

Archaeological Fieldwork Report

HAFAN-Y-MOR

For Bourne Leisure Ltd

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L-P:ARCHÆOLOGY

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HAFAN-Y-MOR

Client: Bourne Leisure Ltd

Local Authority: Gwynedd Council

NGR: 243018,336311

Planning App: C10D/0141/40/LL

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Doc Ref: LPI163C-WBR-v1.2

Date: November 13

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Summary

This report details the results of five phases of archaeological works conducted on Parcel 1, 5 and 6. The fieldwork was undertaken by L – P : Archaeology on behalf of Bourne Leisure Ltd.

There is evidence that the Llyn Peninsula has been occupied since the Mesolithic period. A large flint assemblage and buried ground surfaces have been recorded at the tip of the peninsula to the south of the site, and occasional flint artefacts found during this work supported the theory for Mesolithic activity on the peninsula. Archaeological work during improvements to the A497, which forms the northern boundary of the site, revealed significant Bronze Age funerary and domestic remains and an ephemeral Iron Age structure but no such remains were found within the site and it may be that activity from this period was limited to the sheltered land closer to the rocky outcrops to the north.

There is no known Roman or Early Medieval activity in the immediate area. The later Medieval township of Penychen may lie immediately to the east of the site and it is likely that the site was farmland during this period. Three small scorched clay features were radiocarbon dated to AD1100, which are interpreted as temporary fires for shepherds or farmers. The site continued to be used as farmland as evidenced by the various field boundaries, drainage ditches and clodd walls recorded across the site during the works.

During the 1940s the site was developed as a Naval Training Camp and evidence for this remains as defensive structures located along the coastline. Following the end of the Second World War (WWII) the site was converted into a public holiday camp although no evidence for reuse of WWII camp structures into the holiday camp buildings was found.

1. Introduction

- 1.1. This document has been prepared by Catherine Rees and Matt Williams of L - P : Archaeology on behalf of Bourne Leisure Ltd.
- 1.2. This report concerns land at Hafan-y-Mor Holiday Park, Pwllheli (centred on NGR 243018,336311 FIGURE 1).
- 1.3. This report details the results of a programme of five separate phases of archaeological works conducted on Land Parcels 1, 5 and 6 (FIGURE 2). The background, aims and methodology for each phase of work is given at the beginning of each relevant section.
- 1.4. The local authority is Gwynedd Council who take archaeological advice from Gwynedd Archaeological Planning Service (GAPS).
- 1.5. Planning permission has been granted for development of all six parcels, application number C10D/0141/40/LL. Condition 9 of the planning permission relates to archaeology:
- No development shall be commenced on any parcel which is the subject of the permission until a desk based study of the potential archaeological interest of each phase has been submitted to and approved in writing by the local planning authority. The desk based study shall identify any further investigation and/or observation that may be required during the course of construction work. Any archaeological mitigation work required as a result of such investigation and/or observation shall be carried out in accordance with details which shall be approved by the local planning authority beforehand.*
- 1.6. The British Geological Survey GeoIndex shows the site to be located on a transition of bedrock from undifferentiated Llanvirn rock to the west and extrusive rock to the east. The superficial deposits in the area are recorded as diamicton (poorly sorted sediment) (BGS 2013).

2. Archaeological and Historical Background

2.1. The following is summarised from the Desk Based Assessment (L - P : ARCHAEOLOGY 2011) and gives a general background to the site. A short summary of relevant archaeological background is also included in the introduction to each section. Information from the Gwynedd Historic Environment Record (GHER) is referenced with the PRN in brackets; information from the National Monuments Record is referenced with the NPRN in brackets.

2.2. PALAEOLITHIC

2.2.1. Although there is evidence for occupation in northern Wales during this period, for example at Pontnewydd cave near, St. Asaph, there are no recorded findspots in the vicinity of the site. Glacial action would have removed any remains within the area.

2.3. MESOLITHIC

2.3.1. The density of prehistoric sites in the vicinity indicates that the area was exploited from the Mesolithic period onwards. During this period the population was nomadic, moving to different sites as the seasons changed. The majority of Mesolithic find spots in Gwynedd are on the coast, although the coastline has moved since the Mesolithic period as sea levels have risen by 5-10m in the last 7000 years (GAT 2011,3).

2.3.2. In 2011 Gwynedd Archaeological Trust (GAT) excavated six trial pits on the peninsula at Pen-y-Chain (PRN 6787). Several possible old ground surfaces were identified and the report author tentatively suggests two phases of prehistoric activity which are inferred to be Mesolithic (GAT 2011,5).

2.4. NEOLITHIC

2.4.1. There is scattered evidence for Neolithic activity in the area, including a polished axe findspot at Chwillog (PRN 5761) 1.8km to the north of the site and a Neolithic tomb at Y Ffor 4km to the north west of the site (HEATH 2006, 100).

2.5.BRONZE AGE

- 2.5.1. A standing stone thought to date to this period has been recorded 360m to the west of the site (PRN 18400) exposed within eroding sand dunes.
- 2.5.2. A cluster of features comprising four pits and a burnt mound is recorded on the northern site boundary (BERKS ET AL 2007, 11) (PRN31151). Radiocarbon analysis has dated charcoal on the mound to 3890 +/- 70BP and one of the troughs to 3810 +/- 120 BP. Most burnt mounds in north Wales date to the second millennium BC and therefore this site may be one of the earliest of its type in the area (BERKS ET AL 2007,11).
- 2.5.3. A Bronze Age funerary site was identified during the same excavations 1km east of the site on the line of the A497 (BERKS ET AL 2007,4) (PRN31147). Two possible Bronze Age domestic features were identified during the same excavations. Dating suggests that both are later than the funerary enclosure.

2.6.IRON AGE

- 2.6.1. A rectangular stone structure with an entrance in the west was discovered during the A497 improvement excavations (PRN31145). Radiocarbon analysis of a charcoal deposit overlying the cobbled surface gave a date range of 2000+/40BP. It is interpreted as a temporary shepherd structure, probably occupied in the summer and autumn (BERKS ET AL 2007,16).
- 2.6.2. This area does not appear to have been intensively occupied during this period. It is likely that there were no more than occasional farmsteads and shepherd huts in the vicinity.

2.7.ROMAN

- 2.7.1. The Roman conquest had a relatively low impact in north west Wales and there was not the urbanisation seen in south Wales (e.g. Caerwent) and elsewhere. A military presence remained at Caernarfon until the end of the 4th century. There is a Roman camp at Dolbenmaen, c.20km to the east of the site, and the road from this camp probably led north to Caernarfon (on the line of the modern A487) (SENIOR 2006,13), where a military presence remained until the end of the 4th century. This appears have been the western extent of the Roman

network as there are no known Roman roads or camps near the site. It is likely that the dispersed farmstead settlements continued from the Iron Age into this period (ARNOLD AND DAVIES: 2002,67).

2.8.EARLY MEDIEVAL

- 2.8.1. There is little evidence for Early Medieval activity in this area and the model of dispersed farming settlements is likely to have continued.

2.9.MEDIEVAL

- 2.9.1. During the Medieval period Pwllheli (3.5km to the west) and Criccieth (5.6km to the east) emerged as important towns. Pwllheli took over from Caernarfon as the regional administrative centre in the 1230s (SENIOR 2006,27) and Criccieth was granted a charter in 1355 (SENIOR 2006,33). The site lies on the route between the two towns. A hollow way or trackway, consisting of sand and gravel layers 0.45m thick, was recorded during the A497 works (PRN5729).
- 2.9.2. Documentary evidence suggests there were two Medieval townships in the area, Penychen (Pen-y-chain) and Penarth (PRN7344 and PRN7345 respectively). There are also two areas of earthworks, both interpreted as putative Medieval settlement sites, near the site. An area of substantial earthworks is recorded just outside the north east corner of the site (PRN5733), which is described in the HER as 'the most likely spot for the main settlement of the township of Penychain'.
- 2.9.3. Another group of earthworks, perhaps house platforms, is recorded 670m west of the site along the line of the old toll road (PRN5735), however excavation during A497 works indicated that some of these features were probably field boundaries and the artefacts recovered were all Post Medieval.
- 2.9.4. In the south of the site is the remains of a long hut (PRN1332). It is undated but houses of this type were used from the 13th to the 19th centuries.

2.10.POST MEDIEVAL

- 2.10.1. It is likely that the site was used as pasture throughout this period. Three farmsteads are shown on the 1920 OS map. These are Pen-y-chain in the centre

of the site, and Clogwyn and Penrhyn in the south. Clogwyn appears to have been demolished by the end of WWII.

2.10.2. The railway that runs through the northern part of the site was constructed between 1855 and 1868 and Pen-y-chain station is within the site, at the west end of the railway line.

2.11. MODERN

2.11.1. The holiday park development on the site originated as a Naval training base, HMS Glendower. It was built soon after the outbreak of WWII by Billy Butlin, who had an agreement with the Government to buy the site and buildings back after the war (DACRE 1982, 134). The base was converted to a public holiday camp in 1947 (www.bygonebutlins.com). The majority of the housing was converted to chalets, many of the the larger buildings were retained and some new buildings were constructed. The layout of the site remained remarkably similar into the 1980s. Since then there have been significant alterations but it is likely that some of the bases of the original buildings remain.

2.11.2. Several WWII defence structures are also visible on the coastline, including battery platforms and a shelter. There are also some small structures that may relate to this period scattered within the site. The two easternmost of these features are now in areas covered by vegetation.

3. Parcel 1 (Chalets)

3.1.INTRODUCTION

3.1.1. Parcel 1 is a rectangular area to the south of the main site entrance (FIGURE 2). Within this area of the site is a restaurant, three rows of chalets and a car park. The site elevation is approximately 11m OD. This phase of work consisted of monitoring the demolition of the chalets and producing a record of the buildings as agreed in the specification (L – P : ARCHAEOLOGY 2011B).

3.1.2. The chalet rows are in the same positions as the buildings shown on an aerial photograph taken in 1945 during WWII (FIGURE 3). Although the current chalets appear to date to the 1970s or later, it was considered possible that the concrete bases may have been reused from the WWII development.

3.1.3. Works undertaken in Parcels 5 and 6 indicated that the archaeological horizon/natural geology was 400-500mm below the ground surface. The ground in Parcel 1 has been terraced to provide flat areas for the buildings and this activity is likely to have removed a moderate to large amount of potential below ground archaeological deposits.

3.1.4. The buildings were demolished and the base slabs removed. The area was landscaped using imported material.

3.2.AIMS

3.2.1. The aims of the work in Parcel 1 were:

- ◆ To produce a photographic record the general character of the standing buildings prior to demolition.
- ◆ To observe the base slab during removal and determine the likelihood of it being reused WWII structure.

3.3.METHODOLOGY

3.3.1. A basic visual record of the chalets was made prior to their demolition using a 13.6 mega pixel digital camera. This record illustrates the location, general design and character of the buildings.

3.3.2. The concrete slab was inspected during removal and the nature and thickness of the slab was recorded.

3.3.3. Exposed ground was inspected for artefacts and features.

3.4.RESULTS

3.4.1. A series of photographs were taken prior to the demolition of holiday chalets in Parcel 1. A sample from these photographs are included as **PLATE 1** and **PLATE 2**. Following the demolition of the structures the bases were examined but these structures showed no evidence of having been reused from the WWII camp and the bases were constructed of a thin layer of concrete over hardcore. A sample of photographs taken following the demolition showing an example of a chalet base have been included as **PLATE 3** and **PLATE 4**. The complete photographic archive for this phase of works is included in the site archive.

4. Parcel 5 (Touring Park)

4.1. INTRODUCTION

- 4.1.1. Parcel 5 is an 'L' shaped area to the east of the main site entrance (FIGURE 2). The west end of the parcel was covered in hardstanding and the rest of the area was tree, gorse and thick grass vegetation. The site elevation is approximately 11m OD. This phase of work consisted of monitoring the stripping of the topsoil and recording archaeological features (strip and map) as agreed in the specification (L – P : ARCHAEOLOGY 2011C).
- 4.1.2. A Bronze Age burnt mound with associated troughs and a pit was identified during work on the A497 approximately 50m to the north of parcel 5.
- 4.1.3. An area of earthworks 250m to the west of the parcel was described in the Gwynedd HER as 'the most likely spot for the main (Medieval) settlement of Penychain'.
- 4.1.4. Aerial photographs taken during the Second World War show the western part of the parcel was utilised as a football pitch with the remainder used as open fields.
- 4.1.5. The west of the parcel was used for touring caravans and some hardstanding of unknown depth remains. The rest of the parcel was heavily vegetated, although the area of the road had been cleared. A site walkover indicated that there had been some landscaping within this land parcel, especially in the northern area. This was considered most likely to have occurred when the north eastern area of the holiday park was first developed.
- 4.1.6. The Parcel 5 development consists of the construction of 75 bases for touring caravans, access roads and a toilet block with associated service. The watercourse that runs across the north of the parcel will also be altered. The total area to be developed is 12,100 sq.m.
- 4.1.7. Radiocarbon dates are given as calibrated range at 95% confidence as per Stuiver and Pearson (1986) followed by the laboratory reference and conventional age (BP) as per Stuiver and Polach (1977).

4.2.AIMS

4.2.1. The aims of the strip and map in Parcel 5 were:

- ◆ To record the character, date, location and preservation of any archaeological remains on the site.
- ◆ To record the nature and extent of any previous damage to archaeological remains on the site.

4.3.METHODOLOGY

4.3.1. It was initially proposed that the site area to be stripped was to be taken down to the archaeological horizon/natural geology in two phases, with the road area to be cleared by machine and filled with stone. This area would then be used as hard standing for the machine stripping of the areas to be occupied by tourer caravans.

4.3.2. On commencement of works this methodology was found to be impractical due to adverse weather conditions (heavy rainfall) and the need to remove large quantities of spoil off site. It was therefore agreed with GAPS that the site be reduced to level in two loops, the first of which was to be cleared and stoned before the second loop was commenced. Each loop was machined in two halves with the machine stripping one side to the required depth whilst a dumper truck was able to drive/stand on the un-stripped topsoil to remove the spoil. The depth of vegetation/topsoil acted to protect the underlying deposits. The stripped area was then covered with stone and the machine used to clear the other side whilst the dumper truck was able to drive on the stoned area. The tourer plots were cleared as the machine reached them rather than returned to at a later date.

4.3.3. All works were conducted under archaeological supervision using a 360 tracked excavator with a toothless bucket. Areas were 'signed off' by GAPS prior to being stoned over.

4.3.4. No deposits meriting environmental sampling or scientific dating were encountered during this phase of works.

4.4.RESULTS

4.4.1. A number of archaeological features and two standing structures were recorded during works on Parcel 5. For ease of interpretation the structures will be discussed first. As far as possible the buried features will be discussed chronologically beginning with the undated examples. Details the locations of features/ drawings discussed in the following text.

4.4.2. A small number of archaeological artefacts were recovered from the topsoil during the stripping of the area. They included a single large worked flint, a small number of Post-medieval pottery sherds and a 1948 Butlin's Holiday Camp pin-badge. These will be discussed separately in the finds section of the report.

STRUCTURES

4.4.3. The earliest of the structures was a 'clawdd' wall (plural 'cloddiau') (29) running approximately east west across the site (see FIGURE 5, PLATE 5 AND PLATE 6). This type of boundary is literally translated as a hedge, dyke or embankment and is a traditional Welsh construction form commonly found on the Llyn Peninsula. It is not strictly speaking a wall, but rather a stone faced earthen bank (WWW.DRY-STONE.CO.UK) and this particular example had a low hedge on the top of it and a ditch running alongside. The stone facing had only been used on the northern face and two sets of stone gate posts were recorded along the length of the wall. It is therefore believed that this structure was used to define a pathway/right of way between fields. As far as it was possible to follow the length of the clawdd it ran the full width of the development plot and the stone element (not including the hedge) survived to a maximum height of 1.10m and a maximum width of 1.70m. The wall survey suggests that the clawdd walls are Post Medieval.

4.4.4. The second of the structures was a small square, brick built structure with a concrete pad roof and base (Feature 30) identified in undergrowth to the South-west of the development area (FIGURE 5 and PLATE 7). The dimensions of the building were 1.40m x 1.40m x 1.15m in height. The concrete pad on the roof was 0.08m thick. The structure was enclosed on three sides with no

windows and open to the front. There was evidence that this originally had a door or hinged flap. There were two metal pipes leading from the building interior to the outside. The function of this building is unclear but it is likely to have been associated with the Second World War usage of the site as a naval camp. The small size and low ceiling height would have limited what the structure was used for but it could have held goods or a single person in a blast proof environment.

UNDATED PIT GROUP [006]

- 4.4.5. A cluster of five pits/possible pits were excavated in the road area between the proposed location of base 2 and bases 74 and 75 (FIGURE 5 AND FIGURE 6). All features were sealed by the subsoil (003) and were cut into the underlying natural (002) and despite their close grouping were not inter-cut. The group comprised pits [007], [009], [011], [013] and [015], and were assigned the group number [006].
- 4.4.6. Of the five features [007], [009] and [011] reaching maximum depths of 0.07m, 0.05m and 0.03m respectively(see FIGURE 7, FIGURE 8, FIGURE 9). These three features were irregular in plan and profile with the maximum length and width dimensions as follows: [007] maximum length 0.80m, maximum width 0.80m, [009] maximum length 0.80m, maximum width 0.66m, [011] maximum length 0.80m, maximum width 0.54m.
- 4.4.7. Features [013] and [015] (FIGURE 10 and FIGURE 11)were more defined and survived to greater depths with the maximum depth of [013] reaching 0.34m and the maximum depth of [015] reaching 0.15m. Both pits were irregular in plan although the profiles varied. Pit [013] was half-sectioned across its north-east – south-west axis and was shown to have a concave profile, sloping steeply on the south-western side and gently on the north-eastern side. The feature was the largest in the group, with the maximum length measured at 1.36m and the maximum width measured at 1.00m.
- 4.4.8. The dimensions in plan of feature [015] were more akin to [007], [009] and [011] with a maximum length of 0.76m and a maximum width of 0.62m. The pit was cross-sectioned along an approximate north – south axis. The profile

varied and the feature was shallow to the south with a steep near vertical slope at the northern extent.

4.4.9. The fills of all features within this group were indistinguishable from each other, with each feature containing a single mid-brown silty clay fill. None of the features contained any artefactual material and no charcoal or dating evidence.

4.4.10. Given the shallow depth of three of the features and the irregular nature of the group in general it is difficult to draw any firm conclusions as to the function, origin or date of these features. It appears that what survives are either the bases of features which were once of a much greater depth or that this group was formed by natural processes – most likely animal burrowing.

UNDATED LINEAR FEATURE

4.4.11. A linear feature [004] was identified to the south of Pit Group [006] (FIGURE 5 AND FIGURE 12). The ditch extended beyond the limit of excavation and a length of approximately 4m was initially recorded within the stripped area. Further stripping revealed that the feature continued for at least another 5m on the same alignment. The feature was aligned north-east – south-west and had a shallow, concave profile. The maximum depth of feature [004] was 0.11m and the maximum width was 0.60m. The feature cut the natural and was sealed by the subsoil.

4.4.12. The feature contained a single mid-brown, silty clay fill with moderate gravel inclusions (005). This fill contained no artefactual or dating evidence and the feature could therefore not be assigned a date with absolute certainty. It was however felt that this feature was likely to have been a Post-Medieval agricultural feature, either a land drain or field boundary and several such features were identified on the site.

UNDATED LINEAR FEATURE WITH RETURN

4.4.13. Feature [032] was ditch with a 90 degree return or the corner of a larger feature (see FIGURE 13 and PLATE 8). It cut the natural and was sealed by the topsoil. The ditch was aligned roughly north-south (5.0m visible in plan) with an east-west return (3.30m visible in plan), was approximately 1.0m wide and

survived to a maximum depth of 0.26m. The ditch profile was concave with a flat base.

4.4.14. Ditch [032] contained a single fill (033) which was recorded as a loose brown clay-silt with well sorted small to medium rounded stone inclusions. No artefactual or datable material was recovered and without having seen the full nature and extent of the feature in plan it is impossible to speculate as to its form, date or function. Nothing similar was recorded during earlier excavations in the area to aid interpretation.

POST-MEDIEVAL FEATURES

4.4.15. Numerous agricultural drainage features were identified during the stripping of the site, particularly in the areas to the north and north-east of the development area where the underlying natural is clay rather than the freer draining sand and gravel mix found elsewhere. The location of the two main drainage features were noted (FIGURE 5) and a basic photographic record made but the majority of these features were unexcavated due to the high water level. All drainage features were cut into the natural and sealed by the subsoil.

4.4.16. One example [025] was fully cleaned and a section through was excavated through the drain (see FIGURE 14 and PLATE 9). The feature was curvilinear in plan and extended beyond the boundaries of the development area. Approximately 12.00m of the length was exposed in plan and the maximum width of the drain was 1.90m although the width measured 1.50 – 1.60m along the majority of its length. The maximum depth of the feature was 0.36m. The ditch profile was wide and shallow sloping with slightly concave sides which drop away to near vertical for a width of approximately 0.60m at the centre of the feature. The drain had a flat base. The drain was still active and the water level reached the point where the sides sloped steeply.

4.4.17. The drain contained three fills, (026), (027) and (028). The lower section was filled with sub-rounded cobbles (028) which reached the height where the feature sides sloped more gently. Deposit (028) was overlain by layer (027) which was a loose, fine grained grey clay. Deposit (027) was overlain by layer (026) a loose brown clay which was similar to the overlying subsoil. Deposits

(026) and (027) are backfill deposits used to cover the drain following the laying of the cobbles which form the main drainage element.

4.4.18. A single sherd of late 19th or early 20th Century date was recovered from deposit (028) during the excavation. The pottery is described in greater detail in the finds section of this report.

MODERN FEATURES

4.4.19. The final group of features uncovered during the strip, map and sample of Parcel 5 were clearly of modern origin and may belong to the WWII phase of site use and may therefore be significant.

4.4.20. Four features were identified, three rectangular features [019], [020] and [021] with rounded ends and a single sub-square pit feature [017]. Unfortunately when excavation commenced the features were all found to contain asbestos and it was therefore considered unsafe to hand excavate. The depths, profiles etc of these features is therefore unknown.

4.4.21. Due to the inability to excavate these features no interpretation as to their form or function can be offered but it is thought that they could date from the period of or following WWII.

5. Parcel 6 (Chalets and Lodges)

5.1.INTRODUCTION

- 5.1.1. Some initial groundwork occurred prior to the implementation of a watching brief on five chalets in the west of parcel 6 (FIGURE 2). The stripped area was observed with the concrete bases in place and watching brief was then imposed on the remaining groundworks. The site of the archaeological works was undulating grass with natural bedrock outcrops. The site elevation varies between 18mOD and 24mOD.
- 5.1.2. A site meeting was held between L – P : Archaeology and GAPS on 13th July 2011 to discuss work on the further chalets. It was decided that the next main chalet area should be subject to a programme of Strip, Map and Sample.
- 5.1.3. Mesolithic flint scatters have been recorded on the southern tip of the headland within Parcel 6. Subsequent trial pits by Gwynedd Archaeological Trust and volunteers identified two possible phases of prehistoric activity (PRN6787), although the results were uncertain.
- 5.1.4. Pwllheli and Criccieth were both important Medieval centres. However, the site was unlikely to have been used during this period as it is some distance from the towns and the road. It is possible that the area was used agriculturally.
- 5.1.5. The Hafan-y-Mor Camp started as a Naval Training Camp which was then converted to a holiday camp after WWII. Parcel 6 was not developed as part of the training camp and no features relating to WWII were present.
- 5.1.6. This area of the site had not been previously developed. However some chalet bases, associated access and service trenches had been excavated without archaeological monitoring.
- 5.1.7. The proposed development involved the construction of one block of four chalets with associated services.

5.2.AIMS

- 5.2.1. The aims of the watching brief in parcel 6 were:

- ◆ To record the character, date, location and preservation of any archaeological remains on the site.
- ◆ To record the nature and extent of any previous damage to archaeological remains on the site.

5.3.METHODOLOGY

5.3.1. It was originally laid out in the WSI produced for this area that the removal of topsoil to the depth required for development or to the top of the archaeological horizon, whichever is the shallowest, would be conducted under archaeological supervision and using a 360 degree tracked excavator with a toothless bucket.

5.3.2. This was however not undertaken as works had commenced and much of the site had been stripped and the concrete chalet bases built prior to the archaeologists attendance at the site. Following a site meeting with Ashley Batten of GAPS a walkover survey was conducted and the excavation of the site drainage/service trenches was conducted under archaeological supervision. No archaeological remains were visible within the areas which had already been stripped but it is possible that some features could have been missed or covered by building activity. Archaeological features were observed within the service trenches.

5.3.3. No deposits meriting environmental sampling or scientific dating were encountered during this phase of works.

5.4.RESULTS

5.4.1. The majority of this area was not stripped under archaeological supervision. The record of archaeological features in this plot may therefore be incomplete and this must be noted so as to aid interpretation. FIGURE 15 details the locations of features/ drawings discussed in the following text.

5.4.2. Three shallow areas of in-situ burning were recorded in Parcel 6. All three features were cut into the natural (1005) and were sealed by the subsoil (1006).

- 5.4.3. Two of the burnt features [1001] and [1007] were situated together and were uncovered during the excavation of a service trench (FIGURE 16). The area around them had been stripped prior archaeological monitoring and a concrete chalet base had already been laid. It is therefore possible that there were more features in the immediate area that were covered/destroyed by the groundworks.
- 5.4.4. Feature [1001] was sub-circular in plan measuring 1.32m x 1.40 and survived to a depth of 0.14m (FIGURE 17). A shallow pit had been dug into the natural to contain the fire and the heat had baked the surrounding deposit, changing the colour of the natural clay. (PLATE 10).
- 5.4.5. Above the scorched area was a charcoal deposit (1003) containing charcoal lumps and fragments within a clay matrix. The clay element forms less than 10% of the overall deposit composition and is thought to have been washed in from the overlying deposit. The maximum thickness of (1003) was 0.10m. Radiocarbon dating of this deposit gave a date of AD1050-1090, AD1120-1140, AD1150-1220 (Beta-360925; 870 +/- 30 BP).
- 5.4.6. Deposit (1003) was sealed by (1004), a compact mid-brown clay deposit with frequent charcoal flecks. It is possible that this may be the remains of turf/topsoil used to extinguish the fire although it is as likely to be the result of the slumping of subsoil into the feature and the charcoal may have been mixed in by worm action. This deposit contained a single flint flake although this could have been residual and shows no evidence of having been burnt. This artefact along with a further small flint found in the topsoil are discussed in greater detail in Section 6.5.
- 5.4.7. Directly opposite [1001] was a similar feature, [1007] (FIGURE 18, PLATE 11). This feature was not fully exposed in plan as it lay outside the pipe trench area. The maximum exposed dimensions were 1.15m x 0.40m and from the section seen was likely to have been a similar shape to [1001]. This fire did not appear to have burned at as high a temperature or for as sustained a period as [1001] and although the underlying natural had been baked hard by the heat the same colour change was not evident. The lower fill of [1007] was (1008) a mid

brown clay with frequent charcoal flecks which was a maximum of 0.03m in thickness. The charcoal content of this deposit was considerably less than in (1003) and was an inclusion rather than forming the bulk of the deposit. The feature was sealed by deposit (1009) a mid-brown-grey clay with occasional charcoal flecks which was a maximum of 0.10m thick.

5.4.8. The third burnt feature [1011] (FIGURE 19) was located approximately 20m to the north-west of the other two features and again it must be noted that much of the surrounding area had been stripped without archaeological supervision. It was truncated by the service trench and was recorded in section only.

5.4.9. The feature was very similar to [1001] and had shallow concave sides with a flat base. The width in section was 1.70m and the maximum depth was 0.17m. This pit also showed evidence of having been burnt and the underlying natural clay had been coloured orange by the heat which had caused changes to a depth of 30mm. This was numbered (1012) although as with comparable context (1002) this is not a separate deposit in the strictest sense. Pit [1011] contained three fills, (1013) a yellow-brown silty clay with a maximum thickness of 0.10m, (1014) a black silty clay charcoal rich deposit (maximum thickness 0.09m) similar to (1003) and (1015) a yellow-brown silty clay layer which seals the feature (maximum thickness 0.08m).

5.4.10. The function of these features was not obvious, although they appear to be short lived hearths. They may have been temporary fires made by shepherds or farmers.

5.4.11. The only other feature noted during the archaeological monitoring was a modern concrete and iron feature [1010] which was recorded in the service trench (see PLATE 12). It is possible that this feature may have been part of a cable car attraction which was once in use on the site.

6. Parcel 6 (Golf Course Test Pits)

- 6.1.1. Six test pits were excavated in the area of the golf course of Parcel 6 between 6th and 9th March 2012 as agreed in the specification (L – P : ARCHAEOLOGY 2011E). Parcel 6 is a series of open fields to the south of the holiday park (FIGURE 2). The site of the golf course was undulating grassland with rocky outcrops in the north and low lying fields in the south. The site elevation varies between 18m OD and 24m OD.
- 6.1.2. Mesolithic flint scatters have been recorded on the southern tip of the headland within Parcel 6. Subsequent trial pits by Gwynedd Archaeological Trust and volunteers identified two possible phases of prehistoric activity (PRN6787), although the results were uncertain. Potential prehistoric buried ground surfaces were recorded at depths of between 0.20m and 0.50m below ground level.
- 6.1.3. Pwllheli and Criccieth were both important Medieval centres. However, the site was unlikely to have been used during this period as it is some distance from the towns and the road. It is possible that the area was used agriculturally.
- 6.1.4. The site had not been previously developed. It was covered with grass with areas of gorse, some of which had been cleared.
- 6.1.5. The field boundaries are dry stone and cloddiau walls and some banks with trees. These have been cut through as part of this development in some areas and sections were exposed.
- 6.1.6. The golf course consisted of a putting green and nine holes. Each hole consists of a tee, a fairway and a green with some additional bunkers. The tees are to be built up over the existing turf. The existing turf on the fairways will be mowed and spiked to a depth of c.150mm using blades rather than round spikes. The existing turf on the greens and bunkers will be removed using a hand held turf cutting machine and the level will be built up on the exposed soil.

6.2.AIMS

- 6.2.1. The aims of the test pits were to:

- ◆ ascertain the presence or absence of any prehistoric buried ground surfaces (BGS) and to record the character, date, location and preservation of any archaeological remains.
- ◆ To use the results to help determine the potential for significant archaeological remains in other areas of the site, especially within Parcel 6.

6.3.METHODOLOGY

- 6.3.1. Test pits were excavated in the exposed areas of the putting green and greens one, two, three, seven, eight and nine (FIGURE 4). The turf in the areas of the greens and bunkers was removed using a hand held turf cutting machine prior to the test pit excavation. All exposed areas were visually inspected by a qualified archaeologist to identify any possible archaeological remains.
- 6.3.2. Each test pit measured 1.00m by 3.00m as this was considered the minimum area required to clearly identify a buried ground surface. Pits were to be excavated to a maximum depth of 1.00m or natural geology, whichever was the shallower.
- 6.3.3. The test pits were excavated by hand. Spoil was placed on plastic sheeting adjacent to each trench. Backfilling was by hand using the excavated material.
- 6.3.4. No deposits meriting environmental sampling or scientific dating were encountered during this phase of works.

6.4.RESULTS

TEST PIT 1

- 6.4.1. Trench 1 was aligned SW-NE and measured 1m by 3m with a maximum depth of 0.40m. The SW corner was at NGR242874,335955.
- 6.4.2. The uppermost layer was a 0.25m thick dark brown humic silt topsoil (101) with occasional patches of rounded gravel (105) at the base. This overlay a 0.20m thick mid orange brown silt subsoil (102). A small patch of dark brown red clay with very occasional charcoal flecks (106) was noted in the south of the trench below (102). The soil within (106) was not scorched and this was not thought to be the same as the burnt areas seen in the Parcel 5 watching

brief.

6.4.3. The natural geology within the trench consisted of mid orange gritty clay (103) and pale yellow angular gravel (104).

6.4.4. No archaeological deposits or features were noted in the trench and no finds were recovered.

TEST PIT 2

6.4.5. Trench 2 was aligned SW-NW and measured 1m by 3m with a maximum depth of 0.55m. The SW corner was at NGR242966,335825. It was close to the remains of a dry stone enclosure. The clawdd walls of the enclosure suggest a Post Medieval date. The section drawing is given in FIGURE 20.

6.4.6. The humic topsoil (201) was 0.15m thick and contained occasional modern refuse such as foil and plastic. (201) sealed three cuts. In the northwest was a shallow sided scoop 0.30m deep [206]. The primary fill was friable mid brown silt (210) that accumulated when the pit was left open. This had been deliberately backfilled with angular rocks and dark brown silt (205).

6.4.7. In the north of the trench was the edge of a steep sided cut [204] running north south. The base was outside the area of the test pit, and the lowest fill was mid brown silt and angular rocks (203) that appeared to have slumped in from the edge of the feature. The tertiary fill was angular rocks, mortar flecks and dark brown silt (202) which contained one sherd of 19th/20th century brown glazed pot. In the east of the trench, parallel to [206] was the edge of a similar shallow scoop [208]. The upper fill of angular rocks and silt (207) was exposed and partially excavated.

6.4.8. All the features cut 0.40m thick mottled orange brown silt clay (209). This overlay natural compact grey yellow clay and gravel (211).

6.4.9. The function of the shallow sided cuts [206] and [208] is unclear although they appear to have been deliberately backfilled with rubble, possibly from the nearby structure. The steep sided cut may have been a drainage feature that was eventually filled with imported rubble including mortar. The backfill in all the features would have acted to solidify the marshy land. The finds suggest that

this occurred during the 20th century.

TEST PIT 3

6.4.10. Trench 3 was aligned N-S and measured 1m by 2m with a maximum depth of 0.00m. The SW corner was at NGR243035,335758. The sequence within the trench was 0.30m thick humic topsoil (301) over 0.20m thick mid orange clay silt (301) over 0.10m thick pale brown grey silt (303). At the base of the trench was compact pale brown grey clay gravel natural deposits.

6.4.11. No finds or features were recorded.

TEST PIT 4

6.4.12. Trench 4 was aligned N-S and measured 1m by 3m with a maximum depth of 0.70m. The SW corner was at NGR243295,335765.

6.4.13. The sequence within the trench was 0.30m humic topsoil (401) over 0.10m mid brown silt subsoil (402), which was the result of ploughing. It overlay mid 0.25m thick orange clay silt (403) and 0.30m thick pale grey silt clay. At the base of the trench was compact grey clay gravel natural geology (405).

6.4.14. No finds or features were recorded.

TEST PIT 5

6.4.15. Trench 5 was aligned N-S and measured 1m by 2m with a maximum depth of 0.75m. The SW corner was at NGR243177,335677. The section drawing is given in FIGURE 20.

6.4.16. The sequence within the trench was 0.20m humic topsoil (501) over 40mm of pebbles and gravel (502). The reason for this layer of stones sorting to the base of the topsoil may be worm action. Below (502) was a 0.25m thick mid brown silty subsoil (503) with very occasional charcoal flecks. A flint flake was recovered from this layer. (503) overlay 0.30m thick mid brown orange silt clay (504) which had been heavily disturbed by roots. This overlay natural deposits of 0.10m thick orange clay gravel, and pale grey silt clay with angular stones at the base of the trench.

6.4.17. No features were recorded within the trench although the presence of charcoal and a flint flake in the subsoil may indicate prehistoric activity in the area.

TEST PIT 6

6.4.18. Trench 6 was aligned NW-SE and measured 1m by 2m with a maximum depth of 0.35m. The SW corner was at NGR243033,335908. It was positioned between two rocky outcrops in the north of the golf course area.

6.4.19. The sequence within the trench consisted of 0.15m thick humic topsoil over 0.20m of mid brown orange clay sit. At the base of the trench was natural orange grey gravel clay.

6.4.20. No finds or features were recorded in the trench.

6.5.SUMMARY

6.5.1. Trenches 1 and 3 to 6 showed a similar sequence of natural gravel overlain by orange clay silt and humic topsoil. In trenches 4 and 5, in the east of the site, an additional layer of brown subsoil was recorded. This suggests that these fields were ploughed. The date range of the ploughing is unknown although the fields are close to Penrhyn Farm which appears on the 1st edition Ordnance Survey map of 1889.

6.5.2. Trench 2 was located in a very marshy area and it appears there were attempts to drain and stabilise the area in the 20th century which involved drainage channels and packing the site with stone.

6.5.3. No prehistoric ground surfaces were identified, although a flint flake was recovered from the subsoil in trench 5 which suggests some prehistoric activity in the area.

6.5.4. The geology recorded in the golf course area was comparable to the glacial clay and gravel seen inland rather than the windblown sand deposits recorded at the tip of the peninsula by GAT (2011).

7. Parcel 6 (Golf Course Field Survey)

7.1.INTRODUCTION

7.1.1. A survey of the field boundary walls and newly exposed rock outcrops in the golf course area of Parcel 6 (FIGURE 2) was requested by the Gwynedd Archaeological Planning Service (GAPS) to identify any potential Prehistoric stone walls or markings on rock outcrops. The survey was carried out on 13th September 2012 by Matthew Williams of L – P : Archaeology. The survey took place in the golf course area as described in the introduction to Section 6.

7.2.AIMS

7.2.1. The aims of the survey were to:

- ◆ record the field boundaries and try to identify potential prehistoric stone boundaries; and
- ◆ examine exposed rock outcrops to identify prehistoric markings.

7.3.METHODOLOGY

7.3.1. Field boundary types were recorded on a plan and a sample of exposed sections through cloddiau walls were photographed. A sample of dimensions was also taken.

7.3.2. Rock outcrops were examined for carvings.

7.3.3. General photographs were taken to indicate the character of the site. All photographs were taken using black and white film and a digital camera.

7.4.BOUNDARY RESULTS

7.4.1. Four types of boundary were recorded. These were cloddiau, walls obscured by vegetation, earth banks and fences (FIGURE 21).

CLODDIAU

7.4.2. A clawdd (plural cloddiau) consists of an earth or rubble core with stone outer facing, it may also have a fence or hedge on the top. A general view of typical cloddiau on site is shown in PLATE 31 and a section through a clawdd wall where is shown in PLATE 13. This type of wall is common in Cornwall, Devon

and some Welsh coastal regions, especially around Bangor, Anglesey and the Llyn Peninsula (WWW.DRY-STONE.CO.UK).

- 7.4.3. Two basic styles of clawdd were recorded at Hafan-y-Mor. Clawdd 1 consisted of a base stretcher course of large stones, up to 1m in length, with up to five courses of smaller stones (up to 0.40m) above. This type was seen in the north east of the site. Preservation varied greatly across the site, for example the eastern section in figure 1 was almost completely collapsed and very eroded (PLATE 14 and PLATE 19). However the distinctive base course remained and therefore the boundary could be recognised as clawdd (PLATE 16). The same type of wall, generally in much better repair, was recorded along the north west boundary although one section had collapsed which allowed a direct comparison with the other section (PLATE 18). It is possible that this type of construction was more widespread across the site but vegetation and soil had obscured the base of many of the walls.
- 7.4.4. The rest of the clawdd on the site were Clawdd 2 which generally consisted of four or five courses of random stones (up to 1m). Although stones at the base tended to be larger but there was no distinct base course (PLATE 17 and PLATE 19). In some sections the stones were very random and appeared to be held together by the soil and vegetation that had grown around them (PLATE 14 and PLATE 21). The interior of this type was visible where a section had been cut through a wall on the approach to the site. It showed the core consisted of topsoil from the site with occasional additional stones to strengthen it. There was a thick earth bank on the top of the wall (PLATE 13).
- 7.4.5. One new section of clawdd was constructed as a part of the golf course development in the south east of the site.
- 7.4.6. Both types survived to a maximum height of about 1.10m, although some sections had collapsed. Many sections in the eastern and southern areas had small trees, hedges or gorse growing in the top. All the walls, except the new section, were overgrown with a build up of soil at the base (e.g. PLATE 23 and PLATE 32).
- 7.4.7. Breaks in the cloddiau were usually terminated with large stones either upright

(PLATE 26 to PLATE 28) or laid on top of one another (PLATE 22 and PLATE 23). These often had holes drilled in them for gate hinges or latch. Some terminations did not have large stones and may be where gateways have been inserted or widened and stones removed (see left side of PLATE 22).

- 7.4.8. The only anomaly noted in the walls was a crude bridging structure where a clodd crossed a water channel (PLATE 20). This formed part of the original structure.

WALLS OBSCURED BY VEGETATION

- 7.4.9. Some sections of boundary were inaccessible or so overgrown with gorse that it was not possible to see the boundary construction. In all cases it was most likely that the obscured boundaries were cloddiau.

EARTH BANK

- 7.4.10. In the south east part of the site a series of wide, low earth banks have been constructed to divide up a large field. A section had been cut across the top of one which shows mixed topsoil (PLATE 21). The undifferentiated topsoil in the section and lack of trees or gorse on the banks suggests that they are relatively modern. Boundaries along these lines are shown on the first edition 1889 OS map.

FENCES

- 7.4.11. Wooden post and wire fences have been put up in some areas. Along the northern boundary a fence divided the site from the wooded area and chalets. In the south east of the site fencing had been put up at the base of the slope that forms a natural field boundary (PLATE 24). In other parts of the site, especially along the eastern boundary, small sections of fence have been put up to fill in areas of collapsed cloddiau. The fence construction is all modern.

7.5. ROCK OUTCROP SURVEY RESULTS

- 7.5.1. None of the outcrops inspected showed evidence for man made carving or marking. The outcrops that had been exposed for a long time had an irregular, undulating surface with extensive lichen covering. Outcrops that had been recently exposed by gorse removal showed distinct strata and had a grooved appearance where the softer layers had been eroded (PLATE 29 and PLATE 30).

The extent of the erosion behind the gorse indicates that the rock is soft and it is unlikely that prehistoric markings, if present, would have survived. The rock type is recorded as sedimentary mudstone and sandstone in the British Geological Index (WWW.BGS.AC.UK/GEOINDEX).

7.6.DISCUSSION

7.6.1. The boundary survey recognised two general types of cloddiau within the site. Both types varied greatly in preservation with cloddiau on high exposed areas or adjacent to marshy areas in worse condition than those in the central fields. The age of the cloddiau cannot be certain although the poor condition of some sections would suggest an age of 150 years or more. All the boundaries except the new clawdd built as part of this development are shown on the 1889 OS map. No sections of prehistoric structure were recognised and the ancient appearance of the wall in the north of the site is a result of the structure collapsing and erosion of the stones in exposed areas of the site. No markings of any sort were seen on the rock outcrops, although the recently exposed surfaces and erosion of some of the cloddiau suggest that the rock is soft and any ancient carving is unlikely to have survived.

8. Finds

8.1. A small collection of artefacts were recovered during the watching briefs/excavations conducted on Parcels 5 and 6.

8.2. The assemblage consisted of a number of flint flakes, a small quantity of Post-Medieval pottery, a slate counter and a post-war holiday camp badge. Due to the small size of the assemblage artefacts will be discussed by type rather than area.

8.3. FLINT BY BLAIR POOLE (FIGURE 22 TO FIGURE 24)

8.3.1. A total of four flint small finds were collected from the Hafan y Mor site, Pwllheli. The flints were recovered from disparate locations across the site, making any detailed topographic conclusions about activity patterns impossible.

8.3.2. As only four flints were recovered from the site, each from different contexts, they will be discussed individually below.

Context	Material	Cortex	Dimensions (mm)	Form	Retouch
Unstratified	Cream, smooth flint	Rough brown texture at proximal and right edge.	21.61 x 10.19 x 2.42	Microlith	Left edge
003	Coarse grey flint	Not present	55.45 x 41.38 x 14.68	Retouched blade	Left and right edges
503	Cream smooth flint	Rough brown texture at distal and left edge	21.26 x 12.11 x 3.14	Debitage	None
1004	Cream smooth flint	Rough brown texture on dorsal face, left edge	29.70 x 22.25 x 5.02	Cortical scraper	None

Table 1- Flint artefacts by context

UNSTRATIFIED FLINT

8.3.3. A microlith was recovered from the topsoil in parcel 6 during the excavations for pipe trench 1. The lithic measures 21.61mm by 10.19mm by 2.42mm and is of a smooth cream material, with a rough brown cortex present at the proximal end at along the right edge (FIGURE 22). This material is similar to

flint deposits on the Llyn peninsula (LORD 1993), although not natural in the site area. The striking platform and bulb of percussion are clear, as are two negative flake scars on the dorsal face (PLATE 33). Retouch is present along the left edge, having been worked from the ventral face. This form of flint is most typically seen in a Mesolithic environment, however microliths did continue in use into the Neolithic. Its presence in the topsoil shows it is not an *in situ* find.

CONTEXT (003)

8.3.4. A good example of a retouched blade, measuring 55.45mm x 41.38mm x 14.68mm, was recovered from (003), a subsoil identified at the northeastern area of the site, in Parcel 5 (FIGURE 20). The blade is of a coarse grey flint, which has no cortex present. Arises on the dorsal face show negative flake scars from previous working of the material. A pronounced bulb of percussion can be seen with numerous bulbar scars, suggesting prior working from this end of the core. Retouch can be seen along both left and right edges, with working seen from both faces (PLATE 34). The right edge has been worked more in order to thin the item. This was not required on the left edge, as a single flake had been removed to form a sharp edge. Although known from the Mesolithic period they are known to still be in use into the Neolithic. However, this form of retouched blade is more likely Mesolithic in date.

CONTEXT (503)

8.3.5. A small flake measuring 21.26mm x 12.11mm x 3.14mm was found in subsoil (503) in evaluation Trench 5, located in the southern area of the site. The flint material is the same as the unstratified microlith, that is a smooth cream with rough brown cortex. There is no retouch or working seen on the item. However, a single negative flake scar on the dorsal face indicates that this was not the first flake to be removed from a core (PLATE 35). The size of the flake suggests this was debitage associated with microlith manufacture, indicative of Mesolithic activity. The presence of debitage could indicate that tool manufacture occurred in the area during the Mesolithic period.

CONTEXT (1004)

8.3.6. A cortical scarper was recovered from (1004), a deposit overlying a burnt patch or hearth in Parcel 6. Charcoal from this deposit has been dated to the

12th century, indicating that this flint is a residual find, and not contemporary with the Medieval activity. The lithic measures 29.70mm x 22.25mm x 5.02mm (Figure 21) and has a pronounced bulb of percussion. This bulb in conjunction with a negative bulbar scar on the dorsal face (PLATE 36) lends the handler to hold the tool in a specific manner, leaving the sharpest edge open for use. The material is the cream, smooth flint with rough brown context, and its form is typical of the Mesolithic period.

SUMMARY

8.3.7. Although the assemblage is very small it can all be dated to the Mesolithic period. A note at Bangor Museum says that between 1985 and 1986 a total of 406 flakes, 13 cores and one denticulate was found at Pen-y-Chain (BANGOR MUSEUM 1988/1). The location is given as SH436353 which is at the very end of the peninsula in the area where GAT recorded possible Mesolithic buried ground surfaces (GAT 2011). The density of flint found during the recent work was far lower than this, suggesting the the focus of activity and/or best preserved Mesolithic remains are within the wind blown sands at the end of the peninsula. The flints found on site may represent casual loss and redeposition of artefacts associated with the activity on the peninsula.

8.3.8. Three of the four pieces are of the cream brown flint which is known to occur on the Llyn peninsula (Brown 1993) and therefore does not infer long distance trade at this particular area during this period. The fourth piece was grey flint of unknown provenance.

8.4.POST-MEDIEVAL POTTERY BY MATTHEW JONES

8.4.1. All the pottery finds were of 1800's or later date and were recovered either from the top soil or features associated with Post Medieval agricultural activity.

TOPSOIL FINDS

8.4.2. Nine ceramic sherds were recovered from the topsoil and these were a mixture of fine and coarse wares. The fine wares were represented by four sherds of blue and white transfer printed pottery and two sherds of white glazed ware. The coarse wares were represented by a single stone ware sherd, two thin

earthen ware body fragments with brown partial glaze and painted slip decoration, and a single rough shard of glazed earthen ware. These sherds are discussed in detail below.

- 8.4.3. Four fragments blue and white transfer printed ware were recovered. These sherds represent the remains of two plates. The first was a small fragment with shell edge border and the second a larger piece decorated with a 'Willow III' pattern. Also recovered was the base of a shallow dish or plate. Unfortunately there were not sufficient design elements visible to provide a positive identification of the pattern used on this item. The final piece was a fragment of a straight sided bowl with a flat flanged rim. The decoration is once more incomplete and it was not possible to make an identification of the pattern used.
- 8.4.4. Two pieces of white glazed ware were found on-site. The first was the fragmentary base of a steep sided bowl with a shallow foot and the second was the mouth and body of a jar with a raised rounded rim.
- 8.4.5. A large fragment of light grey stone ware with a metallic brown glaze was identified. This sherd was glazed on both the exterior and interior and is believed to have formed part of a large storage jar.
- 8.4.6. Three earthen ware sherds were amongst the Hafan-y-Mor assemblage. Two of these were the rim and part body sherd of a shallow bowl. The bowl had a light pink body with small quartz grit inclusions. The exterior of the bowl had a reddish colour with a stripe of brown slip. The interior of the vessel had a striped decoration and descending from the lip there was a dark brown slip with an orange striped slip leading to a dark reddish slip and a dark brown glaze. The lip had an impressed (possibly roll stamped) decoration creating a roughly triangular wedge shaped design.
- 8.4.7. The third earthen ware piece was a large sherd from a red-brown earthen ware jar with an undulating lined interior decoration and brown glaze. The exterior had the same brown glaze which began approximately half way down the sherd.

FIELD DRAIN (028)

8.4.8. Context (028) was the fill of a Post Medieval field drain in Parcel 5 and three sherds of glazed coarse ware were recovered from the context. The first was a single sherd with an exterior steep ridged decoration and brown glaze. There were also the remains of a connecting handle base (also glazed) on the sherd. The interior of the vessel had a shallow ridged decoration and the same brown glaze. The body was of an orangey pink fabric with small grit inclusions. This sherd was interpreted as having been part of a jug. A smaller sherd with shallow ridge decoration made from the same fabric and glaze detailed above was also recovered along with a smaller similar fragment. All three sherds were of Buckley or a Buckley type earthen ware, probably dating from the late 1880's to early 1900's.

8.5.SMALL FINDS BY MATTHEW JONES

TOPSOIL

8.5.1. A souvenir badge (FIGURE 25) was found in the tracks of one of the machines and was assigned to the topsoil layer. The badge was produced for the Butlins Holiday Company by 'W Reeve & Co, Tenby, Birmingham' and had the image of a flying seagull in the foreground with the sea and a rising sun in the background. The colour scheme used was dark and light blue. The badge had raised metal lettering saying "Butlins", "Pwllheli" and "1948". These souvenir badges were produced as affordable gifts for holiday makers and new designs were produced each year to allow visitors to collect them from various sites.

FIELD DRAIN (019)

8.5.2. Context (019) was the fill of Post Medieval field drain. During excavation a single artefact, a single circular stone disk 1.5 cm in diameter and 0.02cm thick was recovered. The artefact was believed to be a Post Medieval token or counter.

9. Summary and Conclusions

- 9.1. Observations across the site revealed topsoil and subsoil overlying clay and gravel geology with rocky outcrops which is the same as the geology recorded to the north of the site during the A497 work. No windblown sand deposits or potential buried ground surfaces, as recorded by GAT in the test pits at the far south of the peninsula, were seen during the works.
- 9.2. The ground surfaces recorded by GAT were interpreted as Mesolithic, and a very large assemblage of flint artefacts, including a denticulate, are recorded found on the tip of the peninsula (BANGOR MUSEUM 1988/1). The three flakes and one scraper found during the work described in this document were all interpreted as Mesolithic. The available evidence suggest a focus of activity at the end of the peninsula during the Mesolithic period and occasional artefacts lost, discarded or redeposited in the surrounding area.
- 9.3. No evidence was found within the site area for Bronze Age or Iron Age activity despite the large amount of remains found during the A497 road works just to the north of the site. The line of the A497 is the natural sheltered route along the coast between the rocky hills to the north and the sea to the south, and it may be that Bronze Age and Iron Age activity is concentrated along this area.
- 9.4. Three small areas of *in situ* burning were identified in Parcel 6, and radiocarbon dating of charcoal from one feature gave a mid 12th century date. The burning was not very intense and it is likely that these were short lived outdoor hearths used by shepherds or farmers working on the peninsula. No Early or later Medieval artefacts were found and there is no direct evidence that the field boundaries are older than the Post-Medieval period, although the subsoil recorded below the topsoil across the site suggests it may have been ploughed for some time.
- 9.5. A number of features of archaeological interest were uncovered within Parcel 5 during this phase of work. All features were either undated or Post Medieval. Recorded features included Post-Medieval drainage features, a ditch with a 90 degree return and several small pits which had probably formed naturally. The 'clawdd' boundary walls are also all probably of Post Medieval date.
- 9.6. The site was used as a training camp during WWII and the foundations of

demolished chalets were investigated to see if WWII base foundations had been re-used, but the shallow concrete slab suggested not. A small standing structure thought to be of WWII date was identified in the wooded area in the south-western corner of the development area.

9.7. The current landscape reflects its use as a holiday camp. The date of the holiday camp were obscure due to WWII secrecy and the earliest reference was from the early 1950s, however a 1948 Butlin's Holiday camp badge was found in parcel 5.

SOURCES CONSULTED

BIBLIOGRAPHIC

- ARNOLD C AND DAVIES J 2002 *Roman and Early Medieval Wales* Sutton, Stroud
- BERKS T, DAVIDSON A, KENNEY J, ROBERTS J AND SMITH G 2007 A497 Improvement: Prehistoric sites in the vicinity of Abererch and Chwilog in *Archaeology in Wales* **47** pp 3-17
- DACRE P 1993. *The Billy Butlin Story*. Robson Books, London
- DODD A H 1968. *A History of Caernarvonshire:1284-1900*. Caernarvonshire Historical Society
- GAT (GWYNEDD ARCHAEOLOGICAL TRUST) 2011 Appendix B: Pen-y-Chain excavation report in *Arfordir/Coastal Heritage: Gwynedd. Progress Report* Gwynedd Archaeological Trust, Bangor
- GRUFFYDD E 2003. *Llyn*. Translated by Owen G. Gwasg Carreg Gwalch, Llanrwst
- HEATH J 2006. *Ancient Echoes: The early history of a Welsh peninsula*. Gwasg Carreg Gwalch, Llanrwst
- LLOYD DG 1991. *Pwllheli. An old Welsh town and its history*. Gwer Press, Llandysul
- LORD J 1993 *The nature and subsequent uses of flint*. John Lord.
- L - P : ARCHAEOLOGY 2011A *Archaeological Desk Based Assessment for land at Hafan-y-Mor*, unpublished archive report.
- L - P : ARCHAEOLOGY 2011B. *Written Scheme of Investigation for Archaeological Recording Hafan-y-Mor Parcel 1*, unpublished archive report.
- L - P : ARCHAEOLOGY 2011C. *Written Scheme of Investigation for Archaeological Work Hafan-y-Mor Parcel 5*, unpublished archive report.
- L - P : ARCHAEOLOGY 2011D. *Written Scheme of Investigation Hafan-y-Mor Parcel 6 (Field 1)*, unpublished archive report.
- L - P : ARCHAEOLOGY 2011E. *Written Scheme of Investigation Hafan-y-Mor Parcel 6 (Golf Course)*, unpublished archive report.
- LYNCH 2001 *A Guide to Ancient and Historic Wales: Gwynedd*. CADW, Cardiff
- LYNCH F 2003. *A Research Framework for the Archaeology of Wales, Regional Seminar Paper. Northwest Wales – Early Prehistoric 22/12/2003*
- PREVETT T 2008 *Roads and Trackways of North Wales*. Landmark, Ashbourne
- SENIOR M 2005. *Hillforts of northern Wales*. Gwasg Carreg Gwalch, Llanrwst
- SENIOR M 2006 *Llyn. The Peninsula's Story*. Gwasg Carreg Gwalch, Llanrwst
- SKIDMORE I 1986. *Gwynedd*. Robert Hulme, London
- SYLVESTER D 1983. *A History of Gwynedd*. Phillimore, Chichester

CARTOGRAPHIC AND PICTORIAL

1889 ORDNANCE SURVEY
1891 ORDNANCE SURVEY
1900 ORDNANCE SURVEY
1917 ORDNANCE SURVEY
1963 ORDNANCE SURVEY
1977 ORDNANCE SURVEY
1982 ORDNANCE SURVEY

ELECTRONIC

www.butlinsmemories.com/pwllheli/index accessed 06/06/2011
www.bygonebutlins.com/pwllheli accessed 06/06/2011
<http://jura.rcahms.gov.uk/COFLEIN> accessed 05/09/11

DOCUMENTARY

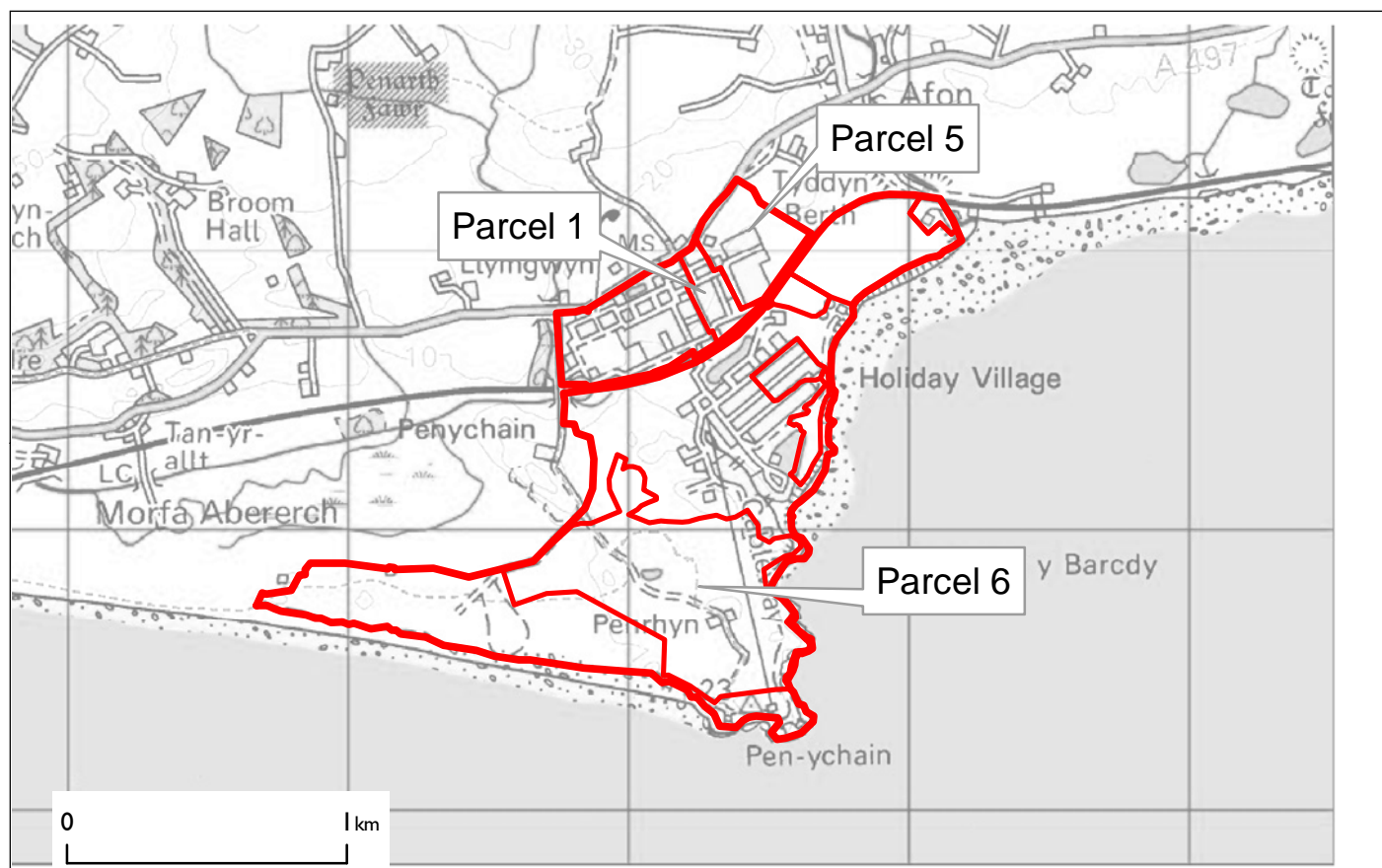
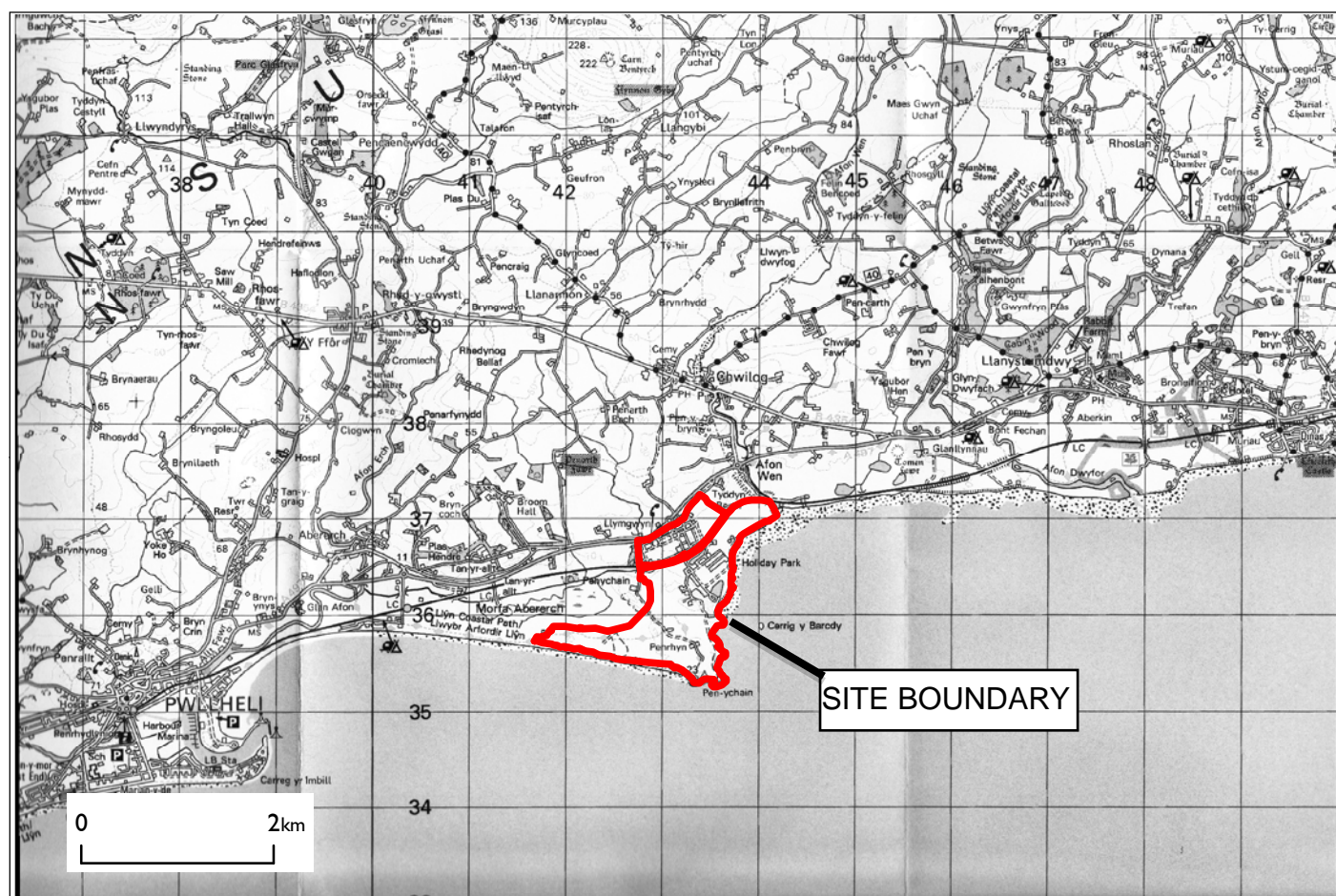
Royal Commission Wales Aerial Photograph 4291
Royal Commission Wales Aerial Photograph 4292
Royal Commission Wales Aerial Photograph 4293
Royal Commission Wales Aerial Photograph 0142
Royal Commission Wales Aerial Photograph 0148
Bangor Museum 1988/1, Note from Francis Lynch.

OTHER

Discussion with Medwyn Parry, library officer at the Royal Commission on the Ancient and Historical Monuments of Wales. 01/09/11.

FIGURES

FIGURES 1 and 2 // Site location



Top: Site location general 1:75,000@A4

Bottom: Location of parcels, 1:25,000@A4

PROJECT // I163C - Hafan-y-Mor

DESCRIPTION // Site location

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DOC REF: LPI I63C-WBR-v1

L-P:ARCHAEOLOGY

FIGURE 3 //WW II photograph



Not to scale



PROJECT // 1163C - Hafan-y-Mor

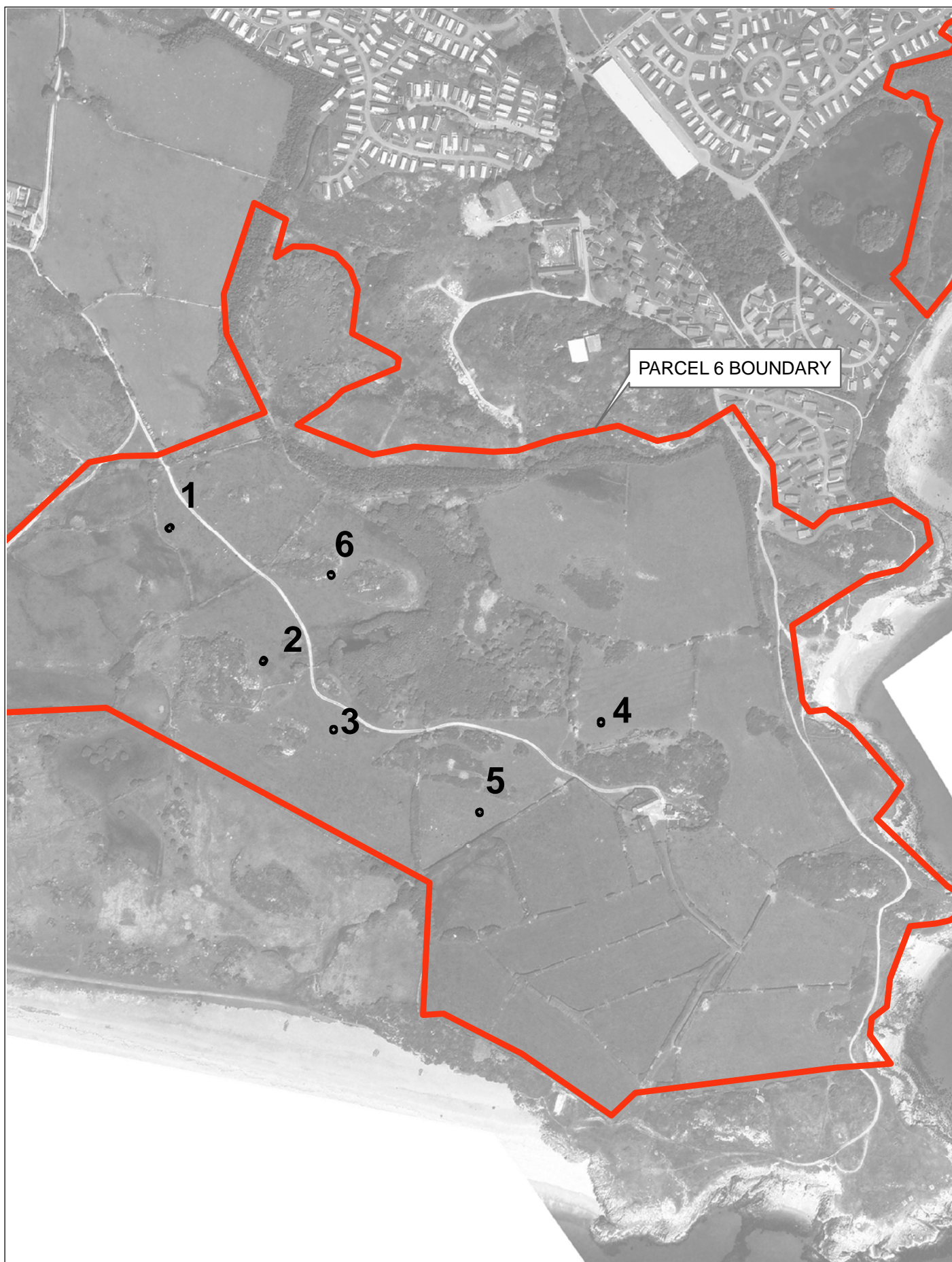
DESCRIPTION // 1945 WW II photograph

Royal Commission Wales Aerial Photograph 4293

DOC REF: LPI 1163C-WBR-v1

L-P:ARCHÆOLOGY

FIGURE 4 // Test pit location



0 250m



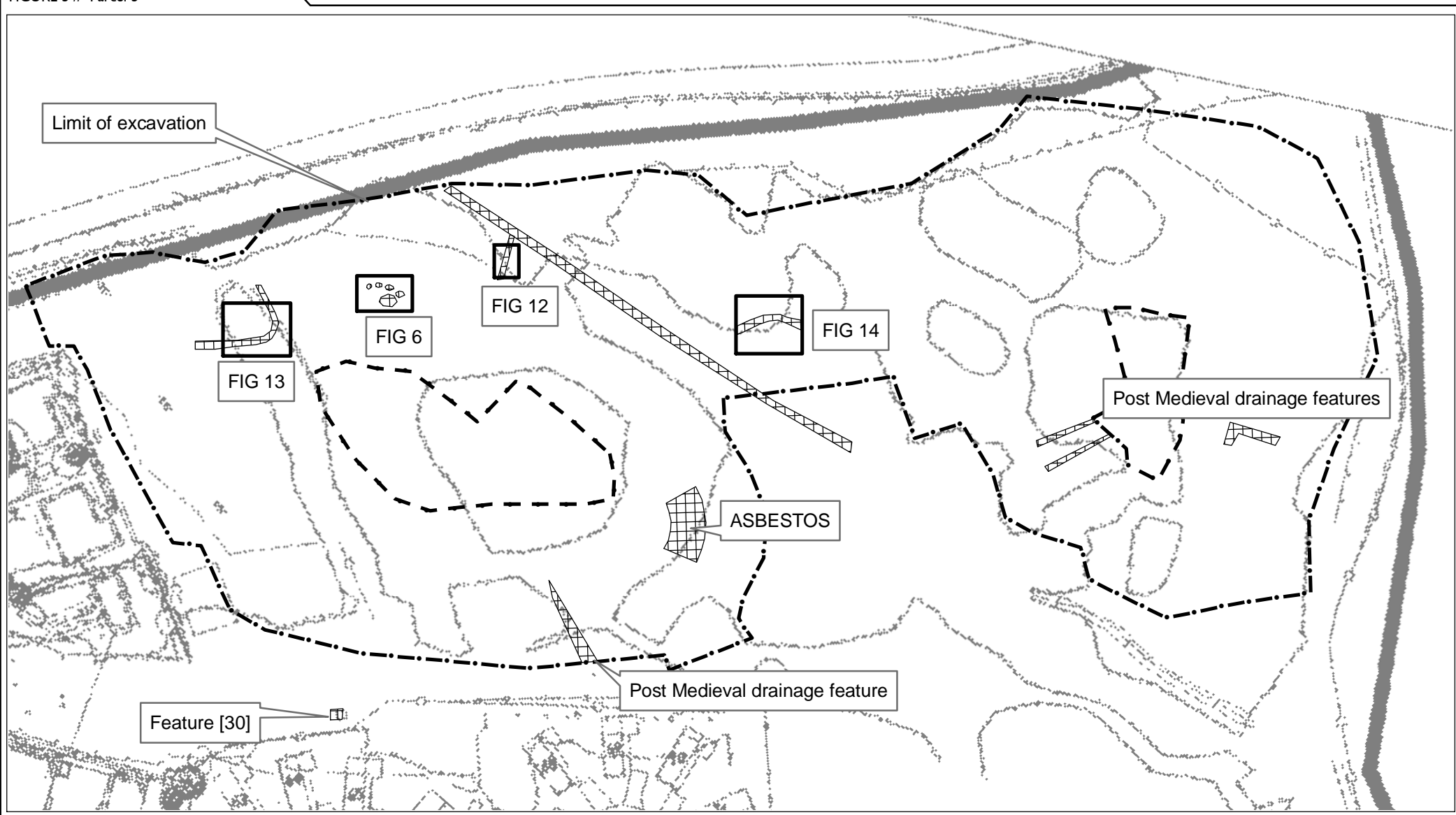
PROJECT // 1163M - Hafan-y-Mor

DESCRIPTION // Test pit location

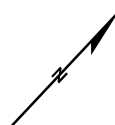
DOC REF: LPI 163M-WBR-v1

L-P:ARCHÆOLOGY

FIGURE 5 // Parcel 5



Scale: 1:1000@A4



PROJECT // 1163C- Hafan-y-Mor

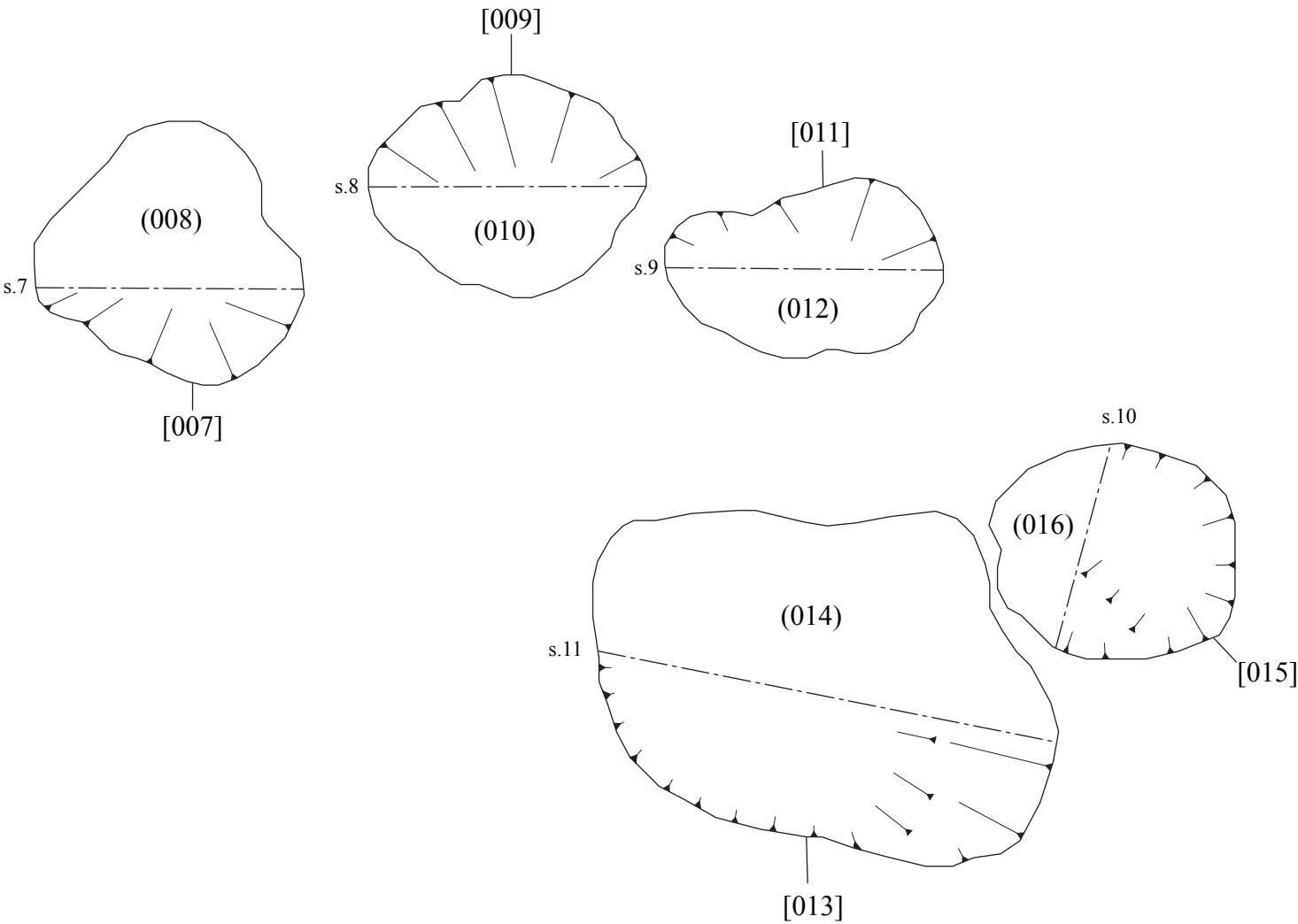
DESCRIPTION // Parcel 5 figure and feature locations

Base data provided by Bratherton Park Design Ltd

DOC REF: LPI1163C-parcel11-SAW-v1

L-P:ARCHAEOLOGY

FIGURE 6 // Feature group [I06]



PROJECT // I163C - Hafan-y-Mor

DESCRIPTION // Feature group [I06]

DOC REF: LPI163C-WBR-v1

L-P:ARCHAEOLOGY

Figure 7. South-east Facing Section Through Feature [007]

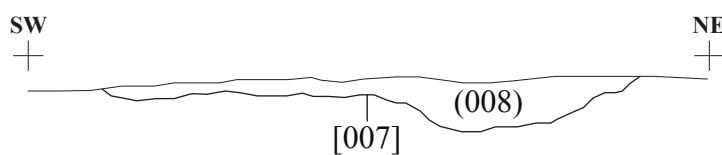


Figure 8. North-west Facing Section Through Feature [009]

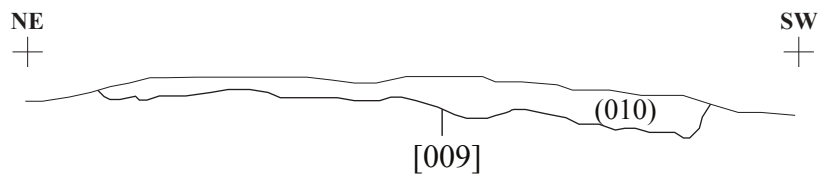


Figure 9. North-west Facing Section Through Feature [011]

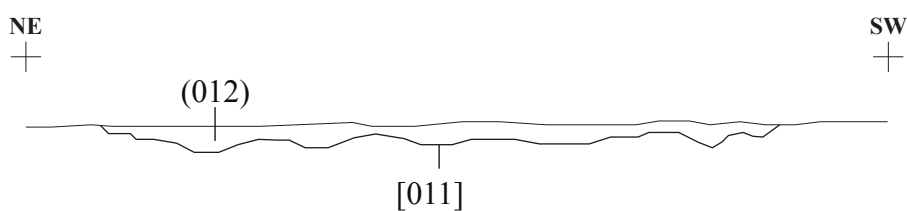


Figure 10. East Facing Section Through Feature [015]

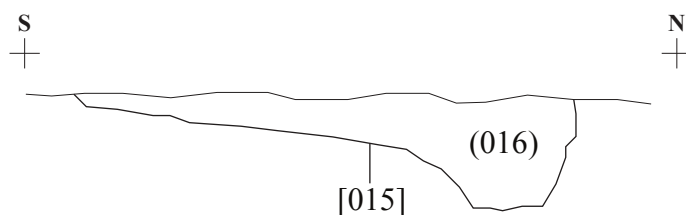
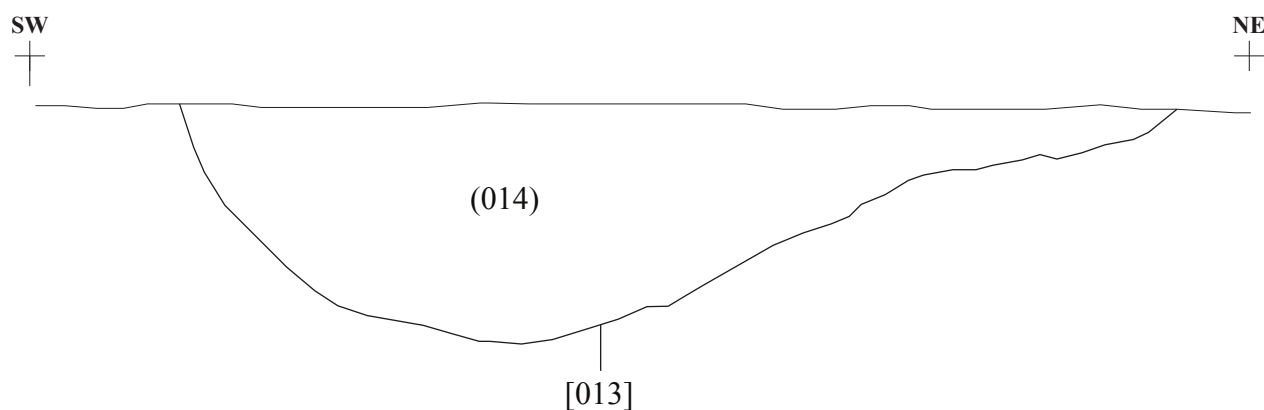


Figure 11. South-east Facing Section Through Feature [013]



0 1m

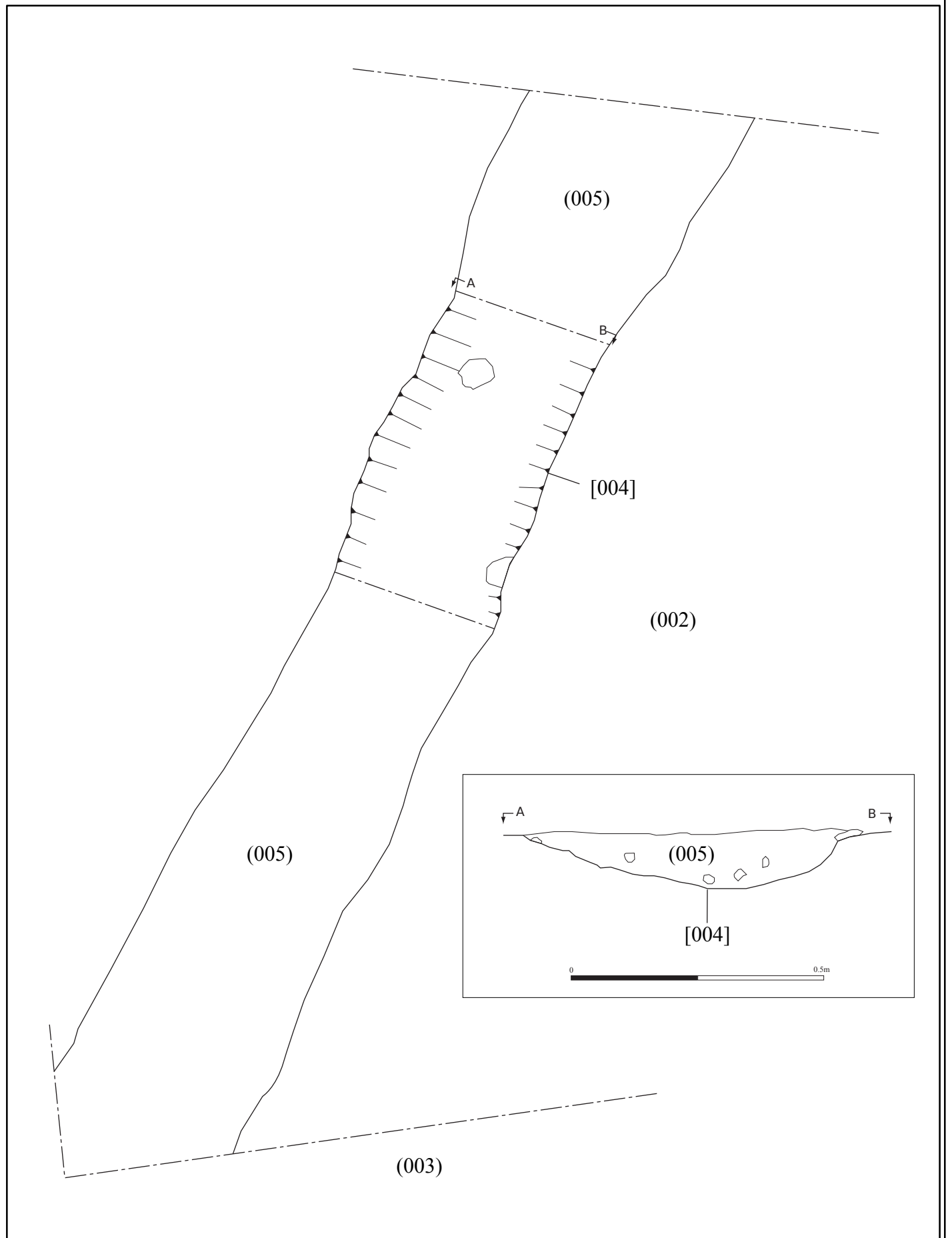
PROJECT // 1163C - Hafan-y-Mor

DESCRIPTION // Section drawings

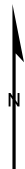
DOC REF: LPI163C-WBR-v1

L-P:ARCHÆOLOGY

FIGURE 12 // Feature [004]



0 1m



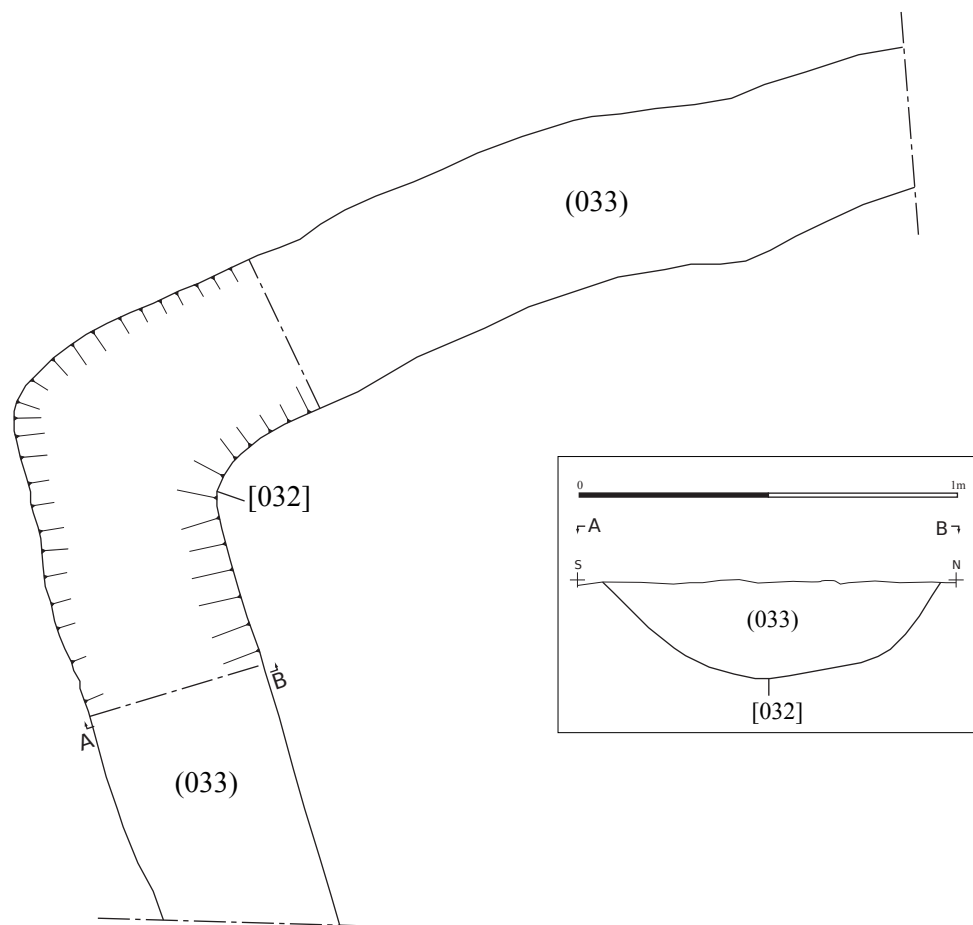
PROJECT // 1163C - Hafan-y-Mor

DESCRIPTION // Feature [004] plan and section

DOC REF: LPI 1163C-WBR-v1

L-P:ARCHAEOLOGY

FIGURE 12 // Feature [032]



0 1m



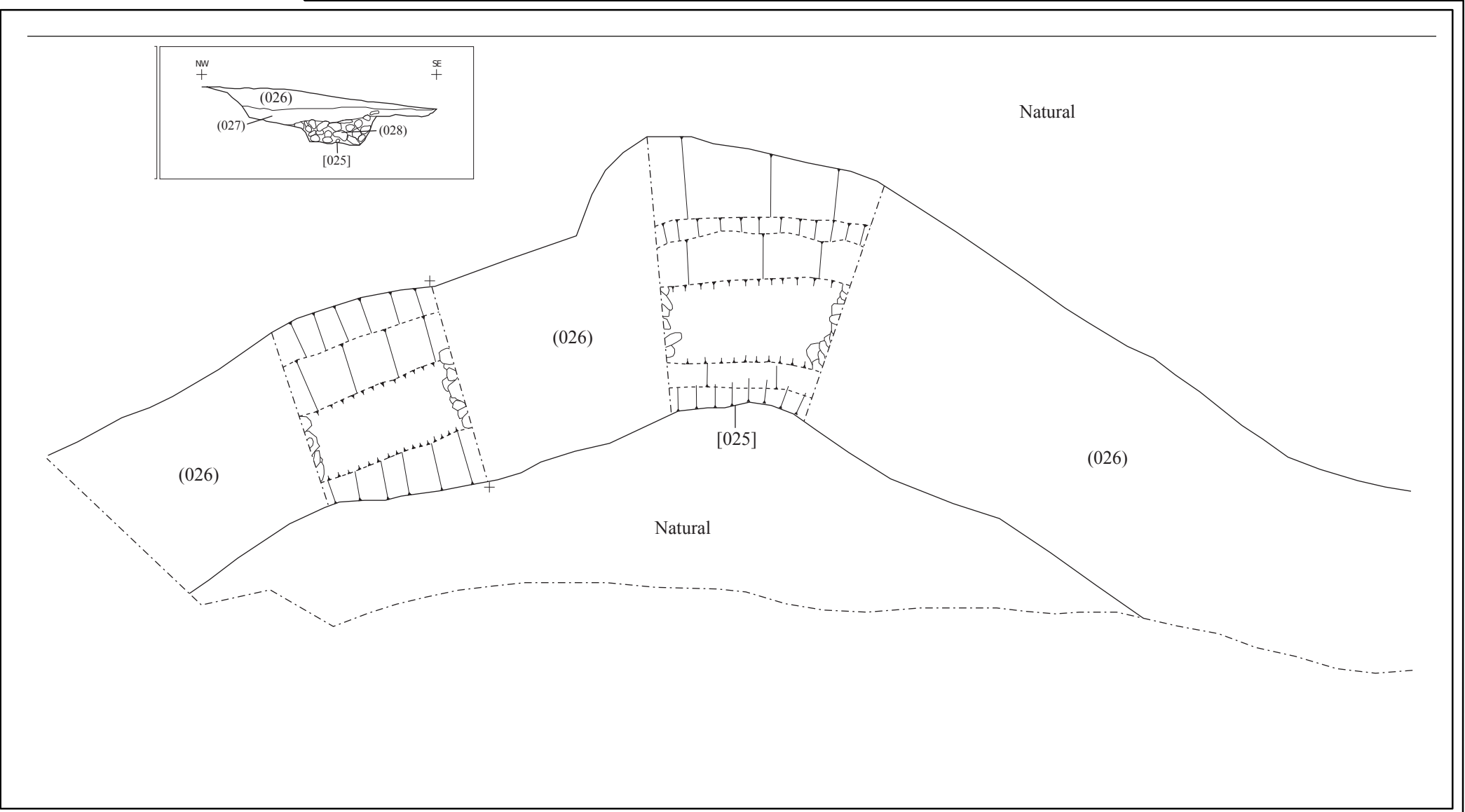
PROJECT // 1163C - Hafan-y-Mor

DESCRIPTION // Feature [032] plan and section

DOC REF: LPI 1163C-WBR-v1

L-P:ARCHÆOLOGY

FIGURE 14 // Feature group [025]



0 1m



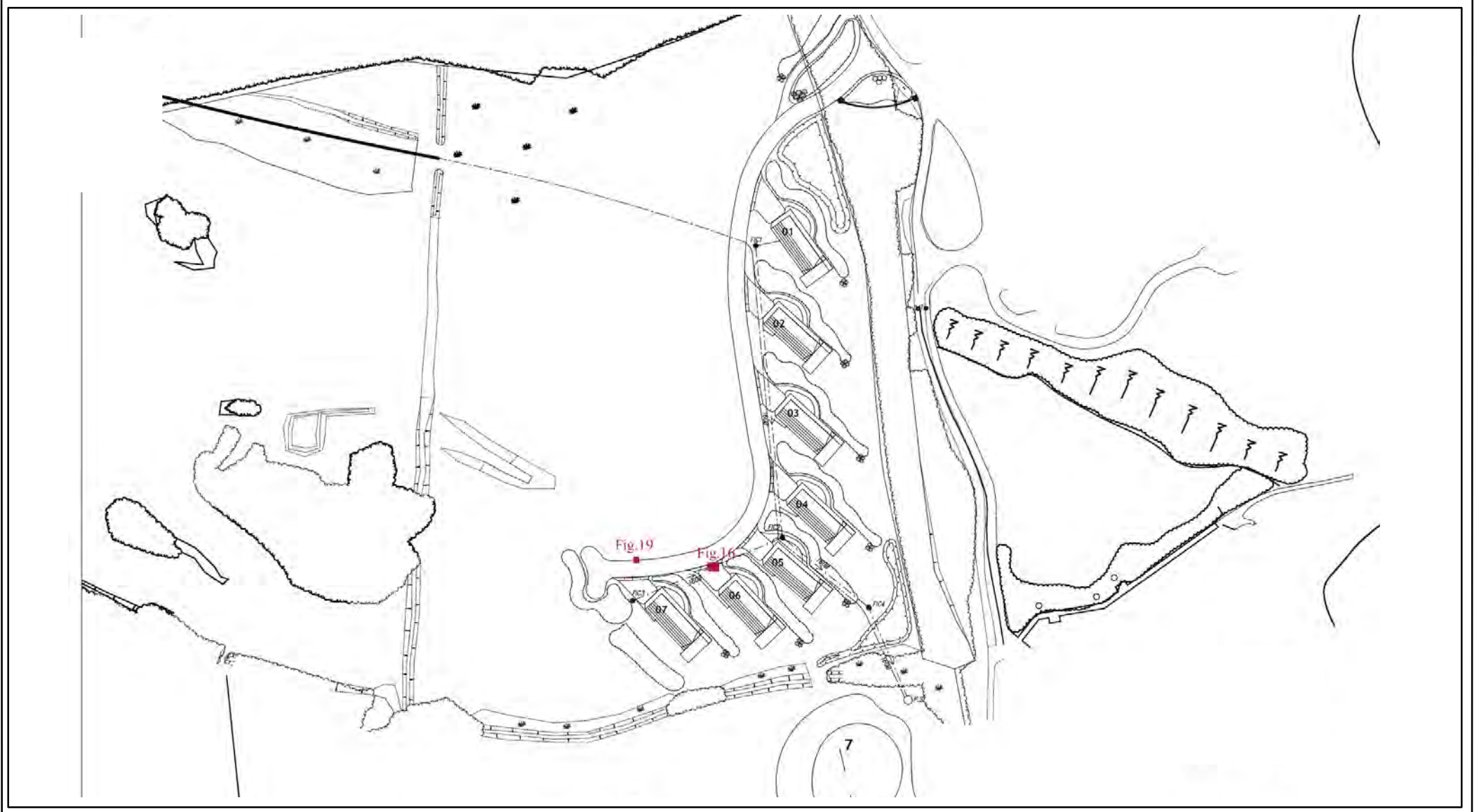
PROJECT // 1163C - Hafan-y-Mor

DESCRIPTION // Feature group [025]

DOC REF: LPI163C-WBR-v1

L-P:ARCHAEOLOGY

FIGURE 15 // Location of drawings in parcel 6



Not to scale



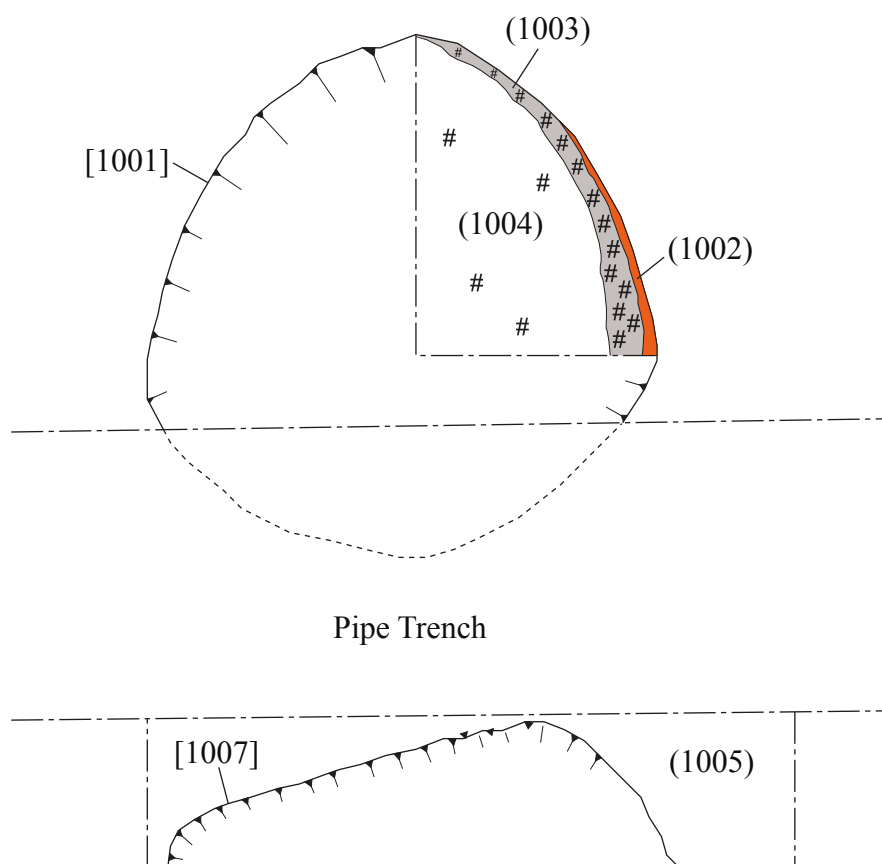
PROJECT // I163C - Hafan-y-Mor

DESCRIPTION // Location of drawings in parcel 6 in relation to chalets

DOC REF: LPI163C-WBR-v1

L-P:ARCHÆOLOGY

FIGURE 17 // Plans of [1001] 007]



0

2m

KEY: ■ Burnt Layer
▨ Charcoal Rich Layer



PROJECT // 1163C - Hafan-y-Mor

DESCRIPTION // Plans of features [1001] and [1007]

DOC REF: LPI 1163C-WBR-v1

L-P:ARCHAEOLOGY

Figure 17. Section Through Hearth Feature [1001]

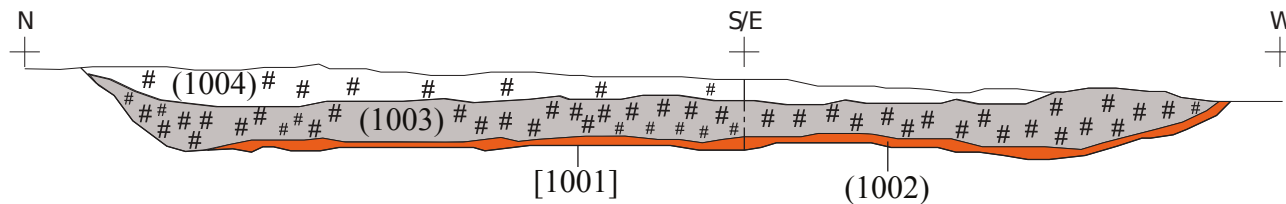


Figure 18. Section Through Hearth Feature [1007]

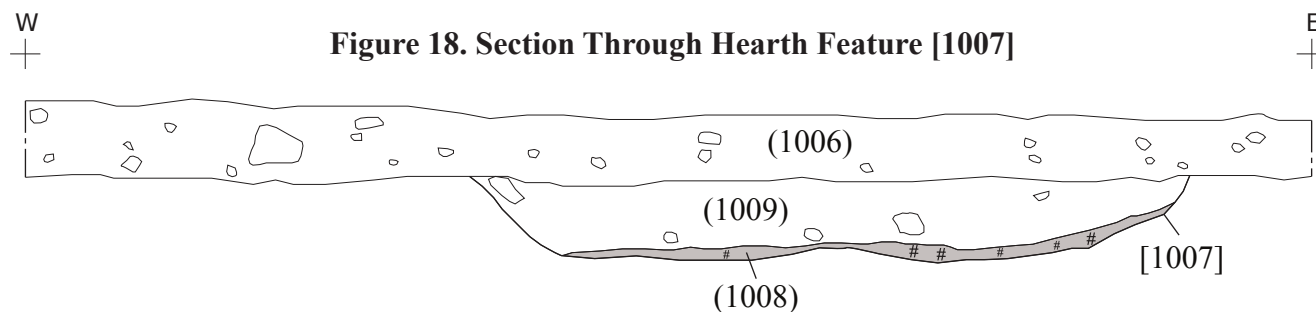
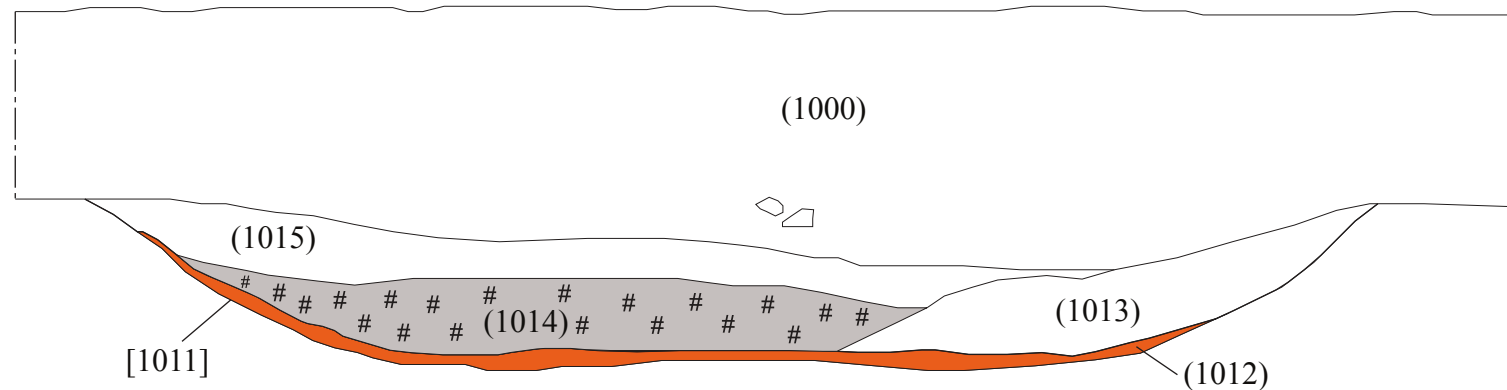


Figure 19. Section Through Hearth Feature [1011]



0 1m

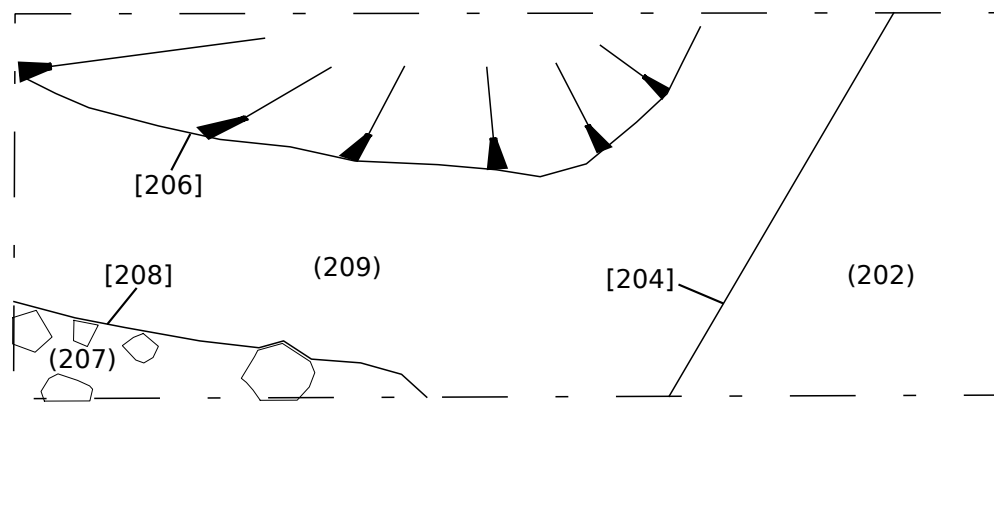
PROJECT // I163C - Hafan-y-Mor

DESCRIPTION // Section drawings features [1001], [1007] and [1011]

DOC REF: LPI163C-WBR-v1

L-P:ARCHAEOLOGY

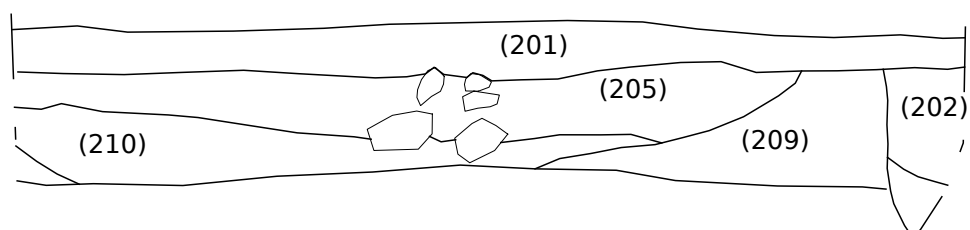
TRENCH 2 PLAN



TRENCH 2 SECTION

SW

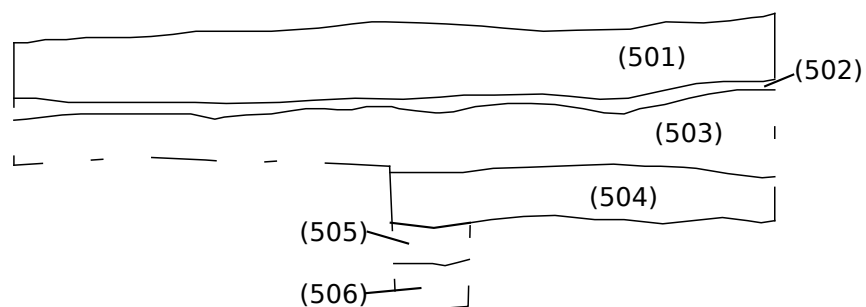
NE



TRENCH 5 SECTION

S

N



A4 scale at 1:20

PROJECT // I163C - Hafan-y-Mor

DESCRIPTION // Trench 2 plan and section. Trench 5 section

DOC REF: LPI163C-WBR-v1

L-P:ARCHÆOLOGY

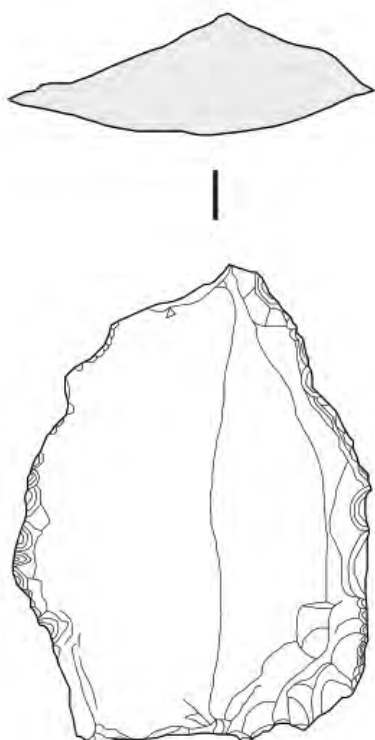


Figure 22

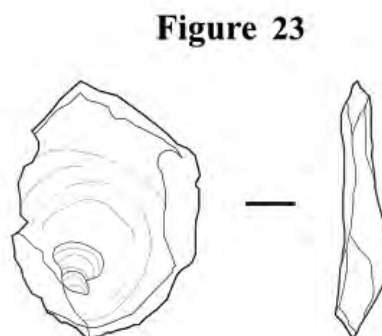


Figure 23

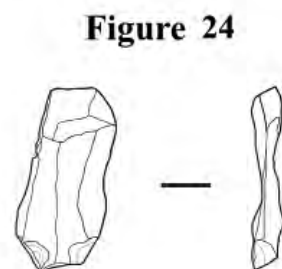


Figure 24

0 3cm



0 1.5cm

Figure 25

Figure 22. Flint Artefact Recovered from Topsoil in Parcel 5

Figure 23. Flint Artefact Recovered from Feature [1001] in Parcel 6

Figure 24. Flint Artefact Recovered from Topsoil in Parcel 6

Figure 25 Holiday Camp Souvenir Badge Recovered from Topsoil in Parcel 5

PLATES



Plate 1 - Holiday chalets prior to demolition



Plate 2 - Holiday chalet frontage prior to demolition



Plate 3 - Holiday chalet and concrete base following demolition



Plate 4 - Sample photograph of holiday chalet and concrete base following demolition



Plate 5 - Clawdd Wall in Parcel 5. 1m scale



Plate 6 - Clawdd Wall in Parcel 5. 1m scale



Plate 7 - Feature 30 – Possible WWII Structure. 1m scale



Plate 8 - Feature [032]. 1m scale.



Plate 9 - Section through feature [25]. 1m scale



Plate 10 - Section through feature [25]. 1m scale



Plate 11 - South Facing View of Feature [1007]



Plate 12 - Concrete and Iron Feature [1010] Possibly Part of a Cable Car Attraction



Plate 13 - Section through wall where gate post removed



Plate 14 - Collapsed wall in north of site



Plate 15 - Collapsed wall in north of site



Plate 16 - Collapsed wall detail



Plate 17 - Clawdd wall with recently cleared ditch



Plate 18 - Base of collapsed clawdd wall



Plate 19 - Random built clawdd wall



Plate 20 - Bridging structure built into clawdd base.



Plate 21 - Section through earth bank



Plate 22 - Large gate post stones



Plate 23 - Gate post stones detail



Plate 24 - Southern boundary fence



Plate 25 - Random built clawdd wall



Plate 26 - Gate post stone and clawdd wall



Plate 27 - Gate post stones



Plate 28 - Gate post stone detail



Plate 29 - Recently exposed rock outcrop



Plate 30 - Recently exposed rock outcrop detail



Plate 31 – General view showing typical clawdd within the site



Plate 32 – Collapsed section of heavily overgrown random built clawdd



Plate 33 – Unstratified microlith from parcel 6



Plate 34 - Retouched blade from (003), parcel 5

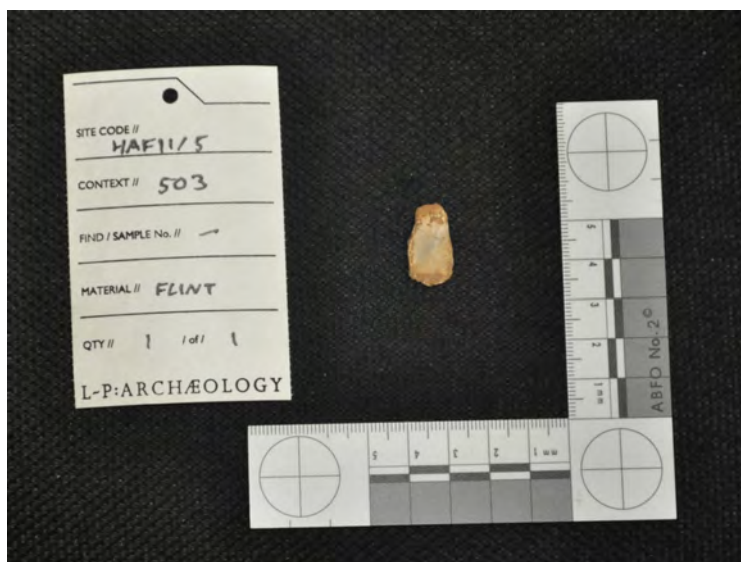


Plate 35 - Debitage flake from (503)



Plate 36 - Cortical scraper from (1004), parcel 6

RADIOCARBON DATING REPORT

APPENDIX I



*Consistent Accuracy . . .
... Delivered On-time*

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4985 SW 74 Court
Miami, Florida 33155 USA
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Fax: 305 663 0964
Beta@radiocarbon.com
www.radiocarbon.com

Darden Hood
President

Ronald Hatfield
Christopher Patrick
Deputy Directors

October 18, 2013

Dr. Matthew Williams
L-P Archaeology
The Pump House Coton Hill
Shrewsbury
Shropshire, SY1 2DP
United Kingdom

RE: Radiocarbon Dating Result For Sample LPHAF12_1003

Dear Dr. Williams:

Enclosed is the radiocarbon dating result for one sample recently sent to us. It provided plenty of carbon for an accurate measurement and the analysis proceeded normally. The report sheet contains the method used, material type, and applied pretreatments and, where applicable, the two-sigma calendar calibration range.

All results (excluding some inappropriate material types) which are less than about 42,000 years BP and more than about ~250 BP include a calendar calibration page (also digitally available in Windows metafile (.wmf) format upon request). Calibration is calculated using the newest (2009) calibration database with references quoted on the bottom of the page. Multiple probability ranges may appear in some cases, due to short-term variations in the atmospheric ¹⁴C contents at certain time periods. Examining the calibration graph will help you understand this phenomenon. Don't hesitate to contact us if you have questions about calibration.

We analyzed this sample on a sole priority basis. No students or intern researchers who would necessarily be distracted with other obligations and priorities were used in the analysis. We analyzed it with the combined attention of our entire professional staff.

The cost of the analysis was charged to the MASTERCARD card provided. Thank you. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,

Digital signature on file

**BETA ANALYTIC INC.**

DR. M.A. TAMERS and MR. D.G. HOOD

4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305-667-5167 FAX: 305-663-0964
beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Dr. Matthew Williams

Report Date: 10/18/2013

L-P Archaeology

Material Received: 10/3/2013

Sample Data	Measured Radiocarbon Age	$^{13}\text{C}/^{12}\text{C}$ Ratio	Conventional Radiocarbon Age(*)
Beta - 360925 SAMPLE : LPHAF12_1003 ANALYSIS : RadiometricPLUS-Standard delivery MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid 2 SIGMA CALIBRATION : Cal AD 1050 to 1090 (Cal BP 900 to 860) AND Cal AD 1120 to 1140 (Cal BP 830 to 810) Cal AD 1150 to 1220 (Cal BP 800 to 730)	900 +/- 30 BP	-27.0 o/oo	870 +/- 30 BP

Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 95% the ^{14}C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby ^{14}C half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured $^{13}\text{C}/^{12}\text{C}$ ratios ($\delta^{13}\text{C}$) were calculated relative to the PDB-1 standard.

The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the $\delta^{13}\text{C}$. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed $\delta^{13}\text{C}$, the ratio and the Conventional Radiocarbon Age will be followed by "as". The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-27;lab. mult=1)

Laboratory number: Beta-360925

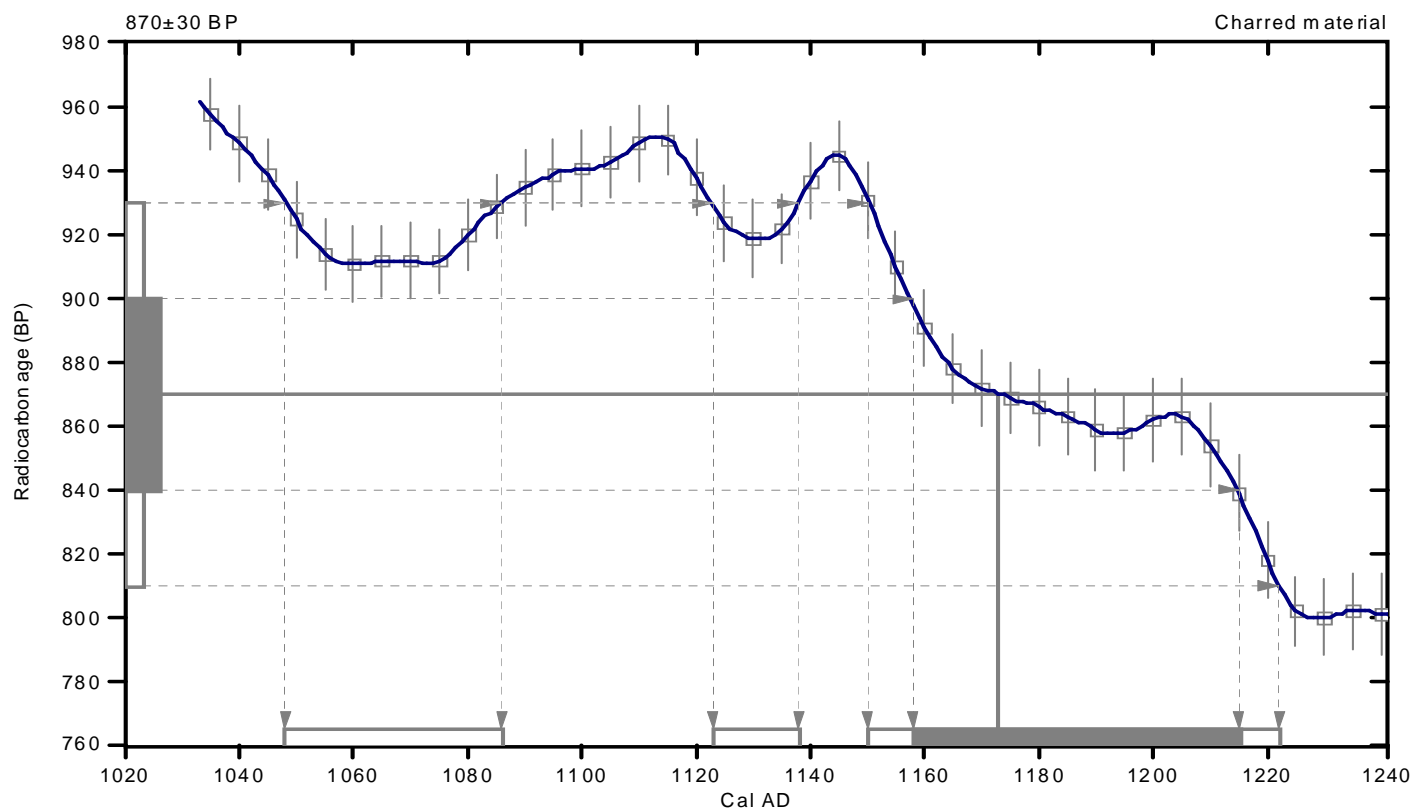
Conventional radiocarbon age: 870±30 BP

**2 Sigma calibrated results: Cal AD 1050 to 1090 (Cal BP 900 to 860) and
(95% probability) Cal AD 1120 to 1140 (Cal BP 830 to 810) and
Cal AD 1150 to 1220 (Cal BP 800 to 730)**

Intercept data

Intercept of radiocarbon age
with calibration curve: Cal AD 1170 (Cal BP 780)

**1 Sigma calibrated result: Cal AD 1160 to 1220 (Cal BP 790 to 740)
(68% probability)**



References:

Database used
INTCAL09

References to INTCAL09 database

Heaton, et.al., 2009, *Radiocarbon* 51(4):1151-1164, Reimer, et.al., 2009, *Radiocarbon* 51(4):1111-1150, Stuiver, et.al., 1993, *Radiocarbon* 35(1):137-189, Oeschger, et.al., 1975, *Tellus* 27:168-192

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, *Radiocarbon* 35(2):317-322

Beta Analytic Radiocarbon Dating Laboratory

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Mr. Darden Hood
President

Mr. Ronald Hatfield
Mr. Christopher Patrick
Deputy Directors

The Radiocarbon Laboratory Accredited to ISO-17025 Testing Standards (PJLA Accreditation #59423)

Quality Assurance Report

This report provides the results of reference materials used to validate radiocarbon analyses prior to reporting. Known value reference materials were analyzed quasi-simultaneously with the unknowns. Results are reported as expected values vs measured values. Reported values are calculated relative to NIST SRM-4990B and corrected for isotopic fractionation. Results are reported using the direct analytical measure percent modern carbon (pMC) with one relative standard deviation.

Report Date: October 18, 2013
Submitter : Dr. Matthew Williams

QA MEASUREMENTS

Reference 1	Expected Value: 2.6 +/- 0.1 pMC Measured Value: 2.6 +/- 0.1 pMC Agreement: Accepted
Reference 2	Expected Value: 57.2 +/- 0.3 pMC Measured Value: 57.3 +/- 0.2 pMC Agreement: Accepted
Reference 3	Expected Value: 104.6 +/- 0.2 pMC Measured Value: 104.6 +/- 0.1 pMC Agreement: Accepted
Reference 4	Expected Value: 95.6 +/- 0.3 pMC Measured Value: 95.0 +/- 0.4 pMC Agreement: Accepted

COMMENT: All measurements passed acceptance tests.

Validation:

Date: October 18, 2013