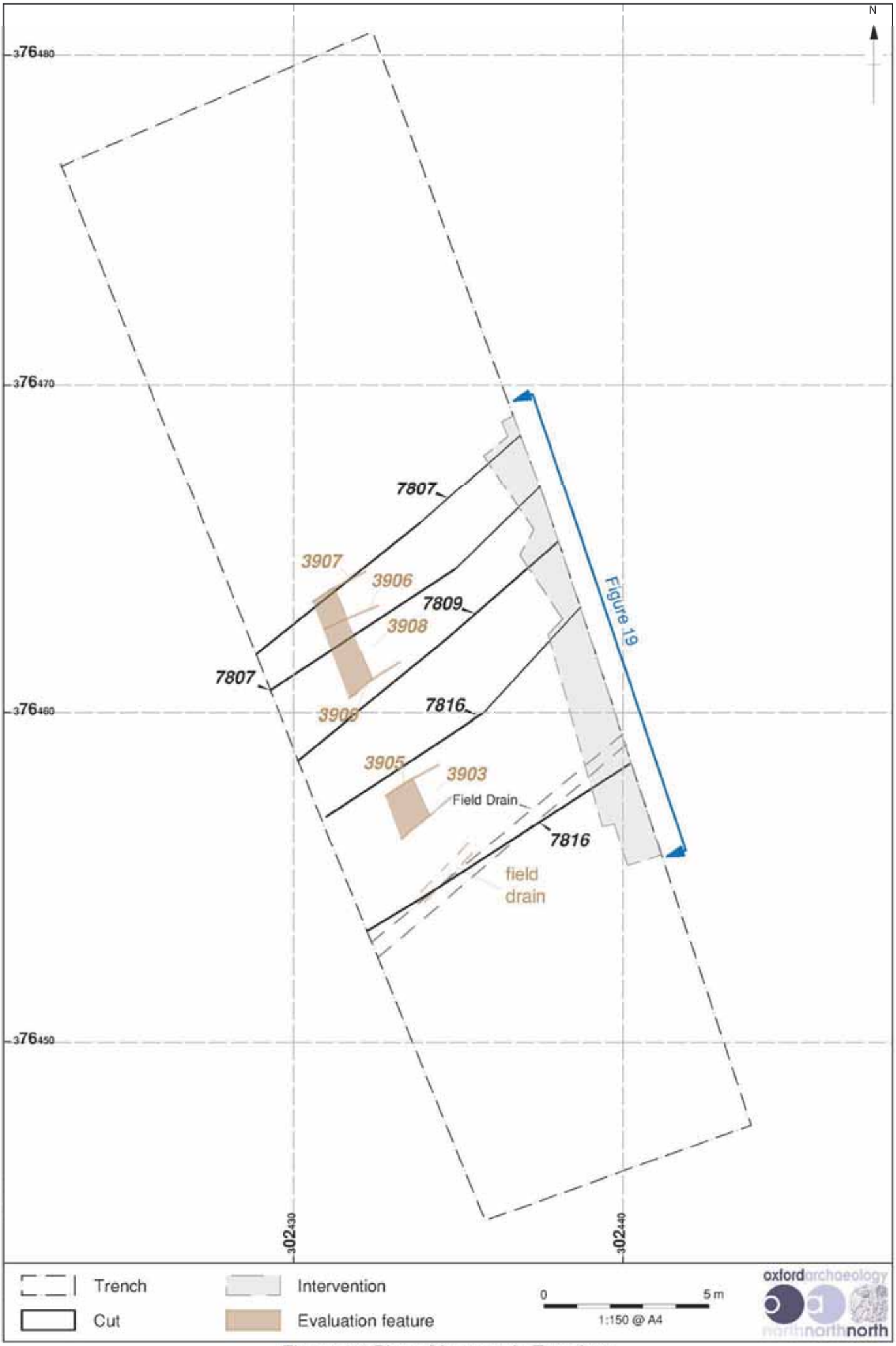


Figure 18: Plan of features in Trench 39

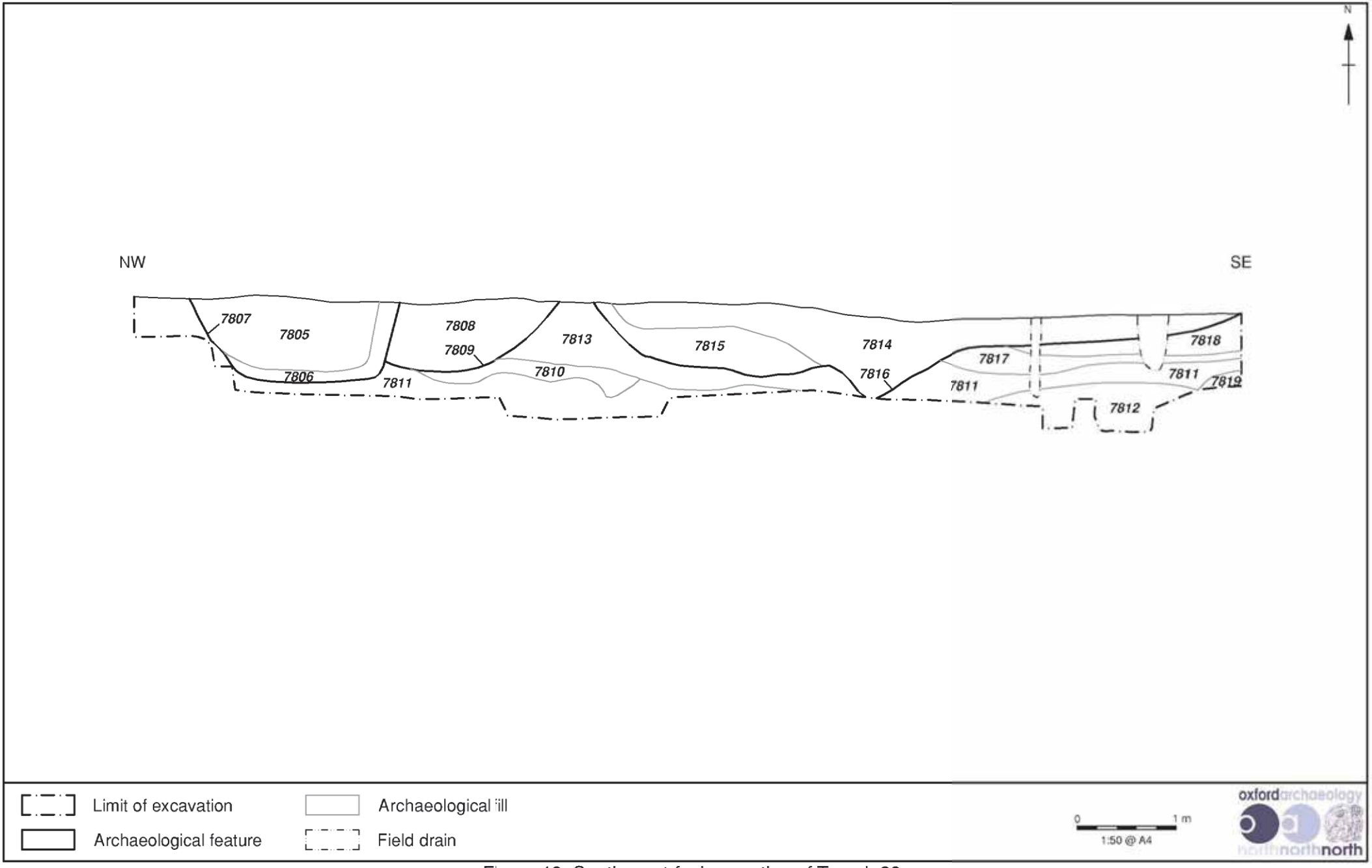


Figure 19: South-west-facing section of Trench 39

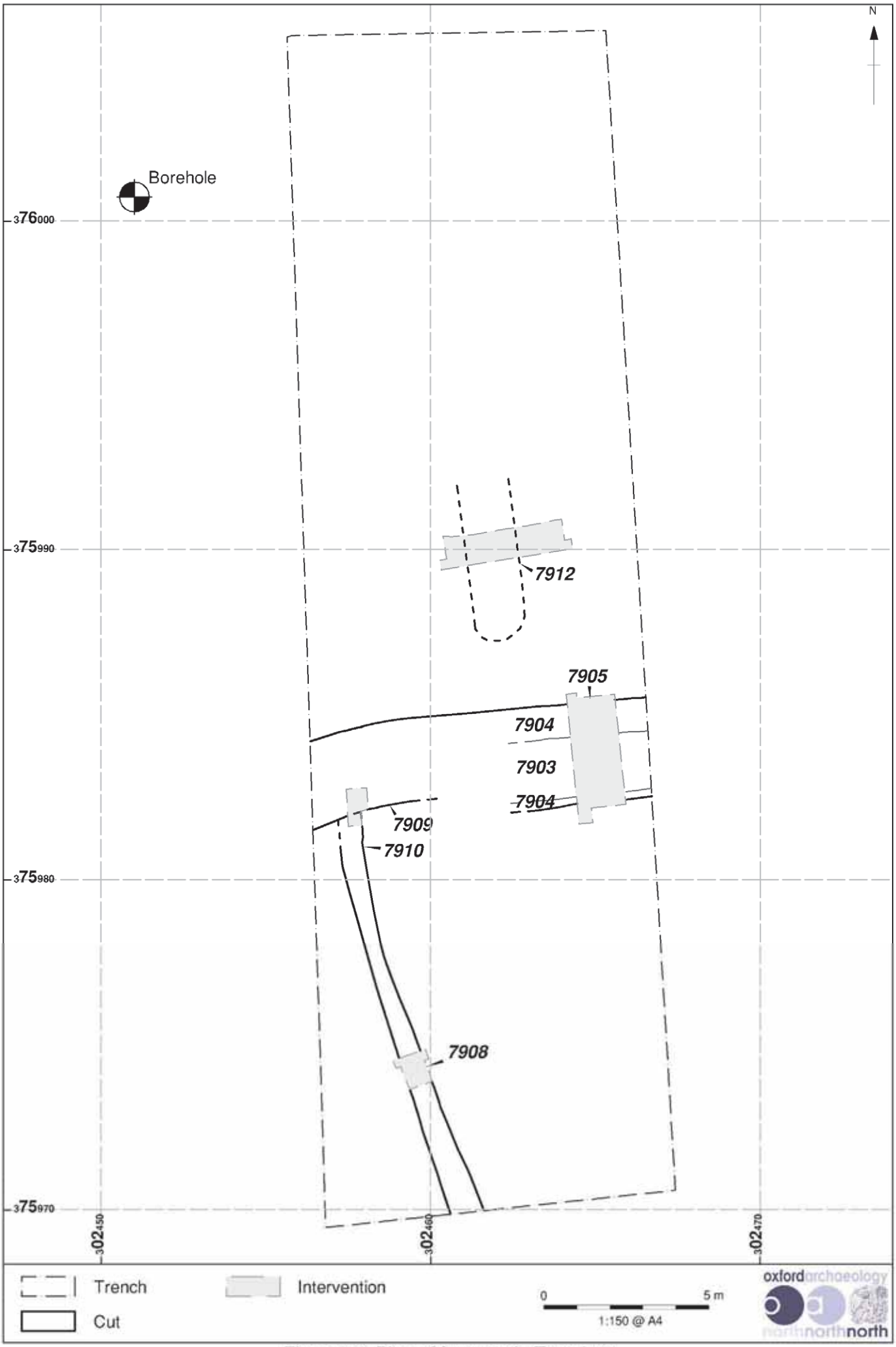


Figure 20: Plan of features in Trench 41