NATIONAL BOTANIC GARDEN OF WALES REGENCY RESTORATION PROJECT

PHASE 1 ARCHAEOLOGICAL INVESTIGATIONS AND STRUCTURE RECORDING 2015

INTERIM REPORT





Prepared by: DAT Archaeological Services For: NBGW





DYFED ARCHAEOLOGICAL TRUST

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Gan / By

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PHASE 1 ARCHAEOLOGICAL INVESTIGATIONS AND STRUCTURE RECORDING 2015 INTERIM REPORT

SUMMARY

During July, August and September 2015 DAT Archaeological Services were commissioned by the National Botanic Garden of Wales to undertake a programme of archaeological investigation and recording for the HLF funded development phase of the Regency Restoration Project.

The information gained through the fieldwork is intended to inform the design stage of the project, but also provides useful information to advance the understanding and interpretation of the various features in the former waterpark area of the waterpark and the future management of the landscape features.

The programme of archaeological investigations has been designed by Consultant Landscape Archaeologists Professor David Austin and Paul Everson (CLA), based on an archaeological topographic survey covering the area of the former Paxton waterpark undertaken by DAT Archaeological Services.

The investigations comprised detailed site recording of visible structures and features and excavations of buried archaeology for research, evaluation and recording purposes.

Where little or nothing of significance was found, recording was limited to photography, a TST survey of the extent and location of the investigations, and written notes and observations. Where more complex structures and archaeology were encountered, scale plans and elevation drawings were made, based on 3D photogrammetric models of the structures. The field investigations were undertaken with the assistance and support of volunteers.

58 investigations were undertaken, and about 50 structures requiring some degree of recording were identified.

This interim report presents summaries of each investigation, with scale illustrations and photographs of major features. General observations and specific issues are also offered.

NATIONAL BOTANIC GARDEN OF WALES REGENCY RESTORATION PROJECT

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1 INTRODUCTION

This report presents the results of archaeological investigations undertaken by Dyfed Archaeological Trust (DAT Archaeological Services) on behalf of the Regency Restoration project to provide background information to support and inform the HLF Project Development Phase and future management of the landscape features.

The investigations comprised detailed site recording of visible structures and features and excavations of buried archaeology for research, evaluation and recording purposes.

The fieldwork was undertaken during July, August and September 2015, with the help of numerous volunteers.

1.1 Project background

The National Botanic Garden of Wales at Llanarthne in Carmarthenshire (OS NGR SN5218) opened in May 2000. The garden lies at the heart of a 560 acre historic parkland of the Middleton Estate, which is included in the *Cadw*/ICOMOS *Register of Parks and Gardens* of Special Historic interest in Wales, and is Grade II Listed on account of the surviving remains of a Regency waterpark.

The National Botanic Garden of Wales has secured funding from the Heritage Lottery Fund (HLF) and others funders to undertake the first phase of a project to restore the regency landscape of the estate and its waterpark as it existed in the early 19th century. Within the waterpark, the Regency Restoration Project intends to restore Llyn Mawr, Llyn Felin and the fishpond, along with their associated features. Elsewhere in the estate, the landscapes depicted in Hornor's paintings made in 1815 will largely be re-created. The 17th century and earlier origins of the estate will also be explored.

1.2 Brief site history

The Middleton Hall Estate dates from at least the 17th century, but almost certainly has earlier origins. At some time between 1584 and 1609 Christopher Middleton appears to have obtained possession of a large estate (probably Middleton Hall); possibly on behalf of his brothers in the East India Company. By the 1620s Henry Middleton had Middleton Hall and by the 1640s the Middletons were well integrated into the gentry families of the region.

Various features that date from the 17th century (or even earlier) survive within the estate landscape. The Middletons eventually sold the estate to the Lawyer John Gawler in 1776. The estate was probably in a state of decay by this time.

William Paxton purchased the estate between 1787 and 1789 and set about creating the new hall and its designed landscape in the late 18^{th} and early 19^{th} centuries.

Paxton's waterpark was created by taking advantage of two streams that run through the estate, the Clearbrook, which runs from north to south, and the Afon Gwynon which runs from east to west. These streams meet near the northern boundary of the parkland before leaving the estate and flowing northwards into the Tywi valley. The Clearbrook was used to create a chain of lakes. In the Afon

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Gwynon Valley, the drained remains of an upper fish pond survive along with several other features including bridges, a waterfall, cascade and a chalybeate spring. The whole designed landscape was recorded in a series of watercolour paintings made by Thomas Hornor in 1815. Only some of these paintings survive.

Following Paxton's death in 1824, the estate was sold to the Adams and Abadams families in 1824. In 1919 it was sold on to Lt Col. William N. Jones in 1919. The house burnt down in 1931. During this period the waterpark began to decline relatively quickly and became an increasingly wooded landscape.

After Paxton's mansion was destroyed by fire in 1931, the estate passed into the control of Carmarthenshire County Council. The Llyn Mawr embankment dam was partially breached at this time, probably to avoid complying with the 1930s Reservoirs Act. By 1948 the lakes held little water.

Dyfed County Council succeeded Carmarthenshire CC. They let out the land and buildings as small holdings and in 1985 instituted an MSC Scheme which undertook some unsympathetic restoration work on several of the features in the waterpark. The parkland remained divided into small holdings until the late 1990s when the National Botanic Garden of Wales was created.

The upper lakes (Llyn Uchaf and Llyn Canol) were restored when the Botanic Gardens were created. The two lowest lakes, Llyn Mawr and Llyn Felin are now drained and their lake beds are overgrown with self-seeded trees and laurel.

1.3 Project design

The archaeological programme for the restoration project is being led by Consultant Landscape Archaeologists Professor David Austin and Paul Everson (CLA). An archaeological topographic survey covering the area of the former Paxton waterpark has been undertaken by DAT Archaeological Services. The survey and its interpretation (Everson and Austin 2015) has provided the basis for the programme of archaeological investigations designed by Messrs Austin and Everson.

The investigations will add detail beyond what can be extrapolated from the surviving Hornor paintings (and other sources) and will clarify construction methods, and design details to be included in the detailed project proposals. The investigations will also help to ascertain the sequence of development of the landscape and how it functioned.

The detailed narrative description of the site, based on research and interpretation of the survey is also available separately (Everson and Austin 2015).

1.4.1 Methodology

The field investigations were undertaken with the assistance and support of volunteers. To provide volunteers with the necessary skills in excavation techniques and recording processes the excavation of the rustic bathhouse (1AS3) was run as a training excavation.

A full excavation programme and WSI outlining the methods and procedures to be adopted during the project were produced as part of the tender for this project and are available as separate documents.

Due to limited access, the majority of site clearance and excavation was carried out by hand. Where practical, sites were cleared of undergrowth and small trees prior to the removal of overburden etc. However the ease and extent of excavation was in many cases hampered by the size, age and environmental sensitivity of many of the trees that grow on or in close proximity to several of the investigation sites.

Other sites could not be investigated due to safety and access issues.

The programme of investigations was based on assumptions about how easy it would be to obtain the information sought at each location. However, some of the intended investigations had to be moved, the goals modified, abandoned or postponed due to practical constraints such as water levels.

Where little or nothing of significance was found, recording was limited to photography, a TST survey of the extent and location of the investigations, and written notes and observations.

Where more complex structures and archaeology were encountered, scale plan and elevation drawings were made. Context sheets and stratigraphic records were only made where warranted by the complexity of the archaeology. Otherwise, a site notebook was kept to record ideas and interpretations for each investigation.

For large and complex masonry structures 3D photogrammetry was undertaken to provide a variety of plan and elevation images from which scale drawings could be produced.

Within each Archaeological Area (numbered 1 to 11), the archaeological investigations were identified by letter (A, B, C etc.). Structures within each investigation area were given individual numbers with an S prefix (S1, S2, S3 etc.) to facilitate explanation and interpretation of the results.

In addition to descriptions of the results of each investigation for some sites additional observations are offered relating to the potential need for further investigation, conservation or interpretation etc.



Figure 1: Project location

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2 THE ARCHAEOLOGICAL AREA INVESTIGATIONS

2.1 AREA 1



Figure 3: Proposed areas of investigation in Area 1



Figure 4: Plan of excavated features in Area 1 (excluding Area 1H)

2.1.1 Site 1A Structure 1: Diversionary dam culvert (1AS1). Figure 4.

Original goal:

Large area excavation to explore the presence, position and constructional methods and materials of the rustic bath-house and its relationship with the chalybeate well, as well as explore other features such as paths which existed in this area.



Photo 1: Outlet of diversionary dam culvert 1AS1

Results:

Structure 1 (Photo 1) is the north end outflow of a culvert leading from the north bank of the watercourse (opposite the Cascade [1BS8] in the Llyn Felin dam [1FS28 and 1GS29]). The end had a vertical face and there appear to be slight traces of limewash on the stonework. The internal diameter is 0.8m. The external diameter is approximately 1.65m. The culvert is constructed from dressed stone and lime mortar. The top of the culvert has slumped by approximately 0.2m (assuming it was originally completely circular) but is currently completely open except at its southern end, where it has collapsed as a result of riverbank erosion and tree root damage and is now almost totally obscured by a fallen tree and collapsed masonry. Approximately 10.5m of the culvert length survives intact.

The bedrock below the outflow appears to have been hewn to create a channel dropping down in steps to join the river below.

It is uncertain whether Structure 1 is actually a continuation of the culvert that runs beneath the Llyn Felin dam cascade [1BS8]. Both surviving lengths of culvert have the same diameter (0.8m), but any potential evidence that they were originally contiguous has been destroyed by the current watercourse.

If culverts 1AS1 and 1BS9 were contiguous, the intention was presumably to enable water to be drained from the Llyn Felin lake but avoiding sending too much water through the diversionary dam cascade.

The location of Culvert A1S1/1BS9 (beneath the cascade) suggest that it may have been used to drain the lake, or to channel the stream flow during construction of the various water management features. After construction the section of culvert crossing the watercourse between the cascade and the diversionary dam may have been removed. Culvert A1S1 may have continued to channel water, but operating solely as a water feature. If Culvert 1AS1 was separate from 1BS9, it was presumably intended to control the level and volume of water travelling over the diversionary dam cascade. No visible evidence of a sluice mechanism at the south end of the culvert survives (if one were ever present).

Culvert 1CS7 at the western end of the Llyn Felin Dam, also allows water to be drained from the Llyn Felin lake to below the Diversionary Dam Cascade, but from a higher level, effectively controlling the level of water in the lake.

Observations:

- For reasons of safety, the outflow at the north end of this culvert should be blocked up to prevent access.
- If culvert 1AS1 were incorporated into the scheme, it is recommended that the south end of the culvert is cleared of the fallen tree, tree roots and fallen masonry to obtain more evidence of its relationship with culvert 1BS8 (if any survives).
- The north end of the culvert should be consolidated.
- If it is cleared of fallen masonry etc., the south end of the culvert it is likely to need consolidation and blocking up.



Figure 5: The end of culvert 1AS1

2.1.2 Site 1A Structure 2: Drainage ditch (1AS2). Figure 4.

Original goal:

Large area excavation to explore the presence, position and constructional methods and materials of the rustic bath-house and its relationship with the chalybeate well, as well as explore other features such as paths which existed in this area.



Photo 2: Drainage ditch A1S2

Results:

1AS2 (Photo 2) was investigated to ascertain whether the visible stonework was the remains of a revetment wall supporting and original trackway, and to characterise the ditch that ran alongside the existing path.

The investigation ascertained that the ditch contained a plastic drainage pipe. This is assumed to have been inserted in the 1980s to drain water from the chalybeate well (1AS4). It is not known whether this was also the original drainage route for the well.

The roughly constructed masonry wall terminated at a point where the drainage ditch veers away from the line of the path. It has been interpreted as a 1980s revetment strengthening the side of the path where it runs alongside the drainage ditch. Where the ditch runs alongside the path it has been partially backfilled.

No evidence of historic features was identified.

Observations:

None.

2.1.3 Site 1A Structure 3: Bath house (1AS3). Figure 4.

Original goal:

Large area excavation to explore the presence, position and constructional methods and materials of the rustic bath-house and its relationship with the chalybeate well, as well as explore other features such as paths which existed in this area.



Plate 1: Detail from Horner's painting from Station 7 of the 'Bathhouse' or 'Grotto of Hygiea'



Photo 3: Drains and mortar spread after removal of overburden



Photo 4: Detail of the mortar 'bed' looking east

Results:

Topsoil (001) and a thick deposit of yellow clay (002) were removed using a tracked mini-digger. The excavation area was located so as to reveal the majority (if not all) of the structure depicted in Hornor's painting of viewpoint 7. The remains of a rectangle of mortar were revealed, along with a variety of drains, conduits and other linear arrangements of stones (Photo 3). It was immediately apparent that the surviving evidence did not represent the well preserved remains of a substantial or well-built structure. Instead, any evidence of the above ground structure appears to have been systematically removed, leaving only parts of the sub-floor drainage system.

The mortar deposit (020) was approximately 0.12m thick and covered an area measuring approximately 2.2m by 1.4m (Photo 4). The mortar deposit was crossed by several irregularly shaped 'gullies' on an east-west orientation. The purpose of the mortar deposit is uncertain, but after much deliberation it was decided that it was most likely to be the remains of a mortar bed to support a stone flagged or tiled floor. The gulleys may have formed as a result of water erosion beneath the floor.

Running along the eastern edge of the mortar spread was a drain (044) on a north-south orientation, capped with flat tilestones (Photo 5). At least one of tilestones had a hole drilled in it, suggesting these were re-used roofing tiles. Further east was a second north-south oriented drain (047), capped with large river-cobble stones (035) and smaller cobbles (034).

To the south of these drains ran another linear spread of stones (048) which made a right angle turn to an east west orientation (Photo 6). Careful removal of some of the stones of 048 revealed it to be a third drain. Also on an east-west orientation was conduit 043 (Photo 5). This was constructed from large cobbles similar to those of drains 048 and 047, and was capped with flat stone slabs, some of which appeared to be re-used from an earlier structure.

In section it was possible to ascertain that 048 was the earliest drain. It was originally probably associated with mortar spread 020 and conduit 043 which is presumed to be the means by which spring water was supplied to the building. The insertion of drains 044 (possibly first) and 047 (possibly second), however, has destroyed direct evidence of these associations (Photo 7).

The drains are cut into a series of dumped make-up deposits across the entire trench. These deposits appear to level off a generally yellowish clay silt natural bank to the east of the trench and hollows containing riverbank deposits of blue-grey clay silt with waterlogged twigs, branches and leaves in the southern half of the trench. Insufficient exposures of the yellow clays were possible to ascertain whether they are indeed natural deposits or are part of a very large scale landscaping of this area in the early stages of the construction of this landscape.

It is curious that the three drains and the conduit are not very well constructed. None of these features have basal stones, and the evidence of surviving capstones suggests that the drains never contained either ceramic or lead pipes to convey the water. All the drains appear to terminate in the south and convey water northwards.

No evidence of wall foundation trenches defining the extent of the building was apparent. Evidence of the east wall may have been destroyed by the later drains. Evidence of the north wall may survive beyond the excavated area. However, the absence of any evidence of footings for the south and west walls may suggest that the ground levels across the entire area have been reduced to below the level of presumed wall footings.

Although the excavation has located the remains of a building in the same location as in Hornor's painting, virtually no evidence of demolition debris of any sort remains at the site. All such evidence appears to have been intentionally removed. Only a few fragments of wall plaster and lime mortar paint flakes were present in the gulleys within the mortar spread. If it was constructed from good quality materials, the building could have been dismantled and sold, or moved elsewhere. Alternatively, any remains that were formerly present may have been removed during the 1980s works undertaken in this area.

Although it has not been possible to ascertain the exact dimensions of the former building from the surviving archaeological remains, Hornor's painting suggests it would not have been much larger than the excavated area. The bath house is described as having dressing rooms etc. and the equipment to enable tepid baths.

If the excavated mortar spread represents the original floor space of the building is unlikely that it could have contained these features, let alone the absence of any evidence for a plunge pool which might be expected within a bathhouse.

Hornor's narrative for Station 7 also refers to a 'rustic building' which he calls the Grotto of Hygiea. Other sources describe the Grotto of Hygiea as 'not finished', but affording an agreeable retreat from the sun. It therefore remains a possibility that the excavated building is the remains of the unfinished grotto of Hygeia rather than the bathhouse.

Other descriptions mention that spring water was piped from the spring to outside the estate for the use of the public. The two later drains identified during the excavation may represent several attempts to achieve this.

During the 1980s groundworks, two parts of a fluted Coadestone column were recovered from the stream in the vicinity of the Llyn Felin Dam. These appear very similar to the two columns that front the 'Rustic chalet' in Hornor's depiction. No evidence of foundation holes for these columns was identified during the excavation, and their diameter seems out of scale with the likely size and dimensions of the building as it is depicted.

The same or a similar column segments appear in photographs of the 1980s groundworks (Photo 42), where they appear to have been mounted on plinths at the ends of the cascade side walls. It is unknown whether this was done on the

basis of surviving evidence or not. If so, similar columns may have been located in other locations.

It is perhaps noteworthy that there would not have been a very good view of the Llyn Felin cascade from the balcony of the grotto.

Although one might be expected, no evidence of a conduit supplying water to the chalybeate well was identified within the area of excavation.



Photo 5: Partially excavated later drains 044 (left) and 047 (right)



Photo 6: Partially excavated later drains with early drain 048 revealed (center)



Photo 7: Three phases of drains following removal of all capstones etc.

Observations:

- Some confusion may have arisen over the identification of the various structures in this part of the park. Two small buildings are referred to in the area, Hornor's narrative for Station 7 refers to a 'rustic building' (which he calls the Grotto of Hygiea) appropriated to the spring. The 'spring' (also referred to as a 'chalybeate spring') is presumably the feature often referred to today as the 'chalybeate well'. It appears that it is these features that are shown in Horner's painting of Station 7. Other sources describe the Grotto of Hygiea as 'not finished', but affording an agreeable retreat from the sun.
- The second building is described as a 'bath' (bathhouse?) supplied from the spring. Hornor's narrative for Station 7 refers to 'the bath which is near the spring as shown in the last view' (Station 6?). It is described as having the equipment to enable tepid baths. Sales particulars from 1824 refer to a 'rustic building with a chalybeate and vapour bath with dressing rooms etc'. The sales particulars also mention a grotto and a Chalybeate spring with pipes conducting the overflow to the outside of the park.
- Based on these sources and the results of the excavation it seems likely that the excavation has revealed the remains of the 'Grotto of Hygiea' rather than the bath/bath house. That it appears never to have been completed may account for the scarcity of its remains, although Hornor's illustration suggests it was a standing building.
- The missing painting of the view from Hornor's Station 6 would seem to have depicted the bath house (hence: 'The bath which is near the spring as shown in the last view [Station 6] may be used as a tepid bath as it is furnished with complete apparatus for that purpose).
- The excavations have provided little evidence of how the rustic building was constructed. If the structure was to be rebuilt it would need to be based largely upon Hornor's watercolour.
- The surviving drainage system is no longer functional.
- If the bath house is indeed a different building to the one excavated, where the bath house was located remains uncertain. Trees and undergrowth make prospection for the remains of the building problematic, but a programme of hand-dug test-pitting across the area may locate its remains.

- Fragments of pottery recovered during the excavation have not been processed or analysed.
- Additional archaeological investigations would be needed to locate and characterize the bath house.



Figure 6: Simplified first phase of structure 1AS3 with conduit leading to drain 045 and mortar bed



Figure 7: Simplified second phase of structure 1AS3 with drain 044 superimposed over drain 045



Figure 8: Simplified third phase of structure 1AS3 with drains 044 and 045 superseded by drain 047



Figure 9: Cross section through features in Area 1AS3

2.1.4 Site 1A Structure 4: Chalybeate well (1AS4). Figure 4.

Original goal:

Large area excavation to explore the presence, position and constructional methods and materials of the rustic bath-house and its relationship with the chalybeate well, as well as explore other features such as paths which existed in this area.



Photo 8: Chalybeate well looking northwest

Results:

Although the Chalybeate well (Photo 8) was not subject to archaeological investigation, it has been assigned a reference identity for the convenience of discussions.

Although there was presumably a pipe supplying water to the well, no evidence of such a pipe (or a cut to contain one) was identified within the area of the bathhouse excavation. Structure 1AS2 is likely to represent the course of a run off drain from the chalybeate well, but this was not proven archaeologically.

Observations:

- In the original sources, the terms 'spring' and 'chalybeate spring' appear to refer to what today is generally referred to as the Chalybeate well.
- No evidence of how water was routed to the chalybeate well was revealed during the investigations.

2.1.5 Site 1A Structure 5 and Site 1E Structure 39: Bridge abutments (1AS5 and 1ES39). Figure 4.

Original goal:

Large area excavation to explore the presence, position and constructional methods and materials of the rustic bath-house and its relationship with the chalybeate well, as well as explore other features such as paths which existed in this area.



Photo 9: West Bridge abutment 1ES39 looking west



Photo 10: East Bridge abutment 1AS5 looking east

Results:

The abutments for the bridge at the end of the diversionary dam have been identified as 1AS5 (east bank) and 1ES39 (west bank). This bridge was 'restored' in the 1980s.

Structure 39: Bridge abutment (1ES39). Figure 4. Photo 9

The west bank bridge abutment underwent some conservation in the 1980s. Although the splayed form of the abutment looks as if it could be original, a plastic seepage pipe has been inserted at the base of the structure, and it is possible that the whole abutment was rebuilt in the 1980s. The abutment is built upon solid bedrock.

Adjacent to the north side of the abutment is the rock-cut outlet of the overflow channel (1ES40).

Adjacent to the south side of the bridge abutment are wall footings indicating that the west bank embankment masonry (1ES41), formerly butted up against the bridge (similar to the abutment 1AAS5. The embankment wall between the outflow of Culvert 1CS7 and abutment 1AS39 appears to have been destroyed by a water-eroded channel resulting from a breach in Culvert 1CS7.

It is curious that the two bridge abutments are not located directly opposite each other. It is not clear whether this was originally the case, or suggests that one or other of the abutments has been relocated from its original position.

Structure 5: Bridge abutment (1AS5). Figure 4. Photo 10

The east bank bridge abutment appears slightly less well built than 1AS39, but this may be as a consequence of only being partially consolidated in the 1980s. The curved embankment wall 1AS42 on the south side of the bridge abutment is presumably an original feature but appears to have been rebuilt or repointed in the 1980s, and now appears 'bonded' with the bridge abutment. Although the bridge abutment and embankment wall are both built upon solid bedrock, the lowest footings have been washed away by the flow of water over the diversionary dam cascade. The wall above appears reasonably stable at present.

The rebuilt wall forms a parapet on top of the abutment. The top of the parapet is the same height as the top of the west bank abutment 1AS39.

The abutment is currently capped with concrete containing post imprints etc relating to the 1980s bridge structure (see Figure 10).

No convincing evidence of a path or carriageway surface leading up to the abutment was apparent, but this may well have been removed by the 1980s works.

Observations

- The bridge abutment and associated embankment walls might require further investigation and recording depending on the potential impact of any proposed bridge re-instatement on the existing structures.
- The surviving evidence suggests that this was probably only ever a footbridge. This is perhaps problematic if a carriageway circuit around this part of the garden is assumed. The only other candidate for a carriagewide route is over the Llyn Felin dam and cascade. Based on the evidence of Hornor's paintings and map, the bridge over the cascade has a 'rustic' character and it is unclear whether it could have supported a carriage. The surviving physical evidence of red brick on the cascade abutment may suggest a red brick arched bridge similar to 6AS25.



Plate 2: A photograph of the 'diversionary dam footbridge' as it was restored in the 1980s.Looking east



Figure 10: Cross section through bridge abutment 1AS5

2.1.6 Site 1B Structure 8: Cascade (1BS8). Figure 4.

Original goal:

Clean up (including minor surface excavation) and record the masonry cascade surviving on the east end of the Llyn Felin main dam together with all vertical stone faces to a standard allowing its authentic recreation or conservation through consolidation.



Plate3: Detail from Horner's painting from Station 7 showing the bridge over the Llyn Felin cascade in the background



Photo 11: The remains of the Llyn Felin dam cascade (1BS8) looking southwest

Results:

The remains of the cascade (1BS8) in the Llyn Felin dam (1FS29/1GS29) were stripped of moss and undergrowth (Photo 11). Some areas were not stripped in order to conserve rare species of moss: Fissidens monguillonii, Gyroweisia tenuis, and Plagiochila britanica.

The east side of the cascade has been lost, so it is uncertain what its original width would have been. It might be reasonable to extrapolate its original width on the assumption that the missing masonry is mostly likely to have comprised the east side wall of the cascade.

The western cascade side-wall is approximately 45cm wide. The base of the wall footings are wider than the wall and consist of large, randomly arranged unmortared boulders. The south end of the wall butts up against the west flanking wall of the cascade. The northern end of the wall curves northwestwards to a point where it has been washed away by the river.

There is no surviving evidence as to whether the side wall would have stopped in line with the northern edge of the dam, or whether it continued, effectively becoming part of the river embankment wall 1ES41. It seems most probable that the eastern side-wall of the cascade followed a similar curve, effectively forming part of the eastern river embankment masonry 1AS42. Alternatively, if the eastern side-wall was a mirror image of the west side, it might support the idea that there was a pool at the base of the cascade.

Horner's map suggests that the path on top of the dam followed the curve of the cascade side wall (see Plate 4).

The cascade itself has masonry faces with a rubble and clay core. The top (the cascade spillway) is capped by stone slabs, linked with iron staples along the edges of the cascade drop. The flanking wall of the cascade has a brick facing. Although this appears similar to the brick-faced bridge abutments of 6AS25, there is no evidence for the curve of a bridge arch. Horner's depiction of the bridge over the Llyn Felin Cascade appears to show a 'rustic style' bridge. This may suggest that the red brick bridges are a later replacement for the earlier 'rustic' bridges, but no direct physical evidence of this has been identified.

Horner's map shows some interesting detail, but is unfortunately not entirely clear. The path/ carriageway on the top of the dam on its west side appears to follow the curve of the cascade sidewall up to the cascade bridge. It is not clear whether the path/ carriageway continues over the cascade or not. Watercolour 7 appears to depict a footbridge which spans a greater distance than the cascade alone (see Plate 4).



Plate 4: Detail of the Llyn Felin dam from Hornor's map

On the south side of the cascade are two stone masonry piers flanking a vertical ceramic pipe associated with culvert 1BS9. Another curved block of masonry abuts the eastern pier. This is presumably either a remnant of a masonry face to the dam on its lake side, or a block of additional masonry to strengthen the pier. There is no equivalent masonry visible on the west side of the culvert pipe. Further excavation would be needed to ascertain whether there was ever any present. If no masonry was identified it might argue against the dam having a masonry face on its lake side.

At the bottom of the cascade drop on its north side are two large stone slabs. Mortar scars on the cascade wall and side wall suggest that these are not remnants of the surface of the base of the cascade, but were instead included in the bedding for the cascade base to protect the culvert masonry that lies below them. No trace of the original slabs that formed the base of the cascade survive, although a mortar scar indicates the height of the base of the cascade and the thickness of the slabs.

At a point where the base of the cascade is likely to have dropped down, there is a recess in the side wall containing a circular iron band (Photo 12). The purpose of this socket is uncertain, but it may have housed one end of an iron bar, perhaps used to strengthen the edge stones of the step in the cascade floor, or had some other purpose perhaps associated with creating turbulence in the cascade waters.



Photo 12: Detail of the recess containing a circular iron band

Observations:

- The investigations provided a considerable amount of detail regarding the construction of the cascade and its associated features. Sufficient information was obtained to enable a reasonably well informed restoration of the cascade to be undertaken if desired.
- The purpose of the recess containing a circular iron band could perhaps be ascertained through further research.
- Although reasonably stable at present, exposed masonry, core work and evidence of structural details will continue to deteriorate over time. Tree growth on this structure should be prevented.
- Further investigation and recording may be desirable, depending on the potential impact of any proposed re-instatement of the cascade, dam and culvert on the existing remains of these structures.
- In the absence of surviving archaeological evidence, careful consideration of the visibility of the cascade from various viewpoints will be needed to decide on the form of its east side.
- If there was a pool beneath the cascade, this too will have an influence on the character of the east side of the cascade.
- Further archaeological investigations at other bridge sites would be needed to ascertain if red brick bridges are replacements for earlier rustic bridges or whether the difference is functional (ie. Rustic footbridges/red brick carriageway bridges).
2.1.7 Site 1B Structure 9: Cascade culvert (1BS9). Figure 4

Original goal:

Clean up (including minor surface excavation) and record the masonry cascade surviving on the east end of the Llyn Felin main dam together with all vertical stone faces to a standard allowing its authentic recreation or conservation through consolidation.



Photo 13: down pipe to culvert on south side of the cascade. Flanked by culvert wing-walls

Results:

On the south side of the cascade are two stone masonry piers flanking a 13" diameter vertical ceramic pipe (Photo 13). The top of the pipe seems high if the culvert was intended to drain the lake. If, however, the pipe provided access to a mechanism to open or close a sluice leading to the culvert (as has been suggested for 1CS7), it seems a bit low. Further excavation immediately south of the pipe would be needed to ascertain how it relates to the culvert (1BS9) running beneath the cascade.

The culvert (Photo 14) runs through the masonry cascade and alongside the curving cascade side-wall. The space between the sidewall and the culvert has been partly filled with mortar.

The northern extent of the culvert has been washed away by the river and no evidence of its relationship (if any) with culvert 1AS1 is apparent. In plan it appears that there is a slight curve in the line of cascade culvert 2BS9. This curve may be sufficient to suggest that culvert 2BS9 wan never continuous with culvert 1AS1 (assuming the culverts would need to be exactly straight).

Assuming a constant diameter of 0.8m for the culvert, the estimated (and extrapolated) height for the interior top of culvert 2BS9 at its most northerly point (41.76m OD), and the height for the interior top of culvert 1AS1 at its most southerly point (41.62m OD), do not discount the possibility that the two culverts were linked. However, if culverts 2BS9 and 1AS1 were connected, it seems reasonable to assume that the culvert ran beneath the riverbed (which must have been significantly higher than it is today).

This would have implications for the water levels below the Llyn Felin dam and the function of whatever structure may or may not have existed at the diversionary dam cascade. It seems unlikely however, that all evidence of what it would have been necessary to construct to achieve all of this, has been completely lost. It is perhaps more likely that it never existed in the first place.

The culverts may have been linked temporarily to divert the river waters during the construction of the Llyn Felin and diversionary dam cascades. Once they were constructed, the portion of the culvert crossing the watercourse may have been demolished. Both sections of culvert could still have functioned after construction.



Photo 14: Collapsed section of the culvert that ran beneath the Llyn Felin cascade (looking south)

- If the culvert and cascade are to be renovated to function as was originally intended, further investigation and recording may be necessary, to obtain a better understanding of how the culvert intake and sluice control system worked.
- Further investigation and recording may be desirable, depending on the potential impact of any proposed re-instatement of the cascade, dam and culvert on the existing remains of these structures.
- A more detailed survey (of the relative heights of the culverts, the base of the cascade and the riverbed than it was possible to achieve as part of the archaeological excavations), would be necessary to ascertain what would and would not have been possible in the original design of these features.



Figure 11: East facing elevation of the Llyn Felin cascade

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Figure 12: Plan of the Llyn Felin cascade

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2.1.8 Site 1C Structure 7: Dam culvert (1CS7). Figure 4

Original goal:

Medium-sized excavation and cleaning to record the nature of the culvert through the main dam.

Results:

Culvert 1CS7 (Photo 15) is located on the western end of the Llyn Felin dam. It appears to have been used to control the height of the water in the lake, by passing the Llyn Felin Cascade (1BS8) and the Diversionary Dam Cascade (1DS10). On the south side of the dam, the partially damaged culvert intake was partially excavated. Due to the unstable nature of the structure it was not possible to excavate deeper down to reveal the entire culvert opening, but the visible remains suggest that the remains of a sluice mechanism are likely to be present below the present ground surface.

The end of the culvert is faced with stone and red brick into which two vertical iron rods have been set (presumably to support some aspect of the sluice mechanism).

A slightly recessed and curved column of mortar set into the masonry facing is presumed to mark the former position of a vertical ceramic pipe (as is present on the sluices associated with culverts on other structures in the garden). Such pipes are thought to have given access to a handle socket to operate a winding mechanism (a lifting davit?).

The outflow at the north end of the culvert (Photo 16) has been repaired with red brick.



Photo 15: The inflow point and sluice for Culvert 1CS7 on the south (lake-side) side of the Llyn Felin dam

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Figure 13: Plan of culvert intake 1CS7



Figure 14: Elevation of culvert intake 1CS7



Photo 16: The outflow of Culvert 1CS7. Note red brick repairs to the base of the opening

- Further investigation and recording may be desirable, depending on the potential impact of any proposed re-instatement of this structure.
- If the culvert is to be restored to its original form and function, further excavation may be needed to better understand the details of the culvert intake and its presumed sluice arrangement.
- Young trees could be removed from some locations to prevent further damage to the culvert.
- Open ends of the culvert could be consolidated to prevent further collapse.
- Open ends could be blocked to prevent access into the culvert.

2.1.9 Site 1D Structure 10: Diversionary dam cascade (1DS10). Fig. 15

Original goal:

Cleaning and recording of the second cascade across the river.



Figure 15: Plan of structures associated with the diversionary dam



Photo 17: Diversionary dam cascade 1DS10

Results:

Two blocks of masonry (Photo 17) survive at the top of the Diversionary Dam Cascade (1DS10). This appears to be a natural cascade formed by a drop in the height of the bedrock in the river channel. The stone piers are both built upon bedrock. Their west facing elevations are constructed with finely dressed stone, while the east facing elevation (where is survives in the east bank) is not. This suggests that the masonry was either intended to frame a particular view or spectacle (when viewed from the north), or was part of a more ornate structure that the surviving masonry suggests. No clear evidence survives that suggests there was a bridge in this location, and the condition of the surviving masonry does not suggest it may not have been sufficiently robust to support a bridge.

If there was a constructed masonry cascade across the river at this point, no evidence of it survives, either in the surviving parts of the embankment walls, or in the bedrock of the river bed. This may therefore have been a natural cascade.

- The footings of these structures are being actively undermined by the flow of water. Repair and consolidation of these structures is recommended as a matter of urgency.
- In the absence of any surviving evidence of a constructed masonry cascade across the river at this point it may not be justifiable to construct one.
- Perhaps the masonry piers, may have acted as plinths to support statuary to frame the view of the cascade from the bridge 1AS5 and 1ES35.

2.1.10 Site 1E Structure 40: Storm overflow channel (1ES40). Figure 15

Original goal:

Cleaning and small area excavation to record the outlet of the storm overflow channel.



Photo 18: Outflow of rock cut storm channel 1ES40 looking west

Results:

The overflow channel (Photo 18) appears to be entirely rock-cut. No evidence of either mechanical or hand tool marks is apparent, but its form and profile may suggest it was dug by hand rather than by machine. The channel appears on 1st and 2nd edition mapping. Structure 27 (the carriageway bridge at 1H) appears to be contemporary with the channel. There is no evidence as to whether or not the channel and bridge are a later adaptation.

- If the water channeling function of this feature is re-established as part of the restoration scheme, it will need to be cleared of tree growth.
- Further investigation may provide additional information about how the channel was constructed and how it worked.

2.1.11 Site 1E Structure 41: Embankment - west (1ES41). Figure 15

Between bridge abutment 1ES5 and Cascade masonry 1DS10 is a stretch of masonry that abuts both structures. The outlet of Culvert 1CS7 is also built into this embankment. There is no evidence (and it seems unlikely) that the embankment wall ever continued north of bridge abutment 1ES5.

It is possible that the embankment masonry also existed between the Llyn Felin Dam cascade and the diversionary dam cascade. Unfortunately, due to erosion, no evidence to prove this has survived on the west side of the river.

2.1.12 Site 1A Structure 42: Embankment - east (1AS42). Figure 15

On the east bank, however, what appear to be vestiges of collapsed embankment walling do survive immediately to the east of the diversionary Dam cascade. The vertical mortar bedding planes visible in these large blocks of mortared masonry suggest they have toppled forwards from their original location (having originally been horizontally bedded in the traditional manner), presumably as a result of having been undermined by the flow of water.

Elsewhere along the current waterline, large boulders may be the construction footings of the diversionary dam itself.

It is presumed that the intake for culvert 1AS1 would have been built into the embankment. East of culvert 1AS1, any evidence of former embankment walling was destroyed in the 1980s when stone filled gabions were inserted to strengthen the east bank. As a consequence, there is no evidence to indicate whether or not any such embankment wall linked up with the east side-wall of the cascade.

If this whole stretch of the watercourse was effectively 'canalised', and considering the likely level of the base of the cascade, it seems unlikely that there was a significant pool of water at the base of the cascade.

- Even if it is not necessary in order to achieve the re-establishment of the Llyn Felin lake etc., rebuilding the sections of embankment walls between structures 1DS10 and 1ES40 (including the outflow of 1CS7) could be considered.
- Rebuilding of the presumed embankment walls between 1DS10 and 1BS8, would be more conjectural, but would create an impressive spectacle and demonstration of the complexity of the water park engineering.
- The extent of canalization of the watercourse in Area 1, coupled with the cascades and culvert outflows, suggests an intention to display mastery over the power of water, rather than to create a romantic spectacle demonstrating the power of nature over humankind. If so, what does this tell us about the ethos behind the design of the various features of the waterpark.



Figure 16: East facing elevation of features associated with the diversionary dam



Figure 17: West facing elevation of features associated with the diversionary dam

2.1.13 Site 1F Structure 28: West end of dam (1FS28). Figure 4

Original goal:

Section trench to explore the relationship between the dam and the old ground surface on the west end of the main dam. This will also give an opportunity to explore the makeup of the paths on the dam and along the shoreline.



Photo 19: Remnant of track surface on top of the Llyn Felin dam

Results:

Due to uncertainties about the likely location of the interface between the old ground surface and the dam structure, this investigation was limited to a small excavation on top of the dam to ascertain the presence and character of any path surface on top of the dam.

Evidence of the top of a surface constructed from crushed stone was identified (Photo 19), but was not investigated further in order to maintain access along the top of the dam.

The surviving cascade masonry suggests that the bridge spanning the cascade (illustrated in Horner depiction 6), could have been a maximum of 2.0m wide. As such it may have been wide enough for a carriageway. The excavated track surface seems a bit narrow and unsubstantial to represent a carriageway, and may have been constructed as a footpath in the 1980s.

The Horner map (Plate 4) appears to show wide paths leading to the cascade, but the bridge across the cascade appears more like a footbridge. The bends in the route across the dam also question whether it was a carriageway or not.

- Augering would be the most effective low impact method of ascertaining the nature of the dam core and the point at which it meets the old ground surface.
- Large scale engineering works undertaken as part of the scheme in the future may provide an opportunity to record the dam structure (including evidence of an earlier track surface leading to the cascade bridge) in more detail.

2.1.14 Site 1G Structure 29: East end of dam (1GS29). Figure 4

Original goal:

Same as 1F. There may also be an opportunity, in consultation with the engineers, to clean down and record a section through the dam where it has been breached by the river at the east end: this will provide a view of the dam structure to identify its original construction method and materials.

Results:

Due to tree root growth, the danger posed by an actively falling tree limb, and uncertainty about the most appropriate location to achieve the original goals, this investigation was abandoned.

- Augering would be the most effective low impact method of ascertaining the nature of the dam core and the point at which it meets the old ground surface.
- Large scale engineering works undertaken as part of the scheme in the future, may provide an opportunity to record the dam structure and construction methods (including evidence of an earlier track surface leading to the cascade bridge) in more detail.
- Careful consideration needs to be given as to the character of the original land forms between the east side of the dam and the Chalybeate well. The loss of the east side of the dam cascade, the breach, river channel erosion and later insertion of gabions along the bankside have all conspired to alter the lie of the land considerably.
- Hornor's artwork and cartographic evidence may help clarify the original landforms and their possible reinstatement.

2.1.15 Site 1H Structure 27: Bridge across storm overflow channel (1HS27) and metalled carriageway surface (1HS28). Figure 18

Original goal:

Cleaning, small area excavation to record the inlet for the overflow channel and examine its relationship with the lake edge.



Figure 18: Location of Site H investigations



Photo 20: Bridge Abutment 1HS27 looking south

Results:

The roughly dressed stone rubble footings of a probable 2.2m wide bridge abutment were revealed immediately adjacent to the modern steps on the south side of the overflow channel (Photo 20). A single red brick located on the east side of the abutment suggests that it was brick-faced. Immediately to the south of the abutment was an associated crushed stone metalled surface. A vestige of mortared masonry on the north side may be the scant remains of the north abutment, suggesting the span of the bridge (and the width of the overflow channel) may have been about 2.4m wide.

The abutment footings appeared to be built upon the same clays and silts that were encountered in other small excavations to examine the relationship between the overflow channel and the lake edge. No evidence of the lake edge or a base to the overflow channel was identified, despite the overflow channel being largely rock cut. The clays and silts may represent a constructed clay lining deposit, or perhaps more likely a natural clay deposit. Whichever it is, building the abutments on the clay was presumably not considered problematic.

If the bridge and track are original Paxton period features, it may suggest that the overflow channel was also an original feature, rather than a later modification. The extrapolated water level of the lake suggests that at least some of the overflow inlet held water permanently. If there was formal sluice mechanism for controlling the flow of water through the channel, it seems most likely to have been located to the west of the bridge, rather than between the bridge and the lake.

The image below is of a bridge in an unknown location. It could however, well be a representation of structure 1HS27 viewed from the east.



Plate 5: Painting by Alice Abadam circa late 19th century possibly depicting bridge 1HS27

- If a replacement for the bridge is likely to require more substantial footings, a watching brief during associated groundworks might reveal evidence for the form and construction of the bridge, and any evidence that it was an original feature or a later modification.
- Additional investigations to the west of the bridge may ascertain whether there was a sluice associated with the overflow channel.



Figure 19: Plan of Features in Area 1H



Figure 20: Elevations in Area 1H

2.1.16 Site 1I

Original goal:

Small area excavation to examine the extent of destruction caused by the modern work area and to examine the make-up of the possible Middleton carriageway.

Results:

Not investigated in Phase 1.

Observations:

Pending any future investigation.

2.1.17 SITE 1J Structure 48: Rock cut feature adjacent to river. Figure 4

Original goal:

Small area excavation to investigate by cleaning up and recording the shelving slope into the W side of the stream as it turns N again. Possible additional water cascade, or access to water side.



Photo 21: Site 1J looking north

Results:

Although it appears to be a cut feature, the banks of Site 1J, which are cut through soils as well as loose bedrock (Photo 21), seem unlikely to have constituted a water course. It seems most likely that the feature was intended to provide access to the river for some (probably practical) purpose or other. There was no evidence that there were ever rock cut or constructed steps in this location. There was no evidence to suggest a likely date of construction for this feature.

Observations:

• No Observations.

2.1.18 SITE 1K

Original goal:

Small area excavation to address issue of road alignment and conjectured earlier bridging or crossing arrangement of the stream northwards, that was superseded (perhaps on a slightly different alignment) by the Paxton period bridge.

Results:

Not investigated in Phase 1.

Observations:

Pending any future investigation.

2.1.19 Site 1L Structure 6: Modern steps. Figure 4

Original goal:

Small area excavation, cleaning and recording of the structural evidence of access points at either end of the dam; are the present steps in an authentic position?

Results:

The steps on the north side of the west end of the dam (Photo 22) are modern. No evidence was revealed to suggest there were ever earlier steps or a metalled track surface in this location.



Photo 22: Modern steps (site 1L) leading up onto the Llyn Felin Dam, looking south

Observations:

• If these steps were to be removed, there would be no need for further archaeological mitigation.



Figure 21: Plan of Proposed investigation locations in Archaeological Area 2

Site 2A

Original goal:

Removal of a section (if not all) of the DCC gabions at the western end of the dam to reveal the plan and construction method of the second-phase 'hornwork' and cascade arrangement.

Results:

Not investigated in Phase 1.

Observations:

Pending any future investigation.

2.2.2 Site 2B Structure 15: Culvert (2BS15). Figure 22

Original goal:

Clearance, cleaning and limited excavation of the 2001 breach in the dam to examine and record the following:

- the nature of the wall and sluice which may be part of a first-phase dam;
- the culvert; and
- the currently exposed faces of the dam to determine whether they are of different construction technique and material









Results:

Structure 2BS15 (the culvert), 2BS16 (the sluice) and 2BS17 (the masonry block at the inflow of the culvert) all appear to be functionally related and of the same phase of construction. They appear to have been cut into an initial dam structure presumably as part of the second phase of dam.

Culvert 2BS15 (Photo 23) is constructed in the same style as the culverts of the Llyn Felin dam. The culvert was originally approximately 24m long, but has collapsed, been demolished, or has been washed away along much of its length.

2.2.3 Site 2B Structure 43: Revetment wall? (2BS43). Figure 22

Original goal:

Clearance, cleaning and limited excavation of the 2001 breach in the dam to examine and record the following:

- the nature of the wall and sluice which may be part of a first-phase dam;
- the culvert; and
- the currently exposed faces of the dam to determine whether they are of different construction technique and material



Photo 24: Culvert 2BS15 with revetment wall 2BS43 on left, looking north

Results:

There are vestiges of a masonry wall (Photo 24) on the western side of the culvert on the south side of the surviving culvert masonry in the 'breach'. It is uncertain whether this wall is the remnant of an earlier phase of culvert, or is a revetment wall constructed just prior to construction of the culvert to support the edges of the cut through the dam. The former perhaps seems more likely as there is no evidence of an equivalent revetment wall on the east side of the culvert.

This wall may or may not be related to a stub of wall footings (visible in the stream bed) that appear to have been a revetment wall on the lake-side face of the dam (in this location at least). Evidence of other walls that may have been present on the east side of the 'breach' are likely to have been destroyed by the insertion of the later culvert.

Observations:

• A watching brief or additional archaeological excavation should be undertaken during or prior to any major groundworks that are undertaken in this location to identify any additional evidence that may suggest whether the revetment walls significantly pre-date the construction of the culvert, or were associated with the construction of the culvert.

2.2.4 Structure 16: Sluice (2BS16). Figure 22

Original goal:

Clearance, cleaning and limited excavation of the 2001 breach in the dam to examine and record the following:

- the nature of the wall and sluice which may be part of a first-phase dam;
- the culvert; and
- the currently exposed faces of the dam to determine whether they are of different construction technique and material



Photo 25: Sluice 2BS16 looking south

Results:

The remains of some kind of wooden sluice structure (Photo 25) survive, built across the masonry culvert 2m north of the masonry block containing the down-pipe (and presumed associated sluice), and the sluice intake. The culvert masonry and the sluice timbers appear to be integrally associated.

It is unclear what the purpose of a sluice in this location would be as it appears to significantly restrict the free flow of water through the culvert at this point. It is also unclear how the sluice could have been conveniently accessed from the level of the top of the dam for maintenance or repair.

Observations:

• A watching brief or additional archaeological excavation should be undertaken during or prior to any major groundworks that are undertaken in this location to identify any additional evidence that may suggest how the sluice was constructed and functioned.

2.2.5 Site 2B Structure 17: Downpipe structure (2BS17). Figure 22

Original goal:

Clearance, cleaning and limited excavation of the 2001 breach in the dam to examine and record the following:

- the nature of the wall and sluice which may be part of a first-phase dam;
- the culvert; and
- the currently exposed faces of the dam to determine whether they are of different construction technique and material



Photo 26: Downpipe masonry structure (2BS17) looking south

Results:

The substantial masonry block 2BS17 (Photo 26) (aka the culvert 'wing walls') appears to have been constructed to house the intake pipe (Photo 27) for the culvert that was inserted into the dam after its original construction. It may also have housed a sluice mechanism.

A cut through the clay layers of the dam core, in which the masonry structure was built, is clearly visible. It has also cut through the masonry facing (2BS19) to the landward side of the first phase dam. There is no clear evidence to suggest that masonry block 2BS17 and the culvert are not contemporary with each other.

The western end has been partially destroyed. Assuming the culvert was located centrally, about 0.3m of the masonry has been lost, however, there is a roughly faced and slightly curving appearance to some of the masonry suggesting it may not have been a simple rectangular shape. There may have been masonry 'piers' on the south side of the structure channeling water into the culvert (similar to those on the Llyn Felin dam.

On the top of the masonry structure is the mouth of a 13" diameter vertical ceramic pipe. A similar pipe was present on the Llyn Felin cascade structure. It seems most likely that these pipes provided access to a mechanism for opening or closing a sluice to control the flow of water into the culvert. Alternatively the pipe itself may have fed water into the culvert.



Photo 27: Photo from 1980s showing down pipe leading into the culvert looking south

Observations:

 The exact form and function of 2BS17 remains uncertain. A watching brief or additional archaeological excavation should be undertaken during or prior to any major groundworks that are undertaken in this location to clarify how the flow of water into the culvert was regulated, the construction details of the south side of the masonry block, its relationship to masonry 2BS43 (or other evidence of preculvert structures) and any additional evidence that may suggest how the culvert was constructed and functioned.

2.2.6 Site 2B Structure 18: Phase 1 Dam. Figure 22

Original goal:

Clearance, cleaning and limited excavation of the 2001 breach in the dam to examine and record the following:

- the nature of the wall and sluice which may be part of a first-phase dam;
- the culvert; and
- the currently exposed faces of the dam to determine whether they are of different construction technique and material



Photo 28: Masonry facing of Phase 1 dam. Looking east

Results:

The 'breach' has effectively provided a cross section through the Llyn Mawr dam. Undergrowth was removed, and as much slumped soil as was safe and practical. It appears to have been built in two phases. The core of the 1st phase dam is constructed from clay, several alternating bands of blue or yellow clay approximately 0.6m thick can be distinguished. The southern (lake side) face of the dam was not represented in the cross section but 2BS43 may suggest that at least part of it (possibly in the location of a former culvert in the same location as the later culvert?) may have had a masonry facing. The north (landward) side of the dam was faced with clay bonded masonry built up in steps (Photo 28).

The cross section through the masonry may originally have been formed when the cut for the insertion of the culvert (Photo 29) was made.

There was no obvious evidence for the masonry facing on the west side if the culvert, but it is possible that this has been obscured by remnants of the backfill of the cut for the insertion of the culvert.



Photo 29: Cut through the Phase 1 dam for the insertion of the culvert

- If engineering works are undertaken, a watching brief and/or additional archaeological excavation should be undertaken in this location to clarify how the dam was constructed, its relationship to the culvert features and the Phase 2 dam modifications.
- It would be worth undertaking more investigations of the culvert 4CS34 and dam 4AS44 to compare the construction characteristics of these structures with the early phase of the Llyn Mawr dam.

2.2.7 Site 2B Structure 19: Phase 2 Dam. Figure 22

Original goal:

Clearance, cleaning and limited excavation of the 2001 breach in the dam to examine and record the following:

- the nature of the wall and sluice which may be part of a first-phase dam;
- the culvert; and
- the currently exposed faces of the dam to determine whether they are of different construction technique and material



Photo 30: Phase 2 material deposited against the Phase 1 Dam masonry facing. Looking south

Results:

At present it remains unclear whether the two apparent phases of the dam represent an original dam that was later modified, or a single phase dam incorporating two necessary construction sub-phases. However, the fact that the existing culvert appears to be a later modification, and that wall footings 2BS43 may represent an earlier phase of culvert, strongly suggests that there may have been two distinct phases of dam.

Phase 2 appears to consist of the insertion of the new culvert, raising the height of the dam and increasing its thickness by adding material to the north (landward) side.

It was not possible to cut a cross section through the Phase 2 material deposited against the Phase 1 masonry facing (Photo 30).

- If engineering works are undertaken in this location, a watching brief and/or additional archaeological excavation should be undertaken to clarify how the dam was constructed, its relationship to the culvert features and the Phase 2 dam modifications.
- If the opportunity arises, it would be useful to obtain cross sections through the Llyn Mawr dam at other points along its length. Alternatively an auger survey might provide sufficient data to ascertain the extent of the phase 1 and 1 dams.



Figure 23: Plan of Site 2B



Figure 24: West facing elevation of Site 2B

2.2.8 Site 2C Lakeside bank. Figure 25:

Original goal:

Section trench through the proposed phase 1 shoreline seen at the west end of the dam-works.



Photo 31: Trench 2C shore of Llyn Mawr

Results:

The investigations did not reveal any evidence of a constructed shoreline revetment. All the deposits appeared to be natural clays and silts. Lake sediment deposits were identified at the southern end of the trench.

The main bank slope (Photo 31) appears to represent the edge of the lake at the time of the repair works undertaken (see photo xxx). The level area at the top of the bank is likely to have been created during the repairs to the breach In the Llyn Mawr dam. The water level at this time is indicated in Photo 32.







Photo 32: The location of investigation is close to the top left The water level is defined by the downpipe in Structure 2BS17 (see Photo 27).

Observations:

No Observations

2.2.9 Site 2D Structure 49: Dam. Figure 27

Original goal:

Section trench to test the existence of an early dam at a point where it appears to be visible as an earthwork shoulder emerging from below the later dam.

Results:

An area measuring approximately 2m by 6m was investigated. Beneath the root horizon a mid yellow homogenous clay silt was revealed across the entire trench. No evidence of cuts, structures or deposits were apparent. This deposit is presumed to be Phase 1 dam core material.

Observations:

A large scale machine excavated trench at a later stage in the project would be a more effective means of obtaining a better understanding of the phases of dam construction.

Photo 42: No Photo



Figure 27: Plan of location of Trench D

2.2.10 Site 2E Structure 50: Dam Figure 28

Original goal:

Section trench through the second-phase dam at a point along the canal where we can be sure that we are clear of the first dam; this will test the extent to which this stretch of the dam is built on a bench of natural ground as well as determine the edge of the hollow quarried to create the canal itself.

Results:

The results of investigations in search of the Chinese Bridge (2F) were considered sufficiently fruitless to suggest that no useful information would be retrieved from additional excavations in location 2E.

Observations:

A large scale machine excavated trench at a later stage in the project would be a more effective means of obtaining a better understanding of the phases of dam construction.

Photo 43: No Photo



Figure 28: Location of Trench 2 E/F
2.2.11 Site 2F Structure 51: Chinese bridge. Figure 29:

Original goal:

Very small area excavation to examine the place where, based on measurements taken from the early maps, the abutment for the Chinese Bridge should exist on the inner dam edge; this will also allow a further examination of the dam on the 'canal' arm of Llyn Mawr.



Figure 29: Location of Trenches 2F



Plate 6: Hornor's depiction of the Chinese Bridge

Results:

Several attempts were made to find evidence of the Chinese bridge in various locations (see Figure 29). The easternmost excavation was located by measuring from the cascade (2PS53) to the location of a footbridge depicted on the 1st Edition Ordnance Survey map. The second location, (based on the bridge location indicated on Hornor's map) suggested a possible earth-cut abutment, but no structural evidence was identified (Photos 33 and 34). No archaeological evidence of the form of the bridge or its construction methods could be identified on either side of the lake in these locations.

Observations:

- If the supposed location of the Chinese bridge is correct, larger scale investigations may be required to obtain more information about the construction of the bridge.
- The Horner depiction of the Chinese bridge (see Plate 6) may suggest that it was essentially only a façade to be seen from the mansion house. In reality it may not have been a very substantial structure.



Photo 33: Chinese bridge investigation facing north



Photo 34: Chinese bridge investigation facing east

2.2.12 Site 2G Structure 11: Dam (2GS11) Figure 30:

Original goal:

Medium-sized area excavation on the northern toe of the dam to test the dam's full extent and to identify whether there are archaeological features on the ground surface beneath the dam. The trench will also look at the surfacing materials of a Paxton-period path.



Figure 30: Location of Trenches 2G and 6C

Results:

To achieve the goals of this investigation, two narrow trenches were opened (in different locations) to sample the dam structure and Paxton-period path in suitable locations.



Photo 35: Structure 2GS11 facing south

The trench was intended to ascertain the northern extent of the dam. Beneath the topsoil, redeposited dam clay containing occasional small to medium-sized stones. Below the ground surface, a stoney horizon was revealed (Photo 35). Approximately half way along the trench a group of larger stones lying immediately above the stoney layer, marked a change in the stoney horizon from being relatively loose and irregularly lain, to being very compact and flattened.

The group of larger stones are considered to represent the northern edge of the dam structure. The compacted area lies below the dam structure. The looser stone horizon extends beyond the northern edge of the dam.



Figure 31: Profile of Trench 2GS11

Observations:

- The stoney horizon would appear to be some kind of construction surface upon which the dam was constructed.
- If the opportunity for a cross section to be cut through this part of the dam, a better understanding of how it was constructed and how this compares to the dam structure further west could be achieved.
- A larger area of excavation would be needed to ascertain the presence of predam features in the area.

2.2.13 Site 2G Structure 12: Carriageway? (2GS12) Figure 30:

Original goal:

Medium-sized area excavation on the northern toe of the dam to test the dam's full extent and to identify whether there are archaeological features on the ground surface beneath the dam. The trench will also look at the surfacing materials of a Paxton-period path.



Photo 36: Carriageway? (2GS12) facing south



Photo 37: Carriageway? (2GS12) facing north

Results:

A location for a narrow trench (Photo 36) was selected that from the surviving landscape evidence was thought likely to provide a good chance of characterizing the Paxton-period path.

Other than a slightly stonier deposit at the north end of the trench, which may constitute a crude track surface (Photo 37), no convincing evidence of a formally constructed path surface was apparent other than could be traced from the associated landforms. Below the topsoil, yellow clays and silts appeared likely to be natural deposits, but it is possible that they are redeposited clays associated with the structure of the adjacent dam.

Observations:

• On the topographic survey, path 2GS12 is linked with the well-constructed metalled surface 6AS37. The apparent differences in these surfaces suggested by the excavated evidence may suggest they are not the same feature?



Figure 32: Profile of Trench G2 S12

2.2.14 Site 2H

Original goal:

Small section trench across the presumed original edge of the valley left as a 'bar' to retain water in the eastern 'canal'.

Results

Not investigated in Phase 1.

Observations:

2.2.15 Site 2I

Original goal:

Small section trench across another ridge of the presumed former ground surface, also left as a 'bar' to pool water in the canal.

Results:

Not investigated in Phase 1.

Observations:

2.2.16 Site 2J

Original goal:

Cleaning and recording of steps into the narrow gorge below the 'hornwork' as recorded in the survey.

Results:

Not investigated in Phase 1.

Observations:

2.2.17 Site 2K Structure 33: Small dam (2KS33). Figure 33

Original goal:

Cleaning and recording of the stone-faced earth dam which retained the lower (northern) end of the small 'perched' pond between Llyn Fawr and Llyn Felin.



Figure 33: Location of investigations 2K and 8B



Plate 7: Detail of Hornor's map showing the small lake and small dam

Results:

The west bank abutment footings (Photos 38 and 39) are bedded on solid natural bedrock that appears to be one side of the natural watercourse. Although not revealed during the investigations, it seems likely that the footings of the eastern bank are similarly bedded on bedrock, and that the limit of the surviving masonry on the eastern side marks the line of the east bank bedrock.

On the north face of the dam some vestiges of lime bonded masonry of are visible Built onto the bedrock in the stream bed. The core of the dam is redeposited yellow clay.

Beneath the leaf litter/topsoil, a thin scatter of small stones may represent the original crest of the dam. The original height of the parapet walls is uncertain, but they may not have been significantly higher than the surviving evidence suggests.

The curved shape of the dam suggests that the body of water it created was narrow. The north end of the lake is depicted on the Horner map, but no detail of the dam is visible. What is clear, however, is that there was no bridge or path or carriageway across the dam. There was presumably a cascade or sluice associated with this dam structure, but no clear evidence of it survives.



Photo 38: Structure 2KS33 looking east



Photo 39: Structure 2KS33 looking west

Observations:

• Although the feature has been surveyed, should the opportunity arise, structure 2KS33 would be a candidate for 3D photographic recording in order to produce an accurate plan of the feature.



Figure 34: Cross section through Dam 2KS33

2.2.18 Site 2L

Original goal:

Two small section trenches to examine whether there are traces of a high-level leat on either side of a natural gulley feeding into the `canal'.

Results:

Not investigated in Phase 1.

Observations:

2.2.19 Site 2M

Original goal:

Two small section trenches to examine whether there are traces of a high-level leat on either side of a natural gulley feeding into the `canal'.

Results:

Not investigated in Phase 1.

Observations:

2.2.20 Site 2N

Original goal:

Small section trench to explore the nature of a curving bank which appears to define the area of the 'canal'.

Results:

Not investigated in Phase 1.

Observations:

2.2.21 Site 20 Structures 45 and 46. Site 20. Figure 28

Original goal:

Small area excavation of the triangular platform between the paths on the side and the top of the dam as identified above; a small area excavation to test the nature of the path surfaces and materials at a point where the path along the top meets another ramping down the outer flank of the dam.

Results:

Although the platform (Structure 45) and the path (Structure 46) are clearly part of the designed landscape, no evidence of constructed revetment walls, metalled surfaces or structures was identified within the small excavation area (Photo 40). The features appear to be constructed as part of the dam structure in this location.



Photo 40: Platform (Structure 45) and the path (Structure 46) looking east

Observations:

No specific observations.

2.2.22 Site 2P Structure 53: Eastern Cascade. Figure 30

No investigation or recording work on this structure was identified as part of the Phase 1 works. It was not possible to make a 3D photogrammetric record of the structure. Following the removal of the majority of the moss covering the masonry, a basic photographic record of the structure was made, with the intention of identifying the areas of original masonry and the repaired or rebuilt sections.

Some photographs taken during repair works in the 1980s (Photos 41 and 42) are useful in identifying the extent of rebuilding for the lower parts of the cascade, the upper parts rely on what can be discerned in the existing masonry.



Photo 41: Repairs to the cascade in the 1980s



Photo 42: Repairs to the cascade in the 1980s



Photo 43: Bridge and masonry at the top of the cascade (looking west)



Photo 44: East side, looking east. Top of cascade



Photo 45: West side, looking west. Top of cascade



Photo 46: Top of cascade, west side, looking west



Photo 47: Top of cascade, east side, looking east



Photo 48: Culvert at base of first drop of cascade



Photo 49: East wall at the first drop of cascade



Photo 50: West wall at the first drop of cascade



Photo 51: West wall at the second drop of cascade



Photo 52: East wall at the second drop of cascade



Photo 53: West wall at the third drop of the cascade



Photo 54: East wall at the third drop of the cascade

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Figure 35: Plan showing repairs to the cascade (with photo references)



Photo 55: The cascade before rebuilding



Photo 56: The cascade after rebuilding

2.3 AREA 3



Figure 36: Plan of proposed investigations in Areas 3 and 5



Figure 37: Plan of structures investigated in Area 3 and 6

2.3.1 Site 3A Structure 21: Overflow pipe. Figure 37

Original goal:

Section trench to test the existence of the bridge depicted by Hornor and the nature of any dam which might be there.





Results:

The direct relationship between the dam and the surface has been destroyed by the later insertion of an overflow pipe on the south side of the dam that cuts across the dam at the point where the track would have met the dam surface (Photo 57). The overflow pipe may have been constructed in the 1980s during repairs to the north side of the dam.

After cutting across the top of the dam the overflow pipe turns a right angle and runs along the original north face of the dam up to the outflow which is built within a flanking revetment wall running between the dam and the valley side.

The flanking revetment wall on the west side is in a different location in relation to the equivalent wall on the east side. The whole western flanking wall may therefore have been rebuilt. There is no surviving evidence as to whether it replaced an earlier wall in a location more symmetric with the eastern side.

2.3.2 Site 3A Structure 22: waterfall/dam south. Figure 37

Original goal:

Section trench to test the existence of the bridge depicted by Hornor and the nature of any dam which might be there.

Results:

Sufficient undergrowth and overburden were removed from the top of the cascade/dam (Photo 58) to define its shape and extent. Having established the curvaceous shape of the structure it became apparent that the straight bridge depicted in the Horner painting of the waterfall was unlikely to have existed in reality, or if it did, was unlikely to be built on top of the dam itself.

The south side of the dam appears to be in relatively good condition. The lime mortared stone capping appears to be original. The parapet wall also appears likely to be an original feature, but has been rebuilt or repaired.

On the east side of the dam (south end), some recesses in the edge of the paved surface may formally have held some form of upright for a barrier, but these are not regularly sized or spaced, and may just be the result of missing masonry.

No evidence of supports for a bridge structure on top of the dam was visible in the cleared areas.

The cascade spillway is shallow and is lined with large dressed stone slabs. Some are linked with metal staples. The east side of the spillway has been repaired. There are also a few other holes in some of the slabs, but they do not appear to be regularly positioned.



Photo 58: Exposed parts of the south side of the waterfall

2.3.3 Site 3A Structure 24: Waterfall track south. Figure 37

Original goal:

Section trench to test the existence of the bridge depicted by Hornor and the nature of any dam which might be there.



Photo 59: Track deposits (grey) in section

Results:

Originally the south side of the dam appears to have continued southwards, presumably until it eventually abuts solid bedrock on the natural valley side. The southern extent is, however, covered in a layer of yellow dam clay and two layers of stone chippings (Photo 59). These chippings are the remains of a metalled surface (Structure 24) leading on to the dam. The surface appears not to have continued across the top of the dam.

No clear evidence of supports for a bridge as depicted in Horner's painting were identified.

2.3.4 Site 3B Structure 23: Cascade Track north. Figure 37

Original goal:

Small area excavation to examine the northern bridge abutment and the nature of its approach path(s).

Results:

The point where the northern approach track meets the top of the dam was cleared of leaf litter (Photo 60). The track was found to be metalled with crushed stone running seamlessly onto the mortared slab stonework of the northern half of the dam. Part of the revetment wall flanking the approach path has collapsed.

The curvaceous dam structure was built first with the flanking revetment wingwall added to create a concave shape to the entire structure.



Photo 60: Interface between the path and the top of the great waterfall on the north side. Looking south.

A further revetment wall built upon the valley side bedrock runs beneath the flanking wall at an obtuse angle. There is no visible evidence of an equivalent wall on the opposite side of the dam. The path landform leading south from the dam on its north side does not appear to be metalled and is therefore presumably not a continuation of the same path.

2.3.5 Site 3B Structure 20: Cascade/dam north. Figure 37

Original goal:

Small area excavation to examine the northern bridge abutment and the nature of its approach path(s).



Photo 61: North side of the waterfall, looking south

Results:

The north side of the dam structure (Photo 61) shows evidence of several phases of alteration as a result of various repairs presumably undertaken at different times. Where there have been no repairs, the top of the dam is surfaced with flat stone fragments set in lime mortar (as on the south side). Coarse grey concrete on the north edge of the dam indicates a phase of repair. Grey cement on the northern edge indicates another repair. These patches may have capped exposed core work resulting from the removal of the equivalent parapet wall that survives on the south side. The random stone rubble in a clay matrix projecting above the level dam surface represents the backfill of a third repair which presumably removed material from the core of the dam perhaps to repair a leak or remove tree roots.

Possible evidence of two or three post pads was identified, but these were of different sizes and were not evenly spaced. Any other potential evidence for a possible bridge across the dam that may have existed previously was destroyed by the later repairs.

The Hornor illustration (see Plate 8) appears to show a long straight bridge. It is difficult to see how this could have run across the arc of top of the waterfall dam, and no evidence for such a bridge was identifiable.

North face of the dam/cascade. Figure 37

The north face of the cascade/dam also shows evidence of various phases of repair or rebuilding.

At the base of the structure on its west side a masonry blocked culvert is visible. This was presumably used to carry the river water during construction of the dam. Higher up, some feint circular marks visible on the dam face may be scars from scaffolding used during the dam construction.

Differences in the mortar pointing on either side of the cascade suggest that the upper parts of the dam have been repaired or repointed.

Drainage pipes inserted on the north side of the dam, coupled with the evidence of backfilling of the dam core and the absence of a parapet, may suggest that this side of the dam has been more substantially repaired or rebuilt.



Plate 8: Detail of Hornor's painting of the great waterfall showing the bridge

Observations:

- Visible cracks and leaking suggest that the north side of the dam still requires substantial repair or rebuilding.
- It is possible that there was originally a bridge over the cascade spillway, but because only part of the west side of the dam was cleared of overburden, no evidence was revealed. On the east side, later disturbance may have destroyed any evidence formerly present.
- Further investigation of the flanking revetment walls (currently inaccessible) on the east and west sides of the dam may provide additional information as to whether the dam was originally symmetrical or not, and may even provide clues as to how it was bridged.
- The overflow pipe may only have had a temporary function. If it is to be retained and restored to function, it may be necessary to ensure that the right angle bend does not get blocked up with debris.





Figure 39: West facing elevation of the great waterfall

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2.4 AREA 4



Figure 40: Proposed investigation locations in Area 4



Figure 41: Location of investigations in Area 4

2.4.1 Site 4A Structure 44: Dam. Figure 4. Figure 41

Original goal:

Section trench to test the relationship between the main dam and the natural slope.

Results:

The supposed area of interface between the dam and the valley side/quarry was stripped of overburden. The quarried rock face was revealed (Photo 62), over and against which the dam appears to have been constructed (from clay and stone rubble). The quarry is therefore most likely to pre-date the construction of the dam. No evidence for a stone facing to the dam (on its lake side) was apparent. What appears in the photo like some coursed masonry is most likely just a fortuitous arrangement of stones.



Photo 62: Site 4A looking north

Investigation 4B shed no more light on the structure of the dam. Observations on the north side of the dam showed vestiges of stone rubble masonry (Photo 63) adjacent to, (and apparently behind), the rebuilt revetment walls on the north side of the watercourse. These may be vestiges of the current structures before they were restored, or perhaps more likely, vestiges of a masonry facing to the dam, or of an earlier water management structure (such as a cascade).



Photo 63: Stonework visible adjacent to the restored water management features may be vestiges of a masonry face to the dam, or the remnants of an earlier water management feature.

Observations:

• If this dam is restored as part of the scheme, larger scale investigations would be needed to fully understand the sequence of features in this location.

2.4.2 Site 4B Bank abutting dam? Figure 41

Original goal:

Section trench to test the relationship between the main dam and the inserted bank on the north side of the river.

Results:

No evidence to clarify whether the existing land forms are the result of a bank being built up against the lake-side side of the dam was identified (Photo 64). It was difficult to estimate exactly where such an interface might be located, so it may be that the evidence sought did not fall within the excavated area. Furthermore since the whole landform is constructed from yellow clays, it is difficult to differentiate between potentially different deposits.

Observations:

• If this dam is restored as part of the scheme, larger scale investigations (prior to or during construction works) would be needed to fully understand the sequence of features in this location.



Photo 64: Investigation 4B

2.4.3 Site 4C Structure 34: Culvert below early dam. Figure 41

Original goal:

Small area excavation to explore the hypothesis that the linear depression is actually the remains of a culvert.

Results:

The removal of overburden revealed the remains of a stone-built culvert (Photo 65). The masonry consists of large undressed irregularly shaped stone. What survives of the walls revealed suggests they are irregularly coursed and clay bonded.

The culvert is constructed in a very different style to the known Paxton period culverts, and is most likely to be of earlier origin.

It is perhaps significant that the masonry of the culvert outlet is on a NNW–SSE alignment, while the existing dam earthwork appears to be on a more N-S orientation. This may suggest that the existing dam (4A) and the inserted bank (4B) are associated with the later Paxton period water management features, while the culvert is possibly associated with an earlier (now buried?) dam associated with the small pond (with which it is well oriented) to the east of the existing dam.



Photo 65: Culvert 4CS34, looking east

Observations:

- Although the culvert appears to be of earlier origin, it need not suggest that the dam above it is of the same date.
- If this dam is restored as part of the scheme, larger scale investigations (prior to or during construction works) would be needed to fully understand the sequence of features in this location.




Figure 43: South facing elevation of Culvert 4CS34



Figure 44: North facing elevation of Culvert 4CS34

2.4.4 Site 4D Diversionary dam? Figure 41

Original goal:

Section trench to test the composition of the diversionary dam and the nature of its northern terminal, in particular whether it was stone-faced.

Results:

Due to the presence of myriad tree roots, only a small area was cleared of leaf litter etc. No evidence to suggest that this was a constructed landform was apparent (Photo 66). Although it is possible that the course of the river in this location has been engineered, it seems most likely that this bank is entirely natural.



Photo 66: Site 4D looking southwest

Observations:

No observations.

2.4.5 Site 4E

Original goal:

Small area excavation to examine path composition and to test the hypothesis about the presence of an early leat.

Results:

Not investigated in Phase 1.

Observations:

2.4.6 Site 4F

Original goal:

Section trench through what may be the later sediments to test the hypothesis and recover potential palaeo-environmental evidence.

Results:

Pending.

Observations:

2.4.7 Site 4G Structure 52: 'Fishpond cascade'



Photo 67: 3D photogrammetric image of Structure 52

Although no investigation or recording work upon Structure 52 was identified as part of the Phase 1 investigations, the opportunity was taken to 3D photogrametically record the structure. Should the need arise drawn records of the structures could also be made.



Photo 68: Structure 52 before repairs

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Photo 69: Structure 52 after repairs

2.5 AREA 5



Figure 45: Location of proposed investigations in areas 3 and 5

2.5.1 Site 5A

Original goal:

Section trench to examine the point where the earthworks of the high-level leat disappear.

Results:

Not investigated in Phase 1.

Observations:

2.5.2 Site 5B

Original goal:

Section trench to test the nature and materials of the Paxton carriageway.

Results:

Not investigated in Phase 1.

Observations:

Pending any future investigation.

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Site 5C

Original goal:

Medium-sized area excavation to examine the sequences and relationships of the various carriageways, paths and leat which, it is speculated, accumulate at this point.

Results:

Not investigated in Phase 1.

Observations:

2.5.4 Site 5D

Original goal:

Very small section to test whether (as seems unlikely) an historic path ran up the north side of the gorge at this point.

Results:

Not investigated in Phase 1.

Observations:

2.5.5 Site 5E

Original goal:

Small area excavation to examine the potential Middleton-period carriageway at a point where it appears to exit through a contemporary field boundary and gate.

Results:

Not investigated in Phase 1.

Observations:



2.6 AREA 6







2.6.1 Site 6A Structure 25: bridge abutments. Figure 46

Original goal:

Cleaning and recording of the surviving abutments for a bridge on the Llyn Felin stream, at the south-eastern corner of Llyn Felin; the path surfaces can also be tested for original constructional materials.



Plate 9: Detail of Hornor's map showing bridge 6A S25

Results:

The remnants of both bridge abutments were investigated (Photos 70 and 71). On the north bank, adjacent to the modern path, vestiges of irregularly coursed rubble stone in a mortar matrix were revealed. Most of this is core work (the wall face having collapsed). The length of the stonework suggests that on this bank, the bridge abutment is incorporated into a bank-side revetment wall. The concentration of red brick in photo 70, corresponds with the west side of the bridge which survives on the southern bank bridge abutment. The remainder of the bridge abutment lies to the east (beyond the excavated area). The visible stonework is assumed to represent the southern side of abutment, minus its red brick facing.

The deposits between the masonry and the current riverbank appear to be riverine deposits and rubble from the bridge abutment. This suggests that the watercourse was originally wider than it appears today. The bulk of the north bank abutment is presumed to lie beneath the modern track.



Photo 70: East abutment



Photo 71: West Abutment

The southern abutment is better preserved than the north abutment. Assuming that both abutments were built in the same way, it demonstrates that the abutment was built as a right angled, slightly splayed 'C' shape open to the south (see Photo 72). It consists of an irregularly coursed stone rubble and brick fragment core with a red brick facing. The lower course of the brick facing to the bridge arch survives, and there is perhaps enough evidence to project the curve of the arch to establish how the watercourse was spanned.

The bridge would appear to have been approximately 2.3m wide spanning a width of about 7.2m. If the recess formed by the open end of the abutment represents the width of the path over the bridge, it would only have been about 1.2m wide. It may therefore only have been a footbridge.



Figure 48: Plan of Bridge 6AS25



Figure 49: Theoretical elevation of Bridge 6AS25, based on the assumption that it had three arches

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Observations:

• Although difficult to confirm, in the absence of any other bridges in this area, it seems likely that the image below is a view of Bridge 6AS25 seen from the north.



- **Plate 10:** This painting by Alice Abadam circa late 19th century titled 'The minnow Bridge Chalybeate Pond' is probably a depiction of bridge 6AS25
- Because the width of the watercourse has changed, and the bed of the river may have lowered, it is not possible to see if evidence survives of pier bases for the spanning arches.
- Major groundworks and waterflow management would be needed to try and find evidence of bridge piers.

2.6.2 Site 6A Structure 37: Metalled surface. Figure 47

Original goal:

Cleaning and recording of the surviving abutments for a bridge on the Llyn Felin stream, at the south-eastern corner of Llyn Felin; the path surfaces can also be tested for original constructional materials.





Results:

Adjacent to the southern bridge abutment a metalled path surface was revealed (Photo 72). Curiously, the path appears to continue westwards, beyond the bridge, apparently heading for the river in the manner of a ford (although the extent to which landforms may have altered makes this uncertain). The path is currently thought to continue southeastwards to the great cascade. A narrow trench across the path at this end, however, did not reveal evidence of the same metalled surface.

In addition, the path surface does not appear to be associated with the bridge abutment. It would be reasonable to have expected a metalled ramp leading up from the path to the bridge, but there is no evidence to suggest this was the case.

Observations:

- With the available evidence it seems that the metalled path may either pre-date, or perhaps (more likely?) post-date the bridge abutment. After the bridge fell out of use, a ford may have been established to cross the river.
- Is it possible that the brick faced bridges depicted in the historic sketches (and of which several examples have been identified in the fieldwork) are a later phase of construction than the bridges depicted in the Horner paintings.
- Further investigation might be considered to establish the route of the track surface associated with the bridge.

2.6.3 Site 6B

Original goal:

Small area excavation to test for the existence of a viewing platform.

Results:

Not investigated in Phase 1.

Observations:

2.6.4 Site 6C Structures 46 and 47: Track surface and pipe. Figure 46

Original goal:

The junction of the main valley path on the south side with the flight of steps to the top of the Llyn Mawr dam; small area excavation to test the nature of the paths and attempt to discover the original arrangement of steps (if not, as seems likely, destroyed by the modern restoration).



Plan 50: Location of investigations 6C

Results:

Two trenches were excavated across the pathway. In the western trench (Photo 73) clear evidence of a metalled carriageway surface was identified. The eastern trench was excavated to test the theory that this may have been the location of a footbridge across the river. No evidence of this was discovered, but the same metalled surface was revealed at the southern end of the trench a ceramic water/drainage pipe was identified in a cut backfilled with fragments of red brick (Photo 74).

Although it was not possible to ascertain what paths if any led up to the top of the cascade, photographs taken in the 1980s when the modern paths were constructed do not suggest there were formal steps in these locations (Photos 75 and 76).

Observations:

- It is unlikely that evidence of a footbridge across the river can be located.
- Larger scale investigations would be needed to fully establish the original network of paths and tracks in this area.



Photo 73: Site 6C track surface, looking east





Photo 75: 1980s photograph of steps to top of the cascade under construction



Photo 76: 1980s photograph of steps to top of the cascade under construction

Photo 74: Site 6C track surface with brick filled pipe trench. Looking north



Figure 51: Plans and section through the track surface at 6C



- 2 Modern surface (path)
- 3 Small/medium subangular stone set in firm silty clay matrix
- 4 Medium brown, silty-clay; small sub angular stone.

Figure 52: Plan and section through the track surface at 6C

2.6.5 Site 6D

Original goal:

Small area excavation to test the junction and material of two paths on the north side of the gorge.

Results:

Not investigated in Phase 1.

Observations:

2.6.6 Site 6E

Original goal:

Small area excavation to test the existence and materials of a potential viewing platform.

Results:

Not investigated in Phase 1.

Observations:

2.6.7 Site 6F

Original goal:

Small area excavation to test the junction and material of two paths on the north side of the gorge.

Results:

Not investigated in Phase 1.

Observations:

2.6.8 Site 6G

Original goal:

Small area excavation to check the possible continuation of a river-edge path.

Results:

Not investigated in Phase 1.

Observations:

2.6.9 Site 6H

Original goal:

Section trench to test the date and nature of a small bank isolating a small river ox-bow; is this part of the Paxton scheme?

Results:

Not investigated in Phase 1.

Observations:

2.6.10 Site 6I

Original goal:

Small area excavation and section to test the relationship of the high-level leat with the large gulley to the north.

Results:

Not investigated in Phase 1.

Observations:

2.6.11 Site 6J Structure 30: Cascade. Figure 46

Original goal:

Cleaning and small area excavations to record bridge abutments and the surface materials of the approach paths at this point.



Plate 10: Detail of the Hermits Grotto

Results:

The masonry block (Photo 77) was cleared of overburden and its surviving extent established. The masonry seems unlikely to be a bridge abutment because it is so narrow. There was no evidence of a path surface associated with it.

The masonry is more likely to be the remains of a small cascade, designed to add an extra dramatic element to the cascades above. It would also define the water level in the pool below the 'hidden waterfall'. The masonry is set in a small cut into the existing natural bankside clays. Clay has been banked up against its eastern side to channel water over the cascade.

No evidence of masonry footings on the opposite bank could be discerned. These may have been swept away, or perhaps the cascade did not completely span the watercourse.

Approximately 1m to the west of the cascade are the remains of some bankside revetment walling on the south bank. It is possible that this might also be an alternative location for the bridge to the 'Hermit's Cave', although other than the bank revetting wall, no structural evidence was discernable.

Observations:

• Restoration of this feature would re-establish the pool below the hidden waterfall to its intended height.



Photo 77: Structure 30 looking south

2.6.12 Site 6J Structure 31: Cascade Figure 46

Original goal:

Cleaning and small area excavations to record bridge abutments and the surface materials of the approach paths at this point.



Photo 78: Structure 31 looking east

Results:

A second stub of mortared masonry (Photo 78) was located above the 'Hidden' waterfall. This is also likely to be the remnant of a small cascade to enhance the dramatic effect of this location (however, it does seem quite dramatic enough without it).

There is no evidence of masonry on the other side of the watercourse.

Observations:

• Restoration of this feature would re-establish intended water levels below the great cascade.

2.6.13 Site 6K

Original goal:

The entrance to the Hermit's Cave.

Results:

Not investigated in Phase 1.

Observations:

2.6.14 Site 6L

Original goal:

Small section trench through the modern path to determine whether there survives a sequence of surfaces at this point to test the hypothesis of multi-period routeways.

Results:

Not investigated in Phase 1.

Observations:

2.7 AREA 7



Figure 53: Location of proposed investigations in Area 7

2.7.1 Site 7A

Original goal:

Small area excavation to examine the relationship between the other possible Middleton carriageway and the spur which turns eastwards.

Results:

Not investigated in Phase 1.

Observations:

2.7.2 Site 7B

Original goal:

Small area excavation to explore the relationship between the main carriageway and the existing Park wall.

Results:

Not investigated in Phase 1.

Observations:
2.8 AREA 8



Figure 54: Locations of proposed investigations in Area 8

2.8.1 Site 8A

Original goal:

Section trench across two paths running parallel to each other down the slope from the west end of the Llyn Mawr dam to where there was the small dam for the 'perched pond'; the trench will test any evidence for relationship or sequence as well determine materials used in construction.

Results:

Not investigated in Phase 1.

Observations:

2.8.2 Site 8B Structure 26: Fountain. Figure 54

Original goal:

Although the springhead has been heavily restored a small area excavation is required to understand its water source and its relationship with the shoreline path.



Photo 79: Drain leading from fountain, looking north

Results:

The existing structure appears to have been almost entirely rebuilt, to the extent that is not possible to know whether its present appearance differs from its original form. The existing fountain head is a modern facsimile. Beneath the wooden boards supporting the modern pathway, a mortared masonry wall face appears to be associated with the original structure (Photo 79). It is slightly differently aligned to the existing restored structure. An iron pipe exits from this masonry into a crudely constructed rubblestone drain that may formerly have held pipework.



Photo 80: Investigation on north side of the fountain, looking north

Above the fountain feature, a small area was cleared to ascertain how the fountain was fed (Photo 80). It appears that a small reservoir behind the fountain was fed with spring water. The overflow from this, fed the fountain spout. No evidence of a pipe or conduit leading to the fountain was identified.

The existing pathway that runs past the feature appears to be modern. The investigations were unable to reveal enough evidence to characterize the setting of this feature and how it may have related to the lake edge and presumed carriage way route at this point.

Observations:

- Although the investigations confirm that much of the existing structure was rebuilt in the 1980s, it also suggests that some clues as to its original form may survive.
- A larger scale investigation would be needed to fully characterise the original form of this feature, and its setting.
- If sufficient evidence of the original form and setting of this feature could be revealed, it might warrant further restoration.

2.8.3 Site 8C

Original goal:

Small area excavation to explore the relationship of the carriageway with the quarry which is assumed to be a source of materials for the Paxton dams and other structures; this will also demonstrate the materials used for the carriageway.

Results:

Not investigated in Phase 1.

Observations:

2.8.4 Site 8D Structure 13: Carriageway. Figure 54

Original goal:

Small area excavation to explore the relationship between the main carriageway and a branch slanting down towards the shoreline.



Figure 55: Locations of Site 8D investigations

Results:

The carriageway in this location was found to be cut into the sloping shale bedrock on its north side (Photo 81). At the base of the cut, what was originally thought to be a wheel rut, now seems more likely to be a drainage gully. Two phases of compacted crushed stone surfaces were identified, each with evidence of wheel ruts and a distinct camber.

This carriageway appears to be very well engineered and constructed. Further south, where the same route was sampled in Trench 11A, it appears to be similarly constructed but not cur into bedrock.



Photo 81: 8DS14 looking west



Figure 56: Plans and sections of Site 8DS13

2.8.5 Site 8D Structure 14: Metalled track. Figure 54

A second trench was opened to characterize the track thought to be associated with the nearby stone quarry (Photo 82). This track was also terraced into the sloping bedrock. The track also had a metalled surface with evidence of wheel ruts, but was generally less well constructed and using a coarser grade of crushed stone.



Photo 82: Structure 14: metalled track looking west

2.8.6 Site 8D Structure 32 Carriageway. Figure 54

A third trench (Photo 83) was cut across the trackway to try and ascertain whether one of the routes was later than the other. This was found to be cut directly down onto bedrock, with remnants of a metalled surface above. It is most likely to be the same surface as carriageway structure 13.



Photo 83: Structure 32 Carriageway looking south

Observations:

• None

2.8.7 Site 8E

Original goal:

Small area excavation to confirm the presence and construction materials of the shoreline paths.

Results:

Not investigated in Phase 1.

Observations:

2.8.8 Site 8F Structure 35: Trackway. Figure 54

Original goal:

Small area excavation to confirm the presence and construction materials of the shoreline paths.



Figure 57: Location of Site 8F investigations

Results:

The trench could not be located in its intended position due to extreme waterlogging of the location. An alternative location on the top edge of the terrace above was excavated instead (Photo 84). A spread of cobbles of varying size in a clay silt matrix was revealed, but this appears to be a natural deposit rather than a constructed carriageway.



Photo 84: Site 8F. Looking east

Observations:

none

2.8.9 Site 8G Natural levee. Figure 54

Original goal:

Section trench to help understand what appear to be artificial banks for the managed course of the eastern Gwynon.

Results:

A trench (Photo 85) was opened between the two banks to ascertain their significance. The topsoil was a naturally deposited silt overlying medium sized river cobbles of various shapes and fairly mixed (not sorted) lying within a river-bed like gully between the banks. There is no evidence of the channel having been constructed or artificially cut into natural deposits. Basically the feature is a natural former stream course.

The uncompacted clay-silt bank material lies on top of naturally deposited river gravels and contains a few fragments of red brick (Photo 86), presumably derived from the nearby bridge. The character of the bank material suggests that they are not purposefully constructed (clay would have been a more effective material to line a water channel with). Instead, the banks appear to be a typical example of a 'levée', where the channel has broken its banks during a peak flood event. Silts (and brick fragments) within the flood water have settled out beside the main flow, eventually forming the banks which tail off more gradually away from the watercourse.

For this to have happened at a time before the current watercourse had become as incised as it now is. Also, based on the current estimated level of the Llyn Felin lake this location was underwater. For the levee to have formed, this area must have been above water level most of the time. The current watercourse may therefore only have developed since the breach in the Llyn Felin dam was created.



Photo 85: Site 8G looking south



Photo 86: Detail of south bank of Levee, looking west

Observations:

No observations.



Figure 58: Section through Site 8G investigation

2.9 AREA 9



Figure 59: Proposed investigations in Area 9

2.9.1 Site 9A

Original goal:

Small trench to examine the nature of the gulley feature which may be part of the old landscape.

Results:

Not investigated in Phase 1.

Observations:

2.9.2 Site 9B

Original goal:

Small trench to explore the junction between probable Paxton-period paths.

Results:

Not investigated in Phase 1.

Observations:

2.9.3 Site 9C

Original goal:

Small trench to explore the nature of another gulley feature which may be part of the old landscape.

Results:

Not investigated in Phase 1.

Observations:

2.10 AREA 10



Figure 60: Proposed investigations in Area 10



Figure 61: Trench locations in Area 10

2.10.1 Site 10A Structure 38: Trackway

Original goal:

Section trench through the carriageway leading from the west end of the Llyn Mawr dam towards the later Middleton House; at this point it has been etched into the side of the natural slope and is carried, in part, on an artificial terrace.

Results:

Remnants of what appeared to be a metalled surface were located at the eastern end of the trench (Photos 87 and 88), and presumably extended eastwards on the other side of the fence. This is in line with the carriageway leading up to the western end of the Llyn Mawr dam.



Photo 87: Structure 38: Trackway, looking southeast



Photo 88: Trackway surface

Observations:

• The carriageway must run in quite close proximity to the viewing platform.



Figure 62: Plan of carriageway surface investigation 10AS38

2.10.2 Site 10B Viewing platform?

Original goal:

Small area excavation of what may be a viewing platform which exploited a natural knoll at this point; survey also suggests a low parapet wall and a path leading down to the Boat-house; excavation will test the hypothesis and identify constructional details.

Results:

No evidence of a formally constructed or surfaced viewing platform was apparent within the excavated area (Photo 89).



Photo 89: Site 10B investigation

Observations:

• Larger scale investigations would be required to characterize the various potential features in the vicinity.

2.10.3 Site 10C Boathouse

Original goal:

Trial excavation to determine what surviving remains there may be of the Boat-house which is otherwise currently invisible.

Results:

A hand dug trench was located within the possible location of the boathouse as extrapolated from the feature represented on the 1st edition Ordnance Survey mapping. The exact location was dictated by the presence of tree roots and former badger sett runs.

The soil was generally loose and very disturbed as a result of the badger activity. No significant features or deposits were identified (Photo 90), however, a few roof slate fragments were observed.



Photo 90: Site 10C investigation looking northwest

Observations:

- Although it was not possible to characterize the boathouse structure, the presence of some roof slate fragments suggests that some of its remains are likely to survive in the vicinity.
- A larger scale investigation would be needed to gain a clearer understanding of the boathouse construction.
- The presence of a badger sett and veteran trees in the vicinity would make larger scale investigations problematic.

2.10.4 Site 10D

Original goal:

Section trench through the remains of a large leat which lay below the surface of the Paxton Llyn Mawr; this trench will also test the existence of a shore-line path at this point.

Results:

Not investigated in Phase 1.

Observations:

2.10.5 Site 10E

Original goal:

Section to test the existence of a shore-line path at this point.

Results:

Not investigated in Phase 1.

Observations:

2.10.6 Site 10F

Original goal:

Small area excavation of a platform where the path to the neo-classical Bath-house left the main carriageway; there may have been a small architectural feature here.

Results:

Not investigated in Phase 1.

Observations:

2.10.7 Site 10G

Original goal:

Small area excavation to test whether there was a cascade down the slope flowing from the lower end of the early Middleton ornamental pond.

Results:

Not investigated in Phase 1.

Observations:

2.10.8 Site 10H

Original goal:

Area excavation of the neo-classical Bath-house.

Results:

Not investigated in Phase 1.

Observations:

2.10.9 Site 10I

Original goal:

Small area excavation to examine the stone-culverted spring which may have been part of the Bath-house complex.

Results:

Not investigated in Phase 1.

Observations:

2.10.10 Site 10J

Original goal:

Section trench to test the hypothesis that there may have been an early bridge abutment at this point.

Results:

Not investigated in Phase 1.

Observations:

2.10.11 Site 10K

Original goal:

Small area excavation to test the idea that there was a pond at this point for the early Middleton southern water garden.

Results:

Not investigated in Phase 1.

Observations:

2.11 AREA 11



Figure 63: Plan of proposed investigations in Area 11



Figure 64: Locations of investigations in Area 11

2.11.1 Site 11A Trackway?

Original goal:

Section trench through the carriageway which is provisionally assigned to the Middleton period, to give information about constructional materials and methods.

Results:

Although a linear feature was visible as a land form on the ground surface, no evidence of a constructed feature was apparent within the machine excavated trench (Photo 91). Occasional small to medium sized stones and pebbles may be remnants of a metalled surface but it is assumed that ploughing has effectively destroyed any metalled surface that may have existed. No evidence of wheel ruts or roadside ditches was observed.



Photo 91: Site 11A looking northwest

Observations:

• None

2.11.2 Site 11B: Trackway?

Original goal:

Section through the quarry track-way to give information about constructional materials and methods.

Results:

Although a linear feature was visible as a land form on the ground surface, no evidence of a constructed feature was apparent within the machine excavated trench (Photo 92). Occasional small to medium sized stones and pebbles may be remnants of a metalled surface but it is assumed that ploughing has effectively destroyed any metalled surface that may have existed. No evidence of wheel ruts or roadside ditches was observed.



Photo 92: Site 11B looking northwest.



Photo 93: Detail of Site 11B profile.

Observations:

No observations

2.11.3 Site 11C

Original goal:

Section through the hedgerow which forms the southern edge of the former North Drive, to give information about constructional materials and methods.

Results:

Not investigated in Phase 1

Observations:

3 DISCUSSION

For several of the investigation sites the intended goals could not realistically be achieved by hand digging relatively small excavation areas. It is suggested that some sites are investigated more fully.

Where the information that could potentially be gained is not crucial to informing the details of the next phase of the project, it is recommended that further investigation is undertaken once the delivery phase of the project has been confirmed.

Hopefully, once the full range of landscape features that will be restored has been finalized it will be possible to commit to the removal of selected larger trees to establish access for mechanical excavators to enable larger scale and more intrusive excavations to be undertaken as a prelude to engineering groundworks etc. This may need to be integrated into a woodland management and clearance programme.

For some features (especially those where scaffolding, shoring, drainage and water management will be necessary) archaeological recording and investigation may have to be undertaken during engineering works, and will therefore need to be factored in to the engineering work programme.

Where the archaeological investigations have not been able to answer questions that are still needed to inform the development stage, more extensive hand excavation may remain the only option. In some instances, less intrusive investigation methods such as auger survey might be an alternative.

Although several structures have been 3D photogrammetrically recorded, additional 3D photogrammetry could be undertaken on Cascade 2PS53, Small dam 2KS33, Fountain 2BS26, the chalybeate well 1AS4 and the main bridge over the Afon Gwynon to complete a comprehensive record of all the major surviving masonry structures.

It is also recommended that a general watching brief is undertaken on any groundworks associated with improving access or re-establishing the original access routes. The requirements of an archaeological watching brief may need to be integrated into an access improvement plan.

Where the proposed engineering works will result in the complete removal of archaeologically significant structures or features, additional archaeological investigation and recording may be desirable.

The longer term conservation and management of some features and structures will need to be considered, regardless of whether the project proceeds.

While some suggestions about the potential for further archaeological work have been made throughout this report, it is suggested that a definitive programme is drawn up in consultation between all the relevant consultants prior to the commencement of the delivery phase.

Numerous identified locations were not investigated in Phase 1. It is suggested that these are reviewed in the light of the Phase 1 findings to decide if any can be abandoned, relocated or reallocated to other areas of investigation.

4 ARCHIVING

All data recovered during the evaluation will be collated into a site archive structured in accordance with the specifications in *Archaeological Archives: a guide to best practice in creation, compilation, transfer and curation* (Brown 2007), and the procedures recommended by the National Monuments Record, Aberystwyth. The *National Standards for Wales for Collecting and Depositing Archaeological Archives* produced by the Federation of Museums and Art Galleries of Wales will also be adhered to.

The results of this stage of work will be presented in an interim report (this document), providing the information needed to inform subsequent design considerations of the project. The report will not need to provide a detailed historic background, but will aim to tie in features recorded during the works with the relevant period of development of the area.

The project archive, including all significant artefacts and ecofacts (excepting those which may be deemed to be Treasure) will be collated into a site archive, but will not be retained by DAT Archaeological Services for collation into a final overall site archive (NB this may be completed by a third party).

A summary of the results of this phase of the project, excluding any confidential information, may be prepared for wider dissemination (e.g. Archaeology in Wales and special interest and period-specific journals).

The report will be prepared to follow the *Standard and Guidance for Archaeological Field Evaluations* (CIfA, 1994, revised 2001, 2013).

Seven bound copies of the interim report will produced for the client. Seven CDs containing digital pdf copies of the report will also be supplied. Bound copies of the reports will also be produced for Dyfed Archaeological Trust Heritage Management and the regional Historic Environment Record.

5 SOURCES

- Middleton: Regency Restoration Project Request for Quotation (Brief) (Ref. RFQ-RR 305-2015 Revision A)
- Everson, P and Austin, D. 2015 National Botanic Garden of Wales Regency Restoration Project. Narrative account of the results of the Phase 1 archaeological survey: Felin Gat and Llyn Mawr
- National Botanic Garden of Wales Regency Restoration Project. Written Scheme of Investigation: Version 2 (DAT)
- Various documentary sources provided by NBGW.
NATIONAL BOTANIC GARDEN OF WALES **REGENCY RESTORATION PROJECT**

PHASE 1 ARCHAEOLOGICAL **INVESTIGATIONS AND STRUCTURE RECORDING 2015** INTERIM REPORT

RHIF YR ADRODDIAD / REPORT NO. 2015/61 RHIF Y DYGWILLIAD / EVENT RECORD NO. 108883

Paratowyd yr adroddiad hwn gan / This report has been prepared by: Duncan Schlee

Swydd / Position: DAT Archaeological Services Project Manager

Junion Settlee

Llofnod / Signature

Dvddiad / Date: 26.11.2015

Mae'r adroddiad hwn wedi ei gael yn gywir a derbyn sêl bendith /

This report has been checked and approved by: **James Meek** ar ran Ymddiriedolaeth Archaeolegol Dyfed Cyf. / on behalf of Dyfed Archaeological Trust Ltd.

Swydd / Position: Head of DAT Archaeological Services

Llofnod / Signature

Yn unol â'n nôd i roddi gwasanaeth o ansawdd uchel, croesawn unrhyw sylwadau sydd gennych ar gynnwys neu strwythur yr adroddiad hwn

As part of our desire to provide a quality service we would welcome any comments you may have on the content or presentation of this report

