# 1353

# Penrhyn Castle Renewable Heating Scheme

Assessment of Potential for Analysis: MAP2 Phase 3





Ymddiriedolaeth Archaeolegol Gwynedd Gwynedd Archaeological Trust

# Penrhyn Castle Renewable Heating Scheme

# Assessment of Potential for Analysis: MAP2 Phase 3

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## **1 NON-TECHNICAL SUMMARY**

Gwynedd Archaeological Trust was commissioned by National Trust to complete a programme of post-excavation assessment of potential for analysis following a programme of archaeological assessment, evaluation and mitigation undertaken during the construction of a renewable heating system at Penrhyn Castle, Llandygai, Gwynedd. The post-excavation Assessment of Potential for Analysis has been undertaken in response to the identification of suspected prehistoric archaeological activity, activity associated with the Penrhyn Estate and the recovery of associated ecofacts and artefacts. The ecofacts and artefacts have been sent for specialist assessment and recommendations have been made where necessary for further analysis.

The ecofact assessment of charred macroplant samples recovered from a prehistoric pit, identified fragments of oak, birch, alder and elm, which were interpreted as residual wood fuel deposited in the pit. Specialist recommendation has been made for the submission of the birch, alder and elm for radiocarbon dating.

The artefact assessment for lithic material recovered from the prehistoric pit identified burnt and heat cracked shattered stone that bore evidence of prolonged heat exposure and three microliths suggested to be of late Mesolithic to early Neolithic date. No further recommendations were made for analysing the heat cracked stone or microliths but it is hoped the radiocarbon dating of the charred macroplant should provide a date for these artefacts. It is recommended that the microliths are accessioned to an appropriate archive.

The artefact assessment of brick fragments recovered from the remains of a building featured on an 1803 Penrhyn estate map concluded that the bricks were handmade and were typical of late 18<sup>th</sup> to early 19<sup>th</sup> century. No further recommendations were made for analysing the bricks. It is not recommended that the bricks are accessioned for archive, but will be retained at the Gwynedd Archaeological Trust for reference.

# 2 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been commissioned by National Trust to complete a post-excavation Assessment of Potential for Analysis (MAP2 Phase 3). This follows a programme of archaeological assessment, evaluation and mitigation undertaken during the construction of a renewable heating system at Penrhyn Castle, Llandygai, Gwynedd (NGR SH60277193; Figure 01). The post-excavation Assessment of Potential for Analysis has been undertaken in response to the identification of suspected prehistoric archaeological activity, activity associated with the Penrhyn Estate and the recovery of associated ecofacts and artefacts.

The post-excavation is being undertaken as a phased process in accordance with guidelines specified in *Management of Archaeological Projects – MAP2* (English Heritage, 1991), and relevant guidelines from *Management of Research Projects in the Historic Environment* (Historic England 2015). Five project phases are specified in *MAP2* (English Heritage, 1991):

- MAP2 Phase 1: Project Planning
- MAP2 Phase 2: Fieldwork
- MAP2 Phase 3: Assessment of Potential for Analysis
- MAP2 Phase 4: Analysis and Report Preparation
- MAP2 Phase 5: Dissemination

The assessment of potential for analysis report specifically relates to the assessment of recovered artefacts and ecofacts (MAP2 Phase 3). The proposed methodology and nominated specialists are noted in Sections 3.1 and 3.2. Subsequent analysis, dating, report preparation and dissemination will be undertaken as part of MAP2 Phases 4 and 5.

Reference has also been made to the following guidelines:

- Campbell, G., Moffett, L. and Straker, V., 2011. *Environmental Archaeology: A guide to the theory and practise of methods, from sampling and recovery to post-excavation* (2<sup>nd</sup> edition). Historic England.
- Standard and Guidance for Archaeological Excavation (Chartered Institute for Archaeologists, 1995, rev. 2001, 2008 and 2014).
- Standard and Guidance for Archaeological Watching Brief (Chartered Institute for Archaeologists, 1995, rev. 2001, 2008 and 2014).
- Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives (Chartered Institute for Archaeologists, 2009 and 2014).

- Standard and Guidance for the Collection, Documentation, Conservation and Research of Archaeological Materials (Chartered Institute for Archaeologists, 2008 and 2014).
- Royal Commission for Ancient and Historic Monuments Wales Guidelines for Digital Archives Version 1

NB. All phases of this project are being monitored by the Gwynedd Archaeological Planning Services (GAPS). The content of this and any future project designs and reporting must be approved by GAPS.

# 3 BACKGROUND

The renewable heating system included the erection of a biomass energy centre building, located next to the visitor car parking area at Penrhyn Castle, and a series of heat mains linking the energy centre building to the existing boiler rooms and services within the castle.

The groundworks comprised the following:

- Energy Centre Building A 14m by 11.7m structural base for the Energy Centre Building located in an area of scrubland and saplings to the north-east of the public car park;
- Heat Main Pipe 1 this comprised a 216m long, 402mm wide and 1002mm deep trench running north-west from the heat main to the west side of Penrhyn Castle;
- Heat Main Pipe 2 this comprised a 12m long spur, 326mm wide and 826mm deep trench running west-east from Pipe 1 to the castle keep;
- Heat Main Pipe 3 this comprised a 24m long section from the junction of Pipes1 and 2 heading north to the castle, 382mm wide and 882mm deep trench; and
- Heat Main Pipe 10 this comprised a 24m long trench, 362mm wide and 862mm deep trench across the outer courtyard at Penrhyn Castle, running west-east to the stable boiler.

GAT completed an archaeological assessment for the scheme in 2015 (GAT Report 1286), which included recommendations for targeted evaluation for assessment Feature 6, a small rectangular building noted on the 1803 Penrhyn Estate map, positioned along the route of Heat Main Pipe 1. No archaeological evidence for Feature 6 was uncovered during the subsequent evaluation (GAT Report 1299). The watching brief was completed between June and September 2016 and monitored groundworks for the energy centre foundations, and the heat main trenches (GAT Report 1341). A small possible prehistoric pit (Feature 19) was identified in the footprint of the energy centre building that included burnt stone and lithic fragments. A number of features representing post-medieval activity associated with the Estate were also identified during the watching brief, including drainage features across the parkland and structural features close to the castle, including a redundant footpath. The remains of Feature 6 were also identified along the route of Heat Main Pipe 1, further to the north than what was suggested by the assessment, and the area targeted by the evaluation.

The key features that require assessment of potential for analysis are summarised below.

#### 3.1 Feature 19

A possible prehistoric fire pit was identified within the footprint of the Energy Centre Building, at NGR SH60407172. The feature has been designated within the regional historic environment record (HER) as Primary Reference Number (PRN) 62271.

The cut of the pit [04] was sub oval, 1.2m by 1m and 0.27m deep, and orientated northsouth. The pit contained fire cracked stones within a charcoal rich sandy silt (05) within which a small fragment of worked flint was located (Small Find 02). This deposit was 0.7m long, 0.42m wide and 0.16m deep within the pit. The deposit sealed a dark greyish brown silty clay with small to large rounded cobbles and sub angular stones, as well as about 2% charcoal (06). A possible flint tool (Small Find 03) was found on the south edge of the pit although this was not clearly within a stratified context. It can be suggested that the burnt material was placed in the pit rather than burnt *in situ* as there does not appear to be evidence of burning in the vicinity.

The pit is similar in character to pits have been found in the excavation carried out at Parc Bryn Cegin nearby and morphologically appears to be a prehistoric feature. The results from further assessment of the ecofacts and artefacts recovered from the pit may help with dating the feature.

### 3.2 Feature 21 (Feature 6)

Feature 21 (Feature 6) was located at NGR SH603571725, within Heat Main Pipe 1, at a depth of 0.48m and cut within a mid-orange brown silty clay subsoil (11). The feature has been designated within the regional HER as PRN 61223. Feature 21 consisted of a small brick structure [12^], with a breadth of less than 1m with the largest depth at 0.58m. The feature was interpreted as the building noted on the 1803 Penrhyn Estate map, which was previously targeted, but not encountered, during the evaluation phase (GAT Report 1299). Brick fragments, similar to that used for Feature 21 (Feature 6) were identified in the spoil from the heat main trench excavation further along the route, suggesting that the building was lost during later landscaping in this area. It was not possible to determine the function of the building from the truncated remains.

# 4 METHODOLOGY - ASSESSMENT OF POTENTIAL FOR ANALYSIS: SPECIALIST ASSESSMENT

#### 4.1 Ecofact Assessment

The primary aim of the ecofact assessment is to recover charred macroplant remains for radiocarbon dating. The ecofact assessment has been limited to the following samples recovered from Feature 19:

|            |         |             |                            |         | % of      |
|------------|---------|-------------|----------------------------|---------|-----------|
| Bulk       | Context | Context     |                            | No. of  | Deposited |
| Sample No. | No.     | Description | Purpose of sample          | Box/Bag | Sample    |
|            |         | lower pit   |                            |         |           |
| <1>        | (05)    | fill        | Dating, Plant Macrofossils | 2 box   | 100       |
|            |         | Upper pit   |                            |         |           |
| <2>        | (06)    | fill        | Dating, Plant Macrofossils | 0.5 bag | 10        |

The ecofact assessment has been completed as a two stage process, and is based on the following methodology:

- The bulk sample has been processed in house by GAT. This consisted of flotation and wet sieving using a 500 micron mesh to collect the residue (which collects more than the 1mm = 1000 micron), with the flot collected in a 250 micron mesh. The residues have been sorted to recover artefacts and non-floating ecofacts. Once sorted the residues will be discarded. The flots have been weighed, catalogued and examined for charred macroplant remains.
- 2. Recovered charred macroplant has been sent for specialist assessment to AOC Archaeology. The charred macroplant h sieved using a 4mm, 2mm and 1mm system of stack sieves and subsequently examined under magnification (x10 and up to x100). Macroplant identifications have been completed using modern reference material and seed atlases stored at AOC Edinburgh. Taxonomic and nomenclature for plants have been based on Stace,C. 2010. New Flora of the British Isles. 3rd Edition. Cambridge University Press. Charcoal fragments 4mm and larger will be collected for species identification and recommendations will be made for any subsequent analysis and radiocarbon dating.

A copy of the assessment report by AOC Archaeology is included within Appendix II.

Any recommendations made for any subsequent analysis and radiocarbon dating will be defined in a MAP2 Phase 4 project design prepared by GAT.

### 4.2 Artefact Assessment

Artefact assessment has been limited to the prehistoric flint and burnt stone recovered from Feature 19 and the brick material recovered from Feature 21 (Feature 06).

| Finds No. | Context No. | Material    | Description                         | Weight (g) |
|-----------|-------------|-------------|-------------------------------------|------------|
|           |             |             | Possible flint tool found at bottom |            |
| 02        | 05          | Flint       | of [04]                             | 0.5        |
|           |             |             | Possible flint tool found near      |            |
| 03        | 05          | Flint       | surface of [04]                     | 07         |
|           |             |             | Pieces of flint recovered from      |            |
| 08        | 05          | Flint       | coarse residue, sample 01           | <0         |
|           |             |             | Small selection from 100% sample    |            |
|           |             |             | (total weight 12.9kg) of burnt      |            |
| 09        | 06          | Burnt stone | stones                              | 2548       |

#### 4.2.1 Feature 19 Artefacts

The flint and burnt stone has been assessed by George Smith, a specialist working on behalf of GAT, for form, function and provenance with any recommendations made for any further analysis as part of MAP2 Phase 4. A copy of the report is included in <u>Appendix III.</u>

#### 4.2.2 Feature 21 Artefacts

| Finds No. | Context No. | Material | Description                       | Weight (g) |
|-----------|-------------|----------|-----------------------------------|------------|
| 04        | 11          | Brick    | Large 'complete' red/orange brick | 2759       |
| 05        | 11          | Brick    | Orange brick with mortar          | 1548       |
|           |             |          | Burgundy coloured brick with many |            |
| 06        | 11          | Brick    | inclusions - pebbles              | 1517       |
|           |             |          | Piece of grey-blue brick with     |            |
| 07        | 11          | Brick    | several inclusions                | 1694       |

The artefacts from Feature 21 (Feature 6) comprise of brick fragments associated with the structure identified in Heat Main Pipe 1, interpreted as the truncated remains of a building noted on the 1803 Penrhyn Estate map (Fig 02). The brick fragments have been assessed by Spencer Smith at GAT for form and provenance, including manufacturing technique and origin of materials used with any recommendations made for any further analysis as part of MAP2 Phase 4. A copy of the report is included within <u>Appendix IV</u>.

# 5 RESULT OF ECOFACT ASSESSMENT

## 5.1 Bulk Sample Processing

GAT processed two samples from pit cut [04], relating to the upper and lower fills of the pit (Contexts (06) and (05) respectively). The pit was of suspected prehistoric date due to general morphology and the recovery of flint artefacts. The samples were taken with a view to recovering charred macroplant for assessment and dating and were processed in accordance with the methodology defined in <u>para. 4.1.</u> A summary of the results from the flotation process and subsequent coarse residue sorting are presented below.

#### 5.1.1 Floatation Results

|        |         | Total  |        |        | No:   |                                      |
|--------|---------|--------|--------|--------|-------|--------------------------------------|
| Sample | Context | Weight | Volume | No: of | of    |                                      |
| No.    | No.     | (kg)   | (L)    | Trays  | Flots | Notes                                |
|        |         |        |        |        |       | Abundant charcoal flecks and pieces, |
| <01>   | (05)    | 25.7   | 20     | 6      | 2     | some root material.                  |
|        |         |        | Small  |        |       | Frequent charcoal small and large    |
| <02>   | (06)    | 0.72   | bag    | 1      | 1     | flecks.                              |

#### 5.1.2 Coarse Residue Results

| Sample | Context | Charcoal | Bone | Shell | Flint | Pottery | Glass | Mortar | Slag | Burnt<br>Stone | Other (s) | Comments                 |
|--------|---------|----------|------|-------|-------|---------|-------|--------|------|----------------|-----------|--------------------------|
|        |         |          |      |       |       |         |       |        |      |                | Burnt     |                          |
|        |         |          |      |       |       |         |       |        |      |                | Quartz    | Abundant charcoal, flint |
|        |         |          |      |       |       |         |       |        |      |                | 34g,      | tool fragments, heat     |
|        |         |          |      |       |       |         |       |        |      |                | sandstone | cracked stones, quartz   |
| <01>   | (05)    | х        | <0g  |       | <0g   |         |       |        |      | 2511g          | 3g        | & burnt sandstone (3g)   |
|        |         |          |      |       |       |         |       |        |      |                | Heat      | Charcoal flecks and      |
|        |         |          |      |       |       |         |       |        |      |                | cracked   | some heat cracked        |
| <02>   | (06)    | х        |      |       |       |         |       |        |      |                | stones    | stones                   |

The majority of the charred macroplant material was recovered during the floatation process, with additional larger pieces of charcoal recovered during the coarse residue sorting. The combined charred macroplant were subsequently sent to AOC Archaeology for further assessment (the results of which can be seen below in <u>para. 5.2</u> and <u>Appendix II</u>).

A total of 2511g of burnt stone was recovered from the coarse residue, along with fragments of flint. These artefacts were subsequently assessed by George Smith, specialist working on behalf of GAT (see <u>para. 6.1</u> and <u>6.2</u>, and <u>Appendix III</u>).

#### 5.2 Charred Macroplant Assessment

The charred macroplant remains were sourced from the floatation process from samples <1> and <2> which were subsequently sent away to be assessed by Jackaline Robertson, a specialist in Archeobotany, working on behalf of AOC Archaeology. The flots were sieved using a 4mm, 2mm and 1mm system of stack sieves and examined under a microscope using magnification x10 upto x100.

#### 5.2.1 Sample <1> context (05)

This sample was taken from a charcoal rich deposit, of which 100% sample was taken and a total 35.6g of charred macroplant remains were recovered. The species identified were birch, elm and oak.

#### 5.2.2 Sample <2> context (06)

The quantity of this sample was much smaller by comparison to sample <1> as it was sourced from the spread lying within the upper deposit of pit [04], of which roughly a 10% sample was taken and a total of 1.6g charred macroplant remains were recovered. The species identified were alder, elm and oak.

| Sample | Context | Species            | Name  | Number | Weight (g) |
|--------|---------|--------------------|-------|--------|------------|
| <1>    | (05)    | <u>Betula</u> sp.  | Birch | 6      |            |
| <1>    | (05)    | <i>Ulmus</i> sp    | Elm   | 3      |            |
| <1>    | (05)    | Quercus sp.        | Oak   | 1      | 35.6       |
| <2>    | (06)    | Alnus gultinosa L. | Alder | 4      |            |
| <2>    | (06)    | Ulmus sp.          | Elm   | 5      |            |
| <2>    | (06)    | Quercus sp.        | Oak   | 1      | 1.6        |

#### 5.2.3 Charcoal Species Results

The charcoal assemblage from the deposits within pit [04] were identified as four wood species, as birch (*Betula* sp.), elm (*Ulmus* sp.), oak (*Quercus* sp.) and alder (*Alnus gultinosa* L.). According to Robertson, there is no evidence any worked wood or round wood within either context, the mixture of more than one wooden species tend to be representative of fuel debris. Given there was no evidence of in-situ burning within pit [04], it was suggested that it is likely the remains derived from the later disposal of fuel residue.

Robertson recommends that the alder, birch and elm charcoal are all suitable for radiocarbon dating. As Oak is a slow growing species, it cannot produce a reliable dating result and therefore is not recommended for radiocarbon dating.

A copy of the AOC Archaeology report on the charred macroplant remains can be seen in <u>Appendix II</u>.

# 6 RESULT OF ARTEFACT ASSESSMEMT

#### 6.1 Lithics

The lithics recovered during the watching brief at Penrhyn Castle from Feature 19 (see figure 01), were assessed by a specialist working on behalf of GAT, George Smith. A total of three lithics were recovered: two from within the burnt deposits of cut of pit [04] and another was lying directly on the surface of the glacial horizon (03), within very close proximity to pit cut [04].

| Finds | Context | Site |          |  | Weight |
|-------|---------|------|----------|--|--------|
| No.   | No.     | Sub. | Material | Description                                | (g)    |
|       |         |      |          | Possible flint tool found at bottom of pit |        |
| 02    | 05      | ECB  | Flint    | [04]                                       | 0.5    |
|       |         |      |          | Possible flint tool found near surface of  |        |
| 03    | 03      | ECB  | Flint    | pit [04]                                   | 07     |
|       |         |      |          | Pieces of flint recovered from coarse      |        |
| 08    | 05      | ECB  | Flint    | residue, sample <01>                       | <0     |

#### 6.1.1 Feature 19: Lithics

Two pieces of flint were recovered from within the burnt deposit (05). Find no.02 is an incomplete 12mm x 10mm off white flint thin tertiary blade that has been snapped cleanly across in two places. Smith states that it is likely a remnant from microlith manufacture or of a composite cutting tool manufacture, possibly from the later Mesolithic or early Neolithic (see plate 01 and 02).

The second lithic from deposit (05) is find no.08 which was retrieved from the coarse residues, along two small waste pieces of worked flint. Smith states that the yellow-brown opaque flint, 16mm x 6mm, is a blade tip fragment that was possibly part of a composite cutting tool (see plate 07 and 08). A red (heat altered), waste piece, blade butt fragment from a possible retouched blade was also recovered, which Smith also suggests may have been a failed attempt at a notched microburin removal. Both pieces are probably from the later Mesolithic.

Find no. 03 (plate 03 and 04) is a thick, irregular, poor quality mottled mid-grey/cream core rejuvenation flake, 42mm x 18mm was recovered on the surface of (03) approximately 0.15mm of the away from pit [06] cut and was in amongst the spread from the pit (likely to have been caused by Watts landscaping (Jones 2016)). Smith suggests that the tool was

struck from a largish simple core that had been worked on by a hammer, struck transversely on the edge of the core to provide a new platform edge. The flint was undatable, and due to the material and knapping technique, it does not suggest that flint 03 has an association with flint 02, however Smith states that there isn't any other evidence to deny an association between the two. No further recommendations were suggested by Smith in relation to the lithics though, it is recommended that the microliths are accessioned to an appropriate archive.

A copy of George Smith's report on the lithics is included in Appendix III.

#### 6.2 Burnt Stone

The burnt stone was recovered from the upper fill and spread of deposit (06) and was retained as part of sample <2> for later inspection, alongside some heat cracked stones from sample <1>. Once the stones were recovered from post-flotation process and after coarse residue sorting, 2458g of burnt stone was assessed by a specialist working on behalf of GAT, George Smith.

#### 6.2.1 Feature 19: Burnt Stone

| Finds | Context | Site |          |  | Weight |
|-------|---------|------|----------|--|--------|
| No.   | No.     | Sub. | Material | Description                                    | (g)    |
|       |         |      | Burnt    | Small selection from 100% sample (total weight |        |
| 09    | 06      | ECB  | Stone    | 12.9kg) of heat cracked stones                 | 2548   |

According to Smith, the appearance of the burnt stones was caused but heating with fire, creating the reddish colour, and subsequent plunging in water; the rapid cooling causing the stones to fracture. The stones included dense igneous dolerite stones and rounded, sub-angular glacial cobbles; the latter likely sourced from Afon Ogwen. Both of these stones are able to withstand heating and cooling better than softer rocks, which shatter too easily under prolonged heat exposure. Smith suggests that the stones are waste products from a cooking process and likely to be remnants of a more widespread midden deposit. No further recommendations were suggested by Smith in relation to the burnt stone.

A copy of George Smith's report on the burnt stone is included in Appendix III.

## 6.3 Ceramic Building Material (Brick)

The Ceramic Building Material (CBM) recovered during the watching brief comprised four brick fragments from Feature 21 (Feature 6), identified as the remains of a structure on the 1803 Penrhyn Estate map (Fig 02 and Plate 16). The CBM was assessed by Spencer Gavin Smith, working at GAT.

| Finds | Context | Site |          |                                       | Weight |
|-------|---------|------|----------|---------------------------------------|--------|
| No.   | No.     | Sub. | Material | Description                           | (g)    |
| 04    | 11      | PL1  | СВМ      | Large 'complete' red/orange brick.    | 2759   |
| 05    | 11      | PL1  | СВМ      | Orange brick with mortar.             | 1548   |
|       |         |      |          | Burgundy coloured brick with abundant |        |
| 06    | 11      | PL1  | СВМ      | inclusions.                           | 1517   |
|       |         |      |          | Piece of grey-blue brick with several |        |
| 07    | 11      | PL1  | CBM      | inclusions.                           | 1694   |

#### 6.3.1 Feature 21: CBM

Upon inspection of all four pieces of brick (04, 05, 06 and 07) from context 11, structure [12<sup>A</sup>], Smith states that they have all been handmade from a pale orange clay bonded with small, well sorted inclusions, though 07 has been poorly constructed with larger inclusions which resulted in fabric fail during the firing process. The source of the clay to manufacture these bricks is unknown, though Smith suggests that the clay may have been sourced from clay deposits towards the eastern edge of the Penrhyn parkland, around Afon Ogwen's estuary. All four bricks bore some evidence of a hard shelly lime mortar, suggesting this was the material used to lay the bricks (plate 12).

Although some of the brick's preservation was rather poor, Smith states that the overall dimensions were at a standardised size at 25cm x 10cm x 7.5cm. They were created by placing clay into a rectangular mould and partially dried before being fired. This is evident with slump marks on the brick made by the mould, alongside bowing of the vertical axis of the brick which is caused by drying pre-firing (plate 08). This process is highly evident on brick 04, where finger marks on the brick suggests that it was handled twice prior to firing. Smith also suggests that a clamp may have been used given the curvature of the bricks along the vertical fabric of the bricks (plate 10) and perhaps a tool known as a 'strike' to remove excess from the brick moulds. No further recommendations were suggested by Smith in relation to the CBM.

A copy of Spencer Gavin Smith's report is included in Appendix IX

# 7 CONCLUSIONS AND RECCOMENDATIONS FOR FURTHER ANALYSIS

Overall a total of two ecofacts, three flint tools, one source of burnt stone and four pieces of CBM were assessed by specialist, working on behalf of GAT or outsourced to AOC Archaeology.

The charred macro plant remains assessed by AOC Archaeology, recovered four species of wood, the alder, elm, birch and oak. Given the mixed assortment of wood, it is representative of fuel debris which were later disposed within pit [04]. Of the charred remains, Jackaline Roberston recommends that the birch, alder and elm recovered from samples <1> and <2> are suitable for radiocarbon dating.

The stone and lithics were assessed by GAT's specialist George Smith who suggested that the appearance of burnt and heat cracked shattered stone bore evidence of prolonged heat exposure, which could suggest repeated use of area, which is quite plausible given the morphology of pit [04] and Jackeline's ecofact assessment of the charred remains. Given the appearance of three flint tools, it was clearly an active area, of which Smith states the microlithics manufacture were suggestive to be of late Mesolithic to early Neolithic. The ambiguity of these dates can be resolved with radiocarbon dating from the charred plant remains as recommended by Jackaline Robertson. It is also recommended that the microliths are accessioned to an appropriate archive.

Spencer Gavin Smith, a specialist working on behalf of GAT, assessed the ceramic building material sourced from feature 21. This was identified as feature 6 on the 1803 Penrhyn estate map during the Assessment and Evaluation (figure 01 and 02), but was not encountered until the watching brief. Smith's assessment of the four fragments of brick recovered from structure [12^] states that the bricks were handmade, partially dried within a mould, of which later placed in a clamp during the firing process. Given the evident bowing, slipping, and large inclusions within the brick, the morphology is typical of late 18<sup>th</sup> to early 19<sup>th</sup> century brickwork. It is highly plausible that the CBM belonged to the small agricultural structure as seen on the early Penrhyn estate map (figure 02). No further recommendations were made by Spencer Gavin Smith in regards to the ceramic building material.

# 8 SOURCES CONSULTED

- Campbell, G., Moffett, L. and Straker, V. Environmental Archaeology: A guide to the theory and practise of methods, from sampling and recovery to post-excavation (2<sup>nd</sup> edition). (Historic England, 2011).
- 2. English Heritage, 1991, Management of Archaeological Projects
- **3.** Evans, R. 2015. Penrhyn Castle Renewable Heating Scheme Archaeological Assessment. GAT Report 1286.
- Evans, R. 2015. Penrhyn Castle Renewable Heating Scheme Archaeological Evaluation. GAT report 1299
- 5. Historic England 2015. Management of Research Projects in the Historic Environment
- **6.** Jones, B. and Evans, R. with McGuinness, N. 2016 *Penrhyn Castle Renewable Heating Scheme: Archaeological Watching Brief.* GAT Report 1341.
- **7.** Standard and Guidance for Archaeological Excavation (Chartered Institute for Archaeologists, 1995, rev. 2001, 2008 and 2014).
- Standard and Guidance for Archaeological Watching Brief (Chartered Institute for Archaeologists, 1995, rev. 2001, 2008 and 2014).
- **9.** Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives (Chartered Institute for Archaeologists, 2009 and 2014).
- **10.** Standard and Guidance for the Collection, Documentation, Conservation and Research of Archaeological Materials (Chartered Institute for Archaeologists, 2008 and 2014).



Figure 0#: Reproduction of National Trust map of Penrhyn Castle estate, showing location of Dunster pipe scheme route along with noted Gwynedd Archaeological Trust features. Scale 1:2500@A4



Figure 02: Reproduction of 1803 Penrhyn Estate Map and location of proposed North and South Option routes and information from the Historic Environment Record and National Trust. Scale: 1:2500@A4. (Source: National Trust)



Plate 01: View of flint 02, later mesolithic or early neolithic thin tertiary blade. (photographic archive ref. G2447\_187).



Plate 02: View of flint 02, from the rear, Later Mesolithic or Early Neolithic thin tertiary blade (photographic archive ref. G2447\_188).


Plate 03: View of flint 03, core rejuvenation flake showing triangular cross section (photographic archive ref. G2447\_189).



Plate 04: View of flint 03, core rejuvenation flake showing platform edge (photographic archive ref. G2447\_190).



Plate 05: View flint 08 blade tip fragment, possibly Later Mesolithic composite cutting tool (photographic archive ref. G2447\_191).



Plate 06: View of flint 08, from the rear showing microchipping along convex side edge (photographic archive ref. G2447\_192).



Plate 07: View of brick 04 showing slumping on top ridge and finger indentations, and mortar (photographic archive ref. G2447\_175).



Plate 08: View of brick 04, showing bowing caused by drying pre-firing and use of clamp along with finger indentations and mica inclusions (photographic archive ref. G2447\_174).



Plate 09: View of brick 05 showing small fragment and mica from beach deposit within brick fabric (photographic archive ref. G2447\_177).



Plate 10: View of brick 05 showing curvature on horizontal plane caused by using a clamp during the firing process (photographic archive ref. G2447\_179).



Plate 11: View of brick 06 showing very large inclusions along with a faint slump mark along top edge (photographic archive ref. G2447\_180).



Plate 12: View of brick 08 showing lime mortar on surface along with slight twisting along horizontal plane caused by clamping (photographic archive ref. G2447\_181).



Plate 13: View of brick 07 demonstrating curvature created by clamping during firing (photographic archive ref. G2447\_182).



Plate 14: View of brick 07 showing grey fabric which is caused by low firing temperature of a brick clamp, some lime mortar is visible on surface. Slumping evident on top edge (photographic archive ref. G2447\_185).



Plate 15: View of brick 07 vertical plane with evidence of bowing which is caused by contraction on t he sides from partially drying before firing (photographic archive ref. G2447\_184).



Plate 16: Small enclosure wall [12^] of Feature 21 (Feature 6), from where CBM 04 - 07 was sourced. Scale 1m (photographic archive ref. G2447\_107).

# 9 APPENDIX I

# 9.1 Approved Project Design

PENRHYN CASTLE RHS (G2447)

# PROJECT DESIGN FOR AN ASSESSMENT OF POTENTIAL FOR ANALYSIS: MAP2 PHASE 3

**Prepared for** 

National Trust

January 2017

Ymddiriedolaeth Archaeolegol Gwynedd Gwynedd Archaeological Trust

## **PENRHYN CASTLE RHS**

# PROJECT DESIGN FOR AN ASSESSMENT OF POTENTIAL FOR ANALYSIS: MAP2 PHASE 3

Prepared for National Trust, January 2017

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| Approvals Table |                                  |  |  |  |  |  |  |
|-----------------|----------------------------------|--|--|--|--|--|--|
|                 | Role Printed Name Signature Date |  |  |  |  |  |  |
| Originated by   | Document Author                  |  |  |  |  |  |  |
| Reviewed by     | Document Reviewer                |  |  |  |  |  |  |
| Approved by     | Principal Archaeologist          |  |  |  |  |  |  |

| Revision History |                    |                |                      |  |  |  |  |
|------------------|--------------------|----------------|----------------------|--|--|--|--|
| Rev No.          | Summary of Changes | Ref<br>Section | Ref Purpose of Issue |  |  |  |  |
|                  |                    |                |                      |  |  |  |  |
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|                  |                    |                |                      |  |  |  |  |
|                  |                    |                |                      |  |  |  |  |

All GAT staff should sign their copy to confirm the project design is read and understood and retain a copy of the specification for the duration of their involvement in this phase. On completion, the specification should be retained with the project archive:

Name

Signature

Date

## **1 INTRODUCTION**

Gwynedd Archaeological Trust (GAT) has been commissioned by National Trust to complete a post-excavation Assessment of Potential for Analysis (MAP2 Phase 3). This follows a programme of archaeological assessment, evaluation and mitigation undertaken during the construction of a renewable heating system at Penrhyn Castle, Llandygai, Gwynedd (NGR SH60277193; Figure 01). The post-excavation Assessment of Potential for Analysis will be undertaken in response to the identification of suspected prehistoric archaeological activity, activity associated with the Penrhyn Estate and the recovery of associated ecofacts and artefacts.

The post-excavation will be undertaken as a phased process in accordance with guidelines specified in *Management of Archaeological Projects – MAP2* (English Heritage, 1991), and relevant guidelines from *Management of Research Projects in the Historic Environment* (Historic England 2015). Five project phases are specified in *MAP2* (English Heritage, 1991):

- MAP2 Phase 1: Project Planning
- MAP2 Phase 2: Fieldwork
- MAP2 Phase 3: Assessment of Potential for Analysis
- MAP2 Phase 4: Analysis and Report Preparation
- MAP2 Phase 5: Dissemination

The current design specifically relates to the assessment of recovered artefacts and ecofacts (MAP2 Phase 3). The proposed methodology and nominated specialists are noted in Sections 3.1 and 3.2. Subsequent analysis, dating, report preparation and dissemination will be undertaken as part of MAP2 Phases 4 and 5.

Reference has also been made to the following guidelines:

- Campbell, G., Moffett, L. and Straker, V., 2011. *Environmental Archaeology: A guide* to the theory and practise of methods, from sampling and recovery to post-excavation (2<sup>nd</sup> edition). Historic England.
- Standard and Guidance for Archaeological Excavation (Chartered Institute for Archaeologists, 1995, rev. 2001, 2008 and 2014).
- Standard and Guidance for Archaeological Watching Brief (Chartered Institute for Archaeologists, 1995, rev. 2001, 2008 and 2014).
- Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives (Chartered Institute for Archaeologists, 2009 and 2014).

- Standard and Guidance for the Collection, Documentation, Conservation and Research of Archaeological Materials (Chartered Institute for Archaeologists, 2008 and 2014).
- Royal Commission for Ancient and Historic Monumnets Wales Guidelines for Digital Archives Version 1

NB. All phases of this project are being monitored by the Gwynedd Archaeological Planning Services (GAPS). The content of this and any future project designs and reporting must be approved by GAPS.

## 2 ARCHAEOLOGICAL RESULTS

The renewable heating system included the erection of a biomass energy centre building, located next to the visitor car parking area at Penrhyn Castle, and a series of heat mains linking the energy centre building to the existing boiler rooms and services within the castle.

The groundworks comprised the following:

- Energy Centre Building A 14m by 11.7m structural base for the Energy Centre Building located in an area of scrubland and saplings to the north-east of the public car park;
- Heat Main Pipe 1 this comprised a 216m long, 402mm wide and 1002mm deep trench running north-west from the heat main to the west side of Penrhyn Castle;
- Heat Main Pipe 2 this comprised a 12m long spur, 326mm wide and 826mm deep trench running west-east from Pipe 1 to the castle keep;
- Heat Main Pipe 3 this comprised a 24m long section from the junction of Pipes1 and 2 heading north to the castle, 382mm wide and 882mm deep trench; and
- Heat Main Pipe 10 this comprised a 24m long trench, 362mm wide and 862mm deep trench across the outer courtyard at Penrhyn Castle, running west-east to the stable boiler.

GAT completed an archaeological assessment for the scheme in 2015 (GAT Report 1286), which included recommendations for targeted evaluation for assessment Feature 6, a small rectangular building noted on the 1803 Penrhyn Estate map, positioned along the route of Heat Main Pipe 1. No archaeological evidence for Feature 6 was uncovered during the subsequent evaluation (GAT Report 1299). The watching brief was completed between June and September 2016 and monitored groundworks for the energy centre foundations, and the heat main trenches (GAT Report 1341). A small possible prehistoric pit (Feature 19) was identified in the footprint of the energy centre building that included burnt stone and lithic fragments. A number of features representing post-medieval activity associated with the Estate were also identified during the watching brief, including drainage features across the parkland and structural features close to the castle, including a redundant footpath. The remains of Feature 6 were also identified along the route of Heat Main Pipe 1, further to the north than what was suggested by the assessment, and the area targeted by the evaluation.

The key features that require assessment of potential for analysis are summarised below.

## 2.1 Feature 19

A possible prehistoric fire pit was identified within the footprint of the Energy Centre Building, at NGR SH60407172. The feature has been designated within the regional historic environment record (HER) as Primary Reference Number (PRN) 62271.

The cut of the pit [04] was sub oval, 1.2m by 1m and 0.27m deep, and orientated northsouth. The pit contained fire cracked stones within a charcoal rich sandy silt (05) within which a small fragment of worked flint was located (Small Find 02). This deposit was 0.7m long, 0.42m wide and 0.16m deep within the pit. The deposit sealed a dark greyish brown silty clay with small to large rounded cobbles and sub angular stones, as well as about 2% charcoal (06). A possible flint tool (Small Find 03) was found on the south edge of the pit although this was not clearly within a stratified context. It can be suggested that the burnt material was placed in the pit rather than burnt *in situ* as there does not appear to be evidence of burning in the vicinity.

The pit is similar in character to pits have been found in the excavation carried out at Parc Bryn Cegin nearby and morphologically appears to be a prehistoric feature. The results from further assessment of the ecofacts and artefacts recovered from the pit may help with dating the feature.

## 2.2 Feature 21 (Feature 6)

Feature 21 (Feature 6) was located at NGR SH603571725, within Heat Main Pipe 1, at a depth of 0.48m and cut within a mid-orange brown silty clay subsoil (11). The feature has been designated within the regional HER as PRN 61223. Feature 21 consisted of a small brick structure [12^], with a breadth of less than 1m with the largest depth at 0.58m. The feature was interpreted as the building noted on the 1803 Penrhyn Estate map, which was previously targeted, but not encountered, during the evaluation phase (GAT Report 1299). Brick fragments, similar to that used for Feature 21 (Feature 6) were identified in the spoil from the heat main trench excavation further along the route, suggesting that the building was lost during later landscaping in this area. It was not possible to determine the function of the building from the truncated remains.

## 3 METHODOLOGY - ASSESSMENT OF POTENTIAL FOR ANALYSIS: SPECIALIST ASSESSMENT

## 3.1 Ecofact Assessment

The primary aim of the ecofact assessment will be to recover charred macroplant remains for radiocarbon dating. The ecofact assessment will be limited to the following samples recovered from Feature 19:

| Bulk Sample | Context | Context     |                            | No. of  | % of Deposited |
|-------------|---------|-------------|----------------------------|---------|----------------|
| No.         | No.     | Description | Purpose of sample          | Box/Bag | Sample         |
|             |         | lower pit   |                            |         |                |
| 1           | (05)    | fill        | Dating, Plant Macrofossils | 2 box   | 100            |
|             |         | Upper pit   |                            |         |                |
| 2           | (06)    | fill        | Dating, Plant Macrofossils | 0.5 bag | 10             |

The ecofact assessment will be completed as a two stage process, based on the following methodology:

- The bulk sample will be processed in house by GAT. This will consist of flotation and wet sieving using a 500 micron mesh to collect the residue (which collects more than the 1mm = 1000 micron), with the flot collected in a 250 micron mesh. The residues will be sorted to recover artefacts and non-floating ecofacts. Once sorted the residues will be discarded. The flots will be weighed, catalogued and examined for charred macroplant remaines.
- 2. Recovered charred macroplant will be sent for specialist assessment to AOC Archaeology. The charred macroplant will be sieved using a 4mm, 2mm and 1mm system of stack sieves and subsequently examined under magnification (x10 and up to x100). Macroplant identifications will be completed confirmed using modern reference material and seed atlases stored at AOC Edinburgh. Taxonomic and nomenclature for plants will be based on Stace,C. 2010. New Flora of the British Isles. 3rd Edition. Cambridge University Press. Charcoal fragments 4mm and larger will be collected for species identification and recommendations will be made for any subsequent analysis and radiocarbon dating.

Any recommendations made for any subsequent analysis and radiocarbon dating will be defined in a MAP2 Phase 4 project design prepared by GAT.

## 3.2 Artefact Assessment

Artefact assessment will be limited to the prehistoric flint and burnt stone recovered from Feature 19 and the brick material recovered from Feature 21 (Feature 06).

#### 3.2.1 Feature 19 Artefacts

| Finds No. | Context No. | Material    | Description                                 | Weight (g) |
|-----------|-------------|-------------|---|------------|
| 02        | 05          | Flint       | Possible flint tool found at bottom of [04] | 0.5        |
|           |             |             | Possible flint tool found near surface of   |            |
| 03        | 05          | Flint       | [04]  | 07         |
|           |             |             | Pieces of flint recovered from coarse       |            |
| 08        | 05          | Flint       | residue, sample 01                          | <0         |
|           |             |             | Small selection from 100% sample (total     |            |
| 09        | 06          | Burnt stone | weght 12.9kg) of burnt stones               | 2548       |

The flint and burnt stone will be assessed by George Smith, a sepcilaist working on behalf of GAT, for form, function and provenance. If relevant, recommendations will be made for any further analysis as part of MAP2 Phase 4.

#### 3.2.2 Feature 21 Artefacts

| Finds No. | Context No. | Material | Description                           | Weight (g) |
|-----------|-------------|----------|---------------------------------------|------------|
| 04        | 11          | Brick    | Large 'complete' red/orange brick     | 2759       |
| 05        | 11          | Brick    | Orange brick with mortar              | 1548       |
|           |             |          | Burgundy coloured brick with many     |            |
| 06        | 11          | Brick    | inclsuions - pebbles                  | 1517       |
|           |             |          | Piece of grey-blue brick with several |            |
| 07        | 11          | Brick    | inclusions                            | 1694       |

The artefacts from Feature 21 (Feature 6) comprise brick fragments associated with the structure identified in Heat Main Pipe 1, interpreted as the truncated remains of a building noted on the 1803 Penrhyn Estate map. The brick fragments will be assessed by Spencer Smith at GAT for form and provenance, including manufacturing technique and origin of materials used. If relevant, recommendations will be made for any further analysis as part of MAP2 Phase 4.

## 3.3 Reporting

Following completion of the stages outlined above, a MAP2 Phase 3 report will be produced incorporating the following:

- 1. Non-technical summary
- 2. Introduction
- 3. Background
- 4. Methodology (including specialist methodology)
- 5. Results of Ecofact Assessment
- 6. Results of Artefact Assessment
  - i. Lithics (flint)
  - ii. Burnt Stone
  - iii. Ceramic building material (Brick)
- 7. Conclusions and recommendations for further analysis (MAP2 Phase 4)
- 8. Sources Consulted
- 9. Appendix I Approved Project Design
- 10. Appendix II Ecofact Assessment Report
- 11. Appendix III Artefact Assessment Reports

A full archive will also be prepared. A draft copy of the report will be sent to the regional curatorial archaeologist (GAPS) and to the client for review by **March 2017**. Once approved, a final report will be submitted to all parties as well as the Historic Environment Record; the archive will be sent to the *Royal Commission for Ancient and Historic Monuments Wales* (*RCAHMW*).

The following dissemination will apply:

- 1. A digital report will be provided to GAPS (draft report then final report).
- 2. A paper report plus a digital report will be provided to the regional Historic Environment Record, Gwynedd Archaeological Trust; this will be submitted within six months of report completion (final report only).
- 3. A digital report and archive (including photographic and drawn) data will be provided to *RCAHMW* (final report only). Submission of digital information to the Royal Commission on the Ancient and Historical Monuments of Wales shall be undertaken in accordance with the *RCAHMW Guidelines for Digital Archives Version 1*. Digital information will include the photographic archive and associated metadata
- 4. A digital report(s) plus paper report(s) (if requested) will be provided to the client (draft report then final report).
- 5. It is proposed ultimately to publish a summary of the work in *Archaeology in Wales*, the journal for the Council of British Archaeology Wales. This will be undertaken as part of MAP2 Phase 5.

## 4 SOURCES CONSULTED

- Campbell, G., Moffett, L. and Straker, V. Environmental Archaeology: A guide to the theory and practise of methods, from sampling and recovery to post-excavation (2<sup>nd</sup> edition). (Historic England, 2011).
- 2. English Heritage, 1991, Management of Archaeological Projects
- 3. Evans, R. 2015. *Penrhyn Castle Renewable Heating Scheme Archaeological Assessment*. GAT Report 1286.
- 4. Evans, R. 2015. *Penrhyn Castle Renewable Heating Scheme Archaeological Evaluation.* GAT report 1299
- 5. Historic England 2015. *Management of Research Projects in the Historic Environment*
- 6. Jones, B. and Evans, R. with McGuinness, N. 2016 *Penrhyn Castle Renewable Heating Scheme: Archaeological Watching Brief.* GAT Report 1341.
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- 8. Standard and Guidance for Archaeological Watching Brief (Chartered Institute for Archaeologists, 1995, rev. 2001, 2008 and 2014).
- 9. Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives (Chartered Institute for Archaeologists, 2009 and 2014).
- 10. Standard and Guidance for the Collection, Documentation, Conservation and Research of Archaeological Materials (Chartered Institute for Archaeologists, 2008 and 2014).

## 5 Figure 01

5.1 Reproduction of National Trust map of Penrhyn Castle estate, showing location of Dunster pipe scheme route along with noted Gwynedd Archaeological Trust features. Scale 1:2500@A4

## **10 APPENDIX II**

# 10.1 Ecofacts Assessment Report

# Penrhyn Castle: Renewable Heating Scheme

Planning Application Number: National Grid Reference Number: AOC Project no: 23702 Site Code: G2447

Date: January 2017



| Penrhyn Castle: Renewable Heating Scheme         |                     |  |  |  |  |  |
|--|---------------------|--|--|--|--|--|
| On Behalf of: Gwynedd Archaeological Trust (GAT) |                     |  |  |  |  |  |
| National Grid Reference (NGR):                   |                     |  |  |  |  |  |
| AOC Project No: 23702                            |                     |  |  |  |  |  |
| Prepared by:                                     | Jackaline Robertson |  |  |  |  |  |
| Illustration by:                                 | N/A                 |  |  |  |  |  |
| Date of Fieldwork:                               |                     |  |  |  |  |  |
| Date of Report: January 2017                     |                     |  |  |  |  |  |

This document has been prepared in accordance with AOC standard operating procedures.

Author: Jackaline Robertson Approved by: Ciara Clarke Report Stage: Draft Date: January 17 Date: 02/02/2017 Date:

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|---------------|---|--|
|               | Tel.<br>Fax.<br>e-mail.                           | 0131 440 3593<br>0131 440 3422<br>edinburgh@aocarchaeology.com |



#### **Factual data**

Two samples were submitted for environmental analysis by Gwynedd Archaeological Trust (GAT) from the excavation undertaken at Penrhyn Castle. The two samples along with a possible flint tool were collected from a single fire pit believed to date to the prehistoric period. The taphonomic similarities of this pit with other excavated features at Parc Bryn Cegin are suggestive of Neolithic activity at Penrhyn Castle. The main aim of this analysis was to recover suitable environmental material to provide an accurate radiocarbon date for this fire pit.

#### **Methodology**

The samples comprised two flots ranging from 208g (sample 1) to 7g (sample 2) in weight. These were sieved using a 4mm, 2mm and 1mm system of stack sieves. The sieved flots were examined using a microscope under magnification x10 and up to x100.

#### **Results**

No carbonised macroplant remains were recovered from either sample, but ten fragments of charcoal larger than 4mm were selected from both contexts for species identification. The results are presented in Table 1 below.

| Sample Context |   | Species            | Name  | Number | Weight(g) |
|----------------|---|--------------------|-------|--------|-----------|
| 1              | 5 | <i>Betula</i> sp.  | Birch | 6      |           |
| 1              | 5 | <i>Ulmus</i> sp.   | Elm   | 3      |           |
| 1 5            |   | Quercus sp.        | Oak   | 1      | 35.6      |
| 2              | 6 | Alnus glutinosa L. | Alder | 4      |           |
| 2              | 6 | <i>Ulmus</i> sp.   | Elm   | 5      |           |
| 2              | 6 | Quercus sp.        | Oak   | 1      | 1.6       |

Table 1. The charcoal species

The charcoal assemblage totalled 37.2g and was identified as alder (*Alnus glutinosa* L.), birch (*Betula* sp), elm (*Ulmus* sp) and oak (*Quercus* sp). There was no evidence of any worked wood or roundwood within either context. The mix of two or more wood species in samples is normally representative of fuel debris. There is no evidence to suggest *in situ* burning occurred within this pit and it is more likely that these remains derived from the later disposal of fuel residue.

#### Sample 1 context [05]

This deposit was charcoal rich and a total of 35.6g was recovered. The species identified were birch, elm and oak.

#### Sample 2 context [06]

The quantity of charcoal from this deposit was much smaller with 1.6g present. The species identified were alder, elm and oak.

#### Recommendations

The alder, birch and elm charcoal are all suitable for radiocarbon dating. Oak is a slow growing species which can produce unreliable dating results. We do not recommend dating of the oak.





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# www.aocarchaeology.com

# 11 APPENDIX III

# 11.1 Artefact Assessment Report: Lithics & Stone

#### **G2447 PENRHYN: LITHICS FINDS**

#### SF02, Context 05:

Flake fragment. 12mm long (incomplete), 10mm wide and 2mm thick.

Flint, off-white with a little iron staining but otherwise fresh. Mid-part of small, thin tertiary blade snapped cleanly across in two places. No secondary working. Probably punch-struck from a prismatic core.

Possible remnant of microlith manufacture or of composite cutting tool manufacture. Later Mesolithic or Early Neolithic (see plates 01 and 02).

#### SF03, Context 03:

Core rejuvenation flake. 42mm long, 18mm wide and 9mm thick.

Flint, mottled mid-grey/cream, poor quality.

Thick, irregular tertiary flake of triangular cross-section, struck transversely across the edge of a core, removing the heavily struck platform edge, presumably to provide a new platform edge. Struck from a largish simple core that has been worked by hammer.

Undatable. There is no similarity in material or technique to suggest an association with SF02 but, on the other hand, nothing to deny it (see plates 03 and 04).

Context 05 & 06, SF09

#### Burnt stone.

2458g of stone fragments, shattered by heating and water plunging, and mostly reddened by heating. Dense igneous stone, mostly probably dolerite, which withstands heating and cooling better than softer rocks that easily disintegrate and harder rocks that are more brittle and shatter too easily. The fragments derive from slightly rounded, subangular cobbles up to about 200mm in length, probably from glacial deposits, and could have been sourced from the nearby river Ogwen. Essentially these are waste products from some cooking process and probably just remnants of a more widespread midden deposit. There are few smaller, unburnt pebbles that have become included by chance.

#### LITHIC ARTEFACTS FROM SIEVING RESIDUES

#### Flaked flint

Measurements are in millimetres, incomplete pieces, i.e. broken, measurements shown in brackets. L = length, maximum, perpendicular to the striking platform; B=Breadth, maximum, parallel to the striking platform; D=depth, maximum. In order L x B x D

#### SF08 Context (05):

- Possible utilised piece: Blade tip fragment. 16 x 6 x 2.5. Yellow-brown opaque flint. Clean snap break. There is microchipping along one convex side edge. Possibly the result of utilisation, possibly mounted as part of a composite cutting tool. There is also some inverse microchipping on the same edge that appears to have no patina so is probably just recent damage. Probably Later Mesolithic (see plates 05 and 06).
- Waste piece: Blade butt fragment. 4 x 5 x 1. Reddish pink opaque flint, probably heat altered. Clean snap break. Probably punch-struck. Some microlithic style abrupt retouch on one edge. Possibly a failed attempt at a notched microburin removal or just a retouched blade, possibly similar to 1. Probably Later Mesolithic.
- 3. Waste piece: Small irregular chip. 9 x 4 x 2. Mottles dark grey/mid-grey flint with fossil cavity. Probably the result of burning rather than knapping. Undatable.

George Smith

9-01-17

## **12 APPENDIX IV**

# 12.1 Artefact Assessment Report: CBM

## **CBM Methodology and Report**

### **Methodology**

Spencer Gavin Smith has been commissioned by Gwynedd Archaeological Trust (GAT) to undertake an assessment of the Ceramic Building Materials (CBM) recovered from an archaeological excavation at Penrhyn Castle, Llandygai, Gwynedd (Jones et al 2016). The CBM will be assessed in line with guidelines used by Dr Philip Mills, Leicester, updated as and where required with Chartered Institute of Archaeologists guidance to replace the Institute of Field Archaeologists guidance within the original text.

The assessment of the CBM recovered from intrusive fieldwork cannot be undertaken without knowledge of its provenance. Information on context, phasing, date and methods of retrieval and an internally consistent stratigraphic matrix should be provided for assessment (CIFA 2014, 3.5.2). The minimum information reported upon should be the forms by context, comments regarding diagnostic items, fabrics and the character of the context assemblage, and context spot dates (KHM 2002, 2.5.1).

### Report

Four whole or partial bricks ([4]; [5]; [6] and [7]) were assessed for this report. They were recovered from within a subsoil (Context 11, Structure 12) close to the site of a building removed as part of landscaping improvements on the Penrhyn Estate (Feature 21; Jones et al 2016, Plate 06).

CBM from Context 11 (Mid –orange brown silty clay subsoil)

[4] Hand Made Brick (plates 07 -08) Dimensions:

Maximum Surviving Length 8 ¾ Inches (222mm)

Maximum Surviving Width 4 inches (103mm)

Maximum Surviving Depth 3 inches (75mm)

A handmade brick fired in a brick clamp. Made of a pale orange clay, the colour of which is still visible within the fabric due to the relatively low firing temperature of a brick clamp, the process of which has turned the fabric a purple colour. Inclusions within the fabric include pieces of angular quartz and small fragments of mica. In addition both rounded and angular inclusions are visible within the fabric, suggesting a beach deposit may have provided the source for the inclusions.

The brick was made by throwing clay into a rectangular mould, a process which can leave a slump mark on the edges of the brick once the mould is removed. There are at least two patterns of finger marks on the surface of the brick, showing the brick was handled at least twice prior to the firing process after its manufacture. A bowing in the vertical axis of the brick leading to a contraction of the sides shows that it was allowed to dry out before being fired.

There is contraction and distortion of the brick fabric due to the firing process as part of a brick clamp, most noticeable in the twisting of the brick in a horizontal plane across the fabric and a

curvature of the brick in a vertical plane along the fabric. There are very faint indications of mortar adhering to the surface of the brick, suggesting a lime mortar was used to lay the brick.

[5] Hand Made Brick (plates 09- 10) Dimensions:

Maximum Surviving Length 4 ¼ inches (108mm)

Maximum Surviving Width 4 inches (103mm)

Maximum Surviving Depth 2 ¾ inches (72mm)

A handmade brick fired in a brick clamp. Made of a pale orange clay, the colour of which is still visible within the fabric due to the relatively low firing temperature of a brick clamp, the process of which has turned the fabric a purple colour. Inclusions within the fabric include pieces of angular quartz and small fragments of mica. In addition both rounded and angular inclusions are visible within the fabric, suggesting a beach deposit may have provided the source for the inclusions.

The brick was made by throwing clay into a rectangular mould, a process which can leave a slump mark on the edges of the brick once the mould is removed. There is no discernible bowing in the vertical axis of the brick, suggesting the fabric was able to maintain its integrity whilst drying.

There is a small amount of contraction and distortion of the brick fabric due to the firing process as part of a brick clamp, most noticeable in the slight twisting of the brick in a horizontal plane across the fabric and similar slight a curvature of the brick in a vertical plane along the fabric. There is a considerable amount of a hard shelly lime mortar adhering to the surface of the brick.

[6] Hand Made Brick (plates 11 - 12) Dimensions:

Maximum Surviving Length 6 ¼ inches (157mm)

Maximum Surviving Width 3 5/8 inches (92mm)

Maximum Surviving Depth 2 5/8 inches (67mm)

A handmade brick fired in a brick clamp. Made of a pale orange clay, the colour of which is still visible within the fabric due to the relatively low firing temperature of a brick clamp, the process of which has turned the fabric a purple colour. Inclusions within the fabric include pieces of angular quartz and small fragments of mica. In addition very large (up to 1 ½ inches in length) rounded and angular inclusions are visible within the fabric, and appear to be a different composition from those found in bricks [4] and [5]

The brick was made by throwing clay into a rectangular mould, a process which can leave a slump mark on the edges of the brick once the mould is removed. A bowing in the vertical axis of the brick leading to a contraction of the sides shows that it was allowed to dry out before being fired.

There is a small amount of contraction and distortion of the brick fabric due to the firing process as part of a brick clamp, most noticeable in the slight twisting of the brick in a horizontal plane across the fabric and similar slight a curvature of the brick in a vertical plane along the fabric. There are

very faint indications of mortar adhering to the surface of the brick, suggesting a lime mortar was used to lay the brick.

[7] Hand Made Brick (plates 13 -15) Dimensions:

Maximum Surviving Length 5 ¾ inches (146mm)

Maximum Surviving Width 4 3/8 inches (112mm)

Maximum Surviving Depth 3 inches (75mm)

A handmade brick fired in a brick clamp. Made of a pale orange clay, the colour of which is still visible within the fabric due to the relatively low firing temperature of a brick clamp, the process of which has turned the fabric a grey colour. Inclusions within the fabric include pieces of angular quartz and small fragments of mica.

The brick was made by throwing clay into a rectangular mould, a process which can leave a slump mark on the edges of the brick once the mould is removed. A sagging in the vertical axis of the brick leading to a contraction of the sides shows that it was allowed to dry out before being fired .

There is a small amount of contraction and distortion of the brick fabric due to the firing process as part of a brick clamp, most noticeable in the slight twisting of the brick in a horizontal plane across the fabric and similar slight a curvature of the brick in a vertical plane along the fabric . There are very faint indications of mortar adhering to the surface of the brick, suggesting a lime mortar was used to lay the brick.

#### Conclusion

The four bricks [4], [5], [6] and [7] from Context 11 are all very similar in their overall dimensions, with a size standardised at 8 inches by 4 inches by 3 inches. For comparison, modern brick dimensions of 8 ½ inches x 4 inches by 2 ½ inches are currently in use. Bricks [4], [5] and [6] are very similar in fabric, being made of a pale orange clay with small, well sorted inclusions to bind the clay together. The fabric of brick [7] is different, with larger inclusions within the fabric, some of which have caused the fabric to fail during the firing process. All four bricks were handmade, and the process is illustrated in Leslie 1971 with clay thrown into a mould and the excess removed with a tool known as a 'strike'. The 'green' or unfired bricks are then left to dry, with Broadway 2003, 234 describing how brickmaking was a year round process in the Seventeenth century, and how a brickmaker could have another occupation between the different stages of manufacture. The four bricks from Context 11 all appear to have been fired as part of a brick 'clamp', where bricks are stacked over a fire source, and the heat radiates out through gaps left in the stacked bricks above. Even with careful control, this produced bricks which were fired to different qualities, and consequently different prices were charged for bricks from different parts of the clamp.

The site of badly truncated 17<sup>th</sup> century brick clamp was identified during an archaeological watching in parkland to the south of Llannerch Hall, Denbighshire in 2014 (Reilly 2014, 9). An example of an 18<sup>th</sup> century brick clamp was identified in Delaware, USA in 2001 (O'Neill 2001) and provides an excellent example of the heat signature which a brick clamp leaves behind of the site is subsequently undisturbed. The source of the clay to manufacture bricks [4], [5], [6] and [7] has not been identified,
although there are clay deposits towards the eastern edge of the Penrhyn castle parkland in and around the mouth of the River Ogwen (<u>http://mapapps.bgs.ac.uk/geologyofbritain/home.html</u>). It is likely that bricks [4], [5], [6] and [7] were fired in a clamp within the park for use to construct a building.

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