Gas Pipeline Replacement: Pwllheli to Blaenau Ffestiniog

Report on archaeological mitigation Volume I

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

Gas Pipeline Replacement: Pwllheli to Blaenau Ffestiniog

Report on archaeological mitigation Volume I

Project No. G2148

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Contents

Tables

Figures and plates

Figures

Plates

GAS PIPELINE REPLACEMENT: PWLLHELI TO BLAENAU FFESTINIOG

Report on Archaeological Mitigation (G2148) Volume I

1. SUMMARY

1.1. Introduction

Gwynedd Archaeological Trust (GAT) was commissioned by RSK Environment Ltd (RSK) on behalf of Wales and West Utilities (WWU) to complete a programme of archaeological mitigation along the route of a replacement gas pipeline from Pwllheli to Blaenau Ffestiniog. The route ran from NGR SH 38533597 to NGR SH 70454573, and the archaeological mitigation started on 16th March 2011 and was completed on 22nd September 2011.

1.2. Results

The project revealed several burnt mounds, sites for boiling water using hot stones, dating from the late Neolithic to the early medieval periods. Dated mounds from the latter period being very rare in Wales. Other discoveries included a medieval corn drier constructed on the site of two Iron Age pits, a Bronze Age cremation burial and an Iron Age shell midden. A deposit of worked timber dating to the second half of the 14th century AD may represent a medieval causeway across the Dwyryd flood plain.

Pollen and soil micromorphological work provided an environmental context for the largest burnt mound and charcoal and charred plant remain assemblages from all the sites gave indications of woodland types and their use and farming regimes across a long period of time.

1.3. Storage and curation

The finds (including charred plant remains) are held at Gwynedd Art Gallery and Museum, Bangor (accession number 2013/2), and the digital and paper record is held by the Royal Commission on the Ancient and Historic Monuments of Wales, Aberystwyth.

2. INTRODUCTION

Gwynedd Archaeological Trust (GAT) carried out a programme of archaeological work on the route of a replacement gas pipeline from Pwllheli to Blaenau Ffestiniog. The work was commissioned by RSK Environment Ltd (RSK) on behalf of Wales and West Utilities (WWU), and included an archaeological watching brief during removal of top soil and excavation of the pipe trench, controlled stripping of selected areas, and the archaeological excavation of sites identified during both activities. The work started on 16th March 2011 and was completed on 22nd September 2011. This document provides a full description of the site work and discoveries, the specialist analysis and final interpretations and conclusions. The report is in two volumes; this volume (volume I) contains the description and discussion of the excavations with detailed illustrations and brief summaries of the specialist analysis, volume II contains the full specialist reports.

3. BACKGROUND

The scheme involved the construction of 39 km of a 150mm diameter gas pipe within a 20m wide working corridor from Pwllheli to Blaenau Ffestiniog, Gwynedd, between NGR SH 38533597 and NGR SH 70454573 (figures 1 to 4). The western end of the route ran along the southern side of the Llŷn Peninsula, generally within about 1km from the coast, but avoiding the reclaimed salt marshes that fringe the coast in places. The land here is gently undulating where small rivers and streams have carved narrow valleys. At the eastern end of the peninsula the route ran inland to the head of the western branch of Traeth Mawr. 'Traeth Mawr' means 'great sands' and was until the early 19th century the tidal estuary of the Afon Glaslyn. The mouth of this estuary was blocked in 1813 by an embankment, known as the Cob, so that the land behind the barrier could be drained and claimed for agriculture.

After the town of Porthmadog the pipe route crossed the Afon Glaslyn and over the spur of land on which Penrhyndeudraeth is built. The route descended on to the flood plain of the Afon Dwyryd and followed the flat, reclaimed farmland up the river valley past Maentwrog. Where the valley narrows to that of a mountain stream the pipe route headed north across quite steeply undulating upland country to Blaenau Ffestiniog, set in the heart of the mountains of Snowdonia.

RSK prepared an archaeological desk-based assessment of the route and carried out a field reconnaissance survey (RSK 2010a). Geophysical surveys were undertaken along specific parts of the route (Bartlett 2010) and GAT undertook a programme of evaluation trenches (Owen 2010, GAT Report 893). These works informed an Environmental Statement for the pipeline (RSK 2010b).

The desk-based assessment and field reconnaissance identified 618 recorded or potential archaeological sites within a 1km-wide study area, centred on the pipeline. These sites included 5 Scheduled Ancient Monuments, 189 Listed Buildings, four Conservation Areas, three Historic Parks and Gardens and 417 non-scheduled archaeological sites. Sites ranged from negligible to high archaeological importance and dated from the prehistoric to modern periods (RSK 2010a). A possible impact during construction was predicted for 58 of the 618 recorded sites. Of the 33 trial trenches excavated, only 3 contained archaeological features, most significantly a prehistoric burnt mound.

Following the desk-based assessment and evaluation the Archaeological Written Scheme of Investigation (RSK 2011) defined the methodology of the main works, which included a watching brief on the topsoil stripping along the pipe route, controlled stripping of selected areas and the excavation of any archaeological sites exposed.

The project was monitored by Gwynedd Archaeological Planning Service (GAPS) and the Snowdonia National Park Authority (SNPA) Archaeologist.

3.1. Acknowledgements

The work was funded by Wales and West Utilities and overseen by RSK Environment Ltd. The project was managed on-site by Ken Owen and Andrew Shobbrook supervised the excavations in plot 6/29.4. GAT would like to thank Ken and his team of archaeologists for their dedicated work. GAT would also like to acknowledge the guidance and assistance provided by Ashley Batten of Gwynedd Archaeological Planning Services and John Griffith Roberts, the Snowdonia National Park Authority Archaeologist. GAT would also like to acknowledge the contribution made by the specialists listed in volume II.

4. AIMS AND OBJECTIVES

The original aim of the programme of work was to identify any archaeological remains revealed prior to and during the course of the construction works. Appropriate mitigation measures were developed for all archaeological remains revealed, including excavation and recording and/or preservation *in situ* as appropriate.

The objective of the post-excavation analysis and report writing was to prepare an archaeological archive of the site to ensure a thorough understanding and the long-term curation of the recovered data. This included the treatment and preservation of finds, deposition of the archive at agreed repositories, and the detailed analysis and publication of results to an appropriate level in line with nationally defined guidelines.

This project has been managed in accordance with the standards defined in *Management of Archaeological Projects* (English Heritage, 1991), and conforms to the *Management of Research Projects in the Historic Environment Project Manager's Guide* (English Heritage 2009).

5. PROJECT METHODOLOGIES

5.1. Fieldwork Methodology

Throughout the project identification of areas along the pipe route was by plot numbers allocated by Wales and West Utilities (WWU). The original mitigation maps issued by WWU showing all plot numbers have been reproduced in the Assessment of Potential Report (Kenney 2012a, GAT report 1020) and will not be repeated here, but plot numbers are shown on all detailed maps included with this report.

During the works GAT archaeologists monitored topsoil stripping along the pipeline easement. The stripping was undertaken with 360-degree excavators. The surface of all stripped areas and spoil heaps was visually searched for archaeological finds and archaeological deposits. The results of the watching brief were recorded in daily site diaries and on pro-forma record sheets. The excavation of the pipe trench was also monitored and where archaeological features were identified the trenching was paused so that these could be investigated and recorded. The monitoring of the pipe trench was negotiated during the works and did not take place from the start of trenching. Regular monitoring of the trenching started from plot 2/2, but plots 0/2 and 0/11 were also monitored.

Several areas were identified with archaeological potential (plots 6/10 to 6/11, 6/31 to 6/34, 13/35 to 13/37, 14/16 to 14/19 and 17/13 to 17/15). In these areas the entire easement was subjected to a controlled strip. This involved the stripping of topsoil and subsoil under constant archaeological control to a depth at which either archaeological features or layers were revealed or the natural subsoil was exposed. The stripping was carried out by a 360-degree mechanical excavator with a toothless bucket.

Where archaeological remains were identified in either the topsoil stripping or the controlled strip they were marked and fenced to avoid damage and evaluated for significance. Small, discrete features or other minor sites were excavated and recorded as part of the watching brief programme but Further Archaeological Works Designs (FAWD) were drawn up for more complex sites specifying the methodology to be used in investigating and recording them. These generally involved full or partial excavation and detailed recording with hand drawn plans and sections. Plans were drawn using a local grid located by Global Positioning System equipment by WWU survey support.

Where excavation was necessary each context was recorded on a pro-forma context sheet by written and measured description; principal deposits were recorded by drawn plans (scale 1:20 or 1:50 as appropriate) and sections (scale 1:10 or 1:20 as appropriate). Photographs were taken as appropriate with a digital SLR camera set to maximum resolution. All significant artefacts were recovered and retained for processing and analysis in accordance with all appropriate standards and guidance. Samples were taken from deposits as appropriate and in conjunction with discussion with the planning archaeologists. All finds and samples were bagged separately with unique numbers related to the context record.

Field boundaries considered of archaeological interest were identified in the desk-based assessment (RSK 2010a), and these was recorded as part of the archaeological watching brief during the course of the topsoil strip

phase. The boundaries were recorded on a *pro-forma* sheet, along with a measured sketch of its section and appropriate photographs. A summary of the field boundary records is included as appendix II.

In Traeth Mawr and on the Dwyryd Valley floor deposits were recorded as seen in the pipe trench. In Traeth Mawr (plots 6/51 to 7/13) and the first part of the Dwyryd (plots 3/6-3/19, 3/23-25) notes were made on the plot in general. The results are listed in appendix III with a grid reference for the approximate centre of the plot on the line of the pipe trench (see figures 1 to 4 for plot locations). Where the pipe route crossed the flood plain of the Dwyryd the deposits were recorded at 50m intervals. This recording including plots 13/27-13/30, 13/35-13/37, 14/1, 14/2, 14/4, and 14/7-14/14. Smaller areas of peat or alluvial deposits were also recorded. These included plots 0/8, 3/8, 8/1.1, 9/4, 10/2, 11/3, 11/4, 13/7, 13/8, 15/4, 15/28, 16/1-16/6, 16/9, 17/2, 17/4-17/7, 17/9, 17/10, 17/23, 17/25, and 17/27. The recording was done from the trench edge, describing and measuring the depth of deposits and by photograph. Where peat deposits were encountered the presence of these was also recorded. No samples were taken. All results are included in appendix III with grid references.

5.2. Post excavation methodology

Data collection from site records
A site database was created in Microsoft Access into which basic site information was entered to allow the data to be searched and interrogated effectively and the print-out of information for the use of specialists. The database includes the drawing, photographic, finds and samples registers and selected information from the context sheets. Context information entered consists of a brief summary, so the paper context records were used in analysing the sites. The site records were checked and cross-referenced and a site matrix drawn up for plot 6/29.4. Photographs, plans, finds and samples have been cross-referenced to contexts. The site records were used to write a site narrative for each plot and to create detailed illustrations including plans and sections as appropriate.

Field boundary records and deposit records have been summarised in appendices II and III.

All paper field records have been scanned to provide a backup digital copy. Field drawings have been scanned both as a backup and to use in the creation of final illustrations. The photographs have been organised and precisely cross-referenced to the digital photo record so that the Royal Commission of Ancient and Historical Monuments of Wales can curate them in their active digital storage facility.

A basic quantification of site records is given in appendix I.

Finds methodology
The finds were catalogued and grouped by material type. All finds, where appropriate, have been cleaned. All finds have been packaged in suitable containers and conditions for long-term storage and if necessary were conserved to ensure they are stable for storage. The finds have been assessed and where recommended further work was carried out and illustrations produced. The specialists who carried out the assessment and analysis are listed in volume II of this report. Insignificant items recommended for discard were identified (see section 6.2). A basic quantification of finds and samples and a full list of finds are given in appendix I, and the full specialist reports are included in volume II and summaries are included in the text below.

Environmental samples
The sampling strategy for bulk soil samples was related to the perceived character, interpretational importance and chronological significance of the strata under investigation. This ensured that only significant features were sampled. The aim of the sampling strategy was to recover carbonised macroscopic plant remains and, if the deposit was waterlogged, possibly non-carbonised plant and animal remains, especially insect remains. However, the samples simultaneously enabled the recovery of small artefacts particularly knapping debris and evidence for metalworking.

The bulk soil samples have been processed by flotation and wet sieving by The Environmental Archaeology Consultancy using their standard procedure, with the exception that a 250 micron mesh was used for flotation. They sorted the residues to recover finds and non-floating ecofacts. All residues were tested for magnetic metalworking debris and this was collected where present. Once sorted the fine residues were discarded but the coarse residues from the burnt mounds were retained for analysis.

The flots were weighed and catalogued and assessed by The Environmental Archaeology Consultancy. The flots were rapidly assessed and their potential established in relation to charcoal and other plant macrofossils. The presence of suitable dating material was also recorded. Further work was carried out on specific samples identified during the assessment process.

A monolith sample (M3) was taken from the wetland adjacent to the large burnt mound in plot 6/29.4 to determine the background pollen history of the site. The sample was obtained by machine excavating a trench into a marshy area at c.SH 52265 39617, close to the stream that ran across the plot. Two soil monoliths were collected from the burnt mound site in plot 6/29.4. Monolith M1 was from the possible buried soil layers (6294099/6294100) overlying and filling the upper part of feature [6294098/6294101], but this was not analysed. Monolith M2 was taken from a layer (6294096) interpreted on site as a buried soil that extended beneath the burnt mound. Monoliths M2 and M3 were recommended for full analysis (Jones 2012). The full analysis was carried out by Fiona Grant (see Grant 2013 for methodology).

Three soil micromorphology samples were taken from deposits within and under the burnt mound site in plot 6/29.4. These samples were originally labelled K1-3, but have been renamed M1-3 in the specialist report. Micromorphological sample K1/M1 was taken from the possible buried soil layers (6294099/6294100) adjacent to pollen monolith M1. Micromorphological sample K2/M2 was from layer (6294004) interpreted on site as a buried soil layer beneath the burnt mound deposit (6294045). Micromorphological sample K3/M3 was from (6294037), a silty deposit filling hollow [6294036], and probably also part of the buried soil pre-dating the burnt mound. These samples were studied by Dr Richard Macphail, (see Macphail 2013 for methodology).

It was proposed by the curatorial archaeologists that boreholes were drilled for palaeoenvironmental analysis in Traeth Mawr and the Dwyryd Valley, but the opportunity to do this was not taken advantage of. Such analysis may have provided a more general overview of the changing landscape of the area and particularly the development of the Dwyryd flood plain. This could have placed worked timber found by the river in a wider context.

6. STORAGE AND CURATION

6.1. Archiving repositories

Gwynedd Museum and Art Gallery, Bangor will hold the artefactual archive, including charred plant remains and charcoal, which has been prepared according to their guidelines. The finds have been bagged, boxed and marked with the accession code as agreed with the museum, and an inventory has been produced. Permission has been obtained from landowners for the deposition of the finds. The accession number for this archive is 2013/2.

The full paper and digital archive will be held by the Royal Commission on the Ancient and Historical Monuments of Wales. RCAHMW holds the national archive of digital site records for Wales and has facilities to actively curate the archive.

The digital archive comprises an Access database including summary information on all contexts and site registers, digital site photographs, backup scans of the context sheets, scans of all site drawings, and a digital copy of the site report.

The paper archive includes all significant site records, e.g. context sheets, site registers, site drawings, site diaries, level books. The paper element is stored in archive stable boxes and the Permatrace site drawings in cotton bags.

6.2. Discard policy

Museum space is limited so objects of little or no archaeological value have been discarded. This includes stone objects that have no traces of wear or use, and the post medieval pottery assemblage. These were fully described and studied before discard. The leather shoe pieces are late and would require expensive conservation if they were to be retained, so these have also been discarded. Similarly due to the expense of conservation and storage of the timbers the information from these has been preserved by detailed records and the timbers themselves were then discarded.

Table 1. Items that have been discarded from the archived collection

Find No.	Plot	Description of finds
02	1/2	Modern coins
08	3/2	Small heat-fractured boulder, probably unused
11	3/2	Small heat-fractured boulder, unused
13	3/2	Small broken boulder
26	6/22	Leather shoe soles from midden
30	3/20	2 sherds post-med pot
33	6/22	15 sherds late post-med pot
36	14/7	Wood
37	6/29.4	Wood
38	14/7	Wood
39	14/7	Wood
40	14/7	Wood
41	14/7	Wood
42	14/4	Wood
43	11/3	Wood
44	14/7	Wood
45	14/7	Wood
46	14/7	Wood
47	14/7	Wood
48	14/7	Wood
49	14/1	Wood
50	11/3	Wood
51	11/3	Wood
52	11/3	Wood
53	11/3	Wood
54	0/8	Wood
55	0/3	Unworked glacial cobbles
56	14/7	Wood
57	6/29.4	Wood
58	13/30	Wood
59	13/30	Wood

7. BACKGROUND INFORMATION

7.1. Landscape and Geology

James Rackham

The route of the pipeline runs along the southern side of the Llŷn peninsula between a ½ and 1½ kilometres from the coast from just east of Pwllheli to Criccieth. This is an area of arable and pasture at the present day. The route then moves slightly northwards to go around the north of the hill of Moel-y-gest and bypass Porthmadog on the north side. It crosses Traeth Mawr, an area of land in the valley of Afon Glaslyn reclaimed from the sea in the 19th century and used for arable and pasture. The route passes through Penrhyndeudraeth north of the A4971 before taking a similar course to the A487 to the tidal valley of Afon Dwyryd. The pipeline runs along the floor of the valley to Rhyd-y-sarn across land largely used for pasture, then up the head of the valley before turning north into higher terrain of rough pasture and moorland to Blaenau Ffestiniog.

The bedrock geology along this route is Ordovician mud and siltstones, with igneous extrusions, and including Ffestiniog Flags (mud and siltstones of Cambrian age) east of Criccieth (table 2). The superficial deposits along the whole route generally comprise tills (diamicton), deposited during the last glaciation, with occasional sands and gravels, and localised alluvial sediments where the pipeline route crosses river and stream valleys and former coastal areas. Much of the first part of the route lies at 10m OD or below with stretches rising to about 20m OD between Pwllheli and Criccieth, after which it moves three kilometres inland where it traverses higher ground, 80m OD, as it crosses behind Moel-y-Gest before dropping down to below 5m OD across the reclaimed land of Traeth Mawr, previously the tidal estuary of the Afon Glaslyn, then rising to nearly 30m again as it crosses the spit of higher ground on which Penrhyndeudraeth sits before falling again to 5m OD and below in

the valley of the Afon Dwyryd. The route follows the floor of the valley past Maentwrog, the land rising gradually to 25m OD at the head of the floodplain at Rhyd-y-sarn. It then follows the valley of the Afon Teigl eastwards before turning north above Llan Ffestiniog and rising rapidly into the uplands of Snowdonia to over 220m OD before terminating in Blaenau Ffestiniog at about 210m OD.

Starting in the west the route starts on igneous rocks of the Allt Fawr Rhyolitic tuff formation overlain by clay and silt rich diamictons (Devensian till; BGS Sheet 134 (Geology of Britain Viewer); Young, Gibbons and McCarroll 2002) just 0.6km from the coast before dropping down onto siltstones of the Cwm Eigiau formation overlain by Devensian tills (plots 0/2 and 0/3). The route again crosses an igneous extrusion, of the Penychain Rhyolitic complex in plot 0/8 where the trench cut across an area of rough pasture and wet ground and woody peats of about 1.5m thickness. The peat overlies Devensian till and is overlain by grey alluvial clays. In plot 0/11 a possible burnt mound site lies at 10m OD over mudstones of the Nant Ffrancon subgroup and superficial deposits of diamicton. A similar geology underlies the next few plots with another igneous extrusion of the Rhyolitic complex between plots 2/2 to 3/1, again covered by Devensian till. Plot 3/2 lies on Devensian till over mudstones of the Nant Ffrancon subgroup. Along the short stretch of pipeline north east of Hafan y Mor between plots 3/3 and 3/13 the route moves over sandstones of the Dywach formation and siltstones of the Cwm Eigiau formation covered by glacial till. All the soils of this first section of the route are described as freely draining slightly acid loamy soils (LandIS), although localised peats and marshy areas indicate more poorly drained soils.

From plots 3/14 to 3/20 the route runs within 500m of the coast over Devensian till covering undifferentiated mudstone, siltstone and sandstones (Llanvirn Rocks), before once again crossing an igneous extrusion of Felsic Tuff just west of the Afon Dwyfach. East of the river the Devensian tills cover mud and siltstones of the Caradoc Rocks up to about plot 4/6 after which the tills again cover an igneous extrusion of Felsic Tuff up to plot 5/7 north of Criccieth. From plot 5/7 to 6/11 the tills cover Llanvirn Rocks and then eastwards the route moves inland over Devensian tills sealing further mudstones, siltstones and sandstones of the undifferentiated Tremadoc Rocks. The soils across most of this part of the landscape that the pipeline crosses comprise seasonally permeable and seasonally wet acid loamy and clayey soils with very local areas more prone to waterlogging.

A burnt mound found in plot 6/21 overlies mud and siltstones of the Cyn-Afon Formation and a large burnt mound in plot 6/29.4, some 500m east, overlies similar rocks of the Ffestiniog Flags Formation, a series dated to the Cambrian Era. Another 640m north east of plot 6/29.4 another burnt mound at plot 6/33 lies on the same geology.

Between plots 6/29.4 and 6/50 the superficial geology is glacial tills overlying the Ffestiniog Flag Formation (BGS Sheet 119 (Geology of Britain Viewer); Howells and Smith 1997), on which are developed freely draining slightly acid loamy soils. But after plot 6/50 the route drops down onto reclaimed marine alluvium infilling the former estuarine bay and saltmarshes of the Afon Glaslyn. Former saltmarsh creeks are clearly visible on aerial photographs and the molluscan evidence from a sample of blue grey alluvial clay in plot 6/51 clearly indicates a former marine strand line at the western edge of this reclaimed saltmarsh. Between plots 6/51 and 7/13 the route crosses this reclaimed area, Traeth Mawr, where recent marine, tidal and warping sediments overlie till, with a bedrock of mudstone, siltstone and sandstones of the Cyn-Afon Formation on the western and eastern side, and mud and siltstones of the Nant Francon subgroup in the centre. These coastal flats and saltmarsh soils are of recent origin resulting largely from the construction of the Cob across the mouth of the bay, but the dating of a shell midden in Plot 7/1 at the northern base of Moel-y-Gest on the south-west edge of Traeth Mawr to the Iron Age suggests a former prehistoric coastline very close to the site.

The route rises eastwards from the south eastern edge of Traeth Mawr across the low peninsula of land lying between the valleys of the Afon Glaslyn and Afon Dwyryd. This area is covered with Devensian till, overlying mudstones, siltstones and sandstones of the Cyn-Afon formation. In places (plot 11/3) up to 2m of peats have developed over a fairly large area at about 15m OD, but elsewhere the soils are freely draining slightly acid loams. The underlying geology between plots 13/3 and 13/8 are mudstone and siltstone of the Dolgellau formation and as the route drops down onto the floor of the Afon Dwyryd valley this changes to the Ffestiniog Flag Formation which underlies the valley as far as Rhyd-y-Sarn (plot 14/19), where similar rocks are assigned to the Maentwrog Formation. For the whole of this section the route lies on alluvial sediments of the Afon Dwyryd, mainly silts and silty clays, making loamy and clayey floodplain soils with a high ground watertable, and at risk from occasional seasonal flooding.

After Rhyd-y-Sarn the route follows the Afon Teigl across Devensian till overlying mud and siltstone of the Maentwrog Formation as far as plot 15/19, where similar mud and siltstones are assigned to the Ffestiniog Flag Formation and continue to plot 15/29. The bedrock changes to mud and siltstones of the Dolgellau Formation between plots 16/1 and 16/6, and then the Dol-Cyn-Afon Formation from plots 16/7 to 18/1, with sandstones and siltstones of the Lwyd Formation underlying the last two plots 18/2 and 18/3.

Superficial deposits comprise diamicton (Devensian till), where these have not been eroded off. The soils across the whole of this upland stretch are described as freely draining slightly acid loamy soils over rock. Little significant archaeology, other than post-medieval industrial workings, was found along this upland stretch of the route.

Boreholes created for a geotechnical survey in advance of the pipe works (Johnson 2009) gave some indication of the depths of deposits in Traeth Mawr and the Dwyryd valley. Just to the north of the Cob sand deposits, some with shell fragments, were 12m deep. Deposits in the Dwyryd valley were also up to 12m deep. These deposits were mostly alluvial, although the lower part was probably glacial and peri-glacial gravels. Organic deposits were explicitly recorded in two occasions: a peaty deposit was found down to 8.8m in borehole 21 and a deposit with wood fragments was found down to 6.9m in borehole 20. These indicate potential locations for the preservation of palaeoenvironmental information, although the recording of the trench carried out during the watching brief recorded many more such locations. The borehole data gives an indication of the full depth of deposits as the watching brief could only record the upper 1m to 1.5m as exposed in the pipe trench. (See appendix IV for details on boreholes and figure showing location and depths of boreholes in Dwyryd Valley).

Table 2. Soils and geology at the sites along the pipeline

Sites (plot no.)	**Altitude (m OD)**	**soils**	**superficial geology**	**bedrock**
0/1	10	Freely draining slightly acid loamy soils	Diamicton, Devensian till	Fawr phyolitic tuff formation – igneous
0/2	5	Freely draining slightly acid loamy soils	Diamicton, Devensian till	Cwm Eigiau formation – siltstone
0/3	15	Freely draining slightly acid loamy soils	Diamicton, Devensian till	Cwm Eigiau formation – siltstone
0/8	5	Freely draining slightly acid loamy soils	Diamicton, sands and gravels	Pen-Ychain Rhyolitic Complex – igneous
0/9	5	Freely draining slightly acid loamy soils	Diamicton, sands and gravels	Cwm Eigiau formation – conglomerate and sandstone – interbedded
0/11	10	Freely draining slightly acid loamy soils	Diamicton, sands and gravels	Nant Ffrancon subgroup – mudstone
1/2		Freely draining slightly acid loamy soils	Diamicton, sands and gravels	Nant Ffrancon subgroup – mudstone
3/2	21	Freely draining slightly acid loamy soils	Devensian till, clay and silt rich diamicton	Nant Ffrancon subgroup - mudstone
3/6	10	Freely draining slightly acid loamy soils	Diamicton, sands and gravels	Cwm Eigiau formation – siltstone
3/10	10	Freely draining slightly acid loamy soils	Diamicton, sands and gravels	Cwm Eigiau formation – siltstone
3/14	10	Seasonally permeable and seasonally wet acid loamy and clayey soils	Diamicton, Devensian till	Llanvirn Rocks – mudstone, siltstone and sandstone
3/20	15	Freely draining slightly acid loamy soils	Diamicton, Devensian till	Llanvirn Rocks – mudstone, siltstone and sandstone
3/27	19	Seasonally permeable and seasonally wet acid loamy and clayey soils	Diamicton, Devensian till	Caradoc Rocks – mudstone, siltstone and sandstones
5/5	75	Seasonally permeable and seasonally wet acid loamy and clayey soils	Diamicton, Devensian till	Undifferentiated igneous extrusion, Felsic Tuff.
6/6	69	Seasonally permeable and seasonally wet acid loamy and	Diamicton, Devensian till	Llanvirn Rocks - undifferentiated mudstones, siltstone and sandstone

		clayey soils		
6/10	63	Seasonally permeable and seasonally wet acid loamy and clayey soils	Diamicton, Devensian till	Llanvirn Rocks - undifferentiated mudstones, siltstone and sandstone
6/21	80	Freely draining slightly acid loamy soils	Diamicton, Devensian till	Dol-Cyn-Afon formation – mudstone and siltstones
6/22	75	Freely draining slightly acid loamy soils	Diamicton, Devensian till	Dol-Cyn-Afon formation – mudstone and siltstones
6/29.4	27	Freely draining slightly acid loamy soils	Diamicton, Devensian till	Ffestiniog Flags formation – mudstone, siltstone and sandstone
6/33	48	Freely draining slightly acid loamy soils	Diamicton, Devensian till	Ffestiniog Flags formation – mudstone, siltstone and sandstone
6/38	45	Freely draining slightly acid loamy soils	Diamicton, Devensian till	Ffestiniog Flags formation – mudstone, siltstone and sandstone
6/39	45	Freely draining slightly acid loamy soils	Diamicton, Devensian till	Ffestiniog Flags formation – mudstone, siltstone and sandstone
6/44	50	Freely draining slightly acid loamy soils	Diamicton, Devensian till	Ffestiniog Flags formation – mudstone, siltstone and sandstone
6/47	45	Freely draining slightly acid loamy soils	Diamicton, Devensian till	Ffestiniog Flags formation – mudstone, siltstone and sandstone
6/51	5	Loamy and clayey soils of coastal flats with naturally high groundwater	Marine alluvium, saltmarsh clays and silts	Dol-Cyn-Afon formation – mudstone and siltstones
7/1	5	Loamy and clayey soils of coastal flats with naturally high groundwater	Devensian till	Dol-Cyn-Afon formation – mudstone and siltstones
7/2	3	Loamy and clayey soils of coastal flats with naturally high groundwater	Marine alluvium, saltmarsh clays and silts	Dol-Cyn-Afon formation – mudstone and siltstones
7/8	2	Saltmarsh soils	Marine alluvium, saltmarsh clays and silts	Nant Ffrancon subgroup – siltstones
7/13	3	Saltmarsh soils	Marine alluvium, saltmarsh clays and silts	Dol-Cyn-Afon formation – mudstone and siltstones
9/6	24	Freely draining slightly acid loamy soils over rock	Head – alluvium, clay, silt , sand, gravel and peats	Dol-Cyn-Afon formation – mudstone and siltstones
11/3	17	Freely draining slightly acid loamy soils over rock	Peat	Dol-Cyn-Afon formation – mudstone and siltstones
13/30	3	Loamy and clayey floodplain soils with naturally high groundwater	Alluvium, clay, silt, sand, gravel	Ffestiniog Flags formation – mudstone, siltstone and sandstone
14/1	4	Loamy and clayey floodplain soils with naturally high groundwater	Alluvium, clay, silt, sand, gravel	Ffestiniog Flags formation – mudstone, siltstone and sandstone
14/4	4	Loamy and clayey floodplain soils with naturally high groundwater	Alluvium, clay, silt, sand, gravel	Ffestiniog Flags formation – mudstone, siltstone and sandstone
14/7	7	Loamy and clayey floodplain soils with naturally high groundwater	Alluvium, clay, silt, sand, gravel	Ffestiniog Flags formation – mudstone, siltstone and sandstone
17/3	199	Freely draining slightly acid loamy soils over rock	Diamicton, Devensian till	Dol-Cyn-Afon formation – mudstone and siltstones
17/15	180	Freely draining slightly acid loamy soils over rock	Diamicton, Devensian till	Dol-Cyn-Afon formation – mudstone and siltstones
18/3	215	Freely draining slightly acid loamy soils over rock	Diamicton, Devensian till	Lwyd formation – interbedded sandstone and siltstone

7.2. Archaeological and historical background

Figure 5
The Llŷn Peninsula is largely low-lying and has relatively good farmland so the archaeology has suffered from the destructive effects of farming, but development is low-level so the discovery of buried archaeology through excavation is relatively rare. This means that the archaeology known from the area tends to be restricted to site types less likely to be destroyed and that are visible above ground, particularly chambered tombs and hillforts. More sites survive on the uplands around the northern side of Traeth Mawr and along the sides of the Dwyryd valley. However few of these sites have been excavated and their dates can be uncertain.

Some of the flint scatters identified on the Llŷn Peninsula have elements more or less diagnostic of Mesolithic activity, especially those found on the coast at the western end of the Peninsula and on Bardsey Island. Further east there are few traces of Mesolithic activity but a rock shelter at Garreg Hylldrem recently excavated on the shore of the former Glaslyn estuary has produced Mesolithic dates from a shell midden (G Robinson pers. comm.).

Neolithic activity in the area is mainly indicated by the chambered tombs, which are relatively common on the Llŷn Peninsula but not known to the east in the uplands. The few other Neolithic sites are predominantly casual finds of stone axes with some flint scatters but very few excavated remains. However there has been recent excavation at the stone axe quarry on Mynydd Rhiw, which appears to have been in use throughout much of the Neolithic period (Burrow 2011).

Bronze Age sites are more numerous but again a large proportion of them are burial sites. Burial cairns are present on the uplands with cists and cremation burials revealed on the lowlands by farming and other modern activity. Where these have been excavated it has often been in the 19th century and in a more or less casual manner. A cremation burial was recently excavated on the route of the improved A497 close to the present pipe route (Berks *et al* 2007).

Relatively few burnt mounds are known in the area but several of those have been found by excavation, both along the A497 and on the shore of Porth Neigwl at Nant Farm (Smith 2009). Settlement sites are even fewer. Many of the hut circles on the higher uplands are assumed to be Bronze Age in date as settlement retreated due to climatic deterioration in the beginning of the first millennium BC. However the distribution of bronze axe finds and burials suggest that the lowlands, such as the Llŷn Peninsula, must have been a focus of settlement (Smith 1999). These lowland settlements have been difficult to identify but one dating to the middle Bronze Age was excavated at Meyllteyrn Uchaf, Sarn Mellteyrn (Ward and Smith 2001).

There are ten double ringwork enclosures on the Llŷn Peninsula, which represent settlement sites that may have originated in the late Bronze Age and continued into the Iron Age (Karl and Waddington 2011, 1). These include Castell Odo, which was excavated in the 1950s (RCAHMW 1964, 8) and the neighbouring site of Meillionydd, currently undergoing excavation (Karl and Waddington 2011)

The Iron Age is characterised by hillforts, including Moel y Gest, and possibly Moel Ednyfed, close to the pipe route, but many of the sites on the HER marked as Roman period are roundhouse settlements that probably originated in the Iron Age, or even the late Bronze Age (Smith 1999). Few of these have been excavated so their dates are generally unknown with stone-built roundhouses often assumed to be of Roman date. Some have produced Roman material but the scarcity of diagnostic Iron Age artefacts from this area makes Iron Age activity difficult to identify even on excavated sites unless they have been securely radiocarbon dated. However some of the settlements were originally built in the Roman period such as the roundhouse at Rhiwgoch, near Harlech (Kenney 2012b). The known roundhouse settlements are very much concentrated on the uplands, where they have survived as visible monuments, but aerial photography has shown that more formerly existed in the lowlands (Ward and Smith 2001).

The Roman forts at Caernarfon, Pen Llystyn and Tomen y Mur strongly influenced the distribution of Roman military activity in the area. The roads linking the forts ran through the mountains and along the western edge of the hills. There was little need to travel down the Llŷn Peninsula so settlements here would have been only on the edge of the Roman economic and political systems, unlike those towards the eastern end of the pipe route.

In the medieval period the area would have been dominated by the castles, first those of the Welsh princes such as Criccieth, then those built by Edward I, such as Harlech, although Criccieth and other Welsh castles were rebuilt and used by Edward. There were also the homes of the local lords, such as Tomen Fawr near

Llanystymdwy. Many of the churches are medieval, and although none have fabric dating from earlier than 12th century, some have traditions of early origins in the 5th or 6th centuries AD. Some of these early church sites are associated with holy wells, and there are earlier monuments with Christian inscriptions. The HER has many other sites including structures relating to ecclesiastical sites on Bardsey, Aberdaron and Clynnog. There are also more ordinary houses, field systems, long huts in the hills and other remains.

In the post medieval period the main concentration of drainage and agricultural improvement work was in Traeth Mawr and the Dwyryd valley where large areas of land were reclaimed for agriculture. However improvements, including extensive enclosure, would have been seen across the richer land of the Llŷn Peninsula. The uplands would have been less altered but changes from cattle to sheep on the hills would have changed the appearance of the land and how people used it. The hills around Blaenau Ffestiniog were particularly changed by slate quarrying but this influenced much of the Dwyryd valley with a railway being built and before that the use of the river for slate transport. The towns also developed to house the people and services related to industry and shipping.

8. FIELDWORK RESULTS

Thirty-nine sites were investigated and recorded during the fieldwork. These range from post-medieval drains of low significance to an extensive and complex group of features related to burnt mound activity of late Neolithic and Bronze Age date. On investigation some of the sites proved to be natural features.

Each plot is considered individually below with information from the specialist reports combined with descriptions of features and deposits. A brief summary of the specialist results for the project as a whole is then given. The results of recording the field boundaries are also summarised below.

The general locations of the sites are shown on figures 1 to 4. The numbers in brackets below are context numbers; those in square brackets are cut numbers and those in round brackets are deposits, fills and other contexts. Numbers prefixed by SF are find numbers and refer to specific artefacts. Where other existing sites are mentioned they are referred to using the Gwynedd Historic Environment Record Primary Record Numbers (PRN), and new PRNs have been allocated to sites found during this project.

8.1. Plot 0/1: Probable stone-filled drain (PRN 34075)

Grid Reference: SH 38544 35997 A
Period: Post-medieval
Mitigation undertaken: Investigated during the watching brief and recorded on the topsoiling sheet.

Plates 1 and 2, for location see figure 1
A linear stone feature was found running north-north-east to south-south-west parallel to the track. This was composed of large sub-angular stones, up to 0.74m in length, some of which were laid flat. Other stones that lay at an angle had probably originally been flat but had either collapsed into the feature or been disturbed by the plough. Under these was a quantity of densely packed smaller stones.

This feature was exposed for a length of about 5m and was 1.06m wide and 0.49m deep. This feature was initially interpreted as a wall but the densely packed stoned under the flat slabs are suggestive of a stone-filled drain. These drains are not necessarily capped but in this case a rough capping seems to have been added.

This feature was on flat land below 10m OD and the fact that it ran parallel to the 19th century track to Tan-yr-allt farm suggests a drain created soon after the fields were laid out, probably in the mid-19th century.

8.2. Plot 0/2: Burnt mound spread (PRN 34076)

Grid Reference: SH 38674 36216
Period: Bronze Age?
Mitigation undertaken: Identified and recorded in section during pipe trench watching brief, with basic recording on the trench sheet.

See figure 6 and plate 3
Buried beneath between 0.2m and 0.7m of grey-brown stony silt was a black, charcoal rich layer containing burnt stones. For a considerable depth beneath this the natural subsoil had been reddened by the heat. The black

layer showed up most clearly in the south-western side of the trench and it extended for 12-13m. It was closest to the ground surface at the south-western end and sloped down towards the north-east.

This site was located at about 5m OD, 30m south-west of a small stream. No other burnt mounds are known in the immediate area.

This site was identified in the pipe trench by the team digging the trench. This occurred before GAT was authorised to monitor the trench digging and no requirement was made for detailed recording of this site. Recording therefore consisted of photographs and brief notes before the pipe trench was backfilled.

8.3. Plot 0/3: Pit/gully terminus (PRN 34077)

Grid Reference: SH 38718 36289
Period: Unknown
Mitigation undertaken: Hand excavated and recorded during the watching brief

See figures 6 and 7, and plate 4.
An elongated feature [03005] was found, aligned north-west to south-east. This was possibly the terminus of a gully, as it continued under the baulk to the north-west. A length of 1.8m was exposed in the trench and its width was 0.86m and the depth 0.27m. The south-eastern terminus was rounded, and the sides sloped gradually to a rounded base. The brown loamy fill included charcoal and burnt clay as well as numerous stones, some of which appeared to be heat-shattered.

Two stones (SF55) were recovered because they were considered to be possible hammerstones, but proved to be unused natural cobbles (Smith 2013b). There was also a small piece of iron (SF01), which appeared as a corroded mass (Goodwin 2013b), and a small amount of hammerscale was collected from the wet sieving as well as burnt stone and burnt earth (Rackham and Giorgi 2013).

This is a rather irregular feature of uncertain date, although the presence of an iron object and some hammerscale may indicate a fairly late date.

Hazelnut shell, grass seeds, dock seeds and a few fragments of unidentifiable cereal grain were identified among the charred plant remains, but afford little interpretive value. However charcoal was abundant and well-preserved. The charcoal was solely from oak, with both sapwood and heartwood present. Three fragments of charcoal appeared to have traces of working, although this is difficult to determine (Challinor, Giorgi and Rackham 2013).

The site lies at about 15m OD on a slight rise in the glacial boulder clay on the edge of a wet, low-lying area forming part of the flood plain of a tributary to the Afon Erch. The Yoke House hut circle (PRN 432) lies about 630m to the north-west, indicating some Iron Age or Roman period activity in the general area. The iron suggests that this feature was probably not related to a burnt mound. Although Iron Age burnt mounds are known elsewhere in Britain and Ireland they are rare and are not known from Wales. The function and date of this feature remains unknown.

8.4. Plot 0/8: Timber find spot (PRN 34078)

Grid Reference: SH 39047 36352 A
Period: Unknown
Mitigation undertaken: Recorded during watching brief, timber sampled and studied.

See figure 6 and plate 5
The pipe trench cut through a marshy area where a layer of light grey clay overlay a thick bed of peat, which was about 1.5m deep. Occasional pieces of wood were visible in the peat, mainly branches up to 0.65m in length and about 0.1m in diameter. A sample of a large timber was retained for study. This was a badly decayed piece of birch roundwood with no tool marks to suggest it was worked, and it is likely to have been part of natural woodland (Nayling and Bale 2013).

This marsh lies at a height of about 5m OD in the valley of a small tributary to the Afon Erch. It is shown as marsh on the 1889 OS map although there had been considerable efforts by this time to drain it.

8.5. Plot 0/9: Non-archaeological deposits (PRN 34079)

Grid Reference: SH 39260 36328

Mitigation undertaken: Machine and hand cleaning around the feature, basic recording during watching brief.

See figure 8 and plate 6
An irregular dark area was noted during stripping. This was 0.4-0.6m below the present surface directly on the natural alluvial silts. There was a slightly higher concentration of stones within the dark area than elsewhere but the difference would not have been noticed without the darker colour. The colour was a dark purple brown and therefore mostly due to natural manganese staining, although some charcoal is recorded as being present. It was concluded that this was probably a tree root hollow, which had altered the hydrology and therefore caused the manganese precipitation. Some of the tree or bush seems to have been removed by burning resulting in some charcoal in the deposit.

8.6. Plot 0/11: Possible burnt mound (PRN 34080)

Grid Reference: SH 39424 36386
Period: Bronze Age?
Mitigation undertaken: Recorded during watching brief on the trench record sheet.

See figure 8 and plate 7
A dark grey layer was recorded in the side of the pipe trench. This was about 1.6m below the present ground surface and extended for nearly 30m. The layer contained few stones, although occasional stones thought to be burnt were noted towards the edge of the deposit. It is possible that this was the edge of a burnt mound but there does not seem to have been the distinctive burnt stone layer typical of these features.

This site lay at just under 10m OD about 85m north of the Afon Erch, with no small streams nearby. The only burnt mound known in the area is that found in plot 0/2 770m to the west. However the adjacent field is called Cae Carn (cairn field) on the Abererch tithe map (1841), possibly indicating that other mounds were visible in the past. The name of Yr Odyn (the kiln) for buildings nearby on the OS first edition map presumably relates to more recent history, but it is a term that may be applied to a burnt mound visible in a field.

8.7. Plot 1/2: Modern coins

Grid Reference: SH 39590 36376 A
Period: Modern
Mitigation undertaken: Recorded during watching brief

Four 2p and 1p coins dating to the 1980s were found in the remains of a leather wallet. These were found in the topsoil and are of no archaeological significance. No PRN has been allocated to this find as is it not considered significant enough.

8.8. Plot 3/2: Corn drier and pits (PRN 34081 and 34082)

Grid Reference: SH 41856 36698
Period: Medieval and Iron Age
Mitigation undertaken: Area machined down to level where archaeology was exposed, area cleaned and hand excavated and recorded.

Description
See figures 9, 10 and 11, and plates 8-14
A feature with a roughly dumb-bell shaped cut [32009] was identified mainly due to the stones lining it projecting into the ploughsoil. The feature measured 6.6m in length and varied between 0.86m and 2.2m in width. It was aligned roughly west-north-west to east-south-east. It swelled into rounded chambers at each end and these were joined by a narrow channel.

The chamber at the west-north-western end was roughly oval measuring 2.1m by 1.5m and had been lined with stones (32007), although some of these had been removed and others seem to have been disturbed and heaped back into the corner of the cut (32030). The chamber was about 0.5m deep, and the sides were fairly well-defined but sloped quite gradually into a flat base.

The more steeply sided channel opened from this chamber to the east-south-east. The stone lining (32007) continued along the channel, where it was regular and generally well-preserved, with many of the stones carefully set on edge. This channel may have been covered by capping stones; certainly there was one large slab (32006) which lay across the south-eastern end of the channel where it opened into the other chamber. This

chamber measured about 2.3m by 2.0m and was 0.5m deep. The sides sloped quite gradually and there was no evidence of stone lining at this end.

Many of the lining stones, especially in the joining channel, appeared heat-altered, although stones resistant to heat fracture had obviously been chosen and few were cracked. In the base of the channel, especially under the capstone (32006), was a burnt, reddened silt with some charcoal (32004). In the west-north-western chamber a layer of fairly flat stones (32025) in its base may have formed a rough surface, although it would have been quite irregular. This chamber seems to have filled partly by erosion (32020) then a dense group of stones were dumped into it (32024). These stones were generally not heat-altered, but may have originated from the upper part of the structure. The channel seems also to have filled in by erosion with some structural stones collapsing in. The east-south-eastern chamber had an erosion layer in its base mixed with some charcoal, but with no traces of *in situ* burning. The remainder of the fill was the same as the rest of the feature.

This feature (PRN 34081) was probably a corn drier. The fire seems to have been lit under the large capstone. There is no firm evidence for burning in the east-south-eastern chamber so this may have been used mainly for access. The heat of the fire would be drawn through the channel, which would act as a flue, to the west-north-western chamber. A loose layer of branches would probably have been laid over this end on which a cloth containing the grain could be placed.

Nearby were two pits (PRN 34082). One pit [32014] almost touched the disturbed west-north-western end of the corn drier. This pit was nearly circular and measured 1.12m by 1.05m. It was 0.39m deep with fairly steep sides curving gradually into a flat base. In the base of the pit were a patch of heat-reddened sandy silt (32021) and a compact dump of small burnt stones (32022). Together these formed a rough lining to the cut. The pit was filled with large sub-rounded stones up to 0.5m in length, many of which were heat fractured or reddened (32019/32013). The stones were densely packed into the cut, but did not seem to be either post-packing or lining. A large stone (SF20) was included in the fill. This is a thin slab worn smooth with use, although it is too fine for use as a quern. There was no direct relationship between this pit and the corn drier. Both the corn drier and the pit had been disturbed by animal burrowing.

About 2.8m north-west of the end of the corn drier was another pit [32003] measuring 1.5m in diameter and 0.4m in depth. This had a reddish layer (32023) in its base, probably representing *in situ* heating. Over this was a rough ring of six heat-altered stones (32017), one of which (SF7) was a quern stone (Smith 2013b). These were covered by a layer of heat-reddened sand mixed with charcoal (32016), and the majority of the pit was filled with heat fractured large stones in a brown sandy matrix with charcoal flecks (32012). The stones in the base seemed to have been deliberately placed probably to help retain heat if the pit was used as a fire pit or oven.

Pit [32003] contained a variety of quern stones and rubbing stones, mostly broken. These included two saddle querns (SF7, SF9), one broken, fragments of two other saddle querns (SF14, SF18.1), a saddle quern rubber (SF18.2), a pebble rubbing stone with facetted edges (SF10) and a worn cobble (SF12) (Smith 2013b) (plates 13 and 14). These objects had been burnt during their reuse and this accounts for them being broken.

Hammerscale was found in all three features but the fills of pit [32014] produced the highest densities (although only 1.3g in total) (Rackham and Giorgi 2013). This indicates smithing in the area and it may have been contemporary with pit [32014]. The wet sieving residues also produced small quantities of unidentifiable burnt animal bone (both sheep and cattle sized fragments) and fired earth or daub from the corn drier (Rackham and Giorgi 2013). A flake of crystal quartz (SF64) was found in pit [32003], a flint flake (SF66) came from the corn drier and a possibly utilised flint blade (SF19) came from an animal burrow adjacent to the corn drier (Smith 2013a).

The environmental remains show a clear distinction between the corn drier and the pits. Soil samples from the corn drier were rich in charred cereals, dominated by oats, with barley, wheat and rye also present. None of the cereal grains had sprouted to suggest a use for malting. A range of charred weed seeds probably came in with the cereals, and there was little chaff in any of the samples. A seed of common vetch may represent the use of vetch as animal feed. Hazelnut fragments were also recorded, possibly introduced with fuel wood. Together this assemblage supports the interpretation of this feature as a corn drier (Challinor, Giorgi and Rackham 2013).

As oats are common medieval cereals in the area and have previously been found charred in corn driers this supported a medieval date for this feature, which was confirmed by radiocarbon dates. Three charred cereal

grains, two oat grains and a wheat grain, from the lower part of the fill of the corn drier were submitted for dating. The resulting dates were as follows:

Lab ID	Context number	Context description	Material	Radiocarbon age (BP)	Calibrated date (95% confidence)
SUERC-44174	32002	fill of corn drier [32009]	charred grain: *Avena* sp.	851 ±25	cal AD 1150–1260
SUERC-44175	32018	fill of corn drier [32009]	charred grain: *Triticum* spp.	891 ±26	cal AD 1040–1220
SUERC-44177	32018	fill of corn drier [32009]	charred grain: *Avena* sp.	839 ±25	cal AD 1150–1260

The best estimate for the date of this feature is *cal AD 1175–1260* (*95% probability*), and probably *cal AD 1185–1255* (*68% probability*) (Hamilton 2013), demonstrating that it was probably used in the late 12th or early 13th centuries AD.

Oak was the dominant species in the charcoal assemblages from the corn drier, and presumably represents the main fuel-wood used to stoke the drier, but some alder and hazel was also used indicating that wet ground or riverside trees were also being exploited (Challinor, Giorgi and Rackham 2013).

In contrast to the corn drier the charred plant assemblages in the two pits were dominated by glume wheats, particularly emmer. The fills of pit [32003] had a high proportion of charred cereal grains but little chaff or weeds seeds. Emmer wheat was the most common grain in this pit, but there were hints of spelt wheat and a small number of barley grains. A single oat grain was probably present as a weed. The fills of pit [32014] contained few remains but again mainly wheat. Most of the weed seeds present were of arable weeds, some species suggesting cultivation on well-drained sandy soils. The presence of *Danthonia decumbens* (heath grass) may indicate ploughing with and ard rather than a mould board plough (Challinor, Giorgi and Rackham 2013).

Emmer wheat is normally associated with prehistoric sites (Challinor, Giorgi and Rackham 2013), so its presence suggested that the pits were not contemporary with the corn drier, and this was confirmed by radiocarbon dates.

Lab ID	Context number	Context description	Material	Radiocarbon age (BP)	Calibrated date (95% confidence)
SUERC-44176	32016	fill of pit [32003]	charred grain: *Triticum* spp.	2319 ±26	410–370 cal BC
SUERC-46825	32016	fill of pit [32003]	charred grain: *Hordeum* sp.	2290 ±29	410–230 cal BC
SUERC-46253	32019	lower fill of pit [32014]	charcoal: *Alnus/Corylus* sp., roundwood	2269 ±30	400–210 cal BC
SUERC-46254	32021	stone lining of pit [32014]	charcoal: *Corylus avellana*, roundwood	2282 ±30	400–230 cal BC

If these dates are subjected to Bayesian modelling they suggest that the activity in plot 3/2 associated with these two pits began in probably *410–380 cal BC*, lasted for probably *1–40 years* and ended in probably *390–355 cal BC* (all at 68% probability) (Hamilton 2013). The dates indicate that the two pits could be contemporary and used over a short period of time in the middle Iron Age.

The charcoal assemblage from pit [32003] was dominated by hazel, with a lesser presence of oak, mainly from twigs and small branches, and representing small hazel brushwood, presumably collected as fuel. Pit [32014] only produced a few small fragments of charcoal which were difficult to identify, but identifiable pieces included oak, hazel and broom or gorse; the last indicating the presence of heathland type habitats. The paucity and size of the charcoal suggests that it could have been wind-blown or dispersed material rather than a coherent deposit derived from a single activity. This pit therefore does not seem to have been used as a hearth or oven like [32003], despite traces of burning in its base.

Discussion
The radiocarbon dates have proved that what initially appeared to be a coherent group of features belonged to two very different periods; medieval and Iron Age. The two flints and flake of quartz crystal may indicate earlier prehistoric activity as well, although the evidence of this is very slight.

Iron Age pits
The quern stones and rubbers from pit [32003] must have been deliberately placed in the pit. They are domestic objects of a type associated with Iron Age settlement, and overall the finds and charred plant remains are consistent with an Iron Age date for the pits. One of the querns is of a neat oval form, a developed type that could be expected to be late in the occurrence of such objects. Rotary querns are believed to have come into use in north Wales in the late first century BC or first century AD, but saddle querns did continue in use later.

The pits are likely to be domestic. The lower ring of stones in pit [32003] seems to have been *in situ* and heated in the pit. The stones would have retained heat to make the hearth more efficient. The charcoal present was consistent with fuel wood, and the grain-rich charred plant assemblage supports the idea that the pit was used for cooking, so a function as a hearth or oven seems likely. The lack of fuel charcoal in pit [32014] argues against this being used for a fire but the heat-reddened deposit in the base suggests *in situ* burning. The number of burnt stones in the fill also suggests a close relationship to fire, but the quantity of hammerscale within the pit was insufficient to suggest the use of the pit as a smithy and its function is unknown.

The dominance of cereal grains in the two fill samples and the paucity of chaff fragments and weed seeds suggest that the charred remains derive from a virtually cleaned and de-husked crop of emmer wheat with some barley, the grains being accidentally burnt while being dried before milling or as a result of a cooking accident.

Emmer was the main wheat grain cultivated in the earlier prehistoric period in Britain but appears to have been largely replaced by spelt during the first millennium BC in southern England, although it may not have always been the case in Wales. Emmer, possibly combined with barley, could have been used for making unleavened loaves, made into porridge or gruel or added to stews or soups. There were no germinated grains to suggest the use of any of the cereals for brewing beer.

The few charred wild seeds were probably arable weeds. These suggest the cultivation of sandy acidic soils, but there is also evidence for the use of damper soils, with some suggestion that ards rather than mouldboards were being used for ploughing. Emmer and barley may be both spring and autumn sown but some of the weeds suggest the spring-sowing. Other weeds may point to harvesting by cutting low down on the stem or possibly by uprooting (Challinor, Giorgi and Rackham 2013).

There was no trace of a contemporary structure, so the pits seem not to have been inside a dwelling. The quern stones are clearly reused from elsewhere but are unlikely to have been brought far, indicating a settlement very close by. The querns may just have been conveniently available for reuse in the fire pit, but their use may have been determined by other factors. The querns were not greatly worn so they were not discarded merely because they were unusable. Most are broken but this seems to have been the result of heating and most were probably not broken when deposited in the pit.

This site is located on a sandy ridge at about 21m OD overlooking the coastal marshes and a stream valley leading into the Afon Ddu. In the stream valley just over 200m south-east of this site an possible Iron Age structure was found during work in advance of the improved A497 trunk road (PRN 31145, Berks *et al* 2007, 14-16). The structure was slight, its walls defined by a line of boulders and there was a central hearth with part of a cobbled surface around it. This was dated to 50 cal BC – cal AD 110 (Beta-204430), so it seems to have been later than the pits. The area was used in earlier periods, with a probable ring ditch from a Bronze Age barrow located by aerial photography to the north (PRN 24772, Driver 2005, 114). Two small pits with Bronze Age pot sherds and a Bronze Age radiocarbon date were found on the line of the A497 about 470m to the east (PRN 31147, Berks *et al* 2007, 11-12). The area would have been favourable for settlement in the Iron Age and the presence of the quern stones suggest a settlement nearby but so far the location of this has not been identified. Two circular banks that may be the remains of Iron Age roundhouses were located 950m east of the site (PRN 5732, Mason 1993, 6), but this seems a long way to carry worn-out querns for disposal or reuse. About 300m east a semi-circular linear feature was identified during the geophysical survey in advance of improvements to the A497 (Donaldson 2004, area 19) (PRN 30498), but trenching in the area revealed no archaeological features and nothing was identified during the subsequent watching brief (Davidson et al 2007, 47 (trench 42)). However the survey data was quite regular and convincing and it is possible that this was a largely ploughed out enclosed settlement of which little remained and any surviving features were missed during

the watching brief. With this absence of evidence it is clearly not possible to claim that this was the settlement from which the querns originated.

There was a hay crop on plot 3/2 when the geophysical survey was carried out so this area was not investigated geophysically. The survey done by Stratascan of the route of the current A497 (Donaldson 2004) showed slight linear anomalies in the area immediately south of plot 3/2, which might possibly relate to an early field system but nothing was recorded during the works on the road.

Corn drier

Corn driers are required both to preserve grain and to allow easier milling. They can also be used to encourage malting of barley, although there was no evidence of this on the present site. Whilst the drying of corn will have been undertaken throughout prehistory, specific structures for this purpose date from Roman times onwards (O'Sullivan and Downey 2005, Scott 1951).

The radiocarbon dates demonstrate that this corn drier was used in the late12th or early 13th centuries AD. This is the approximate period to which many of the excavated corn driers in the region date. A partially stone-lined corn drier at Cefn Du, Anglesey was dated to cal AD 1000-1280 (Wk-9275) (Cuttler *et al* 2012, 25). A corn drier at Graeanog, Clynnog was dated between 880-1160 cal AD (CAR-934) and 1040-1280 cal AD (CAR-932) (Kelly 1998, 132), and one at Parc Bryn Cegin, Llandygai to between cal AD 1040-1260 (Wk-20035) and cal AD 1020-1220 (Wk-20036) (Kenney 2008, 132). A corn drier at Llanbebelig, Caernarfon was dated to cal AD 1050–1260 (SUERC-42596) and cal AD 1220–1280 (SUERC-41961) (Kenney and Parry 2013, 39). There appears to have been an increase in the use of corn driers in this period. This is probably related to the increase in the cultivation of oats, which are generally picked under-ripe and then require drying (McKenna 2013).

The grains in the corn drier may have been accidentally burnt while being dried before milling or storage. Oat was the principal grain while the other cereal grains may have been left over from previous use of the drier or may have been weeds of the oat crop. The scarcity of chaff from all the corn drier samples might indicate that a cleaned crop was being dried in the structure. The presence of weed seeds provides some hints of the arable regimes in the area. The weed assemblage suggests that different soil types may have been used for growing crops, with species represented that grown on acid sandy soils and other that grow on clays soils. It is possible that the oats may have been growing on acidic sandy soils, similar to those used in the Iron Age period of the site, while free-threshing wheat was cultivated on richer soils. Some of the weeds are associated with spring-sown crops, as would be expected for oats, but there were also some weeds of autumn-sown crops and these might have been associated with the wheat and barley. The presence of some twining weeds may indicate the crop stems being cut low down during harvest (Challinor, Giorgi and Rackham 2013).

The shape of the corn drier in plot 3/2 is a classic form as corn driers are often keyhole or dumb-bell shaped (O'Sullivan and Downey 2005). However many are much simpler and often not lined. This is a large and well-built example indicating that it was built by people with the resources to do so and was presumably intended for fairly long term use. Its location may be significant. It is likely that it was adjacent to the medieval coastal road. Earthworks and buried remains of the 1803 turnpike road (PRN 5729) were identified during the A497 works (Davidson *et al* 2007, 26) and this could be seen running towards the site. The road, or one along a similar line, would have been in use in the medieval period (William-Jones 1977, 78) and may have been used to bring grain for drying. The evidence for grain grown on different soil types supports the suggestion that grain was brought here to dry from a fairly wide area.

The corn drier lay within Botach township (PRN 7358), and about 800m to the north-west of the corn drier lies an area of earthworks on land south-west of Broom Hall (PRN 1825, 7358). This site has not been surveyed either on the ground or from aerial photographs, so its full extent and the existence of associated field systems are not known. It was probably the site of two cottages known as 'Botach' demolished in the late 18th century when Broom Hall was built and may indicate the former location of the main settlement of the township (Gresham 1973, 364-367). However there were four farms in the township, the corn drier being within Glan y Morfa, so the closest contemporary settlement might be expected near the present Glan Morfa farm.

Earthworks identified as a possible medieval platform house were recorded about 200m south-west of the site (PRN 5735) but excavation during the A497 improvement works demonstrated that the earthworks were part of a redundant field boundary and no medieval settlement was revealed (Davidson et al 2007, 36). The corn drier therefore seems not to have been close to a settlement but next to a main road, possibly indicating a communal function with grain being brought from several farms.

8.9. Plot 3/6: Elongated pit (PRN 34083)

Grid Reference: SH 43718 37356
Period: Unknown/Bronze Age?
Mitigation undertaken: Hand-excavated during the watching brief.

See figures 12, 13 and plate 15
A sub-rectangular pit [36002] was found, aligned roughly east-west, and measuring 1.70m by 0.58m, with a depth of 0.22m.The long sides were straight and parallel and the short ends were fairly rounded. The sides of the cut were steep and the base flat. The feature was well-defined. Its dark grey silty fill (36001) contained numerous stones, many heat-shattered, and lenses and patches of charcoal.

The regular rectangular shape of this feature is similar to that of burnt mound troughs, although no trace of a mound was recorded on this site. The presence of burnt stones in the fill of the feature must make it likely that an activity involving similar hot stone technologies had taken place here. No soil samples were taken from this feature so comparison of the charcoal assemblage to other burnt mounds is not possible.

About 58m to the north-east was a shallow hollow, c.0.8m in diameter, containing 4 stones and some charcoal. This was so shallow and poorly defined that it was interpreted as a burnt root hollow of a small bush.

This site lies just below 10m OD about 170m west of the Afon Wen and on its flood plain, and the area was seen to be covered by alluvial silts. It is on the edge of an area of earthworks that may be the remains of a medieval settlement (PRN 5733), possibly associated with a mill on the Afon Wen, the exact location of which is not known (PRN 29705, Kenney 2004, 4). These earthworks were recorded during the assessment for the A497 road improvement (Mason 1993, 6-7) but as the road route ran considerably to the north this area was not investigated and the actual nature of the site is not confirmed. It is therefore possible that while this may have been a burnt mound trough it could be related to much later activity. Unfortunately no datable material was recovered from this feature so no radiocarbon date could be obtained. No other features possibly related to medieval settlement were identified in this area during the watching brief.

About 480m to the west of this site a burnt mound was found and excavated on the route of the A497 (PRN 31151, Berks *et al* 2007, 9-11). This had three pits and produced a late Neolithic/Early Bronze Age date. A burnt mound was also found in plot 3/10 (see below). This feature therefore lay within an area used for burnt mounds and it is possible that it represents the remains of a mound otherwise removed by ploughing. The geophysical survey carried out in advance of this project shows strong anomalies near the stream in the western part of plot 3/6 and possible pits close to where [36002] was found (Bartlett 2010, 7). This may indicate that this pit was related to more extensive burnt mound activity that for some reason was not recognised in the watching brief, but identifying burnt mounds in geophysical data is often difficult and other natural and manmade features can produce similar signals.

8.10. Plot 3/10: Two burnt mound troughs (PRN 34084 and PRN 34085)

Grid Reference: SH 44198 37566
Period: Bronze Age
Mitigation undertaken: The site was hand excavated and recorded, but the troughs were sampled and not fully excavated.

See figures 12, 14 and plate 16
Two rectangular pits interpreted as burnt mound troughs were found about 9m apart. Pit [310001] (PRN 34084) was sub-rectangular and measured 2.4m by up to 1.7m, and about 0.6m deep. The pit was aligned south-west to north-east; the western side was steep, the eastern side more gradual and the base was flat. The north-eastern end of the cut was quite rounded. There was a grey sandy primary fill (310002), but the rest of the feature was filled with heat-cracked stones in a dark grey or black charcoal-rich matrix (310003/310004). Sealing the pit was a thin burnt stone layer (310005) and this spread out beyond the limits of the trough forming the remains of a mound measuring 5.4m by 3.2m. This was nowhere more than 0.2m deep. Other small patches of burnt mound material hinted that the mound was once much bigger.

To the east was pit [310007] (PRN 34085), which measured 2.2m by 1.2m, and was 0.45m deep. This was also sub-rectangular with rounded ends, aligned west-south-west to east-south-east. The sides at western end were steep and the eastern end was more gradual. There was a large stone, 0.4m in length, in the base of the pit, with burnt stone deposits around it (310008, 310009). In the eastern end of the pit was a paler grey fill with numerous

heat-cracked stones (310012) and over all these was a black layer (310010) with more charcoal and fewer stones than the other fills. At the western end an orange silt (310011) had washed over the fills making the edge of the cut difficult to see on the surface. There were slight patches of burnt mound material associated with this pit but it is possible that any mound associated with it was outside the stripped easement.

Much of the stone from the pits was heat-altered but there were no finds recovered. Two charred cereal grains were recovered from the fill of pit [310001], but these were in too poor a condition to identify beyond wheat/barley. However the presence of cereal grains on burnt mounds is relatively rare and their presence may hint that food or drink were sometimes prepared on these sites. The very few charred weeds seeds and rare fragments of charred herbaceous stem were in too poor a condition to identify (Challinor, Giorgi and Rackham 2013).

The charcoal was abundant in quantity but in a very poor condition. Oak, alder, hazel, hawthorn and holly were found. Alder was dominant in the main fill of pit [310001] and in layer (310010) over pit [31007], while context (310004) in pit [310001] produced a more mixed assemblage with oak and hazel (Challinor, Giorgi and Rackham 2013).

Both pits [310001] and [310007] were radiocarbon dated with two dates each:-

Lab ID	Context number	Context description	Material	Radiocarbon age (BP)	Calibrated date (95% confidence)
SUERC-46255	310010	fill of trough [310007]	charcoal: *Alnus glutinosa*	3296 ±30	1670–1500 cal BC
SUERC-46256	310010	fill of trough [310007]	charcoal: *Alnus glutinosa*	3266 ±28	1620–1450 cal BC
SUERC-46257	310004	fill of trough [310001]	charcoal: *Alnus glutinosa*	3265 ±30	1620–1450 cal BC
SUERC-46258	310004	fill of trough [310001]	charcoal: *Corylus avellana*	3310 ±28	1690–1510 cal BC

If these dates are subjected to Bayesian modelling they suggest that the burnt mound activity in this plot began in probably *1635–1550 cal BC*, lasted for probably *1–100 years* and ended in probably *1585–1490 cal BC* (all at 68% probability) (Hamilton 2013). The pits could therefore be contemporary but the long possible duration of use probably indicates that they were consecutive, but both used in the middle Bronze Age.

The quantity of burnt stone and the shape of the pits strongly suggest that these were burnt mound troughs. Their distance apart implies two separate mounds potentially separated by a considerable period of time. These troughs are located at about 10m OD in a relatively dry area 300m east of the Afon Wen. As discussed above, as well as the pit in plot 3/6, a burnt mound (PRN 31151) was found to the west and about 800m to the east was a pit possibly related to burnt mound activity that dated to the late Bronze Age (PRN 35032, Berks *et al* 2007, 12-14). Further east near Glanllynnau two pits (PRN 24742) were excavated which contained some burnt stone but these did not have the very stony, charcoal-rich fill typical of burnt mounds so it is not certain that these did represent a burnt mound (Evans 2008).

The burnt mound was picked up on the geophysical survey (Bartlett 2010, fig 6), but it is rarely possible to distinguish burnt mound signals from other noise in geophysical surveys and it was labelled as 'uncertain/unknown'. The survey does suggest that this was the only burnt mound along this stretch of the pipe route.

8.11. Plot 3/14: Smithing site (PRN 34086)

Grid Reference: SH 45320 37818
Period: medieval
Mitigation undertaken: Hand-excavated, 100% excavation

See figures 15, 16 and plates 17 and 18
A large oval pit [314001] was found measuring 2.1m by 1.4m and 0.4m deep. The long axis of the pit was aligned about south-west to north-east and the sides were variable, being steeper on the western side. It was filled with brown, pebbly silty sand (314004) but had a thin layer of charcoal in the base (314003).

About 3m to the east was a small, irregular hollow [314002], measuring 0.7m by 0.6m and c.0.1m deep. This slight feature had a charcoal-rich fill (314005) and could have been the root hollow of a burnt bush, but some

pieces of slag and other artefacts were found that suggested that it was anthropogenic. A piece of copper alloy plate (SF03) was found. This tapers at one end to rounded terminal and has 2 lateral, sub-circular perforations, possibly used to mount the item. A tiny fragment of thin curved copper alloy sheet (SF65) with a concave face and two small parallel indentations may have been part of the larger piece, the function of which is unknown (Goodwin 2013b). The pit also produced a piece of vitrified iron hearth or furnace lining (SF61), tentatively identified as a fragment of a tuyère (Rackham and Giorgi 2013).

The soil sample from pit [314002] produced a large quantity of magnetic concreted iron-rich lumps and thousands of flakes of hammerscale. When seen under the microscope the concreted lumps appeared to be large quantities of hammerscale and small slag concreted together. These are reminiscent of the hard concreted layers that develop on the floor of a smithy. Nearly 3.5 kilogrammes of magnetic material was recovered from an 8.5kg soil sample indicating a very high concentration of smithing debris (Rackham and Giorgi 2013). Pit [314002] therefore appears to have been the base of a smithing hearth and presumably pit [314001] was also associated.

As well as a reasonably large charcoal component an oat grain, grass seed and a fragment of uncharred hazelnut shell were recovered (Challinor, Giorgi and Rackham 2013). The charcoal assemblage was dominated by oak, of which most came from heartwood, with some evidence of slow growth. A single fragment of alder was noted. Iron smithing required the use of charcoal as fuel in order to achieve the high heat necessary, and oak would have produced a good quality charcoal.

Two radiocarbon dates were obtained on an oat grain and a piece of charred alder.

Lab ID	Context number	Context description	Material	Radiocarbon age (BP)	Calibrated date (95% confidence)
SUERC-44178	314005	fill of pit [314002]	charred grain: *Avena/Poaceae* sp.	897 ±25	cal AD 1030–1220
SUERC-46460	314005	fill of pit [314002]	charcoal: *Alnus glutinosa*	868 ±30	cal AD 1040–1230

The best estimate for the date of this deposit is *cal AD 1060–1255* (*95% probability*), and probably *cal AD 1160–1215* (*68% probability*) (Hamilton 2013), demonstrating that this was a medieval smithy in use in the late 12th or early 13th century AD.

This site lay at just over 10m OD about 30m west of a small stream just above the edge of the former salt marshes. About 150m to the south-east lies the medieval ringwork of Tomen Fawr (PRN 1329) and the associated medieval bond township of Ffriwlwyd (PRN 7351). Tomen Fawr is a ring motte without a bailey (RCAHMW 1960, 237), and earthworks may indicate an adjacent settlement. The motte was probably occupied by the Lord of Eifionydd in the 12th century (Gresham 1973, 338). In the late 12th or early 13th century the township was given to the Cistercian Abbey of Aberconwy and became a grange, possibly after the removal of the existing inhabitants. The monks seem to have moved the main settlement inland, so the motte and the adjacent settlement were probably not in use in the 13th century (Gresham 1973, 338-342). An area of the township was known as Hen Efail (old smithy) and a house about 350m north-west of the site was called Hen-efail in 1889 (OS first edition County Series map) and is still known by that name. On his map 33 Gresham (Gresham 1973, 339) marks this area as defined by what are now the A497 and B4354, presumably indicating that the medieval roads ran on roughly the same lines. It would be normal to have a smithy in this position adjacent to roads and on the edge of the demesne lands, which covered the area between the A497 and the coast.

The smithing pit presumably lay just outside the Hen Efail area, on the opposite side of the road, but its date is probably contemporary with the use of the motte and the adjacent settlement and its position seems too close to be entirely unrelated to the name 'Hen Efail'. It may not be the site of the main medieval smithy but is seems likely to have been at least a subsidiary working area. If the A497 runs along almost the same line as the medieval road the pit would have been in the ideal position for servicing traffic along the road. The later importance of this road junction is demonstrated by the positioning of a toll-house and gate here in the late 18th century (PRN 11368). No clear anomalies were seen in this area on the geophysical survey (Bartlett 2010, fig 7), so it seems unlikely that there was a large area of working.

8.12. Plot 3/20: Large ditch or channel (PRN 34087)

Grid Reference: SH 46114 37866

Period: Unknown, probably glacial
Mitigation undertaken: First recognised in pipe trench then machine and hand excavated and recorded alongside pipe trench in accordance with a FAWD.

See figures 17, 18 and plate 19
Running nearly north-south across the easement in this plot was a large ditch-like feature [320004]. This was up to 3.4m wide and 0.8m deep where the section was recorded. However it got deeper towards the south as it was recorded as 1.5m deep in the pipe trench. As the ground slopes down from south to north this meant that the feature became deeper as it continued uphill.

The sides of the feature were gently sloping, with the western side being shallow and poorly defined. The base was fairly flat. The feature was filled by a series of brown sandy silts with varying amounts of stones and gravel (320012, 320007, 320006, 320005), which seem to represent gradual erosion from the surrounding hill slope. An iron nail (SF27) was recovered from the upper fill (320005), but this cannot be used to date the feature. This upper fill on the eastern side was cut by a drainage ditch [320008], the fill of which (320010) produced a sherd of 19th century Buckley ware. About 2m west of the ditch was a stone-filled drain [320009], the fill of which (320011) contained a large nail (SF29), late post-medieval pot sherds and a few marine shells. A copper alloy 19th century button (SF28) was recovered from the ploughsoil over the site.

Even from the sieved residue of the bulk soil samples archaeological finds were limited to a little heated-affected stone, a little vitreous slag, and a few flakes of hammerscale. The environmental remains were even more limited, with very small flots, each producing only a little charcoal (Challinor, Giorgi and Rackham 2013). There is nothing from any of the samples that gives any clue as to the date of the feature, and none of the charred material is secure enough to be suitable for radiocarbon dating.

This site is on the northern end of a slight spur 80m south of the Afon Dwyfach not far from its confluence with the Afon Dwyfor. The 1889 First Edition OS County Series map shows some small buildings, presumably agricultural buildings (PRN 25724), at the end of a track with a field boundary, all of which had gone by 1918. The buildings are shown on the 1834 Llanarmon tithe map, and are probably the barn referred to in the name of the adjacent field (Cae Sgubor, *barn field* (RSK 2010a, RSK Id. 613, 99)).The drainage ditch [320008] found in the excavation is on exactly the same alignment as the field boundary and, accounting for slight errors in the First Edition map, is in the same place so it seems likely that this ditch represents the field boundary. Ditch [320009] is probably related to the building compound. The large feature [320004] was earlier than these and was aligned differently to the field boundary. It was just to the north of the summit of the spur on the north-facing slope. The broad, rather poorly-defined character of this feature makes it possible that this was not a ditch but a natural erosion channel running down the slope.

8.13. Plot 3/27: Bronze Age cremation burial (PRN 34088)

Grid Reference: SH 47304 38218
Period: Bronze Age
Mitigation undertaken: Hand-excavated, 100% excavation

Description
See figure 19 and 20, and plates 20 and 21
Two features were identified in this plot. One was a neatly circular pit [327001] measuring 0.52m in diameter and 0.18m deep. The pit had fairly steep sides and a flat base and was filled by a very dark grey sandy silt (327003) that contained charcoal and 51.6g of burnt bone. About 3.7m to the south was small hollow [327002], measuring only 0.22m in diameter and 0.06m deep. This was also filled with a very dark grey sandy silt (327004) with charcoal and 8.6g of burnt bone. Some bone was collected by hand but unfortunately this was lost and could not be studied.

The bone was human and represents the remains of a minimum of one individual, aged between *c.* 15-40 years old. The sex could not be determined, and no pathological lesions were observed. All the bone subject to examination is white in colour indicative of full oxidation. The close proximity of the two pits and the lack of observable duplication of skeletal elements suggest that both deposits derived from the same cremation, one representing the burial remains, and the other a 'formal' deposit of pyre debris (McKinley 2013).

No pyre goods were recovered. Two small fragments (SF75) were tentatively identified as pottery were recovered from the wet sieving residue from pit [327001], but these proved to be burnt clay (Rackham and

Giorgi 2013). The pit also included some heated affected stone, a single flake of hammerscale and some rounded pebbles and grit cemented by calcareous material (SF71). The latter appeared like mortar and is presumably related to the cremation process.

Pit [327001] produced an extremely large amount of charcoal, but few other identifiable charred plant remains. The assemblage consisted of cereal grains including a few of barley, occasional hazelnut shell fragments and a small number of *Rubus* seeds including blackberry, possible fruit stone fragments, and a few seeds of the grassland plant ribwort plantain. Other charred debris included a few herbaceous stem and thorn fragments. It is possible that the food plants indicate the presence of food offerings included in the cremation, although their numbers are rather low. Pit [327002] produced a smaller flot sample, which only contained charred herbaceous stems and unidentified seeds (Challinor, Giorgi and Rackham 2013).

Charcoal was abundant in both features, and was exclusively oak. Much of the charcoal came from slow growing heartwood, but a few roundwood fragments were recorded. This is presumably mature oak specially collected to fuel the pyre.

Two radiocarbon dates were obtained on cremated bone from pit [327001] and one from pit [327002].

Lab ID	Context number	Context description	Material	Radiocarbon age (BP)	Calibrated date (95% confidence)
SUERC-44825	327003	fill of pit [327001]	cremated human bone	3262 ±35	1630–1440 cal BC
SUERC-44826	327003	fill of pit [327001]	cremated human bone	3263 ±35	1630–1440 cal BC
SUERC-44827	327004	fill of pit [327002]	cremated human bone	3225 ±35	1610–1420 cal BC

If the two deposits are contemporary the best estimate for the date of this activity is *1540–1420 cal BC 95% probability*), and probably *1515–1445 cal BC* (*68% probability*) (Hamilton 2013), demonstrating that they are middle Bronze Age in date.

The geophysical survey (Bartlett 2010) showed no trace of a ring ditch or other features that could be related to a barrow.

Discussion

Location and comparisons

These features lay in the corner of a field at 19m OD about 70m south-east of the Afon Dwyfor, just outside Llanystumdwy. No Bronze Age sites are known in the immediate vicinity, although a bronze palstave was reported to have been found near Llanystymdwy churchyard (PRN 2277). A stone hut circle was found in 1927 about 340m north-west of the site but this produced Roman pottery so it is assumed to have been Iron Age and used into the Roman period (PRN 1330, RCAHMW 1960, 238). The current farm of Aberkin or Abercain was the site of a house known as Berkin (Gresham 1973, 187) that formed the focus for the southern part of the medieval township of Abercain (PRN 7353). There is nothing to suggest that this was also the site of a Bronze Age settlement but it was probably an attractive place for settlement at any period situated as it is between the coastal marshes and the Afon Dwyfawr.

The closest Bronze Age funerary site is c. 2.5km east, near Afon Wen, where two cremation urns were found within a circular ditched enclosure (PRN 19659) in advance of the A497 improvements (Berks *et al* 2007, 4-9). The dates from this site are mainly on oak and have large errors due to the use of radiometric measurement rather than AMS, but a date from the pit holding the earlier cremation burial was 1880-1530 cal BC (Beta-210124). Statistical comparison of this date with those from plot 3/27 shows that the latter site about 200-300 years later (Hamilton 2013), but the difference could be accounted for by old wood effect on the Afon Wen sample and it is not impossible that these sites were approximately contemporary. The difference between the two sites is considerable with the Afon Wen cremation burials being contained in urns and buried in the centre of an enclosure. Both burials appeared to be of adult males. The truncated nature of the cremation burial in plot 3/27 makes comparison difficult but it may be that this was a lower status burial, made at roughly the same time as the Afon Wen burials and by the same group but with less ceremony. Both burials are in fairly similar positions close to the coastal marshes, although plot 3/27 overlooks the Afon Dwyfawr rather than the coast.

Looking further afield Smith (2003, 22) records six sites with Bronze Age cremation burials on the Llŷn Peninsular, although the RCAHMW Inventories list several more that have been entered into the HER under a variety of categories (figure 21). Many of these are 19th century finds with few recorded details. The vagueness of the records means that in some cases it is not clear if one or more sites are referred to. Many of the Bronze Age cremation burials that have been found were in cists, often in urns inside the cist. However several appear to have just been in urns with no cist recorded. In these cases mounds are generally not recorded so they may represent flat cemeteries. One of the few exceptions where un-urned cremation burials were found was at Blaen-y-Cae, Bryncir (PRN 19678, Smith 2004). It is notable that this was a modern investigation in advance of quarrying and it is likely that earlier, more casual discoveries would have failed to identify cremation burials without urns. At Blaen-y-Cae one cremation burial was found in an urn, and another in a pit with no urn. There were also several pits containing charcoal, three of which had small quantities of cremated human bone, and an accessory vessel buried without cremated remains. The two cremation burials and the accessory vessel were adjacent to each other, with two of the pits containing charcoal and bone about 2-3m away and the third over 4m away. This resembles the layout in plot 3/27, except more than one cremation burial is present, and suggests that burial of pyre material was taking place in both cases.

Some of the Blaen-y-Cae features were dated but mixed samples, including oak heartwood, were used for radiometric dates rather than AMS making interpretation difficult. Two features, including the urned cremation burial, were dated to the Early Bronze Age (2290-1940 cal BC (Beta-186977) and 2120-2100 cal BC (Beta-186978), while one of the pits with charcoal and bone was dated slightly later (1920-1620 cal BC (Beta-186976). This later date is still about 500 years earlier than the plot 3/27 cremation burial. Despite the difference in date the impression is of these two sites following the same tradition of isolated cremation burials with no mound or ditch to mark them and not necessarily in urns but with remains of the cremation pyre buried nearby. The burial of pyre debris is probably quite common but often unrecognised (McKinley 1997). The presence of 10 cremation burials in urns within a cist under a cairn (PRN 2803) only about 450m away from the Blaen-y-Cae site may suggest different status of burials within the same community.

Un-urned cremation burials are rarely found more widely in the region. The best known site is Cae Mickney (Cae Meini), Llanidan, Anglesey (PRN 3153). Here seven un-urned cremation burials were found in 1882, but only because they formed part of a cemetery of 32 burials, the rest in urns (Lynch 1991, 196-200). Un-urned cremation burials may have been much more common than they now appear as they are difficult to identify and vulnerable to destruction by ploughing. Plot 3/27 had been ploughed and as it almost certainly formed part of the medieval fields of Abercain township it has probably been ploughed for a long time. The survival of these features was therefore little more than luck. Even during controlled archaeological excavations they are easily truncated by machine stripping and, as occurred during the current project, their significance can be over looked without pottery or other hints to indicate their age, leading to less careful excavation than is appropriate. The possibility that any pit containing burnt bone is a cremation burial must be assumed and the feature treated accordingly.

Charcoal assemblage
Dana Challinor and James Rackham

The two cremation deposits were composed entirely of oak, including some heartwood fragments. The use of oak in cremations is common in the Bronze Age, and has been recorded at other sites in North Wales, such as Brenig (Keepax 1993). Not only does oak provide the high calorific heat necessary to cremate a human body, the wood is also easy to split for use in pyre structures and/or coffins (Gale and Cutler 2000, 204-5). It has also been suggested that the predominance of a single taxon is of ritual significance and that it may have been that a single tree was purposely felled for such occasions (Thompson 1999, 253). Certainly, the assemblages from Plot 3/27 indicate a deliberate and focussed selection of fuel, especially when compared to the taxonomic composition of other Bronze Age features along the pipeline. It is also interesting that context-related variation was evident at Brenig, where cremated bone deposits were associated with oak but pit deposits contained alder, hazel and birch (Brittain 2004).

8.14. Plot 5/5: Possible stone-filled drain (PRN 34089)

Grid Reference: SH 49288 38986 A
Period: Post-medieval
Mitigation undertaken: Recorded on trench record sheet during watching brief.

See plate 22

A linear feature was seen in the section of the pipe trench. This had fairly steep sides, which curved into a rounded base. The fill was a grey silty clay with frequent sub-rounded medium sized stones. The feature was about 1m wide and 0.62m deep. Stone-filled drains are usually narrower with vertical sides but this is probably some similar drainage feature, or an open ditch that has been backfilled with stone.

The early OS maps show this field as rough pasture, although improved by 1916. In 1889 a track is shown running across the field but this runs south-west to north-east, whereas the feature seems to be roughly perpendicular to this.

8.15. Plot 6/6: Burnt mound (PRN 34090)

Grid Reference: SH 50241 38912
Period: Late Neolithic
Mitigation undertaken: Excavated by hand. A sondage was dug through the site but the pits were not fully excavated.

See figures 22 and 23, and plates 23 and 24
In this plot was an irregular arc of burnt stone in a dark grey silt matrix (66003), which surrounded the northern and eastern sides of two intercutting pits. Pit [66013] was probably ovoid in plan, but was not fully exposed; however it was 0.5m deep. Lumps of charcoal (66016) were scattered in its base and the pit was filled by a grey clayey silt, containing some stone and charcoal (66012). This fill was cut by an oval pit [66011], measuring 1.7m by 0.9m and 0.55m deep. It had steep sides and a rounded base. This was filled by a dark grey silt with burnt stone and charcoal (66010). There was a lens of charcoal chunks in the base of the pit similar to that in [66013].

The fill of pit [66011] was covered by a layer of dense charcoal (66004), which may represent a hearth or dumping from one. This was sealed by a fine water-borne silt (66005).

The remains represent a small burnt mound with possibly two sequential troughs. This site was investigated by a slot through the middle of the mound and troughs and was not fully excavated. No artefacts were recovered except tiny fragments of vitreous slag, probably fuel ash slag.

The charcoal assemblage from the fill of pit [66011] was large and dominated by hazel charcoal, with several large roundwood fragments, and occasional small twigs and herbaceous stems, and one fragment of charred hazelnut shell. The charcoal in context (66004), a possible hearth deposit sealing pit [66011], contained a greater variety of species; as well as hazel and oak, alder, poplar/willow, hawthorn and holly were found.

Two radiocarbon results were obtained on fragments of hazel charcoal from the fill (66010) of pit [66011].

Lab ID	Context number	Context description	Material	Radiocarbon age (BP)	Calibrated date (95% confidence)
SUERC-46826	66010	fill of trough [66011]	charcoal: *Corylus avellana*	4127 ±29	2880–2570 cal BC
SUERC-46838	66010	fill of trough [66011]	charcoal: *Corylus avellana*	3933 ±29	2550–2340 cal BC

The two measurements are not statistically consistent, suggesting the material is of mixed ages, but the best estimate for the date of this deposit is *2560–2305 cal BC* (*95% probability*), and probably *2480–2345 cal BC* (*68% probability*) (Hamilton 2013).

Discussion
The burnt mound is within 7m of a ditch canalised along a straight field boundary, but the presence of the ditch suggests that formerly there probably was a natural stream. The area was clearly quite waterlogged as several field drains were also noted in this plot. The boundary running adjacent to the ditch is shown on the 1840 tithe map and the First Edition County Series map shows the stream flowing down to the south-west to join another small stream in the middle of Criccieth, confirming that this was originally a natural stream, not just a drainage ditch.

The geophysical survey (Bartlett 2010) showed various clusters of anomalies in this plot but these are no different to many others in other plots and are probably not related to the burnt mound.

The site lies at about 70m OD to the north of Criccieth, to the south of a small hill called Moel Ednyfed, on which there may have been a hill fort (PRN 11097). Around the foot of this hill, at a similar distance from the summit to PRN 34090, are several burnt mounds (figure 22). All these survived as earthworks into the 1950s but PRN 1302 (i) had disappeared by 1971 (RCAHMW 1960, 241-2; OS card SH53NW3), and their current condition is not known. None have been excavated. The mounds are all close to streams, and the mound in plot 6/6 appears to be just one of many mounds in this area. It is likely that many more levelled by agriculture, like this one, survive so far undiscovered. The radiocarbon dates indicate that the mound was active in the late Neolithic or Beaker period, rather than in the Bronze Age as is often assumed for burnt mounds. Bronze Age features in the area, including cremation burials (PRN 2378) near Braich y Saint and a bronze socketed axe (PRN 4061) found under the ruined Neolithic chambered tomb (PRN 1291), would therefore post-date the use of the mound.

8.16. Plot 6/10: Fire pit or oven (PRN 34091)

Grid Reference: SH 50551 38918
Period: Unknown/prehistoric?
Mitigation undertaken: Investigated and fully recorded as part of the watching brief.

See figures 22, 24 and plate 25
A small, roughly figure-of-eight shaped cut [610001] was found measuring 0.95m by 0.55m, with a depth of 0.12m. The long axis of the pit was aligned north-west to south-east. A thin layer of charcoal (610004) covered the base of the north-west chamber, and partially slumped over this was a burnt orange clay (610003), which appeared to be the remains of a clay lining. The remainder of the pit was filled with brown silty clay (610002, 610005), darker and with more charcoal in the north-western than the south-eastern end of the feature.

A very little fired earth and just three flakes of hammerscale were recovered from the wet sieving residue. Some of the fine residue was magnetic due to heating in a fire (Rackham and Giorgi 2013).

The large charcoal-rich flot included a single fragment of emmer wheat chaff, charred seeds of ribwort plantain, small grasses, bramble/raspberry, medick/clover, sedge, cinquefoil and bugle, with charred tubers and herbaceous stems. These are mainly pasture plants and might indicate hay or even animal dung being burnt. The bulk of the flot is charcoal and roundwood is particularly abundant. The charcoal assemblage was dominated by poplar/willow, with occasional pieces of hazel, cherry type species and holly (Challinor, Giorgi and Rackham 2013).

The figure-of-eight shape of the feature suggested its interpretation as a corn drier, although it appeared very small. However, the charred plant assemblage is not typical of a corn drier in that there is no charred grain and very little chaff. The charcoal assemblage also contrasts with that from the medieval corn drier in plot 3/2, which was dominated by oak. The charcoal assemblage from pit [610001] presumably represents fuel. Willow can be fast growing and a good source of fuel wood, but is associated with wet ground habitats, while the charred plant assemblage is indicative of drier pasture or grassland (Challinor, Giorgi and Rackham 2013). The willow may not have grown nearby suggesting that it was deliberately collected, but the possible use of animal dung as fuel and the presence of other tree species suggests a variety of fuel sources, and the possible reuse of the pit on different occasions.

With use as a corn drier ruled out the clear evidence of burning in the pit suggests that it was probably a small oven or fire pit. The traces of clay lining support this interpretation. There are several burnt mounds in this area, see plot 6/6 above, but the lack of burnt stones on this site suggests that it is not a feature of this type.

This feature lies at 63m OD on the east bank of a stream called Nant y Wyddan. The pit is 22m east of the stream. The date of the feature is unknown, and it was considered too small and isolated a feature to date with radiocarbon assay. The presence of chaff from emmer wheat may support a prehistoric date, but it could be later.

The site lay within the free medieval township of Ystumllyn, close to its western boundary. Much of the township was probably used as grazing land by the burgesses of Criccieth (Gresham 1973, 163-4). The suggestion that hay or dung might have been burnt in the feature could indicate that it fit within this agricultural regime and may have been a temporary oven for cooking food for a cowherd while caring for the burgesses cattle, but without a date this must remain highly theoretical.

8.17. Plot 6/21: Burnt mound (PRN 34092)

Grid Reference: SH 51726 39790
Period: Late Neolithic
Mitigation undertaken: Recorded and excavated in width of pipe trench

See figures 25, 26 and plate 26
A burnt mound was seen in the pipe trench. It measured about 7.5m in length and in places covered the full width of the exposed trench (2m wide). The mound was represented by patches of heat-cracked stones in a dark matrix (621001, 621003, 621004, 621007). These deposits were up to 0.4m thick but generally much thinner. In places there was a lower layer of charcoal-rich clayey silt with fewer stones (621002, 621005). At the eastern end a grey brown clay (621012) may have represented the ground surface beneath the mound.

Sealed under the western end of the mound was a sub-circular pit [621008] measuring 1.0m by 0.8m. It was up to 0.28m deep and filled with a charcoal-rich deposit with relatively few stones (621009).

Some heated-affected stone was recovered from the wet sieving residues, and the presence of small magnetised stones reflects the heating of the deposits rather than metalworking. Apart from one fragment of charred hazelnut shell the relatively small flots produced only charcoal, with few fragments large enough to justify identification and quantification. The exception was the sample from 621007, which is much bigger than the other three samples and was studied in detail. This sample was dominated by oak, with some hazel, and two fragments of holly. The oak included some heartwood and fragments exhibiting slow growth. This suggests that the wood came from older, mature trees and not young coppiced stems, with the fuel wood possibly sourced from unmanaged woodland.

Two radiocarbon dates were obtained on fragments of hazel charcoal from the fill (621009) of pit [621008].

Lab ID	Context number	Context description	Material	Radiocarbon age (BP)	Calibrated date (95% confidence)
SUERC-46839	621009	fill of trough [621008]	charcoal: *Corylus avellana*	4183 ±29	2890–2640 cal BC
SUERC-46843	621009	fill of trough [621008]	charcoal: *Corylus avellana*	3978 ±27	2580–2460 cal BC

The two measurements are not statistically consistent, suggesting the material is of mixed ages, and the best estimate for the date of this deposit is *2575–2460 cal BC* (*95% probability*), and probably *2565–2470 cal BC* (*68% probability*) (Hamilton 2013). Like the mound in plot 6/6 this site therefore appears to have been late Neolithic/Beaker period rather than Bronze Age.

This site was at about 80m OD on a fairly steep south-east facing slope. The mound was about 10m from a stream channelled down the side of a field boundary, but it is assumed that a natural stream formerly ran in the vicinity. The site lies to the east of the burnt mounds discussed above but the present project has revealed yet more mounds with the large mound in plot 6/29.4 and two mounds and a pit in plot 6/33 to the east.

8.18. Plot 6/22: Midden (PRN 34093)

Grid Reference: SH 51750 39801 A
Period: Post- medieval
Mitigation undertaken: Recorded during watching brief on trench record sheet.

See figure 25, plates 27 and 28
At the western end of plot 6/22 a midden (622001) containing 19th century ceramics was found. Fifteen sherds of at least twelve ceramic vessels were retrieved, representing the typical wares and forms available to most households during the mid-late 19th century (perhaps with a bias towards the end of this period). They comprise a mix of refined, but affordable tea and table wares (some decorated), and more utilitarian forms. At least some of the material probably stems from the Stoke-on-Trent potteries, although other items come from Newcastle-upon-Tyne and Nottinghamshire and/or Derbyshire (Goodwin 2013a).

There were also parts of leather shoes, iron nail and other objects. The shoes were particularly represented by leather soles, and parts of at least two pairs of adult shoes (although small - size 5 or 6) and one possibly belonging to a child was collected. These are presumably also 19th century in date (Goodwin 2013a).

This site is on the hill slope about 100m north of the farm of Eisteddfa, close to a field boundary and probably represents dumping in an out-of-the-way corner of the farm.

8.19. Plot 6/29.4: Large burnt mound complex (PRN 34094)

Grid Reference: SH 52254 39574
Period: Late Neolithic to Late Bronze Age
Mitigation undertaken: The burnt mound was evaluated by hand-dug slots to investigate the depth and stratigraphy of the mound material and detect the presence of features obscured below the mounds. This evaluation established that the stratigraphic sequence was complex and varied, and a design was then proposed for the full excavation and recording of the site. The burnt spread was removed by hand. Features were excavated and recorded, then a possible buried soil layer was removed by machine and the remaining features on site excavated and recorded.

See figures 25 and 27 to 31 and plates 29 to 44

Summary

This site was composed of several spreads of burnt mound material sealing pits and other features, which represented repeated activity over a long period of time. The site was confused by palaeochannels, one of which must have been open at the time of the burnt mound activity but others were earlier. There were also numerous features, many sealed under a buried soil layer, which initially appeared potentially anthropogenic but on excavation and in the light of post-excavation analysis are more likely to be natural peri-glacial features. A few of the pits did however cut the buried soil but seemed unrelated to the burnt mound activity and may represent an earlier phase of use of the site.

The geophysical survey (Bartlett 2010) shows anomalies all over this area indicative of archaeological features, so this mound appears to have been identified by the geophysics. However there were also similar anomalies to the south of the stream, where no burnt mound material was found when the area was stripped.

Topography

The site lies at an altitude of about 27m OD on the north facing slope of a small stream valley. The stream running in the base of the valley is about 35m north of the northern end of the site but a tributary to this stream runs immediately adjacent to the site on its eastern side. Another smaller stream runs about 35m to the west of the site. The streams join and run east into an area that must originally have been salt marsh. The site lies about 400m west of the head of this marsh. The streams form the boundaries to fields and have probably been channelled although it is assumed that their original courses were not very different to the present ones.

Glacial and peri-glacial deposits and features

The natural subsoil consisted of a pale yellow brown glacial clay with occasional small and medium stones. This was mixed with or overlain by fluvio-glacial sands and fine gravels in places. Over much of the site was a layer of firm light greyish brown silty clay (6294070/6294084/6294089), which contained flecks of charcoal. This layer was interpreted on site as a buried soil but it sealed various features. The study of the soil micromorphology suggests that this layer was a stagno-humic gley soil formed of a humic topsoil over an iron depleted horizon, that was permanently water saturated (MacPhail 2013).

The confirmation that this layer is a buried soil horizon demonstrates that features sealed beneath it must be of an early date, probably peri-glacial. All these early features were irregular, rather confused, with fills that were suggestive of deposition by natural processes. It is likely that these features were the result of the uneven surface of the boulder clay, frost action and water erosion. Occasionally the fills of these features contained charcoal but the micromorphological study showed that there had been bioturbation of the buried soil and charcoal had been introduced to lower layers.

Palaeochannels

As well as smaller undulations in the boulder clay the area seems to have been crossed by several palaeochannels carved into the deposits presumably by streams (plates 29 and 30).

Down slope to the north of the main burnt mound activity was a broad, shallow channel [6294012], 4.6m wide and 0.6m deep. This was poorly defined with a steep western side and a gently sloping eastern side. Its full

extent was difficult to determine as later deposits obscured it along much of its length. Much of the channel was filled with organic silts and degraded peaty deposits with a mottled silty fill in the top.

This channel probably continued south into a more extensively excavated section of a sinuous channel [6294150/6294195]. This varied considerably in width but was up to about 4m wide and a 8.5m length of the channel was excavated. The sides generally sloped gently but were steep in places and the channel was up to 0.7m deep. The base was fairly flat and there was a large boulder embedded in the northern side of the channel close to the eastern baulk of the site. Some of the fills of the channel were gravelly but some were dark and organic in appearance. Much of this channel was filled with burnt mound material.

Channel [6294150/6294195] cut through a pale clayey layer (6294186) and in the sides of the channel could be seen a stony deposit that formed the fill of an earlier channel [6294170], sealed by the clay (6294186). Channel [6294170] (plate 30) was fairly narrow at 1.3m wide and was up to 0.55m deep, although the base varied considerably in depth. Its sides were very steep in places and it was sinuous in plan. The fills were generally very stony but an organic silt had accumulated in the top of the channel. The southern end of the channel faded out but the northern end was eroded away by channel [6294150/6294195]. This shows that the channels were not formed by a single event but were probably created over a long period of time.

Group (6294184)
In the centre of the site were many more or less irregular hollows. When investigated a number of these proved to be undulations in the natural and were not recorded in detail but twelve features were more convincing and were recorded as group (6294184) (plate 31). This group had been truncated by a modern field drain [6294027], so some of the features did not survive in their entirety, but generally they were roughly sub-oval in shape and were filled with dark brown silty gravels. Most were small and very shallow (see table 3 for detailed measurements), but one [6294158] was better defined with steep sides and a depth of 0.4m. This had a collection of fairly large stones (6294161) in its base, but its main fill (6294142) was essentially a continuation of a general stony layer (6294090) covering this area. This layer sealed many of the features in group (6294184). It was composed of *c*.80% stones in a brown silty matrix and was initially thought to be a burnt mound layer, however, although many of the stones were angular they were not obviously heat-shattered, and while they were superficially stained brown, they were not heat-reddened. This was overlain by another similar layer but with smaller stones (6294032), which had been covered by a thin gravel deposit (6294026) then sealed under the buried soil horizon (6294070). These deposits had built up with a large irregular hollow [6294031] and the pit-like features were effectively undulations in the base of this hollow. This sequence suggests hollows in the boulder clay being in-filled by stony colluvium probably moved by solifluction. Some flooding seems to have occurred depositing gravel before the area stabilised and a soil began to develop. Some charcoal seems to have been introduced to these deposits, probably by bioturbation, but it is suggested that they are natural deposits probably built up from the end of the last glaciation and that all the features below them were entirely natural.

Hollow [6294031] (plate 32) merged into the palaeochannel [6294170] and it seems likely that these were part of the same feature, which became deeper and more sharply defined as it continued down slope to the north.

Table 3. Features in group 6294184

Cut No	Description	Filled by	Length	Breadth	Diameter	Depth	Charcoal
6294143	Small sub-oval feature, possibly natural hollow	6294145, 6294144	1.05m	0.8m		0.3m	Small frags
6294146	Small irregular pit/hollow	6294147	0.60m	0.55m		0.25m	Small frags
6294158	Well defined sub-circular pit	6294161			1.0m	0.4m	Small frags, uncharred hazelnut and birch seeds
6294175	Irregular pit/hollow	6294176, 6294177	1.25m	0.65m		0.18m	Small frags
6294178	About a quarter of a presumably sub-circular pit/hollow largely cut away by [6294158]	6294179, 629180			unknown	0.2m	Small frags

6294181	Small oval pit/hollow	6294182	0.4m	0.3m		0.1m	
6294185	Elongated undulation in the natural.	6294174	2.14m	1.5m		0.15m	
6294205	Small hollow, possibly just an undulation in the natural	6294206	0.54m	0.40m		0.1m	
6294207	Small irregular possible pit	6294208	0.8m	0.4m		0.2m	
6294209	Small pit/hollow	6294210	0.6m	0.5m		0.2m	
6294213	Shallow pit/hollow	6294214	0.9m	0.6m		0.1m	
6294215	Sub-oval pit/hollow	6294216	0.42m	0.28m		0.15m	

Hollow [6294098/6294101]
At the southern extremity of the site was a large sub-circular hollow [6294098] with a deeper sub-rectangular hollow [6294101] in its base (plate 34). This feature was not directly sealed by the buried soil (6294070) but was covered by a 0.3m thick layer of friable dark brown silty clay (6294099), which extended some distance beyond the limits of the feature. This layer was similar to the buried soil layer, and the soil micromorphological study described it as a "buried very humic silty soil worked by small acidophyle mesofauna. It is a Mor humus/Ah or peaty horizon (Oh)" (Macphail 2013). This therefore does appear to have been a part of the buried soil horizon but rather more humic than elsewhere.

The large hollow, which was cut into the natural, was partly obscured under the southern baulk and therefore was not fully excavated, but was probably over 5m in diameter. This upper hollow had fairly gently sloping sides, a flat base and was up to 0.61m deep. Set in the base, slightly off centre towards the south-west, was a sub-rectangular cut [6294101], up to 0.27m deep and 0.85m wide. This feature also continued under the southern baulk and therefore was not fully excavated. The sides of [6294101] were steep, and slightly undercut on the northern side, and its base was flat. It contained a single fill (6294102) of friable mid grey silty clay which contained inclusions of frequent small to medium sized sub-angular and sub-rounded stones, none of which showed any sign of burning (confirmed by the analysis of burnt stone (Bates 2013)). Sealing (6294102) and filling [6294098] was a dark brown silty clay (6294100) with *c*.40% gravel.

This feature appeared to be a large, shallow irregular hollow with a deeper hollow in the middle. The absence of burnt mound material from this feature suggests that this was also a natural hollow in the boulder clay.

Possible pre-burnt mound activity
Two features ([6294053] and [6294022]) had a much lower density of burnt stone than the other pits, although analysis of soil samples showed that both did contain some burnt stone. Pit [6294053] was a circular pit which measured 0.70m in diameter and up to 0.25m deep. This feature contained one fill (6294054), described as being a mid-brown sandy silty clay, with few burnt stones. Feature [6294022], in the southern part of the site, was a shallow oval hollow, measuring 2.1m by 1.4m and 0.19m in depth. Its lower fill (6294130) was a brown peaty silt and the upper fill (6294023) was a very dark brown-grey silt containing charcoal (plate 36).

Pit [6294022] contained only roundwood charcoal, in contrast to most of the burnt mound pits, and the fuelwood seems to have been specifically selected for a fast burning fire. Pit [6294053] also had mainly roundwood. The scarcity of burnt stone in these features could show that they were not part of the burnt mound activity and the few burnt stones they contained were probably the result of general burning activities rather than deliberate heating of stone. Both these features were sealed under the burnt mound spread and cut the buried soil layer, and it is possible that they may not have pre-dated the burnt mound by a long period.

Another feature ([6294087] (plate 33) located towards the southern end of the site) may also indicate early activity, but was sealed under the buried soil (6294070), as well as under the burnt mound. The cut of this feature was an irregular sub-oval in shape, possibly formed from two conjoined hollows. The sides were fairly steep. The feature seems to have been filled by a succession of soft clayey deposits with the main upper fill being brown and organic. The lower fills (6294134, 6294135, 6294136) consisted of patches and alternating lenses soft dark brown clay, fine gravelly clay and pale brown clay. These give the impression of gradual deposition of clay and organic matter probably in a waterlogged hollow. The upper fill (6294088) was a soft

dark brown organic clay containing charcoal flecks and patches of organic and fibrous material. This deposit resembled degraded peat and further suggests the infilling of a natural wet hollow with organic material. There was some charcoal and a small amount of burnt stone, the latter mainly from layer (6294134), fairly low in the feature. It is unlikely that this burnt stone came from the burnt mound activity and it probably represents the presence of a fire nearby at an earlier phase. A large stone slab (6294138) and some smaller stones lay on the top of the fill. The excavator suggested that these may have been the remains of capping stones, but even the large slab was not long enough to span the cut and there was no evidence that it had been positioned to do so.

The burnt mound activity

The mounds
Over most of the southern end of the site was an extensive spread of heat-fractured stones that represented the remains of a burnt mound. Other spreads of similar material extended down the slope to the north.

The main burnt mound spread (plate 35) measured about 15m by 13m and was recorded under many different numbers (including 6294024/6294040/6294071). Note that the numbers relate largely to the sequence of investigation rather to visible differences in mound deposits. The mound consisted of a loose dark brown or black silt deposit containing about 80% stone. Most of the stone comprised small angular pieces, occasionally heat reddened, that had been broken by the effects of heat. This had a maximum depth of about 0.4m but was often very much thinner.

Just to the north of the main spread was a separate spread (6294049), measuring 7.2m by 4.5m and up to 0.15m thick. The matrix of this was a dark grey sandy silt and it also had a high proportion of small stones.

Along the eastern baulk of the site was another, rather irregular spread of burnt mound material (6294061/6294151/6294192). This was nearly black in colour with charcoal and heat-fractured stones. It ran for about 13m along the side of the trench, extended up to 10m into the trench and probably merged with spread (6294049). This deposit filled the natural channel [6294150/6294195], which must have been open during the burnt mound activity.

These spreads sealed and obscured numerous features, many of which were grouped towards the southern end of the site.

The southern group of burnt mound features
Under the main burnt mound spread in the southern part of the site were several pits and other features related to the use of the burnt mound. These cut thought the buried soil layers.

Pit [6294127] was a rectangular pit which had square corners and near vertical sides. It measured 2.0m by 1.30m, was 0.25m deep and aligned east to west. It contained a single fill (6294126) which consisted of a loose dark grey to black sandy silt with frequent inclusions of orange heat-affected stones, up to 150mm in diameter. The fill was also very rich in charcoal. This pit seems to have cut into a natural channel [6294103] into which charcoal was introduced; causing some confusion during excavation as this initially appeared to be part of the feature (plate 37).

Adjacent to pit [6294127] were two straight gullies. Feature [6294107] was c.6.5m long, with a maximum width of 0.68m and a maximum depth of 0.18m. It was aligned roughly east-west, but seemed to curve slightly towards the south at the eastern end. This gully had been cut by a similar but straighter gully [6294108], at least 5.5m long, c.0.5m wide and 0.14m deep. Both gullies had fairly gently sloping sides and flat bases. Their fills contained heat-affected stones.

The eastern end of gully [6294108] was cut by a circular pit [6294111], 0.70m in diameter with a maximum depth of 0.32m (plate 38). The main fill of the pit was grey-brown silty clay with numerous stones, some of which appeared to have been heat-affected. In the base of the pit was a deposit of greenish grey sand and fine gravels containing some charcoal.

A little further north was a sub-circular pit [6294105] (plate 39), measuring 1.64m in diameter with a maximum depth of 0.46m. The sides of the pit were steep and slightly undercut on the eastern side whereas the western side was more moderately sloping. The pit contained a firm black silty clay containing small pieces of fire-cracked stone with frequent flecks of charcoal.

Pit [6294033]
To the north of the main mound and sealed under the burnt stone spread (6294049) was a large sub-circular pit [6294033]. The pit measured 1.90m in diameter and had a maximum depth of 0.54m. The sides of the pit were steep and its base was bowl-shaped. Three stakeholes ([6294164], [6294166] and [6294168]) were cut into the bottom of the pit, set in a rough line orientated south-east to north-west (plate 40). The stakeholes were up to 0.1m in diameter and 0.2m deep, and it is probable that they were inserted in the pit base during its use.

Pit [6294033] contained seven fills (plate 41). The basal fills (6294153 and 6294154) were thin deposits rich in charcoal, while the main fills (6294035, 6294152, 6294155, 6294156, 6294157) contained small sub-angular heat fractured stones. These main fills varied slightly in colour and quantity of stones.

It appears likely that the burnt stone generated by the use of this pit was deposited to the east and north-east of the pit in the natural channel [6294150/6294195] (plate 42). The material filling the upper part of this channel (6294051/6294192/6294196) consisted of burnt stones in a very dark brown silty matrix. This had built up over a sequence of organic and erosion deposits (6294193, 6294194) in the base of the hollow.

An irregular hollow [6294118] near pit [6294033] appeared to be a tree root hollow. This seemed to have been sealed by the burnt mound, and some stone from the mound had been introduced into the fill. It is possible that a tree might have grown through the mound without leaving traces in the mound itself and the date of this feature is unknown.

The northern pits
To the north of the burnt mound spreads were two pits (6294002 and 6294003 (plate 43)). These may originally have had associated burnt stone spreads but if so these had been removed by ploughing or erosion.

Both pits were sub-circular with fairly steep sides and flat bases. They contained significant amounts of fire-cracked stones with occasional pieces of charcoal. Pit [6294002] was 1.1m in diameter and 0.23m deep, while [6294003] was 1.42m in diameter and had a maximum depth of 0.32m. A clayey layer (6294010) in the base and up one side of pit [6294003] was interpreted as possibly remains of a clay lining but seems more likely to be an erosion deposit created during the pit's use.

Southern hollow
At the southern limit of the excavated area, beyond the southern edge of the burnt mound, was a feature that was natural in origin but had evidence of being open while the mound was in use. This feature [6294133] was an irregular hollow, 0.38m deep, with poorly-defined edges. It had loose gravel in the base (6294139) and most of the fill was a grey-brown silt (6294140), and contained no burnt stone. The hollow was sealed by (6294096), which appeared to be part of the buried soil extending under the burnt mound. However pollen analysis of this layer and a radiocarbon date showed that it had been accumulating during and after the use of the burnt mound. It was therefore not identical with the soil sealed under the mound. The upper fill of the hollow (6294139) contained two pieces of wood that proved to be split oak and evidence of human activity. It appears likely that the oak was split to provide fuel for the burnt mound and these pieces were discarded in the open hollow.

Artefacts and ecofacts
The only artefacts found were a possibly utilised flint blade (SF23) and a facetted pebble (SF22) (plate 44). Both were from the buried soil horizons below the burnt mound, but could relate to the activity producing the mound. The pebble tool is similar to bevelled pebbles commonly associated with Mesolithic activity but cannot be considered diagnostic and could have been used at a later period. It may have been used in flint knapping, but apart from the presence of the single blade there is no evidence of flint knapping on the site (Smith 2013a).

Very little archaeological material other than burnt stone was recovered from any of the samples from this site, and even burnt stone was not very abundant. There was also very little magnetic material, soil magnetised by heating, that might indicate hearths or fire sites (Rackham and Giorgi 2013). Fire sites are often located near troughs, but none were found during the excavation, raising questions of where the stone was being heated.

An attempt was made to analyse the distribution of burnt stone over the site but this was difficult to interpret. Figure 31 shows proportions of burnt to unburnt stone for features across the plot and the proportion of stone over 7mm in length to smaller stones. Although many features have a fairly high proportion of stone over 7mm, the proportions of burnt stone are very low, even from trough [6294127] and some of the burnt mound deposits. This is almost certainly due to the difficulty in identifying burnt stone. Experiments showed that the degree of

heat alteration was related not just to time in the fire but also to raw material type (Bates 2013). The stone used on the burnt mound was local mud and siltstone and it is probable that this does not show the effects of heating very clearly. Analysis of the distribution of burnt stones across the site are therefore of limited value (Bates 2013). Generally burnt mound deposits and pit fills had fairly high proportions of stones over 7mm, with pre-burnt mound features and some natural features having fewer larger stones. However, many of the features within hollow [6294031] and some other natural features had higher proportions of larger stones than the burnt mound material, but none of these stones showed any signs of burning.

The flots were more productive, although generally less rich than the other burnt mounds sampled. Pits [6294105] and [6294127] each contained a single charred cereal grain (both barley), while tree root hollow [6294118], feature [6294087], and pit [6294033] each had a fragment of hazelnut shell. Three samples produced some waterlogged plant remains with little apart from wood and bark surviving, although the fill of hollow [6294133] produced seeds of birch, goosefoot, sedge, buttercup family and bugle, the upper fill of hollow [6294158] produced uncharred hazelnut shell and birch seeds, and the lower fill of the natural channel [6294103] under trough [6294127] contained waterlogged alder roots and a few insect fragments (Challinor, Giorgi and Rackham 2013).

In many of the samples the charcoal is more fragmented than on the other burnt mound sites. Many of the samples (figure 31) had low amounts of charcoal but considering the dark colour of the burnt mound material this must be due to the fragmentation of the charcoal rather than a genuine lack. The charcoal was dominated by oak, hazel and alder but there was quite a wide variety of other species present with birch, blackthorn, poplar/willow, holly and the hawthorn all represented. There were high levels of vitrification in oak and alder charcoal, especially in burnt mound (6294150) and feature [6294103], but this may relate to specific conditions of combustion or of the fuel rather than just indicating high temperatures (Challinor, Giorgi and Rackham 2013). The soil micromorphology study found a single char fragment within a burnt mound layer. ‘Char’ can be vitrified vesicular burned wood charcoal but can also be derived from fat (Macphail pers. comm.). Fat char tends to be more globular than the fragment found on this site (Goldberg *et al* 2009, 104-106), and this piece is more likely to be related to the vitrified charcoal. Vesicular fuel ash slag was also found on the burnt mound in plot 6/6.

Oak heartwood charcoal was present, in some cases very slow growing material, but small amounts of roundwood were also found in many samples. Pit [6294022] contained many pieces of roundwood and bark, including twigs. The difference between this assemblage and others on site suggests that this feature was not part of the main burnt mound activity (Challinor, Giorgi and Rackham 2013).

Small fragments of charcoal were recovered from several of the natural hollows and also from buried soil contexts. This charcoal was probably introduced from the activity above by bioturbation. The same explanation might be used for the larger quantities of charcoal in two contexts (6294171 and 6294172) that were the upper fills of a palaeochannel [6294170]. Burnt mound deposits directly overlaid these layers and mixing would seem likely. Feature [6294098/6294101] produced little charcoal, which supports the argument that this was not part of the burnt mound activity. Features [6294087] and [6294133] in the southern part of the site both contained some charcoal as well as uncharred remains (Challinor, Giorgi and Rackham 2013), and [6294133] contained two larger pieces of oak, tangentially split (SF 37), one of which had possible toolmarks (Nayling and Bale 2013). There were also several pieces of tangentially split oak (SF 56) from the buried soil (6294046) below the mound (plate 44). This suggests some woodworking was taking place on the site, although it may just have been cutting up wood for fuel (Nayling and Bale 2013).

Charcoal identified in the micromorphological study included pine, which is considered to be rare in the area after the Mesolithic period. However the pollen study also confirmed that pine was present in the general area at the start of the pollen profiles. Pine pollen can travel great distances but the presence of this charcoal on site hints that the trees were not so far away. As none of the macroscopic charcoal was identified as pine it is suggested that pine was not used as fuel on the site but the charcoal might have blown or washed onto the site from burning activity elsewhere.

Micromorphological study of the burnt mound deposits (Macphail 2013) showed that there had been extensive biological reworking of the mound, so it must be assumed that the mound was well-mixed after deposition explaining the lack of any layering within it. There was also evidence of topsoil and subsoil being dumped in the mound as well as stones. The obvious explanation for this might be that soil from digging the pits has become mixed with the burnt mound material, but it is possible that there are other explanations, such as perhaps the inclusions of turves.

Pollen
It is relatively rare for pollen analysis to be undertaken on or very close to a burnt mound and the possibility of doing so here provides an insight into the immediate environment of the mound. A pollen monolith (M3) was taken from the wetland adjacent to the northern end of the burnt mound and another (M2) was taken from the buried soil layer (6294096) in the top of hollow [6294133].

The start of the main wetland profile indicates a largely wooded landscape locally dominated by alder carr. Some clearance is indicated towards the end of the first pollen zone (M3i) by an increase of herbaceous species. The woodland regenerated in pollen zone M3ii but there is evidence of clearance again at the start of M3iii, with woodland again regenerating. Although at the end of the zone a decline in alder corresponds with a peak in micro-charcoal possibly indicating selective clearance or felling. The peak in herbaceous species at the start of M3iii corresponds to another peak in micro-charcoal and cereal pollen grains are present, so this appears to be a clearance for arable agriculture. This clearance event was dated to 1380-1130 cal BC, a period during which the burnt mound was not in use according to the dates obtained on the mound itself. It is possible that the earlier clearance event (in zone M3i) related to the use of the mound and the felling of trees for fuel, in an otherwise heavily wooded area. The extrapolated date for the start of the pollen profile suggests that this first clearance may be too late to correspond to the late Neolithic dates for the start of the use of the mound, but extrapolated dates can only be very approximate.

The clearance event in zone M3iii may indicate the spread of fields closer to the location of the mound, which at that time was not in use. The woodland closed in again in pollen zone M3iv, although some herbaceous species are still recorded. From about 350-60 cal BC, although there was still a high percentage of alder, oak declines, and there are indications of cereal cultivation as well as grassland in the area. Birch and hazel increase suggesting a spread of acidic grasslands and heath, with the final decline of the woodland in zone M3vi. The reappearance of pine in this zone suggests a post medieval date (Grant 2013).

Pollen monolith M2 reflects a similar vegetational history and the deposit seems to have formed during the Bronze Age. The woodland at the start of this profile also has a high proportion of alder, but the presence of cereal pollen grains with some herbaceous species and a moderate increase in micro-charcoal may indicate arable farming in small clearances nearby. This is a different clearance event to that seen in M3iii as it pre-dates the dated sample (1890-1740 cal BC) by a significant amount. It is therefore possible that the clearance was related to activity in the vicinity when the mound was in use. Opening up of the area is indicated towards the end of zone M2iii with final woodland decline in M2iv (Grant 2013).

Dates
A total of 13 radiocarbon results were obtained from seven individual contexts.

Lab ID	Context number	Context description	Material	Radiocarbon age (BP)	Calibrated date (95% confidence)
SUERC-46263	6294010	fill of pit [6294003]	charcoal: *Alnus glutinosa*	3877 ±28	2470–2210 cal BC
SUERC-46264	6294010	fill of pit [6294003]	charcoal: *Corylus avellana*	3853 ±30	2470–2200 cal BC
SUERC-46835	6294156	fill of pit [6294033]	charred hazel nutshell	3966 ±29	2570–2450 cal BC
SUERC-46844	6294156	fill of pit [6294033]	charcoal: *Corylus avellana*	4098 ±29	2870–2500 cal BC
SUERC-46268	6294054	fill of pit [6294053]	charcoal: *Salix/Populus* sp.	3828 ±30	2460–2150 cal BC
SUERC-46269	6294112	fill of pit [6294111]	charcoal: *Alnus glutinosa*	3740 ±27	2280–2030 cal BC
SUERC-46462	6294112	fill of pit [6294111]	charcoal: *Salix/Populus* sp.	3612 ±31	2120–1880 cal BC
SUERC-46829	6294106	fill of pit [6294105]	charcoal: *Alnus glutinosa*	3920 ±24	2480–2300 cal BC
SUERC-46833	6294106	fill of pit [6294105]	charcoal: *Corylus avellana*	3827 ±25	2410–2150 cal BC
SUERC-46463	6294126	fill of trough [6294127]	charcoal: *Alnus glutinosa*	2739 ±31	980–810 cal BC

SUERC-46834	6294126	fill of trough [6294127]	charcoal: *Betula* sp.	2868 ±26	1130–930 cal BC
SUERC-46836	6294151	burnt mound material in channel [6294150]	charcoal: *Corylus avellana*	3734 ±30	2280–2030 cal BC
SUERC-46837	6294151	burnt mound material in channel [6294150]	charcoal: *Prunus* sp.	3938 ±27	2550–2340 cal BC

Many of the pairs of dates from the dated contexts are not statistically consistent, indicating considerable mixing across the site. Only the results from pit [6294003] suggested a lack of mixing, which is consistent with the more isolated position of the two pits at the north end of the site and the scarcity of burnt mound material here. These pits were probably a single short event on the edge of the main burnt mound area. The date from pit [6294053] is consistent with the burnt mound activity despite this pit having little burnt stone. It is possible that the charcoal in this pit was introduced from above, and the feature may be largely natural rather than indicating an earlier phase of activity on the site. The two measurements from trough [6294127] are significantly later than the other dates. The later date (SUERC-46463) provides the best estimate for the date of this particular feature (980–810 cal BC).

When the dates (excluding those from pit [6294127]) are subjected to Bayesian modelling they indicate that activity began in probably *2715–2510 cal BC*, lasted for probably *525–790 years* and ended in probably *2105–1895 cal BC* (all at 68% probability) (Hamilton 2013). It is likely that this represents punctuated use over this period from the late Neolithic into the start of the Bronze Age with reuse again at the end of the Bronze Age represented by pit [6294127].

Discussion

This site is interpreted as a series of activities using hot stone technology. The burnt stones were discarded to form the burnt mound spreads, and some of this material also backfilled the pits. It is assumed that there was considerable mixing and reworking of the burnt stones and material within the spreads. No trace of any hearths for heating the stones was found and it is not clear where this took place.

Feature [6294127] appears to be a rectangular trough typical of burnt mounds. It is likely that it had a lining of some sort, possibly timber, which has not survived. Charcoal and other material from the fill of this feature had become introduced into the fill of feature [6294103] below but the latter feature was irregular and resembled a natural channel, so it is probable that this mixing occurred after the trough was abandoned, possibly through bioturbation. Pit [6294105] was less regular than [6294127] but was full of burnt stone and is likely to have been a sub-circular trough.

Pit [6294111] was very well-defined and filled with burnt stone. It seems to have been associated with the shallow gully [6294108], although it appeared that the pit cut the gully. At Porth Neigwl a burnt mound was found with a wooden launder to feed water into the trough (Smith 2009). The launder was made of a single piece of timber with most of the wood removed to leave the bark and sapwood forming a shallow wooden channel. This was set in a shallow gully similar to [6294108]. No trace of timber was found in [6294108] but its straightness indicates that it may have held a similar launder. If this was the case the gully would be expected to run into a large trough, but no such trough or pit was found. The apparent relationship between [6294108] and [6294111] suggests that they were not contemporary; in any case the pit seems too small to have justified a launder to fill it.

Feature [6294107] may also have held a launder. This gully was earlier than [6294108] and appeared to curve slightly at its eastern end and so may have originally run into trough [6294127]. However it would be difficult to create a curve in a wooden launder of the type found at Porth Neigwl and this may have just been a channel dug to carry water later improved by replacing it by a timber launder. If these features were launders or water channels they should have been running from the stream to the south-east of the site into a trough. If they did carry water from the stream they seem to have been running not into any of the troughs or pits but into the natural channel in the centre of the site. There are therefore problems with this interpretation of these features and they cannot be considered to have been proved to be the remains of launders or water channels.

Pit [6294033] seems to have been the trough for a separate episode of burnt mound activity. The burnt stone from the use of this feature was spread around the pit but was possibly also dumped into the natural channel to the north-east. At least parts of this channel must have been visible when the burnt mound was in use and the upper part of the channel was filled with burnt stone. The channel seems to have continued to the north but here contained no burnt stone despite having two pits ([6294002] and [6294003]) filled with burnt stone on its

western edge. This part of the channel may have been entirely in-filled when the pits were in use but there were few traces of a burnt mound spread associated with these two northern pits so it is possible that they were used in a different way to the other pits on the site and did not produce large amounts of burnt mound material.

Earlier activity on the site may be represented by pits [6294022] and [6294053], which did not have much burnt stone and are not clearly associated with the burnt mound activity. They were rather slighter and less well-defined features than the pits associated with the burnt mound. There were no finds or other anthropogenic evidence associated with these except for charcoal within their fills. The nature of any earlier activity is therefore unclear.

On excavation many of the features appeared to have been natural in origin, although it was impossible prior to excavation to securely distinguish archaeological from natural features. A hollow with a very uneven base [6294031] occupied the centre of the southern part of the site and this seems to have led into a deeper channel [6294170] running down hill to the north-east. A stratigraphically later channel [6294150/4195] ran across the northern part of the site and it was this channel that seems to have been at least partially visible as a feature when the burnt mounds were in use.

These early features were not dated as charcoal within them is most likely to be intrusive from the activity above and any dates would therefore not indicate the actual age of the channels and hollows. However the dumping of burnt mound material in channel [6294150/4195] shows that at least this feature was still open when the burnt mound was in use. Some of the other hollows, particularly [6294133], must also have been open during the use of the site.

The radiocarbon dates indicate a long period of use. The mound material is a mixture from use at quite different periods and contained no stratigraphic information to allow the periods of use to be separated. The pits were backfilled with whatever mound material was around and dates from these can also not be used to separate out phases of activity. Only in pit [6294003] was there no sign of mixing and the two pits in this area probably represent a short-lived event dating to around 2461-2207 cal BC. Pit [6294127] is so much later than the rest of the activity that it must have been an isolated feature but it was a substantial trough that was probably used numerous times, possibly over an extended period as is suggested by the dates. The burnt mound material immediately around the trough presumably originated from it but with other pits close by this is likely to have had a high proportion of earlier material mixed in. It seems most likely that pits [6294033] and [6294105] were also used independently and sequentially. Pit [6294111] and the possible water channels formed part of the earlier phase of activity on the site, although they are close to trough [6294127], but whether they were in use with pit [6294105] is not clear.

The charcoal in pit [6294053] seems to have come from the burnt mound activity, and may indicate that charcoal in the earlier features is merely the result of bioturbation. In which case features [6294053] and [6294022] may be natural hollows rather than representing earlier human activity.

The discovery of more burnt mounds in plot 6/33 and the presence of cereal pollen grains in the pollen profiles suggests significant late Neolithic and Bronze Age activity around Pentrefelin, with a high likelihood of a settlement in the area. However no evidence for settlement has been found so far. A standing stone (PRN 1300) about 400m east is not a sign of Bronze Age activity but was erected in 1721. A possible Roman period settlement (PRN 2365) and the discovery of a Iron Age or Roman period spindlewhorl (PRN 4056) shows that the area was suitable for settlement in later periods. It is possible that known roundhouse settlements had Bronze Age origins, but full excavation and careful radiocarbon dating would probably be needed to prove that.

8.20. Plot 6/33: Two burnt mounds with an isolated pit (PRNs 34095, 34096, 34097)

Grid Reference: SH 52587 40118
Period: Late Neolithic and early medieval
Mitigation undertaken: Both burnt mounds were fully excavated and the isolated pit was half excavated. After the burnt mounds were recorded in plan evaluation slots were dug through them and once the sections of these had been recorded the mounds were removed by hand to reveal any features beneath.

See figures 25, 32-35 and plates 45 to 53
In plot 6/33 two burnt mounds were discovered following removal of the ploughsoil under a supervised archaeological controlled strip. One area had two patches of burnt mound material (group number (633012)) in close proximity in the south-western area of field 6/33. A second burnt mound spread (group number (633015))

was discovered c.24m downslope from (633012) in the eastern side of plot 6/33. A thin layer of burnt mound spread was identified in the pipe trench so some of the burnt mound spread was preserved *in situ* under the running track. An isolated pit [633010] containing burnt stones was found further east down the hill.

Burnt mound (633012) (PRN 34095)
This feature, which had been detected in evaluation trench T24, consisted of two burnt mound deposits (plate 45); layer (633004) projected 1.7m from the northern baulk of the trench and was 3.2m long, and layer (633005) measured 3.2m by 2.3m. Both deposits were composed of c.60% small sub-angular heat-affected stones in charcoal-rich black silty clay, up to 0.12m thick, and must essentially have been part of the same mound. Patches of largely stone-free charcoal-rich silt (633019, 633021) underlay parts of deposit (633005).

Under (633004) was the terminus of a possible shallow gully [633006], aligned roughly north-south and measuring 0.30m in width with a depth of 0.09m. The gully had a rounded end, gently sloping sides and its fill was indistinguishable from the mound above. There was also a small, sub-circular, steep-sided hollow [633008] sealed under (633004). This measured 0.25m in diameter and 0.18 metre in depth, with a narrow, tapering base. It was filled by firm black silty charcoal fill (633009) which contained small fragments of burnt stone. This feature may have been a posthole, although there were no post-packing stones present, and alternatively it may have been a hollow where a stone was removed during the life of the burnt mound.

Deposit (633005) seemed to form the main part of the mound, and initially it was thought to seal various features. However a potential pit [633018] on the western side proved to probably be an animal burrow, and stones set on edge (633020) that appeared to be part of a trough lining were actually embedded in the natural and their presence was purely fortuitous (plates 46 and 47). A charcoal-rich deposit (633019) had built up in a hollow [633032] against these stones but this hollow, which was only 0.15m deep, did not seem to be a deliberately cut feature. Part of layer (633005) filled a shallow, sub-circular hollow [633030] with some small flat stones (633022) lying on it base, but there was no sign of heat-alteration on these and they had probably eroded into the hollow through natural processes.

No obvious trough was therefore identified in association with this mound, nor was there a clear fire site, although the lower, less stony charcoal layers (633019) could represent the remains of a fire.

One sample from (633004) produced a tiny chip of flint (SF67), but other than that only burnt stone was recovered from this mound. Fairly large quantities of charcoal were recovered from the site and posthole [633008] produced a charred bramble/raspberry seed. The charcoal assemblage was dominated by oak heartwood and hazel roundwood, with a small amount of alder, blackthorn and holly (Challinor, Giorgi and Rackham 2013). Layers (633019) and (633021) were probably dumps of firewood under the mound and their charcoal assemblages were quite different with (633019) containing mainly oak, some of which was highly vitrified, and (633021) containing no oak but mainly hazel. These therefore may represent separate burning events with wood collected from different sources (Challinor, Giorgi and Rackham 2013).

Two radiocarbon dates were obtained from the layer of charcoal (633019) beneath the mound.

Lab ID	Context number	Context description	Material	Radiocarbon age (BP)	Calibrated date (95% confidence)
SUERC-46267	633019	charcoal layer sealed under burnt mound	charcoal: *Alnus glutinosa*	4224 ±27	2900–2700 cal BC
SUERC-46461	633019	charcoal layer sealed under burnt mound	charcoal: *Alnus glutinosa*	4159 ±31	2890–2620 cal BC

The two measurements are statistically consistent and could be the same actual age, and the best estimate for the date of this deposit is *2875–2625 cal BC* (*95% probability*), and probably *2800–2670 cal BC* (*68% probability*) (Hamilton 2013). This was therefore a late Neolithic feature.

Burnt mound (633015) (PRN 34096)
Burnt mound (633015) was located down slope and to the east of the mound described above. It formed a rough L-shape in plan measuring 4.20m in length north-south and 4.85m in breadth east-west (plates 48 and 49). The mound contained three distinct deposits. The main part of the mound was (633024) which consisted of a friable black silty clay containing c.50% heat-affected stone with charcoal. Underlying this in places was a reddish brown silty clay (633025) with c.60% heat-affected stone, and less charcoal than (633024). Also under (633024)

on the northern side was a similar dark reddish brown deposit with a high proportion of heat-shattered stones (633027).

Under the northern edge of the mound was a sub-oval trough [633034] with steep sides and a flat base (plate 50). This feature measured 1.70m in length, 1.10m wide and a maximum depth of 0.63m. It was filled by small heat-shattered stones in a dark reddish brown silty clay matrix (633035) (plate 51).

Also on the northern side of the burnt mound, not sealed by the mound layers, but obscured under a grey silt (633036), was a circular pit [633028], with steep sides and a flat base (plate 52). The pit measured 1.04m in diameter and 0.27m in depth. It contained a single fill (633029), which consisted of a firm black silty clay with occasional fragments of burnt stone and frequent small flecks of charcoal.

This mound seemed to have had two troughs, presumably in use sequentially and producing the different burnt mound layers. It is tempting to associate pit [633028] with the mound layer (633025) because the layer was mainly seen in the eastern side of the mound near the pit. It could then be claimed that [633028] pre-dated pit [633034] as layer (633025) underlay (633024). However it is likely that considerable reworking of the mound layers occurred and that some of the differences between the layers are due to soil conditions during and after the use of the mound, so defining the stratigraphic relationships is problematic.

No finds other than burnt stone were recovered from this mound. The burnt mound layer (633024) produced two fragments of charred hazelnut shell. The mound had quantities of alder and hazel charcoal with very little oak and some holly. The same species were found in pit [633028] but also blackthorn and hawthorn in small amounts (Challinor, Giorgi and Rackham 2013).

Two radiocarbon dates were obtained from the fill of pit [633028].

Lab ID	Context number	Context description	Material	Radiocarbon age (BP)	Calibrated date (95% confidence)
SUERC-46265	633029	fill of pit [633028]	charcoal: *Corylus avellana*	1414 ±30	cal AD 590–670
SUERC-46266	633029	fill of pit [633028]	charcoal: *Alnus glutinosa*	1444 ±30	cal AD 560–660

The two measurements are statistically consistent and could be the same actual age. The best estimate for the date of this deposit is *cal AD 600–665* (*95% probability*), and probably *cal AD 620–655* (*68% probability*) (Hamilton 2013). This demonstrates that this burnt mound was used in the early medieval period in the 7th century AD. The two consistent dates make this date reliable and unlikely to be the result of contamination by later material.

Pit [633010] (PRN 34097)

About 26m east and downslope of burnt mound (633015) was an approximately circular pit [633010], measuring 1.28m in diameter and 0.11m deep. This slight feature was burnt red in its base suggesting an *in situ* fire, and the main fill consisted of heat-fractured stone in a dark grey silty clay with frequent charcoal (633011) (plate 50). The pit contained some identifiable pieces of charcoal but no artefacts. Like burnt mound (633012) the pit contained mainly oak and hazel charcoal with some holly and also a single fragment of ashwood. The latter was the only example found in the project. Ash is good fuelwood and would have been used if it had been present so this scarcity suggests few ash trees in the oak-hazel woodland (Challinor, Giorgi and Rackham 2013).

Two radiocarbon dates were obtained from the fill of pit [633010].

Lab ID	Context number	Context description	Material	Radiocarbon age (BP)	Calibrated date (95% confidence)
SUERC-46827	633011	fill of pit [633010]	charcoal: F*raxinus excelsior*	3901 ±29	2480–2290 cal BC
SUERC-46828	633011	fill of pit [633010]	charcoal: *Corylus avellana*	3903 ±25	2480–2290 cal BC

The two measurements are statistically consistent and could be the same actual age, and the best estimate for the use of the pit produced by combining the dates is *2470–2305 cal BC* (*95% probability*) (Hamilton 2013). This feature was also therefore late Neolithic feature but significantly later than burnt mound (633012).

Discussion
Some of the slight anomalies seen on the geophysical survey (Bartlett 2010) probably related to the burnt mounds but they were indistinguishable from many other similar anomalies with no archaeological cause.

The mounds were on an east facing slope at about 48m OD. The closest stream was 33m to the north, and down slope, so the troughs were probably filled with rain water or ground water. The clays into which the troughs were cut certainly seemed able to hold water. The closest known burnt mound in the area is that found in plot 6/29.4 (640m to the south-west), but the wet valley to the east would appear an ideal place for burnt mounds and it is likely that there were others not yet identified.

The dates show that the features in this plot were used sequentially with considerable time between; mound (633015) being very much later than the other features. Despite its early medieval date this mound was no different to others found in the project and demonstrates that late burnt mounds cannot be identified without radiocarbon dating.

The scarcity of oak charcoal from the later mound could indicate that oak woodland was much reduced in the early medieval period compared to the late Neolithic, but the variability in the fuel sources for the mounds means that this cannot be taken as a firm indication of the composition of the surrounding woodland. It is possible that a stand of hazel happened to be close to the mound and was used in preference to oak slightly further away.

8.21. Plot 6/38: An organic deposit and a natural hollow (PRN 34098)
Grid Reference: SH 52972 40018
Period: Unknown, natural deposit
Mitigation undertaken: Recorded by brief notes and photographs during watching brief

Figure 25, Plates 54 and 55
Two potential features were investigated in this area but both proved to have natural origins. Feature (638001) was an irregular patch of organic staining measuring 0.5m by 0.5m, probably degraded peat. Feature [638002] was an irregular hollow filled with angular stone and grey silt. Investigation suggested that this was a natural feature probably formed by peri-glacial processes. This plot is in a small valley near the stream and although there is little peat it is a wet area and flooded during the works.

8.22. Plot 6/39: Natural stone deposit (PRN 34099)
Grid Reference: SH 53010 40019
Period: Unknown, natural deposit
Mitigation undertaken: Investigative work and recording undertaken during the watching brief and the feature was found to be natural.

Figure 25, Plate 56
A layer of generally flat stones (639001) lay within or on a pale grey-brown silty clay, covered by a peaty topsoil (639002). The stony area measured c.13.0m by 4.5m and was about 0.15m deep. Some of the stones seemed to form lines but on excavation these proved not to be coherent. Some of the stones were embedded in the gritty glacial clay (639003) below and it is considered most probable that frost action has caused the stones to be lifted out of the substrate and sorted to produce this feature.

This plot is in a small valley near the stream and although the peat layer was only 0.3m deep it is a wet area and flooded during the works.

8.23. Plot 6/44: Tree root hollow (PRN 34100)
Grid Reference: SH 53549 40012
Period: Unknown
Summary: Irregular feature with evidence of root activity and rodent burrows
Mitigation undertaken: Recorded by brief notes and photographs during watching brief

Plate 57

Feature (644001) was a very irregular feature, measuring 5m across and 0.45m in depth, filled by mid brown and light grey silty clay with some stones. It appeared to be the result of tree root activity with perhaps some animal burrowing.

8.24. Plot 6/47: Two boundary ditches (PRN 34101)

Grid Reference: SH 53733 40085
Period: Post-medieval
Mitigation undertaken: Recorded by brief notes and photographs during watching brief

Plate 58
The pipe trench cut through two ditches about 3m apart. Ditch [647001] was 3.4m wide and 0.6m, while [647003] was about 3.5m wide and 0.4m deep. They were filled was fairly stony brown silty clay (647002, 647004) and seemed to be roughly parallel. These ditches were just east of a boundary that is shown on the 1889 OS map. There is also a footpath shown on this and later maps and the ditches may have flanked the path.

8.25. Plot 6/51: Shells in clay deposit (PRN 34102)

Grid Reference: SH 54327 40092 A
Period: Unknown, possibly post-medieval
Mitigation undertaken: Recorded during watching brief on trench record sheet. Sample of shelly clay collected.

Figure 36, Plate 59
Shells were seen in blue grey clayey silt (651001) at 1.8-2.0m below the surface and a bulk soil sample was collected. The sample produced an organic flot, with wood, waterlogged seeds, numerous herbaceous stems, moss and leaf fragments, snail shells, insects and a little charcoal. The snail and mollusc shells include species typical of estuaries and salt marshes. This suggests a former salt marsh environment, probably a former strand line (Rackham and Giorgi 2013).

This deposit was recorded at the north-western edge of Traeth Mawr, presumably on the original shore line. Its position means that this could deposit may be post medieval in date, and could just pre-date the reclamation of the traeth.

8.26. Plot 7/1: Small shell midden (PRN 34103)

Grid Reference: SH 55507 39594
Period: Iron Age
Mitigation undertaken: Recorded and samples obtained as part of the watching brief.

See figures 36 and 37 and plate 60
A concentrated deposit of shells (71001) was found covering a roughly oval area measuring 2.98m by 1.80m. The deposit, which was up to 0.36m thick, was composed mainly of cockle shells with some winkles and a few oyster shells, and had built up against an outcrop of bedrock. The shells were in a matrix of dark grey/black silty sand, and some charcoal was also present.

Below the midden was a heat-reddened layer containing burnt stones and charcoal flecks. This layer measured 1.8m by 1.3m and was 0.25m thick and was probably heat-altered natural; many of the stones seemed to be naturally broken bedrock. It is assumed that this was the site of a fire or hearth.

The soil sample from this site included some unburnt organic debris, wood and birch and bramble/raspberry seeds, which may be recent material although some bramble/raspberry seeds were also recorded charred. Charcoal was present with a few terrestrial snails suggesting a shaded or woodland environment (Challinor, Giorgi and Rackham 2013).

The most abundant finds were marine shells, mostly cockles, but also periwinkles, oyster and rough winkle (nearly 6 kilogrammes of shell were sorted from the 27.75 litre sample). The site would appear to have been a shell processing site where the shells were probably boiled, but on the basis of the organic component and the terrestrial snails it was set back from the coast within woodland (Rackham and Giorgi 2013).

The site lies on the very edge of Traeth Mawr at about 5m OD. It must have been on the southern shore of the traeth before reclamation. The midden was partially buried under a thin layer of soil and colluvium, and the

proximity of the Cambrian Railway raised the possibility that navvies involved in its construction deposited the midden. However the evidence for woodland indicated that the midden was not so recent as none of the early OS maps shows woodland on this site.

Radiocarbon dating of a charcoal sample and a cockle shell.

Lab ID	Context number	Context description	Material	$\delta^{13}C$ (‰)	Radiocarbon age (BP)	Calibrated date (95% confidence)
SUERC-46259	71002	shell midden	charcoal: *Corylus avellana*	-26.7	2428 ±30	750–400 cal BC
SUERC-46845	71002	shell midden	marine shell: *Cardium edule* (cockle)	1.3	2652 ±29	660–340 cal BC

When appropriately calibrated and statistically combined these give a best estimate for the date of the deposit of *590–335 cal BC* (*95% probability*), and probably *500–385 cal BC* (*68% probability*) (Hamilton 2013), demonstrated that the midden was middle Iron Age in date.

The inaccuracy of the assumption that all shell middens are Mesolithic was demonstrated recently by the discovery of a medieval shell midden near Minffordd (Parry 2013). It is likely that shell fish were used as a resource in all periods but this is the only one known from the area dating to the Iron Age and gives a valuable hint of activities not usually considered for that period.

It was proposed in the project design that if the midden proved to be early prehistoric the shell assemblage would be studied in more detail. This would include the measurement of the shells, counting of growth rings on the shell surface and isotope analysis. The aim would be to detect evidence of seasonality. In the Mesolithic period establishing seasonality is important to determine when mobile hunter gatherer groups were present in an area, but as the radiocarbon dates show that this was an Iron Age midden the question is less pertinent. The sedentary Iron Age population is likely to have been present at all seasons. There are known Iron Age settlements on Moel y Gest, the closest (PRN 1287) is 690m south-west of plot 7/1, and people from there might possibly have been responsible for creating the midden. If the site had been larger it might have been possible to determine whether there was a seasonal pattern to shellfish exploitation that might give some indication of the use of the shellfish, whether mainly for food or bait. However the very small size of the midden suggests that it was the result of a single event, with no way to judge how typical this is of Iron Age activity. If further Iron Age middens are found in future a project looking at the seasonality of several of them in relation to their locations and the shell types include may be able to formulate and answer worthwhile research questions.

8.27. Plot 7/2: Relict stream channels (PRN 34104)

Grid Reference: SH 55610 39560 A
Period: Post-medieval
Mitigation undertaken: Channels investigated and recorded during watching brief and recorded on topsoiling sheets

See figure 36 and plate 61
The natural substrate in this plot was a light to mid-brownish grey loamy clay. Within this was seen an arcing gully and other less well-defined curves and lines filled with grey silty sands, generally fairly light grey in colour with lenses of darker grey. The main feature formed an arc about 10.55m across internally, which projected 5.00m from the baulk. The gully was 1.0m wide and up to 0.12m deep. Its sides sloped gradually and its base was irregular and undulating. Although initially thought to be possibly a ring ditch for a barrow investigation showed that the arc was not semi-circular and the gully appeared too shallow and irregular. This plot lies on Traeth Mawr and it is most likely that these gullies were channels through the former salt marsh that have infilled as the land was reclaimed.

When the pipe trench was dug through this plot marine shells were found in the grey clay at about 1m below the surface towards the western end of the plot. This probably marked the shore-line at this point like the shells in plot 6/51.

8.28. Plot 7/8: Modern drainage ditch (PRN 34015)
Grid Reference: SH 57973 39020
Period: Modern
Mitigation undertaken: Recorded during watching brief on trench record sheet.

See plate 62
A ditch recorded in the pipe trench, measuring about 12.0m wide and 0.5m deep. It contained slates and concrete building debris. This could be a north-south aligned field boundary shown on the early OS maps from 1900 but the broad width recorded in the pipe trench suggests that the ditch cuts the line of the pipe at a very obtuse angle. It is therefore most likely that this an open drain shown on the 1970s 1:10,000 map running east-north-east to west-south-west.

8.29. Plot 7/13: Flint find spot (PRN 34106)
Grid Reference: SH 59460 38800 A
Period: Post-medieval/modern
Mitigation undertaken: Recorded during watching brief

A broken piece of flint (SF24) was found in the topsoil. This is a large fresh flake of imported chalk flint and is most probably a modern import from elsewhere in Britain (Smith 2013a). The proximity of the railway line may indicate this was the source of the flint. Nineteenth century pottery was also recorded in this area.

8.30. Plot 9/6: Topsoil finds (PRN 34107)
Grid Reference: SH 60460 38700 A
Period: Post-medieval
Mitigation undertaken: Sherds collected

A small number of post-medieval pot sherds were recovered from the topsoil in the plot next to the Bron y Garth Hospital, previously the Ffestiniog Union Workhouse. There were six sherds of glazed 19th/20th century pottery from five separate vessels, including a fragment of a Marmalade stoneware jar and pieces of transfer printed crockery (Cootes 2013).

8.31. Plot 11/3: Timber find spot (PRN 34108)
Grid Reference: SH 61196 39191
Period: Post-medieval?
Mitigation undertaken: Recorded during watching brief and timbers sampled

See figure 38, plates 63 to 65
A layer of peat up to 2m thick was seen over much of plot 11/3. At a depth of about 1m within this peat was a rough layer where wood was more densely concentrated. Some of the fragments of wood appeared to be chopped or sawn and some were radially split. Many of the pieces were fairly small but there was also the stump of a tree. The peat was found immediately below the ground surface in this area and the upper parts also contained wood, including remains of modern trees.

A sample of wood was collected for study. This included both willow and oak. Some of the willow branches had cut side branches, but the oak was more extensively worked including splitting, sawing and peg holes, some of the latter suggesting re-use (Nayling and Bale 2013).

Two samples of oak with sufficient annual rings were subject to dendrochronological dating, but neither could be matched with any reference chronologies. Both samples had narrow growth rings and their growth seems to have been controlled by microclimatic rather than regional climate factors, explaining the difficulty in matching with the reference chronologies. However the saw marks present on one sample (SF52 4 of 4) and the very good condition of some samples suggest that at least some of this material is of modern (i.e. 19th or 20th century) origin.

This plot has been largely surrounded by houses since the 19th century, but has remained very wet through to the present day as it was covered by Himalayan balsam and willows. It is possible that the worked timber originated from earlier buildings demolished as the 19th century town was built, but some may be even more recent. The likelihood of prehistoric remains in the area, particularly within the bogs seems to be high as both a Bronze Age sword (PRN 4180) and bronze flat axe (PRN 4347) were found in the area.

8.32. Plot 13/30: Timber find spot (PRN 34109)

Grid Reference: SH 65675 40350
Period: Unknown
Mitigation undertaken: Timber collected

See figure 39, plates 68 and 69
Two large timbers were found in base of the trench at a depth of about 1.5m below the present surface. These were in a mid-brownish grey silty sand of probable alluvial origin. Most of the layers above were alluvial silts and clays with a band of brown, organic material in places.

One of the timbers (SF 57) is quartered and has one cross cut worked end, though the decayed surface means no tool marks are visible. The second timber (SF 58) is an approximately quartered piece of knotty oak and one end has been roughly cross cut to form a lipped end, with axe marks visible. Both samples 57 and 58 may have formed horizontal elements to some sort of trackway structure, and show similarities to some of the timbers recovered from plot 14/7 (Nayling and Bale 2013). Whether this indicates that there was a wooden causeway in this area or whether the timber had washed downstream is not clear.

Both samples 57 and 58 contained sufficient rings for dendrochronological analysis. The two timbers cross matched very highly with each other, and were probably from the same parent tree. Unfortunately, neither sample, nor a 157 year mean created from both samples, dated when compared to British, Irish and European reference chronologies.

This site is on the flood plain of the Afon Dwyryd about 190m west of the river. The river here is tidal and meanders across its flood plain, but has not changed its course since 1889, partly because there were already flood banks built along each side of the river at this date.

8.33. Plot 14/1: Timber find spot (PRN 34110)

Grid Reference: SH 66445 40949
Period: Medieval
Mitigation undertaken: Recorded during watching brief, timber sampled

See figure 39, plate 70
A large squared timber was recovered from the mid grey silty clay in the base of the trench. The timber has been radially split from a large branch or trunk timber cross-cut from two directions to cut to length. Marks on one side suggest repeated use as a chopping block probably in cross-cutting other similar timbers to length.

This timber, with its large number of rings, was subjected to dendrochronological analysis. The sample proved difficult to measure with a number of bands of narrow, sometimes anomalous rings, in the latter part of the tree-ring sequence, but it was suspected that the date of the outermost surviving ring of this timber was in the mid-13th century. This date was confirmed by an additional sample, with the innermost ring dating to AD 1073 and the outermost surviving ring dating to AD 1262, giving an estimated felling date range of between AD 1272 and AD 1308 (Nayling and Bale 2013). This date range falls between the death of Henry III in 1272 and the death of Edward I in 1307, making it difficult to fit this closely with any specific historical event in the conquest of Wales.

As this was an isolated item is it likely that it has washed downstream from its original location but the evidence of wood working does imply that it was part of a structure. The use of the timber as a chopping block could indicate a history of use and reuse, alternatively the chopping could have been part of the same activity for which it was split. This site is on the flood plain of the Afon Dwyryd about 180m north-west of the river. The river here is just at the tidal limit with the highest point of ordinary tides being under the bridge at Maentwrog. The river meanders across its flood plain, but has not changed its course since 1889, because there were already flood banks built along each side of the river at this date. The course of the river could have been quite different in the medieval period.

8.34. Plot 14/4: Possibly worked wood (PRN 34111)

Grid Reference: SH 66605 41061 A
Period: Unknown

Mitigation undertaken: Recorded during watching brief, wood samples taken

See figure 39, and plates 71 and 72
A piece of roundwood (SF 42) was found in alluvial clay. A large unworked branch was also found in this plot, but not recovered. The clay is described as firm dark grey silty clay, and it had alluvial gravels below it. Study of SF 42 showed it to be a piece of willow roundwood with a possible toolmark on one side (Nayling and Bale 2013).

This site is on the flood plain of the Afon Dwyryd about 180m north of the river. The river here is generally not tidal, but as the highest point of ordinary tides is under the bridge at Maentwrog this section of river must still be tidal on the higher tides.

8.35. Possible medieval causeway and related finds (PRNs 34112, 34113 and 34114)

Grid Reference: SH 66907 41219
Period: Medieval
Mitigation undertaken: Recorded during watching brief

See figure 39 and plate 73
Plot 14/7 lies within a bend of the Afon Dwyryd. The field is reclaimed land protected by a flood bank since at least the late 19th century. The 1841 tithe map for Maentwrog parish shows the same course of the river as in 1889. The bend in the river to the north-east of plot 14/7 was straightened out in the 20th century and now exists as ox-bow lake-type ponds. Under about 0.1m of topsoil (147001) was a layer of mid orange-brown silty clay (147002) 0.39m thick. This overlaid a mid grey-brown silty clay (147003), which in turn covered a light grey silty clay (147004/147006). All these deposits appeared to be alluvial silts. About 32m east of the current river bank (SH 66864 41214) a large piece of timber (PRN 34112) was recovered from the silts at a depth of 1.1m below the present surface from context 147006. This timber (SF 59) was a quartered piece of oak with an axe cut at one end and other possible axe marks (Nayling and Bale 2013).

In places beneath 147004, centred on SH 66907 41219, was a deposit composed largely of pieces of wood (147005). This deposit (PRN 34113) was between 0.9m and 1.1m below the present surface and composed of dark grey silt containing a dense concentration of pieces of wood, branches and hazelnuts. Many of the pieces were small but two large timbers were found, the largest was 0.75m in length.

For health and safety reasons there could be no access into the trench, which was waterlogged and flooded readily, so the deposit could not be closely studied *in situ*. Although it appeared that some of the timbers were worked it was difficult to establish the date and importance of the site in the field. A sample of wood was collected for study and dating, and the significance of the site only became clear through the post-excavation process.

A total of thirty eight pieces of wood were studied from context 147005. Most of the material was oak but birch, hazel and alder was also present. The collection includes numerous quartered or radially split oak wood with tool marks, but there are also smaller roundwood items with evidence of working such as the cutting of side branches. A number of the pieces exhibit clear woodworking from initial conversion through splitting followed by secondary hewing which implies that at least part of this assemblage represents worked and possibly finished timbers. Some of the smaller items may represent the debris from woodworking (Nayling and Bale 2013).

Although nine timbers from this plot contained sufficient rings to warrant dendrochronological investigation, none of the samples measured provided a date due to very slow growth and therefore narrow rings in all or parts of the wood. The very narrow growth rates observed in some of the material suggests the parent material may have been branchwood and that the narrow rings are the result of microclimatic rather than regional climate effects. The date of this deposit could not therefore be established from dendrochronology (Nayling and Bale 2013).

In order to determine the date of the feature two samples of oak bark were submitted for radiocarbon dating.

Lab ID	Context description	Material	Radiocarbon age (BP)	Calibrated date (95% confidence)
SUERC-46248	dense wood layer, possible structure (147005)	bark: *Quercus* sp.	656 ±27	cal AD 1280–1400
SUERC-46249	dense wood layer, possible structure	bark: *Quercus* sp.	631 ±30	cal AD 1280–1410

(147005)

The two measurements are statistically consistent and could be the same actual age. If they are combined this gives a best estimate for the date of this deposit of *cal AD 1290–1400* (*95% probability*), and probably *cal AD 1350–1395* (*68% probability*) (Hamilton 2013). The possible structure therefore appears to date to the second half of the 14th century AD.

The study of the material implies that at least part of this assemblage represents worked and possibly finished timbers. Some of the smaller items may represent the debris from woodworking, suggesting that the material may not have moved far from its origin. This group of material cannot be explained as natural driftwood, or remnants of simple woodland clearance.

The view of this feature in the base of the pipe trench did not allow the identification of any structure and it was initially assumed to be material deposited by the river. However the worked wood suggests that this was either an *in situ* structure or the remains of a structure displaced by flooding. Its location on the flood plain might suggest a causeway leading to a river crossing and the radiocarbon dates show that it was medieval.

There was a high concentration of hazelnuts amongst the wood debris. Most of the nutshells are intact, and therefore not shells from consumed nuts but they may indicate that many of the branches used in the structure were cut in autumn with their nuts and probably leaves still attached. Branches with leaves would help to make a reasonable temporary surface for a trackway. No artefacts, other than wood, were found in this area.

Fourteen meters to the west of the wood deposit was a palaeochannel (SH 66893 41219), c.5.8m wide and over 0.7m deep (it was not fully exposed in the trench). This channel was filled with layers of alluvial gravel and was cut through the grey alluvial silty clay.

Towards the eastern end of plot 14/7 part of a cattle skull with horns was found at a depth of 1.4m (SH 67004 41235, PRN 34114). This was found within what appeared to be a low mound of grey silty clay (147009). The grey clay was sealed by a mid orange-brown silty clay (147008). The skull fragment comprised the posterior frontal bones with intact horn cores of medium length and the horns themselves still surviving although degrading. The skull is relatively small with the horns pointing slightly upwards and forwards on the skull. Their conformation and size is consistent with a medieval animal, but also could be a small recent breed, such as a Welsh White (Rackham and Giorgi 2013). The medieval date for the timber deposit suggests that finds from this depth are likely to be medieval or earlier. The conclusion is that this is a medieval cattle skull and that the alluvial silts have preserved the horns, making it appear more recent than it is.

8.36. Plot 14/17: Flint find spot and remains of a wall (PRN 34115)

Grid Reference: SH 68490 41682 A
Period: Prehistoric and post-medieval
Mitigation undertaken: Recorded during controlled strip

A flint flake (SF32) was found while walking over the stripped plot. This is a short, broad flint flake and was not associated with any recognisable feature.

The base of a wall, aligned south-west to north-east, was uncovered on the north bank of the river, about 10m from the river. Only the base of the wall remained in the spread but its continuation could still be seen upstanding running parallel to the river beyond the easement. The base of the wall was about 0.6m wide and rested on alluvial sediment. The wall foundations were composed of medium and large sub-rounded river stones, and some 19th century china was found amongst the stones.

This is a wall shown on the early OS maps running for a short distance by the river.

8.37. Plot 17/3: Former stream channel (PRN 34116)

Grid Reference: SH 70318 44195
Period: Unknown, natural feature
Summary: Natural channel initially thought to be possibly a ditch.
Mitigation undertaken: Recorded during watching brief

See plate 74
A channel 3.5m wide and 1.1m deep was noted in the side of the pipe trench. This was aligned north-east to south-west and had peat deposits within its fill. This was initially thought to be a ditch but on closer inspection it was seen to be a natural fluvial channel that had filled in with peat.

8.38. Plot 17/15: Modern dump (PRN 34117)
Grid Reference: SH 70230 45314 C
Period: Modern
Mitigation undertaken: Recorded during watching brief on trench record sheet.

See figure 40, plate 75
A large natural depression has been filled with rubbish and demolition rubble to level the field. Test slots were machined through this deposit to determine its depth. The depth of this deposit meant that this area could not be fully control stripped as had been intended.

The deposit, more than 1.9m deep in places, was dark grey and contained modern brick, stone and slate, as well as large boulders. The upper 0.2m contained plastic piping and bottles probably dating the 1960s and 70s. The lower fill contained finds dating to the early 20th century, including pottery and glass.

Some flat stones slabs exposed in the base of one exploratory slot could be part of a structure and some of the demolition material may have originated from a structure on the site, rather than being dumped from elsewhere.

A disused tip is shown on the 1978 1:10,000 map about 100m west of the pipe route and this may have extended further than that indicates. The tip is not shown on the 1919 OS map. No buildings are shown in the field, although the OS County Series maps from 1888 show a rectangular earthwork at SH 70259 45313, the destruction of which might have contributed to the rubble.

8.39. Plot 18/3: Wall related to gasworks (PRN 34118)
Grid Reference: SH 70464 45690
Period: Modern
Mitigation undertaken: Recorded during watching brief

See figure 41 and plate 76
A large stone wall was found, about 1m thick and surviving to a height of c.2m, although buried about 0.5m below the present ground surface. The wall ran roughly south-west to north-east and was composed of local mortared stone, strengthened with iron bars. The wall was holding back water on its northern side, which was released as the wall was breached making recording difficult. To the south of the wall was a loose stony backfill, but against the northern side of the wall was a denser deposit of demolition rubble comprising stone, slate and brick, including part of a demolished brick wall. There was also an ash deposit in the northern end of the plot.

In 1889 the northern part of plot 18/3 was occupied by a gas works. A south-west to north-east aligned boundary ran through the location of the wall at this time but this was an ordinary field boundary and there is no reason to assume that it was a substantial stone wall. By 1901 the gas works had expanded further south and a large gas holder was located with its southern edge directly over the location of the wall. It therefore seems likely that the wall was part of revetting to level the ground, and the rubble dumped behind it supported the gas holder. The gas works had gone out of use and the gas holders had been removed by 1918.

8.40. Field boundaries

Field boundaries identified in the assessment report as of historical interest were recorded when they were breached by the works. This revealed the construction and nature of these boundaries. Appendix II lists the boundaries recorded with references to the archive photographs. More detail on each boundary is recorded on the boundary record sheets.

Consideration of the records and the map evidence indicates that while the majority of the boundaries recorded appeared on the tithe maps many probably did not pre-date the 18th century. Several are on reclaimed land such as the Traeth Mawr (plots 6/51 to 6/54, figure 36) and the flood plain of the Dwyryd (plot 13/24). William Oakeley was reclaiming the flood plain of the Dwyryd in the late eighteenth century (Evans and Davidson 2012, 33). The western branch of Traeth Mawr was reclaimed after William Madocks had built an embankment east

of the future site of Tremadog in 1800. The larger part of the Traeth was only reclaimed after Madocks had in 1813 finally succeeded in building and consolidating the embankment known as the Cob running across the mouth of the Glaslyn Estuary (Beazley 1985). These field systems on reclaimed land are noticeably regular with large fields and straight boundaries. Many of these boundaries are traditional *cloddiau* (earthen banks faced with stone usually with a hedge growing on top). There is little to indicate that such banks are exclusively early and both cloddiau and drystone walls seem to have been used from the 18th century onwards.

Earlier boundaries can possibly be identified by their irregular or curving line and the small size of the fields they enclose. Of the possibly pre-18th century boundaries most are *cloddiau* but a significant number are drystone walls. Both type of boundary could have been rebuilt and there is evidence of some of the walls having been straightened compared to earlier mapping. They may have originally have been *cloddiau* and have been rebuilt as walls. The suggestion is that most of the earliest boundaries in this area were originally *clawdd* boundaries, although those on higher and rockier ground were probably always drystone walls.

There is a group of small fields with fairly irregular boundaries around Hafod-talog (plots 13/2 to 13/6, figure 42). These have stone walls but they enclose a small knoll on the edge of the Dwyryd flood plain, which was probably quite suitable for agriculture and settlement. The name Hafod suggests a temporary or secondary settlement from the main hendre farm and could indicate a 16th century origin for the fields.

North of Pentrefelin there are fields with curving boundaries (plots 6/29 to 6/31, PRN 55805) which may indicate groups of strips originally within open fields that have been enclosed (figure 24). This is supported by the reference to a 'quillet' (a strip of land formerly part of an open field) in the tithe schedule for plot 6/29 (RSK 2010a, RSK id. No. 620). To the north of Criccieth there are some long, slightly curving parallel boundaries, including plots 6/4 and 6/5 (PRN 34122), that appear to be fossilised remnants of an open field (figure 21). Plots 6/23 to 6/25 immediately north of Eisteddfa are regular in shape but are part of a series of fairly narrow fields running along the slope (PRN 37848), which again may be enclosed strips. The eastern boundary of plot 0/4 has a distinctly sinuous curve typical of strip fields with other boundaries in the area possibly associated (PRN 34120) (figure 5). Other fields around Llanystumdwy, such as plots 3/28-30 (figure 18) should also be considered in this light. It is likely that other fields to the east of Llanystumdwy, including plots 4/2 to 4/4 preserve remains of an open field (PRN 34121) on this side of the village. In some cases the distinctive curve of the boundaries is now difficult to see where fields have been built over, so only the old OS maps preserve some of this evidence. The existing boundaries in these cases have enclosed and fossilised groups of strips that would originally have been within open fields. The boundaries themselves will not therefore be medieval but the field systems that they preserve fragments of presumably are. The confirmation of these boundaries as the remains of open fields would need more investigation of early maps, aerial photographs and possibly work on the ground, but it seems probable that there were open fields around the settlements in this area in the medieval period.

In the 1840s there was a small settlement north and west of Tyddyn Ysguboriau in plots 6/26-6.29 (figure 24), where the tithe map names several houses and crofts (RSK 2010a, RSK Id. Nos. 617-620). While this may have been purely a post-medieval settlement it could indicate the site of earlier settlement.

8.41. Alluvial, marine and peat deposit

The presence of alluvial, peat and marine deposits were recorded in the Traeth Mawr and Dwyryd valley and occasionally elsewhere, see figures 1 to 4 for the locations of recorded plots and appendix III for deposit descriptions. The most significant peat deposit in the western part of the scheme was the marsh in plot 0/8. The western arm of the Traeth Mawr, towards Penmorfa, was largely filled with grey marine clay, infilling the former estuarine bay and saltmarshes of the Afon Glaslyn. Former saltmarsh creeks are clearly visible on aerial photographs, and the remains of these channels were noted in plot 7/2. Shells were noted within the clay, with a particular deposit in plot 6/51 apparently representing the former marine strand-line. The recent marine, tidal and warping sediments overlie till, with a bedrock of mudstone, siltstone and sandstones. This part of the Traeth was the first to be drained after William Madocks built an embankment to the east of the site of Tremadog (Beazley 1985). Within the main part of Traeth Mawr the deposits were mostly sand, representing a more active estuarine environment.

Some perhaps unexpected peat deposits, up to 2m deep, were found in Penrhyndeudraeth in plots 11/3 and 11/4. The pipe crosses on to the flood plain of the Afon Dwyryd at plot 13/6. At the edge of the flood plain in this plot a marsh had developed, but generally the flood plain was composed of alluvial silts and silty clays, making loamy and clayey floodplain soils with a high ground watertable. The deep alluvial deposits ended in plot 14/15.

Patches of peat of varying depths were found within the north-eastern section of the pipe route as it crossed the higher land near Blaenau Ffestiniog.

Peat was present adjacent to the burnt mound in plot 6/29.4 (PRN 34094). A monolith was taken from this deposit and was subjected to full palynological analysis, revealing the vegetational sequence from the late Neolithic or Early Bronze Age through to recent times (see Section 8.19 for a summary and Grant 2013 for the full report).

9. ARTEFACTUAL AND ECOFACTUAL SUMMARIES

The specialists who carried out the assessments on the artefacts and ecofacts are listed in volume II, which includes the full specialist reports. Brief summaries only are given below, where possible using direct quotes from the reports.

9.1. Artefacts

Post medieval pottery and associated leather items
Jon Goodwin

Post medieval pottery, mostly from the 19th and 20th centuries, was recovered from three plots. The largest assemblage was from a midden in plot 6/22. From this 15 sherds were collected representing at least twelve ceramic vessels. These represent the typical wares and forms available to most households during the mid to late 19th century. They comprise a mix of refined, but affordable tea and table wares, and more utilitarian forms, some of which came from the Stoke-on-Trent potteries, although other items come from Newcastle-upon-Tyne and Nottinghamshire and/or Derbyshire.

There were also parts of leather shoes, iron nail and other objects. The shoes were particularly represented by leather soles, and parts of at least two pairs of adult shoes (although small - size 5 or 6) and one possibly belonging to a child was collected. These are presumably also 19th century in date.

Flint and other stone
George Smith

Six pieces of flint were found and one tiny flake of quartz crystal. One piece is probably a modern import from elsewhere in Britain. The remainder are made on locally available glacial pebble flint. There are no retouched pieces and so none properly diagnostic of date. However, two pieces (from plots 3/2 and 6/29.4) are probably utilised blade segments, possibly from composite edge cutting tools and potentially diagnostic of Early Neolithic or Mesolithic activity.

Nineteen other stone objects were recovered from seven contexts. Some of these are manufactured objects and some simply utilised. The objects are of a variety of materials but predominantly tough igneous rock and using glacial boulders or cobbles. Some are coarse and others finer and this relates to their type of use.

The facetted pebble (SF22) was an isolated find from close to the burnt mound in plot 6/29.4. It is a pebble of which the tip has been utilised creating bevelled facets, and could be of Mesolithic date but might be later and could possibly be related to the use of the burnt mound. Two objects (SF55 from plot 0/3) are unused natural cobbles. The rest of the objects, all from plot 3/2, include two saddle querns, one broken, fragments of two other saddle querns, a saddle quern rubber, a facetted edge utilised pebble rubbing stone and a worn cobble. There are also some pieces of broken boulder that may have been part of broken querns. Most of these objects have been burnt and have been reused in a fire-pit or oven. The objects are all domestic and the type of objects associated with later Iron Age settlement. The concentration and weight of the objects indicates that such settlement was very close by. The Iron Age date from the fire pit/oven suggests that the re-use of the items was not widely chronologically separated from their original use. .

Metal objects
Jon Goodwin

A total of five iron and copper-alloy items were recovered from plots 0/3, 3/14 and 3/20. Two nails from plot 3/20 could date to either the medieval or post-medieval periods, whereas a button from this plot was 19th century. A fragment of a copper alloy perforated plate from a smithing pit in plot 3/14 was considered to be probably 18th or 19th century in date, but the medieval date from the pit in which it was found suggests that this item is also medieval. A corroded mass of iron from plot 0/3 was undiagnostic of date.

Archaeometallurgical residues
Hand-collected items of slag and fired clay were assessed by Dr Tim Young. However hammerscale and other metal-working debris was also recovered from the wet sieving of soil samples. This material was assessed by James Rackham and John A. Giorgi. The material from these two sources is reported separately in volume II.

Much of the hand-collected material was either natural or fired clay of uncertain origin but there was evidence for metallurgical activity at two sites; plots 3/2 and 3/14. Small quantities of hammerscale, slag and fired earth were found from the wet sieved samples from plots 0/3, 3/20, 6/6, and 6/10. However in these cases the quantity was so small that it might have been intrusive; a low level of metal-working debris seems to be normal in the soil in many areas. A single flake of hammerscale was recovered from the cremation burial in plot 3/27.

Slightly higher quantities of hammerscale were recovered from pit [32014] of Iron Age date in plot 3/2. This might be associated with a single piece of a smithing hearth cake recovered from the adjacent medieval corn drier. In both cases the material probably indicates smithing somewhere in the general area, possibly during the Iron Age. The presence of 24 pieces of hammerscale in pit [32014], while there were only very occasional pieces in pit [32003] and in the corn drier may suggest that the first pit was directly related to the smithing activity or at least open when that activity was occurring.

The largest quantity of metal-working debris came from plot 3/14 which a pit likely to have been the base of a floor level smithing hearth. This contained thousands of flakes of hammerscale and other smithing fines, and concreted lumps of hammerscale and small slag (including a variety of slag blebs, slag droplets, slag flats). A piece of vitrified hearth ceramic was also recovered, which showed evidence for coarse grit temper as well as an organic temper with the appearance of chopped straw. Nearly 3.5 kilogrammes of magnetic material was recovered from an 8.5kg soil sample, and other items were hand collected, indicating a very high concentration of smithing debris. The deposit also yielded two fragments of copper alloy, possibly suggesting some working of copper alloys was undertaken too. Radiocarbon dating proved this to be a medieval feature.

Timber
Nigel Nayling and Roderick Bale

The wood assemblages derive from seven locations; most in peat or alluvial silts but some pieces came from under the burnt mound in plot 6/29.4. An attempt was made to dendrochronologically date several timbers; all but one of which proved to be unsuitable due to narrow and irregular rings. The piece dated came from plot 14/1.

Many of the timbers recovered had tool marks and their species was identified. Fragments of oak recovered from under the burnt mound in plot 6/29.4 were not well enough preserved for tool marks to survive. However they do suggest woodworking of some sort, even just reduction of material for firewood. Wood from plot 11/3 had tool marks, peg holes and saw cuts and was clearly worked but probably of a recent date. The two large timbers from plot 13/30 were worked but also could not be dendrochronologically dated.

The single large oak timber from plot 14/1 had been radially split and used as a chopping block. This was successfully dendrochronologically dated giving a felling date between AD 1272 and AD 1308.

The material from plot 14/7 included many worked pieces of various species typical of mixed deciduous wet woodland, but dominated by oak. Dendrochronology was unsuccessful. The presence of small items probably representing wood working debris with large pieces, probably finished timber suggests that this material is largely *in situ*, and not natural driftwood or remnants of simple woodland clearance. As the material could not be dendrochronologically dated pieces of bark were submitted for radiocarbon dating and revealed that the probable structure was medieval in date; 14th century AD.

Burnt stone
The wet sieving of bulk soil samples produced residue <1mm, >1mm and >7mm in size. The <1mm residue was discarded after sorting for artefacts. For sites where there was a mix of burnt and unburnt stones the former were separated from the coarse residues. On burnt mound sites and other sites where most of the stone was burnt this was all retained in the coarse residue. On these sites the number of samples with burnt stone was not separately itemised.

Table 4: Weights and numbers of samples with coarse residue and burnt stone

Plot	Site type	Weight (g) of residue >1mm	Weight (g) of residue >7mm	Weight (g) of Fired stone	No of samples with coarse residues	No of samples with fired stone
Plot 0/3	Gully or pit with burnt stone	4221	2858	433.8	1	1

Plot 3/10	Burnt mound	16551	13839	10908	3	3
Plot 3/14	Smithing pit	2331	445.6	16.6	1	1
Plot 3/2	Corn drier and pits	40590	10700.6	2229.2	9	9
Plot 3/20	Ditch	39255	24480	1075	3	2
Plot 3/27	Cremation burial	5541.5	3382	425.8	2	1
Plot 6/10	Oven?	2876	880		2	0
Plot 6/21	Burnt mound	12739	8146		4	0
Plot 6/29.4	Burnt mound	345280.5	259505		54	0
Plot 6/33	Burnt mounds	95822	80832		12	0
Plot 6/51	Former shoreline	233	81		1	0
Plot 6/6	Burnt mound	3211	2095		2	0
Plot 7/1	Shell midden	16632	8366		1	0
Totals		**585283**	**415610.2**	**15088.4**	**95**	**17**

Further analysis was carried out on the coarse residues from the burnt mounds and from plot 3/2, with the numerous samples from the large burnt mound in plot 6/29.4 studied in most detail (Bates 2013). Comparisons of the proportions of burnt stone in different features were hindered by the difficulty in securely identifying which of the mud and siltstones were burnt, but natural features could be distinguished by the absence of any burnt stones.

All deposits in plot 6/29.4 had a low proportion of burnt clasts compared to the other burnt mounds studied. The fills of the troughs under the mound in plot 3/10 had a particularly high proportion of burnt clasts and a mound deposit in plot 6/21 had a fairly high proportion. This pattern is more distinct when only larger clasts are considered, when the some of the deposits in plot 6/33 also show high proportions of burnt stones.

It is not clear how these proportions relate to different uses of the mounds, and it is most likely that sites with higher proportion of burnt stones were using stones which are more easily recognised when burnt. However all the burnt mounds were on a similar mud and siltstone bedrock and were using local stones. It is possible that the proportion of burnt material in the mounds may relate to the amount of disturbance, with more post-depositional mixing perhaps introducing unburnt material, or to the use of a mound for different durations. Perhaps a short duration with little reuse of burnt stone may leave stones less fragmented and more recognisable than on a site where the activity has been of long duration. These explanations may also apply to the variation within plot 6/29.4, with the two northern pits perhaps only used for one event and so even the larger stones perhaps do not show much evidence of burning. The smaller size of clasts in some of the pits in plot 6/29.4 may show that these were areas of greatest reuse of stones.

The source of the stones used on all the burnt mound sites appears to be local bedrock or stones in the glacial till. Most of the stone is mud, silt and sandstone typical of the Ffestiniog Flags Formations underlying the sites. There was also some igneous rock and Ordovician microgabbros do occur in the vicinity to account for these. Till outcrops extensively across the area and could provide a variety of stones. Rounding and edge damage on some of the stones indicated that a source for most of the material was from river worn gravels probably from streams close to the sites.

9.2. Ecofacts and environmental data

Charcoal and other charred plant remains

James Rackham and Dana Challinor

A total of 117 samples from fourteen archaeological sites were collected and processed. Charcoal and other charred plant remains were studied, and detailed results are discussed with the description of individual sites. All samples were assessed for their charred plant remains but only those from plot 3/2 and 3/27 were recommended for full analysis. These two sites produced samples from the middle Bronze Age, the mid-Iron Age and the medieval period, while occasional identified cereals and weed species from the other sites afford a little data to broaden the picture. These data do not allow any in depth analysis, but do show some changes of crop type through time. The charcoal affords the greatest potential for considering any changes through time and additionally the functional selection of fuel resources.

Most of the charcoal assemblages were from burnt mounds and these have provided some valuable insights into their use and environment. The wood fuels used to heat the stones appear to be drawn from the local woodlands,

with oak and hazel predominating, but occasional samples dominated by alder. While different samples may be dominated by a single species it is difficult to argue for selectivity of fuel, and it may be that these assemblages reflect the local availability of suitable and harvestable wood. It is likely that there was oak and hazel woodland with local stands of alder along river and stream banks, and bordering areas of wetland.

In contrast to the burnt mound assemblages the middle Bronze Age cremation pyres were fuelled by oak heartwood and roundwood, indicating the specific selection of fuel for this activity, and reflecting the need for a fuel that can burn hot enough to cremate a body. The pyre would be more efficient if the wood had been stacked and dried prior to use, but perhaps the unpredictability of death did not allow this. The finds of charred barley grain, hazel nutshells, blackberries and sloe stones in the cremation deposit might indicate food offerings, or perhaps 'feasting' at the funeral.

The Iron Age and medieval charcoal assemblages indicate the same range of species, and the same dominance of oak and hazel, suggesting no significant change to the composition of the woodlands. The identification of largely oak in the medieval smithy sample clearly indicates selectivity for these activities, and the dominance of oak heartwood suggests that the fuel was supplied as charcoal. The medieval corn drier was also largely fuelled with oakwood, but a range of other taxa were present.

There are clear indications of the changing importance of cereals through time. Emmer wheat and barley are recorded from the Late Neolithic and Bronze Age deposits and continue to be dominant into the middle Iron Age, when spelt, free threshing wheat and oats first appear. In the medieval samples oats dominate the cereal assemblages with free threshing wheat, barley and rye making an appearance. This is a pattern found elsewhere in North Wales, with emmer tending to survive later than in England and oats dominating the medieval assemblages. The other charred remains allow us little consideration of the husbandry of the crops, although spring and autumn sowing have been suggested. The soils along the southern coastal edge of the Llŷn peninsula are fairly well suited to the cultivation of all these cereals, tending to be loamy and freely draining rather than heavy clays.

The charcoal from the Iron Age shell midden in plot 7/1 suggests that the fairly steeply sloping northern face of Moel-y-Gest was probably covered in an oak and hazel woodland. East of plot 7/1 the archaeological evidence along the pipe route was minimal and no environmental samples were taken, except for hazel nutshells collected at Plot 14/7. We therefore have no data for the valley of the Afon Dwyryd or the uplands between Rhyd-y-Sarn and Blaenau Ffestiniog, the whole of the eastern half of the pipeline route.

Pollen
Fiona Grant

Pollen monolith samples (M2 and M3), both from plot 6/29.4, were assessed, recommended for full analysis and analysed. Monolith M2 was taken from a layer (6294096) interpreted as a buried soil that extended beneath the burnt mound, and monolith M3 was taken from the wetland adjacent to the burnt mound at c.SH 52265 39617. Pollen was extremely well preserved in all of the samples.

The earliest evidence from these cores, suggests that wet woodland dominated by *Alnus* formed an important component of the local environment, and persisted throughout the pollen records. Within the wider environment a dryland woodland of oak, hazel, birch and later holly remained important until the latest phases, with sporadic occurrences of pine and elm.

However species indicative of disturbance and open areas are also recorded throughout. The degree of disturbance varies through time, and suggests patterns of changing grazing practice, and episodes of progressive clearance. The presence of cereal-type grains in association with anthropogenic disturbance indicators, suggests cereal cultivation was carried out close to the sampling points from early in the period of sediment accumulation.

Human activity increases closer to the present day, resulting ultimately in a relatively open landscape with fewer areas of woodland, restricted to hedgerows, isolated stands and areas of wet woodland.

Of particular interest in relation to the burnt mound are the episodic disturbances noted in both profiles, being particularly clear in the lower phases of M3. The reductions in hazel and oak pollen, associated with increased levels of ruderals and microscopic charcoal deposition, possibly related to the use of the burnt mound. The radiocarbon dates confirm that these episodes fall within the Bronze Age, but as the main activity on the burnt

mound is late Neolithic and Early Bronze Age there is the possibility that it pre-dates the clearance evidence seen in the pollen.

Bone
James Rackham

Animal bone was only recovered from two situations; a few calcined fragments of animal bone from plot 3/2 in association with Iron Age pits and a medieval corn drier, and an unburnt cow cranial fragment and two rib fragments were recovered on the floodplain of the Afon Dwyryd (Plot 14/7). Soil conditions were generally unsuitable for bone survival along the whole pipeline route but it may be that many of the sites, particularly the burnt mounds, had little or no bone deposited on them anyway.

The remains from plot 14/7 included part of the skull with horn cores and horns as well as ribs and a vertebra. While the remains could be from a small recent breed, such as a Welsh White, their depth in the alluvium suggests a medieval date. It was assumed that the alluvial deposits would be too acid to preserve bone but this seems not to be the case and the alluvial clay has even caused the unusual preservation of the horns.

Human bone
Jacqueline McKinley

Cremated human bone was recovered from two adjacent features ([327001] and [327002]) set *c.* 3.7m apart in plot 3/27. These probably represent the remains of an unurned cremation burial with redeposited pyre debris, and were dated by radiocarbon assay of the bone to the Middle Bronze Age.

Only small quantities of bone were recovered (51.6g from pit 327001 and 8.6g from pit 327002) by wet sieving of total soil samples. Some bone was collected by hand but has been lost. The bone represents the remains of a minimum of one subadult/adult *c.* 15-40 yr. of indeterminate sex. No pathological lesions were observed. It is possible that both deposits derived from the same cremation, one representing the burial remains and the other a 'formal' deposit of pyre debris.

Marine shell
James Rackham

Marine shells were collected from two plots (6/51 and 7/1). In plot 6/51 the shells included tellens, small cockles, rough winkle, flat winkle and *Hydrobia ulvae*, the latter in thousands. None of these shells are of economic value and are unlikely to have been deliberately collected. They are indicative of estuaries and salt marshes and were almost certainly washed up on the strand line of the former Traeth Mawr. Organic material associated with the shells including wood, waterlogged seeds, numerous herbaceous stems, moss and leaf fragments supports this interpretation.

A deliberate collection of shells was found in plot 7/1 forming a small shell midden. Nearly 6 kilogrammes of shell were sorted from the 27.75 litre soil sample. Approximately 4.5kg were cockles, 340g were periwinkles (*Littorina littorea*), 9.2g of oyster (*Ostrea edulis*), a couple of grammes of rough winkle (*Littorina saxatilis*) and the rest fragmented shell not further identified. This site was dated to the Iron Age and appears to have been a shell processing site.

Soil micromorphology
Richard Macphail

Three soil micromorphology samples were taken from deposits within and under the burnt mound site in plot 6/29.4. These samples were originally labelled K1-3, but have been renamed M1-3 in the specialist report. Micromorphological sample K1/M1 was taken from the possible buried soil layers (6294099/6294100) adjacent to pollen monolith M2. Micromorphological sample K2/M2 was from layer (6294004) interpreted on site as a buried soil layer beneath the burnt mound deposit (6294045). Micromorphological sample K3/M3 was from (6294037), a silty deposit filling hollow [6294036], and probably also part of the buried soil pre-dating the burnt mound.

The soil micromorphological analysis suggests that the local soils are orthic stagno-humic gley soils formed on a fine textured very poorly draining substrate. These soils are essentially formed of a humic or very humic topsoil over an iron depleted Eg (or G) horizon, that is permanently water saturated. Nutrients released from the weathering of the burnt mound material have led to heightened biological activity, including, burrowing into the underlying gleyed substrate. There is an indication of the dumping of both topsoil and subsoil, along with the burnt stone, and these have subsequently been mixing into the mound by bioturbation. Charcoal identified in the soil monoliths included broadleaved wood, conifer wood and monocotyledonous material. There was also a single example of char, which can indicate cooking, but in this case seems more likely to be fuel ash slag originating from burnt plant remains.

10. RADIOCARBON DATING

Derek Hamilton (SUERC)

10.1. Methodology

A total of 43 radiocarbon dates were obtained with all samples being submitted to the Scottish Universities Environmental Research Centre (SUERC) in East Kilbride for radiocarbon dating by accelerator mass spectrometry (AMS). The samples were all single entities of short-life material (Ashmore 1999), and included charcoal, preserved plant macrofossil remains, cremated human bone and a marine shell (see Hamilton 2013 for detailed methodology). The calibrated radiocarbon results are given in table 5.

A Bayesian approach has been adopted for the interpretation of the chronology of some of the sites including the burnt mound in plot 6/29.4. Although the simple calibrated dates are accurate estimates of the dates of the samples, it is the dates of the archaeological events represented by those samples, which are of interest. In the case of the burnt mounds, it is the overall chronology of the use of these features in this area – when did it begin; when did it end; and for how long did it take place – that is under consideration, not necessarily the dates of any individual samples. The dates of this activity can be estimated not only using the absolute dating information from the radiocarbon measurements on the samples, but also by using the stratigraphic relationships between samples.

Fortunately, methodology is now available which allows the combination of these different types of information explicitly, to produce realistic estimates of the dates of archaeological interest. It should be emphasised that the *posterior density estimates* produced by this modelling are not absolute. They are interpretative *estimates*, which can and will change as further data become available and as other researchers choose to model the existing data from different perspectives. The technique used is a form of Markov Chain Monte Carlo sampling, and has been applied using the program OxCal v4.2. See Hamilton 2013 for the detailed models.

Table 5. All radiocarbon dates from archaeological features on the project

Lab ID	Context number	Context description	Material	$\delta^{13}C$ (‰)	Radiocarbon age (BP)	Calibrated date (95% confidence)
SUERC-44174	32002	fill of corn drier [32009]	charred grain: *Avena* sp.	-24.5	851 ±25	cal AD 1150–1260
SUERC-44175	32018	fill of corn drier [32009]	charred grain: *Triticum* spp.	-23.7	891 ±26	cal AD 1040–1220
SUERC-44176	32016	fill of pit with grinding stones [32003]	charred grain: *Triticum* spp.	-22.8	2319 ±26	410–370 cal BC
SUERC-44177	32018	fill of corn drier [32009]	charred grain: *Avena* sp.	-24.4	839 ±25	cal AD 1150–1260
SUERC-44178	314005	fill of smithing site [314002]	charred grain: *Avena/Poaceae* sp.	-26.3	897 ±25	cal AD 1030–1220
SUERC-44825	327003	fill of pit [327001]	cremated human bone	-21.5	3262 ±35	1630–1440 cal BC
SUERC-44826	327003	fill of pit [327001]	cremated human bone	-25.5	3263 ±35	1630–1440 cal BC
SUERC-44827	327004	fill of pit [327002]	cremated human bone	-26.2	3225 ±35	1610–1420 cal BC
SUERC-46248		dense wood layer, possible structure (147005)	bark: *Quercus* sp.	-28.9	656 ±27	cal AD 1280–1400
SUERC-46249		dense wood layer, possible structure (147005)	bark: *Quercus* sp.	-26.8	631 ±30	cal AD 1280–1410
SUERC-46253	32019	lower fill of pit [32014]	charcoal: *Alnus/Corylus* sp., roundwood	-27.0	2269 ±30	400–210 cal BC
SUERC-46254	32021	stone lining of pit [32014]	charcoal: *Corylus avellana*, roundwood	-25.7	2282 ±30	400–230 cal BC
SUERC-46255	310010	fill of burnt mound trough [310007]	charcoal: *Alnus glutinosa*	-25.5	3296 ±30	1670–1500 cal BC
SUERC-46256	310010	fill of burnt mound trough [310007]	charcoal: *Alnus glutinosa*	-26.5	3266 ±28	1620–1450 cal BC
SUERC-46257	310004	fill of burnt mound trough [310001]	charcoal: *Alnus glutinosa*	-26.9	3265 ±30	1620–1450 cal BC
SUERC-46258	310004	fill of burnt mound trough [310001]	charcoal: *Corylus avellana*	-27.0	3310 ±28	1690–1510 cal BC
SUERC-46259	71002	shell midden	charcoal: *Corylus avellana*	-26.7	2428 ±30	750–400 cal BC
SUERC-46263	6294010	fill of burnt mound pit [6294003]	charcoal: *Alnus glutinosa*	-24.6	3877 ±28	2470–2210 cal BC
SUERC-46264	6294010	fill of burnt mound pit [6294003]	charcoal: *Corylus avellana*	-25.9	3853 ±30	2470–2200 cal BC
SUERC-46265	633029	fill of burnt mound trough [633028]	charcoal: *Corylus avellana*	-28.1	1414 ±30	cal AD 590–670
SUERC-46266	633029	fill of burnt mound trough [633028]	charcoal: *Alnus glutinosa*	-29.4	1444 ±30	cal AD 560–660
SUERC-46267	633019	charcoal layer sealed under burnt mound	charcoal: *Alnus glutinosa*	-23.0	4224 ±27	2900–2700 cal BC
SUERC-46268	6294054	fill of burnt mound pit [6294053]	charcoal: *Salix/Populus* sp.	-26.0	3828 ±30	2460–2150 cal BC

Lab ID	Context number	Context description	Material	$\delta^{13}C$ (‰)	Radiocarbon age (BP)	Calibrated date (95% confidence)
SUERC-46269	6294112	fill of burnt mound pit [6294111]	charcoal: *Alnus glutinosa*	-26.6	3740 ±27	2280–2030 cal BC
SUERC-46460	314005	fill of smithing site [314002]	charcoal: *Alnus glutinosa*	-27.1	868 ±30	cal AD 1040–1230
SUERC-46461	633019	charcoal layer sealed under burnt mound	charcoal: *Alnus glutinosa*	-30.1	4159 ±31	2890–2620 cal BC
SUERC-46462	6294112	fill of burnt mound pit [6294111]	charcoal: *Salix/Populus* sp.	-27.1	3612 ±31	2120–1880 cal BC
SUERC-46463	6294126	fill of burnt mound trough [6294127]	charcoal: *Alnus glutinosa*	-27.1	2739 ±31	980–810 cal BC
SUERC-46825	32016	fill of pit [32003] with heat-cracked quern stones	charred grain: *Hordeum* sp.	-23.9	2290 ±29	410–230 cal BC
SUERC-46826	66010	fill of burnt mound trough [66011]	charcoal: *Corylus avellana*	-26.5	4127 ±29	2880–2570 cal BC
SUERC-46827	633011	fill of burnt mound pit [633010]	charcoal: *Fraxinus excelsior*	-24.3	3901 ±29	2480–2290 cal BC
SUERC-46828	633011	fill of burnt mound pit [633010]	charcoal: *Corylus avellana*	-25.0	3903 ±25	2480–2290 cal BC
SUERC-46829	6294106	fill of burnt mound pit [6294105]	charcoal: *Alnus glutinosa*	-26.2	3920 ±24	2480–2300 cal BC
SUERC-46833	6294106	fill of burnt mound pit [6294105]	charcoal: *Corylus avellana*	-26.1	3827 ±25	2410–2150 cal BC
SUERC-46834	6294126	fill of burnt mound trough [6294127]	charcoal: *Betula* sp.	-26.0	2868 ±26	1130–930 cal BC
SUERC-46835	6294156	fill of burnt mound pit [6294033]	charred hazel nutshell	-25.5	3966 ±29	2570–2450 cal BC
SUERC-46836	6294151	burnt mound material in channel [6294150]	charcoal: *Corylus avellana*	-25.5	3734 ±30	2280–2030 cal BC
SUERC-46837	6294151	burnt mound material in channel [6294150]	charcoal: *Prunus* sp.	-25.2	3938 ±27	2550–2340 cal BC
SUERC-46838	66010	fill of burnt mound pit [66011]	charcoal: *Corylus avellana*	-25.6	3933 ±29	2550–2340 cal BC
SUERC-46839	621009	fill of burnt mound trough [621008]	charcoal: *Corylus avellana*	-25.0	4183 ±29	2890–2640 cal BC
SUERC-46843	621009	fill of burnt mound trough [621008]	charcoal: *Corylus avellana*	-25.3	3978 ±27	2580–2460 cal BC
SUERC-46844	6294156	fill of burnt mound pit [6294033]	charcoal: *Corylus avellana*	-27.4	4098 ±29	2870–2500 cal BC
SUERC-46845	71002	shell midden	marine shell: *Cardium edule* (cockle)	1.3	2652 ±29	660–340 cal BC

10.2. The samples and models

3/2: Pits and corn drier
There are two results from each of two pits excavated in area 3/2, and three results from the corn drier. The two measurements from each of the two pits are statistically consistent and could be the same actual age. The four results have been put into a chronological model that simply uses the prior information that they come from two stratigraphically unrelated features that would appear, archaeologically, to be from the same period of activity on the site. The dates have good individual agreements with the model assumptions. The model estimates that the activity at 3/2 associated with these two pits began in *460–365 cal BC* (*95% probability*), and probably in *410–380 cal BC* (*68% probability*). The activity lasted for *1–165 years* (*95% probability*), but probably for *1–40 years* (*68% probability*). The activity ended in *400–230 cal BC* (*95% probability*), and probably in *390–355 cal BC* (*68% probability*).

There are three results (SUERC-44174/5 and -44177) on single grains of oat and wheat from fill (32002) of the corn drier [32009] in area 3/2. The three measurements are statistically consistent and could be the same actual age. The best estimate for the date of this deposit is *cal AD 1175–1260* (*95% probability*), and probably *cal AD 1185–1255* (*68% probability*).

3/10: Two burnt mound troughs
There are two results from each of the burnt mound troughs excavated in area 3/10. In both cases the two results are statistically consistent and could be the same actual age. The four results have put in a chronological model that simply uses the prior information that they come from two stratigraphically unrelated features that would appear, archaeologically, to be from the same period of activity on the site. The dates have good individual agreements with the model assumptions. The model estimates that the activity at 3/10 associated with these two burnt mound troughs began in *1715–1520 cal BC* (*95% probability*), and probably in *1635–1550 cal BC* (*68% probability*). The activity lasted for *1–275 years* (*95% probability*), and probably for *1–100 years* (*68% probability*). The activity ended in *1610–1410 cal BC* (*95% probability*), and probably in *1585–1490 cal BC* (*68% probability*).

3/14: Smithing pit
There are two results on a charred cereal grain and a fragment of alder charcoal from the fill (314005) of smithing site [314002]. The two measurements are statistically consistent and could be the same actual age. The best estimate for the date of this deposit is *cal AD 1060–1255* (*95% probability*), and probably *cal AD 1160–1215* (*68% probability*).

3/27: Cremation burial
There are three results (SUERC-44825–7) on cremated bone from the two pits. There is no replication of skeletal elements between the two deposits on the site and the interpretation is that one pit represents the burial [327001], with the other forming a 'formal' pyre deposit that contained some of the cremated bone [327002]. The three measurements are statistically consistent and could be the same actual age. While this does not prove that the two deposits are of the same individual, it does not invalidate the archaeological interpretation. If the two deposits are contemporary, the best estimate for the date of this activity is *1540–1420 cal BC* (*95% probability*), and probably *1515–1445 cal BC* (*68% probability*).

6/6: Burnt mound
There are two results (SUERC-46826 and -46838) on two fragments of hazel charcoal from the fill (66010) of a burnt mound trough [66011]. The two measurements are not statistically consistent, suggesting the material is of mixed ages. The best estimate for the date of this deposit is *2560–2305 cal BC* (*95% probability*), and probably *2480–2345 cal BC* (*68% probability*).

6/21: Burnt mound
There are two results (SUERC-46839 and -46843) on two fragments of hazel charcoal from the fill (621009) of a burnt mound trough [621008]. The two measurements are not statistically consistent, suggesting the material is of mixed ages. The best estimate for the date of this deposit is *2575–2460 cal BC* (*95% probability*), and probably *2565–2470 cal BC* (*68% probability*).

6/29.4: Large burnt mound complex
The large burnt mound complex in plot 6/29.4 is by far the most well dated area of these excavations. A total of 13 radiocarbon results are available from seven individual contexts. There is one result (SUERC-46268) on a fragment of willow/poplar charcoal in the fill (6294054) of burnt mound pit [6294053]. There are two results from each of pit [6294033], pit [6294105], pit [6294111], trough [6294127], and burnt mound deposit (6294151), which are not statistically consistent and indicate that the deposits are likely composed of mixed-age material. There are another two results from pit [6294003] that are statistically consistent, and could be the same actual age. The two measurements from trough [6294127] are significantly later than the other dates from the burnt mound complex and have been excluded from all further modelling of this area. The later date (SUERC-46463) provides the best estimate for the date of this particular feature (980–810 cal BC).

The low level of statistical consistency between pairs of short-life samples from the same secure contexts suggests that there was a high degree of reworking of these contexts in antiquity. As a result, the 11 results have put in a chronological model that simply uses the prior information that they come from stratigraphically unrelated features that would appear, archaeologically, to be from the same period of activity on the site. The dates have good individual agreements with the model assumptions. The model estimates that the activity associated with the main use of the burnt mound complex in plot 6/29 began in *2840–2500 cal BC* (*95% probability*), and probably in *2715–2510 cal BC* (*68% probability*). The activity lasted for *405–975 years* (*95% probability*), and probably for *525–790 years* (*68% probability*). The activity ended in *2125–1790 cal BC* (*95% probability*), and probably in *2105–1895 cal BC* (*68% probability*). The large span for the use of the area may be the result of punctuated, rather than continuous, use over a protracted period of time. Trough [6294127] indicates a renewed period of use at the end of the Bronze Age.

6/33: Two burnt mounds with isolated pit
In area 6/33 there are three features that were dated from two separate burnt mound deposits and an isolated pit. From each feature there are two radiocarbon results. There are two results (SUERC-46267 and -46461) on single fragments of alder charcoal from layer (633019) under burnt mound (633012) in this area, and thought to be directly related to the use of the mound. The two measurements are statistically consistent and could be the same actual age. There are another two results (SUERC-46827 and -46828) on single fragments of ash and hazel charcoal, respectively, from fill (633011) of pit [633010]. The two measurements are statistically consistent and could be the same actual age. Furthermore, the measurements from burnt mound (633012) and pit [63310] are not statistically consistent, suggesting that the use of these two features is separated in time by some period. There are a final two results (SUERC-46265 and -46266) on single fragments of hazel and alder charcoal, respectively, from fill (633029) of burnt mound trough [633028], associated with the second burnt mound (633015). The two measurements are statistically consistent and could be the same actual age, placing increased reliability in the interpretation of this feature as a medieval burnt mound.

The fill of pit [633010] is thought to represent a single event, and so the two radiocarbon dates from the pit have been combined using the Bayesian Combine function in OxCal to provide the best estimate for the date of this event: *2470–2305 cal BC* (*95% probability*).

The Last function in OxCal was used to provide the best estimate for the date of the deposits associated with the two burnt mounds. The ground surface deposit has been used to date burnt mound (633012) to *2875–2625 cal BC* (*95% probability*), and probably in *2800–2670 cal BC* (*68% probability*). The best estimate for the date of the burnt mound trough deposit associated with mound (633015) is *cal AD 600–665* (*95% probability*), and probably in *cal AD 620–655* (*68% probability*).

7/1: Small shell midden
There are two results (SUERC-46259 and -46845) on a fragment of hazel charcoal and a cockle shell from a layer in a small shell midden (71002). Since the two samples have different carbon reservoirs, terrestrial and marine, they cannot be directly compared in the same way as the other pairs of samples using a simple χ^2 test on the uncalibrated measurements. It is possible to use the Combine function within OxCal, which allows for the two measurements to be calibrated using their appropriate calibration curve, and then compared statistically. The Combine has good agreement, and the associated T-value indicates statistical consistency between the two dates. The best estimate for the date of this deposit is *590–335 cal BC* (*95% probability*), and probably *500–385 cal BC* (*68% probability*).

14/7: Deposit of wood branches
There are two results (SUERC-46248/9) on oak bark from timbers in a dense wood layer that formed part of a possible structure (147005). The two measurements are statistically consistent and could be the same actual age.

The best estimate for the date of this deposit is *cal AD 1290–1400* (*95% probability*), and probably *cal AD 1350–1395* (*68% probability*).

11. THEMATIC DISCUSSIONS

11.1. Introduction

The route of the pipeline runs through varied landscapes from the relatively fertile lowlands of the Llŷn Peninsula through reclaimed estuaries to the rugged upper reaches of the Dwyryd valley. The resources and opportunities in these varied areas will have influenced their use over the millennia, although environmental factors must inevitably be perceived and responded to through the perspective of culture. This slice through the landscape allows a comparison both in space and time of the activities along the pipe route.

A study of this landscape is aided along the southern part of the Llŷn Peninsula by the archaeological work carried out prior to the improvement of the A497 (Berks *et al* 2007 and Davidson *et al* 2007). This information, used in conjunction with that from the current project, provides a wider view of the historic and prehistoric landscape.

Burnt mounds are the most numerous prehistoric site-type to be found in this area and form a dominant part of the results of this project. The number of sites discovered provides the opportunity for detailed comparisons. However the project has also revealed evidence relating to the location and nature of the shore of the former Glaslyn Estuary and the Dwyryd flood plain before reclamation, and hints of medieval field systems. Various pits show other prehistoric activity, and the cremations in plot 3/27 demonstrate funerary practices in the area.

11.2. Burnt mounds

Introduction

Burnt mounds are a very common site-type in Ireland and much of Britain, including North Wales. Their function has not been definitively proved, their relationship to settlement is still obscure, and their dating in Wales has also only just begun, so there is little doubt that this common site-type still has much to reveal.

Prior to this project there were a total of 216 known burnt mounds in Gwynedd as recorded on the HER and found on recent excavations (Kenney 2012c), but that number changes constantly, as the present project demonstrates (figure 43). In addition to sites to be found by excavation there are probably many surviving as earthworks on the uplands that have not yet been identified and recorded.

Classic burnt mounds are easily defined with their deep troughs and fire sites covered or surrounded by an often crescentic mound of heat-shattered burnt stone. Many sites fit this description but there are also variations that might still be considered as burnt mound sites. Pits of a type similar to those under burnt mounds are also found in isolation, either because the mound has eroded away or because one never existed. Some of the pits found on burnt mound sites were probably not used as troughs to hold water but may have had a variety of functions, including use as ovens.

For the typical burnt mound it is generally accepted that stones were heated in a hearth and then transferred to a water-filled trough to heat the water, being discarded to form the mound once they had shattered into pieces too small to be used. It is the purpose to which the heated water was put that is contentious. Any explanation must account for specific features of these sites. The trough, dug with some effort, often carefully lined and centrally placed, was a principal part of the site's function, not incidental. The size of the mounds suggests that the water in the trough was raised to boiling point and kept boiling for some considerable period of time. None of the many ethnographic examples of bathing and saunas listed by Barfield and Hodder (1987) required such a trough, especially when there was often a stream nearby. Most of the suggested industrial uses, such as dying or fulling (Jeffery 1991), also do not require boiling water and so sites would have to be used very frequently to produce the amount of burnt stones actually found. Metalworking has been found on some burnt mound sites in Ireland but there is no convincing evidence for this in Wales (Kenney 2012c) despite White (1977) interpreting burnt mounds on Anglesey as copper smelting sites.

The interpretation of burnt mounds as cooking places comes originally from Ireland where they have traditionally been called *fulachta fiadh* or *fulachta fian* (cooking places of the wild/of the deer and cooking places of the roving hunters/warriors or Fianna respectively) (O'Kelly 1954). Although the evidence must be

used with care (Ó Drisceoil 1990) some of the Irish tales, although written down between the 10th and 17th centuries, contain detail that corresponds very closely with excavated Bronze Age examples. These refer to both cooking and bathing in troughs (Ó Drisceoil 1990), the bathing sometimes following the cooking.

Numerous experiments into the use of burnt mounds (O'Kelly 1954; James 1986; Ó Drisceoil 1988; Allen 1994) have demonstrated that this was an effective way of cooking meat and that the process produces exactly the sort and quantity of burnt stone debris found on the archaeological mounds. The main argument against the cooking of meat is the almost total lack of bones from many sites. However some sites in Ireland have produced bone, most recently 10 burnt mounds along the Carlow Bypass, where animals seemed to have been slaughtered and butchered on site (Tourunen 2007). A cattle tooth from Bryn Cefni, Llangefni (Smith and Kenney 2002), and burnt bone from Nant Farm (Smith 2009) and Graeanog (Kelly 1993) hint at the possibility of bone survival on Welsh sites. Soil acidity probably plays a role in the lack of bone on these usually waterlogged sites.

Recent experiments with beer making in troughs (Pitts 2010, Quinn and Moore 2008) shows that this also produces the type of deposits recorded on burnt mound sites. The same features could be used for both boiling meat and brewing, rather than these functions being exclusive (with the possibility of bathing in addition). During brewing cereal grains would not normally risk carbonisation but the chaff might be disposed of on the fire. Occasionally a small number of charred cereal remains are found on burnt mounds (Kenney 2012c), and a saddle quern was found inside a trough in Co. Waterford (Hegarty 2005).

An annual washing of clothes and bodies has been suggested (Rackham pers. comm.), and heating enough water for a small settlement every year over many years might explain the size of some of these mounds. Most simple societies use cold water in streams for washing clothes and use sweat lodges where heat is required for cleansing bodies, rather than heating large quantities of water for either. Whatever the use of the mounds it seems to have been a function regularly carried out by small groups across most of Britain and Ireland over a very long period of time.

Location

Access to water seems to be the main factor in the location of the mounds, so they are generally located on the margins of water-logged areas or near to a stream or other water source. However they can be a significant distance from open water where groundwater is close to the surface, as at Parc Bryn Cegin, Llandygai (Kenney 2008), or where it is within reach of a well, as at Parc Cybi, Holyhead (Kenney 2011). Mounds seem to be often concentrated in specific areas, perhaps because of a reliable water source, and where one is found there are usually others.

The proximity of burnt mounds to settlements is usually difficult to assess without excavation. Visible upstanding settlements are generally assumed to post-date the mounds and slight, earlier settlement may be impossible to detect without excavation. Hopewell and Smith (2010) found that only 14% of burnt mounds had known prehistoric settlement of any sort nearby and that most were in areas lacking traces of settlement and apparently unsuitable for settlement. The scarcity of finds on burnt mound sites also argues for their isolation from settlements.

Where large area excavations have been carried out the isolation of burnt mounds has been supported despite the proximity of dry areas suitable for settlement (Parc Bryn Cegin, Llandygai (Kenney 2008) and Parc Cybi, Holyhead (Kenney 2011)). However repeated reuse of the mounds must indicate that they were not very remote from settlement sites, and cereal pollen from the mound at Felin Fulbrook, Ceredigion suggests close proximity to arable land (Williams et al 1987). Cereal pollen was also recorded from plot 6/29.4 on the present project and similarly indicates the proximity of arable fields, although it was not possible to precisely tie these chronologically with the burnt mound activity. It is probable that burnt mounds indicate, in a general way, the area of settlement (Hedges 1975, Ehrenberg 1991, Moore and Wilson 1999).

It is notable that there are few burnt mounds known from the Llŷn Peninsula (figure 43). It has been suggested that this was solely due to the lack of field work there (Kenney 2012c) and the current project clearly supports that. A group of burnt mounds was known around Moel Ednyfed (figure 22) and the discovery of another in plot 6/6 supports this as an area with a fairly high density of mounds. However, the previously known mounds were only recorded because they survived as upstanding earthworks. The sites found during this project around Pentrefelin (figure 25) show that where land has been improved and surface traces removed a concentration of mounds can go undetected until excavated by chance. It is possible that apparently isolated mounds such as in plot 3/10 were actually part of similarly dense concentrations. In the eastern part of the pipe route no burnt mounds were found but this is due to the route following the river flood plain, and does not rule out burnt

mounds in the Dwyryd valley. It is therefore difficult to interpret the mound distribution in any useful way, as it appears to be mainly due to differential survival and discovery.

Table 6. Location of burnt mounds found on the project

Plot	Description	PRN	Altitude (OD)	Distance from stream/river	Direction of slope (facing)
0/2	Burnt mound	34076	5m	30m but 14m from edge of former marshland	SE
0/11	Doubtful burnt mound	34080	10m	80m, c.35m to edge of former marshland	S
3/6	Pit possibly related to a burnt mound	34083	10m	40m from a drain, 120m from a spring	SE
3/10	Burnt mound	34084 and 34085	10m	325m E of Afon Wen but in a small valley that might have held a stream	SE
6/6	Burnt mound	34090	10m	7m	S
6/21	Burnt mound	34092	80m	10m	SE
6/29.4	Large burnt mound	34094	27m	<10m	N
6/33	Burnt mounds	34095, 34096, 34097	48m	33m	E

The detailed location of the mounds is perhaps more informative (see figures 44 and 45 for location of all burnt mounds on the pipe route). The altitudinal range over which burnt mounds were found on the project is fairly small but this is due to the higher parts of the pipe route avoiding locations where the mounds are unlikely to be found, as discussed above. Several of the sites are close to a stream but others are not. The mound in plot 0/2 was close to the edge of former marshland and so the ground water table might be expected to have been high. That in plot 3/10 was a long way from current streams but was in a slight valley, which may have formerly held a stream, although the ground is fairly dry today. The mounds in plot 6/33 were on a dry hill slope with the nearest stream at the base of the slope about 33m away. There was no evidence of a former stream so these mounds and possibly that in plot 3/10 must have used ground water or rain water. The presence of a stream is not inevitable in the case of all burnt mounds (Kenney 2012c), and these sites show that running water was not a necessary part of the activities on at least some burnt mounds.

In these examples there seems to be a tendency for burnt mounds to be on south-east facing slopes. This may be due to chance as the sample is not very large or to the angle of the terrain and how the pipe route runs through it. On other sites burnt mounds are not necessarily restricted to south-east facing slopes (those at Parc Bryn Cegin were on a north-west facing slope (Kenney 2008)). Similarly not all settlements are on south-east facing slopes but these tend to be preferred and it is possible that a general tendency towards this direction might indicate that the mounds are in the same general area as settlements.

The two possible burnt mounds sites (in plot 0/11 and 3/6), fit in fairly well with the location of others but are not so close to water sources. In plot 3/6 there is a spring, probably naturally occurring, but the rectangular pit that could potentially have been associated with a burnt mound is some distance from this. Again this may have used ground water but the apparent avoidance of an available spring could indicate that this was not part of a burnt mound.

All the burnt mounds were underlain by a geology of tills over sedimentary mudstones, siltstones and sandstones. In each case the bulk of the stone making up the burnt mounds were these mudstones, siltstones and fine sandstones with only occasional coarser sandstone, quartz and igneous stones present (Bates 2013), some probably derived from the tills that form the superficial deposits. The sub-rounded character of at least some of this stone suggests that the resource is probably being collected from the local stream and river beds (Bates 2013).

Dating

The earliest burnt mound investigated on the pipeline route was mound (633012) in plot 6/33. This was probably in use in *2800–2670 cal BC* (*68% probability*), placing it well within the Neolithic period. Many of the mounds were in use in the later Neolithic, during what can be referred to as the Beaker period; the burnt mound in plot 6/21 was probably in use in *2565–2470 cal BC* (*68% probability*); the mound in plot 6/6 was probably in use in *2480–2345 cal BC* (*68% probability*), and pit [633010] in plot 6/33 was probably in use in *2470–2305 cal*

BC (*95% probability)*. The burnt mound complex in plot 6/29.4 probably started being used in *2715–2510 cal BC* (*68% probability*) and continued until probably *2105–1895 cal BC* (*68% probability*). Only the mounds in plot 3/10 were used in the classic mid Bronze Age period, with the activity probably starting in *1635–1550 cal BC* (*68% probability*) and ending in probably *1585–1490 cal BC* (*68% probability*). Later activity in plot 6/29.4 was dated to the late Bronze Age (980–810 cal BC) (figure 46).

These dates cannot be used to argue that the Llŷn Peninsula was precocious in the development of burnt mounds and that their use dropped off in the Bronze Age; although it is interesting that the dates from the burnt mound at Bryn Bachau (2570–2130 cal BC (Beta-204432) and 2580–1920 cal BC (Beta-204434) (Berks *et al* 2007, 10)) also fall within this late Neolithic period (figure 47). Burnt mound activity in North West Wales in general seems to start around 2500 cal BC (Kenney 2012c), with some earlier dates, including one mound from Parc Bryn Cegin, Llandygai with dates of 3490-3120 cal BC (KIA-30449) and 3340-3020 cal BC (KIA-30450) (Kenney 2008).

There is no reason to assume that burnt mound use on the Llŷn Peninsula did not continue into the Bronze Age. The mounds in plot 3/10 suggest this, as does the date from a pit found at Glanllynnau containing burnt mound-type material (1890–1530 cal BC (Beta-204433) (Berks *et al* 2007, 14)). Further work would almost certainly produce dates spanning the full duration of use of burnt mounds, which in this region seems to run until about 800 cal BC (Kenney 2012c). The late date from plot 6/29.4 fits well with this end of the bulk of the burnt mound activity. However there are hints that burnt mound use may have sporadically continued after this date. The early medieval date for mound (633015) in plot 6/33 is one of the best dates from the region to demonstrate the continuation of use of mounds into this period. Most significantly the mound suggests no change in the nature of that use or in the type of material associated with the mound, making it appear that this was a continuation of the same activity rather than a rediscovery of hot stone technology for different functions.

Across Britain and Ireland burnt mounds are generally assumed to be a Bronze Age phenomenon. This is based on a rigorous study of radiocarbon dates in the 1980s (Brindley *et al* 1990), but since then Late Neolithic dates have increasingly been obtained in both Britain and Ireland, with occasional early Neolithic dates (see table 7).

Table 7. Early dates from burnt mounds in Britain and Ireland

Site	**Date cal BC**	**Country**	**Reference**
Gortalea, Co Kerry	4230-3790	Ireland	Connolly 2001, 12
Greenlaw, Dumfriess-Galloway	3640-3370	Scotland	AHDS
Parc Bryn Cegin mound 6094	3490-3120 3340-3020	Wales	Kenney 2008
Cloghaclocka, Co Limerick	3370-3100	Ireland	Brindley *et al* 1990, 27
Bourn Brook, Harborne, Ridgacre, West Midlands	2900-2150	England	Hodder 1990, 108, AHDS
Ballinaspig More, Co Cork	2800-2500	Ireland	NRA 2005
Lady Glassey Wood, Kilmartin	2700-2460, (TL) 2804+/-360	Scotland	Anthony *et al* 2001
Callaly Moor, Northumberland	2620-2140	England	AHDS
Parc Bryn Cegin mound 2176	*Activity start 2570-2370* *Activity end 2390-2010*	Wales	Kenney 2008
Reenarea Rise, Imlagh Basin, Valentia / Valencia, Co Kerry	2550-1950	Ireland	Mitchell 1990, 24-5
Watermead Country Park, Birstall, Leicestershire	2500-2000	England	Ripper 2003
Birkhall, Dumfriess-Galloway	2470-2020	Scotland	AHDS
Granny townland, site 27, Kilkenny	2461-2148	Ireland	O'Sullivan and Stanley 2005, 148
Site 1, Ballyclogh, Fermoy, Cork	2460-2200	Ireland	Brindley *et al* 1990, 26

The dates from this project fit well with this early phase of use of burnt mounds, and support the growing evidence for this site-type spanning the Neolithic-Bronze Age transition. The early date from Parc Bryn Cegin indicates that in Wales, as well as Ireland, these sites may have developed as part of a mid Neolithic tradition

but became more numerous in the late Neolithic and can possibly be associated with social changes reflected in the construction of henges and changes in burial rites. Once this technology had been adopted burnt mounds were in wide-spread and frequent use throughout the Bronze Age.

In several parts of Britain the use of burnt mounds dates runs into the Early Iron Age, with mounds from the Northern Isles particularly falling in this period (Russell-White 1990, 91). Scotland and the Isle of Man have some later Iron Age mounds (Russell-White 1990 and Hedges *et al* 1995), and there are rare later dates extending into the medieval period (Ryan 1990, 46; Brindley *et al* 1990, 28; Russell-White 1990, 91; Walsh 1990) (see table 8 for late dates on burnt mounds).

Table 8. Late Iron Age and medieval dates from burnt mounds in Britain and Ireland

Site	**Calibrated date**	**Country**	**Reference**
Stackpole Warren Site B	410-160 cal BC (CAR-103)	Wales	Benson *et al* 1990
Dan-y-Coed Enclosure	360BC-70AD (CAR-705)	Wales	Williams and Mytum 1998, 14, 42
Llawhaden	355 cal BC-cal AD 54	Wales	Mentioned in Caseldine and Murphy 1989
Kerrowdhoo, Bride, Isle of Man	170BC-130AD 350BC-70AD	Isle of Man	Hedges *et al* 1995, 204
Cloongownagh, Roscommon	4th century AD	Ireland	Henry 1999, no details of date given
Castle Street, Waterford	540–660 cal AD (2 sigma, UB-4159)	Ireland	Pollock 1997
Holyrood, site DA3, Bryngwran	Cal AD 560-810 (Wk-9552)	Wales	Maynard 2012, 126
Killoran, Tipperary	cal AD 660-880 (Beta-117550)	Ireland	Stevens 1998
Morfa Mawr, Aberaeron	680-990 AD (CAR-458)	Wales	Williams 1985, 184
Fonnybane, Co Down	880-1150 AD	Ireland	Brindley *et al* 1990, 28
Auld Taggart 4, East Rhins, Dumfries and Galloway	AD 990-1210 to 1050-1290	Scotland	Russell-White 1990, 74
Deanery Yard, Bangor	Cal AD 1020- 1210 (Beta – 255302) Cal AD 1020- 1210 (Beta-255303)	Wales	Smith 2007, Smith forthcoming
Auld Taggart 2, East Rhins, Dumfries and Galloway	AD 1020 to 1260	Scotland	Russell-White 1990, 74
Site 2, Catstown, County Kilkenny	1150-1390AD	Ireland	Ryan 1990, 46

The descriptions of burnt mounds in some of the Irish tales, presumably based on early medieval oral tradition, (e.g. Keating's *Forus Feasa ar Éirinn* and The Romance of Mis and Dubh Ruis (quoted at length in Ó Drisceoil 1990)), suggests their use into the medieval period but the current archaeological evidence for this is very limited. Of the small number of dated medieval sites listed above many have single dates and must be questionable as contamination and disturbance cannot be detected when only a single date is obtained. However not all later dates are in doubt. Auld Taggart 4 is convincing as a late mound because its three dates are all quite close (Russell-White 1990, 91). In Wales the deposit of burnt stone at Deanery Yard, Bangor was dated by two dates and appears to be clearly medieval, possibly associated with the construction of Bangor cathedral. At Peter Street, Waterford (Walsh 1990) excavation revealed a wooden trough in a pit with burnt stones, much like a burnt mound but dating to the early thirteenth century AD. The Deanery Yard mound contained quantities of animal bone, but generally the medieval burnt mounds seem to be similar to the prehistoric ones in the type of burnt stone deposit present and the artefacts found, or more often not found. With the number of mounds excavated and dates obtained, especially in Ireland, many more medieval dates would be expected if this site type was widely used in the period, but the use of single dates may also obscure the later use of mounds.

The dating of burnt mound PRN 34096 in plot 6/33 to the early medieval period by two consistent dates from a secure context in a pit is therefore very significant as it adds a solidly dated late example to the hints of early

medieval burnt mounds in Wales. More rigorous dating on other sites could lead to more of these late mounds being identified. It is particularly notable that the other burnt mound in plot 6/33 is one of the earlier mounds found during the project. It was not possible to determine by appearance or any features found during excavation which mound was earlier than the other, in fact the earlier mound appeared less typical as no pit or trough was found on this site, possibly because it was beyond the excavated area.

While the Bronze Age was clearly the height of the use of burnt mounds it would appear that their use continued at a lower level well into the medieval period. This may explain why the medieval Irish could describe their use so accurately. In all periods burnt mounds were used for the heating of significant quantities of water but it would seem probable that their function might have changed over time. However the similarity in the deposits, including the fact that charcoal is deposited mixed with the burnt stone, suggests that there were considerable similarities in use. If cleaner water were important for a particular use, such as fulling and washing people or clothes, it is possible to separate the hot stones from charcoal without much effort. If this occurred areas of burnt stone without charcoal would be expected, despite the extent of post-depositional mixing that seems to occur, especially on mounds used for only a short time. However this is very rare and it appears that in all periods keeping water clean of charcoal was not important. It should be noted that neither cooking nor brewing requires charcoal-free water. Experiments by David Chapman of Ancient Arts have produced good beer while deliberately attempting to reproduce the charcoal and stone mix found archaeologically (the dirt settles out during the brewing process and the presence of clay can facilitate this) (D Chapman pers. comm.). The search for the function of these sites therefore goes on and the evidence that similar functions were carried out over such a long period of time perhaps adds to the mystery.

Plant remains

James Rackham, Dana Challinor and Jane Kenney

Charred plant remains other than charcoal were scarce on the burnt mounds. The few hazelnut shells present were probably introduced on branches as fuel rather representing collecting and eating nuts. Two cereal grains came from a trough in plot 3/10, and a single barley grain was recovered from each of two pits on plot 6/29.4. Cereal grains are rare but not unknown from burnt mounds in north west Wales. At Parc Bryn Cegin one mound (1097) produced six charred grains of barley, one grain of emmer wheat and one unidentifiable cereal grain. Another (2176) produced a single unidentifiable grain (Kenney 2008). Nant Farm, Porth Neigwl also produced evidence of cereals. In this case most of the material was chaff, suggesting the use of grain processing waste as a fuel for the fire, with the few grains present probably accidentally introduced with the chaff (Smith 2009). Although the numbers are low and probably do not indicate the processing of cereal on site, they do indicate its presence, possibly being used in a way that meant the grains were rarely charred. Very few sites in Ireland report the recovery of charred grain but a quern stone was found buried in a timber-lined burnt mound trough at Site 43, Ballyduff East, Co. Waterford (Hegarty 2005), suggesting at very least that the mound was in the proximity of food processing activities.

The relative absence from the samples of charred food plant remains and their associated taxa strongly suggests that cooking a range of foods was not the function of burnt mounds. This does not necessarily rule out boiling meat for consumption elsewhere or brewing beer, as long this resulted in few grains becoming charred. It does indicate that these were not sites of feasting. The lack of plant remains that might relate to other potential uses of burnt mounds, such as dying, means that no support can be given to these interpretations. The presence on the mound in plot 6/29.4 of unburnt split oak pieces, some with bark could potentially be associated with the extraction of tannins for tanning leather, but equally could just be fuelwood.

The common association of burnt mounds with water sources (Barfield and Hodder 1987) may explain the widespread use of alder in the samples along the pipeline. Alder is considered a poor fuelwood unless well-seasoned (Edlin 1949, 158) and there are three possible explanations for the use of this species.

- Alder was utilised, in spite of its lower calorific value, because it was easily available (close by and plentiful).
- The wood had been converted to charcoal (alder charcoal makes an excellent fuel, as does holly).
- The wood was well-seasoned.

A final possibility is that there was some ritual association of hot stone burning with alder, but in the absence of a dataset of domestic fuel, it cannot be adequately compared to other fire types. It may be significant that some burnt mound deposits elsewhere are almost exclusively associated with alder wood, which is rare for domestic type assemblages.

The use of alder converted to charcoal seems unlikely. The conversion of wood to charcoal is a time-consuming and costly process, unlikely to be employed unless necessary. As the fuel appears to have been used to heat stones this would have been done more efficiently with fires fuelled by wood.

Alder is commonly used in areas where other sources of wood are not readily available. For instance, alder-dominated cremations of late Bronze Age date have been recorded in South Hornchurch, Essex (Gale 2000, 347-8) and Dartford, Kent (Challinor 2011, 274), and ones of Roman date at Brougham, Cumbria (Campbell 2004, 270). The general indications from the charcoal record along the pipeline does not suggest that oak and hazel were in decline, although there may be some differences according to the location of the individual plots. Plot 3/10, which produced a large quantity of alder, is in a dry area and some distance from the nearest river. It is possible that less woodland occurred in this locality close to the coast and that fuel was collected from woodland fringing the river and wetland areas near the estuary of the Afon Wen which contained more alder. There was a large quantity of alder from the palaeochannel in plot 6/29.4, and a reasonable amount from the burnt mound there. However, there is no indication of a shortage of oak or that any form of woodland management was taking place.

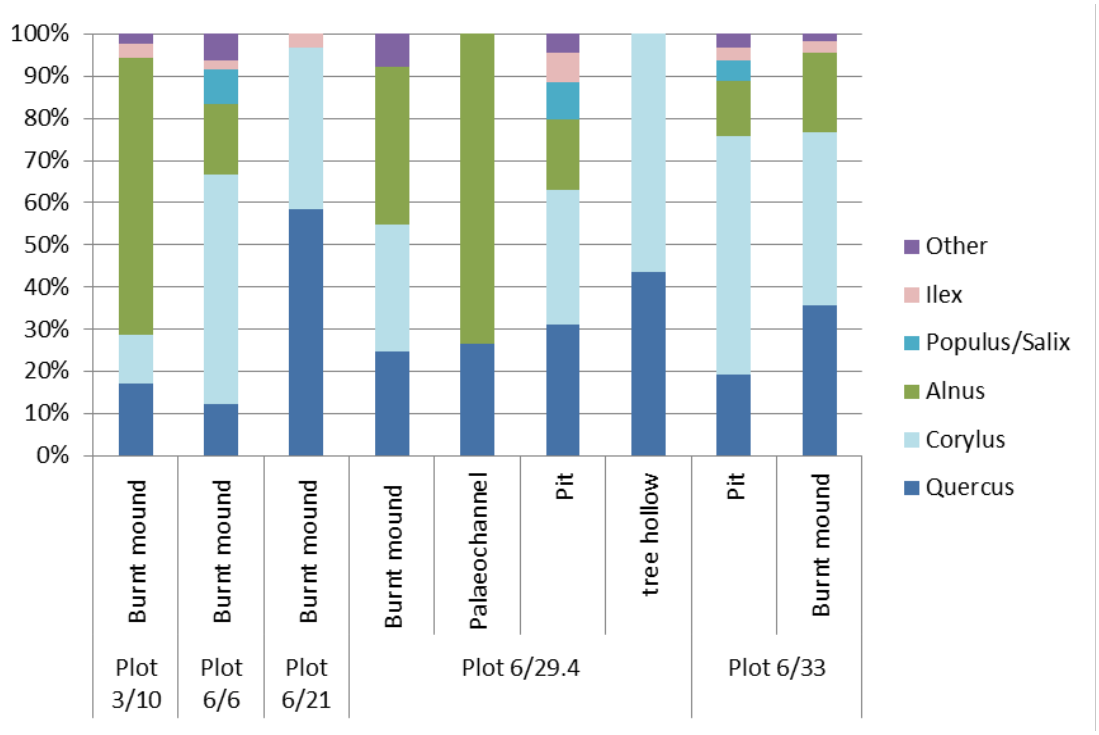

Table 9. Analysis of Late Neolithic and Bronze Age charcoal by plot and feature type (based upon fragment count; the 'Other' category includes taxa of less than 2%)

It seems probable that the alder was an efficient fuel because it was well-seasoned. There are two factors in favour of the idea that the wood was well-seasoned. Firstly, the build-up of burnt mound deposits suggest that this occurred over some time, in which case the need for wood in that location would be anticipated. It may be that there was an aspect of seasonality to both the activity itself and the collection and stacking of firewood. Secondly, the presence of insect tunnels in several of the charcoal fragments indicates that the wood had been sitting around dead for a period prior to burning, although this could also be interpreted as the use of fallen deadwood rather than deliberate seasoning.

Ultimately, a combination of factors probably led to the selection and utilisation of wood taxa in the burnt mound assemblages including, but not limited to, *ad hoc* collection, more deliberate storage and seasoning practices and potentially a ritual association. While we do not know whether the activities conducted at these sites are seasonal or not their ubiquity across the country indicates that the fuel resources needed are likely to have been collected at the most convenient time. Winter harvesting of wood for the burnt mound fires would be preferable to harvesting when the trees are in leaf, and would allow the timber to stand and season (dry out) prior to use, thereby improving the burning quality and heat generation from the fires. Grant's (2013) study of the pollen from plot 6/29.4 suggests episodes of disturbance and subsequent regeneration of the oak and hazel woodland during the 2nd millennium BC that could be linked in part to the exploitation of the local resources for

the burnt mound activities, but these would have to be very substantial to have anything more than a local impact, unlike woodland clearance for agriculture which tends to be cumulative.

Generally it appears that the closest fuel source was used for burnt mounds with the wood species represented relating to the likely woodland type close by. The pollen analysis from plot 6/29.4 indicates that the burnt mound activity took place in a wooded environment, where fuelwood would be easily available. The pollen also suggests that the burnt mound was close to small temporary clearings for arable agriculture, which were unlikely to be distant from settlement. Wet areas on the edge of fields and within reach of settlements, where water and fuel were plentiful might be used to characterise the selection of locations for burnt mounds.

11.3. Knapped stone

George Smith and Jane Kenney

The number of worked flints from this project is very low. Most came from sites excavated by hand, but two were found during machine watching, showing that flints can be found during topsoil stripping, although the level of recovery is likely to be much lower than for hand excavation. Repeated field walking of ploughed fields along the pipe route in advance of the works might have revealed a flint scatter that would not otherwise have been detected. However, as the presence of worked flints on excavated sites across the region is generally low, the chances of finding a significant site by this method are very small.

One piece (from plot 7/13) is a modern import, possibly ballast, and another (from plot 14/17) is probably a piece accidentally struck from a pebble, leaving only four pieces of interest. Two pieces (from plots 3/2 and 6/29.4) are probably utilised blade segments from composite edge cutting tools. These pieces are probably unrelated to other activity in these plots and are of Mesolithic or Earlier Neolithic date. It is not possible to make reliable identifications on the basis of flake shape and size comparisons alone and such blades could be found in assemblages of Mesolithic or earlier Neolithic date. Although little can be made from only two pieces they are a useful indication of activity in this area. Similar small flakes and blades have been found in cliff-top exposures around Llŷn and Bardsey, deriving from Later Mesolithic/Earlier Neolithic hunter-gatherer activity (Smith 2001). Mesolithic activity may also be indicated by the facetted pebble found in plot 6/29.4, but this is not sufficiently diagnostic to be sure of its date.

Any hint of activity in this period is therefore valuable but the conclusions that can be drawn from two pieces are very limited.

Of the other two flint pieces one from the fill of the medieval corn drier in plot 3/2 may have derived from preparation of an edge-flaked tool and is possibly Bronze Age or Later Neolithic in date but is presumably more likely to be residual from the Iron Age activity in this plot. The other piece from plot 6/33 was an undiagnostic chip and presumably related to the burnt mound in which it was found.

Worked flint is generally very rare from inland areas in north-west Wales, and even coastal sites are not numerous. Domestic activity on the Llŷn Peninsula in the Neolithic period has so far only been presumed because of the presence of chambered tombs, which are relatively common here (figure 48). The closest to the present project include tombs at Cist Cerrig on the slopes of Moel-y-gest, at Four Crosses, at Cefn –isaf (Llanystumdwy) and at Ystum Cegid Isaf (Llanystumdwy). Consultation of the Gwynedd HER shows an almost complete absence of flint finds from near the pipeline route, with the exception of the Cist Cerrig burial chamber (PRN 218) and the flint scatter on Penychain (PRN 6787) (figure 48). This scarcity of finds makes the small number from this project of importance beyond their number, but that number is so low that few conclusions can be drawn. The lack of flint finds must be due largely to a collection bias because of the low density of population and the small proportion of cultivated land in the present (Smith 2010), but the scarcity of pieces from such as large swath of country does suggest a genuine lack, probably due to the general scarcity of the raw material.

11.4. Afon Dwyryd crossings

The timber recorded in plot 14/7 appears to have been part of a structure and its location makes a timber causeway likely. The combined radiocarbon dates from this feature demonstrate that it dated to the second half of the 14th century AD. However this feature lies on the possible line of a Roman road. Bowen and Gresham (1967, 257) proposed a route for the Roman road from Tomen y Mur to Segontium running along the north eastern side of the Ceunant Llechrwd valley, reaching the flood plain of the Afon Dwyryd at Pont Llechrwd. They proposed that on the other side of the river the road ran on the line of the old coach road from Tan-y-bwlch

to Croesor, but a road down the northern side of the river and crossing the Traeth Mawr from near Minffordd to Tremadog also seems a likely possibility (Hopewell 2007, 14). These are proposed routes with little firm evidence and in either case the exact crossing point is unknown. However a straight line drawn between Pont Llechrwd and the probable start of old coach road near Bronturnor runs almost exactly through the site of the wooden structure in plot 14/7. This raises the possibility that this was the route of a Roman road that was reused in the medieval period, with the timber structure possibly being a causeway across the flood plain leading to a river crossing. Castell Prysor, located east of Trawsfynydd, is adjacent to a proposed route for the Roman road from Tomen y Mur to Caer Gai (Hopewell 2007), perhaps suggesting that the road influenced the location of the castle. Late 13th century use of the 12th century castle is demonstrated by a letter sent by Edward I from the castle in 1284 (Cathcart King and Kenyon 2001, 409), and it might have been used later. The Roman road system would have helped a garrison in the castle to control the countryside and the causeway may have been on a critical river crossing on this system. There is some evidence that Roman roads were reused in the medieval period as there is a historical reference to woodcutters keeping open the Roman road in the Usk valley for Edward I's troops (Griffiths 1994, 73). Any Roman bridge or causeway across the Dwyryd is likely to have been destroyed or buried in silt, so the construction of a new bridge and causeway would have been necessary in the medieval period.

While the calibrated radiocarbon dates from plot 14/7 seem to overlap with the dendrochronological date on the timber from plot 14/1 (a felling date of between AD 1272 and AD 1308) the combined date from plot 14/7 shows that the possible structure is much later than the isolated timber. The latter may indicate another crossing or a jetty closer to Maentwrog dating from approximately the time of the conquest of Wales by Edward I.

The medieval reuse of the Roman road must remain in question because the line of the Roman road itself is not securely established. The route running through plot 14/7 is conjectural with no firm evidence to support it (Hopewell 2007, 14). In 2011 John Burman identified a straight bank or causeway running across the flood plain near Maentwrog and investigated this on the ground with Hugh Toller. This is an agger-like feature, a 7m wide causeway with quantities of stone, running from SH6632 4068 To SH6610 4077 (figure 39), and clearly visible on the ground surface (pers. comm. Hugh Toller to David Hopewell). This feature was cut by the gas pipeline but nothing of significance was recorded during the watching brief. This may be because the stone bank was clearly within the very recent layers and, not knowing that it was part of a longer feature, its significance may not have been recognised by the watching brief archaeologists. Certainly a Roman date for this feature must be questioned as it runs on the surface of the flood plain and the medieval structure in plot 14/7 was over 0.9m below the present surface. A Roman feature might be expected to be even lower down if it managed to survive floods and the migration of the river channel. The approximate vicinity of plot 14/7 therefore remains a possibility for a Roman crossing, as well as a medieval one, but no evidence for the former was found during the present project.

11.5. Medieval townships in Eifionydd

Jane Kenney, James Rackham and John Giorgi

The western part of the gas pipe route runs through the medieval commote of Eifionydd, the history of which has been studied by Colin Gresham (Gresham 1973). By tradition the district as a discrete entity stretches back to the sixth century but Gresham shows that there is little historical evidence of the early medieval period except the stories of the lives of the early saints (Gresham 1973, xvi). The rural townships were established as administrative units between about 1100 and 1170; overlaid, rather awkwardly, on existing patterns of land-holdings. The western part of Eifionydd was rich farmland and would have been quite intensively settled, and the townships, especially along the coast were much smaller than in the eastern and northern part of the district where the land was high and poor. Gresham identifies the boundaries of the townships, the approximate locations of some settlements and some general indications of landuse, such as demesne land often being on the rich lowlands and salt march of the coastal plain.

The historical evidence helps to fill out the rare archaeological evidence but the latter contributes to the understanding of the structure and function of the medieval landscape not fully described in the documentary sources. The historical evidence supports the existence of a reasonably good road along the coast by the late 13th century as Edward I visited the township of Penychain in 1284 (Gresham 1973, 345), which would have been unlikely without a good transport route. Documents also show that both townships of Penychain and Ffriwlwyd had mills on the Afon Wen, although these have not yet archaeologically detected. However the documents indicate little about the homes of even the most important people in the area, and archaeology can in places fill this gap. The most impressive archaeological medieval feature is the ringwork of Tomen Fawr in the township

of Ffriwlwyd, which Gresham argues was occupied before 1190 by the lords of Ffriwlwyd (Gresham 1973, 338).

The medieval discoveries made during the present project fit within this rather slender understanding of the medieval landscape. The corn drier in plot 3/2 dated to the late12th or early 13th centuries AD may have been located close to the coastal road allowing grain from not just neighbouring fields to have been brought to be dried. The relationship of this to what was probably the main settlement of Botach township, located near Broom Hall, cannot be established until some excavation is carried out the settlement earthworks. Earthworks (PRN 5735) suggested as related to settlement much closer to the corn drier were shown during the A497 improvement works to be part of a redundant field boundary and no medieval settlement was identified (Davidson *et al* 2007, 36).

The main settlement in Penychain township might be identified by the earthworks near Tyddyn Berth (PRN 5733, SH43753732) noted during the assessment for the A497 improvements (Mason 1993, 6-7). The present work revealed little to support this suggestion but a rectangular pit containing burnt stones found in plot 3/6 could have been related to medieval activity rather than being part of a burnt mound.

Consideration of the field boundaries highlights the possibility of traces of open fields surviving in this area. There are distinctive curving boundaries suggestive of enclosed and therefore fossilised strip fields to the north of Pentrefelin, the north of Criccieth and around Llanystumdwy. These would repay further study to see how far the open fields can be traced and whether the layout of different fields around the settlements can be determined.

The samples of charred plant remains recovered from the project show that oat was the principal grain during the medieval period, with limited evidence for free-threshing wheat, rye and barley. The freely draining slightly acidic loams developed on the silt and clay rich tills along the coastal strip are quite suitable for the cultivation of oats and other cereals, although rye is more often associated with soils prone to droughty conditions. The oats may have been spring-sown, while the free-threshing wheat could have been autumn-sown. A single seed of common vetch recorded from the corn drier in plot 3/2 may indicate the use of this species as animal fodder. Vetch was cultivated for animal fodder from early medieval times and Campbell (1988) has illustrated its use, based on documentary evidence, across England in the 13th and 14th centuries. The species is native, particularly in coastal areas on heathland, maritime sands and shingle, and its occurrence here along with a number of seeds of smaller legumes and arable weed species suggests that it could have arrived as a weed with the cereals, although cultivation as a fodder crop cannot be ruled out.

The oak used in the late 12th or early 13th century AD smithy in plot 3/14 was almost certainly used as charcoal, and indicates that charcoal burners were operating in the local woodlands. At least in the early medieval period it seems that the woods and wetlands were still, perhaps just occasionally, used for the operation of burnt mounds. The early medieval mound in plot 6/33 was no different to the late Neolithic and Bronze Age examples found. Its charcoal assemblage lacked oak, and was dominated by hazel, but this may reflect merely local woodland conditions and does not necessarily suggest a scarcity of oak generally. It does more to support a lack of apparent change in the woodland composition between the Neolithic and the medieval periods. The presence of this mound, so similar to the prehistoric ones, does suggest the continuation of the same activities, but as we have no firm evidence yet of what the prehistoric mounds were used for it is harder still to be sure about the function of this site.

12. THE CHANGING LANDSCAPE: A SUMMARY

James Rackham, Dana Challinor, John Giorgi and Jane Kenney

12.1. Introduction

The project revealed a range of individual sites across a transect through the southern side of the Llŷn Peninsula, across major estuaries and extending into the uplands. The individual sites reflect a range of activities carried out along this transect over several thousand years, but samples recovered from these sites also gives a more general picture of the environment. The pollen profiles from plot 6/29.4 show the changing vegetation over time in this location with a series small clearances and woodland regeneration until clearance becomes more permanent in the Iron Age. The charcoal and charred plant remains, while being more selective, still reflect local and wider changes.

12.2. Late Neolithic and Bronze Age

The project could not shed much light on the earlier history of the Llŷn Peninsula and Vale of Ffestiniog. Two flint blades, and perhaps the facetted pebble from plot 6/29.4, may hint at Mesolithic or Early Neolithic activity not far from the coast, but even the pollen record did not show much evidence of activity at this period.

Much more activity is evident from the Late Neolithic when burnt mounds started to be used in the area. The pollen evidence shows a wooded landscape into and throughout the Bronze Age but with small clearings, some apparently for arable agriculture from at least the Early Bronze Age. The cutting of wood for fuel for the burnt mounds may have caused small clearings, although it is hard to firmly link any of the changes in the pollen record to the main phases of activity of the burnt mound in plot 6/29.4. While the exact purpose of burnt mounds is still uncertain they seem to have been a common site type, used over a very long period of time, with the activity in this area demonstrably continuing into the early medieval period. Their use is likely to be linked to small local settlements, the locations of which are not yet known but that cannot be far away if people were cultivating corn in fields near the mounds.

In the Bronze Age the dead were also buried in the area, whether in significant monuments such as the Afon Wen enclosure with two cremation burials in fine urns, or apparently unmarked in a small pit. The burials seem to be on good coastal land, again probably not far from settlements, rather than isolated on the hills as some Bronze Age funerary cairns are.

Deposits of late Neolithic and Bronze Age date excavated during the project produced limited charred plant assemblages, but the presence of charred grain showed that hulled barley was being grown and probably emmer wheat. If charred plant remains from the cremation burial represent food offerings or feasting they indicate the consumption of wild fruits. Weed seeds found in the Late Neolithic and Bronze Age samples generally are from arable and pasture plants such as corn spurrey, orache/goosefoot, ribwort plantain and medick/clover, supporting the evidence of cereal crops being grown and as well as areas cleared for pastureland.

The charcoal assemblages show that three taxa were dominant: oak, hazel and alder. This is consistent with the regional environmental picture provided by pollen evidence (Caseldine 2011; Grant 2013), which shows oak-hazel woodland, with alder, which would have grown in areas of wet ground conditions, such as adjacent to streams. Apart from the small clearings for crops and some larger areas for pasture most of the landscape would have been wooded. However some significant clearance had already begun by the middle Bronze Age as pollen analysis at Mellteyrn Uchaf, towards the western end of the Llŷn, showed that the settlement was built in an open environment (Caseldine 2001, 31).

12.3. The Iron Age

By the Iron Age the woodland was being opened up much more with fields growing the emmer wheat. There must have been settlements of this date along the pipe route but the traces of them were few. However the querns reused in the oven in plot 3/2 could not have been carried far. The shell midden in plot 7/1 shows that people living in the roundhouses on the hills, probably those living on Moel y Gest, were also using marine resources, at least on a small scale. The marine shells reflect a reliance on cockles suggesting easy access to tidal sands in the bay. The terrestrial mollusc shells and charcoal in samples from plot 7/1 suggest oak and hazel woodland fringing the Glaslyn Estuary.

The Iron Age pits in plot 3/2 included two of the richest deposits for environmental evidence along the whole pipeline route. The charred plant remains suggest that emmer was the main grain cultivated, with some barley (both naked and hulled varieties), and traces of both spelt wheat and possibly free threshing wheat. Ards may have been used to work acidic sandy soils, while spring-sowing of crops may have been practiced. A relatively high proportion of chaff in one of the pit fills suggests that the earlier stages of crop processing were being carried out on the site.

The charcoal assemblages suggest that oak and hazel woodland was still available in the landscape in the middle Iron Age, a continuation of the wooded landscape of the Bronze Age, although we have no data that would allow us to assess the extent of the woodland. The study of the pollen from plot 6/29.4 suggests declining oak woodland in the later Iron Age (Grant 2013).

A little hammerscale in the samples from plot 3/2 suggests iron smithing in the middle Iron Age. The few flakes of hammerscale in the sample from plot 6/10 in a landscape devoid of any recent habitation would indicate smithing at this site too, although whether of Iron Age date or later is not known. Industrial activity as well as agriculture is therefore hinted at by the results.

12.4. Medieval

In the Roman period the Llŷn Peninsula was probably quite isolated from the influence of the Roman army and new economic and social ideas, but a Roman road must have crossed the Afon Dwyryd and the people in this area must have felt the impact of the Roman conquest. The road itself may have been reused and restored in the medieval period.

By the medieval period there were open fields around some of the villages but there were still large areas of woodland. Oats, probably grown along the coastal strip, and sown in the spring, were extensively grown, requiring the use of corn driers to prepare it for milling or storage. The corn drier in plot 3/2 was fuelled predominantly by oak, with alder and hazel roundwood, and occasional poplar/willow, an assemblage similar to those from many of the prehistoric samples. This suggests that although the landscape, which included open fields around the villages, must have been less wooded the composition of the woodland was probably much the same as in prehistory.

The smithy pit in plot 3/14 provides evidence of charcoal burning for fuel in the 12-13th century. The woodland must still have been quite extensive at that period, and the material cut for the possible causeway in plot 14/7 indicates that the valley sides of the Vale of Ffestiniog were probably well wooded. At an earlier period charcoal from the early medieval burnt mound in plot 6/33 suggests little change in the woodland composition to that of the Neolithic and Bronze Age.

12.5. Post medieval

The changes in the 19th century were massive with huge areas of sand and estuary converted to farmland and towns developing where none had existed before. The silts of the former Glaslyn Estuary and Dwyryd flood plain provided a record of this process but much of this area remains rural and the pipe route avoided most features typical of these later changes except remains of Blaenau Ffestiniog gasworks. The gasworks itself was demolished because it was superseded by natural gas distributed by a nationwide system, part of which was being replaced and up-dated by the present works, in the process revealing the past of this region.

13. ARCHAEOLOGICAL POTENTIAL AND RESEARCH PRIORITIES

The project has provided an insight into the type of archaeology that might be expected across a variety of landscapes that have previously had little investigation by excavation. This enhances our ability to judge the archaeological potential of these areas and will help inform curatorial decisions about the possible impact of future development proposals on archaeological remains.

The discovery of numerous burnt mounds on the Llŷn Peninsula demonstrates that these sites are to be expected as frequently here as elsewhere in north Wales, and the absence of upstanding burnt mounds does not indicate a

lack of plough-reduced examples where much of the land is farmed. This project has shown that where upstanding mounds do exist, as near Moel Ednyfed north of Criccieth, other buried mounds can be expected. Indeed the tendency of burnt mounds to occur in groups means that the discovery of one mound must increase the probability that there are others in the vicinity. The pollen evidence from plot 6/29.4 showing clearings, at times used for cereal cultivation, close to the burnt mound suggests that this mound and probably all those along the pipe route are not far from settlement and cultivated fields.

The presence of the burnt mounds and the existence of Bronze Age burials in this part of the southern Llŷn strongly suggest that there was late Neolithic and Bronze Age settlement here. These settlement traces might be expected to be slight and subtle and difficult to detect by aerial photography or geophysics. The only known possibly domestic features not related to burnt mounds from this area are two small pits or postholes from Llwyngwyn Farm, near the Hafan y Mor Holiday Park (Berks *et al* 2007, 11-12). These contained late Bronze Age pottery and demonstrate the type of small and fragmentary archaeology that might indicate the presence of a settlement. Such features can only be found by controlled stripping of the ploughsoil. Where future development occurs in areas favourable to occupation, such controlled stripping should be considered as a standard mitigation technique.

The dating programme carried out on this project also shows the value of dating every burnt mound with at least two radiocarbon dates. Assumptions about the date of these sites are problematic as relatively few have been dated so far in north Wales and those show a considerable range of dates (Kenney 2012). The discovery of an early medieval burnt mound shows the potential for other mounds of this date to be found elsewhere across north Wales. The presence of this mound north of Pentrefelin could also indicate early medieval settlement in the area.

Iron Age and Roman period settlement in the southern Llŷn is well attested by the presence of roundhouse settlements but these have generally not been excavated and dated. The pollen analysis from plot 6/29.4 showed that the landscape was largely cleared in the Iron Age and field systems dotted with settlements might be imagined. A large proportion of these settlements must have been partially or entirely destroyed by agriculture, but the survival of the pits in plot 3/2 shows that even where all walls and upstanding remains have been removed valuable archaeological evidence can remain. Plot 3/2 was on fluvio-glacial gravels and this may indicate the types of subsoils that were most attractive to early settlement.

For the medieval period a research priority must be to investigate the probable sites of the main settlements of known townships. The possible locations of settlements identified in Ffriwlwyd township, near Tomen Fawr and in Botach township, near Broom Hall have received minimal investigation. Between these settlements archaeological features might be expected to be widely spaced but the present project shows that they are to be found and can be very informative. While it might have been possible to predict the remains of a smithy somewhere in the vicinity of plot 3/14 the location of corn driers is impossible to predict, but it must be assumed that they were common in an extensively farmed environment. This project has only touched on the possibility of surviving traces of medieval field systems in the southern Llŷn, but these seem to exist in several places and their further study is important to determine how agriculture was organised in this region where the generic picture derived from the open-field systems of the English Midlands provide a poor analogy.

This project has to some degree confirmed the low archaeological potential of the upper deposits in Traeth Mawr, where the upper few metres must be of quite recent date, although the lower deposits have great potential to reveal the development of the estuary. However the shores of the estuary must have always attracted activity. The discovery of the Iron Age shell midden in plot 7/1 shows that the traces of this activity might be slight and difficult to detect.

The restriction of the pipe route largely to the Dwyryd valley in its north-eastern part means that the project has not been able to reveal much about the potential for archaeological sites on the sides of this valley. However where the route did leave the valley floor as it approached Blaenau Ffestiniog sites were rarely found and those that were recorded were mostly recent. This is probably due in part to the rough rocky terrain and in some cases steep slopes making the area unattractive to occupation in most periods. Also some of this area is currently under woodland and the disturbance caused by trying to strip an easement full of tree routes makes discovery of archaeology unlikely.

The flood plain itself proved to have more potential than might have been expected considering that the river channel must have moved across its flood plain before it was stabilised in the late 18th century. Movement of the channel would have resulted in destruction of earlier archaeological deposits but the survival of *in situ* medieval

deposits in plot 14/7, close to the present river channel, suggests that the movement of the river might have been quite restricted in later periods. A geological and depositional study of the flood plain itself would be beneficial in establishing how much change and erosion has occurred and what archaeological deposits might be expected to survive. If this was combined with pollen analysis it would significantly extend our understanding of how the landscape of the valley developed.

The recovery of worked timber from the flood plain shows that flooding may have deposited finds that have become preserved within the silts and clays. The discovery of a cattle skull shows that these finds do not necessarily have to be wooden. Where dated the timber proved to be medieval so it may be that while earlier features and finds might have been lost to river erosion those from the medieval period and later have a good chance of surviving. The discovery of a possible causeway in plot 14/7 shows that not just individual finds might be expected but also *in situ* features. That this feature was medieval shows that this period at least might be represented by structures preserved elsewhere on the flood plain. The level of preservation resulting from burial in anaerobic silts and clays means that these sites might be expected to contain material that is not normally found on dryland sites and could have considerable potential for revealing evidence otherwise extremely rare in north Wales. The importance of flood plains in this respect can be applied to all the flood plains of north Wales, not just the Dwyryd.

The rarity of causeways and wooden trackways of medieval date makes the possible causeway potentially a site of national significance, so it is a clear priority for future research. It may be possible to trace its line with an auger survey and any opportunity to expose more of its structure should be taken, although excavation on the flood plain will never be straightforward. Whether a technique such as ground penetrating radar could be used successfully on the clays of the flood plain would require some experimentation, but other geophysical survey techniques are unlikely to be successful due to the depth of the alluvial deposits over the causeway.

The project has also provided some insight into the value of the methods used. Monitoring topsoil stripping is not the same as undertaking a controlled strip as the topsoiling often does not take the area down to the natural deposits. Both techniques were used on the current project and features were found successfully using both, but only with the control strip is it possible to be sure that all features present were discovered. A controlled strip of the whole route would have been expensive and unnecessary in many areas, such as the flood plain and over very rough ground.

The magnetometer survey carried out as part of the evaluation phase of this project seems to have contributed relatively little to the understanding for the archaeology or to the identification of sites prior to excavation. This is partly due to the nature of the sites. While geophysics can often pick up very subtle linear features, small discrete features are difficult to distinguish from the general noise. It might be expected that burnt mounds would be easy to detect. However the strength of the signal is related to the proportion of iron in the stones and the amount of burning of soil under the mound, so it is possible for a burnt mound to have a fairly weak magnetic signal. More commonly the problem is that the signal is amorphous, not forming a clear shape that can easily be identified as anthropogenic. There are many sources of strong amorphous signals, particularly iron-rich bedrock and natural deposits. Some of the gravels along the pipe route seem to give strong amorphous signals and where burnt mounds are present they are lost within these. Very few of the excavated burnt mounds can be identified in the geophysical plots even with hindsight. High resolution geophysics might improve the identification of these features but where there is a large area to cover this would prove prohibitively slow and expensive. Prospecting by low resolution magnetometry can be expected to reveal large or linear features, while high resolution magnetometry is more suitable for investigating know archaeological monuments. Resistivity is generally only used for high resolution surveys as it is slower than magnetometry, but its use on large commercial projects may be worth considering to complement magnetometry. Other forms of geophysical survey are less widely used in commercial archaeology, although ground penetrating radar is becoming more common, however this also tends to be used to investigate individual sites rather than for prospecting. The gap between the expectation and results of geophysical surveys seems largely to result from confusion between low and high resolution surveys and what can be achieved with them. This does not reduce the value of prospecting with low resolution surveys over a large area but it must be understood that this will miss large classes of archaeological features.

14. PUBLICATION AND PRESENTATION

The present report forms the basis of the presentation of the results of this project and will be made available on the internet through the GAT website and through the Royal Commission on the Ancient and Historical

Monuments of Wales Coflein website, as well as through the Gwynedd Historical Environment Record (HER). A condensed version of the report will be published in Archaeology in Wales (the journal of the Council for British Archaeology: Wales). A more popular version of the results will be made available on the GAT website in association with talks and a media campaign to disseminate the excavation results more widely than just the academic community.

Talks were held for the public on 16th January 2014 in Pwllheli, on 17th February in Blaenau Ffestiniog and on 21st February in Llanystumdwy. The pollen analysis and radiocarbon dates also formed the basis of an event held at Bangor University as part of National Science Week and the Bangor Science Festival.

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16. APPENDIX I: QUANTIFICATION OF FIELD RECORD AND LIST OF FINDS AND SAMPLES

This section itemises the field records produced and the finds and ecofacts recovered.

Table 1: Total site records

Topsoiling records	220 sheets
Trenching records	171 sheets
Day records	131 sheets
Deposit recording sheets	89 sheets
Field boundary records	78 sheets
Find register	5 sheets
Drawing register	8 sheets
Environmental sample register	4 sheets
Context sheets	388 sheets
Context registers	
Survey data	2 sheets
Digital photographs	3248 shots
Plan and section drawings	151 drawings on 86 sheets

Table 2: Environmental samples

Sample type	**No. of sample type**
Bulk soil	92 (115 bags)
Hand collected charcoal	17
Micromorphology	6
Nuts	1
Stone	1

Table 3: Finds totals

Material	**No of items**	**Weight**
Bone	6 bags	
Ceramic (PM)	23	
Burnt clay	26	Totalling 50.52g
Copper alloy	4	
Iron	3	
Knapped stone	7	
Leather	1 bag	
Shell	56	
Archaeometallurgical material	14	Totalling 384.65g
Stone	22	
Wood	53	

Table 4: Finds by plot

Plot	**Find No**	**Context No**	**Material**	**Description**
0/1	No finds			
0/2	No finds			
0/3	1	03003	iron	Small piece of iron
	55	03004	stone	2 possible hammerstones, burnt
	72	03003	burnt clay	Fired earth
		03003	Hammerscale	Flakes and spheroids
		03003	Burnt stone	433.8g
0/8	54	0	wood	Large piece of timber

Plot	Find No	Context No	Material	Description
0/9	No finds			
0/11	No finds			
1/2	02	12001	Copper alloy	Modern coins
3/2	4	32005	slag	Piece of slag
	6	32012	bone	Frags of bone, sheep sized
	7	32017	stone	Saddle quern
	8	32017	stone	Small boulder, probably unused
	9	32010	stone	Broken saddle quern
	10	32012	stone	Rubbing stone
	11	32017	stone	Grinding stone?
	12	32012	stone	Cobble with one worn surface
	13	32012	stone	Grinding stone?
	14	32012	stone	Saddle quern fragment
	15	32018	bone	Burnt bone, cattle sized
	17	32012	bone	Burnt bone, sheep sized
	18	32012	stone	Broken quern and rubber
	19	32026	knapped stone	Flint flake
	20	32019	stone	Grinding stone?
	64	32016	Quartz	Flat piece of quartz. Smooth on one side.
	66	32018	flint	Small flint flake
	68	32007	slag	Possible piece of slag
	77	32020	burnt clay	Fired earth? Ceramic building material?
	78	32018	ceramic/burnt clay	Fired earth/possible pot fragment?
		32002	Metal-working debris	3g magnetic residue and 1 piece of hammerscale
		32012	Metal-working debris	1.6g magnetic residue
		32013	Metal-working debris	0.6g magnetic residue and 9 pieces of hammerscale
		32016	Metal-working debris	0.8g magnetic residue and 2 pieces of hammerscale
		32018	Metal-working debris	13.6g magnetic residue and 1 piece of hammerscale
		32019	Metal-working debris	0.6g magnetic residue and 15 pieces of hammerscale
		32021	Metal-working debris	0.1g magnetic residue
3/6	No finds			
3/10	No finds			
3/14	60	314005	slag	Pieces of slag or iron working debris
	61	314005	slag	Vitrified furnace lining
	65	314005	copper alloy?	Copper rich metal or stone.
	69	314005	slag	Slag
	76	314005	burnt clay	Furnace lining and tuyere fragments
	3	314005	cu alloy	Cu alloy sheet with holes in it
		314005	Slag	55.6g
		314005	Metal-working debris	3480g of magnetic residue and 1000s of pieces of hammerscale
3/20	27	320005	iron	nail
	28	320002	Copper alloy	button
	29	320011	iron	large nail
	30	320011	ceramic (PM)	Late p-m pot sherds
	31	320011	shell	limpet shells
		320006	Metalworking debris	3.6g magnetic residue and 6 pieces of hammerscale
		320007	Metalworking debris	0.2g magnetic residue and 0.5g slag
		320012	Metalworking debris	0.2g magnetic residue and 1 piece of hammerscale
3/27	71	327003	stones and calcareous material	Possible material from cremation.
	75	327003	burnt clay	Fired earth frags.
		327003	pot	2 possible pot frags
		327003	Metalworking debris	20.4g magnetic residue and 1 piece of hammerscale
		327003	Bone	52.4g burnt bone, possibly human
		327004	Metalworking debris	0.2g magnetic residue
		327004	Bone	8.6g burnt bone, possibly human
5/5	No finds			
6/6	No finds except for tiny amounts of magnetic residue and slag			
6/10	74	610002	Burnt clay	Fired earth.
		610002	Metalworking debris	11g magnetic residue and 3 pieces of hammerscale
6/21	No finds			
6/22	26	621001	Leather	Leather shoe soles
	33	621001	Ceramic	Late p-m pot sherds
6/29.4	22	6294096	stone	Bevelled pebble
	23	6294128	knapped stone	Flint flake

Plot	Find No	Context No	Material	Description
	37	6294139	wood	2 fairly small split pieces from fill of natural hollow [6294133]
	56	6294046	wood	Medium sized flat pieces of wood, from pre-burnt mound buried soil deposit.
	70	6294002	burnt clay	Fired earth
	73	3294011	burnt clay	Fired earth
6/33	67	633004	flint	Small flint flake
	21	633024	charcoal	Carbonised wood
6/38	No finds			
6/39	No finds			
6/44	No finds			
6/47	No finds			
6/51	62	651001	Shell	Shells from lower layers
7/1	34	71002	shell	cockle shells
7/2	No finds			
7/8	No finds			
7/13	24	713001	knapped stone/flint	Chunky flint flake with chalk cortex
9/6	25	96001	ceramic (PM)	Late p-m pot sherds from Penrhyn pipe dump
11/3	43	wood	Small cut branch	43
	50	wood	Large branch, probably not worked	50
	51	wood	Large pieces of wood, possibly worked	51
	52	wood	2 large pieces of wood, possibly worked, 2 medium sized pieces	52
	53	wood	Large pieces of wood, possibly worked	53
13/30	57	0	wood	Very large timber, worked
	58	0	wood	Very Large timber, worked
14/1	49		wood	Large squared timber
14/4	42	wood	Small, possibly cut branch	42
14/7	35	147009	bone	cattle skull
	36	147005	wood	Medium sized piece of cut wood
	38	147005	wood	Small cut branch
	39	147005	wood	small piece of wood
	40	147005	wood	Small plank
	41	147005	wood	Small branches and hazelnuts
	44	147005	wood	Cut branch, squared wood and other more natural pieces (7 small, 1 medium)
	45	147005	wood	Medium sized possible split timber
	46	147005	wood	Large timber with (saw) cut end
	47	147005	wood	Small flat, possibly split timbers
	48	147005	wood	Medium sized possibly split timber
	59	147006	wood	Very large timber, worked?
	63	147005	nuts in shells	Whole hazel nuts
14/17	32		knapped stone	flint flake
17/3	No finds			
17/15	No finds collected			
18/3	No finds			

17. APPENDIX II: SUMMARY OF FIELD BOUNDARY RECORDS

Note in the list below the pipe route is seen as running from Pwllheli to Blaenau Ffestiniog so a negative boundary is on the side of the field in the direction of Pwllheli along the route and a positive boundary is in the direction of Blaenau Ffestiniog.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	NorthingsPRN
0/01	-	135	0.6	029, 030	238552	33597737843

Hedge-bank
Clawdd with earthcore and cobble stone revetments. Modern fence on top of bank. Boundary to the road

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
0/01	+	0	0		238580	33604037844

Fence
Not recorded because only modern fence survives. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
0/02	+	1.9	1	519-523	238690	33625037845

Hedge-bank
Stone bank covered with earth, some mature trees on bank. Boundary along side canalised stream. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
0/03	+	2.8	0.6	027, 028	238777	33633637846

Hedge-bank
Clawdd with earthcore and cobble stone revetments. Possibly part of a curving boundary but has been straightened. Boundary shown on tithe map. Possibly originally part of a medieval field system?

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
0/04	+	3.25	1.5	503, 504, 514, 515	238873	33634537847

Hedge-bank
Earth bank with large stones within it. Sinuous boundary. Shown on tithe map. Possibly originally part of a medieval field system?

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
0/07	+	0	0		238960	33634037848

Hedge, fence and stream channel
Not recorded because listed as 0/4 and this was recorded instead

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
0/11	+	0	0	15, 16, 17, 18	239463	33639537849

Modern fence

Hedge lost to road widening on West side and replaced by modern wire fence. Boundary to road. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
01/01	+	2.9	0.99	19, 20	239547	33639737850

Hedge-bank
Earth bank with occasional stones within it, small trees and an occasional large tree. Boundary to fairly regular field

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
01/01	-	1.4	1.15	526-528	239473	33639537851

Hedge-bank
Earth bank with stones in it. Boundary to road. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
03/05		0	0		243596	33725837852

No longer visible
Located in middle of present field. Not recorded because no longer visible. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
03/05	+	1.05	0.6	553, 554	243638	33728937853

Hedge-bank
Earth bank with cobbled stone revetment on outer sides. Boundary to group of regular fields

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
03/09	+	2.2	1.05	535, 536	244072	33750837854

Hedge-bank
Earth core with cobbled stone revetment and modern post and wire fence within it. Boundary to fairly regular field on reclaimed salt marsh. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
03/10	+	0	0	537, 538	244280	33761037855

Hedge-bank
Earth bank with cobble-stone revetment. Gorse hedge on top with modern fence. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
03/11	+	1.9	0.8	539-541	244313	33762437856

Hedge-bank
Earth core with cobbled stone revetment. Boundary to fairly regular field on reclaimed salt marsh. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
03/14	+	1.7	0.3	555, 556	245355	33782137857

Hedge-bank

Wide, shallow earth banked hedge. Irregular boundary but only because it borders a stream. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
03/15	+	1.4	0.7	557, 558	245476	33783737858

Drystone wall

Dry stone wall. Straight boundary to regular field on flood plain. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
03/18	+	1.8	1	559-561	245970	33784037859

Hedge-bank

Earth core hedgebank with stone revetment. Straight boundary to regular field on flood plain. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
03/19	+	2.5	1	562, 563	246090	33786037860

Hedge-bank

Earth core hedgebank with rough cobbled revetment, hawthorn hedge on top. Straight boundary to regular field. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
03/23	+	0	0		246510	33793037861

Fence

Not recorded because only modern fence survives. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
03/24	+	2.6	1.36	108, 109	246910	33804237862

Hedge-bank, modern fenceline

Earth core hedgebank with stone revetment, modern fence on top. Straight boundary to regular field on flood plain. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
03/25	+	1.55	0.92	106, 107	247063	33822937863

Hedge-bank, modern fenceline

Earth core hedgebank with stone revetment, modern wire fence, trees and bushes. Straight boundary to straight track leading from farmyard to river. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
03/26	+	1.33	0.57	94, 98	247267	33822937864

Hedge-bank, modern fenceline

Earth core hedgebank stone revetment, and modern fence. Straight boundary to straight track. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
03/27	+	1.55	1.47	96, 97	247371	33821737865

Hedge-bank

Earth core hedgebank with stone revetment and a modern fenceline running alongside. Straight boundary to regular field. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
03/28	+	2.22	0.66	94, 95	247642	33819937866

Hedge-bank, modern fenceline

Earth core hedgebank with stone revetment and modern fenceline on top. Curving boundary. Boundary shown on tithe map. Possibly originally part of a medieval field system?

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
03/29	+	1.5	0.45	568, 569	247725	33819437867

Hedge-bank

Cobble sized stone core bank covered in turf. Modern hedgeline on top and some mature trees. Straight boundary. Boundary shown on tithe map. Possibly originally part of a medieval field system?

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
03/30	+	2.4	1.3	564, 565	247828	33819137868

Hedge-bank

Earth core hedgebank with occasional cobble sized stone within it. Cobble revetment, covered in turf with gorse hedge and some mature trees and a modern fenceline on top. Part of curving boundary. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
04/01	+	1.76	0.76	128, 129	247976	33826237869

Drystone wall

Dry stone wall consists of large boulders with mature trees and shrubs growing on top. Straight section of originally curving boundary. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
04/02	+	2.55	0.97	130, 131	248080	33831837870

Hedge-bank, modern fenceline

Wide earth core hedgebank with stone revetment. Shrubs and mature trees on top. Straight boundary but part of group of narrow fields, possibly enclosed strips. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
04/03	+	1.8	0.62	165, 166	248140	33835037871

Hedge-bank, modern fenceline

Earth core hedgebank with some stones within it. Modern fenceline runs along top, some mature trees and shrubs. Straight boundary but part of group of narrow

fields, possibly enclosed strips. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
04/04	+	2	0.8	147, 148	248225	33840237872

Hedge-bank

Earth core hedgebank with some stones within it. Cobbled revetment on both sides with hawthorn hedge, gorse, some mature oaks and a modern fence set into top. Straight boundary but part of group of narrow fields, possibly enclosed strips. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
04/05	+	1.8	1	149, 150	248338	33848737873

Hedge-bank

Earth core, stone revetted, hawthorn hedge and modern fence on top. Straight boundary part of regular group of fields. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
04/06	+	1.9	1	151, 152	248450	33857037874

Hedge-bank

Earth core with occassional stones in fill, stone revetted, gorse hedge and some mature trees. Straight boundary part of regular group of fields. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
05/07	+	1.2	0.53	169,	249549	33907237875

Drystone wall

Drystone wall with shrubs and occasional mature trees. Straight boundary part of regular group of fields. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/01	+	1.9	0.6	726, 727	249664	33901237876

Hedge-bank

Earth core with some large boulders on outside. Regular boundary. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/02	+	1.8	0.4	724, 725	249715	33900837877

Hedge-bank

Earth core with numerous sub-angular stones 250mm-400mm. Mature trees in bank. Part of curving boundary to narrow field. Possible enclosed strips. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/03	+	1.5	0.9	722, 723	249782	33900037878

Hedge-bank

Earth core with numerous sub-angular stones 250mm-400mm. Mature trees in bank. Part of rather curving boundary to narrow field. Possible enclosed strips.

Boundary shown on tithe map. Possibly originally part of a medieval field system?

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/04	+	0.7	0.2	728, 729	249900	33891837879

Hedge-bank, modern fenceline

Earth core, shallow bank with modern fenceline on top. Straight boundary to regular field. Boundary shown on tithe map. Possibly originally part of a medieval field system?

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/05	+	1.7	0.9	730, 731	250124	33891237880

Hedge-bank

Large boulders and earth with mature trees on top. Straight boundary to regular field. Boundary shown on tithe map. Possibly originally part of a medieval field system?

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/06	+	0.9	1.1	732, 733	250342	33890837881

Hedge-bank

Stone revetted, earth core hedgebank with gorse hedge and mature trees. Boundary to straight, regular road. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/09	+	2	0.6	184	250520	33891537882

Hedge-bank, modern fenceline

Earth core hedgebank with modern fenceline on top. Parliamentary boundary

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/11	+	1.1	0.75	741, 742	250718	33902037883

Hedge-bank

Earth core with drystone wall on either side. Curving boundary to slightly irregular field

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/17	+	1.4	0.75	752, 753	251380	33953037884

Hedge-bank

Earth core with some stone inclusions, revetted on + side only. Regular boundary part of group of regular fields. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/18	+	1.75	0.95	754, 755	251473	33962137885

Hedge-bank

Stone core hedgebank with gorse hedge. Regular boundary part of group of regular fields. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/19	+	0	0	236, 237	251525	33968937886

Drystone wall

Wall built from large boulders. Regular boundary part of group of regular fields. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/20	+	5.5	0	798, 799	251636	33976337887

Hedge-bank

A clawdd hedgebank with mature hawthorn trees along the top. Regular boundary part of group of regular fields. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/21	+	1.6	0.9	238, 239	251739	33978837888

Hedge-bank

Hedgebank with gorse on top and stone revetment on negative side. Regular boundary part of group of regular fields. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/22	+	1.4	1.1	800, 801	251822	33980637889

Hedge-bank

A wide, low earth and stone bank. Regular boundary part of group of regular fields. Boundary shown on tithe map. Possibly originally part of a medieval field system?

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/23	+	1.35	0.65	240, 241	251895	33980837890

Drystone wall

Freestanding drystone wall. Regular boundary but part of group of fairly narrow fields running along the contours. Boundary shown on tithe map. Possibly originally part of a medieval field system?

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/24	+	1	0.85	225, 226	252006	33979237891

Drystone wall

Freestanding drystone wall. Regular boundary but part of group of fairly narrow fields running along the contours. Boundary shown on tithe map. Possibly originally part of a medieval field system?

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/25	+	1.3	0.25	223, 224	252078	33981637892

Hedge-bank

Low bank with earth core, mature trees. Irregular boundary but due to bordering a stream, however the original E boundary of this field was also irregular. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/27	+	1.35	0.65	221, 222	252170	33985437893

Drystone wall

Freestanding drystone wall. Wall entirely rebuilt between 1915 and 1970s. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/28	+	1.25	0.55	219, 220	252268	33989737894

Drystone wall

Drystone wall. Boundary to road, possibly early. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/29	+	1.3	0.6	242, 243	252316	33994237895

Hedge-bank

Shallow earthbank revetted on W side. Part of curving boundary. Suggestions of enclosed strips in this area. Boundary shown on tithe map. Possibly originally part of a medieval field system?

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/30	+	0.7	1	802, 803	252398	34001237896

Drystone wall

Drystone wall. Part of curving boundary. Suggestions of enclosed strips in this area. Boundary shown on tithe map. Possibly originally part of a medieval field system?

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/31	+	0.7	2	244, 245	252484	34005037897

Drystone wall

Drystone wall. Part of rather curving boundary enclosing irregularly shaped large field. Boundary seems to have been straightened in 20th century. Boundary shown on tithe map. Possibly originally part of a medieval field system?

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/34	+	0	1	804, 805	252710	34010937898

Modern fence

Modern fenceline. No boundary prior to late 20th century

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/37		4	0	246, 247	252902	34003937899

Modern track

Fenced track recorded instead of 6/36+ boundary.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN

06/39	+	1.5	0.5	806, 807	253050	34001537900

Hedge-bank

Degraded clawdd with mature oaks and holly trees. Rather irregular boundary, although the field is quite large. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/40	+	1.5	0.5	808, 809	253165	33999637901

Hedge-bank

Hedgebank with earth core and stone revetment, with mature oaks. Rather irregular boundary, although the field is quite large. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/41	+	1.1	0.65	248-250	253235	34006137902

Drystone wall

Freestanding drystone wall. Rather irregular boundary, although the field is quite large. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/44	+	0.9	0.5	810, 811	253630	34003037903

Hedge-bank

Earth core bank with stone revetment, turf covered in places. Very straight boundary. Part of a very regular field system. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/45	+	2.4	0.7	251, 252	253723	34008437904

Hedge-bank

Earth bank with modern fenceline and occassional mature trees. Slightly irregular boundary but only because it borders a stream. Part of a very regular field system. Ynyscynhaiarn-Penmorfa parish boundary

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/49	-	0.6	1.5	825-827	253993	34020934119

Drystone wall

Drystone wall. Regular field next to road probably related to Bryn Wern. Boundary within Wern Historic Park and Garden

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/49	+	0.5	1.4	828, 829	254047	34020537905

Drystone wall

Drystone wall. Regular field probably related to Bryn Wern. Boundary within Wern Historic Park and Garden

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/50	+	0.5	0.95	830, 831	254291	34011637906

Drystone wall

Drystone wall. Boundary to paddocks related to Bryn Wern. Boundary within Wern Historic Park and Garden

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/51	+	3	0.2	832, 833	254484	34006437907

Hedge-bank

Tree lined bank. Regular field on Traeth Mawr. Boundary within Wern Historic Park and Garden

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/52	+	0	0	847, 848	254793	33983137908

Hedge and ditch

Hedge and ditch. Regular field on Traeth Mawr. Penmorfa-Ynyscynhaiarn parish boundary

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/53	+	0	0	850, 851	255011	33976337909

Hedge and ditch

Hedge and ditch. Regular field on Traeth Mawr. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
06/54	+	0	0	852	255386	33962937910

Hedge-bank

Bank and treeline. Regular field on Traeth Mawr. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
09/05	+	0.7	0.75	916-918	260423	33879037911

Drystone wall

Freestanding drystone wall in poor condition. Slightly irregular boundary running of a very irregular boundary. Rough pasture, furze and marsh in this area in late 19th century. Possible early enclosure of moorland. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
13/03	+	0.6	1	871-873	262784	33999937912

Drystone wall

Drystone wall on natural outcrop of rock. Rather irregular boundary amongst smaller irregular fields surrounding Hafod-talog on an island above the flood plain. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
13/06	+	1.4	0.25	1000, 1001	263011	34004537913

Hedge-bank

Earth core with some stone within fill. Young and mature trees on top of bank. Boundary to track or path with more irregular fields to the west. May be earlier than other regular boundaries to the east. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN

13/08	+	0.65	0.95	1002-1004	263112	33997237914

Drystone wall

Drystone wall with modern fenceline on top. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
13/12	+	1.55	0.25	1005, 1006	263311	33991337915

Hedge-bank

Shallow bank with mature trees on top, ditch to negative side, track on positive side. Part of regular field system with straight boundaries on flood plain

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
13/24	+	1.02	0.23	474	264710	33989537916

Hedge-bank

Bank with ditch to positive side. Part of regular field system with straight boundaries on flood plain. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
13/35	+	2.7	0.46	955, 956	266210	34079837917

Hedge-bank

Shallow bank with built up ground over it, flimsy hedge and some trees were removed. Part of regular field system with straight boundaries on flood plain. Boundary within Plas-Tan-y-Bwlch Historic Park and Garden

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
13/36	+	2.9	0.6	953, 954	266285	34084537918

Hedge-bank

Earth core, some stones within this. Hedge and trees were removed. Part of regular field system with straight boundaries on flood plain. Boundary within Plas-Tan-y-Bwlch Historic Park and Garden

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
15/01	+	0.6	1.5	1707-1710	269030	34209737919

Drystone wall

Drystone wall. Boundary to woodland, part of regular field system with straight boundaries. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
15/06	+	0.7	1.4	1703-1706	269251	34215737920

Drystone wall

Drystone wall, modern wire fenceline to positive side of wall. Part of regular field system with straight boundaries. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
15/09	+	1.05	0.35	1646-1649	269337	34225037921

Hedge-bank

Shallow bank, earth core with infrequent small stones. Curving boundary part of possible enclosed strip field system. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
15/17	+	0.5	1.6	1636-1638	269946	34266437922

Drystone wall

Drystone wall, part of regular field system with straight boundaries. Boundary shown on tithe map.

Plot	Boundary (+ or -)	Width (m)	Height	Photos	Eastings	Northings PRN
16/07	+	0.6	1.45	1221-1223	270279	34362737923

Drystone wall

Drystone wall, boundary of winding road. Boundary shown on tithe map.

18. APPENDIX III: SUMMARY OF DEPOSIT RECORDS

Plot and section	Grid reference	Total trench depth (m)	Photos
00/08	SH 39047 36352	1.5	1016-1019

Depth from surface (m)	Description
0	Light grey clay
0.5	Thin layer of black peat
0.7	Brown peat containing occasional pieces of wood, some branches 0.1m in diameter.

Plot and section	Grid reference	Total trench depth (m)	Photos
03/08a	SH 43857 374300	1.39	2587-2588

Depth from surface (m)	Description
0	A light grey-brown sandy silt, friable and containing frequent rounded pebbles and stones.
0.34	A light blue-grey sandy silt. Friable, containing frequent sub-angular and sub-rounded stones.
0.79	A light brown-grey mottled pea grit containing abundant small and medium rounded stones.

Plot and section	Grid reference	Total trench depth (m)	Photos
06/51	SH 54390 40070	2	2134-2137

Depth from surface (m)	Description
0	Blue grey clay, mottled with brown. Shells observed in clay at depth of 1.8-2.0m

Plot and section	Grid reference	Total trench depth (m)	Photos
06/52	SH 54650 39990	1.7	2099-2112

Depth from surface (m)	Description
0	Topsoil
0.5	Grey clay and sand

Plot and section	Grid reference	Total trench depth (m)	Photos
06/53	SH 54900 39800	2.4	2126-9

Depth from surface (m)	Description
0	Mid brown clayey sand
-	Grey sandy clay, no stones
-	Dark grey clayey sand, no stones

Plot and section	Grid reference	Total trench depth (m)	Photos
06/54	SH 55230 39690	2.23	2142-2149,

Depth from surface (m)	Description
0	Grey-brown sandy clay

Plot and section	Grid reference	Total trench depth (m)	Photos
07/01	SH 55460 39600	1.7	2179-2184

Depth from surface (m)	Description
0	W end of trench shale only shale visible, E end of trench light orange brown silty clay mixed with pale greyish brown with grit, gravel and small stones

Plot and section	Grid reference	Total trench depth (m)	Photos
07/02	SH 55640 39540	1.7	2177-8, 2185-

Depth from surface (m)	Description
0	Blackish brown silty clay topsoil
0.1	Mottled orange brown clay
0.5	Grey clay with deposit of marine shells at 1.0m

Plot and section	Grid reference	Total trench depth (m)	Photos
07/03	SH 55800 39460	3	2187-2190

Depth from surface (m)	Description
0	Blackish brown silty clay topsoil
0.1	Mottled orange brown clay
0.5	Grey clay with deposits of marine shells in lower part of the trench

Plot and section	Grid reference	Total trench depth (m)	Photos
07/04	SH 55930 39390	1.6	1786-7

Depth from surface (m)	Description
0	Light orange-yellow silty sand
0.5	Mid grey slightly clayey silty sand, fairly firm and plastic

Plot and section	Grid reference	Total trench depth (m)	Photos
07/07	SH 5770 39040	1.6	1788-9

Depth from surface (m)	Description
0	Light yellow-grey sand containing lenses of grey sand towards the base of the trench and lenses of light orange sand towards the top.

Plot and section	Grid reference	Total trench depth (m)	Photos
07/08	SH 58030 39020	1.7	1777-1781

Depth from surface (m)	Description
0	Light yellow-grey sand varying in depth from 0.10m to 0.25m. Contains marine shells
0.25	Orange sand with light yellow-grey mottles, containing marine shells. Varies in depth from 0.2m to 0.4m
0.6	Light-mid grey sand. Contains no inclusions except marine shells.

Plot and section	Grid reference	Total trench depth (m)	Photos
07/09	SH 58780 38990	2	2191-2196

Depth from surface (m)	Description
0	Orange sand with mottles of light grey

Plot and section	Grid reference	Total trench depth (m)	Photos
07/10	SH 58530 38980	1.6	2197-9, 1783-

Depth from surface (m)	Description
0	Light yellow-grey sand. No inclusions except marine shells.

Plot and section	Grid reference	Total trench depth (m)	Photos
07/11	SH 58990 38700	1.9	1796-8

Depth from surface (m)	Description
0	Light yellow sand with streaks of dark organic matter
0.2	Irregular layer varying from 0.2m to 1.6m deep. Dark and light grey sand with black streaks
0.4	Light brown-grey sand with black organic streaks

Plot and section	Grid reference	Total trench depth (m)	Photos
07/12	SH 59260 38730	2	1793-5

Depth from surface (m)	Description
0	Light grey sand with bluish patches
0.2	Light yellow sand with grey patches. Varies in depth between 0.3-0.5m . Uneven and mixed with layer below.
0.6	Light blue-grey sand with dark steaks. Strongly laminated with bands of dark to light grey. Irregular patches of light grey sand in the top of the layer may represent in filled channels.

Plot and section	Grid reference	Total trench depth (m)	Photos
07/13	SH 59470 38790	1.9	1799, 2700

Depth from surface (m)	Description
0	Very mixed and patchy deposits, rather than clear layers. Light yellow to grey sand with mottles of varying colours and dark streaks.

Plot and section	Grid reference	Total trench depth (m)	Photos
08/1.1a	SH 59861 38965	1.8	2561

Depth from surface (m)	Description
0	Light grey-brown loam
0.59	Light grey clay
0.84	Shale/slate bedrock. On surface at positive end of field.

Plot and section	Grid reference	Total trench depth (m)	Photos
08/1.1b	SH 59852 38962	2.3	2562

Depth from surface (m)	Description
0	Light brown boggy soil
0.8	Light grey clay with stones
2.3	Light yellow clay with stones

Plot and section	Grid reference	Total trench depth (m)	Photos
08/1.1c	SH 59837 38958		2563-2564

Depth from surface (m)	Description
0	Light brown boggy layer
-	light grey stony layer
-	Light cream (grey) changing to light orange
-	Light grey with small stones and patches of light yellow orange deposit

Plot and section	Grid reference	Total trench depth (m)	Photos
08/1.1d	SH 59818 38953	1.5	2566-2568

Depth from surface (m)	Description
0	Light cream yellow silt clay
0.1	Peat layer
1.3	Grey clay
0.9	light brown clay

Plot and section	Grid reference	Total trench depth (m)	Photos
08/1.1e	SH 59770 38941	1.6	2567

Depth from surface (m)	Description
0	Light grey brown clay
0.2	Light grey brown clay with orange mottling
1	light grey clay with a thick lens of light yellow grey sand
1.3	Light yellow grey sand

Plot and section	Grid reference	Total trench depth (m)	Photos
08/1.1f	SH 59724 38922	1.9	2570

Depth from surface (m)	Description
0	Light grey cream silt clay with light orange mottling
0.8	Light grey clay sand
1.2	Mid grey peaty organic layer with some vegetation visible
1.5	A light blue grey friable sand

Plot and section	Grid reference	Total trench depth (m)	Photos
08/1g	SH 59681 38896	2.5	2571-2572

Depth from surface (m)	Description
0	Light grey brown mottled sand
0.75	Light grey green sand
1.05	Mid brown to very dark brown peat with some visible vegetation.
1.2	Light blue grey clay.
1.4	Light yellow sand with dark grey flecks and lenses

Plot and section	Grid reference	Total trench depth (m)	Photos
09/4	SH 60250 38830	2	2589-2591

Depth from surface (m)	Description
0	Light grey brown silt with angular stone inclusions
0.9	Natural slate/mudstone bedrock

Plot and section	Grid reference	Total trench depth (m)	Photos
10/2	SH 60810 38890	1.6	2546-2547

Depth from surface (m)	Description
0	Light to mid brown firm grey sand silt with fragmented shaley stone
0.6	Bedrock made up of shaley sedimentary rock.

Plot and section	Grid reference	Total trench depth (m)	Photos
10/5	SH 60980 39060	1.8	2548-2551

Depth from surface (m)	Description

0	Dark grey silt with modern rubbish mixed in (plastic wood paper)
-	Dark organic peat with a large amount of root material and wood as well as modern material (glass ceramics plastic)

Plot and section	Grid reference	Total trench depth (m)	Photos
11/3c	SH 61191 39188	2	2879.2880,28

Depth from surface (m)	Description
0	Dark peat with local stone inclusions and bog wood. Wood recovered looked to have been sawn, chopped and some split.

Plot and section	Grid reference	Total trench depth (m)	Photos
11/3d	SH 61150 39160	2	2886-2889

Depth from surface (m)	Description
0	Dump of modern material (rising to 1m thick creating a mound)
0.3	Light grey to dark brown organic material
0.65	Dark black peat with an abundant of organic material
1.35	Mid grey green peat with abundant organic material
2	Light green clay

Plot and section	Grid reference	Total trench depth (m)	Photos
11/4a	SH 61234 39232	4	2599-26001

Depth from surface (m)	Description
0	Homogenous peat with lots of organic material such as branches.

Plot and section	Grid reference	Total trench depth (m)	Photos
11/4b	SH 61225 39230	1.54	2875-2875

Depth from surface (m)	Description
0	Dark brown clay peat (topsoil)
0.08	Peat containing large amounts of vegetation and wood remnants.

Plot and section	Grid reference	Total trench depth (m)	Photos
11/4c	SH 61238 39230	6.1	2592-2597

Depth from surface (m)	Description
0	Earth and rubble bank sitting on an area of built up land of the same material. The rubble was a mix of medium to large stones
3.5	Peat layer with lots of organic material including branches, roots and the occasional tree trunk
4.3	Light grey blue river clay (water flooded the bottom of the trench)

Plot and section	Grid reference	Total trench depth (m)	Photos
13/07	SH 63043 40029	3	2526, 2528-

Depth from surface (m)	Description
0	Light brown friable sand silt with many small angular stones
0.3	Dark brown silt with organic material. A narrow pale yellow band was noted within this deposit which measured 0.1m thick and 2m wide.
1.3	Light grey clay

Plot and section	Grid reference	Total trench depth (m)	Photos
13/08	SH 6306 40017	3	2530-2535

Depth from surface (m)	Description
0	Light brown sand silt
0.25	Dark brown silt peat with organic material throughout.
1.15	Light grey brown silt clay
1.45	Light grey clay

Plot and section	Grid reference	Total trench depth (m)	Photos
13/10	SH 63160 39930	1.8	1790-2

Depth from surface (m)	Description
0	Mid grey-brown sandy silt topsoil
0.25	Yellow-grey sandy and silty clay with moderate amounts of stone.
-	Shaly bedrock very close to surface in eastern part of trench.

Plot and section	Grid reference	Total trench depth (m)	Photos
13/12	SH 63270 39910	1.92	2209-2212

Depth from surface (m)	Description
0	Mainly light grey waterlogged clay. At the western end of the trench this meets the rock of a partially buried rocky spur and becomes more gravelly near the rock.

Plot and section	Grid reference	Total trench depth (m)	Photos
13/13	SH 63350 39910	1.8	2205-2208

Depth from surface (m)	Description
0	Grey waterlogged clay with no inclusions

Plot and section	Grid reference	Total trench depth (m)	Photos
13/14	SH 63440 39915	2	1730-1, 1734-

Depth from surface (m)	Description
0	Mid brown silty clay
0.3	Light grey-brown plastic clay
0.6	Light grey silty sand

Plot and section	Grid reference	Total trench depth (m)	Photos
13/15	SH 63580 39920	1.6	1721-2, 1732-

Depth from surface (m)	Description
0	light yellow-brown silty sand
0.3	Yellow-grey clay, slightly plastic with orange flecks
0.85	Mid grey silty clay

Plot and section	Grid reference	Total trench depth (m)	Photos
13/16	SH 63710 39920	1.5	1748-9, 1759-

Depth from surface (m)	Description
0	Mid grey-brown sandy silt with root activity
0.3	Light yellow-brown plastic silty clay

0.6	Light grey silty sand

Plot and section	Grid reference	Total trench depth (m)	Photos
13/17	SH 63820 39925	1.7	1764-5, 1773-

Depth from surface (m)	Description
0	Light grey-brown sandy clayey silt
0.3	Light grey silty sand

Plot and section	Grid reference	Total trench depth (m)	Photos
13/18	SH 63930 39930	2.1	1745

Depth from surface (m)	Description
0	Light brown-grey silty clayey sand
0.5	Light grey plastic clay

Plot and section	Grid reference	Total trench depth (m)	Photos
13/19	SH 64050 39930	2.1	1719-20

Depth from surface (m)	Description
0	Dark brownish grey silty clayey sand
0.5	Mid grey plastic clay

Plot and section	Grid reference	Total trench depth (m)	Photos
13/23	SH 64570 39895	2	1718

Depth from surface (m)	Description
0	Light orange-yellow sandy clay
0.8	Mid grey sandy clay

Plot and section	Grid reference	Total trench depth (m)	Photos
13/24	SH 64670 39890	1.8	1743-4, 1750-

Depth from surface (m)	Description
0	Light orange-greyish yellow sandy clay
0.7	Mid grey sandy clay

Plot and section	Grid reference	Total trench depth (m)	Photos
13/25	SH 64800 39900	2	1715-7

Depth from surface (m)	Description
0	Light brown silty sand, loosely compacted
1.5	Light grey sandy silt, loosely compacted

Plot and section	Grid reference	Total trench depth (m)	Photos
13/27a	SH 65068 40076	1.5	2707

Depth from surface (m)	Description
0	Mid orange grey sand-silt-clay
0.6	Light grey silt clay with occasional orange flecks

Plot and	Total trench

Plot and section	Grid reference	Total trench depth (m)	Photos
13/27b	SH 65110 40104	1.5	2708

Depth from surface (m)	Description
0	Mid orange brown sand-silt-clay
0.7	Light grey silt clay

Plot and section	Grid reference	Total trench depth (m)	Photos
13/27c	SH 65152 40132	1.5	2709

Depth from surface (m)	Description
0	Dark brown grey sand silt with some clay content. Softly compacted with frequent root material
0.45	Mid grey silt-clay-sand

Plot and section	Grid reference	Total trench depth (m)	Photos
13/27d	SH 65193 40159		2710

Depth from surface (m)	Description
0	Dark brown grey sand silt and root material. A plastic field drain cut through this deposit.
-	Mid grey silt clay with some organic material

Plot and section	Grid reference	Total trench depth (m)	Photos
13/27e	SH 65235 40187	1.5	2716

Depth from surface (m)	Description
0	Dark brown soft grey sand silt with frequent root material from reeds on the surface. A ceramic field drain cut through this deposit.
0.4	Mid grey sand silt clay with some organic material

Plot and section	Grid reference	Total trench depth (m)	Photos
13/28f	SH 65321 40233	1.7	2744-2746

Depth from surface (m)	Description
0	Light grey brown silt clay with plastic and ceramic field drains cutting through.
0.45	Mottled light grey clay

Plot and section	Grid reference	Total trench depth (m)	Photos
13/29a	SH 65538 40304	1.6	2728

Depth from surface (m)	Description
0	Light brown softly compacted grey silt sand with occasional roots.
0.7	Light grey with horizontal dark flecks with a slight orange tinge.

Plot and section	Grid reference	Total trench depth (m)	Photos
13/29b	SH 65490 40289	1.6	2729

Depth from surface (m)	Description
0	Topsoil
0.4	Brown grey softly compacted sand silt with occasional roots
0.8	Light grey silt sand with frequent dark flecks.

Plot and section	Grid reference	Total trench depth (m)	Photos
13/29c	SH 65442 40273	1.3	2730

Depth from surface (m)	Description
0	Light brown grey softly compacted silt sand with some dark horizontal banding
0.6	Light grey silt sand with occasional dark horizontal banding and orange flecks

Plot and section	Grid reference	Total trench depth (m)	Photos
13/29d	SH 65395 40258	1.3	2731

Depth from surface (m)	Description
0	Light grey slight clay silt sand with some horizontal banding
0.5	Light grey slightly clay silt sand with dark horizontal banding, very narrow dark lines

Plot and section	Grid reference	Total trench depth (m)	Photos
13/30	SH 65705 40363	1.5	2723

Depth from surface (m)	Description
0	Light grey brown silt sand with possible charcoal flecks
0.1	Mid grey brown silt sand
0.5	Dark brown with some areas containing lenses of light brown material
0.7	Light brown grey sand silt with brown and black streaks.

Plot and section	Grid reference	Total trench depth (m)	Photos
13/30a	SH 65785 40423	1.6	2720

Depth from surface (m)	Description
0	Mid brown grey silt sand with small amount of root material
1	Mid orange grey silt sand.

Plot and section	Grid reference	Total trench depth (m)	Photos
13/30b	SH 65748 40389	1.5	2721-2722

Depth from surface (m)	Description
0	Mid brown grey soft sand silt with orange flecks and some root material
0.3	Light orange grey clay-silt-sand
0.8	Light orange grey silt sand
1.05	Dark brown with possible charcoal inclusions
1.45	Light brown grey silt sand with brown and black inflections

Plot and section	Grid reference	Total trench depth (m)	Photos
13/30d	SH 65660 40342	1.5	2724, 2726-

Depth from surface (m)	Description
0	Mid brown grey softly compacted silt sand with occasional roots
0.35	Mid orange grey clay-silt-sand
0.9	Light grey clay-silt-sand with frequent dark flecks.
1.1	Mid brown grey silt sand

Plot and section	Grid reference	Total trench depth (m)	Photos
13/30e	SH 65612 40327	1.5	2725

Depth from surface (m)	Description
0	Mid brown-orange-grey softly compacted silt sand. A plastic field drain cut through this deposit.
0.7	Light grey clay-silt-sand with frequent black flecks

Plot and section	Grid reference	Total trench depth (m)	Photos
13/35a	SH 66050 40702	1.75	2574

Depth from surface (m)	Description
0	Mottled dark grey clay silt with very dark bands of peat material. Diffuse with the layer below.
0.75	Light grey brown clay. Diffuse with the deposit above.
1.55	Light blue grey clay

Plot and section	Grid reference	Total trench depth (m)	Photos
13/35b	SH 66092 40729	1.85	2575

Depth from surface (m)	Description
0	Light brown to mid grey peat with abundant organic material in the form of roots and branches
0.7	Light grey brown clay
1.5	Light blue grey clay

Plot and section	Grid reference	Total trench depth (m)	Photos
13/35c	SH 66135 40755	1.55	2576

Depth from surface (m)	Description
0	Dark brown grey clay
0.25	Light brown clay
0.35	Light blue grey clay

Plot and section	Grid reference	Total trench depth (m)	Photos
13/35d	SH 66178 40781	1.65	2577

Depth from surface (m)	Description
0	Light grey clay and loose stones, packing for a ceramic drainage pipe.
0.55	Mid to dark brown peat, truncated by drain.
0.75	Light brown grey clay

Plot and section	Grid reference	Total trench depth (m)	Photos
13/36e	SH 66229 40811	2.5	2580

Depth from surface (m)	Description
0	Light grey brown clay with mid to dark clay bands throughout
1	Light grey clay
1.3	Light blue grey clay

Plot and section	Grid reference	Total trench depth (m)	Photos
13/36f	SH 66272 40837		2581

Depth from surface (m)	Description
0	Light grey yellow clay
0.3	Light brown clay
0.7	Alternating bands of light grey silts with dark grey streaks and light grey brown clay. Light grey blue clay

Plot and section	Grid reference	Total trench depth (m)	Photos
13/37g	SH 66319 40864	1.75	2585

Depth from surface (m)	Description

0	Light cream yellow silt clay
0.15	Light grey clay
0.35	Light grey brown silt clay
0.55	Dark brown grey peat with some organic material
0.95	Light grey brown clay

Plot and section	Grid reference	Total trench depth (m)	Photos
13/6	SH 62990 40040	2.7	2701-2704,

Depth from surface (m)	Description
0	Boggy area restricted to base of hill in eastern end of plot. Homogenous black organic silt with abundant roots and branches of at least 2 species of trees, one probably birch. Large and small pieces of wood present throughout.
2.5	Grey and light brown plastic clay

Plot and section	Grid reference	Total trench depth (m)	Photos
14/01h	SH 66436 40942	1.4	2853-2854

Depth from surface (m)	Description
0	Firm mid brown grey silt clay
0.4	Firm light yellow brown silt clay
0.5	Firm mid grey silt clay

Plot and section	Grid reference	Total trench depth (m)	Photos
14/02g	SH 66475 40970	1.8	2847-2848

Depth from surface (m)	Description
0	Firm light grey brown silt clay with moderate to small sub-rounded stones
0.4	Firm light yellow brown silt clay

Plot and section	Grid reference	Total trench depth (m)	Photos
14/04a	SH 66722 41140	1.45	2824-2825

Depth from surface (m)	Description
0	Light grey brown silt clay with occasional small sub rounded stones
0.3	Mid grey brown clay silt

Plot and section	Grid reference	Total trench depth (m)	Photos
14/04b	SH 66681 41112	1.4	2826-2827

Depth from surface (m)	Description
0	Mid grey brown silt clay
0.6	Light brown grey silt clay

Plot and section	Grid reference	Total trench depth (m)	Photos
14/04c	SH 66639 41084		2829-2830

Depth from surface (m)	Description
0	Friable light grey brown silt clay
-	Firm mid brown silt clay
-	Firm light yellow brown silt clay
-	Firm mid grey silt clay

Plot and	Total trench

section	Grid reference	depth (m)	Photos
14/04d	SH 66597 41056	1.4	2831-2832

Depth from surface (m)	Description
0	Firm light grey silt clay
0.45	Firm dark grey silt clay
0.75	Loose fine alluvial gravels

Plot and section	Grid reference	Total trench depth (m)	Photos
14/04e	SH 66555 41029	1.4	2833-2834

Depth from surface (m)	Description
0	Firm light grey brown silt clay
0.24	Firm light brown grey silt clay
0.54	Loose fine alluvial gravels

Plot and section	Grid reference	Total trench depth (m)	Photos
14/07a	SH 66900 41220	0.77	2747-2748,

Depth from surface (m)	Description
0	Friable mid brown silt clay
0.1	Friable mid orange brown silt clay
0.49	Firm mid grey brown silt clay
0.77	Firm light grey silt clay

Plot and section	Grid reference	Total trench depth (m)	Photos
14/07b	SH 66950 41227	1.4	2750-2751

Depth from surface (m)	Description
0	Friable mid brown silt clay - topsoil
0.1	Friable mid orange brow silt clay.
0.7	Firm mid grey brown silt clay. There was a lens of manganese at the bottom of this layer.
0.95	Firm light grey silt clay. This layer produced the cattle bone remains which were at a depth of 1.4m (see 14/7c.2)

Plot and section	Grid reference	Total trench depth (m)	Photos
14/07c	SH 66999 41234	1.6	2752-2753

Depth from surface (m)	Description
0	Topsoil. Friable mid brown silt clay
0.1	Firm orange brown silt clay
0.37	Firm light brown silt clay
0.57	Firm mid grey silt clay
	Firm dark grey silt clay

Plot and section	Grid reference	Total trench depth (m)	Photos
14/07c.2	SH 67004 41235	1.5	2756-2758

Depth from surface (m)	Description
0	Firm light grey brown silt clay
-	Firm mid orange brown silt clay
-	Grey silt clay. The remains of a cow skull with horns was recovered from this deposit at a depth of 1.4m

Plot and section	Grid reference	Total trench depth (m)	Photos

Plot and section	Grid reference	Total trench depth (m)	Photos
14/08d	SH 67048 41241	1.6	2754-2755

Depth from surface (m)	Description
0	Friable mid grey clay silt
0.6	Mid yellow silt clay with lenses of orange, possibly iron pan.
1.2	Firm mid grey silt clay

Plot and section	Grid reference	Total trench depth (m)	Photos
14/08e	SH 67098 41249	1.6	2761-2762

Depth from surface (m)	Description
0	Light grey brown silt clay
0.34	Firm mid orange brown silt clay
0.77	Alluvial river gravels

Plot and section	Grid reference	Total trench depth (m)	Photos
14/08f	SH 67147 41259	1.62	2763-2764

Depth from surface (m)	Description
0	Firm mid grey brown silt clay
0.42	Firm mid orange brown silt clay
0.5	Alluvial river gravels

Plot and section	Grid reference	Total trench depth (m)	Photos
14/09	SH 67199 41269	1.6	2769-2770

Depth from surface (m)	Description
0	Friable dark brown silt clay
0.1	Firm mid brown silt clay with occasional small sub rounded stone inclusions
0.4	Alluvial river gravels

Plot and section	Grid reference	Total trench depth (m)	Photos
14/09h	SH67249 41274	1.6	2767-2768

Depth from surface (m)	Description
0	Friable mid brown silt clay
0.1	Firm light brown silt clay
0.45	Alluvial river gravels

Plot and section	Grid reference	Total trench depth (m)	Photos
14/10i	SH 67295 41279	1.8	2775-2776

Depth from surface (m)	Description
0	Firm mid brown silt clay with small sun rounded stone inclusions
0.56	Alluvial gravels

Plot and section	Grid reference	Total trench depth (m)	Photos
14/10j	SH 67344 41275	1.7	2771-2772,

Depth from surface (m)	Description
0	Alluvial gravels consisting of very small sub rounded stones. A piece of worked wood was recovered at 0.6m below this gravel level in a mid blue grey silt clay.

Plot and	Total trench

section	Grid reference	depth (m)	Photos
14/11k	SH 67393 41286	1.7	2777-2778,

Depth from surface (m)	Description
0	Alluvial gravels consisting of very small sub rounded stones. Piece of preserved timber was recovered at 1.9m below this gravel level in a light yellow grey silt clay.

Plot and section	Grid reference	Total trench depth (m)	Photos
14/12f	SH 66515 41000	1.4	2837-2838

Depth from surface (m)	Description
0	Firm mid brown silt clay
0.3	Firm light grey yellow silt clay
0.7	Firm mid grey silt clay

Plot and section	Grid reference	Total trench depth (m)	Photos
14/12g	SH 67630 41340	1.8	2258-2259

Depth from surface (m)	Description
0	Grey brown clay silt organic material heavily disturbed by tree roots with the occasional sub angular stone inclusion.
1	Grey loose gravels with the occasional medium rounded stones
1.1	Grey silt with abundant orange stained small to large rounded stones
1.25	Narrow band of manganese with small rounded gravels and small stones. Underneath this was a narrow band of iron panning
1.3	Band of iron pan
1.35	Light grey clay

Plot and section	Grid reference	Total trench depth (m)	Photos
14/12h	SH 67580 41333	1.7	2260-2261

Depth from surface (m)	Description
0	Grey brown clay silt with frequent small to medium rounded and flat stones
1	Compact rounded stones of varying sizes within a gravel and silt matrix

Plot and section	Grid reference	Total trench depth (m)	Photos
14/13a	SH 67848 41384	1.91	2239-2240

Depth from surface (m)	Description
0	Mid brown silt clay with regular small/very small flat stone inclusions, gravels were also present
-	Mid brown silt clay with frequent large to small rounded boulders and a mix of flat to rounded gravels

Plot and section	Grid reference	Total trench depth (m)	Photos
14/13b	SH 67800 41373	1.7	2241-2242

Depth from surface (m)	Description
0	Mid brown silt clay with rare rounded, sub rounded and fine grained stones.
1.2	Light grey green gravel silt with frequent small to medium rounded and sub angular stones

Plot and section	Grid reference	Total trench depth (m)	Photos
14/13c	SH 67751 41362	1.85	2244-2245

Depth from

Depth from surface (m)	Description
0	Brown silt clay fine grained
1.55	Rounded and sub angular small to medium stones within a grey clay matrix. Water flooded the bottom of the trench

Plot and section	Grid reference	Total trench depth (m)	Photos
14/13d	SH 67702 41352		2246-2247

Depth from surface (m)	Description
0	Brown silt clay with frequent small to medium rounded and sub angular stones.
-	Same as the deposit above but with larger rounded stones and loose flat stones and gravels

Plot and section	Grid reference	Total trench depth (m)	Photos
14/13e	SH 67677 41346	1.9	2254-2255

Depth from surface (m)	Description
0	Mid brown silt clay with occasional very small flat with rounded edge stones
1.5	Manganese band. Black with small rounded stones
-	Iron panning. Orange brown with small flat rounded stones
-	Light grey clay with small rounded small to medium gravels and stones

Plot and section	Grid reference	Total trench depth (m)	Photos
14/13f	SH 67656 41341		2256-2257

Depth from surface (m)	Description
0	Brown clay silt with fine grained frequent gravels and small to medium rounded and sub rounded stones
-	Light brown silt clay gravels
-	Small alluvial river gravels. Almost sand.

Plot and section	Grid reference	Total trench depth (m)	Photos
14/14a	SH 68012 41439	1.8	2247-2248

Depth from surface (m)	Description
0	Brown clay
0.2	River gravels, dark grey brown to light grey brown. Rolled stones, and also some evidence of iron panning

Plot and section	Grid reference	Total trench depth (m)	Photos
14/14b	SH 67966 41420	1.7	2243-2244,

Depth from surface (m)	Description
0	Brown clay
0.5	Dark grey brown gravel with small to large round and sub rounded stones

Plot and section	Grid reference	Total trench depth (m)	Photos
14/14c	SH 67920 41401	1.7	2243-2244,

Depth from surface (m)	Description
0	Dark brown clay
0.5	River gravel small to large rounded and sub angular stones

Plot and section	Grid reference	Total trench depth (m)	Photos

Plot and section	Grid reference	Total trench depth (m)	Photos
15/04a	SH 69165 42164	2.9	3068-3069

Depth from surface (m)	Description
0	Dark peat with occasion sub angular stones
0.2	Light yellow orange silt clay with occasional sub angular stones
1.5	Grey gravel silt with occasional small to medium sub angular and rounded stones

Plot and section	Grid reference	Total trench depth (m)	Photos
15/04b	SH 69134 42159	2.2	3070-3071

Depth from surface (m)	Description
0	Dark peat with occasion sub angular stones
1.1	Light yellow orange silt clay with occasional sub angular stones

Plot and section	Grid reference	Total trench depth (m)	Photos
15/04c	SH 69110 42154	2.22	3072-3073

Depth from surface (m)	Description
0	Dark peat with occasion sub angular stones
1	Light yellow orange silt clay with occasional sub angular stones
-	Orange brown silt clay with frequent stones and gravel

Plot and section	Grid reference	Total trench depth (m)	Photos
15/28a	SH 70377 43039	1.4	2927-2928

Depth from surface (m)	Description
0	Friable light brown orange sand clay with lots of small to medium shale stones.
0.45	Friable light grey green peat with lots of small rounded stones and degrading bedrock

Plot and section	Grid reference	Total trench depth (m)	Photos
15/28b	SH 70365 43084	3.75	2929-2930

Depth from surface (m)	Description
0	A mid grey to black fine grained peat with some organic material such as small branches, also contains sub angular and sub rounded medium stones.
2	Dense small to medium sub angular to sub rounded stones and boulders
3.2	Light grey green with abundant small stones and possibly a clay.

Plot and section	Grid reference	Total trench depth (m)	Photos
15/28c	SH 70329 43119	1.3	2630-2632

Depth from surface (m)	Description
0	Very dark brown grey peat with organic material of roots and tree braches
1	Light orange grey silt sand clay with frequent small sub angular shale stones.
1.5	Light grey silt within natural shale rock.

Plot and section	Grid reference	Total trench depth (m)	Photos
16/1	SH 70210 43220	1	3159-3162

Depth from surface (m)	Description
0	Black brown peat. Land drains cut through this layer approximately every 2m
0.5	Pale green grey gravel clay
0.9	Mottled yellow clay

Plot and section	Grid reference	Total trench depth (m)	Photos
16/2	SH 70210 43260	1	3153-4, 3157-

Depth from surface (m)	Description
0	Black brown peat. Land drains cut through this layer approximately every 2m
0.8	Firm grey gravel clay with occasional large to medium boulders and small to medium sub angular stones

Plot and section	Grid reference	Total trench depth (m)	Photos
16/3	SH 70220 43320	1	3155-3156

Depth from surface (m)	Description
0	Peat layer
0.8	Grey gravel clay
1	Orange yellow clay

Plot and section	Grid reference	Total trench depth (m)	Photos
16/5	SH 70230 43390	2	3169-3172

Depth from surface (m)	Description
0	Peat layer
0.5	Yellow brown clay

Plot and section	Grid reference	Total trench depth (m)	Photos
16/6	SH 70239 43439	2	3173-3176,

Depth from surface (m)	Description
0	Peat with occasional large boulder, peat over 2m deep. Dark black/brown peat with numerous roots in top 0.3m and boulders further down.

Plot and section	Grid reference	Total trench depth (m)	Photos
16/9a	SH 70264 43749		3181-3182

Depth from surface (m)	Description
0	Peat. Black brown with organic material and vegetation.
-	Grey gravel clay with large boulders at the base of the peat layer

Plot and section	Grid reference	Total trench depth (m)	Photos
16/9b	SH 70259 43786		3183-3184

Depth from surface (m)	Description
0	Black brown peat, with organic material and also modern rubbish (pram wheel, oxygen bottle and modern pottery were observed). Plastic and ceramic land drains cut through this layer
-	Grey brown waterlogged layer with very frequent sub angular boulders.

Plot and section	Grid reference	Total trench depth (m)	Photos
17/02a	SH 70303 44147	1	3203-3206

Depth from surface (m)	Description
0	Orange brown black peat layer
0.7	Grey gravel clay with occasional boulder

Plot and section	Grid reference	Total trench depth (m)	Photos
17/04	SH 70220 44280	1.2	3209-3214

Depth from surface (m)	Description
0	Peat with some organic material and some occasional small to medium sub angular stones
0.5	Light grey gravel clay with small to medium sub angular stones and large boulders.

Plot and section	Grid reference	Total trench depth (m)	Photos
17/05	SH 70030 44190	1.2	3223-3228

Depth from surface (m)	Description
0	Bright orange brown silty clay with gravel and small to large stones
0.5	Grey gravel clay with small to large boulders and small to large sub angular stones, also some bedrock in places

Plot and section	Grid reference	Total trench depth (m)	Photos
17/06a	SH 70186 44429	1.5	3249-3250

Depth from surface (m)	Description
0	Brown black peat with rare small to large sub angular stones. Area waterlogged. Peat >1.5m

Plot and section	Grid reference	Total trench depth (m)	Photos
17/07	SH 70170 44500		3253-3258

Depth from surface (m)	Description
0	Waterlogged peat bog of yellow clay and some medium to large sub angular stones and some organic material
-	Gravels

Plot and section	Grid reference	Total trench depth (m)	Photos
17/09a	SH 70099 44675	2	3237-3238

Depth from surface (m)	Description
0	Dark black brown peat
-	Mid orange brown
-	Dark black brown peat with organic material
-	Bedrock and grey clay

Plot and section	Grid reference	Total trench depth (m)	Photos
17/10b	SH 70039 44716		3265-3268

Depth from surface (m)	Description
0	Dark organic material with wood and roots.
-	mid brown black with organic material and some medium sub angular stones
-	Grey clay and bedrock

Plot and section	Grid reference	Total trench depth (m)	Photos
17/23	SH 69632 45096	2.35	2934-2935

Depth from surface (m)	Description
0	Peat. Mid black brown
0.35	Granite bedrock

Plot and section	Grid reference	Total trench depth (m)	Photos
17/24b	SH 69584 45110	2.8	2936-2937

Depth from surface (m)	Description
0	Peat. Dark black brown with occasional large sub angular boulders at the interface between the peat and the layer below
0.8	Granite bedrock

Plot and section	Grid reference	Total trench depth (m)	Photos
17/24c	SH 69538 45130	1.8	2938-2939

Depth from surface (m)	Description
0	Mid black brown peat
0.4	Granite bedrock

Plot and section	Grid reference	Total trench depth (m)	Photos
17/24d	SH 69496 45155	2	2926

Depth from surface (m)	Description
0	Thin layer of dark grey fine grained peat
0.4	Light grey green sand silt with frequent small to medium rounded stones
0.7	Friable light mottled green orange silt clay sand
1.9	Granite bedrock

Plot and section	Grid reference	Total trench depth (m)	Photos
17/24e	SH 69444 45162	2.05	2948-2949

Depth from surface (m)	Description
0	Topsoil of dark black peat
0.05	Mid orange brown silt clay with occasional small sub angular stones
-	Mid grey silt clay with frequent small sub angular stones

Plot and section	Grid reference	Total trench depth (m)	Photos
17/24f	SH 69399 45141	2.4	2950-2951

Depth from surface (m)	Description
0	Black peat
0.1	Mid orange brown silt clay
0.4	Mid grey silt clay with frequent small sub angular stones

Plot and section	Grid reference	Total trench depth (m)	Photos
17/24g	SH 69360 45111	2	2952-2953

Depth from surface (m)	Description
0	Firm black peat
0.4	degrading granite bedrock

Plot and section	Grid reference	Total trench depth (m)	Photos
17/25h	SH 69343 45074	2.05	2454-2455

Depth from surface (m)	Description
0	Black peat

0.25	Mid grey silt clay with frequent small to medium sub angular slate stones

Plot and section	Grid reference	Total trench depth (m)	Photos
17/25i	SH 69343 45025	1.7	2456-2457

Depth from surface (m)	Description
0	Fine grained peat layer
0.4	Light orange brown silt sand with abundant small sub rounded stones
0.65	Light grey silt clay with small to medium angular stones
0.85	Granite bedrock

Plot and section	Grid reference	Total trench depth (m)	Photos
17/25j	SH 69309 44990	3.35	2459-2460

Depth from surface (m)	Description
0	Fine grained peat layer
1.8	Shattered bedrock forming a false layer created by previous trenching.
2.8	Light yellow brown clay with very frequent small stones
3.05	Grey sand clay with lots of small stones

19. APPENDIX IV: GROUND INVESTIGATION DATA FROM STRATASURVEYS LTD.

Data from a report by StrataSurveys Ltd, report No 14616, compiled by NF Johnson, issued on 21st August 2009 (StrataSurveys Ltd, Strata House, Holmes Chapel Road, Middlewich, Cheshire. CW10 0JB).

Borehole Number	Location	Site Geology	Easting	Northing	Summary of Ground Conditions
BH01	BH01 is located in a field to the north of the A497, to the south west of Abererch.	Fluvial deposits of Afon Erch over Glacial Till over Ordovician Llanvirn Mudstone of the Nant Ffrancon Group	239444.5	336428	
					GL-0.50m: brown grey clayey topsoil 0.50m
					0.50m-2.70m: medium dense brown grey clayey fine to medium grained Sand.
					100mm band Stiff brown slightly laminated slightly fine sandy Clay with pockets of fine to medium gravelly fine to medium grained sand
					2.80-5.20m: Dense grey clayey fine to coarse grained Sand and fine to coarse Gravel.
					5.20-6.05m stiff dark grey fine sandy fine to medium gravelly Clay.
BH02	BH02 is located on in a field to the to the south of the A497, to the south west of Abererch. BH02 lies just to the north of the river Afon Erch.	Fluvial deposits of Afon Erch over Glacial Till (Boulder Clay Ordovician Caradoc Mudstone of the Cwm Eigiau Formation	239580.3	336331.1	
					A thin band of topsoil (200mm)
					0.20m – 0.60m loose light brown fine to coarse gravelly fine to coarse grained Sand.
					0.60m – 1.40m loose brown fine to medium gravelly fine to coarse grained Sand.
					1.40m – 2.50m firm grey fine sandy silty Clay with pockets of dark brown peat and fine to coarse grained sand
					2.50m – 4.40m stiff yellow brown fine to coarse gravelly fine to coarse sandy Clay
					4.40m – 6.00m medium dense grey fine to coarse grained Sand.

Borehole Number	Location	Site Geology	Easting	Northing	Summary of Ground Conditions
BH05	BH05 is located next to an electric substation, at Afon Wen, just to the west of a Haven holiday camp and to the south of Chwilog.	Fluvial deposits of Afon Wen over Glacial Till over Ordovician Caradoc Mudstone of the Dwyfach Formation	243862	337391.3	
					Topsoil (200mm)
					0.20m- 0.60m brown fine to medium sandy very gravelly Clay
					0.60m – 1.00m yellow brown fine to medium sandy fine to medium very gravelly Clay.
					1.00m-1.35m Grey clayey fine to coarse gravelly fine to medium grained Sand with a pocket of yellow grey fine to medium sandy clay lumps
					2.30m – 4.50m medium dense grey fine to coarse gravelly fine to coarse grained Sand.
					4.50m to 12.00m: soft and firm to stiff grey fine to medium sandy fine to medium gravelly Clay.
BH07	Located on the western bank of Afon Dwyfor at Bont Fechan to the southwest of Llanystumdwy	Fluvial Deposits of the Afon Dwyfor over the coastal sediments over Glacial Till	246402.4	337918	
					Thin topsoil (300mm) over soft and firm fine to medium sandy clay to 0.90m.
					0.90m to 2.90m:dense and very dense grey slightly clayey fine to medium gravelly fine to coarse grained Sand and grey fine to medium sandy fine to medium subangular to angular Gravel with large cobbles and boulders.
					Large boulder is encountered at 2.90m and borehole abandoned.
BH08	Located on the eastern bank of Afon Dwyfor at Bont Fechan to the southwest of Llanystumdwy	Fluvial Deposits of the Afon Dwyfor over the coastal sediments over Glacial Till	246536	337931.4	
					Thin band of silty Topsoil (100mm) over brown fine to medium sandy clay with much root material to 0.90m.

Borehole Number	Location	Site Geology	Easting	Northing	Summary of Ground Conditions
					0.90m to 3.70m: dense and very dense grey brown very clayey fine to coarse very sandy fine to medium gravel and large slate cobbles with occasional light grey fine to medium gravel and clayey fine to medium sand.
					Large boulder is encountered at 3.70m. Borehole abandoned.
BH09	BH09 is located in a field on the northern side of the A497, just to the east of Llanystumdwy.	Glacial Till	247923.1	338238.1	
					Thin topsoil (100mm) over soft brown clayey fine to medium gravelly fine to medium grained Sand to 0.50m.
					0.50m to 1.45m: firm light brown white and yellow mottled fine to medium sandy Clay
					1.45 – 2.35m stiff brown grey fine to coarse sandy Clay.
					Large cobble is encountered at 2.35m. Borehole abandoned
BH10	BH10 is located in a field on the B441 to the north of Criccieth.	Glacial Till	249555	338983.4	
					Topsoil (300mm) over stiff brown and grey fine to medium sandy fine to medium gravelly Clay to 1.90m.
					1.90m – 6.00m very stiff yellow grey fine to medium sandy grey fine to medium gravelly Clay.
BH11	BH11 is located in a field on the A497just to the west of Pentrefelin.	Glacial Till over Cambrian Tremadoc	252275.1	339540	
					Topsoil (300mm)
					0.30m – 1.20m soft yellow brown fine to medium sandy fine to medium gravelly Clay
					1.20m – 2.80m. Dark grey mudstone
BH12	BH12 is located around 1.50km to the northwest of Porthmadog in a field next to A498, opposite	Alluvium over Cambrian Tremadoc Mudstone of the Dol-Cyn-Afon Formation	255395.5	339669.8	

Borehole Number	Location	Site Geology	Easting	Northing	Summary of Ground Conditions
	Porthmadog Golf Driving Range				
					Topsoil (300mm) over firm and soft grey brown slightly peaty fine sandy Clay to 0.90m.
					0.90m – 2.20m: very loose grey silty clayey fine to coarse grained Sand
					2.20m – 5.50m: very soft very fine sandy Clay with small shell fragments
					5.50m – 6.00m: medium dense grey clayey fine to medium subangular to angular mudstone Gravel.
BH13	BH13 is located in a marshy field, approximately 0.50km to the northwest of Porthmadog Adjacent to the railway line.	Alluvium over Cambrian Tremadoc Mudstone of the Dol-Cyn-Afon Formation	256022.1	339343.1	
					Very thin band of topsoil (100mm) over soft and very soft grey yellow brown mottled fine sandy silty Clay to 0.80m
					0.80m - 1.20m: very soft grey silty fine to medium sandy Clay
					1.20m - 6.30m: very loose grey slightly clayey fine to medium grained Sand.
BH14	BH14 is located on the western bank of the Afon Glaslyn to the east of Porthmadog	Alluvium over Ordovician Llanvirn Mudstone of the Nant Ffrancon Group. The Glaslyn estuary has been heavily silted with marsh and mudflats between the mainline railway embankment and the Ffestiniog railway embankment.	258774.5	338926.4	
					Very thin band of sandy topsoil (300mm)
					0.30m - 2.40m: medium dense light brown fine to medium grained Sand.
					2.40m – 12.00m: medium dense dark grey fine to medium grained sand with fine shell fragments.

Borehole Number	Location	Site Geology	Easting	Northing	Summary of Ground Conditions
BH15A	BH15A is located on the eastern bank of the Afon Glaslyn to the east of Porthmadog	Alluvium over Cambrian Tremadoc Mudstone of the Dol-Cyn-Afon Formation The Glaslyn estuary has been heavily silted with marsh and mudflats between the mainline railway embankment and the Ffestiniog railway embankment.	259046.2	338629.8	
					Topsoil (300mm) over 0.30m – 0.90m: dark brown fine to coarse grained sand
					0.90m – 4.20m loose-medium dense brown/grey fine to medium grained Sand. With shell fragments.
					4.20m – 12.00m: medium dense grey fine to coarse grained Sand are encountered from 1.20m to 12.00m.
BH16	BH16 is located on the western side of the railway tracks at Minffordd railway station and to the south of Minffordd Quarry	Alluvium over Cambrian Tremadoc Mudstone of the Dol-Cyn-Afon Formation	259532.9	338776	
					Topsoil (300mm) over 0.30 – 2.20m: very loose yellow brown fine to medium grained Sand.
					2.20m – 6.00m medium dense yellow brown fine to medium grained Sand.
BH17	BH17 is located on the eastern side of the railway tracks at Minffordd railway station and to the south of Minffordd Quarry	Alluvium over Cambrian Tremadoc Mudstone of the Dol-Cyn-Afon Formation	259630.3	338862.5	
					Topsoil (300mm)
					0.30m – 3.20m: very loose and loose brown slightly fine gravelly fine to medium grained Sand.
					3.20m – 6.00m medium dense brown grey fine to medium grained Sand.
BH18	Located in a field just to the north of Bron Y Garth	Cambrian Tremadoc Sandstone of the Dol-Cyn-Afon Formation	260220	338764.3	

Borehole Number	Location	Site Geology	Easting	Northing	Summary of Ground Conditions
	Hospital. Adjacent to the Ffestiniog railway.				
					Topsoil (100mm)
					1.10m – 1.70m firm orange brown fine sandy very fine to coarse gravelly Clay
					1.70m – 1.80m: Weathered dark grey Mudstone.
BH19	BH19 is located on the southern side of the A487 close to Bryn Dwyryd	Alluvium over Cambrian Mudstone of the Ffestiniog Flags Formation	262520	340043.4	
					Topsoil (100mm)
					0.10m – 1.50m: Firm orange brown fine sandy fine to coarse gravelly Clay
					1.50m – 1.90m: Weathered dark grey Mudstone.
BH19A	Located on the flood defence bank of the Afon Dwyryd	Alluvium over Cambrian Mudstone of the Ffestiniog Flags Formation	263333.7	339894.8	
					A thin band of topsoil (100mm)
					0.1m – 1.6m: Made Ground (brown grey medium to coarse gravelly silty fine grained sand Fill to 0.40m and grey peaty fine to medium gravelly fine to medium sandy clay Fill to 1.60m).
					1.60m – 2.10m: soft grey fine sandy silty Clay.
					2.10m – 6.35m: medium dense dark grey silty fine grained Sand with small clay lumps.
BH20	BH20 is located on the northern bank of the Afon Llwyryd close to Felinrhyd-fawr	Alluvium over Cambrian Mudstone of the Ffestiniog Flags Formation	264176.8	339906.5	
					GL-4.00m: medium dense grey brown slightly silty fine to medium grained sand with sandy silty pockets.
					4.00m – 6.90m: Medium dense dark grey fine to coarse grained sand with fine wood fragments.
					6.90m – 7.20m: soft grey silty fine sandy Clay

Borehole Number	Location	Site Geology	Easting	Northing	Summary of Ground Conditions
					7.20m - 10.10m: Loose grey silty fine to medium grained Sand with grey silt bands.
					10.10m – 12.00m: medium dense grey fine to coarse grained Sand and fine to medium Gravel.
BH21	BH21 is located on the southern bank of the Afon Dwyryd close to Felinrhyd-fawr	Alluvium over Cambrian Mudstone of the Ffestiniog Flags Formation	264473.9	339909.9	
					GL – 0.90m: brown grey fine sandy Silt over 200mm firm grey silty fine sandy Clay.
					1.10m – 2.00m: firm grey brown with black mottled fibrous peaty fine sandy silty Clay
					2.00m – 7.30m: Loose dark grey fine to medium grained Sand.
					7.30m – 8.80m: Very loose peaty fine-medium grained Sand with shell fragments.
					8.80m – 11.10m: dense / very dense dark grey fine to coarse sandy fine to medium Gravel of mudstone with quartz fragments.
					11.10m – 11.30m: weathered grey Mudstone.
BH23	BH23 is located on the northern bank of Afon Dwyryd to the south of Bryn Mawr	Alluvium over Cambrian Mudstone of the Ffestiniog Flags Formation	265085	340043.3	
					Topsoil (400mm)
					0.40m – 1.00m: soft grey brown mottled fine sandy slightly fine gravelly Clay
					1.00m – 1.50m very loose grey silty fine grained sand.
					1.50m – 2.70m: Firm dark grey peaty fine sandy clay.
					2.70m – 5.20m:very loose grey silty fine Sand.
					5.20m – 12.00m: medium dense grey fine to coarse grained Sand and fine to medium mudstone gravel
BH23A	Located on the western bank of the bank of Afon Dwyryd at Tan Y Bwlch	Alluvium over Cambrian Mudstone of the Ffestiniog Flags Formation	265781.2	340433.3	

Borehole Number	Location	Site Geology	Easting	Northing	Summary of Ground Conditions
					Thin band of Topsoil (350mm)
					0.35m –0.60m brown black mottled fine sandy clay
					0.60m – 1.20m light brown slightly clayey silty fine to medium grained Sand.
					1.20m – 2.25m brown grey fine sandy silty Clay.
					2.25m - 4.50m medium dense grey fine grained sand
					4.50m – 5.70m medium dense dark grey clayey fine to coarse grained Sand and fine mudstone Gravel
					5.70m – 8.50m dense orange brown fine to coarse grained sand and fine to medium Gravel.
					8.50m – 10.20m medium dense dark grey fine to coarse sandy fine to medium mudstone Gravel.
					10.20m - 12.00m medium dense grey fine gravelly fine to coarse grained Sand.
BH23B	BH23B is located on the northern bank of the bank of Afon Dwyryd at Tan Y Bwlch	Alluvium over Cambrian Mudstone of the Ffestiniog Flags Formation	266019.2	340662.9	
					Ground level – 2.90m soft brown fine sandy peaty silty Clay
					2.90m – 3.70m Soft grey silty Clay
					3.70m – 7.30m Medium dense dark grey fine to coarse mudstone gravel
					7.30m - 8.80m medium dense dark grey fine to coarse grained Sand and fine to medium mudstone Gravel
					8.80m – 10.10m loose grey silty fine to medium gravel.
					10.10m – 12.15m dense fine to coarse Gravel
BH24	BH24 is located on the northern bank of Afon Dwyryd, east of the A487, just to the north of Maentwrog	Alluvium over Cambrian Mudstone of the Ffestiniog Flags Formation	266370.6	340919	
					Thin band of Topsoil (200mm)

Borehole Number	Location	Site Geology	Easting	Northing	Summary of Ground Conditions
					0.20m – 2.10m soft brown slightly fine gravelly fine to medium sandy Clay some organic matter
					2.10m –3.20m loose brown fine to grained Sand and coarse medium to coarse Gravel
					3.20m - 6.00m medium dense grey fine to coarse grained Sand and fine to medium mudstone gravel
BH25	BH25 is located on the northern bank of Afon Dwyryd just to the north of Maentwrog	Alluvium over Cambrian Mudstone of the Ffestiniog Flags Formation	266770.5	341171.5	
					GL – 0.90m soft brown silty fine sandy Clay.
					0.90m – 3.80m medium dense dark brown fine to coarse grained Sand and fine to coarse Gravel.
					3.80m – 12.00m medium dense grey fine to medium gravelly fine to coarse grained Sand
BH27	BH27 is located on the northern flood defence bank of the Afon Dwyryd just to the southwest of Dduallt Station on the Ffestiniog Railway	Alluvium over Cambrian Mudstone of the Ffestiniog Flags Formation	267496.9	341358.5	
					GL - 0.80m brown clayey fine to coarse gravelly fine to medium grained Sand.
					0.80m – 3.00m dense brown clayey fine to medium sandy fine to medium mudstone gravel.
					3.00m – 6.80m dense brown fine to coarse sandy fine to coarse gravel with a large subrounded cobble
					6.80m – 9.90m medium dense clayey fine to coarse grained Sand and fine to medium mudstone Gravel
					9.90m – 12.00m dense medium to coarse mudstone gravel with some cobbles
BH27A	BH27A is located on the southern bank of the Afon Dwyryd just to the southwest of Dduallt Station on the Ffestiniog Railway	Alluvium over Cambrian Mudstone of the Ffestiniog Flags Formation	267538.4	341376	

Borehole Number	Location	Site Geology	Easting	Northing	Summary of Ground Conditions
					GL to 2.30m medium dense brown fine to medium sandy fine to medium gravel
					2.30m– 5.00m dense brown fine to coarse Gravel
					5.00m – 12.00m medium dense grey brown fine to coarse grained Sand and fine to coarse Gravel with occasional cobbles.
BH28	BH28 is located on the northern bank of the Afon Dwyryd to the southeast of Dduallt Station	Alluvium over Cambrian Mudstone of the Ffestiniog Flags Formation	268482.2	341713.4	
					Thin band of gravelly sandy Topsoil (200mm)
					0.20m – 1.80m medium dense brown fine to medium gravelly fine to medium grained sand
					1.80m – 3.00m dense dark grey fine to coarse sandy fine to coarse mudstone
					A large boulder at 3.00m. No groundwater encountered. Borehole abandoned
BH28A	BH28A is located on the southern bank of the Afon Dwyryd to the southeast of Dduallt Station	Alluvium over Cambrian Mudstone of the Ffestiniog Flags Formation	268556.9	341737	
					GL – 2.20m very dense brown fine to medium gravelly fine to medium grained Sand.
					2.20m – 4.60m very dense grey clayey fine to medium gravel encountered to 4.60m.
					A large boulder is encountered at 4.60m. Borehole Abandoned
BH29	BH29 is located on the southern bank of the Afon Dwyryd to the north of Pont Tal Y Bont.	Alluvium over Cambrian Mudstone of the Ffestiniog Flags Formation	268746.3	341793.5	
					A thin band of topsoil (200mm)
					0.20m – 2.40m dense grey slightly clayey fine to medium gravelly fine to medium grained Sand with bands of grey fine to coarse gravelly very fine to medium sandy clay.
					2.40m – 2.90m grey clayey Mudstone.

Borehole Number	Location	Site Geology	Easting	Northing	Summary of Ground Conditions
BH30	BH30 is located on the southern bank of the Afon Dwyryd to the north of Pont Tal Y Bont.	Cambrian Mudstone of the Maentwrog Formation	268916.9	342040.4	
					GL – 0.80m dark brown very peaty Clay
					0.80m – 1.10m soft brown silty fine sandy Clay
					1.10m – 1.30m Grey Mudstone
BH31	BH31 is located approximately 0.50km to the south of Manod at Tyn-y-cefn.	Glacial Sand and Gravel over Cambrian Dolgellau Formation	270282.5	343997	
					GL – 0.90m brown slightly fine to medium sandy fine to coarse Gravel
					0.90m – 1.30m Grey iron stained mudstone.

20. FIGURES AND PLATES

Figures

Plates

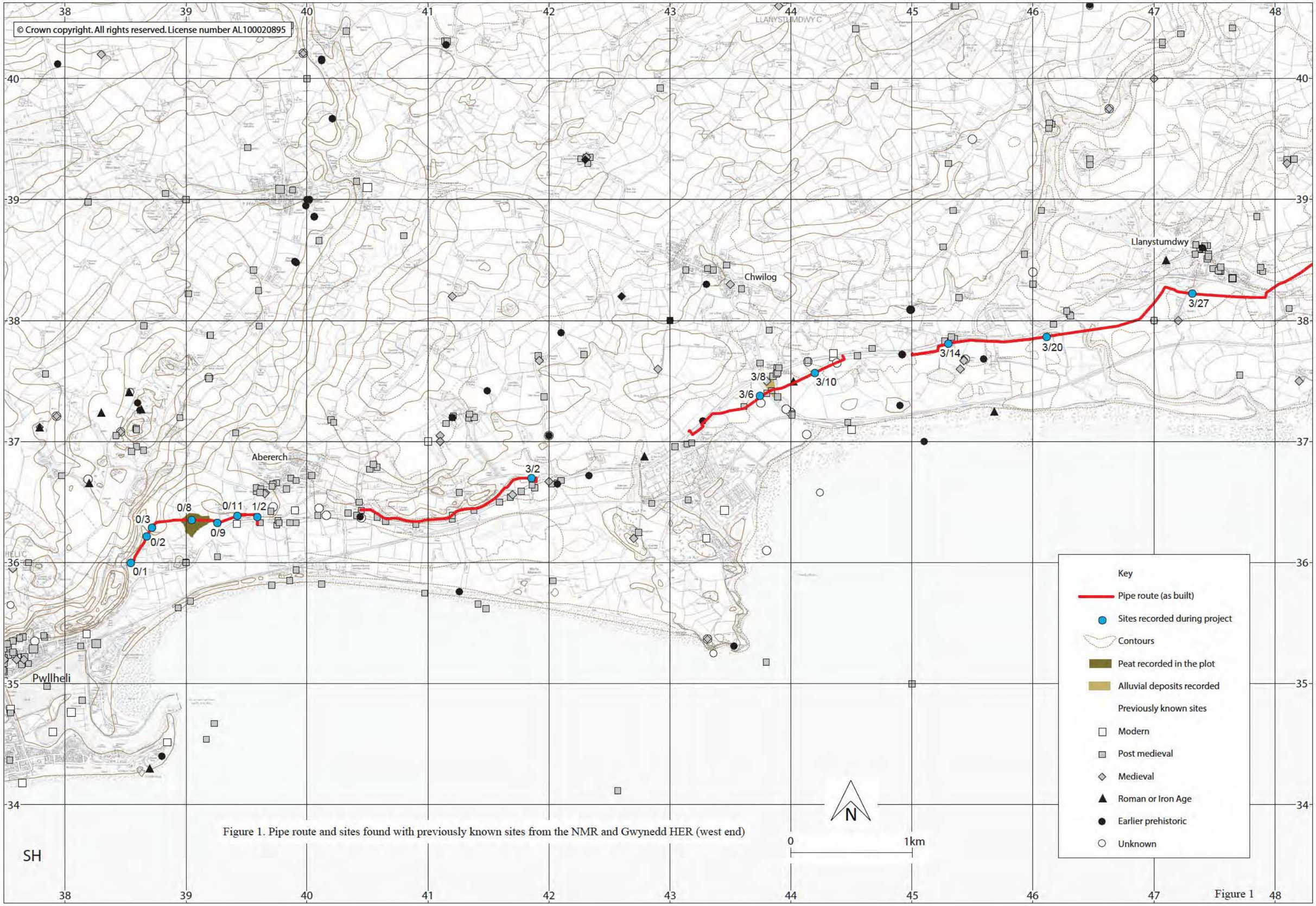


Figure 1. Pipe route and sites found with previously known sites from the NMR and Gwynedd HER (west end)

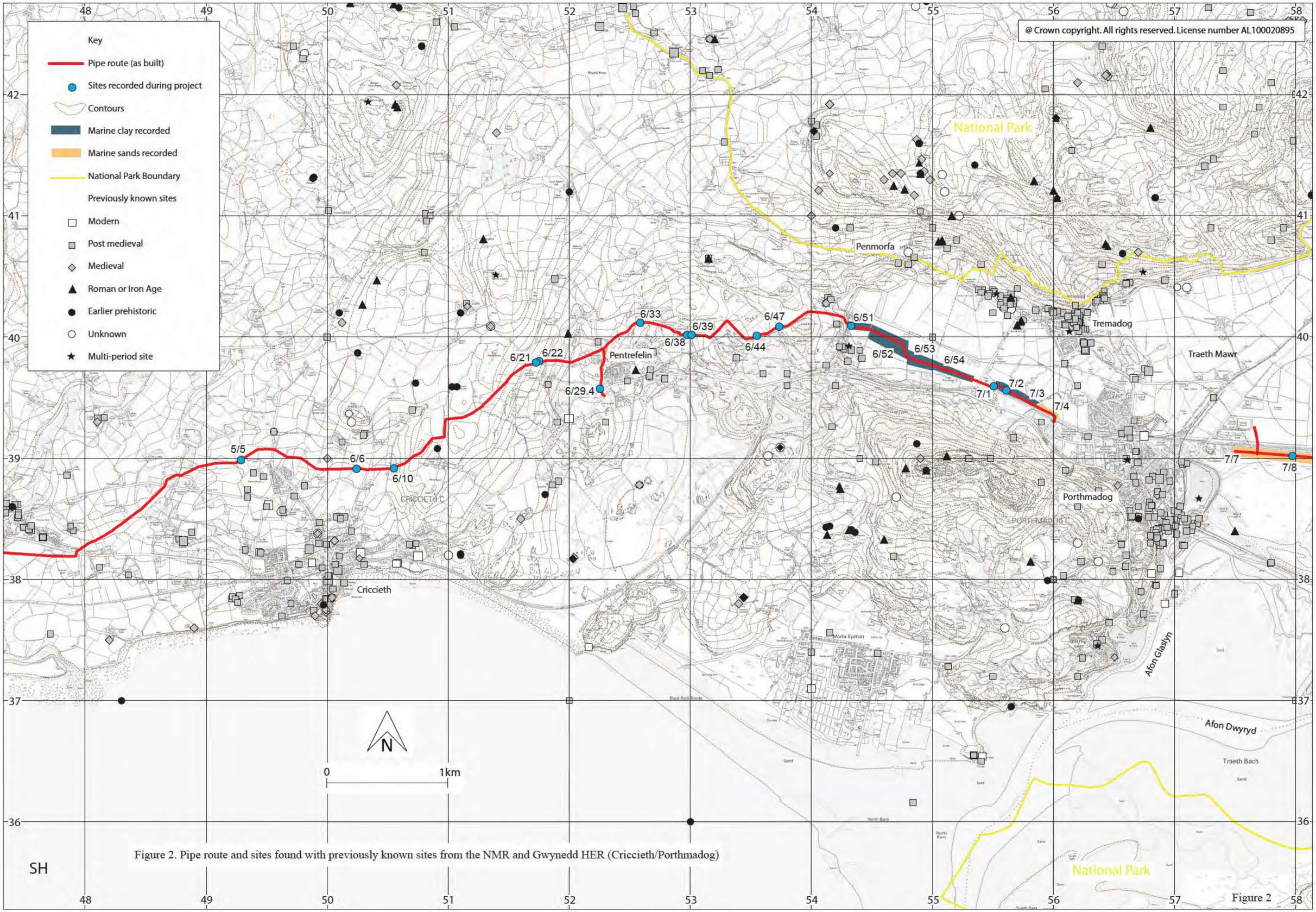


Figure 2. Pipe route and sites found with previously known sites from the NMR and Gwynedd HER (Criccieth/Porthmadog)

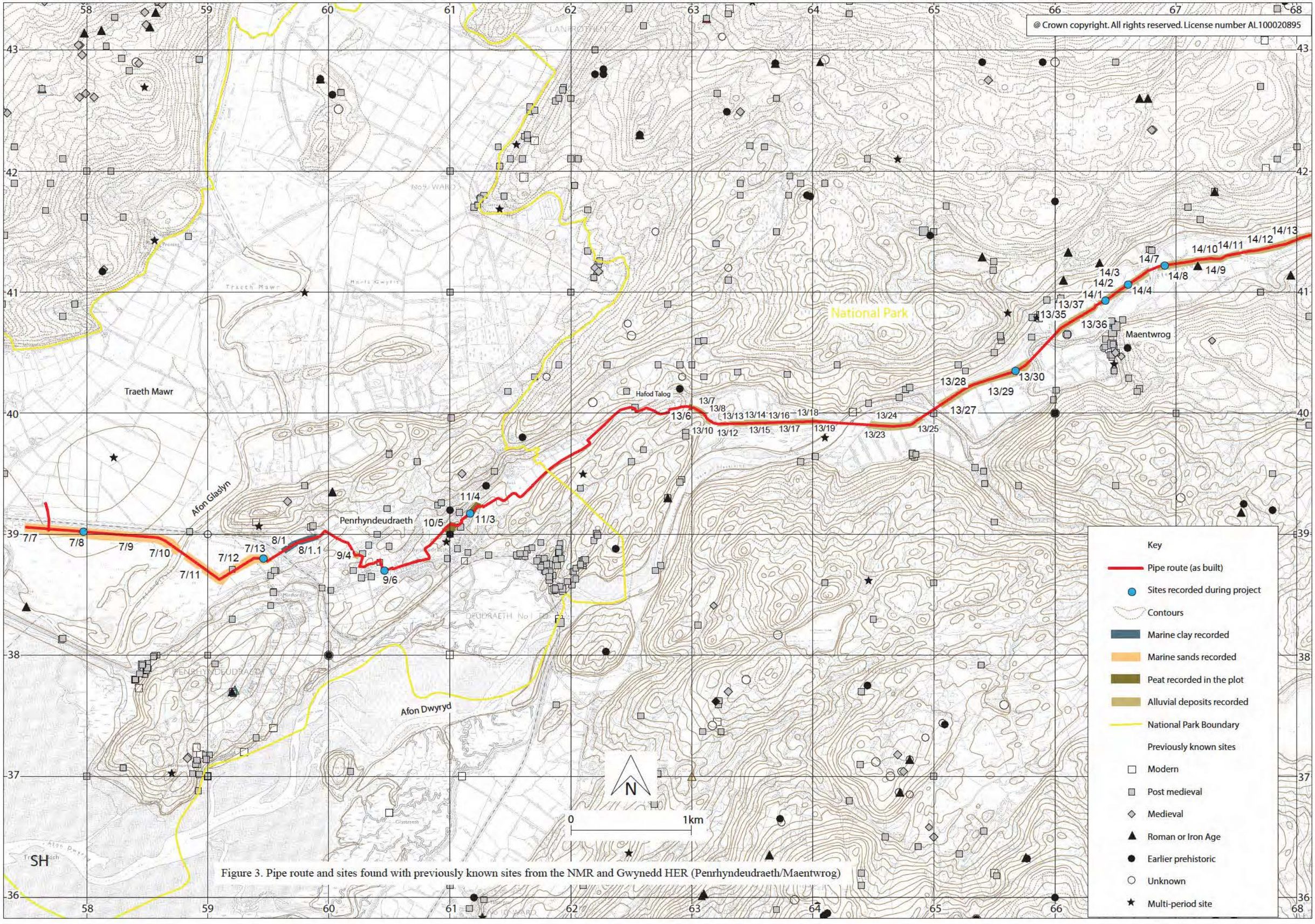


Figure 3. Pipe route and sites found with previously known sites from the NMR and Gwynedd HER (Penrhyndeudraeth/Maentwrog)

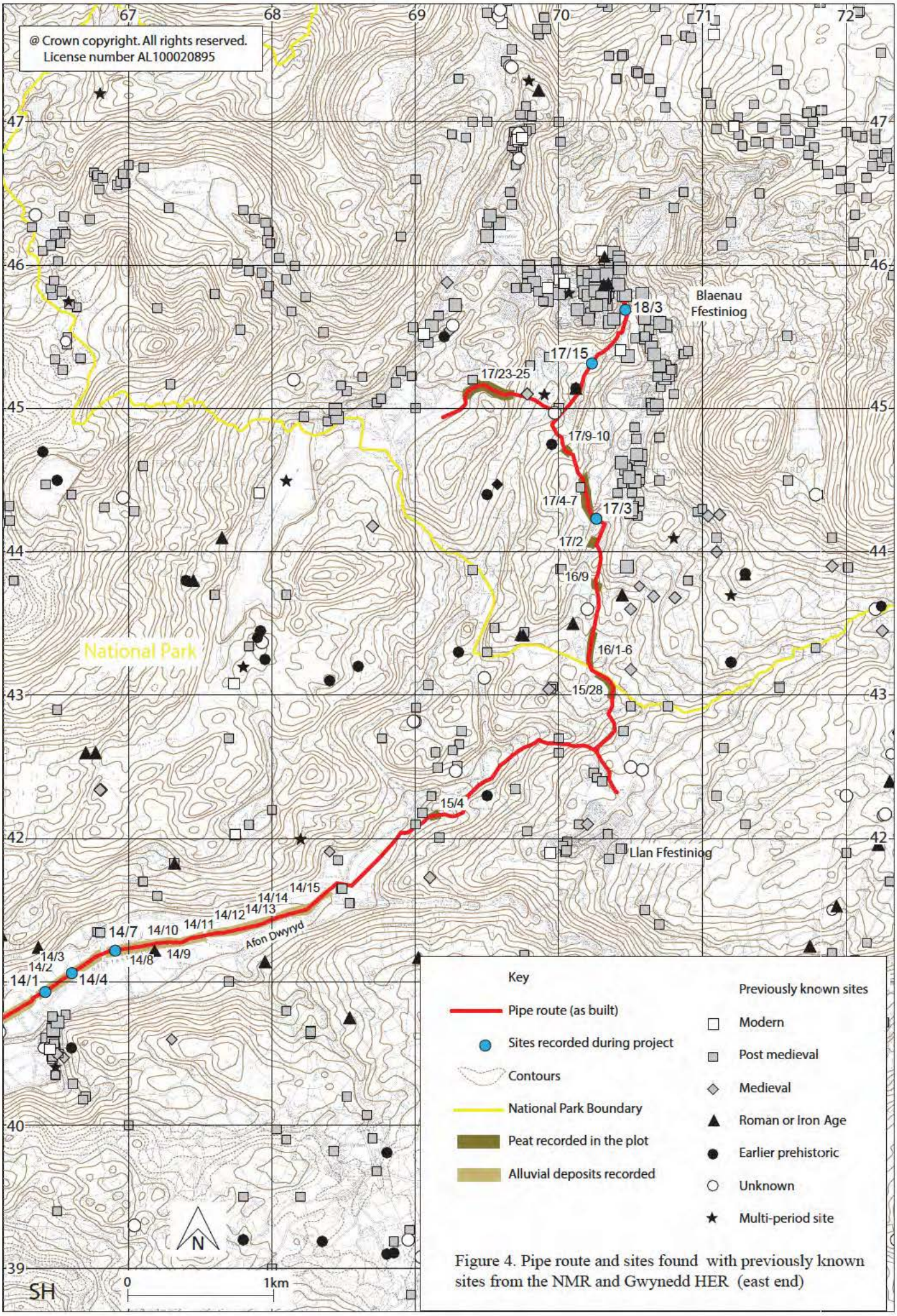
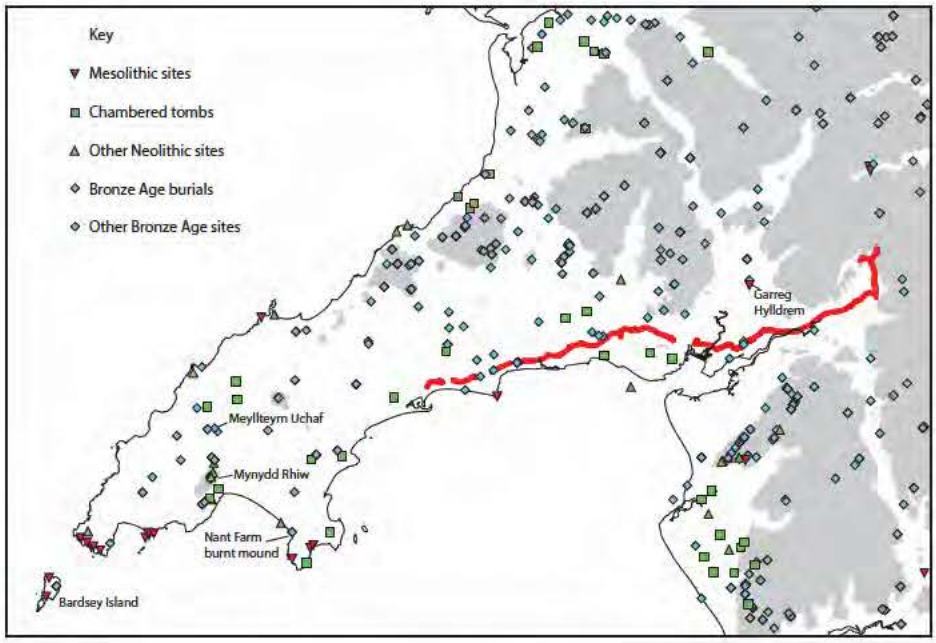
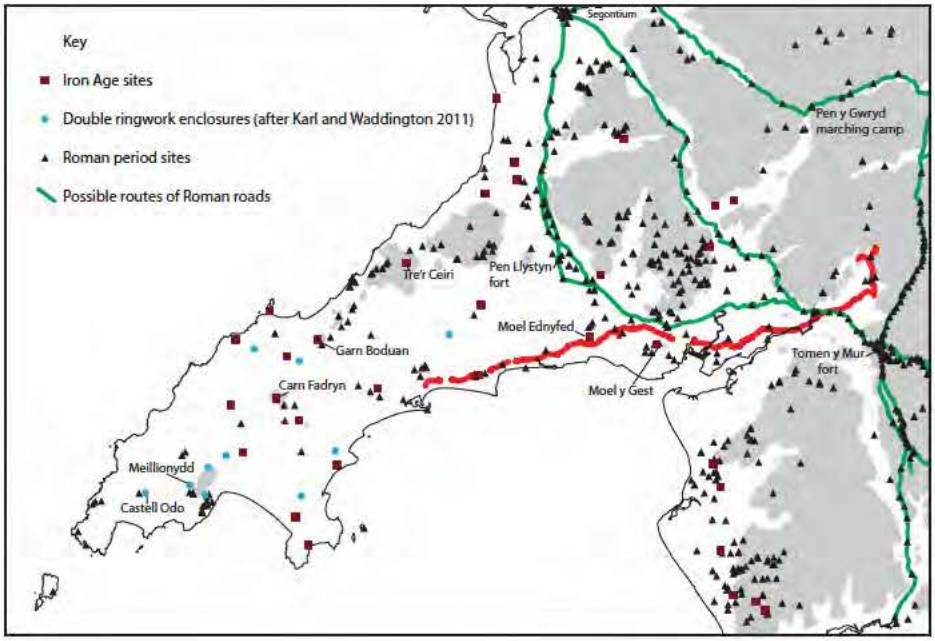


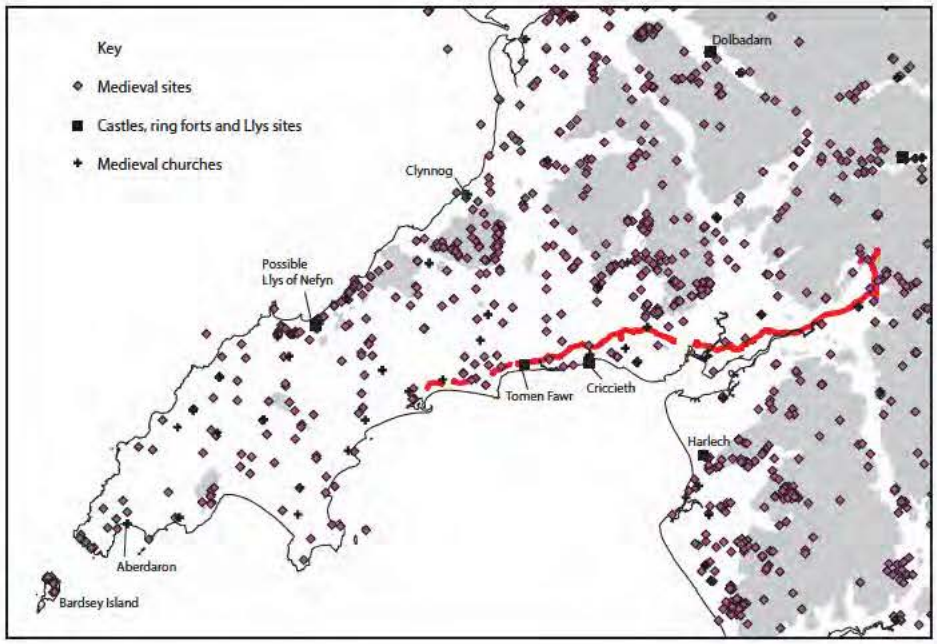
Figure 4. Pipe route and sites found with previously known sites from the NMR and Gwynedd HER (east end)



Mesolithic, Neolithic and Bronze Age sites (unspecified prehistoric sites not included)



Iron Age and Roman sites



Medieval sites

Figure 5. Period plans of area around the pipe route with information from the Gwynedd HER

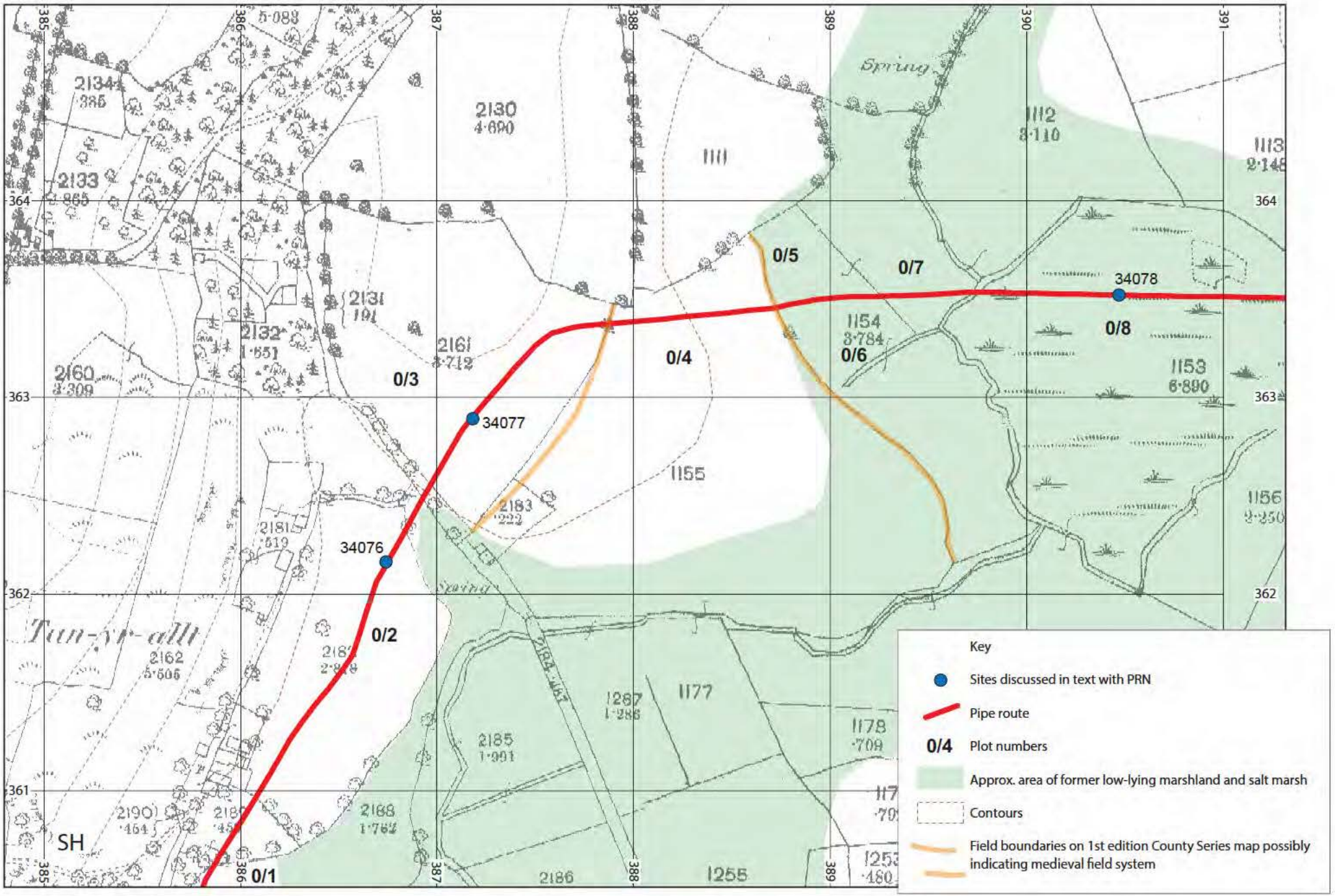


Figure 6. Location of sites PRN 34076-34078 shown on OS 25 inch first edition maps Caernarvonshire sheets XXXX.4 and .8, and XXXXI.1 and .5 (1889)

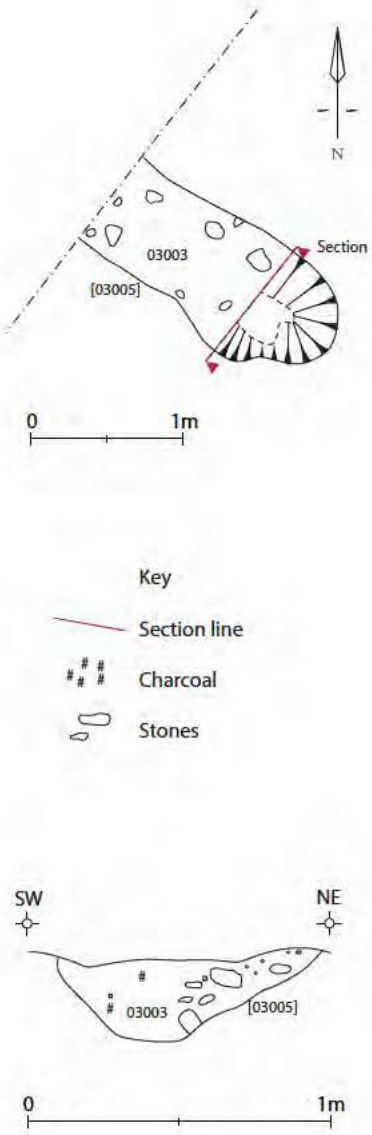


Figure 7. Plan and section of feature [03005] (PRN 34077) in plot 0/3

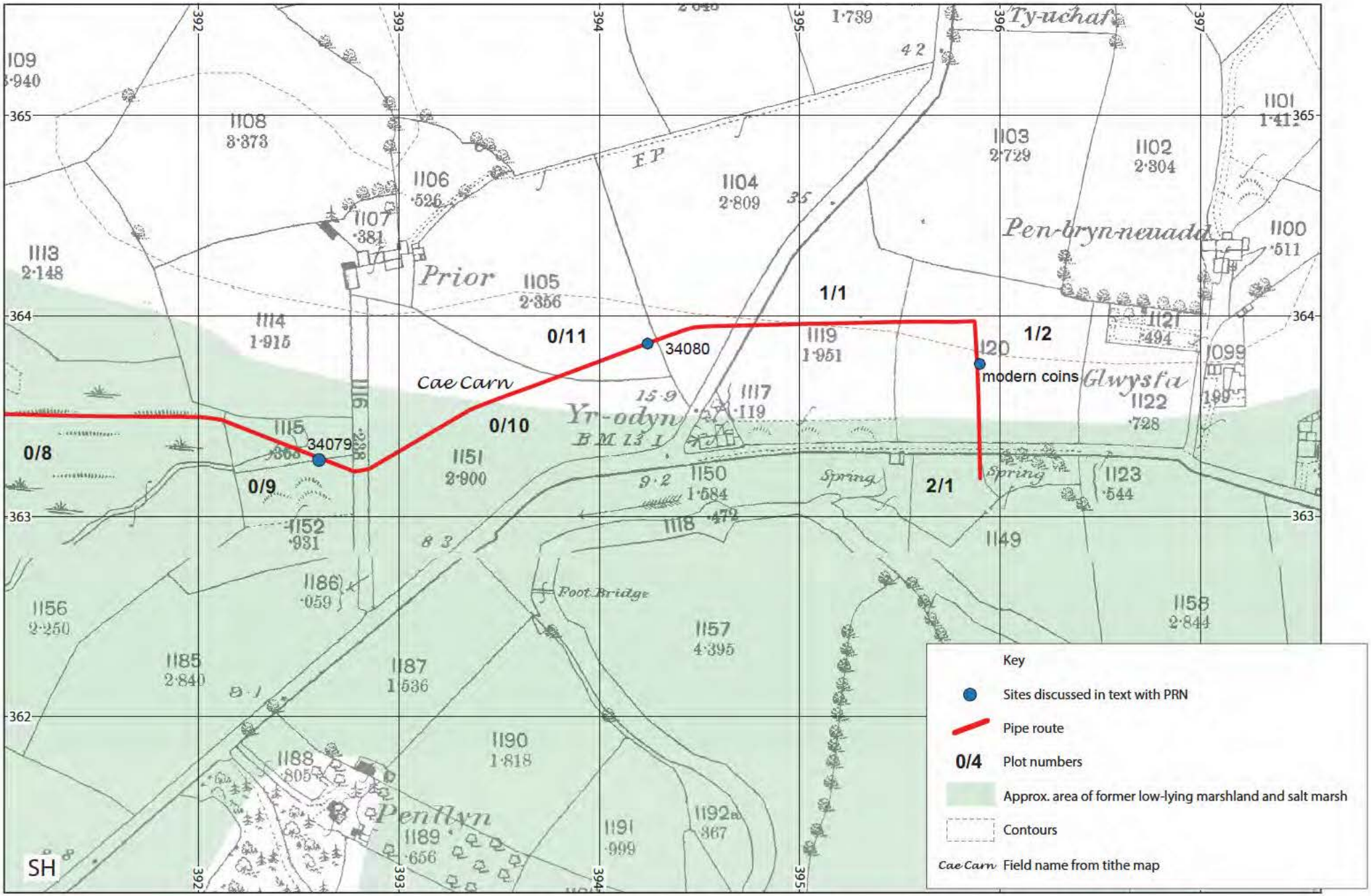


Figure 8. Location of sites PRN 34079 and 34080 shown on OS 25 inch first edition maps Caernarvonshire sheets XXXXI.1 and .5 (1889)

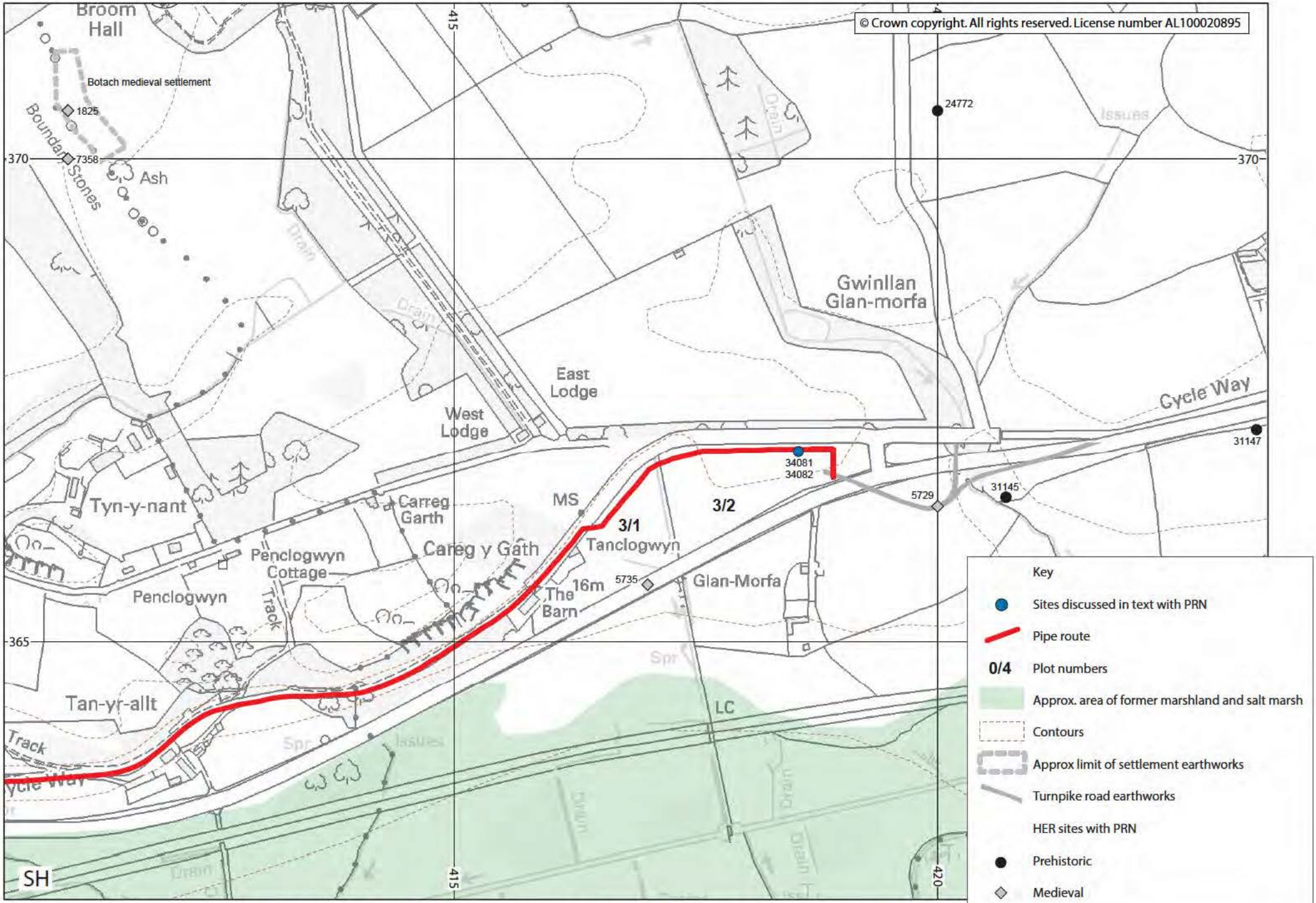


Figure 9. Location of sites PRN 34081 and 34082 shown on modern 1:10,000 scale map, with HER sites discussed in the text.

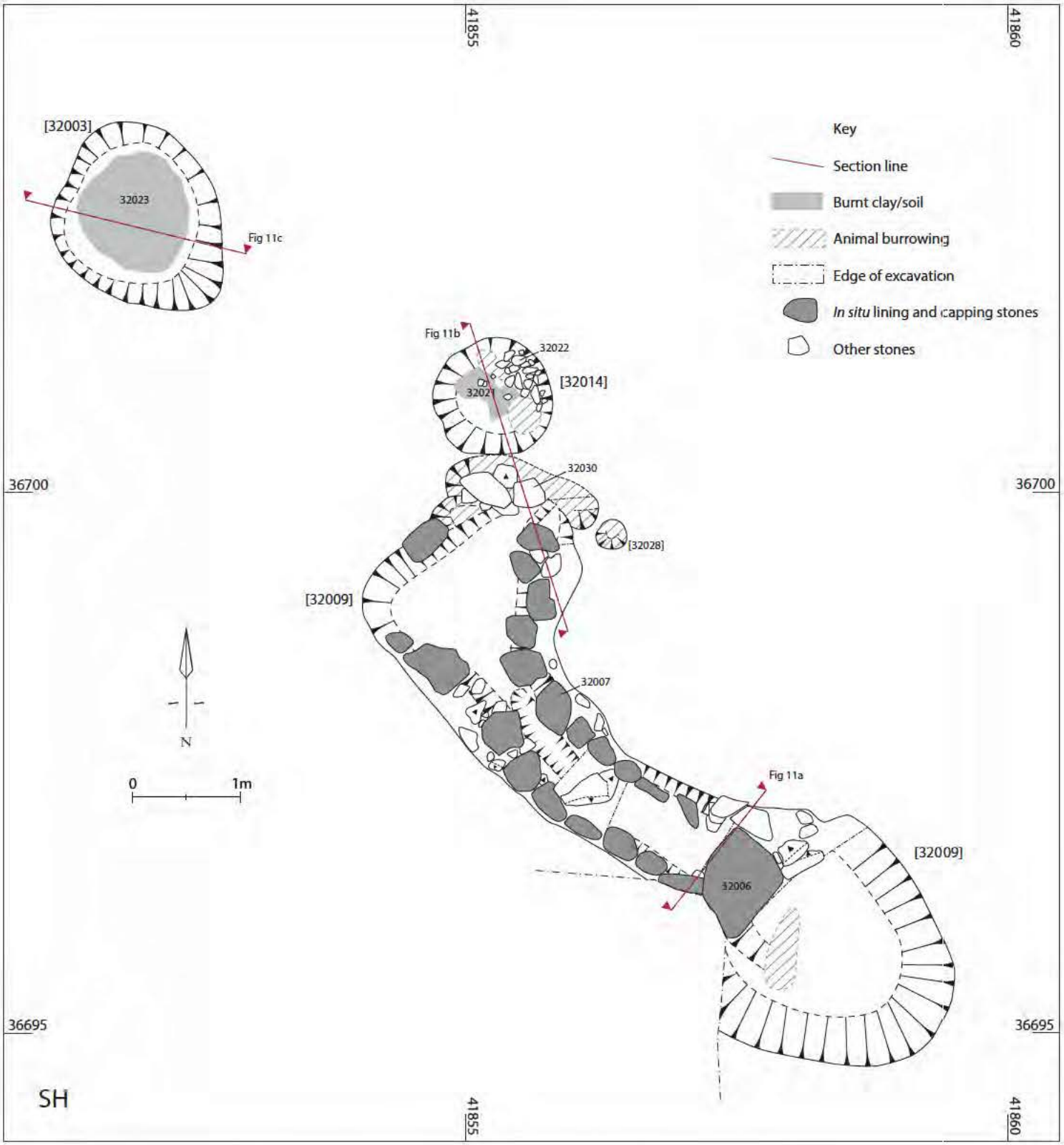


Figure 10. Plan of corn drier (PRN 34081) and pits (PRN 34082) in plot 3/2

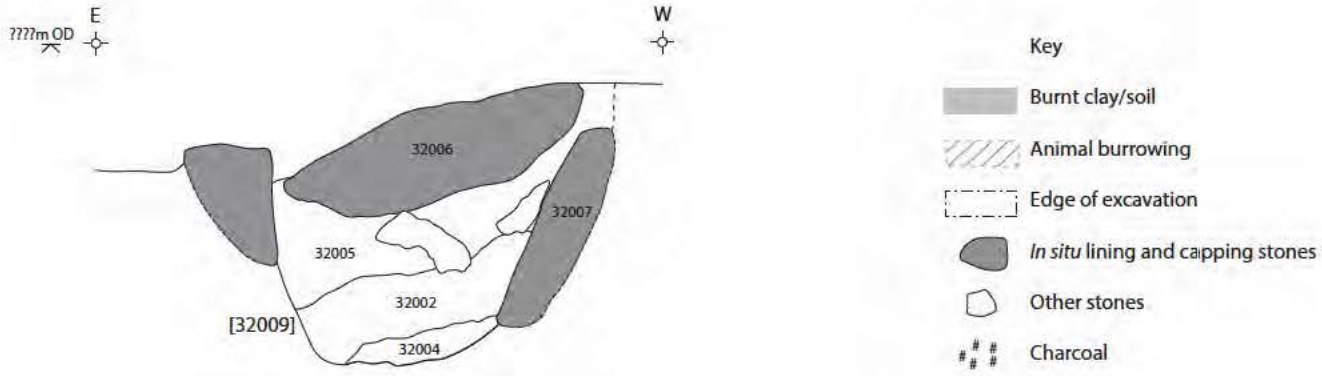


Figure 11a. Section of across corn drier

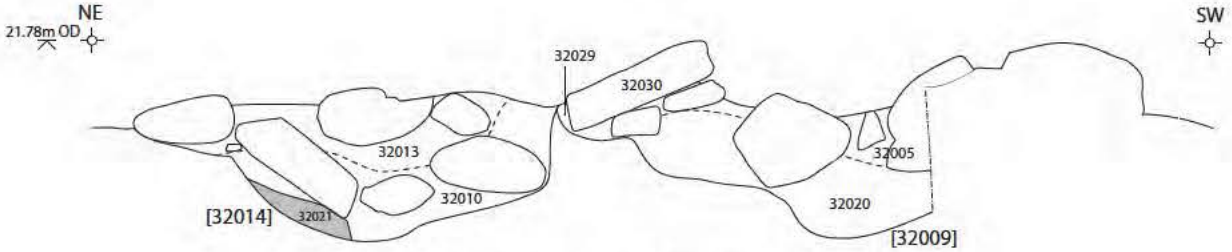


Figure 11b. Section of corn drier and pit [32014]

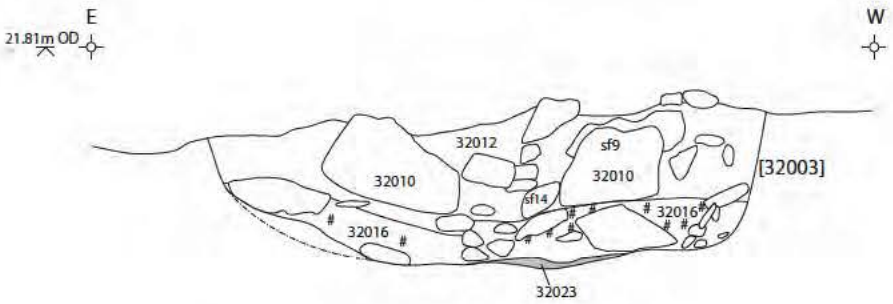


Figure 11c. Section of pit [32003]

Figure 11. Sections of corn drier (PRN 34081) and pits (PRN 34082) in plot 3/2 (see figure 10 for section locations)

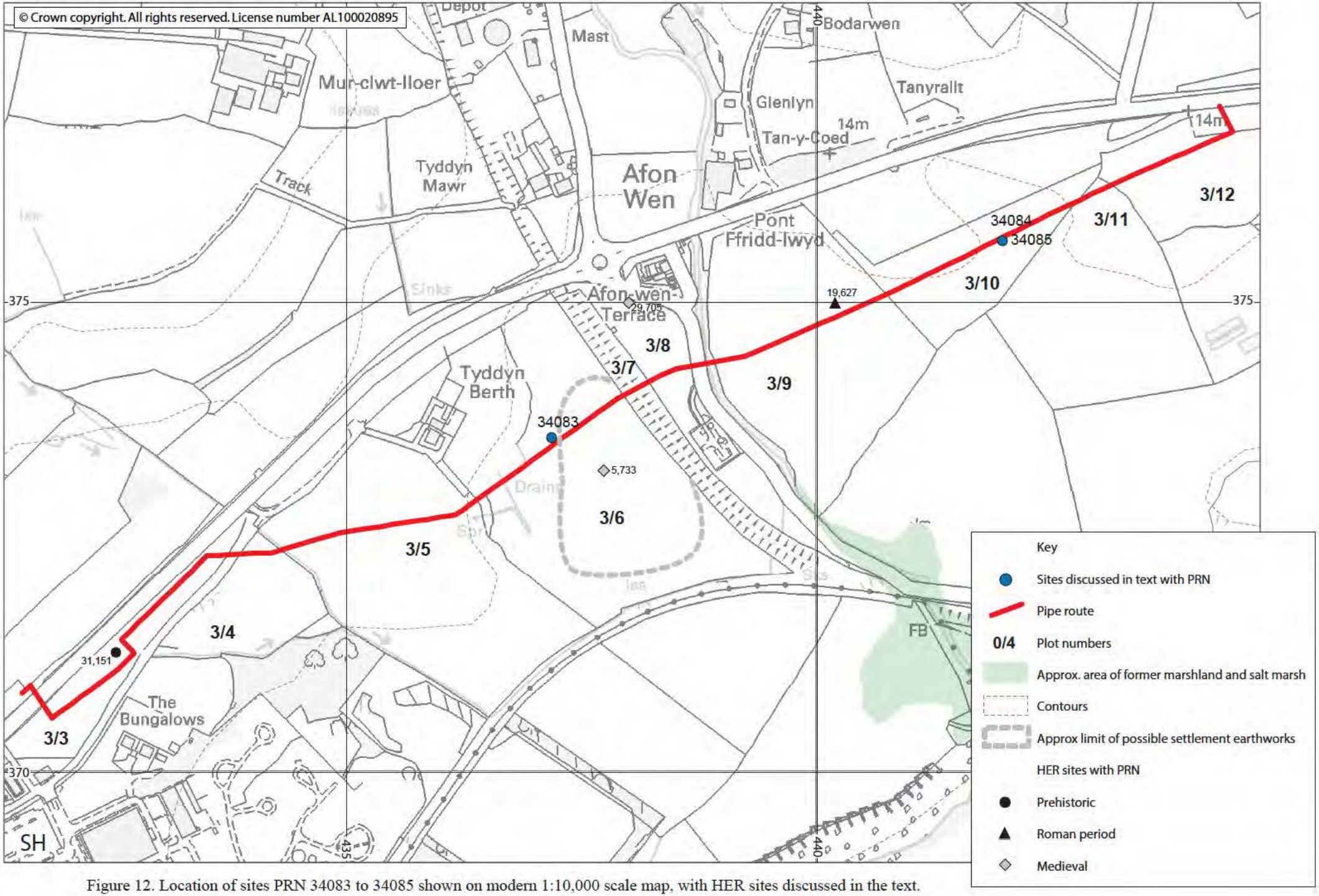
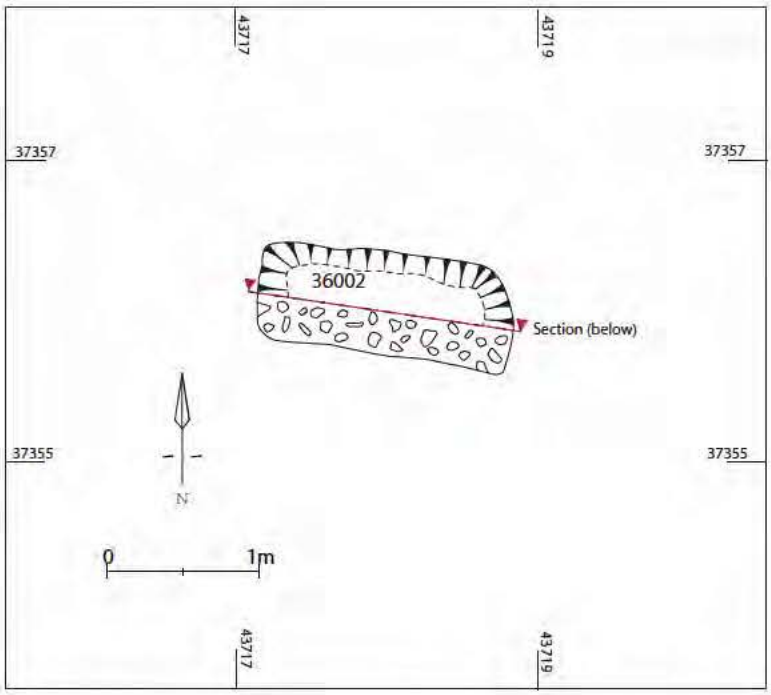
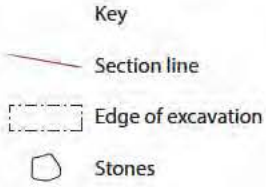


Figure 12. Location of sites PRN 34083 to 34085 shown on modern 1:10,000 scale map, with HER sites discussed in the text.





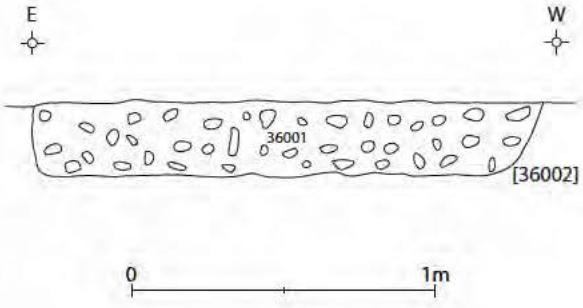


Figure 13. Plan and section of pit (PRN 34083) in plot 3/6

Figure 14. Plan and sections of burnt mounds in plot 3/10
(PRN 34084 and PRN 34085)

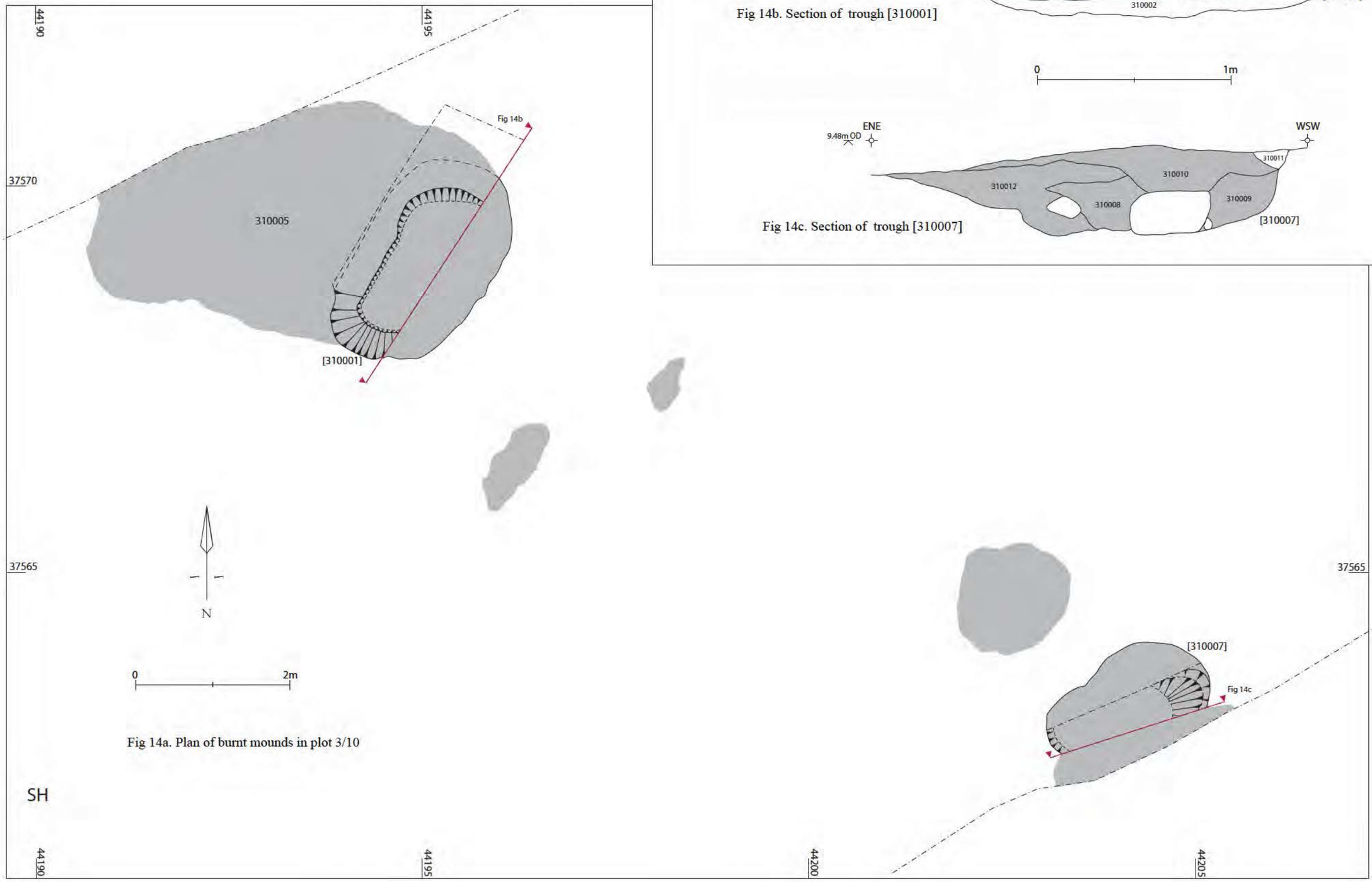


Fig 14a. Plan of burnt mounds in plot 3/10

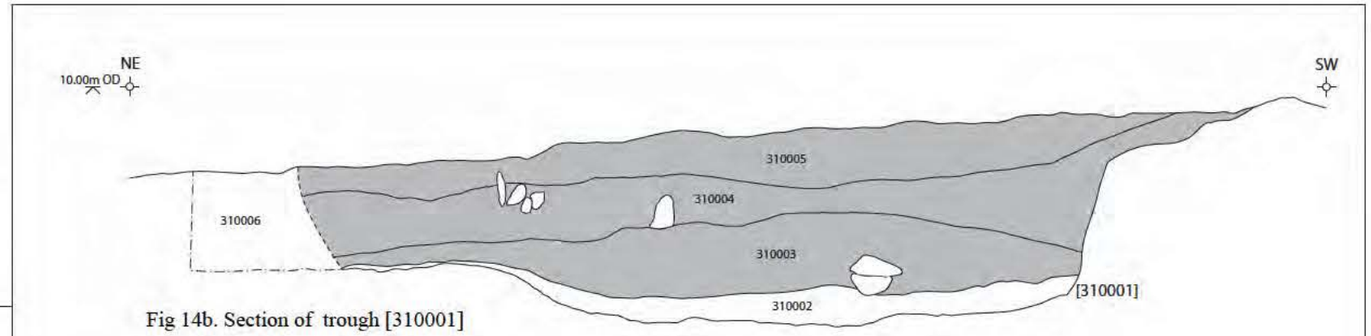


Fig 14b. Section of trough [310001]

Fig 14c. Section of trough [310007]

Figure 14

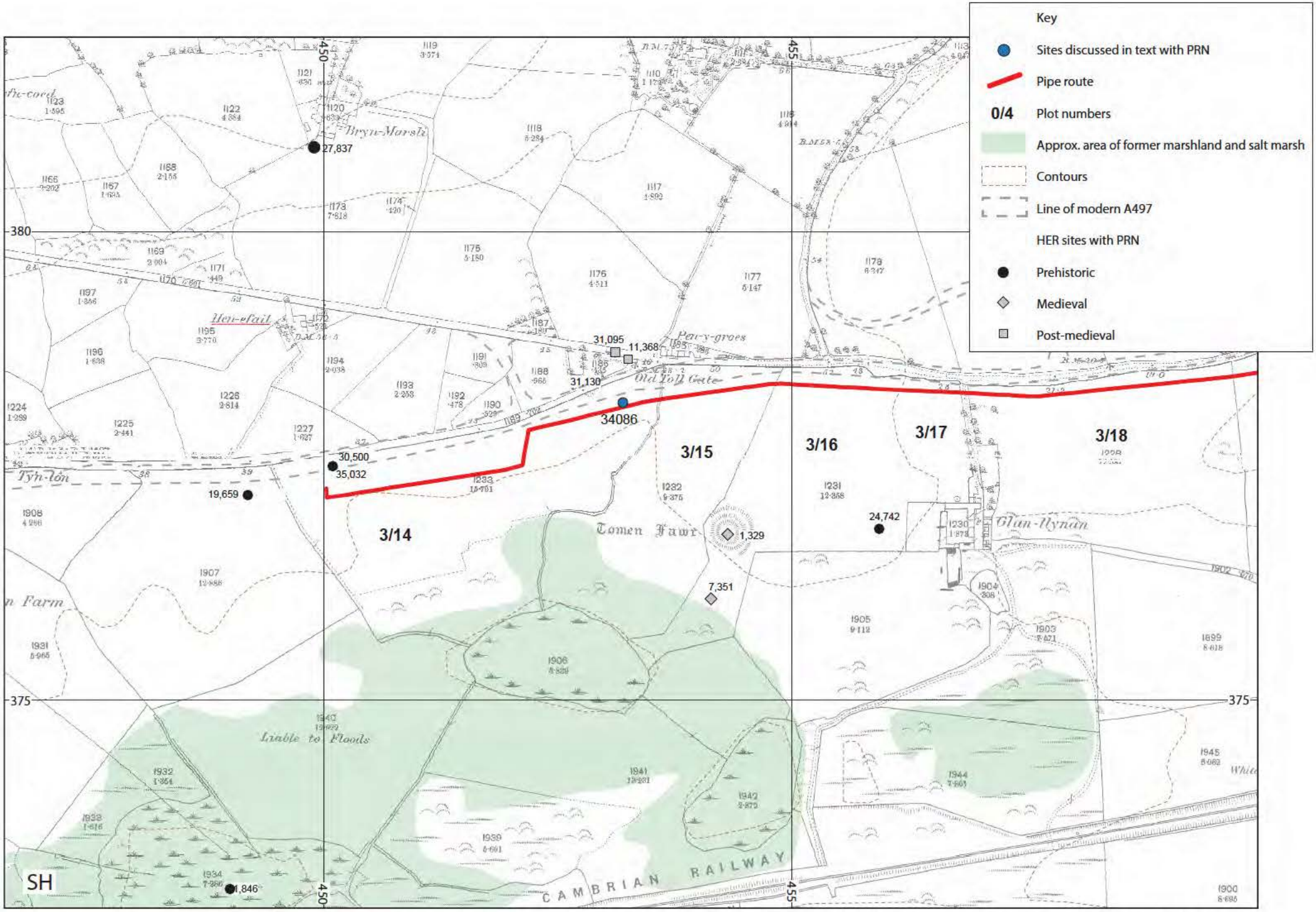


Figure 15. Location of smithing site PRN 34086 shown on OS 25 inch first edition maps with HER sites discussed in the text (Caernarvonshire sheets XXXIII.15 and XXXXI.3 (1889)).

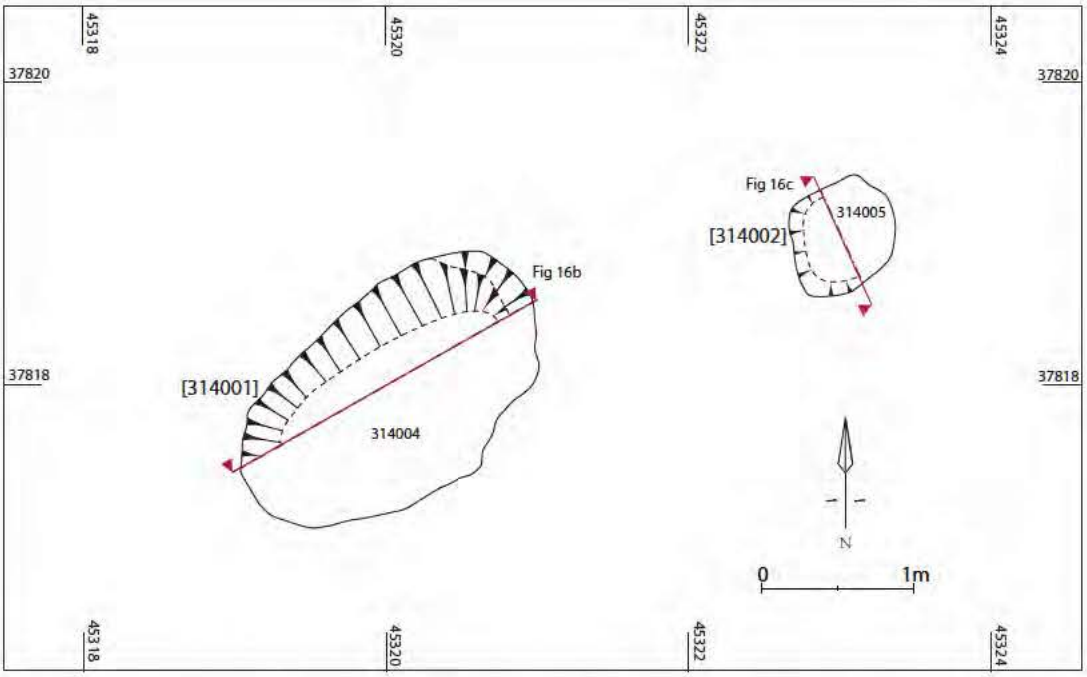


Fig 16a. Plan and sections of smithing site in plot 3/14

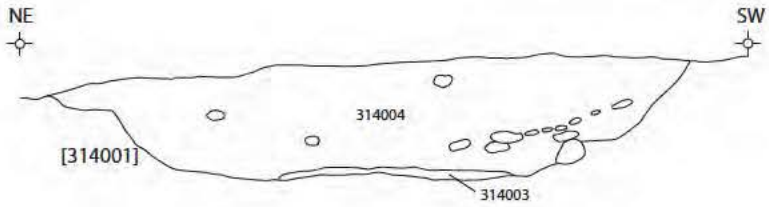


Fig 16b. Section of pit [314001]

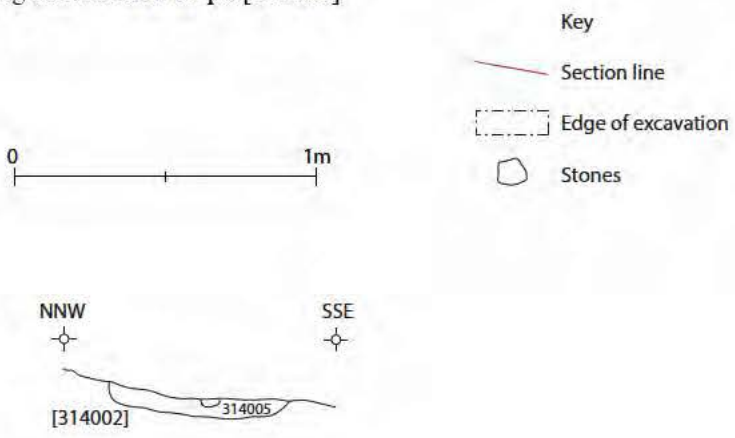


Fig 16c. Section of smithing pit [310002]

Figure 16. Plan and sections of smithing site in plot 3/14 (PRN 34086)

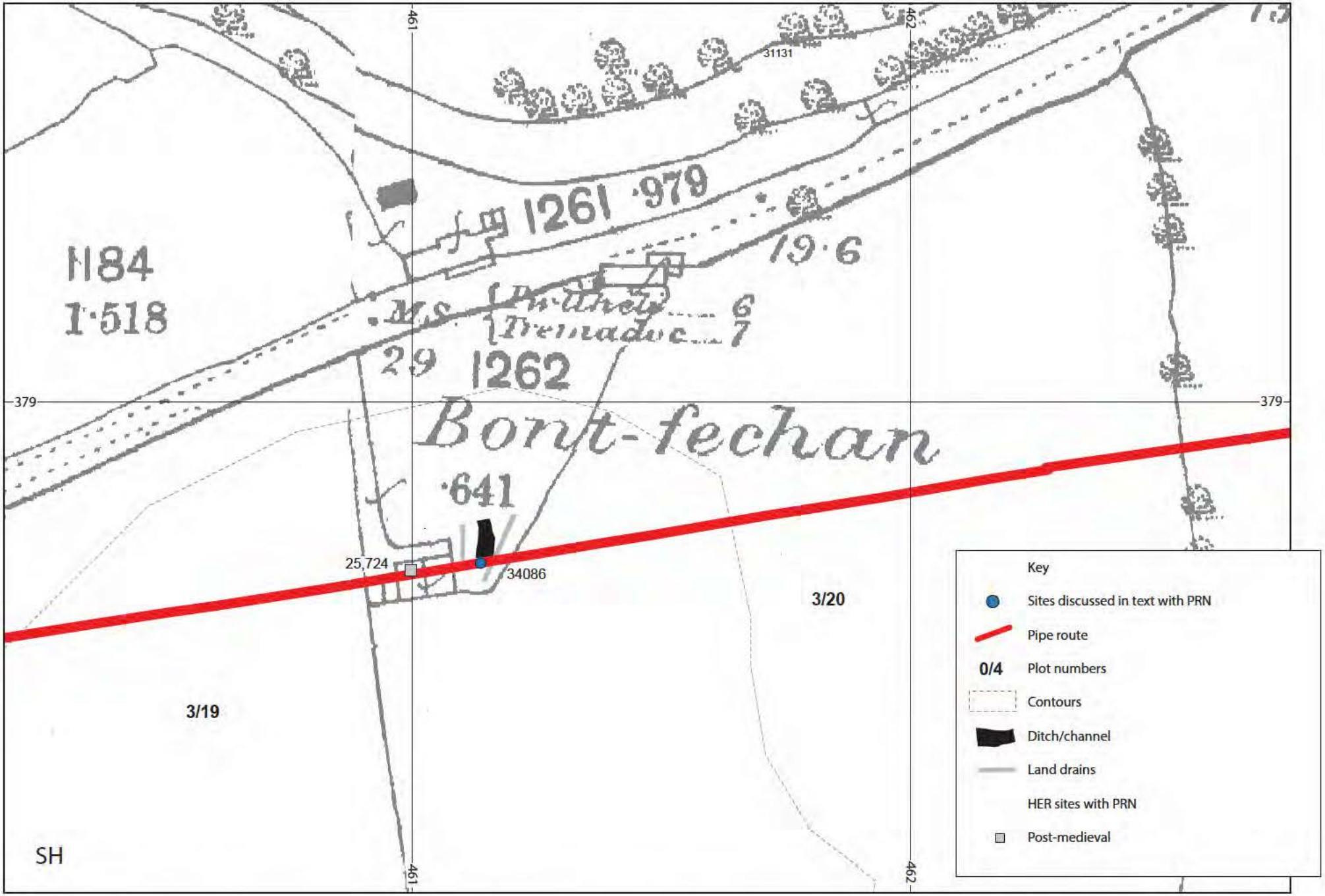


Figure 17. Location of ditch/channel (PRN 34087) shown on extracts from OS 25 inch first edition maps (Caernarvonshire sheets XXXIII.15 and .16 (1889)).

Figure 18. Plan and section of ditch/channel (PRN 34087) in plot 3/20

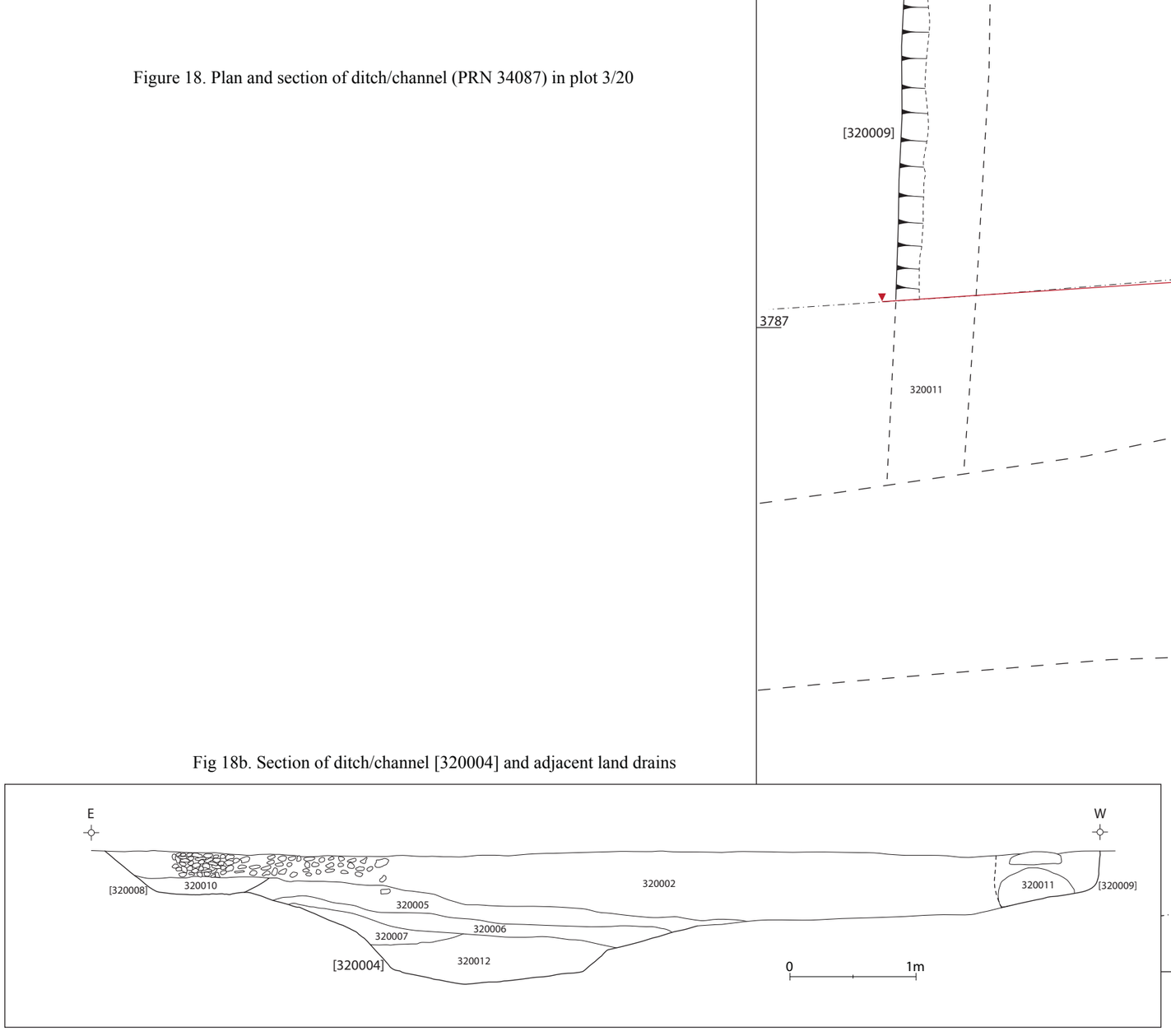


Fig 18b. Section of ditch/channel [320004] and adjacent land drains

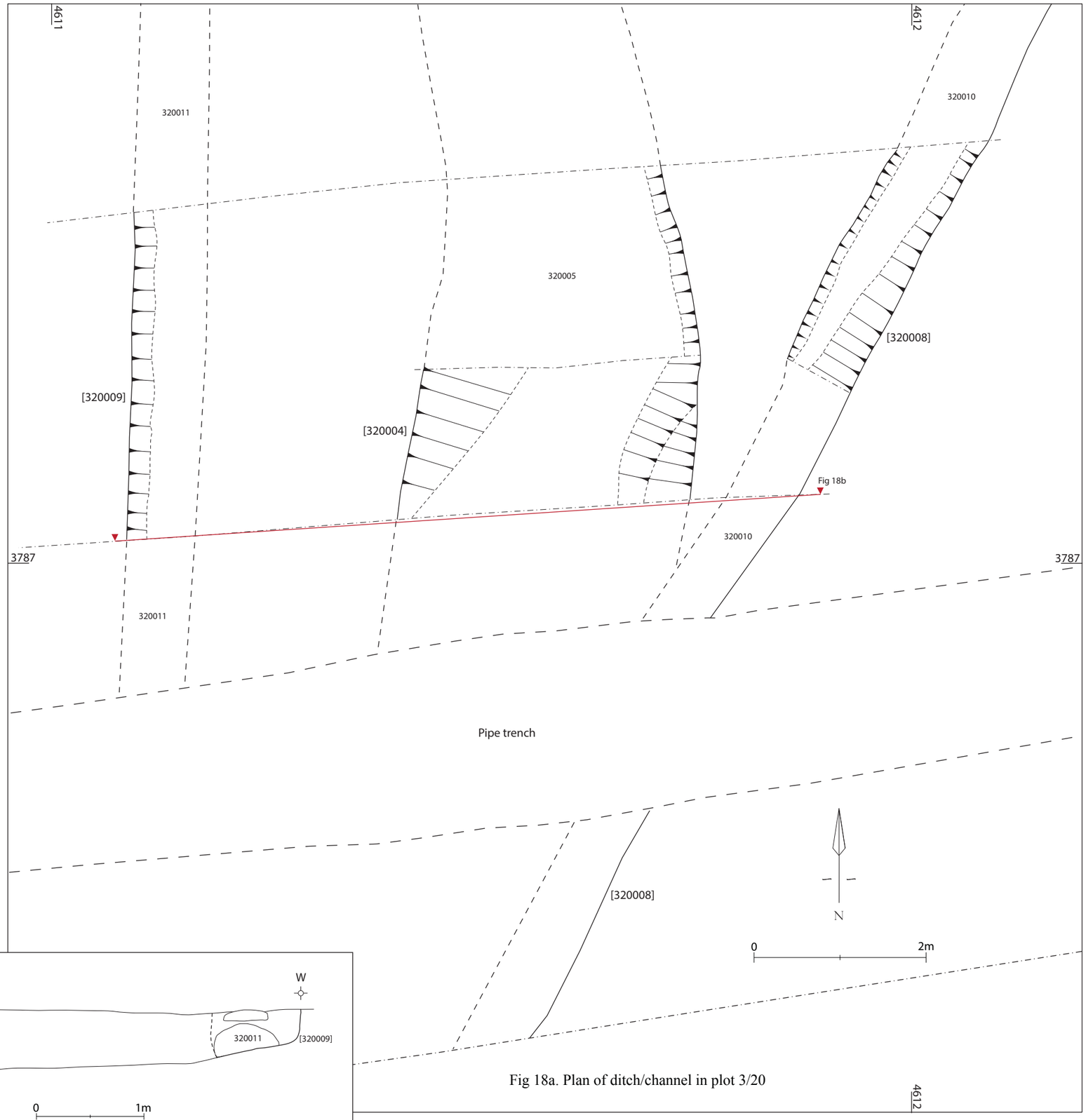


Fig 18a. Plan of ditch/channel in plot 3/20

Key

Section line

Edge of excavation

Stones

Figure 18

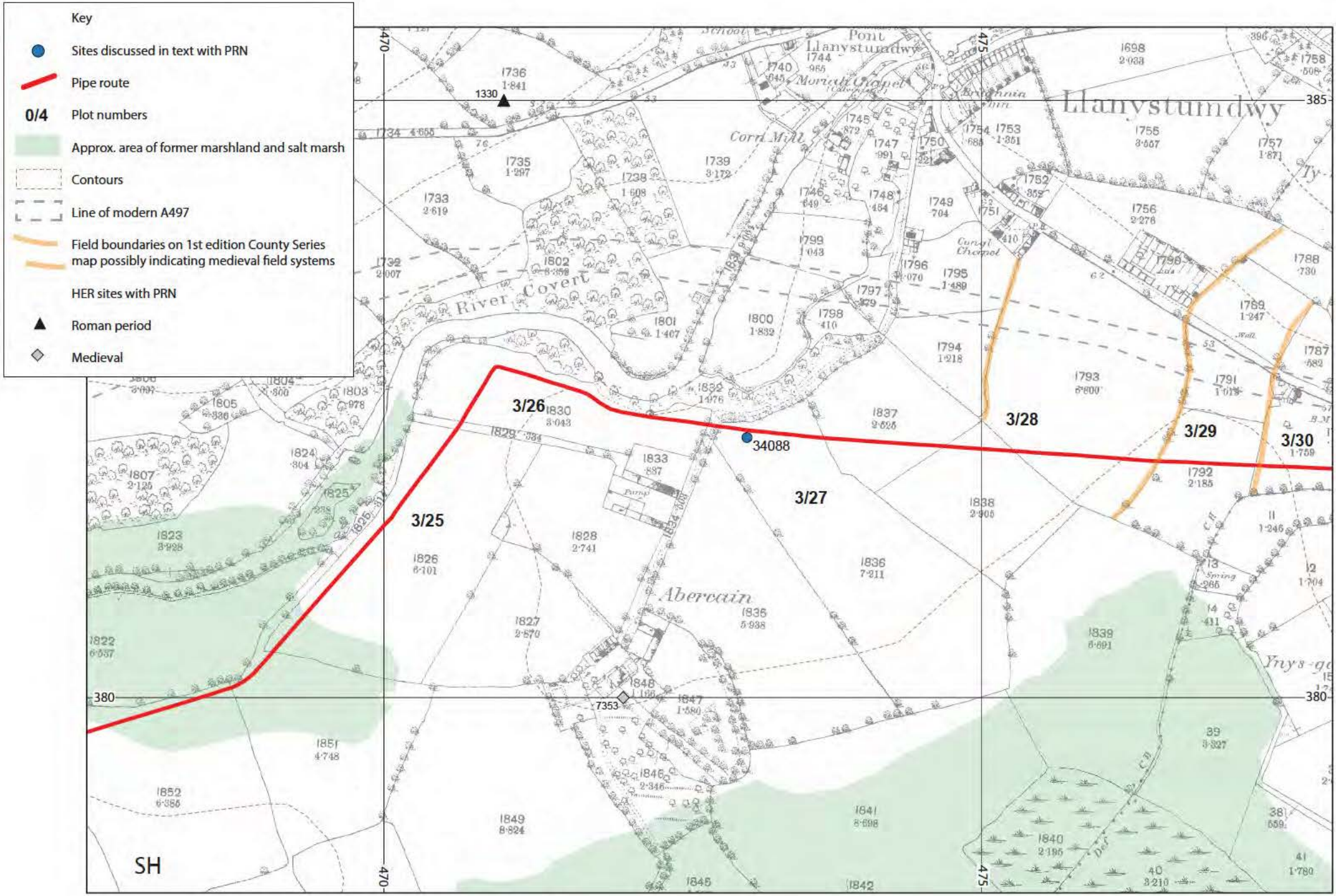


Figure 19. Location of cremation burial PRN 34088 shown on OS 25 inch first edition maps (Caernarvonshire sheets XXXIII.16 (1888)).

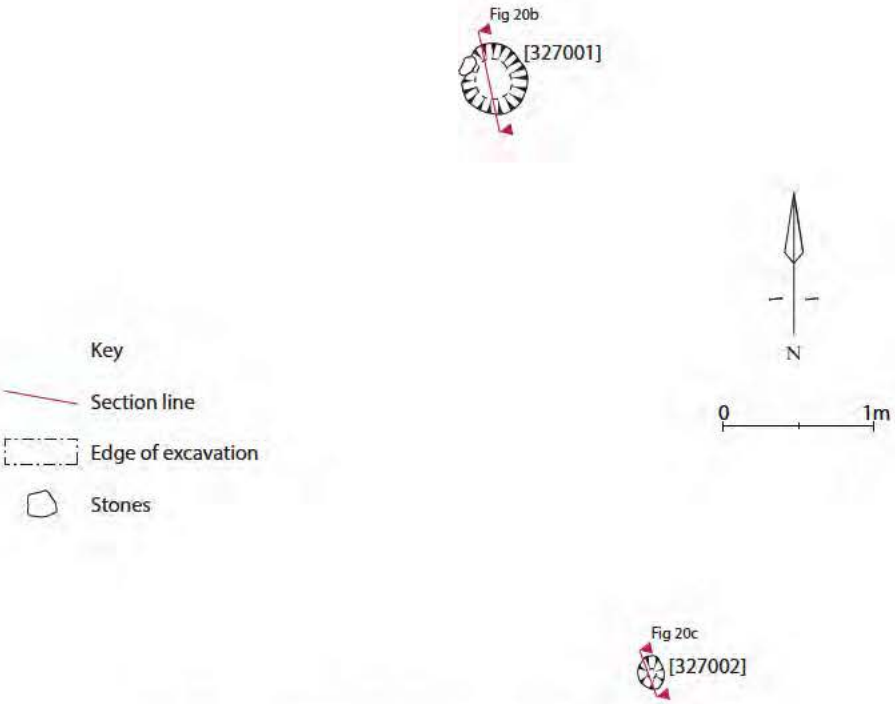


Fig 20a. Plan of cremation burial pits in plot 3/27

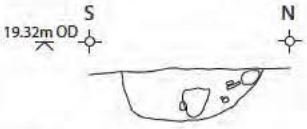


Fig 20b. Section of pit [327001]

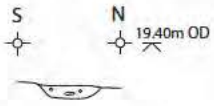


Fig 20c. Section of pit [327002]

Figure 20. Plan and sections of cremation burial (PRN 34088) in plot 3/27

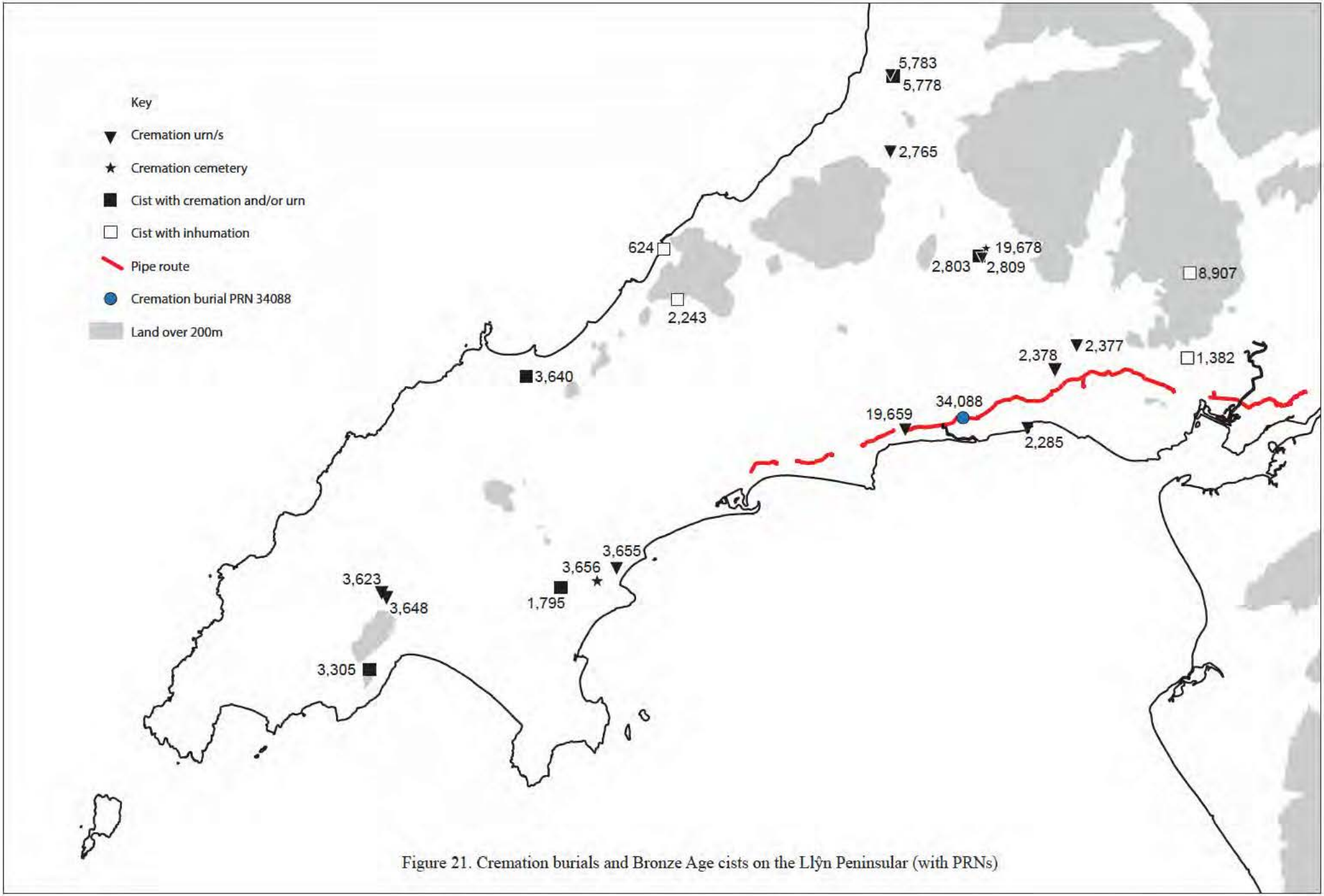


Figure 21. Cremation burials and Bronze Age cists on the Llŷn Peninsular (with PRNs)

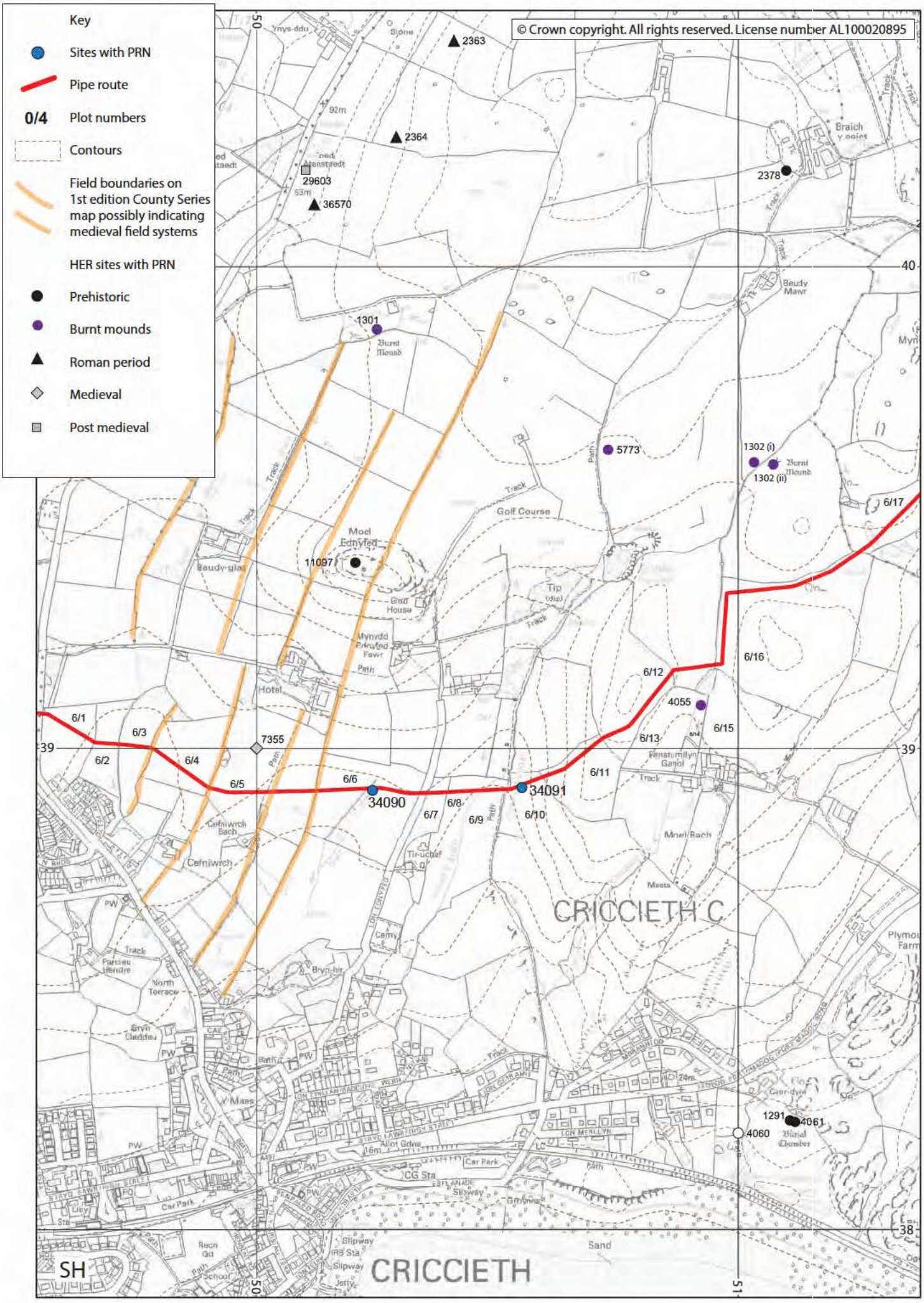


Figure 22. Location of sites PRN 34090 and 34091 shown on modern 1:10,000 scale map, with HER sites discussed in the text.

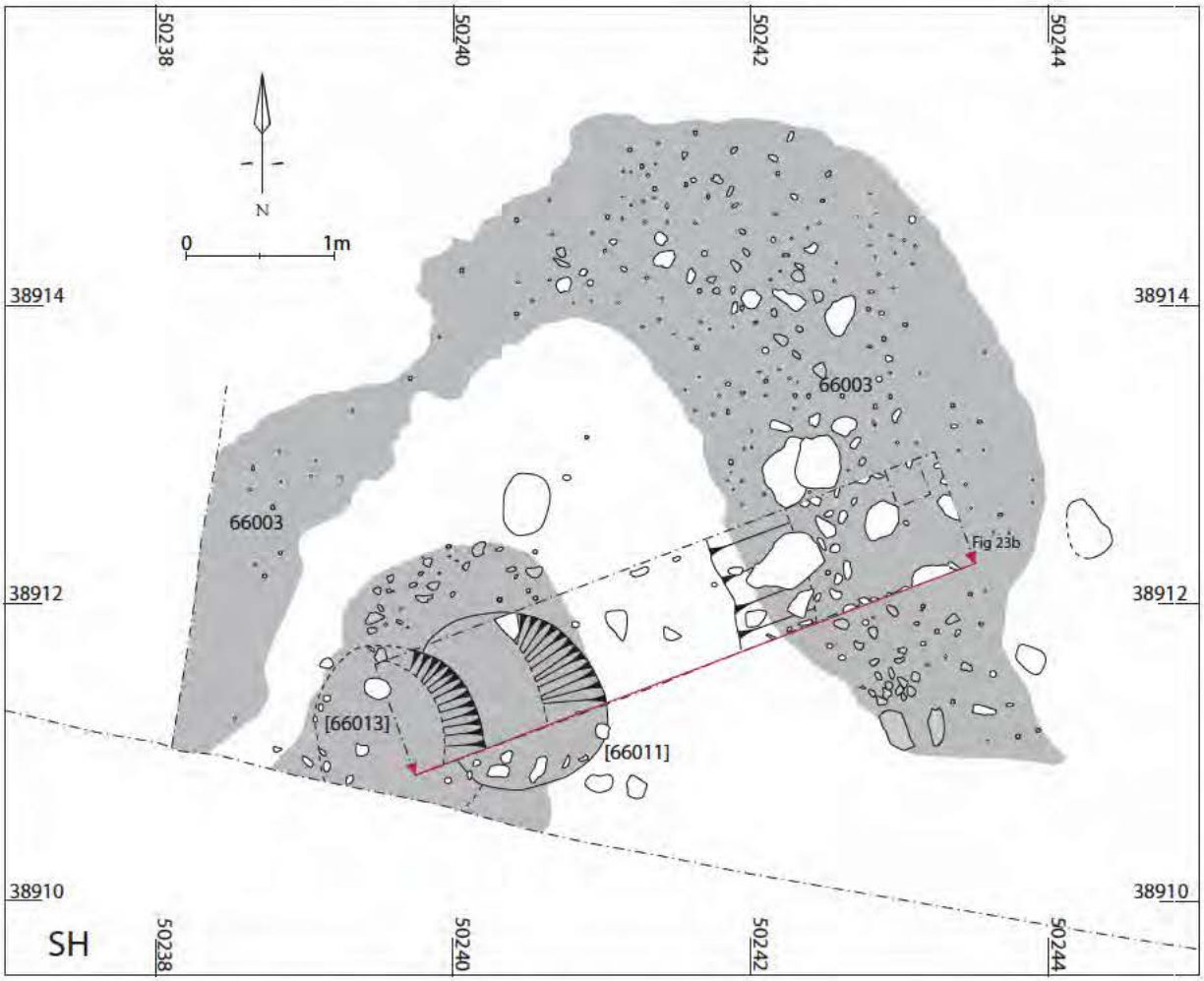
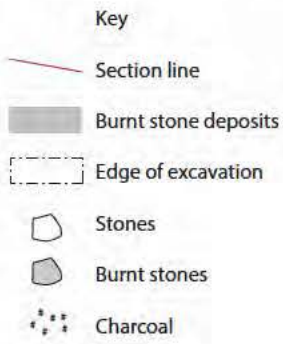


Fig 23a. Plan of burnt mound in plot 6/6



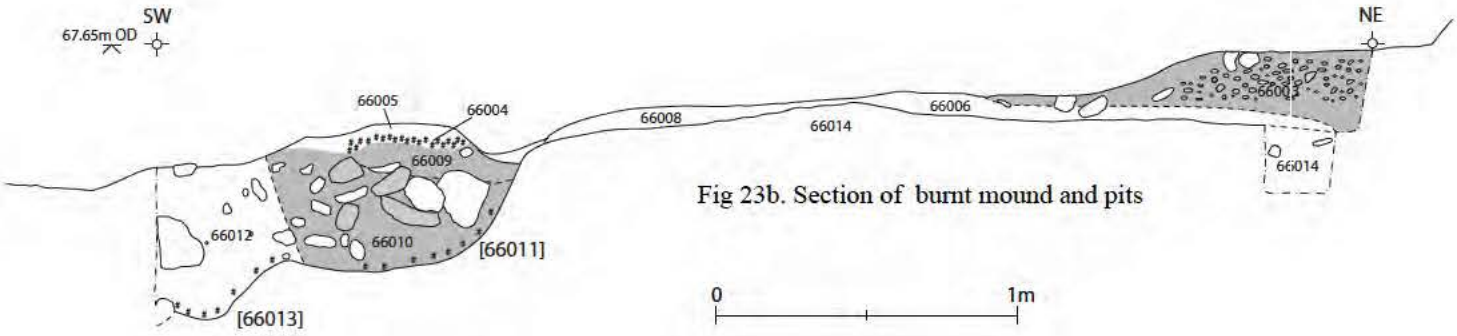


Fig 23b. Section of burnt mound and pits

Figure 23. Plan and section of burnt mound (PRN 34090) in plot 6/6

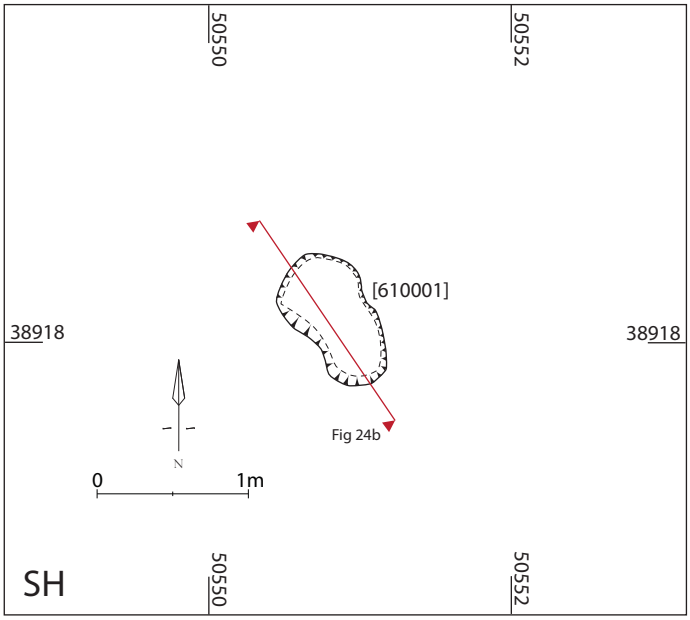


Fig 24a. Plan of fire pit or oven in plot 6/10

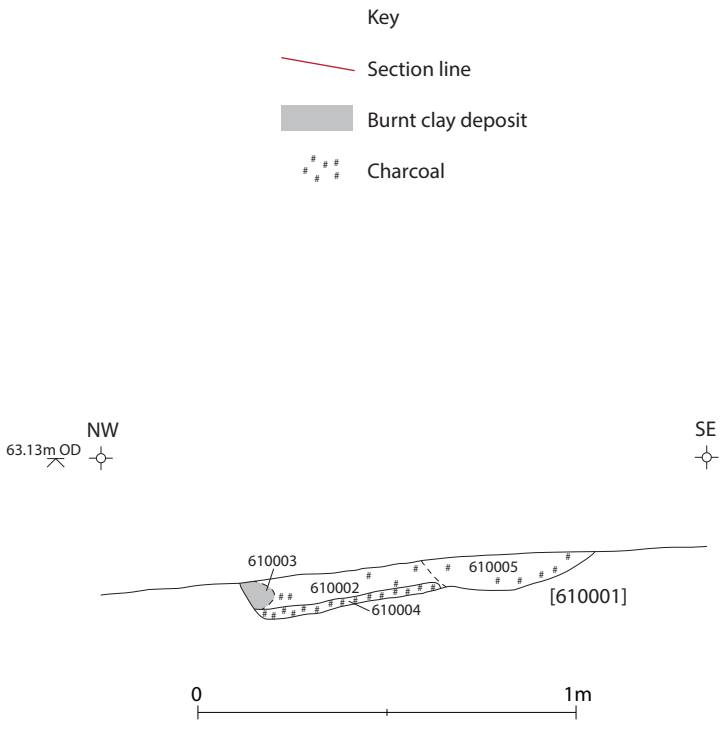


Fig 24b. Section of pit [610001]

Figure 24. Plan and section of fire pit or oven (PRN 34091) in plot 6/10

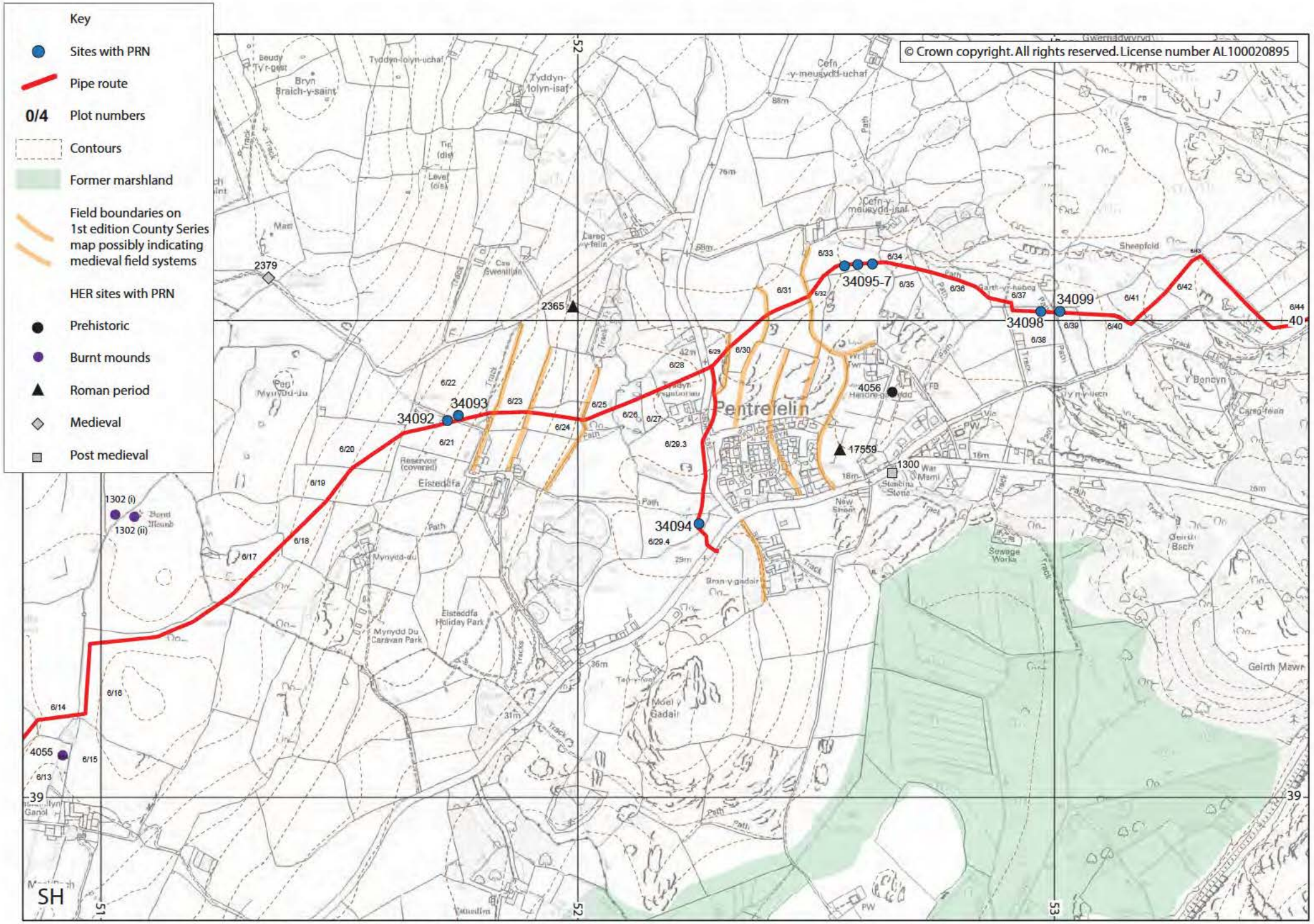


Figure 25. Location of sites PRN 34092 to 34099 shown on modern 1:10,000 scale map, with HER sites discussed in the text.

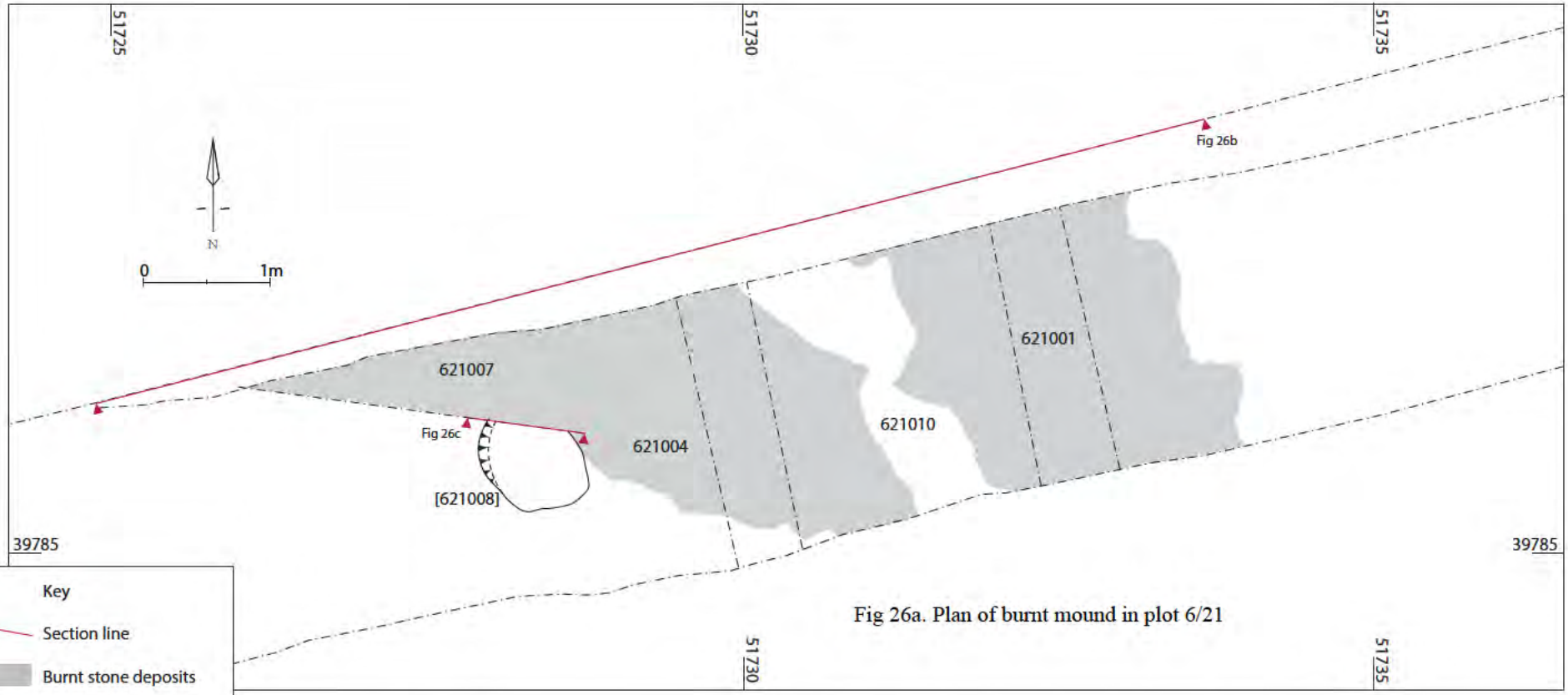
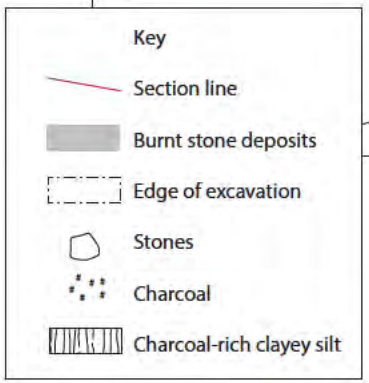


Fig 26a. Plan of burnt mound in plot 6/21



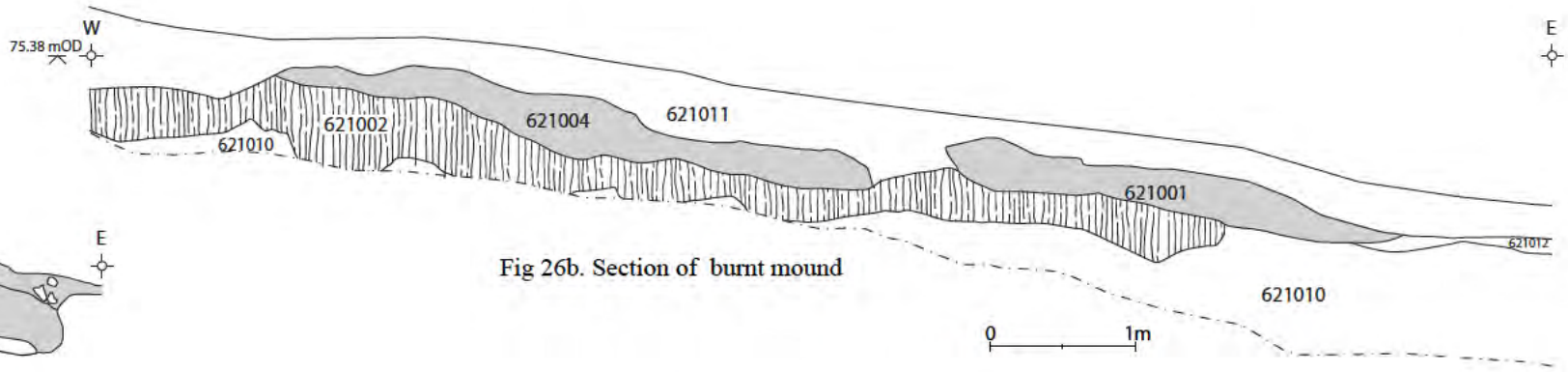


Fig 26b. Section of burnt mound

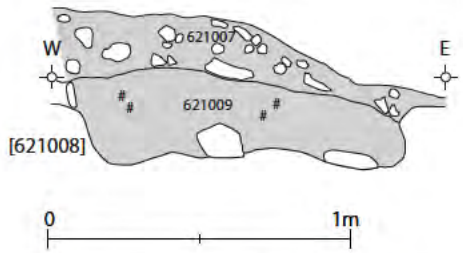


Fig 26c. Section of burnt mound pit

Figure 26. Plan and sections of burnt mound (PRN 34092) in plot 6/21

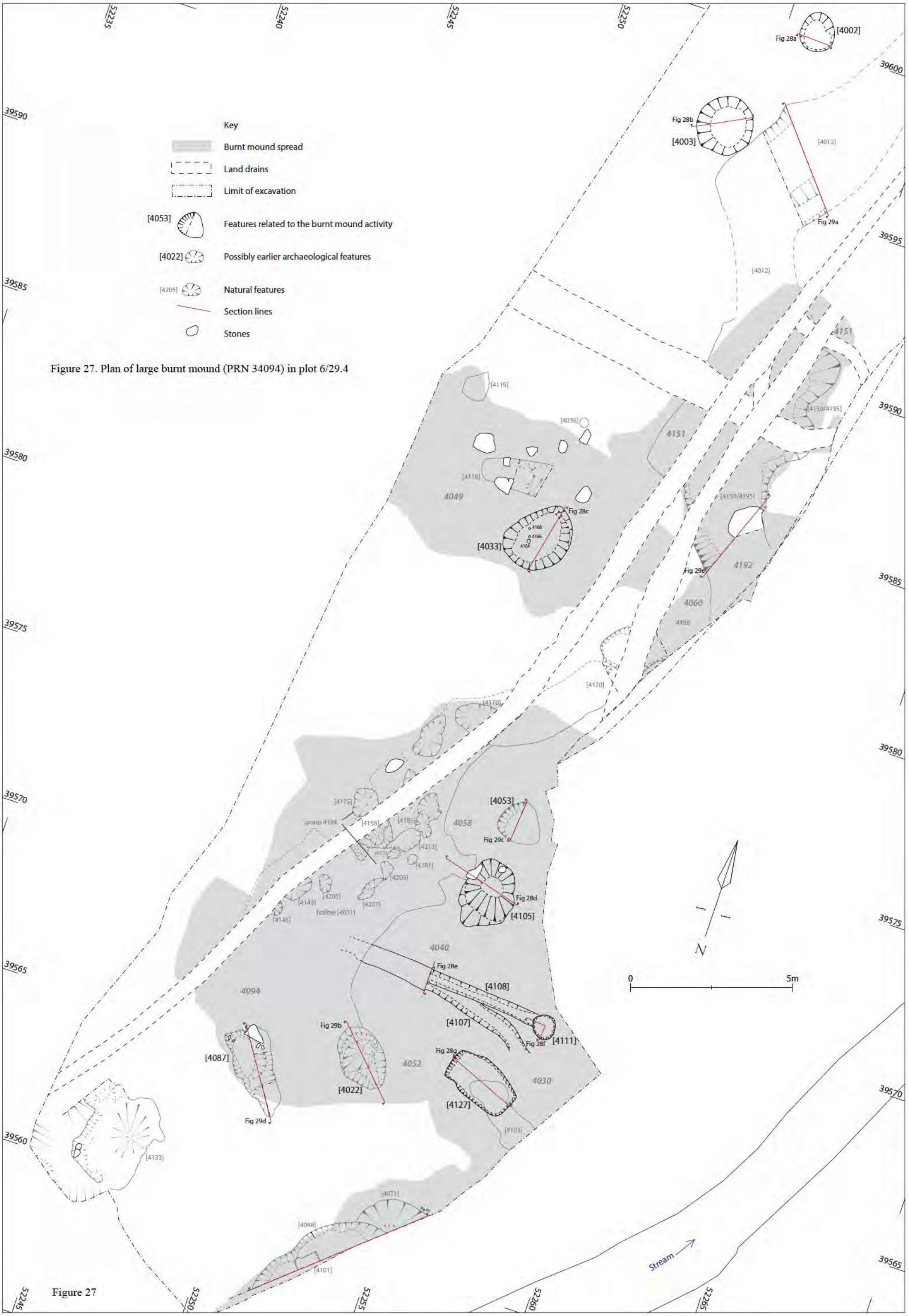


Figure 27. Plan of large burnt mound (PRN 34094) in plot 6/29.4

Figure 27

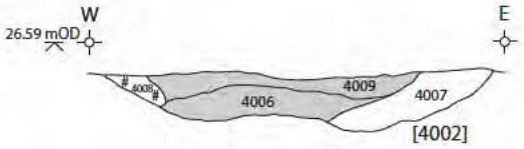
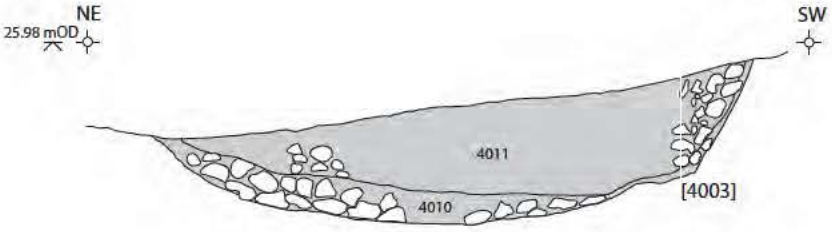


Fig 28a. Section of pit [6294002]



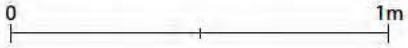
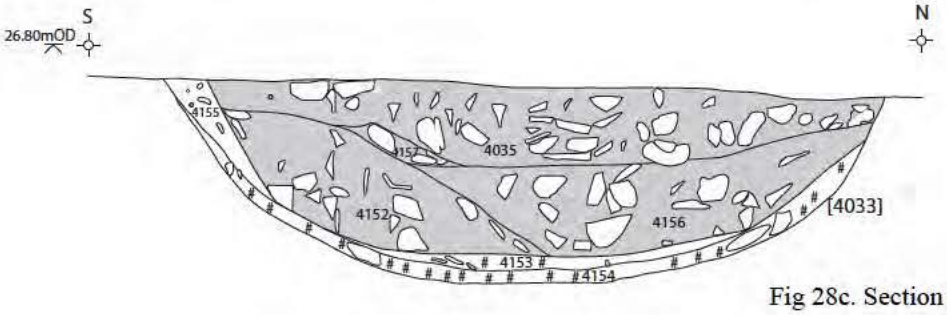


Fig 28b. Section of pit [6294003]



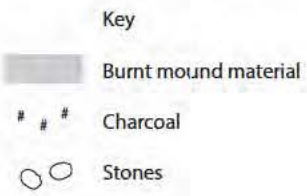


Fig 28c. Section of pit [6294033]

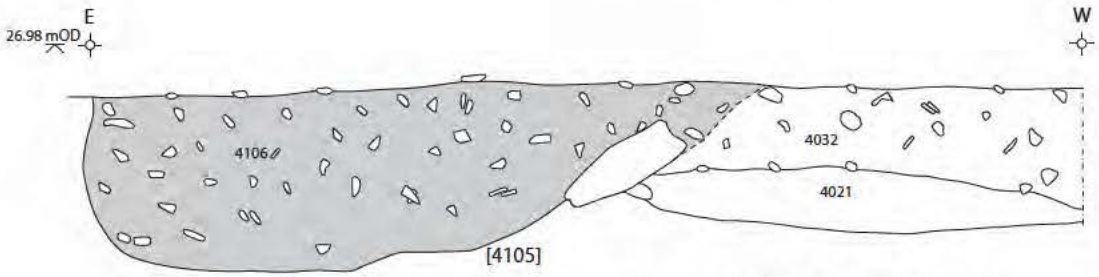


Fig 28d. Section of pit [6294105]

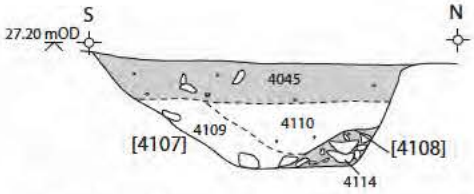


Fig 28e. Section across gullies [6294107] and [6294108]

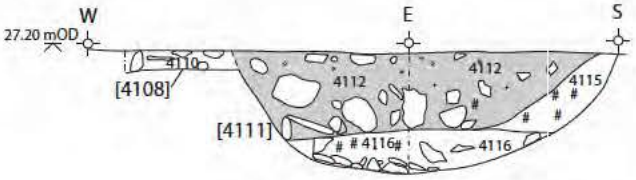


Fig 28f. Section of pit [6294111]

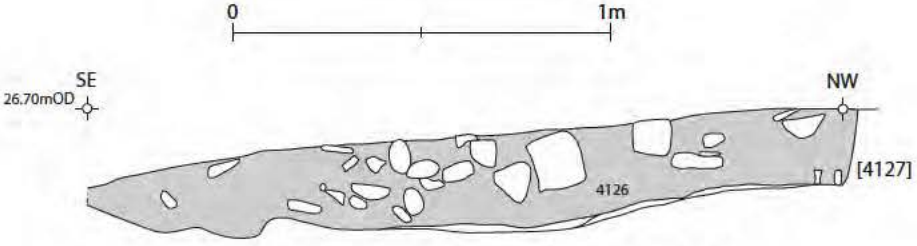


Fig 28g. Section of trough [6294127]

Figure 28. Sections of archaeological features associated with burnt mound (PRN 34094) in plot 6/29.4

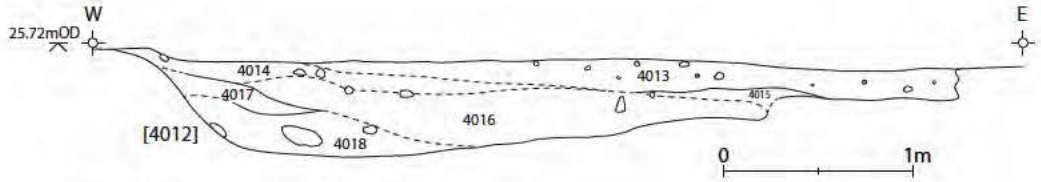


Fig 29a. Section through channel [6294012]

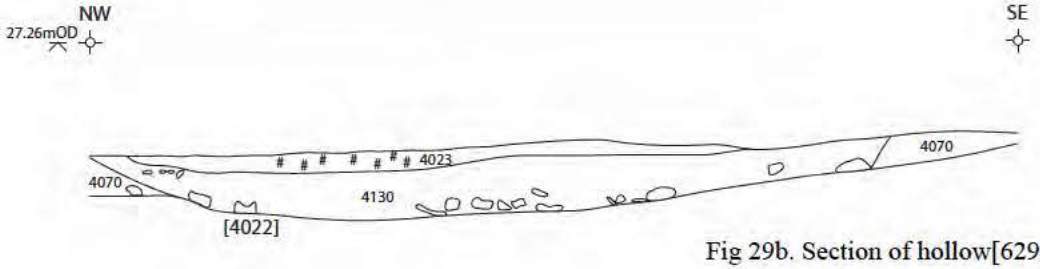


Fig 29b. Section of hollow[6294022]

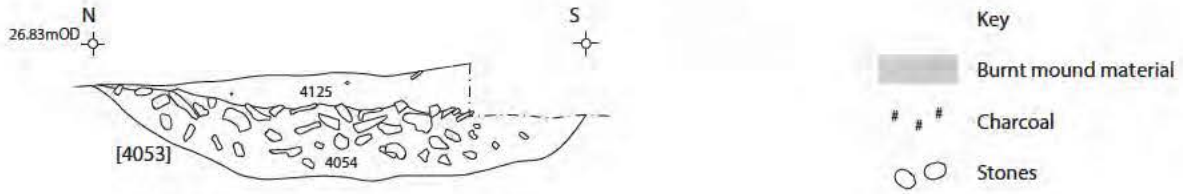


Fig 29c. Section of feature [6294053]

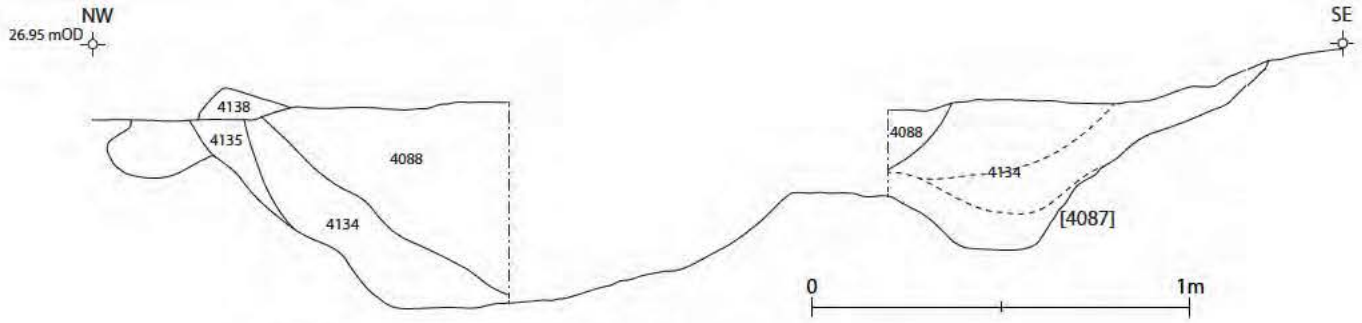


Fig 29d. Section through hollow [6294087]

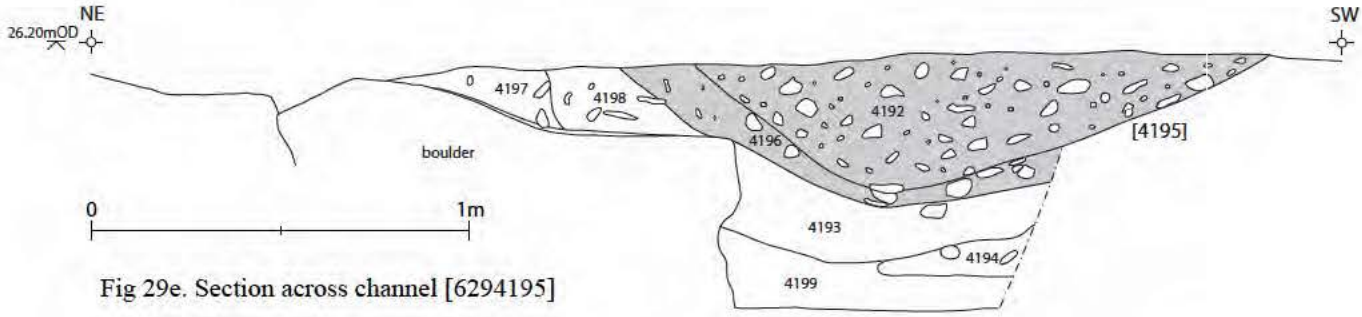
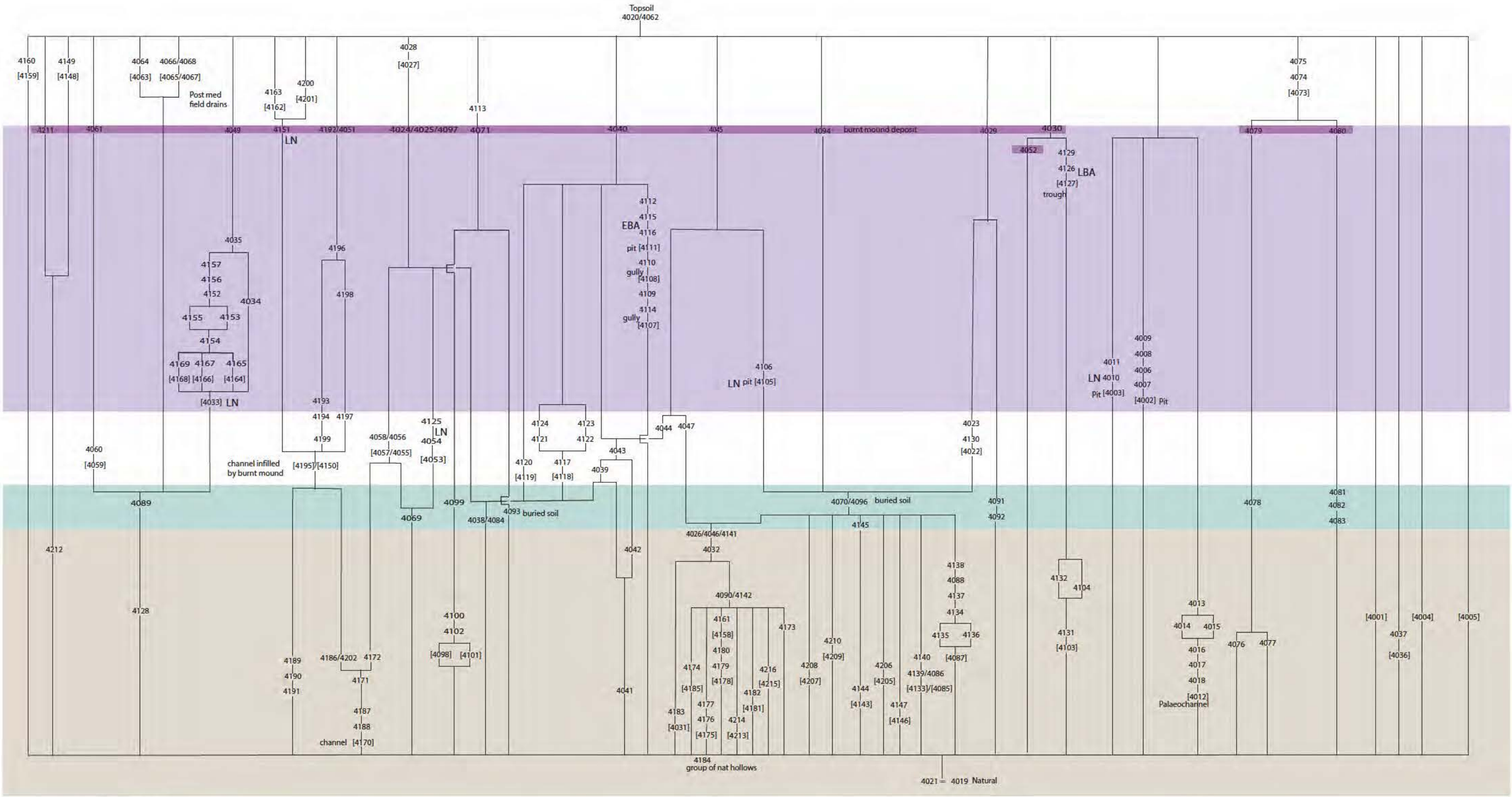


Fig 29e. Section across channel [6294195]

Figure 29. Sections of probable natural features under burnt mound (PRN 34094) in plot 6/29.4



Key to phasing

- Burnt mound deposits
- General burnt mound activity
- Buried soil and natural hollows
- Natural deposits and features

The prefix "629" has been removed from all context numbers for brevity. Numbers in square brackets are cuts.

Approximate period given for radiocarbon dated features
LN = Late Neolithic
EBA = Early Bronze Age
LBA = Late Bronze Age
(The burnt mound deposits are all shown as roughly equivalent even though the must have been produced at very different dates because it is impossible to separate out phases of dumping)

Figure 30. Matrix for plot 6/29.4

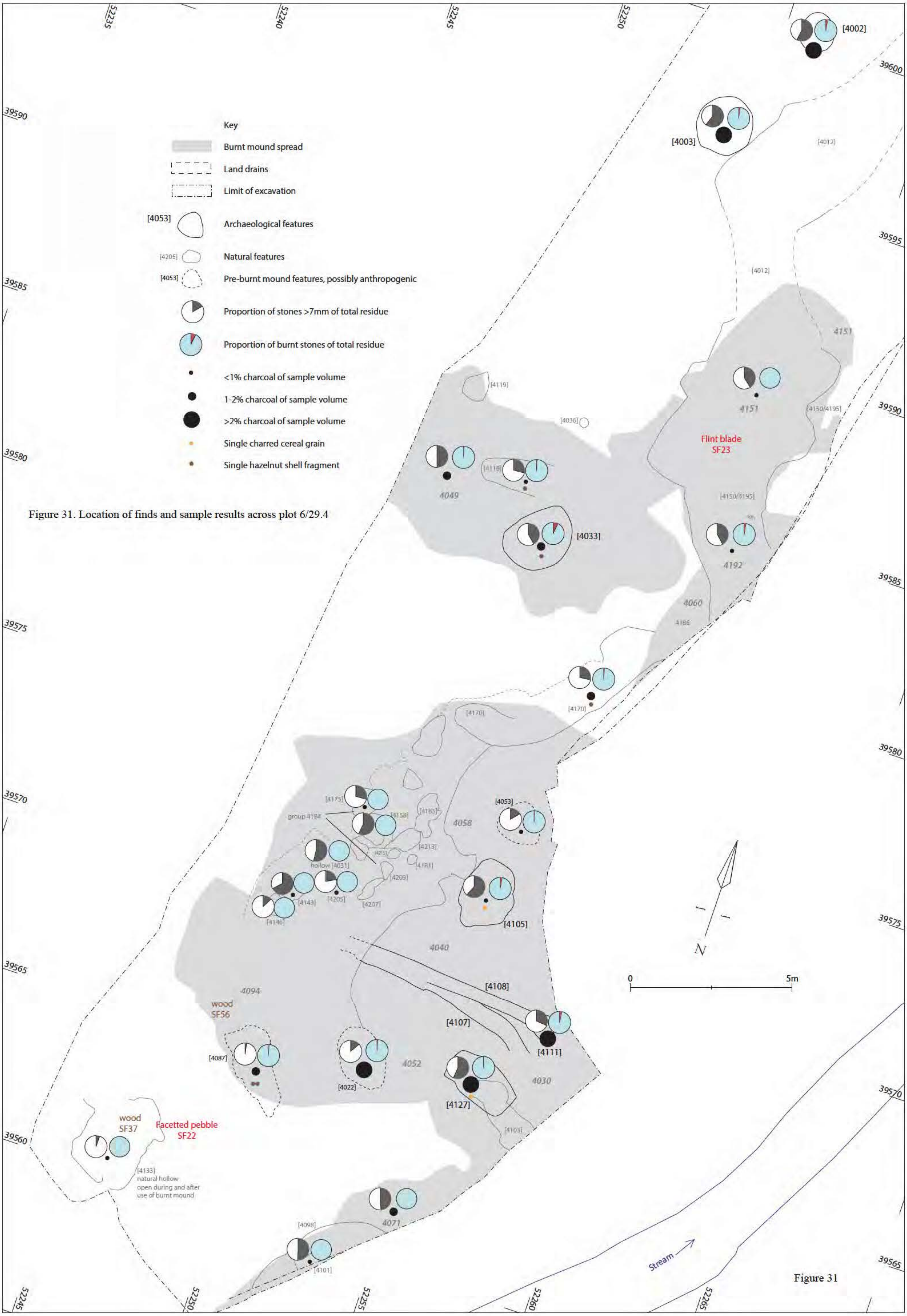


Figure 31. Location of finds and sample results across plot 6/29.4

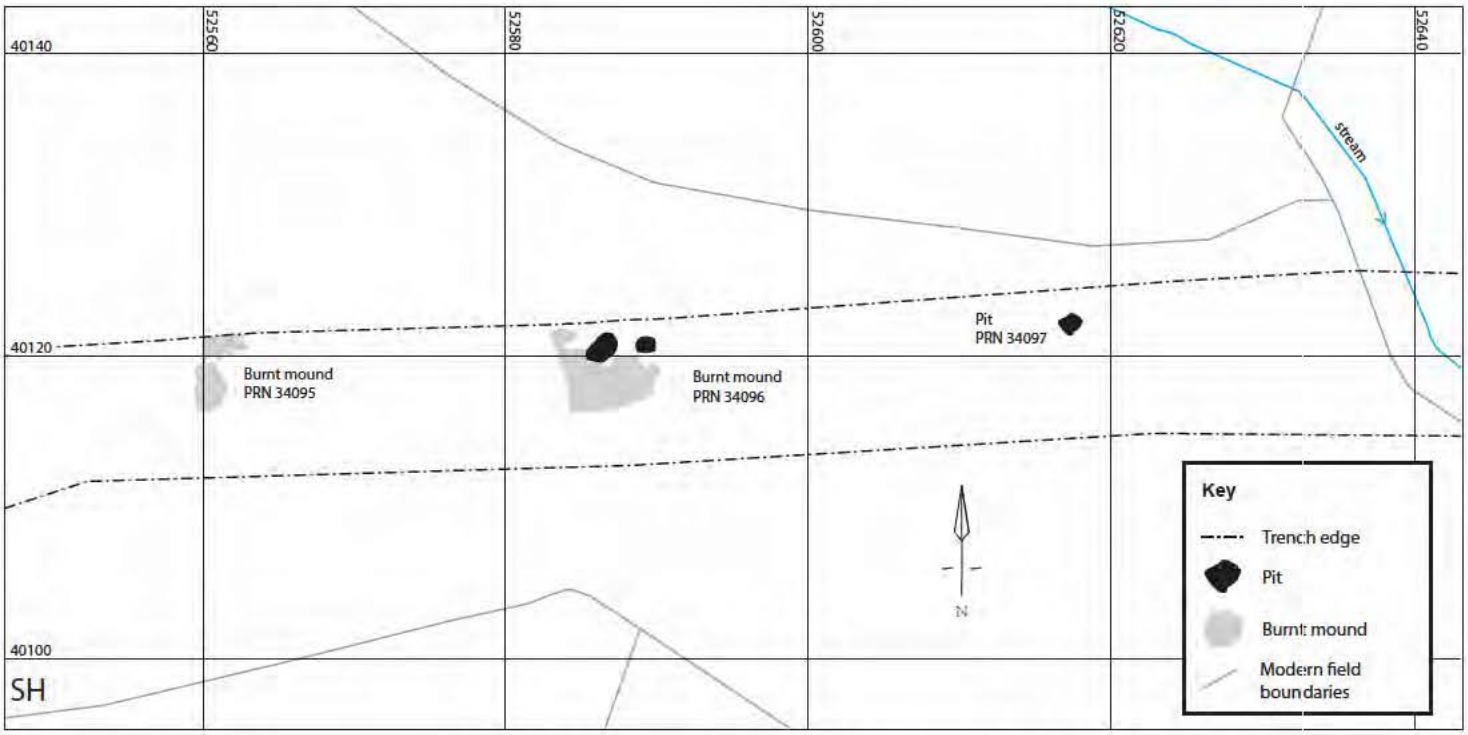


Figure 32. Location of burnt mounds and pit in plot 6/33

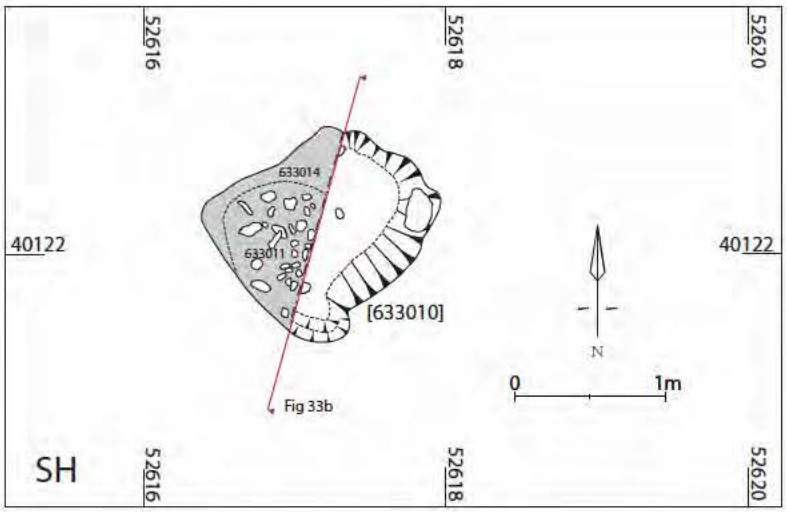


Figure 33a. Plan of pit [633010]

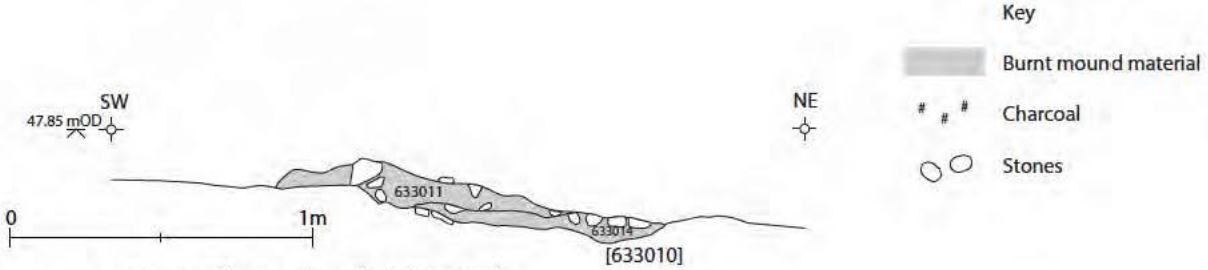


Figure 33b. Section of pit [633010]

Figure 33. Plan and section of pit (PRN 34097) in plot 6/33

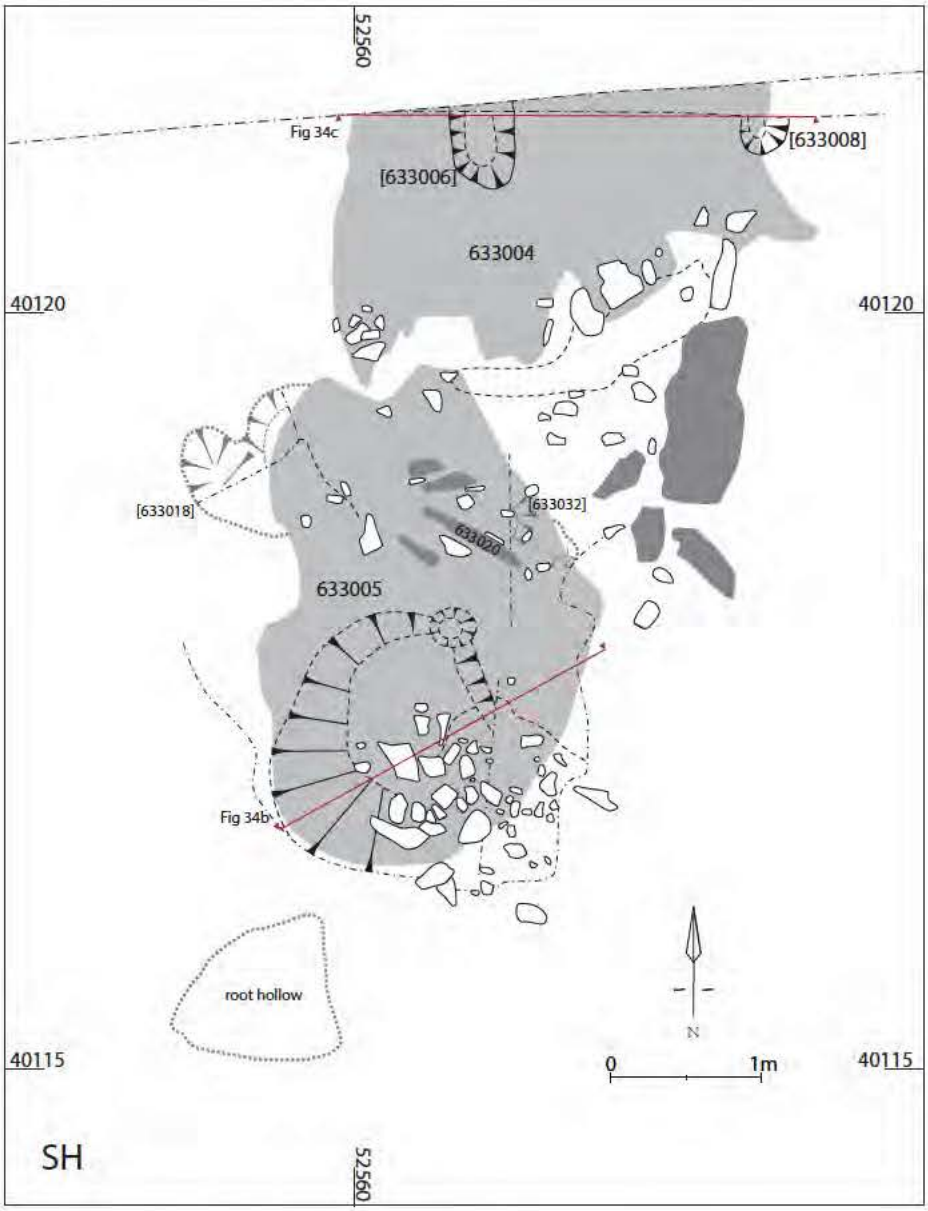


Figure 34a. Plan of burnt mound (633012) in plot 6/33

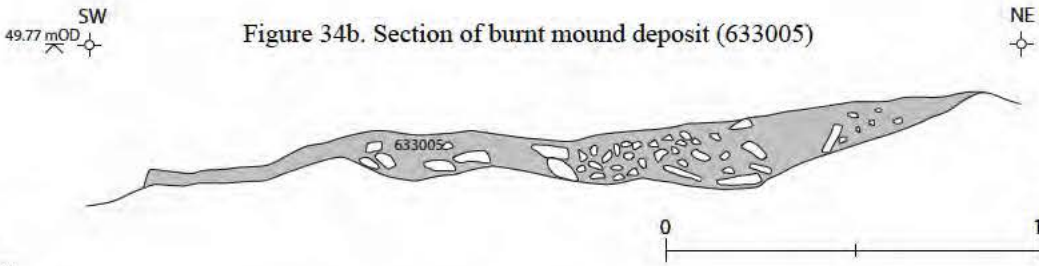


Figure 34b. Section of burnt mound deposit (633005)

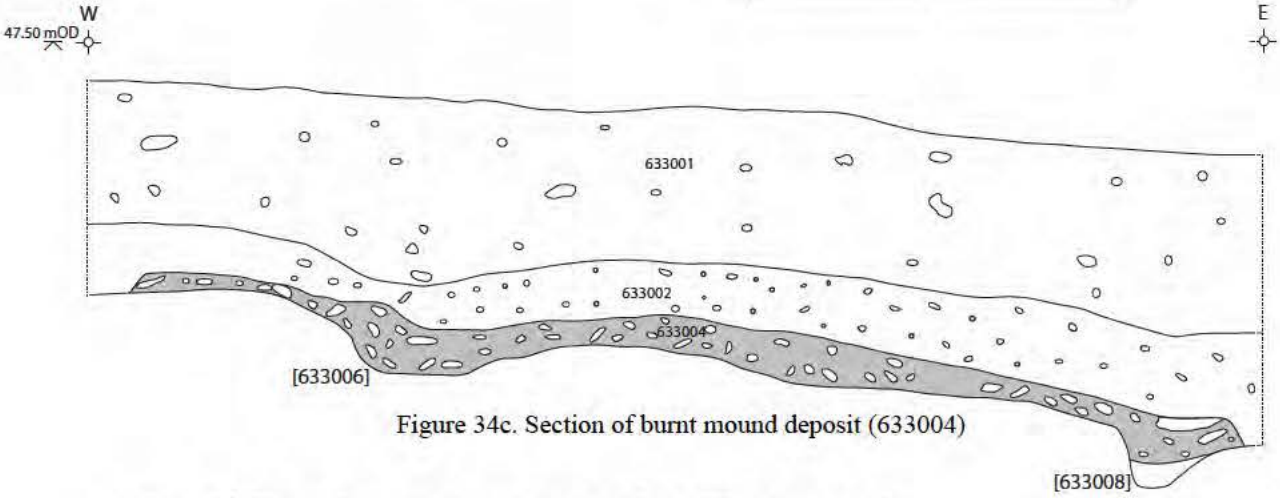


Figure 34c. Section of burnt mound deposit (633004)

Figure 34. Plan and sections of burnt mound (PRN 34095) in plot 6/33

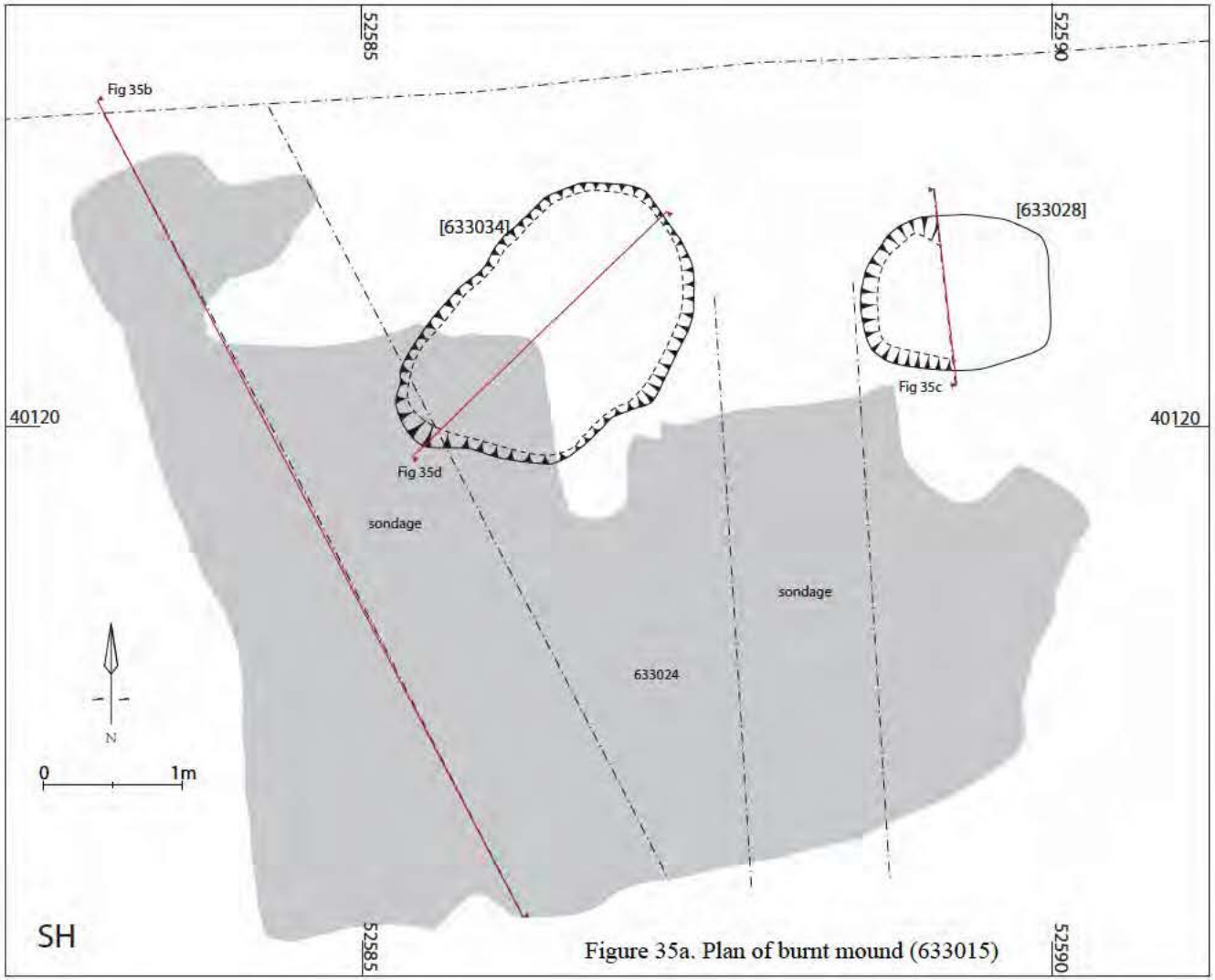


Figure 35a. Plan of burnt mound (633015)

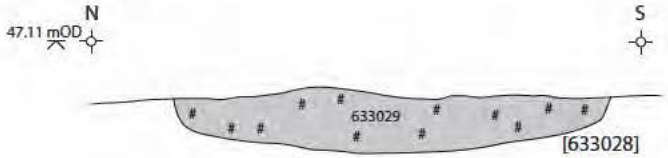


Figure 35c. Section of burnt mound pit [633028]

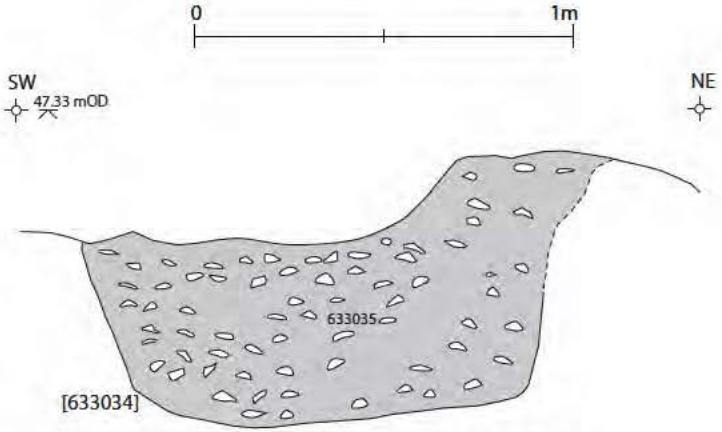


Figure 35d. Section of burnt mound pit [633034]

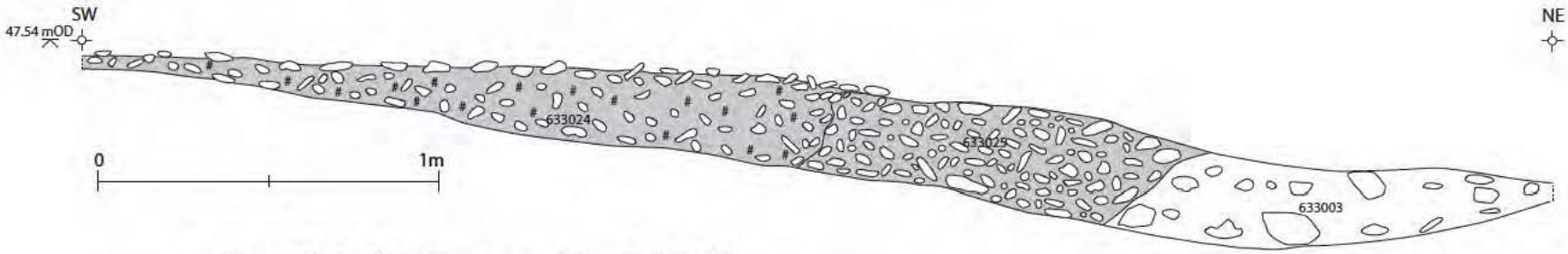


Figure 35b. Section of burnt mound deposit (633024)

Key

Burnt mound material

Charcoal

Stones

Section line

Figure 35. Plan and sections of burnt mound (PRN 34096) in plot 6/33

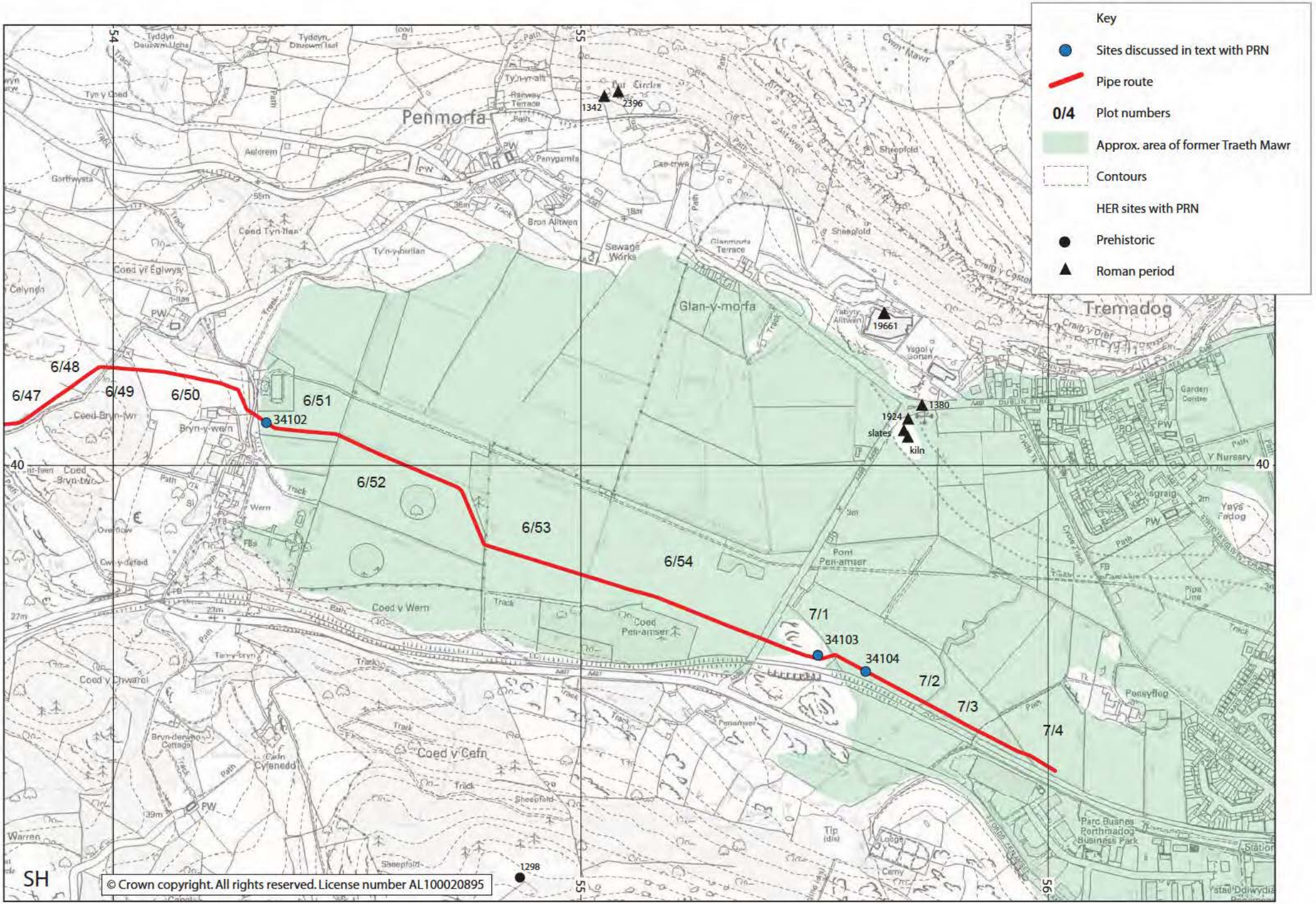


Figure 36. Location of sites PRN 34102 to 34104 shown on modern 1:10,000 scale map, with HER sites discussed in the text.

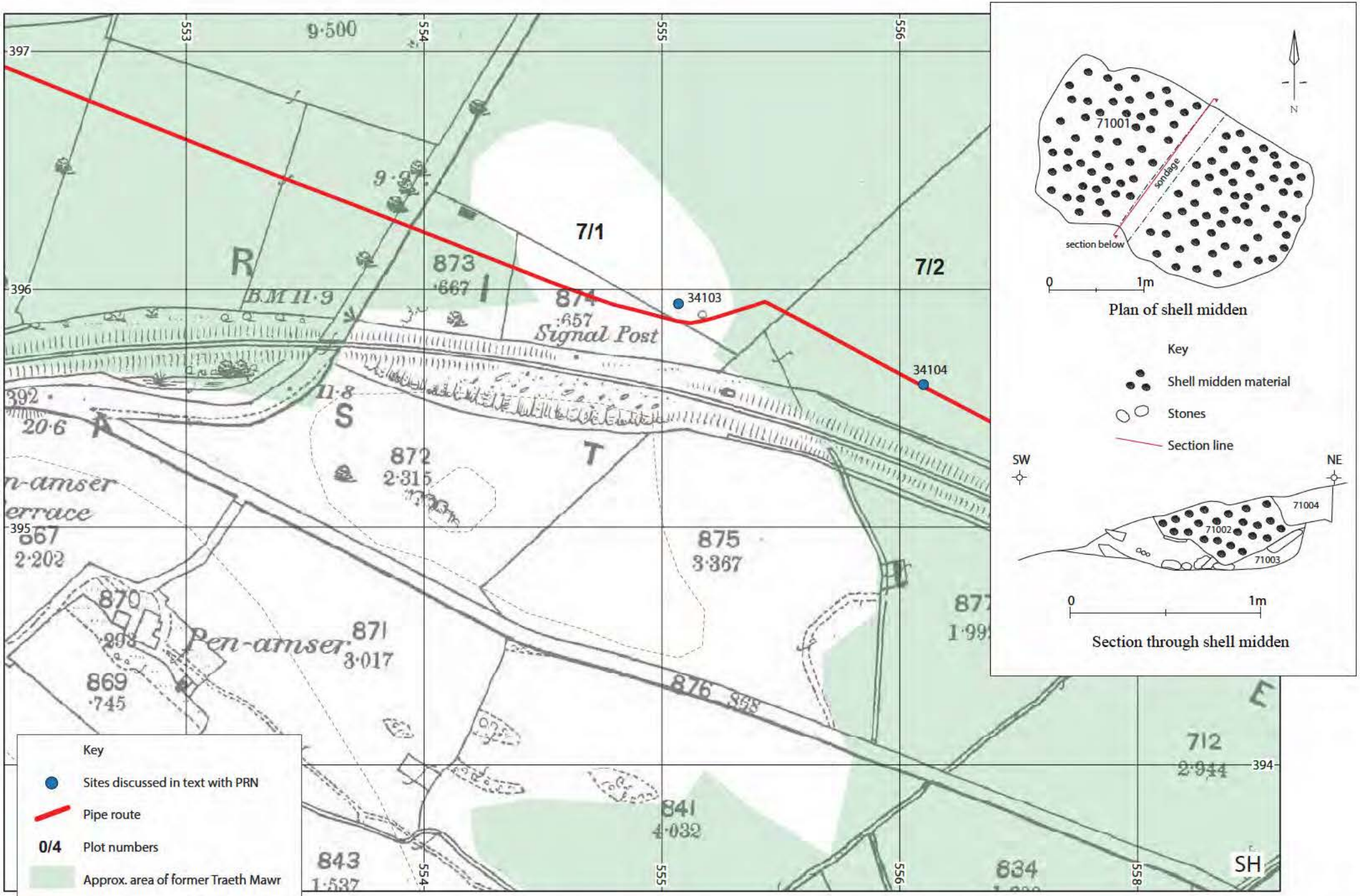


Figure 37. Detailed location of shell midden (PRN 34103) shown on extract from OS 25 inch first edition map (Caernarvonshire sheet XXXXI.11 (1889)), with inset showing plan and section of midden

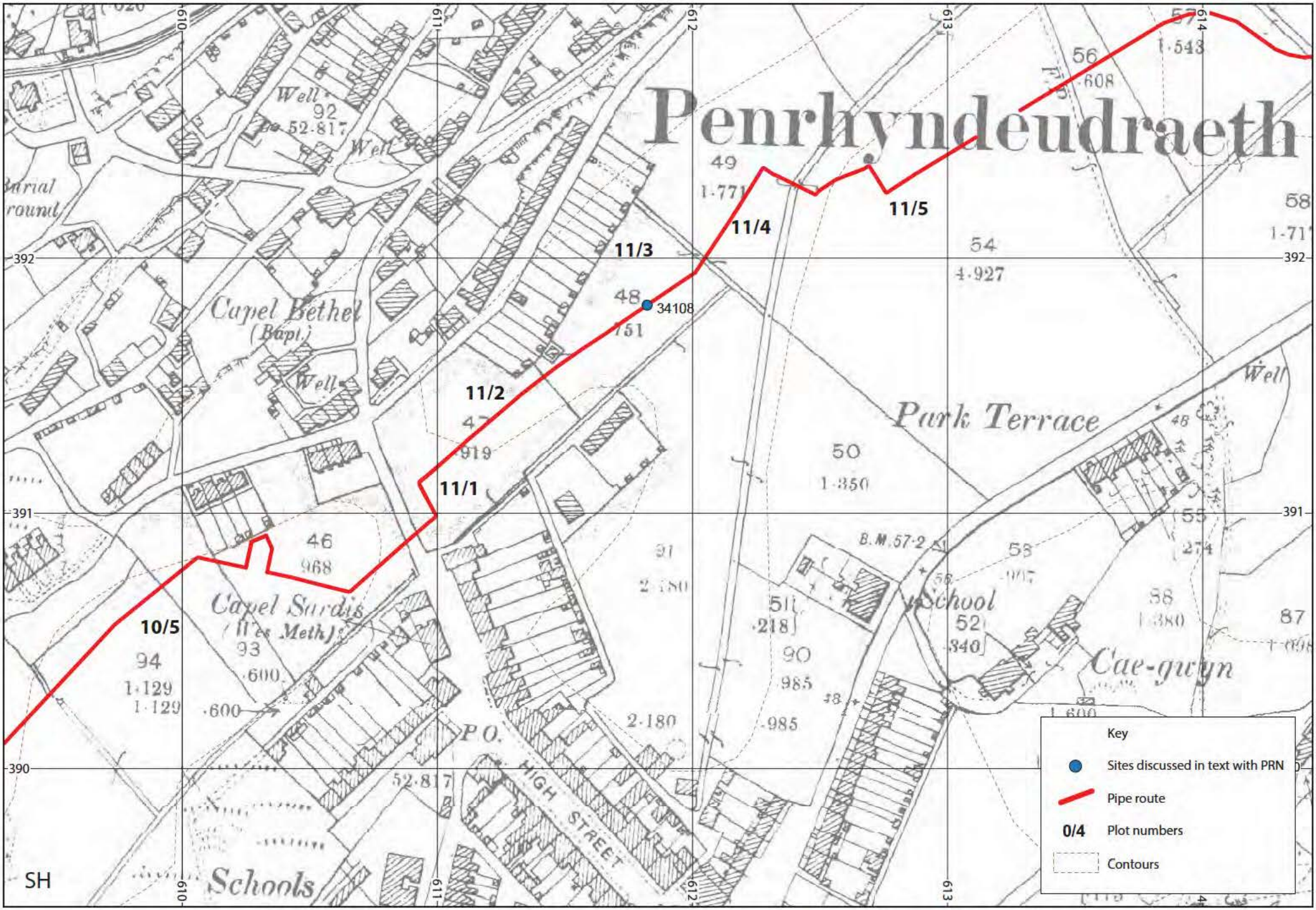


Figure 38. Location of site PRN 34108 shown extract from OS 25 inch second edition map (Merionethshire sheet XI.02 (1901)).

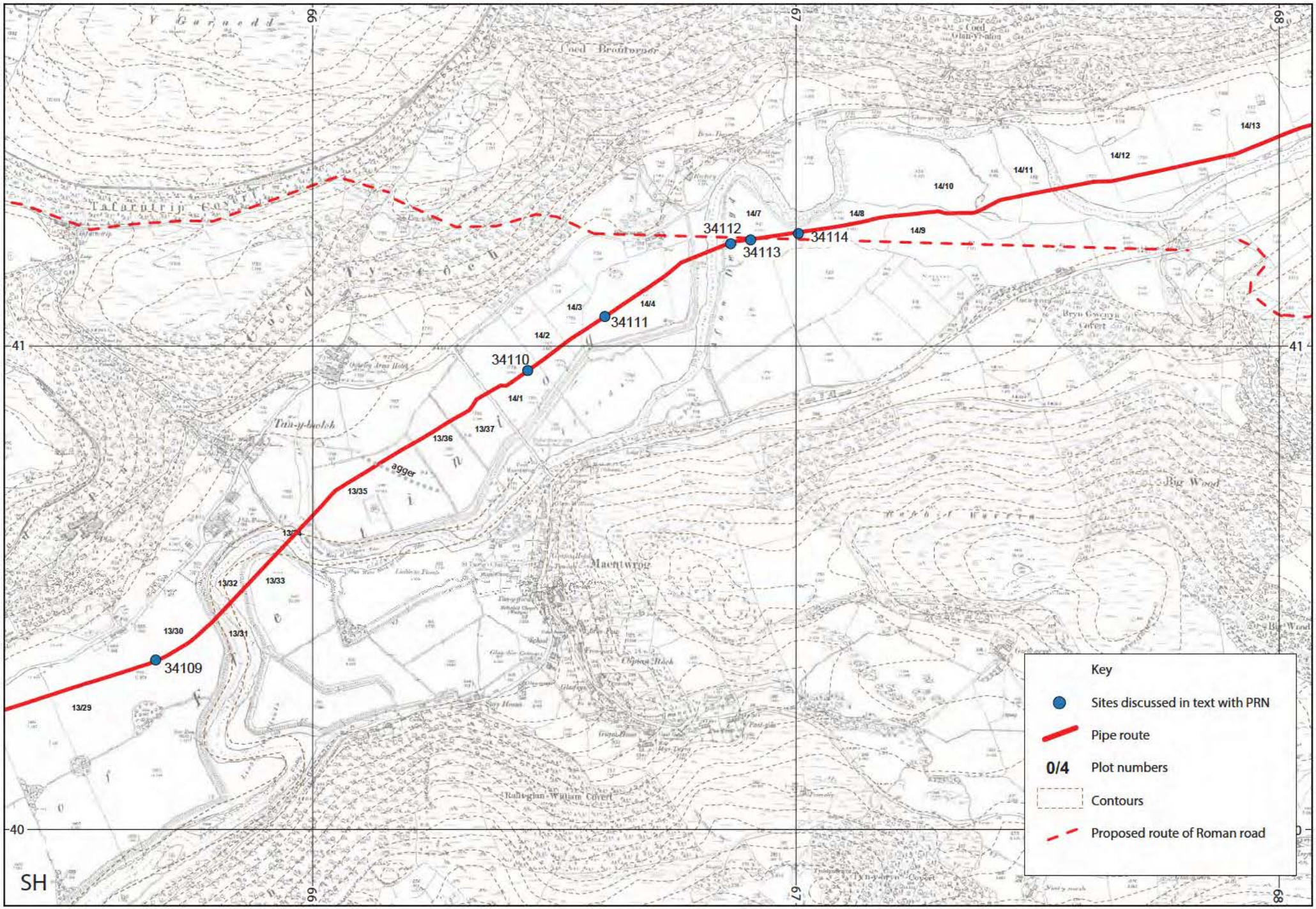


Figure 39. Location of sites PRN 34109 to 34114 shown on extract from OS 25 inch second edition map (Merionethshire sheet XI.08 (1901)).

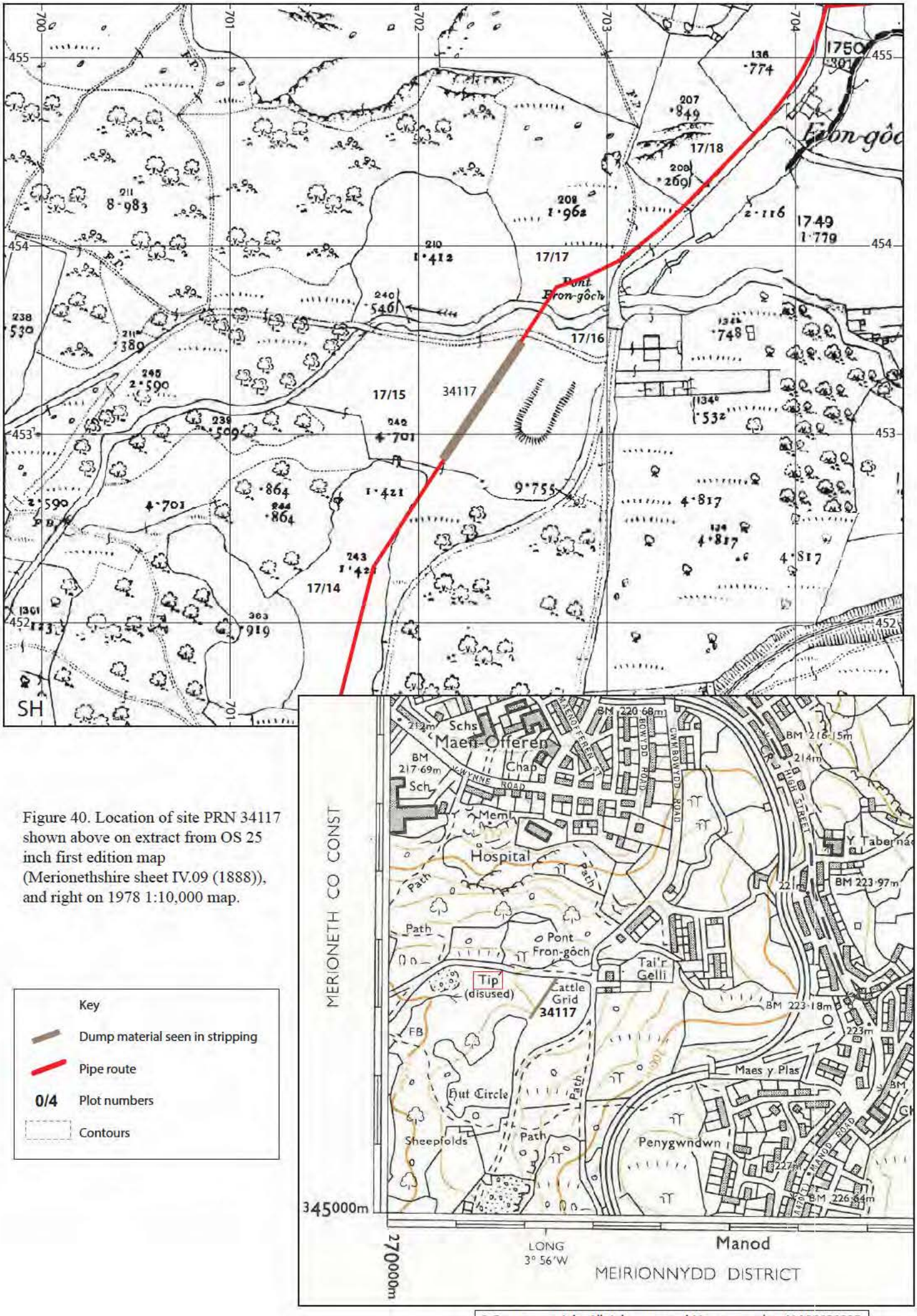


Figure 40. Location of site PRN 34117 shown above on extract from OS 25 inch first edition map (Merionethshire sheet IV.09 (1888)), and right on 1978 1:10,000 map.

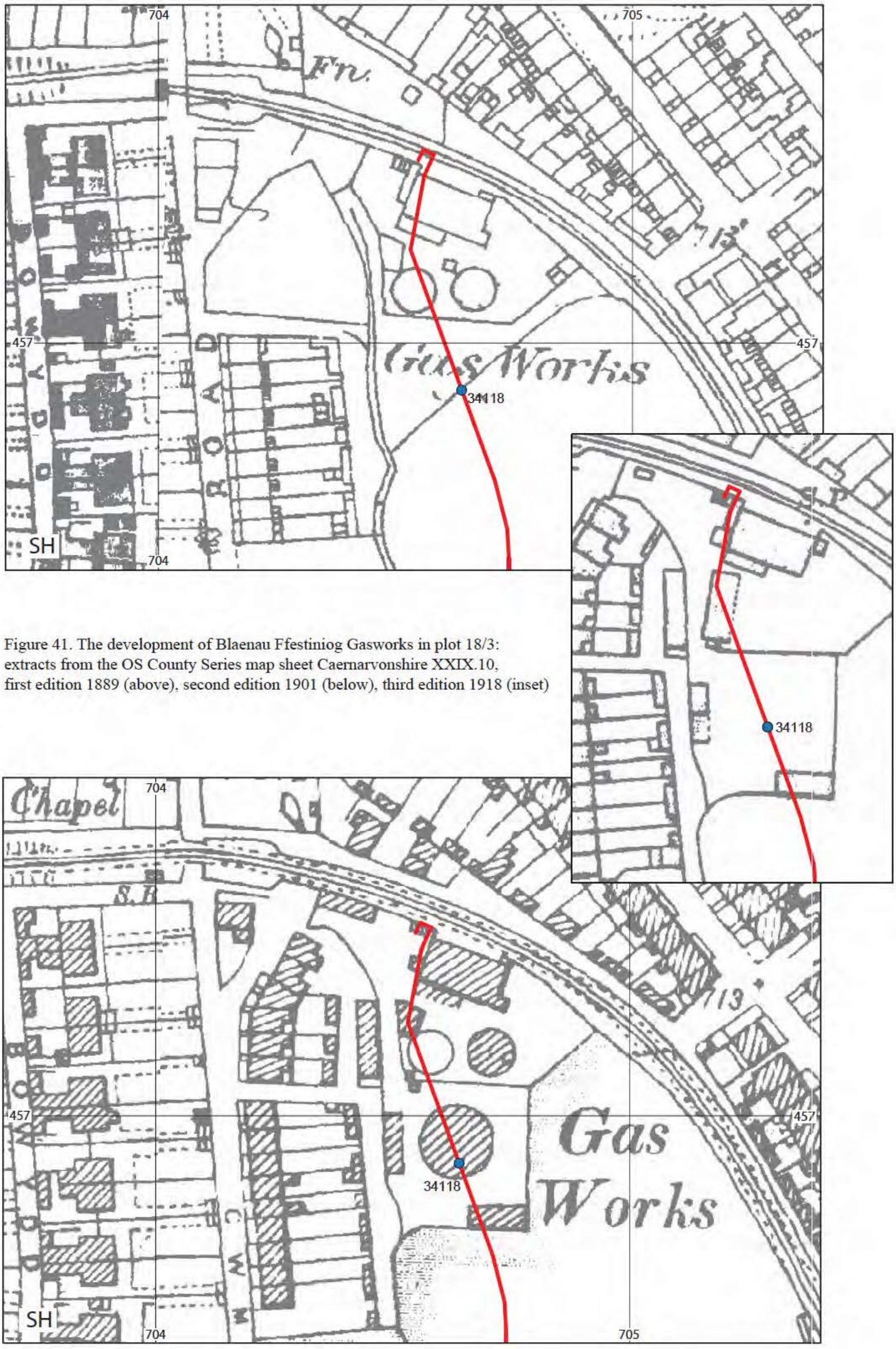


Figure 41. The development of Blaenau Ffestiniog Gasworks in plot 18/3: extracts from the OS County Series map sheet Caernarvonshire XXIX.10, first edition 1889 (above), second edition 1901 (below), third edition 1918 (inset)

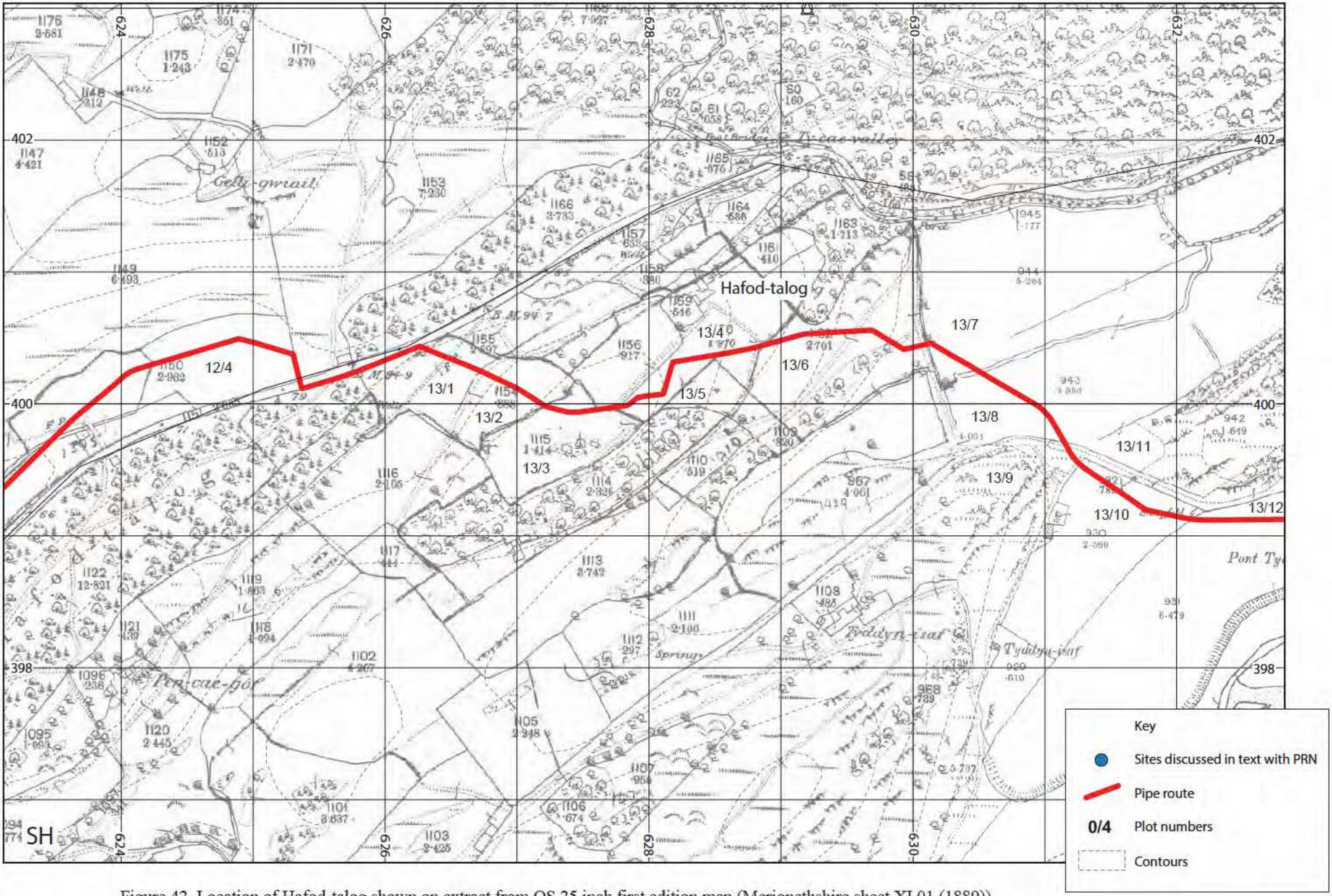


Figure 42. Location of Hafod-talog shown on extract from OS 25 inch first edition map (Merionethshire sheet XI.01 (1889)).

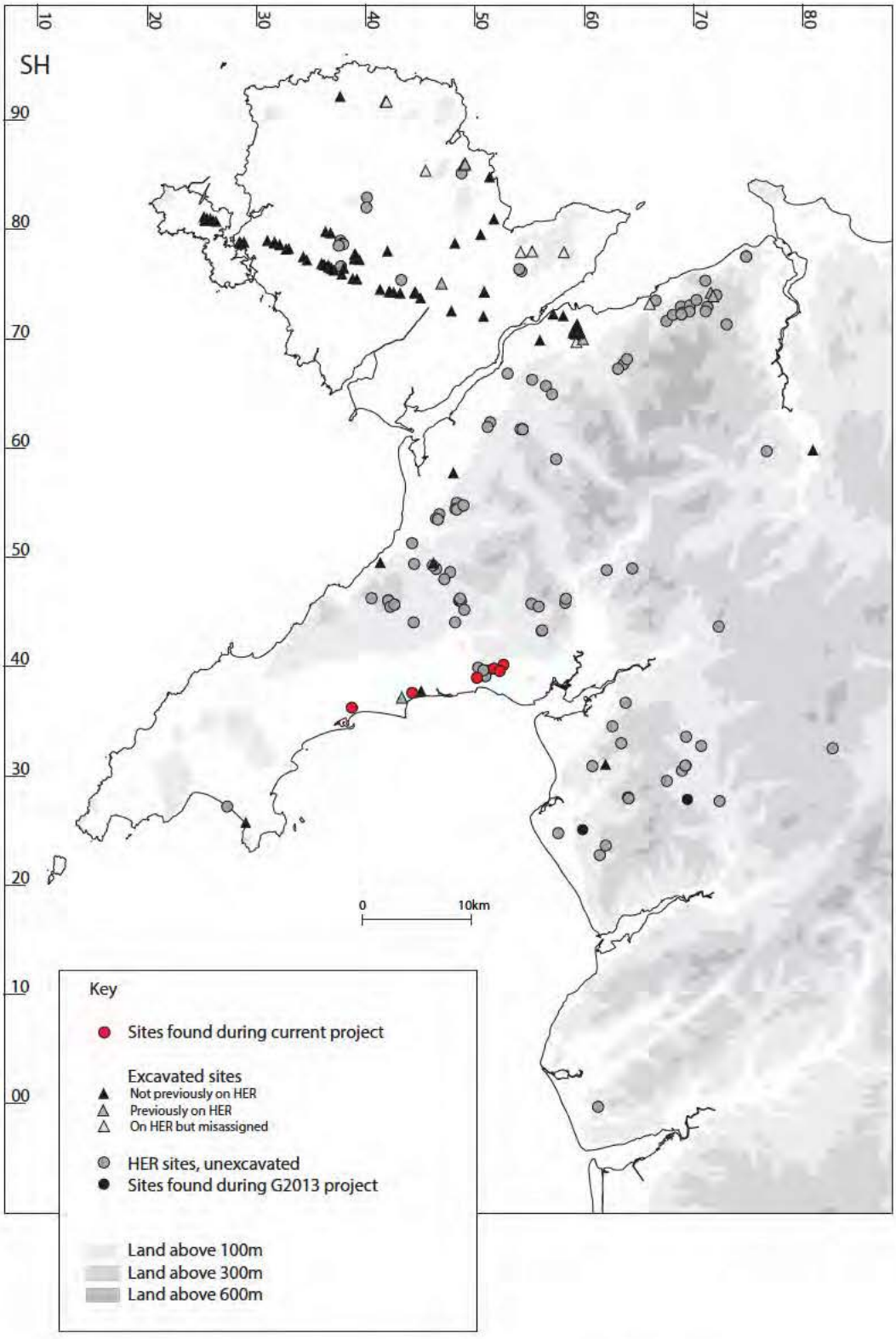


Figure 43. Map of burnt mounds known from north-west Wales (after Kenney 2012c)

Chwilog

Llanystumdwy

Abererch

35032

24742

3/10

3/6

31151

31147

0/11

0/2

Key

Pipe route (as built)

Burnt mound sites with PRN or plot number

Possible or doubtful burnt mound sites

Possible Bronze Age settlement sites

Other prehistoric sites on HER

Contours

N

0 1km

SH

Figure 44. Burnt mounds along western end of pipe route with other prehistoric sites

Key

Pipe route (as built)

Burnt mound sites with PRN or plot number

Possible Bronze Age settlement sites

Other prehistoric sites on HER

Contours

National Park

Penmorfa

Tremadog

Traeth Mawr

6/33

6/21

6/29.4

5773

1302

4055

6/6

Porthmadog

Criccieth

Afon Dwyryd

N

0 1km

SH

Figure 45. Burnt mounds around Criccieth with other prehistoric sites

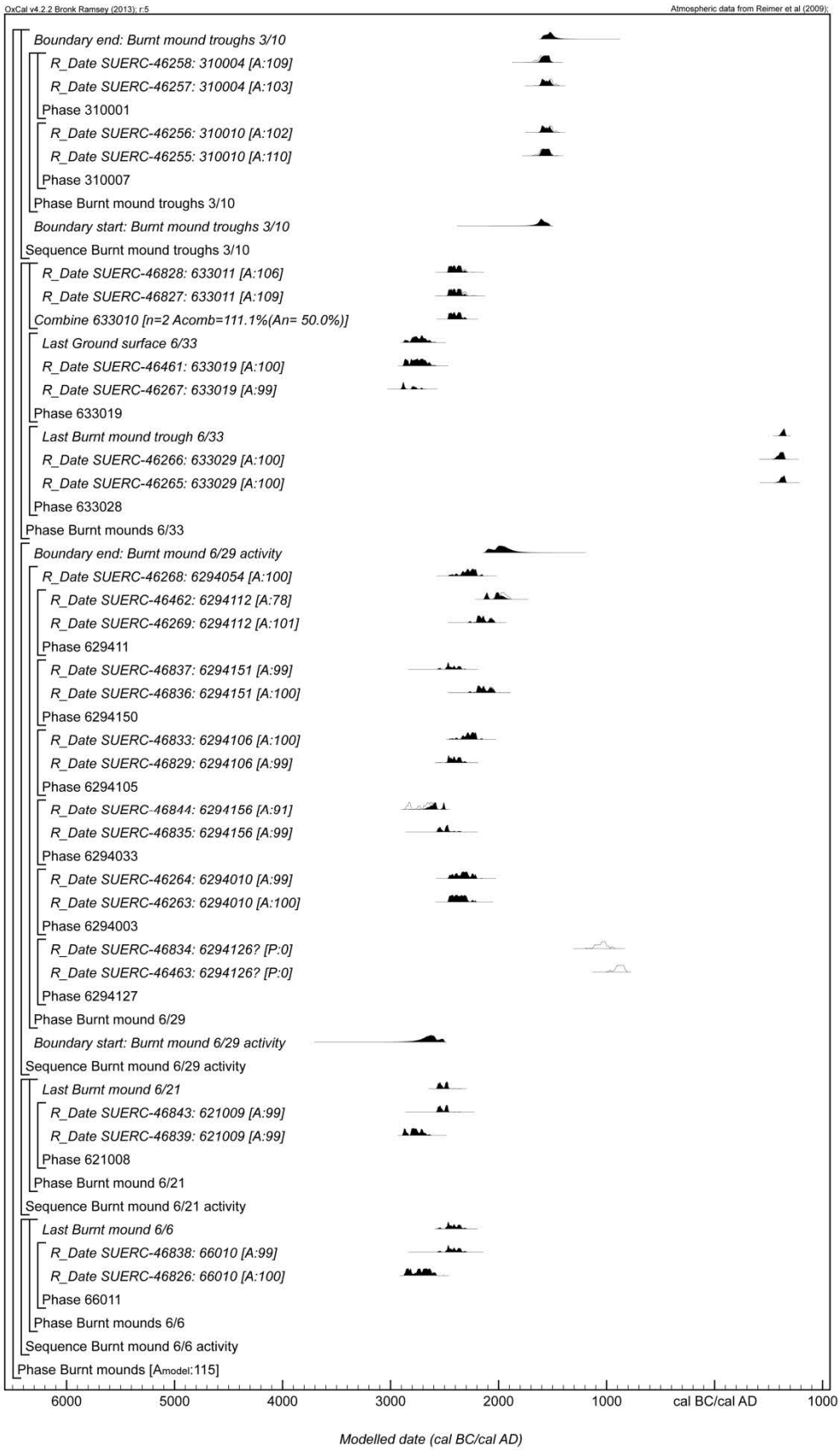


Figure 46. Chronological model for the burnt mounds and burnt mound-like deposits from the Pwllheli to Blaenau Pipeline Project.

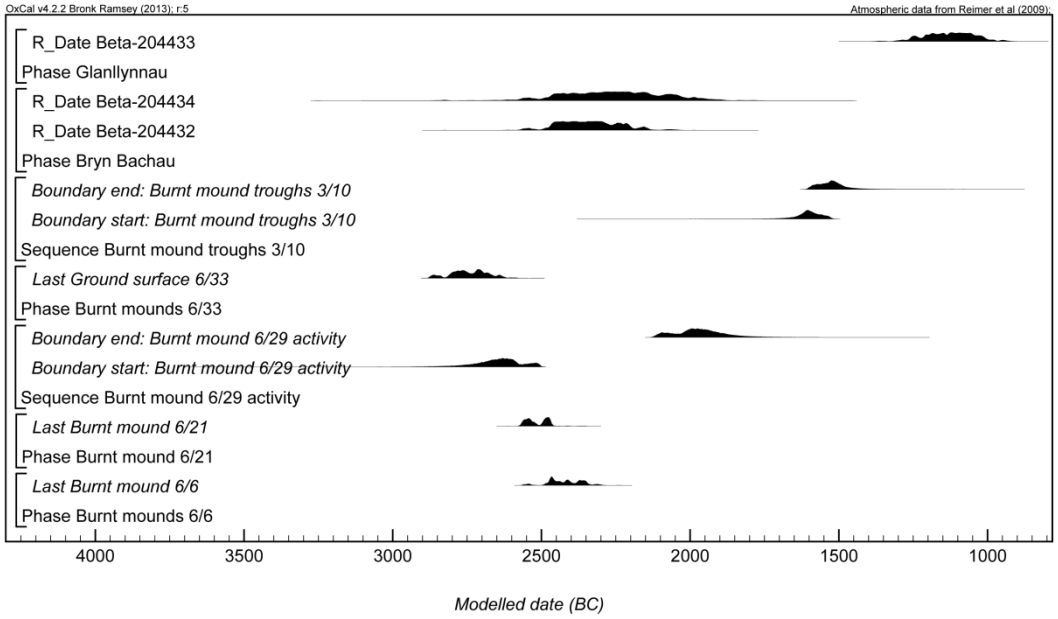


Figure 47. Comparison of dates from the Pwllheli to Blaenau Pipeline Project with those from dated burnt mound deposits in the vicinity.

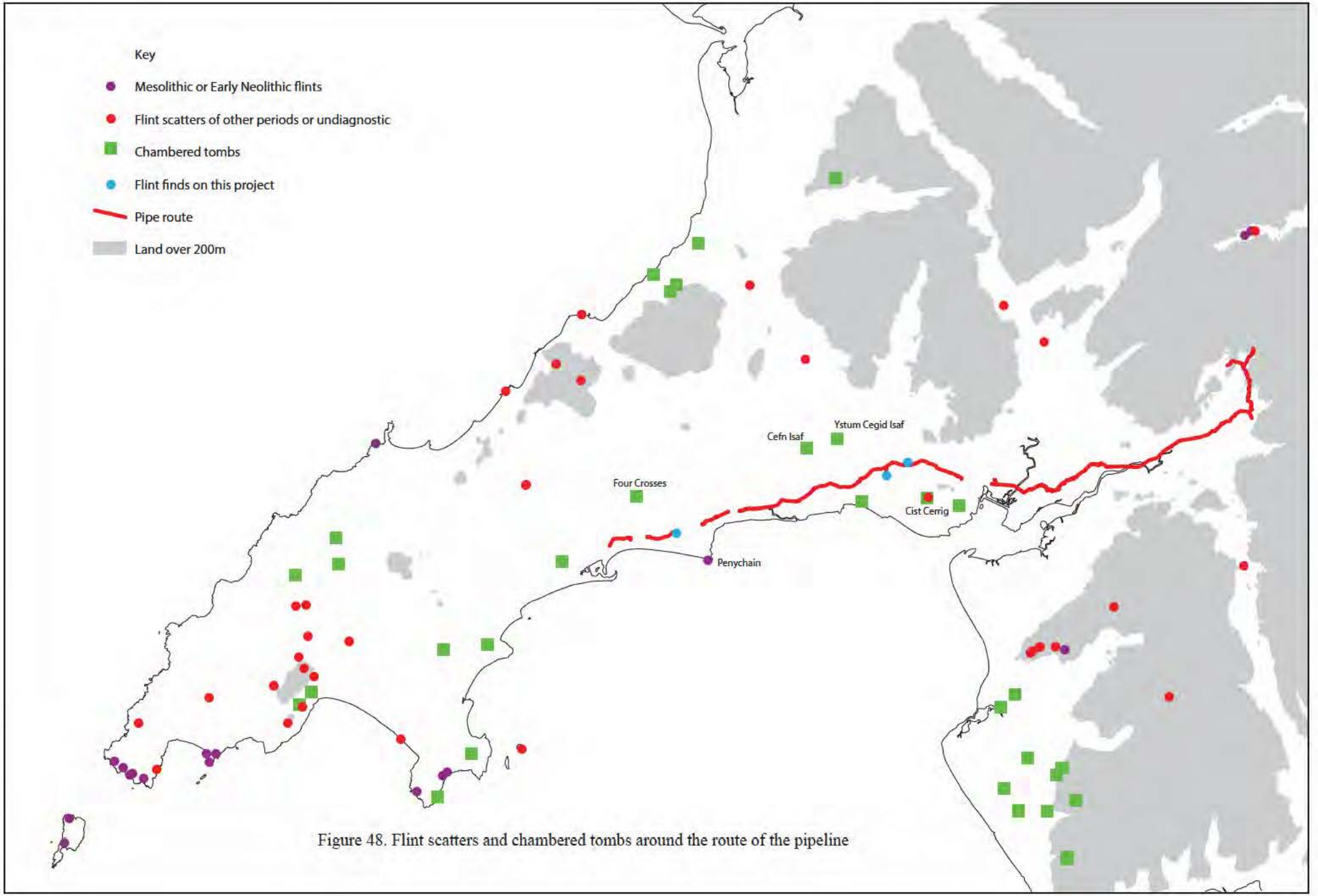


Figure 48. Flint scatters and chambered tombs around the route of the pipeline

Plate 1. Probable stone-filled drain in plot 0/1

Plate 2. Section through probable stone-filled drain in plot 0/1

Plate 3. Burnt mound seen in section of pipe trench in plot 0/2

Plate 4. Section through 03005 in plot 0/3

Plate 5. Peat deposit in plot 0/8

Plate 6. Natural feature in plot 0/9

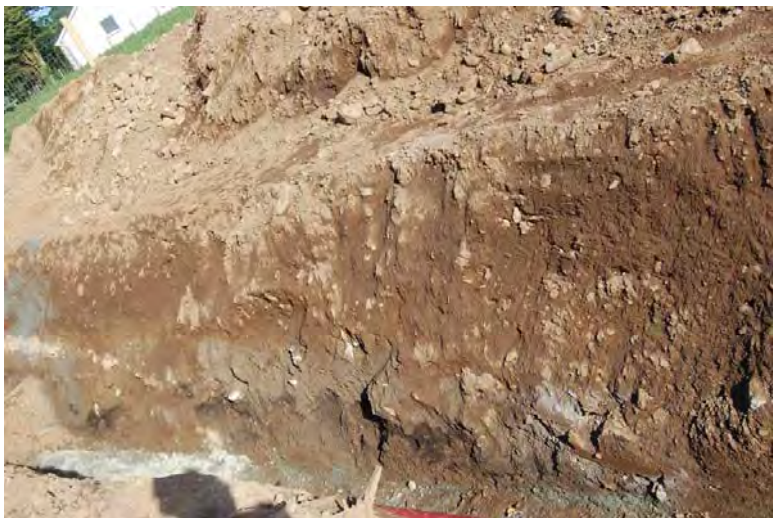


Plate 7. Traces of a possible burnt mound seen in the pipe trench section in plot 0/11

Plate 8. Corn drier 32009 and pit 32014 under excavation in plot 3/2

Plate 9. Corn drier 32009 and pit 32014 in plot 3/2,
fully excavated with the exception of the lining stones in the corn drier

Plate 10. Corn drier 32009 in plot 3/2, from SE end showing chamber and capping stone 32006

Plate 11. Section of corn drier 32009 in plot 3/2, showing capping stone 32006 and traces of burning in base of flue

Plate 12. Excavation of pit 32003 in plot 3/2, showing burnt stones

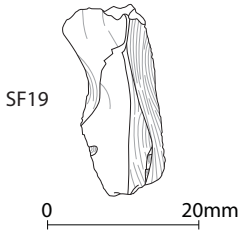
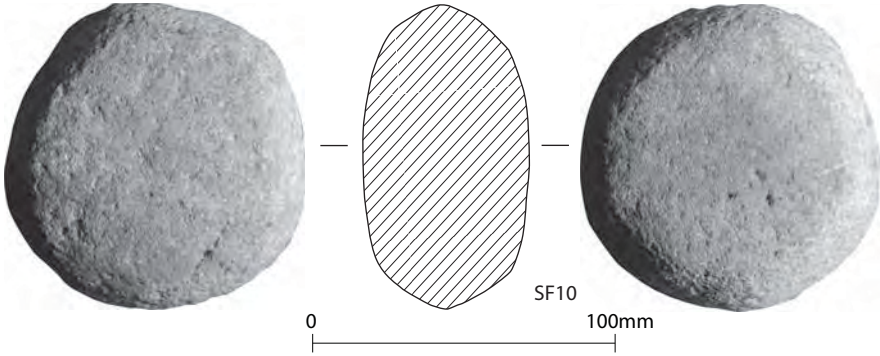
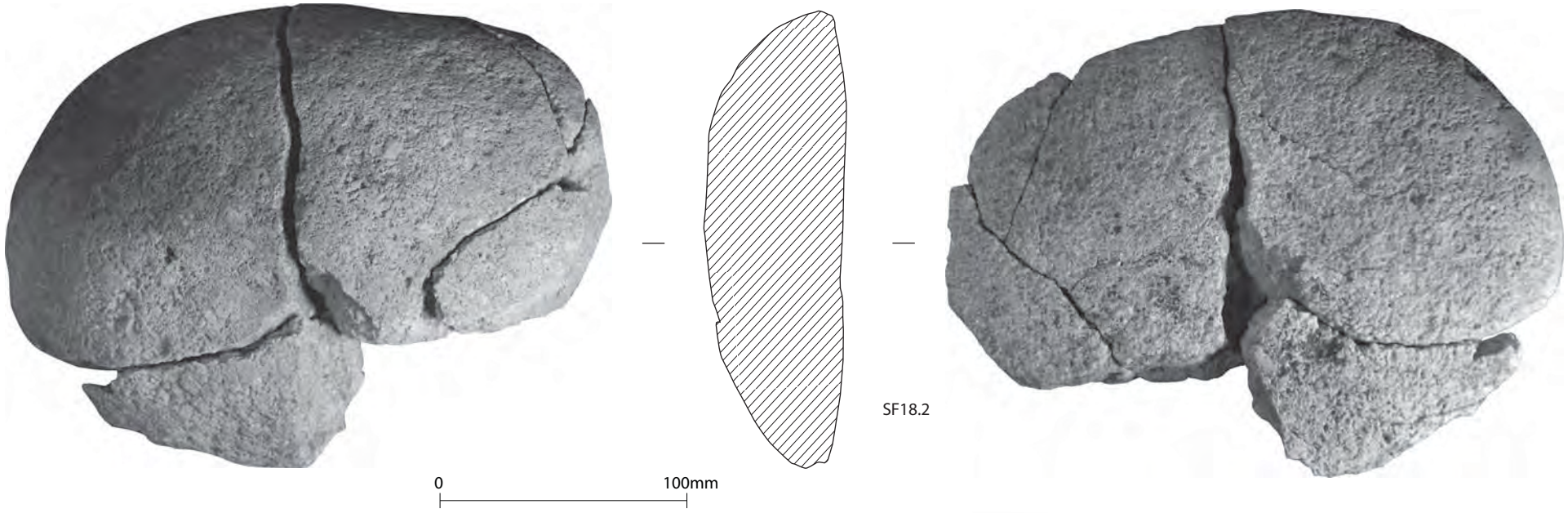


Plate 13. Finds from the Iron Age pits in plot 3/2
SF10: facetted rubbing stone; SF18.2: saddle quern rubber; SF18.1/14: small saddle quern.
Also SF19 utilised flint blade from an animal burrow





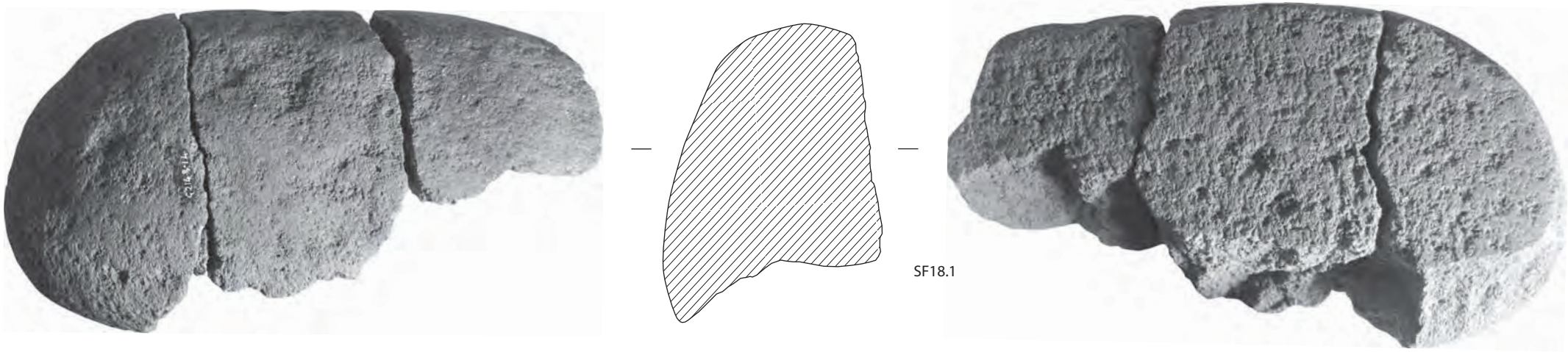


Plate 14. Finds from the Iron Age pits in plot 3/2
SF7 and SF9: saddle querns; SF20: working or rubbing slab

Plate 15. Feature 36002 in plot 3/6

Plate 16. Burnt mound trough 310001 in plot 3/10

Plate 17. Pit 314001 in plot 3/14

Plate 18. Shallow hollow 314002 in plot 3/14 containing smithing evidence

Plate 19. Section of ditch 320004 in plot 3/20

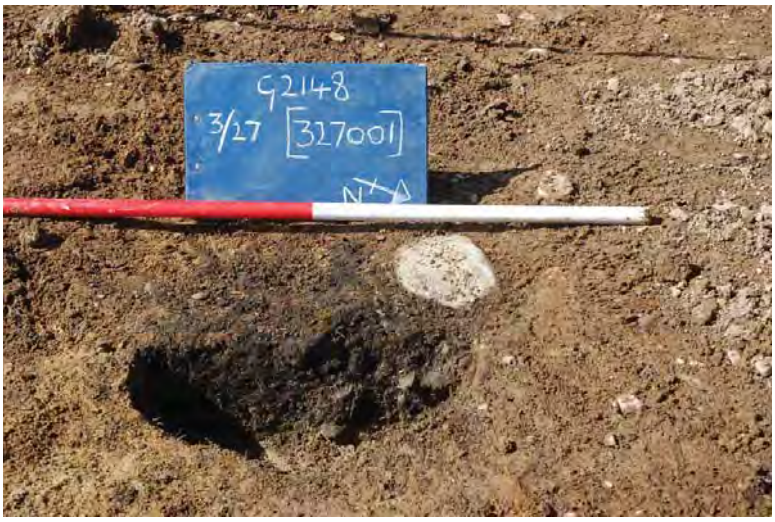


Plate 20. Pit 327001 in plot 3/27, half sectioned

Plate 21. Hollow 327002 in plot 3/27, half sectioned

Plate 22. Probable drainage feature seen in section of pipe trench in plot 5/5

Plate 23. Sondage through burnt mound 66003 and trough 66011 in plot 6/6, from the SE

Plate 24. Sondage through burnt mound 66003 and trough 66011 in plot 6/6, from the NE

Plate 25. Possible small corn drier 610001 in plot 6/10

Plate 26. Burnt mound in plot 6/21

Plate 27. Midden deposit in plot 6/22

Plate 28. Buckley ware from midden in plot 6/22

Plate 29. Natural palaeochannel 6294195 in plot 6/29.4

Plate 30. Natural palaeochannel 6294170 in plot 6/29.4

Plate 31. Natural hollows forming group 6294184 in plot 6/29.4

Plate 32. Natural hollow 6294031 in plot 6/29.4

Plate 33. Natural hollow 6294087 in plot 6/29.4

Plate 34. Natural hollow 6294098/6294101 in plot 6/29.4

Plate 35. The main burnt mound in south end of plot 6/29.4

Plate 36. Pit 6294022 in plot 6/29.4, half sectioned

Plate 37. Trough 6294127 in plot 6/29.4, also showing natural feature 6294103

Plate 38. Pit 6294111 with gullies 6294107 and 6294108 (slot on left of picture is a sondage)

Plate 39. Pit 6294105, half sectioned, in plot 6/29.4

Plate 40. Pit 6294033 in plot 6/29.4, fully excavated with stakeholes in base

Plate 41. Section of pit 6294033 in plot 6/29.4

Plate 42. Natural channel 6294195 in plot 6/29.4, with burnt mound material in section

Plate 43. Pit 6294003, half excavated, in plot 6/29.4

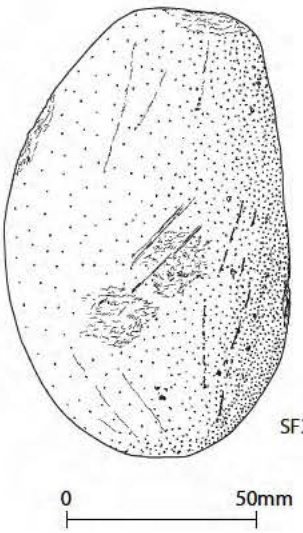


Plate 44. Finds from plot 6/29.4: SF22 - facetted pebble, SF23 - utilised flint blade, SF56 B and C - radially split pieces of oak

Plate 45. Burnt mound 633012 in plot 6/33

Plate 46. Burnt mound 633012 in plot 6/33, with upper layers removed showing stones protruding and animal burrow 633018

Plate 47. Stones 633020 protruding from natural through hollow 633032, in plot 6/33

Plate 48. Burnt mound 633015 in plot 6/33

Plate 49. Burnt mound 633015 in plot 6/33, showing sections of mound

Plate 50. Trough 633034 in plot 6/33

Plate 51. Section showing fill of trough 633034 in plot 6/33

Plate 52. Pit 633028 in plot 6/33

Plate 53. Section of pit 633010 in plot 6/33

Plate 54. Deposit 638001 in plot 6/38

Plate 55. Deposit 638002 in plot 6/38

Plate 56. Stone deposit 639001in plot 6/39

Plate 57. Section through root hollow feature 644001 in plot 6/44

Plate 58. Section through ditches 647001 and 647003 in plot 6/47

Plate 59. Blue marine clay exposed in pipe trench in plot 6/51

Plate 60. Section through shell midden 71001 in plot 7/1

Plate 61. Natural salt marsh channel in plot 7/2

Plate 62. Modern ditch seen in trench section in plot 7/8

Plate 63. Woody peat deposit exposed in pipe trench in plot 11/3

Plate 64. peg hole in a radially split piece of oak from plot 11/3 (sample 53 1 of 4)

Plate 65. Close up of peg hole on underside of radially split oak from plot 11/3 (sample 52 4 of 4)

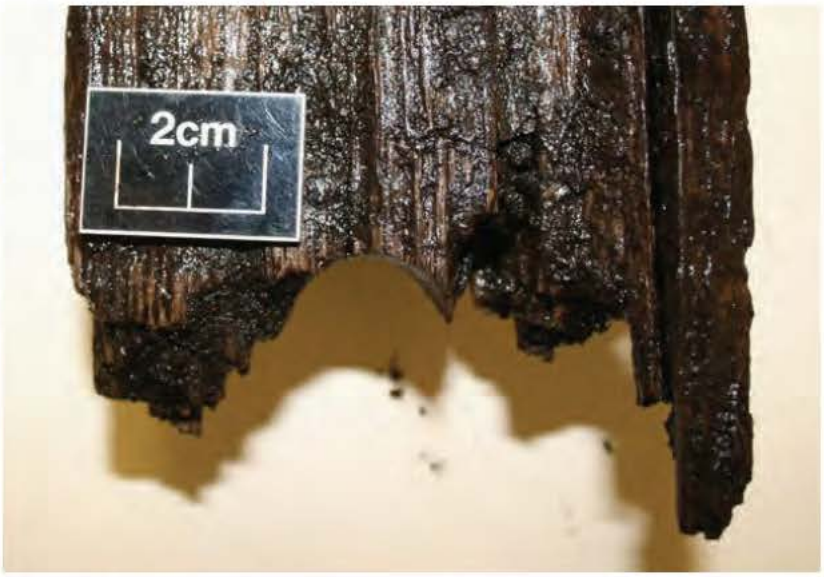


Plate 66. Birch branch with cut end and cut side branch from context 147005, plot 14/7 (sample 38)

Plate 67. End of radially split oak plank from context 147005, plot 14/7 (sample 40)

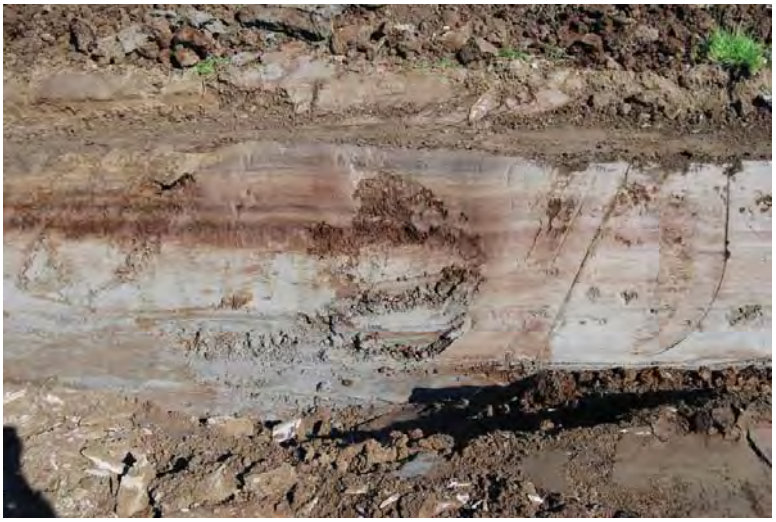


Plate 68. Alluvial silt and clay layer in plot 13/30

Plate 69. Timber found in base of pipe trench in plot 13/30

Plate 70. Clay deposit in plot 14/1

Plate 71. Large unworked branch
being removed from pipe trench in plot 14/4

Plate 72. Clay layer containing wood in plot 14/4

Plate 73. Deposit of wood and branches in plot 14/7

Plate 74. Section of natural channel in plot 17/3

Plate 75. Possible *in situ* structural stones beneath dumped material in plot 17/15

Plate 76. Wall face exposed in pipe trench in plot 18/3

Gwynedd Archaeological Trust
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