

PEN Y GWAITH

LLINIARU ARCHEOLEGOL / ARCHAEOLOGICAL MITIGATION



Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

PEN Y GWAITH

Lliniaru Archeolegol / Archaeological Mitigation

Yr Amgylchedd Hanesyddol yn Cofnodi Prif Gyfeirnod /
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


Cronfa ddŵr yn edrych tuag at arglawdd D o arglawdd C; dim graddfa (cyfeirnod archif G2674_008)
Reservoir looking toward Embankment D from Embankment C; no scale (archive reference G2674_008)

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CRYNHODEB ANHECHNEGOL

Comisiynwyd Ymddiriedolaeth Archeolegol Gwynedd gan Binnies ar ran Adnoddau Naturiol Cymru i liniaru archeolegol yng nghronfa Pen y Gwaith yng Nghoedwig Gwydir, ger Trefriw cyn y gwaith gwella. Mae'r gronfa ddŵr wedi bod yn cael ei defnyddio ers diwedd y 19eg ganrif i ddarparu dŵr ar gyfer gweithgaredd mwyngloddio cyfagos, yn fwyaf tebygol ym mhwl plwm High Hafna. Mae nifer o argymhellion wedi bod ar gyfer briff gwyllo archeolegol yn ystod y gwaith gwella.

NON-TECHNICAL SUMMARY

Gwynedd Archaeological Trust was commissioned by Binnies on behalf of Natural Resources Wales to undertake archaeological mitigation at the Pen y Gwaith reservoir in the Gwydir Forest, near Trefriw in advance of improvement works. The reservoir has been in use since the late 19th century to provide water for nearby mining activity, most likely at High Hafna lead mine. A number of recommendations have been for an archaeological watching brief during the improvement works.

1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) was commissioned by Binnies on behalf of Natural Resources Wales to undertake archaeological mitigation at the Pen y Gwaith reservoir in the Gwydir Forest, near Trefriw (NGR SH77456011; postcode LL27 0YZ). The reservoir comprises an upper and lower section, separated by dam embankments (embankments A to D; cf. Figure 02). The proposed works include:

- Reservoir improvement works including raising of approximately 75m of dam embankment (Embankment D) by 500mm, relocation of existing spillway, provision of new draw-off facility and downstream channel works (Embankment C);
- Tree felling work to facilitate new dam and spillway construction; and
- Excavation of a “v-notch” in dam embankment C to connect the lower and upper reservoir sections.

The improvement works were preceded by geotechnical ground investigation that included hand excavated trial pits, hand augering, surface water sampling and soakaway tests. The ground investigation works during the week commencing 18th January 2021, with the improvement works to follow during summer 2021.

The archaeological mitigation was monitored by Gwynedd Archaeological Planning Service (GAPS) and a written scheme of investigation was submitted to and approved by GAPS in advance of works ([Appendix I](#)).

The report details archaeological mitigation undertaken in advance of and during the ground investigation works that comprised the following:

- a photographic record (conducted 15th January 2021) of the reservoir embankments supported by desk-based research for context; and
- a watching brief of the ground investigation works.

The archaeological mitigation was completed in accordance with the following guidance:

- *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* Version 1.1 (The Welsh Archaeological Trusts, 2018);
- *Guidelines for digital archives* (Royal Commission on Ancient and Historic Monuments of Wales, 2015);

- Management of Archaeological Projects (English Heritage, 1991);
- Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide (Historic England, 2015);
- Standard and Guidance for Archaeological Watching Brief (Chartered Institute for Archaeologists, 2014);
- Standard and Guidance for Desk Based Assessment (Chartered Institute for Archaeologists, 2020);
- Standard and Guidance for the Archaeological Investigation and Recording of Standing Buildings or Structures (Chartered Institute for Archaeologists, 2014); and
- Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives (Chartered Institute for Archaeologists, 2020).

Gwynedd Archaeological Trust is certified to ISO 9001:2015 and ISO 14001:2015 (Cert. No. 74180/B/0001/UK/En) and is a Registered Organisation with the Chartered Institute for Archaeologists and a member of the Federation of Archaeological Managers and Employers (FAME).

The regional Historic Environment Record Enquiry No. for the archaeological evaluation is GATHER1364 and the event primary reference number is 46011.

1.1 Fieldwork Aims and Objectives

The key aims and objectives of the archaeological mitigation were to:

- Complete an archaeological record of the Pen y Gwaith reservoir embankments, supported by desk-based research;
- identify and record any archaeological activity identified during the watching brief, including any further information on the embankment construction. Archaeological activity within the local area includes extensive industrial archaeology associated with lead and zinc mining, and the objective was to establish the date and nature of any archaeological remains identified within the watching brief area and assesses their implications for understanding local historical development, in conjunction with the known archaeological record.

1.2 Acknowledgements

GAT would like to thank the following for their contribution and support:

- *Tetra Tech* (Louise, Geraint, Lewis and Liam);
- *Client (Natural Resources Wales)* Jack Lewis-Roberts;
- *Client (Binnies)* Liam McCarthy and Jack Unwin; and
- *GAPS* Tom Fildes.

2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

The reservoir is part of the landscape that includes the scheduled Hafna and Vale of Conwy mines (Scheduled Monuments 326 and 327 respectively) and is recorded in the regional Historic Environment Record as High Hafna Reservoir II Primary Reference Number (PRN) 9026.

PRN	Name	Type	Location (NGR)
9046	Hafna Mine Buildings	Building	SH77946009
9038	Pandora Reservoir I	Reservoir	SH77056011
9025	Mynydd Bwlch Yr Haiarn Pile of Stones III	Cairn	SH77185990
9022	Mynydd Bwlch Yr Haiarn Pile of Stones IV	Cairn	SH77276000
56483	Building, Ty'n-yr-ardd	Building	SH77906020
21696	Tynyrardd Mine	Lead Mine	SH77906020
9027	High Hafna Reservoir I	Reservoir	SH77696009
8852	High Hafna Compressor Shaft	N/A	SH77606018
8821	High Hafna Mine	Lead Mine	SH77686020
21669	Pen y Gwaith Mine	Lead Mine	SH77706020
21605	Glan Y Gors Mine	Lead Mine	SH77006000

The closest known heritage asset is PRN 88552 – High Hafna Compressor Shaft, which is located c.75m to the northeast of the reservoir.

Pen y Gwaith reservoir is located within Gwydir Forest, to the south of Trefriw, Conwy. The area is closely associated with the Gwydir Estate in the late medieval (1110 – 1539 AD) and post-medieval (1539 – 1750 AD) era; Gwydir Castle (NPRN 26555) is located a couple of miles to the east. When the estate was in the ownership of Sir John Wynn of Gwydir (1553 – 1627) there was a drive to exploit the mineral resources of the area with investigations into the potential of mining being undertaken in 1607 (Bennet and Vernon 1993, 10). Evidence of early post medieval mining is preserved in the form of open stopes and small hand dressing areas which survive with notable frequency in the northern half of Gwydir Forest (PRN 8848) (Thomas 1998, 10).

During the 19th and early 20th century there was extensive mining activity, predominantly for lead and zinc, within the vicinity of Pen y Gwaith. The mines and means to extract the natural

resources varied in size and complexity. Some of the best preserved sites within Gwydir Forest include Hafna (PRN 9046) (located approximately 0.6km to the east) and Aberllyn lead mines. It was common during the later post-medieval and industrial era (1750 – 1899) for these sites to have been powered by water wheels which were feed by water extracted from lakes that were enlarged or created to form reservoirs. At several locations, wheel pits survive alongside other infrastructure such as crushing plant and buddles (a shallow inclined container in which ore is washed) at adjacent mines, for example, the Vale of Conwy (PRN 8823) mine to the immediate southeast of the site. Water wheels were ultimately superseded during the latter half of the 19th century by steam engines and while there is a lack of physical evidence of steam engine bases, there is documentary evidence which illustrates a number of mills were powered by them. At Hafna there are the remains of the base of a horizontal engine that powered fans for the furnace rock breakers (Gwyn, D. R. 1998, 13).

The Upper and Lower Reservoirs of Pen y Gwaith were undoubtedly linked with the lead/zinc mining prevalent in Gwydir Forest during the 19th and 20th century, to provide water to power the engines to process the ore. The location of the reservoir would indicate that it fed water to either the Pen y Gwaith mine (PRN 21669) or High Hafna mine (PRN 8821) which are located to the immediate east. There are documentary references to the High Hafna mine, in particular note in this context; the oval-shaped reservoir located to the immediate south of the mine was most likely constructed by the Mineral Corporation of Great Britain after the company obtained a lease to do so in 1878. This reservoir referred to as High Hafna Reservoir I (PRN 9027) (cf. Bennett, J. & Vernon, R., 1995, *Mines of the Gwydyr Forest Part 2*) and “...not to be confused with a further reservoir to be found in the forest some distance to the south of the sett. “ (Bennett, J. & Vernon, R. 1995, Appendix II, 48). Pen y Gwaith reservoir is referred to by Bennett, J. & Vernon, R. as High Hafna Reservoir II which suggest the authors believed the reservoirs were related.

Cartographic evidence in the form of the first, second and third edition 25-inch to 1-mile Ordnance Survey County Series maps of the area (Caernarvonshire Sheet XVIII.8), published in 1889, 1900 and 1913 respectively (cf. [Figures 03](#), [04](#) and [05](#)), show the area as characterised by irregular field boundaries, localised mining and multiple reservoirs; several lead mines are listed as disused.

The first edition Ordnance Survey map (Figure 03) depicts the Upper Reservoir, with Embankments A, B and C in place. Embankment C formed the eastern most limit of the reservoir at the time of publication in 1889, with a sluice evident at the northern corner of the embankment, that flowed to the north and then northwest toward but stopping short of another reservoir, Llyn Glangors. The reservoir High Hafna I is also depicted, which

underscores that it was in existence after the lease being obtained in 1878. The layout of the reservoir remains unchanged in the second edition ordnance survey map of 1900 (Figure 04). By the time of the publication of the third edition ordnance survey map in 1913 (Figure 05) the Lower Reservoir and Embankment D have been constructed, with a sluice through Embankment C connecting the Upper and Lower reservoirs and a sluice being denoted in Embankment D. Presumably the sluice shown on the earlier editions made way for the extension of the reservoir. None of the historic ordnance survey maps depict leats or a spillway associated with Lower Reservoir. If these features were constructed when the reservoir was being actively used in association with lead mining then they may date from later in the 20th century.

In the first, second and third edition ordnance survey maps, the location of High Hafna lead mine is depicted as being '*Lead Mine (disused)*'. If this was indeed the case, it poses the question of why was Pen y Gwaith reservoir extended between 1900 and 1913. Unless there was limited activity, as noted by Bennett, J. & Vernon, R. "*In 1881 the lease (for High Hafna) was granted to Messrs Richard and Jouannieux of the Hafna Mine, and after 1884 it was part of the extended leases for Hafna and its neighbours which led to a succession of companies*" (*ibid.* 1995, 48). This would suggest that the leases for the mining regularly changed hands and the map evidence does not take account of this short term activity or it is simply an error on the cartographers part. It is also possible that the reservoir was associated with another, working lead mine.

3 METHODOLOGY

3.1 Introduction

The archaeological mitigation comprised the following:

- a photographic record of the reservoir embankments supported by desk-based research for context; and
- a watching brief during ground investigation works.

3.2 Photographic Record

The photographic record was undertaken on Friday 15th January 2021 prior to the ground investigation works; no site clearance work was undertaken for the ground investigation works. The archaeological record included a photographic record of Embankments A to D, the upper and lower reservoir elements and the local environs. This also included the area targeted for ground investigation works (as detailed on Binnies Drawing No. 123242-BVL-ZZ-00-PT-GE-00001; cf. [Figure 02](#)). The photographic record was supported by desk-based research to provide context for the results.

Photographic images were taken using a digital SLR (Nikon D5100) camera set to maximum resolution (4928 × 3264) in RAW format and converted to TIFF format for archiving using Adobe Photoshop. A photographic record was maintained on site using GAT pro-formas and digitised in *Microsoft Access* as part of the fieldwork archive and dissemination process. A total of 17 images were taken in relation to the photographic record (archive numbering system G2674_001 to G2674_017; cf. [Appendix II](#)).

A basic written record using GAT pro-formas were completed; which summarised the visible form and structure of the embankments and recorded the location and orientation of the photographic images taken.

The desk-based assessment involved a study of the following resources:

1. The regional Historic Environment Register ((HER) Gwynedd Archaeological Trust, Craig Beuno, Ffordd y Garth, Bangor, Gwynedd LL57 2RT) will be examined for information concerning the mitigation area, defined as the Pen y Gwaith reservoir, both upper and lower sections, associated embankments and immediate environs, as located in Figure 01. Examination of the core HER will be undertaken, including the 6-

inch and 25-inch County Series Ordnance Survey maps and any secondary information held within the HER, including Bennett, J. & Vernon, R., 1995, *Mines of the Gwydyr Forest Part 6*, Gwyn, D., 1998, *Gwynedd Metal Mines Survey* and Frost, P. & Thomas, D. , 1998 , Forest Enterprise Welsh Heritage Assets Survey. All identified features will be mapped, described and added to a gazetteer of sites and the relative importance of any sites defined;

2. The National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, Plas Crug, Aberystwyth SY23 1NJ) will be checked for sites additional to the HER;
3. Aerial photographs from the National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, National Monuments Record of Wales, Plas Crug, Aberystwyth SY23 1NJ) will be examined for potential features. This will include 1946 RAF vertical aerial photographs;
4. The online catalogue search of the National Library of Wales (Penglais Rd, Aberystwyth SY23 3BU); and
5. Archive data, including primary and secondary sources, historic maps and estate maps will be examined at the regional archives, if open and accessible. Archive data will include historic mapping such as the local tithe map and schedule.

3.3 Watching Brief: Ground Investigation Works

An archaeological watching brief is defined by the Chartered Institute for Archaeologists as a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive (CIfA, 2014).

The watching brief monitored the geotechnical ground investigations detailed on Binnies Drawing No. 123242-BVL-ZZ-00-PT-GE-00001 (cf. [Figure 02](#)), in advance of the proposed reservoir improvement works. The ground investigations were undertaken during the week of 18th January 2021 within the reservoir site and immediate area and included:

- Eighteen hand excavated trial pits were excavated (to a maximum depth of 1.2 m bgl), three to expose the downstream surface of the lower reservoir embankment (Embankment D) and two along the northern embankment (Embankment B);
- Eleven hand augers to refusal;
- Ten surface water and silt/sediment samples, with five deeper silt samples to be taken from within the reservoirs where possible (i.e. to depth of bed); and
- In-situ testing including soakaway tests and hand shear vanes.

The watching brief monitored the excavation of the eighteen hand excavated trial pits, conducted by a team of two, to the maximum depth when viable to do so. On average the trial pits measured 0.30m by 0.30m in size. The other aspects of the ground investigation works were not monitored as they either did not have a physical impact on the reservoir and its surroundings (the surface water and silt/sediment samples and in-situ testing) or it was not viable to do so (the auger samples). This was agreed in advance with GAPS.

Photographic images were taken using a digital SLR (Nikon D5100) camera set to maximum resolution (4928 × 3264) in RAW format and converted to TIFF format for archiving using Adobe Photoshop. A photographic record was maintained on site using GAT pro-formas and digitised in *Microsoft Access* as part of the fieldwork archive and dissemination process. A total of 17 images were taken in relation to the photographic record (archive numbering system G2674_017 to G2674_054; cf. [Appendix II](#)).

- During the watching brief all attendances were recorded using GAT watching brief proformas.

A full project archive has been prepared and the following dissemination applied during final archiving:

- A digital report has been provided to the client and GAPS (draft report then final report);
- A digital report has been provided to the regional Historic Environment Record, Gwynedd Archaeological Trust, along with an event summary, in accordance with *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (Version 1.1); and
- A digital report and digital archive dataset has been prepared for submission to the Royal Commission on Ancient and Historic Monuments, Wales, in accordance with the *RCAHMW Guidelines for Digital Archives Version 1*. The dataset was prepared in the format required by RCAHMW and includes:
 - Photographic metadata (Microsoft Access);
 - Photographic archive (TIFF format);
 - Project Information form (Excel);
 - File Information form (Excel) – Microsoft Word report text final;
 - File Information form (Excel) – Photographic metadata (general);
 - File Information form (Excel) – Adobe PDF report final; and
 - File Information form (Excel) - Photographic metadata (detail).

4 RESULTS

4.1 Photographic Record

The photographic record was undertaken on Friday 15th January 2021 in advance of the geotechnical ground investigations, with the GAT archaeologist being accompanied and assisted by Jack Lewis-Roberts of *Natural Resources Wales*. The record was conducted a dry, overcast, bright yet bitterly cold day with a heavy frost underfoot. Key features, such as, the reservoir embankments were documented as outlined in the WSI as were the locations of the trial pits.

The reservoir was readily accessible via established forestry plantation roads that also provide access to adjacent properties such as Bwlch-y-Gwynt. The roads flank the reservoir and last year a side road was added to allow direct access to the western side of the upper reservoir, which terminates to the immediate southwest of Embankment A. NRW had also cleared trees of the forestry plantation adjacent all four embankments last autumn (2020) to better enable inspection and where necessary renovation works. A small cluster of deciduous trees were concentrated to the immediate northeast of Embankment D and forestry plantation trees remain at the northwestern end of the embankment.

4.1.1 Embankment D

Embankment D, located at the eastern edge of Pen y Gwaith Lower Reservoir, at the time of the site visit, while intact was in quite a dishevelled condition, in part due to disturbance from the trees of the forestry plantation, now removed. There were frequent gaps in the stone work of the embankment where tree roots had dislodged stones or a tree stump had been removed and these had been temporarily sealed with sand bags (Plate 01). The east face of the embankment had quite a distinct vertical face that consisted of dressed stones set in a roughly coursed manner (Plate 02). The course of dressed stones was visible and most prominent at the southeastern third of the structure, but had degraded or was no longer visible by the northwestern half of the embankment. The exposed stone wall element of the embankment was 0.50m in height and appeared to form the core of the embankment, with a noticeable, apparently, earthen berm along the northeastern edge (Plate 03). Embankment D had a maximum width of 2.0m (adjacent to the sluice) and approximate exposed height of 1.7m.

Toward the northwestern end of Embankment D there is the remnant of a sluice through the embankment. The entrance to the sluice, at the southwest face of the embankment, set

within the Lower Reservoir, is demarcated by the remains of a timber 'A'-frame (Plate 04). At the location of the sluice through the embankment, there has been a partial collapse and to prevent further water egress into the structure NRW have temporarily covered the surface of the embankment with plastic sheeting held in place by sand bags (Plate 05). It is believed that the sluice had either been timber lined or a cast iron pipe (pers. comm. Jack Lewis-Roberts) that has subsequently degraded and collapsed.

To the immediate northwest of the sluice there is a concrete box set on top of the embankment (Plate 06). This housed a pump used to extract water from the Lower Reservoir to supply water to nearby residences.

At the southeastern terminal of Embankment D there are the remnants of a spillway associated with the reservoir. A shallow depression is noticeable at this location but at this location the spillway is largely silted up and the dimensions and route of it is difficult to determine due to later activity associated with the forestry plantation and the presence of vegetation (Plates 07 & 08). The spillway may extend northeast – southwest before turning southeast – northwest after a short, approximate, distance of 5.0m. Where the feature turns southeast – northwest there is a more definable cut of a narrow, steep-sided channel, with a width of 0.50m (Plate 09). At this point the channel still has water flowing through it but it was full of leaf mould and small tree branches with moss covered sides. This channel may be associated with the spillway but it is also reminiscent of a drainage gully for a forestry plantation. At the northwestern end of Embankment D there is a possible leat associated with the Lower Reservoir, which is a possibility but once more it had more of an appearance of drainage channel associated with the forestry plantation and may not be archaeological note.

4.1.2 Embankment C

To the southwest of Embankment D, forming the divide between the Lower and Upper Reservoirs of Pen-y-Gwaith is Embankment C. On inspection the embankment appears to be more substantial and in better structural condition than Embankment D. Embankment C has an exposed height of approximately 2.0m and width (at the top of the embankment) of 2.0m (Plates 10 & 11). It had an exposed uncoursed stone revetment along the southwest face, comprised of large, undressed, angular and subangular locally sourced stones. The northeast face was covered with thick moss and grass (Plate 12) but it is likely that it too consists of a stone revetment. Like Embankment D, a sluice goes through the approximate centre of Embankment C, the entrance of which is denoted by the remnants of a timber 'A'-frame (Plate 13), with the timber poles being supported by a metal pole and the depth indicator was still in-situ. The sluice would provide water between the Lower and Upper

Reservoirs. There was no obvious opening for the sluice visible within the southwest or northeast face of the embankment. At present Embankment C forms part of a public footpath across the reservoir.

4.1.3 Embankment B

Embankment B is positioned at the northern limit of the Upper Reservoir. It is a substantial structure, similar in construction and design as Embankment C. Forestry plantation trees had been cleared along the area adjacent to the north face of the embankment (Plate 14) by NRW to better expose the structure for inspection and evaluation. The current water level of the Upper Reservoir is relatively low and does not lap against the south face of the embankment. The area to the immediate south of the embankment there is a spit of land that extends out into the Upper Reservoir which is covered in long grass and pocket marked with wild seeded fir trees and heather bushes (Plate 15).

Embankment B has a maximum exposed height of 1.7m and width of 2.0m at the top. There are exposed, uncoursed drop stone built revetments on the north and south faces of the embankment. The revetments are comprised of large, undressed, angular and subangular locally sourced stones (Plate 16). A layer of soil has developed on the top of the embankment from which grass and moss grows. At the approximate centre of the north face of the embankment there was a partial collapse of the stone revetment. The collapse measured 1.8m wide and 1.5m high (Plate 17).

4.1.4 Embankment A

Embankment A is located at the western limit of the Upper Reservoir. It is similar in construction as Embankments B and C. Forestry plantation trees had been cleared along the area adjacent to the west face of the embankment (Plate 18) by NRW to better expose the structure for inspection and evaluation. The water of the Upper Reservoir laps up against the lower slopes of the eastern face of the embankment.

Embankment A has a maximum exposed height of 1.3m and width of 1.5m at the top. The embankment appears to be of similar construction as that of the nearby Embankment B, insofar as it was comprised of stone revetments along the west and east faces, although this was only partially visible along the west face due to the prevalence of moss and long grass (Plate 19). The southern terminal of Embankment A was partially disturbed by extensive tree roots and included the remnants of tree stumps.

4.1.5 Location of the trial pits

As part of the photographic record the location of the 20 proposed trial pits were also examined prior to the commencement of the ground investigation works. All of the locations, aside from Trial Pit 07, which proved to be inaccessible, were visited to determine the level of archaeological interest.

In relation to the location of the 20 trial pits and the known archaeology:

- a) Trial Pits 08 & 13 were located along the route of the former spillway that is associated with the Lower Reservoir and adjacent to Embankment D, while there were little visible remains on the surface, it was of archaeological interest;
- b) Trial Pits 09 & 12 were positioned along the route of the sluice associated with Embankment D and would be of archaeological interest. Due to its probable relationship with the reservoir it was of archaeological interest;
- c) Trial Pits 10, 11 and 14 were in the vicinity of a leat possibly associated with the Lower Reservoir and Embankment D at the northern/north western corner of the embankment. The location of this possible archaeological feature was highlighted by Jack Lewis-Roberts;
- d) Trial Pits 03 & 05 were located at the north side of Embankment C and while no upstanding remains were noted it was possible that archaeological remains might be present below ground;
- e) Trial Pits 04, 06 & 07 located at the south side of Embankment C and while no upstanding remains;
- f) Trial Pits 01 & 02 located within Embankment B and were of archaeological interest to determine make-up of the embankment;
- g) Trial Pits 17, 18, 19 & 20 positioned Embankment A and were of archaeological interest to determine make-up of the embankment;
- h) Trial Pits 15 & 16, there was nothing obvious at these locations but the area was badly obscured by existing trees and bushes.

4.2 Watching Brief of Ground Investigation Trial Pits

The ground investigations were undertaken during the week of 18th January 2021 within the reservoir site and immediate area. The archaeological watching brief monitored included 18 hand excavated trial pits were excavated. Trial Pits 07 and 16 were not excavated as their locations were inaccessible.

Trial Pit 01 was located at the western terminal and to the immediate north of Embankment B in area recently cleared of forestry plantation trees. The pit had an excavated depth of 0.9m and diameter of 0.3m. It was excavated through a shallow layer of leaf mould, onto a deposit of mid-brown organic rich peat and the surface of mid-grey boulder clay (Plate 20). There was nothing of archaeological significance within the trial pit.

Trial Pit 02 was positioned at the eastern terminal and to the immediate north of Embankment B in area recently cleared of forestry plantation trees. The pit had an excavated depth of 0.5m and diameter of 0.3m. It was excavated through a shallow layer of leaf mould, onto a deposit of dark brown organic rich peat and the surface of a light brown sandy clay. There was nothing of archaeological significance within the trial pit.

Trial Pit 03 was located to the immediate northwest of the northwestern terminal of Embankment C in an area of exposed bedrock and small deposits of peat. The pit had an excavated depth of 0.25m and width of 0.3m. It was excavated through a shallow deposit of dark brown peat that covered a piece of earthfast stone/bedrock. There was nothing of archaeological interest within the trial pit.

Trial Pit 04 was positioned at the southwestern end of Embankment C and was in an area of exposed bedrock and pine trees of the forestry plantation. The pit had an excavated depth of 0.45m and was 0.3m wide. It was excavated through a soft dark brown peaty clay deposit onto earthfast stone/bedrock. The pit was adjacent to a mature fir tree and was full of tree roots. There was nothing of archaeological interest within the trial pit.

Trial Pit 05 was adjacent to Trial Pit 03 and was positioned to the immediate northeast of Embankment C in an area of exposed bedrock and small deposits of peat. The pit had an excavated depth of 0.5m and width of 0.3m. It was excavated through a shallow deposit of dark brown peat that covered a piece of earthfast stone/bedrock. There was nothing of archaeological interest within the trial pit.

Trial Pit 06 was adjacent to Trial Pit 04 at the southwestern end of Embankment C and was in an area of exposed bedrock and pine trees of the forestry plantation. The pit had an

excavated depth of 0.45m and was 0.3m wide. It was excavated through a soft dark brown peaty clay deposit onto earthfast stone/bedrock. The pit was adjacent to a mature fir tree and was full of tree roots. There was nothing of archaeological interest within the trial pit.

Trial Pit 08 was located within the former spillway to the northeast of Embankment D. It had an excavated depth of 0.5m, being 0.4m by 0.3m in width. The trial pit was excavated through soft dark brown peat onto a light brown clayey silt mixed with frequent small stones (Plate 21). There was nothing of archaeological interest within the trial pit.

Trial Pit 09 was positioned to the immediate northeast of the centre of Embankment D in an area cleared of forestry plantation trees. The pit was 0.9m deep and 0.4m by 0.3m wide. The trial pit was excavated through soft dark brown peat onto a light brown clayey silt mixed with frequent small stones and quickly filled with water. There was nothing of archaeological interest within the trial pit.

Trial Pit 10 was located adjacent to the northwest terminal of Embankment D within an area of forestry plantation. The pit measured 0.5m deep and 0.3m in diameter. It was excavated through a soft, dark brown peat deposit rich in organic material and onto bedrock/riverine stones. There was nothing of archaeological interest within the trial pit.

Trial Pit 11 was located to immediate the northeast of Trial Pit 10, in close proximity to the outlet for the sluice from Embankment D. It was within an area of forestry plantation. The pit measured 0.45m deep and 0.3m in diameter. It was excavated through a soft, dark brown peat deposit rich in organic material and onto bedrock (Plate 22). There was nothing of archaeological interest within the trial pit.

Trial Pit 12 was positioned beside the possible continuation of the spillway as it extended on a northwest – southeast orientation, parallel with Embankment D. The pit had an excavated depth of 0.63m and diameter of 0.3m. It was excavated through soft dark brown peat which overlaid a compact light brown clayey silt. There was nothing of archaeological interest within the trial pit.

Trial pit 13 was located to the immediate southeast of Trial Pit 12 and was situated along the probable route of the spillway. The pit had a depth of 0.7m and diameter of 0.3m. It was excavated through a soft dark brownish black peat that overlaid a compact light brown clay mixed with very frequent small pieces of shale. There was nothing of archaeological interest within the trial pit.

Trial Pit 14 was located to the northeast of Trial Pit 11 close to a forestry lane in an area of forestry plantation. The trial pit had a diameter of 0.3m and depth of 1.02m. It was excavated through an organic rich dark brown peat and onto the surface of bedrock/riverine stones. There was nothing of archaeological interest within the trial pit.

Trial Pit 15 was the northern most trial pit, excavated on a bank of up cast material adjacent to a field boundary/drainage ditch. It was excavated to a depth of 1.1m with a diameter of 0.3m. It identified a mixed deposit of light grey sandy clay mixed with mid brown peaty silt, which overlaid a deposit of dark brown peat rich in organic matter. There was nothing of archaeological interest within the trial pit.

Trial Pit 17 was located between Embankment A and Embankment B, to the immediate west of Trial Pit 01. It was excavated but quickly abandoned after an approximate depth of 0.25m as the sandy silt topsoil quickly gave way to bedrock. There was nothing of archaeological interest within the trial pit.

Trial Pit 18 was positioned at the northeastern terminal of Embankment A and set on top of the feature. The pit had an excavated depth of 1.02m and diameter of 0.3m. It was excavated through a compact mid-brownish orange sandy silt mixed with moderate small to medium sized angular stones (Plate 23). This information combined with observations made during the photographic record would imply that the embankment was constructed of dry stone revetments and an earthen core.

Trial Pit 19 was located to the immediate west of Embankment A in an area cleared of forestry plantation trees. The pit was 0.5m deep and 0.3m in diameter. It was excavated through a heavily organic dark brown peat but the pit was quickly abandoned as it flooded. There was nothing of archaeological interest within the trial pit.

Trial Pit 20 was positioned at the southwest terminal of Embankment A and was set on top of the embankment. It had an excavated depth of 1.02m and diameter of 0.3m. The pit was excavated through a shallow layer (0.1m) layer of soft dark brown clayey silt that overlaid a compact layer of mid-brownish orange sandy silt mixed with moderate small to medium sized angular stones (Plate 24). The colour and composition of this deposit was identical to that monitored in Trial Pit 18 and confirmed that it was a packing layer set between the stone reveted sides of the embankment.

5 CONCLUSIONS

GAT undertook a photographic record and conducted an archaeological watching brief of the excavation of trial pits in January 2021 as part of the ground investigation works at Pen y Gwaith reservoir on the behalf of Natural Resources Wales in advance of proposed improvement works. The archaeological mitigation in conjunction with the desk-based research has increased the understanding of the construction of the embankments and development of the reservoirs and associated features, such as the sluices and spillway.

The available documentary and cartographic evidence would indicate that the Upper Reservoir of Pen y Gwaith was in existence before the publication of the first edition ordnance survey map of 1889. The adjacent High Hafna I reservoir was constructed by the Mineral Corporation of Great Britain who obtained a licence to do so in 1878. Given the close proximity of the reservoirs and both being depicted on first edition ordnance survey map, would imply that the Upper Reservoir of Pen y Gwaith was constructed during the late 1870s or 1880s. The Lower Reservoir being constructed between the publication of the second and third editions of the ordnance survey, within the first decade of the 20th century. It is likely but not conclusive that the Pen y Gwaith reservoir was connected with mining activity at High Hafna.

The method of construction of the embankments would appear to tie-in with the known documentary and cartographic evidence. Embankments A, B and C were in existence by 1889 and the photographic record along with observations made during the ground investigation works would suggest a uniform construction technique. The embankments comprise of dry stone revetments for the outer faces with an earthen core and are of similar dimensions. Embankment D was constructed at the start of the 20th century and is of a slightly different construction. It would appear to consist of a stone wall, that had a part exposed dressed finish and supported by an earthen berm along the northeast face.

Embankment D has been negatively affected by forestry plantation and the sluice set within the northwestern end of the structure, has partially collapsed. The current condition of the embankment clearly warrants the reservoir improvement works.

The following are recommendations for the watching brief stage of the archaeological mitigation:

1. Proposed construction work for a new reinforced concrete spillway located at the southeastern terminal of Embankment D and in the location of the existing spillway. This is allow observation and recoding of any associated structural elements of Embankment D and the location of the existing spillway;
2. Monitor the excavation of the trapezoidal earth outlet channel, as it follows the route of the existing spillway/leat that is associated with the Lower Reservoir and Embankment D; and
3. Monitor the excavation of the “v-notch” in Embankment C as it is in the location of the historic sluice. This would enable a better understanding of the type of sluice employed and construction of Embankment C.

6 SOURCES CONSULTED

1. Bennett, J. & Vernon, R., 1995, Mines of the Gwydyr Forest Part 2;
2. Chartered Institute for Archaeologists, 2014, *Standard and Guidance for Archaeological Watching Brief*;
3. Chartered Institute for Archaeologists, 2014, *Standard and guidance for the collection, documentation, conservation and research of archaeological materials*;
4. Chartered Institute for Archaeologists, 2014. *Standard and Guidance for Archaeological Watching Brief*;
5. Chartered Institute for Archaeologists, 2020, *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives*
6. Chartered Institute for Archaeologists, 2020. *Standard and Guidance for Desk Based Assessment*;
7. English Heritage, 1991, *Management of Archaeological Projects (MAP2)*;
8. Frost, P. & Thomas, D., 1998, Forest Enterprise Welsh Heritage Assets Survey;
9. Gwyn, D. R., 1998 , Gwynedd Metal Mines Survey; GAT Report 291;
10. Historic England, 2015, *Management of Research Projects in the Historic Environment (MoRPHE)*;
11. Ordnance Survey Second Edition 1-inch to 25-mile Anglesey County Series Map Sheet XVIII.8 (1889);
12. Ordnance Survey Second Edition 1-inch to 25-mile Anglesey County Series Map Sheet XVIII.8 (1900);
13. Ordnance Survey Third Edition 1-inch to 25-mile Anglesey County Series Map Sheets Sheet XVIII.8 (1913);
14. Royal Commission on Ancient and Historic Monuments of Wales, 2015, *Guidelines for digital archives*;
15. The Welsh Archaeological Trusts, 2018, *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)*;
16. Thomas D., 1998, Gwydyr Archaeological Assessment, CPAT Report 284;

17. Thompson D, 2004, Historic Landscape Characterisation: Mawddach. Gwynedd Archaeological Trust Report 492.

FIGURE 01:

Location Plan, based on Ordnance Survey County Series 1:10000 map sheet SH76. Scale 1:7500@A4 © Crown Copyright. All Rights Reserved. License Number AI100020895

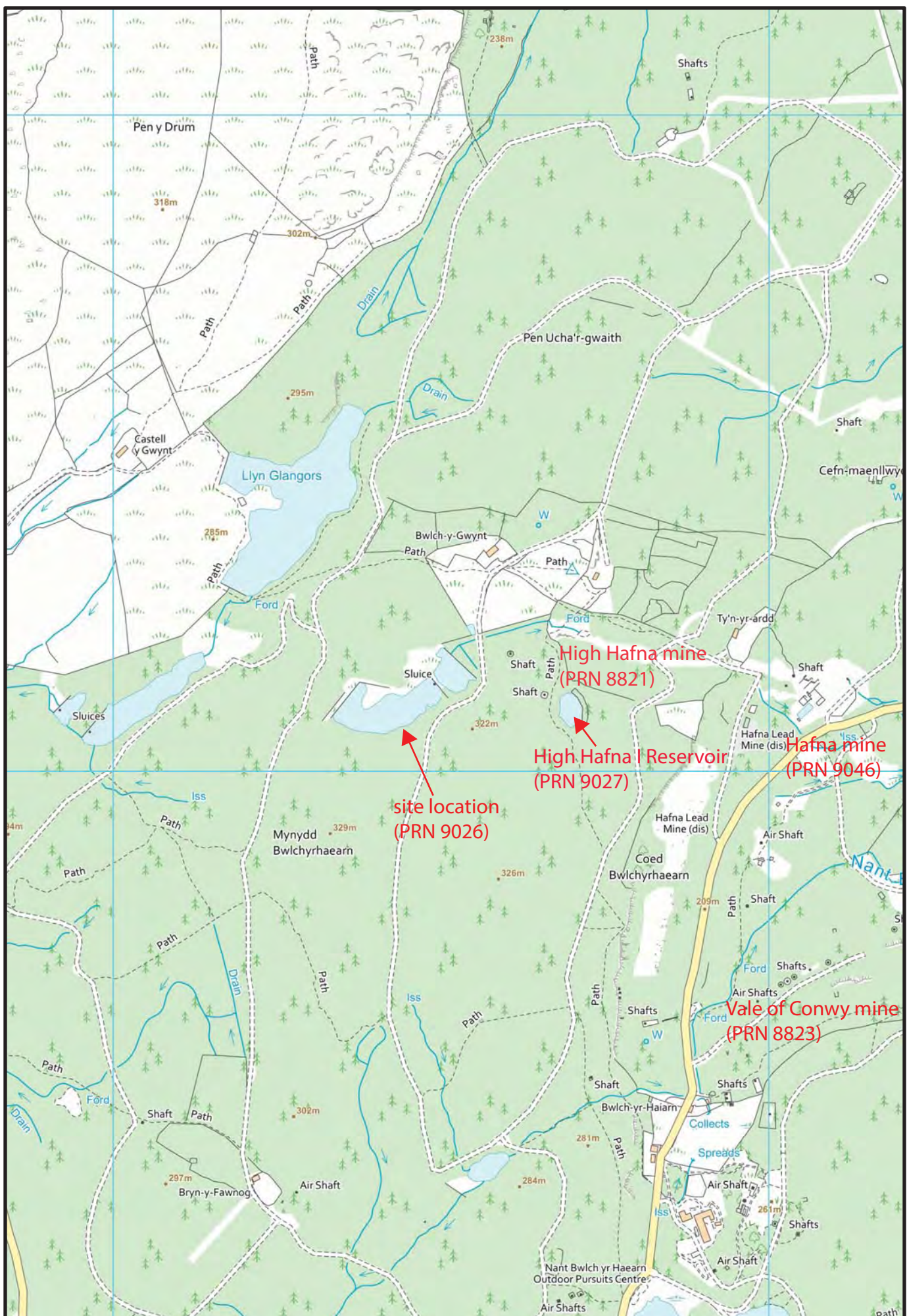


FIGURE 01: Location Plan, based on Ordnance Survey County Series 1:10000 map sheet SH76.
Scale 1:7500@A4 © Crown Copyright. All Rights Reserved. License Number AI100020895

FIGURE 02:

Reproduction of Binnies drawings Binnies Drawing No. 123242-BVL-ZZ-00-PT-GE-00001, 123242-BVL-ZZ-00-DR-C-00001.P01-S2, 123242-BVL-ZZ-00-DR-C-00030.P01-S2 and 123242-BVL-ZZ-00-DR-C-00031.P01-S2



Purpose: This sketch is an informal tool for communicating and collaborating on projects. It shall not be considered as a project output, part of a project output or as satisfying a contractual requirement. All details are indicative and subject to further design and collaboration.

Originator: CRDE

Sketch Name: Pen Y Gwaith Exploratory Hole Locations Plan

Date: 05/11/2020

Key:

-  Hand excavated trial pit
-  Hand auger

Exploratory hole depths:

- AU01 - to refusal
- AU02 - to refusal
- AU03 - to refusal
- AU04 - to refusal
- AU05 - to refusal
- AU06 - to refusal
- AU07 - to refusal
- AU08 - to refusal
- AU09 - to refusal
- AU10 - to refusal
- AU11 - to refusal
- AU12 - to refusal
- AU13 - to refusal
- AU14 - to refusal

- TP01 to TP09 - 1.2m
- TP10 - 1.2m and carefully expose surface of embankment
- TP11 - 1.2m and carefully expose surface of embankment
- TP12 - 1.2m and carefully expose surface of embankment
- TP13 to TP16 - 1.2m
- TP17 - 1.2m and carefully expose surface of embankment
- TP18 - 1.2m and carefully expose surface of embankment
- TP19 - 1.2m and carefully expose surface of embankment
- TP20 - 1.2m and carefully expose surface of embankment

Two additional hand pits will be required to the east of the site on mine spoil to be confirmed on site.

*Note - all exploratory hole locations are indicative and are subject to change pending the issue of the phase 1 report, detailed service searches and topographical surveys. Site locations and depths of exploratory holes are subject to change during site investigation by investigation supervisor.

Water and sediment samples to be taken from the reservoir as directed by the investigation supervisor.

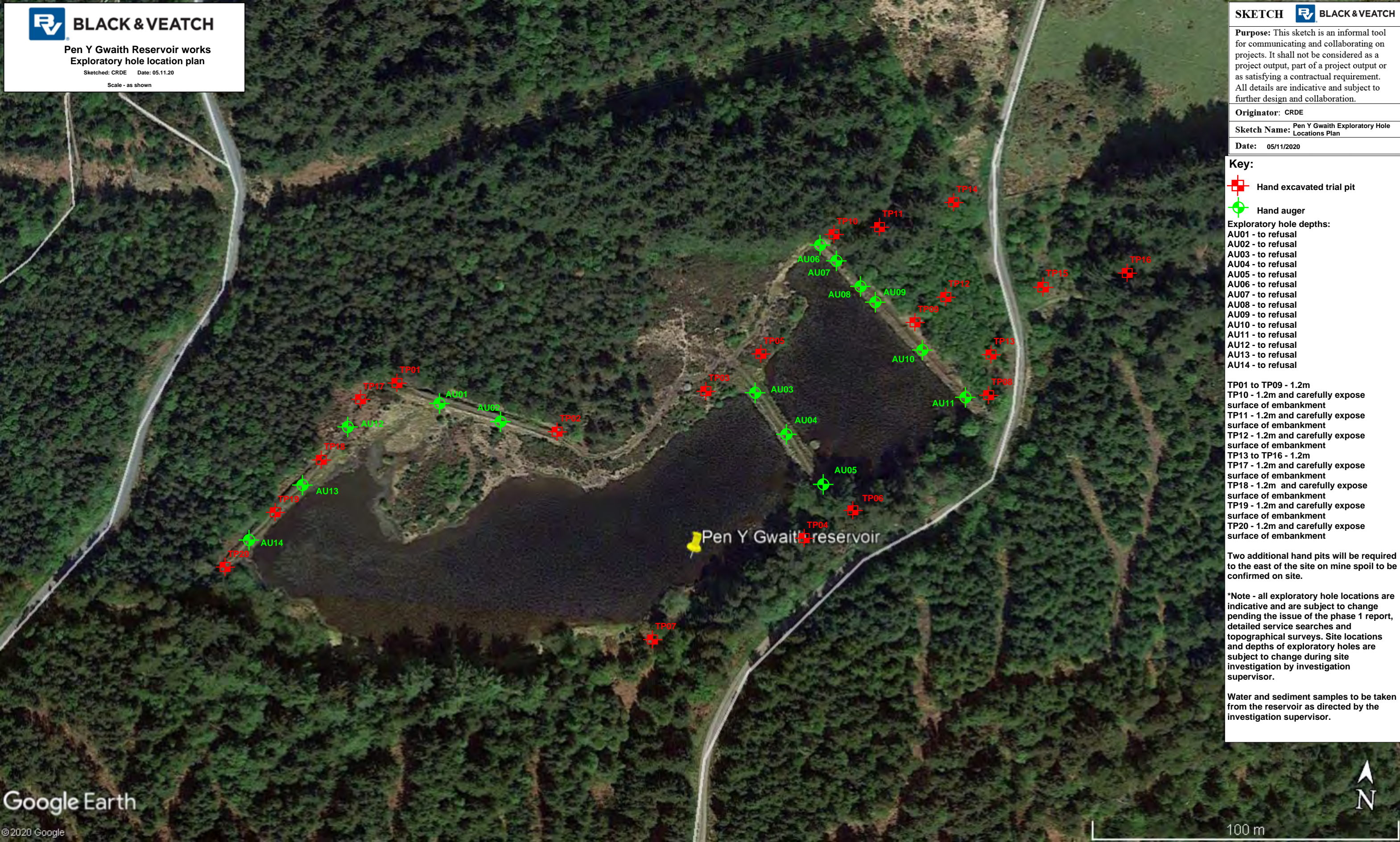


FIGURE 03:

**Reproduction of Ordnance Survey First Edition 1-inch to 25-mile
Caernarvonshire County Series Map Sheet XVIII.8 (1889). Scale
1:7500@A4.**

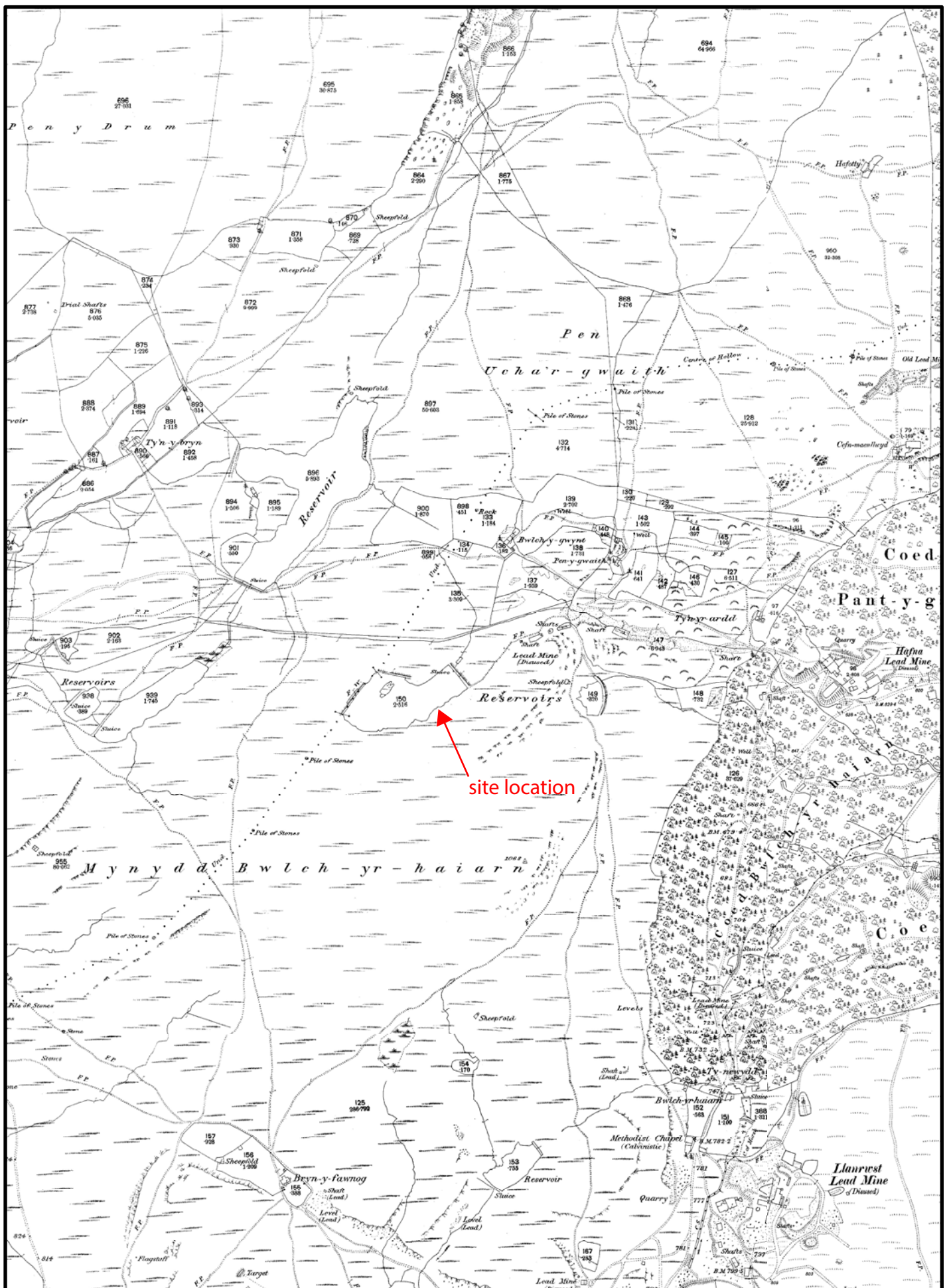


FIGURE 03: Reproduction of Ordnance Survey First Edition 1-inch to 25-mile Caernarvonshire County Series Map Sheet XVIII.8 (1889). Scale 1:7500@A4.

FIGURE 04:

**Reproduction of Ordnance Survey Second Edition 1-inch to 25-mile
Caernarvonshire County Series Map Sheet XVIII.8 (1900) Scale
1:7500@A4.**

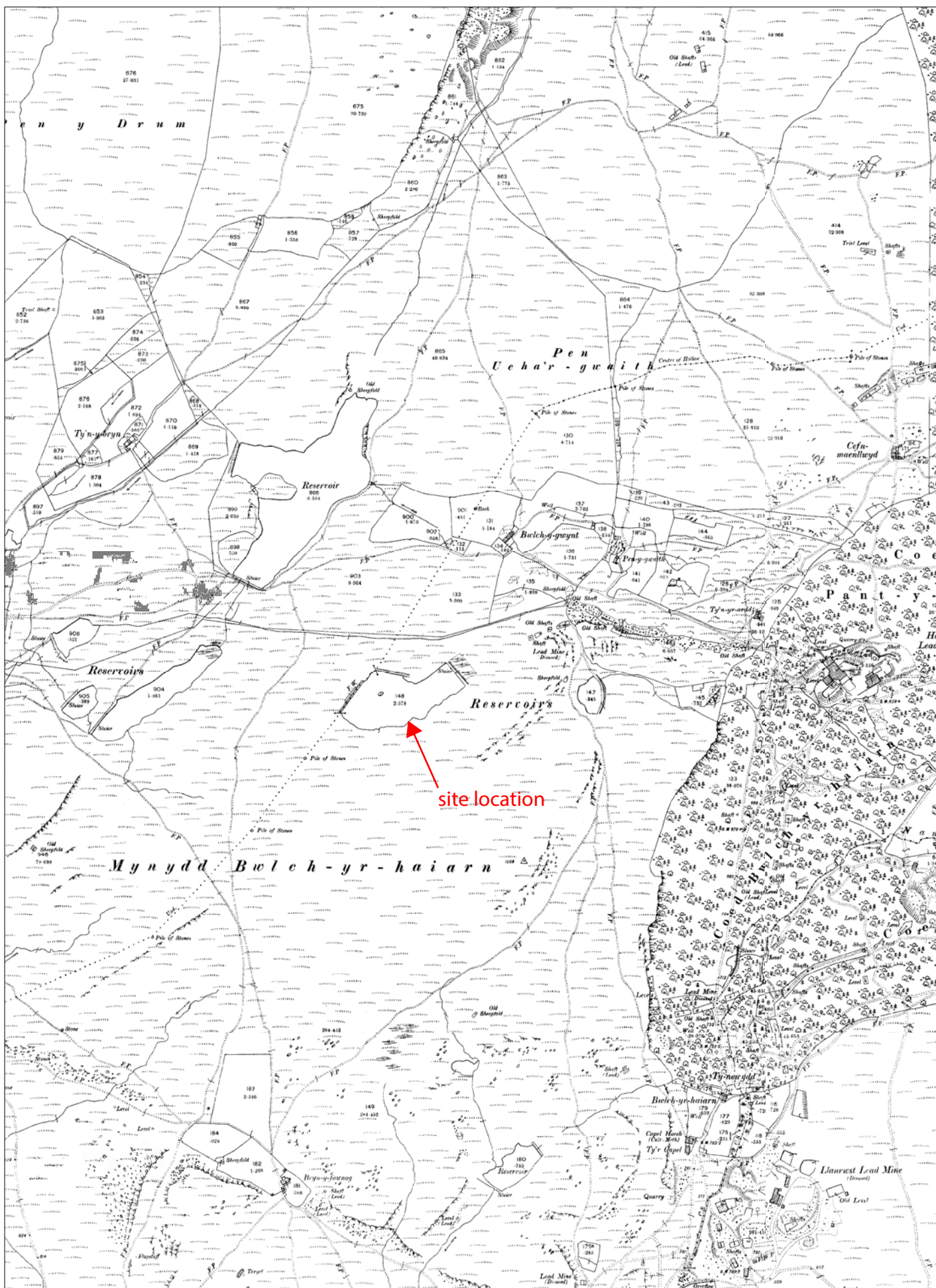


FIGURE 04: Reproduction of Ordnance Survey Second Edition 1-inch to 25-mile Caernarvonshire County Series Map Sheet XVIII.8 (1900) Scale 1:7500@A4.

FIGURE 05:

**Reproduction of Ordnance Survey Third Edition 1-inch to 25-mile
Caernarvonshire County Series Map Sheet XVIII.8 (1913) Scale
1:7500@A4.**

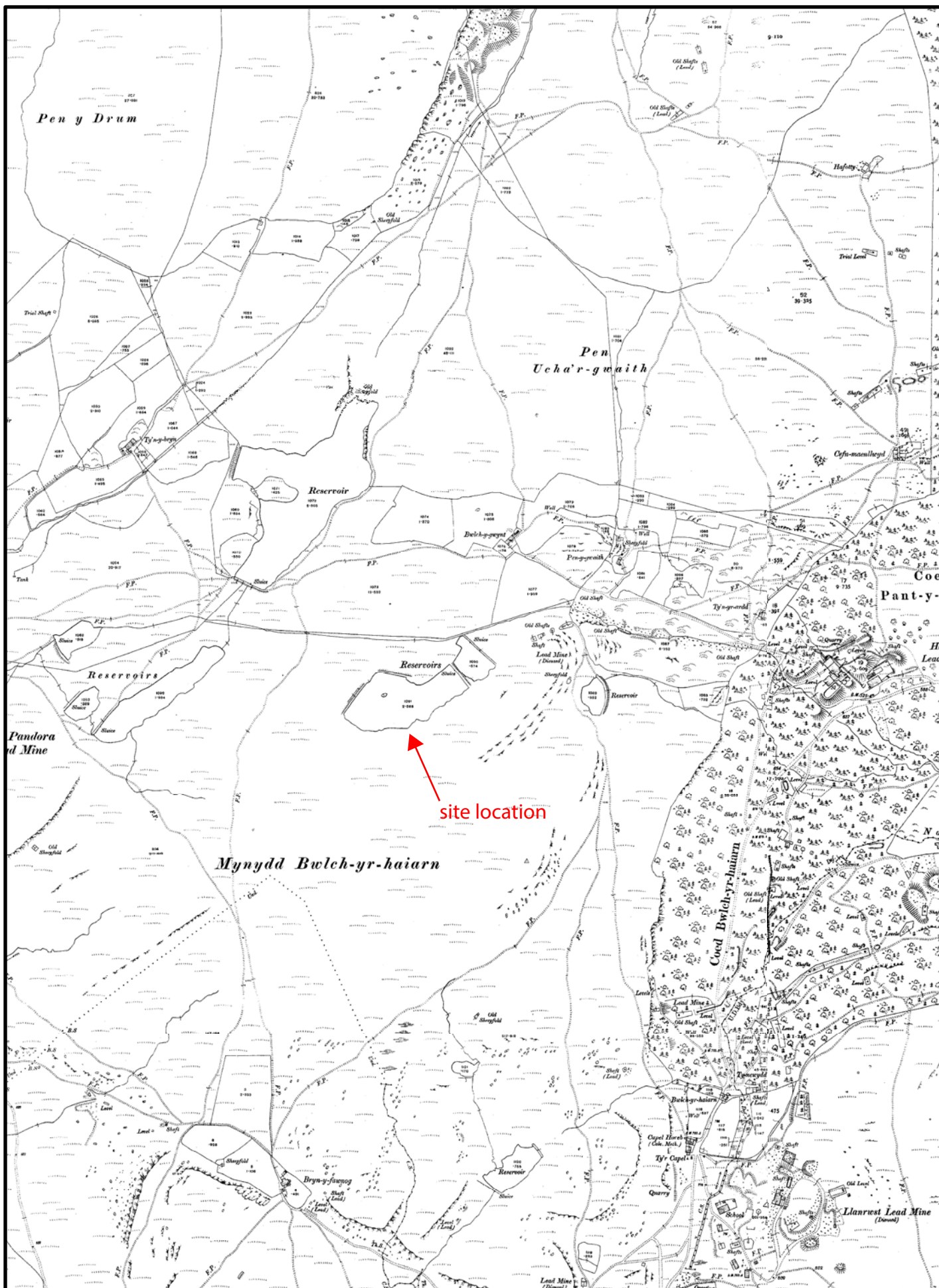


FIGURE 05: Reproduction of Ordnance Survey Third Edition 1-inch to 25-mile Caernarvonshire County Series Map Sheet XVIII.8 (1913) Scale 1:7500@A4.



Plate 01: Embankment D - location shot; scale: 1x1m (archive reference: G2674_001).



Plate 02: North face of Embankment D; scale: 1x1m (archive reference: G2674_048).



Plate 03: Oblique view of north face of Embankment D; scale: 1x1m (archive reference: G2674_049).



Plate 04: Old sluice Embankment D; scale: 1x1m (archive reference: G2674_004).



Plate 05: Old sluice through Embankment D - plastic sheeting and sandbags; scale: 1x1m (archive reference: G2674_005).



Plate 06: Embankment D - location shot; scale: 1x1m (archive reference: G2674_006).



Plate 07: Spillway adjacent to Embankment D; scale: 1x1m (archive reference: G2674_003).



Plate 08: Location of spillway adjacent to eastern terminal of Embankment D; scale: 1x1m (archive reference: G2674_051).



Plate 09: View of possible leat; scale: 1x1m (archive reference: G2674_053).



Plate 10: Oblique view of southwest face of Embankment C; scale: 1x1m (archive reference: G2674_034).



Plate 11: Embankment C - location shot; scale: 1x1m (archive reference: G2674_007).



Plate 12: Northeast face of Embankment C; scale: 1x1m (archive reference: G2674_037).



Plate 13: Sluice marker along southwest face of Embankment C; oblique view; scale: not used (archive reference: G2674_035).



Plate 14: Embankment B - location; scale: 1x1m (archive reference: G2674_012).



Plate 15: Embankment B - location; scale: 1x1m (archive reference: G2674_011).



Plate 16: Oblique view of Embankment B; scale: 1x1m (archive reference: G2676_028).



Plate 17: North face of Embankment B - tumble at centre; scale: 1x1m (archive reference: G2674_029).



Plate 18: Embankment A; scale: 1x1m (archive reference: G2674_013).



Plate 19: Embankment A - location; scale: 1x1 m (archive reference: G2674_023).



Plate 20: Post-ex of Trial Pit 01; scale: 1x1 m (archive reference: G2674_030).



Plate 21: Post-ex of Trial Pit 08]; scale: 1x1m (archive reference: G2674_050).



Plate 22: Post-ex of Trial Pit 11; scale: 1x1m (archive reference: G2674_045).



Plate 23: Post-ex of Trial Pit 18 (relocated to on top of Embankment A); scale: 1x1m (archive reference: G2674_026).



Plate 24: Trial Pit 20 excavated; scale: 1x1m (archive reference: G2674_021).

APPENDIX I

Reproduction of Gwynedd Archaeological Trust Written Scheme of Investigation

PEN Y GWAITH RESERVOIR (G2674)

WRITTEN SCHEME OF INVESTIGATION FOR ARCHAEOLOGICAL MITIGATION: PHOTOGRAPHIC RECORD & WATCHING BRIEF

Prepared for

Black & Veatch

January 2021



Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

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

Name

Signature

Date

PEN Y GWAITH RESERVOIR (G2674)

WRITTEN SCHEME OF INVESTIGATION FOR ARCHAEOLOGICAL MITIGATION: PHOTOGRAPHIC RECORD & WATCHING BRIEF

Prepared for *Black & Veatch*, January 2021

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1 INTRODUCTION

Gwynedd Archaeological Trust has been commissioned by Black & Veatch on behalf of Natural Resources Wales to undertake archaeological mitigation at the Pen y Gwaith reservoir in the Gwydir Forest, near Trefriw (NGR SH77456011; postcode LL27 0YZ). The reservoir comprises an upper and lower section, separated by dam embankments (embankments A to D; cf. Figure 02). The proposed works include:

- Reservoir improvement works including raising of approximately 75m of dam embankment (Embankment D) by 500mm, relocation of existing spillway, provision of new draw-off facility and downstream channel works (Embankment C);
- Tree felling work to facilitate new dam and spillway construction.
- Excavation of a “v-notch” in dam embankment C to connect the lower and upper reservoir sections.

The improvement works will be preceded by geotechnical ground investigation that will include hand excavated trial pits, hand augering, surface water sampling and soakaway tests. The ground investigation works are scheduled to be completed in January 2021, with the improvement works to follow during summer 2021.

The current written scheme of investigation is for the archaeological mitigation in advance of and during the ground investigation works and will comprise the following:

- a photographic record of the reservoir embankments supported by desk-based research for context; and
- a watching brief during ground investigation works.

A separate written scheme of investigation will be prepared for the improvement works. The archaeological mitigation will be completed in accordance with the following guidance:

- *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* Version 1.1 (The Welsh Archaeological Trusts, 2018);
- *Guidelines for digital archives* (Royal Commission on Ancient and Historic Monuments of Wales, 2015);

- Management of Archaeological Projects (English Heritage, 1991);
- Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide (Historic England, 2015);
- Standard and Guidance for Archaeological Watching Brief (Chartered Institute for Archaeologists, 2014);
- Standard and Guidance for Desk Based Assessment (Chartered Institute for Archaeologists, 2020);
- Standard and Guidance for the Archaeological Investigation and Recording of Standing Buildings or Structures (Chartered Institute for Archaeologists, 2014); and
- Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives (Chartered Institute for Archaeologists, 2020).

Gwynedd Archaeological Trust is certified to ISO 9001:2015 and ISO 14001:2015 (Cert. No. 74180/B/0001/UK/En) and is a Registered Organisation with the Chartered Institute for Archaeologists and a member of the Federation of Archaeological Managers and Employers (FAME).

1.1 Fieldwork Aims and Objectives

The key aims and objectives of the archaeological mitigation are to:

- Complete an archaeological record of the Pen y Gwaith reservoir embankments, supported by desk-based research;
- identify and record any archaeological activity identified during the watching brief, including any further information on the embankment construction. Archaeological activity within the local area includes extensive industrial archaeology associated with lead and zinc mining, and the objective would be to establish the date and nature of any archaeological remains identified within the watching brief area and assess their implications for understanding local historical development, in conjunction with the known archaeological record.

1.2 Monitoring Arrangements

The watching brief will be monitored by the Gwynedd archaeological Planning Service (GAPS); the content of this written scheme of investigation (WSI) and all subsequent reporting by GAT must be approved by GAPS prior to final issue.

The GAPS Archaeologist will need to be informed of the project timetable and of the subsequent progress and findings. This will allow the GAPS Archaeologist time to arrange monitoring visits and attend site meetings (if required) and enable discussion about the need or otherwise for further archaeological works (if required) as features of potential archaeological significance are encountered. GAPS' contact details are:

- Jenny Emmett 07824481052
- Tom Fildes 07920264232

1.3 Historic Environment Record

In line with the Gwynedd Historic Environment Record (HER) requirements, the HER will be contacted at the onset of the project to ensure that any data arising is formatted in a manner suitable for accession to the HER and follows the guidance set out in *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (The Welsh Archaeological Trusts, 2018). The HER will be informed of the project start date, location including grid reference, estimated timescale for the work, and further relevant information associated with the project.

2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

The reservoir is part of the landscape that includes the scheduled Hafna and Vale of Conwy mines (Scheduled Monuments 326 and 327 respectively) and is recorded in the regional Historic Environment Record as High Hafna Reservoir II Primary Reference Number (PRN) 9026.

PRN	Name	Type	Location (NGR)
9046	Hafna Mine Buildings	Building	SH77946009
9038	Pandora Reservoir I	Reservoir	SH77056011
9025	Mynydd Bwlch Yr Haiarn Pile of Stones III	Cairn	SH77185990
9022	Mynydd Bwlch Yr Haiarn Pile of Stones IV	Cairn	SH77276000
56483	Building, Ty'n-yr-ardd	Building	SH77906020
21696	Tynyrardd Mine	Lead Mine	SH77906020
9027	High Hafna Reservoir I	Reservoir	SH77696009
8852	High Hafna Compressor Shaft	N/A	SH77606018
8821	High Hafna Mine	Lead Mine	SH77686020
21669	Pen y Gwaith Mine	Lead Mine	SH77706020
21605	Glan Y Gors Mine	Lead Mine	SH77006000

The closest known heritage asset is PRN 88552 – High Hafna Compressor Shaft, which is located c.75m to the northeast of the reservoir.

The first, second and third edition 25-inch to 1-mile Ordnance Survey County Series maps of the area (Caernarvonshire Sheet XVIII.8), published in 1889, 1900 and 1913 respectively (cf. [Figures 03](#), [04](#) and [05](#)), show the area as characterised by irregular field boundaries, localised mining and multiple reservoirs; several lead mines are listed as disused. On the first and second edition maps, the targeted reservoir is limited to the upper portion, with the lower portion appearing in the early twentieth century before the publication of the third edition map ([Figure 05](#)), with embankments A to D clearly visible.

3 METHODOLOGY

3.1 Introduction

The archaeological mitigation will comprise the following:

- a photographic record of the reservoir embankments supported by desk-based research for context; and
- a watching brief during ground investigation works.

3.2 Photographic Record

The photographic record will initially be undertaken prior to the ground investigation works but will be supplemented by further recording after any site clearance undertaken for the ground investigation works. The archaeological record will include a photographic record of Embankments A to D, the upper and lower reservoir elements and the local environs, including the area targeted for ground investigation works (as detailed on Black & Veatch Drawing No. 123242-BVL-ZZ-00-PT-GE-00001; cf. [Figure 02](#)). This will be supported by desk-based research to provide context for the results.

Photographic images will be taken using a digital SLR camera set to maximum resolution in RAW format; a photographic record will be maintained on site using GAT pro-formas ([Appendix I](#)) and digitised in *Microsoft Access* as part of the fieldwork archive and dissemination process. Photographic images will be archived in TIFF format using Adobe Photoshop; the archive numbering system will start from **G2674_001**. When practical, a photographic ID board will be used to record site code, image orientation and any other relevant information. A basic written record using GAT pro-formas (cf. [Appendix II](#)) will also be completed; this will summarise the visible form and structure of the embankments and will also record the location and orientation of the photographic images taken.

The desk-based assessment will involve a study of the following resources:

1. The regional Historic Environment Register ((HER) Gwynedd Archaeological Trust, Craig Beuno, Ffordd y Garth, Bangor, Gwynedd LL57 2RT) will be examined for information concerning the mitigation area, defined as the Pen y Gwaith reservoir, both upper and lower sections, associated embankments and immediate environs, as located in Figure 01. Examination of the core HER will be undertaken, including the 6-inch and 25-inch County Series Ordnance Survey maps and any secondary information held within the HER, including Bennett, J. & Vernon, R., 1995, *Mines of*

the Gwydyr Forest Part 6, Gwyn, D., 1998, *Gwynedd Metal Mines Survey* and Frost, P. & Thomas, D. , 1998 , *Forest Enterprise Welsh Heritage Assets Survey*. All identified features will be mapped, described and added to a gazetteer of sites and the relative importance of any sites defined;

2. The National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, Plas Crug, Aberystwyth SY23 1NJ) will be checked for sites additional to the HER;
3. Aerial photographs from the National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, National Monuments Record of Wales, Plas Crug, Aberystwyth SY23 1NJ) will be examined for potential features. This will include 1946 RAF vertical aerial photographs;
4. The online catalogue search of the National Library of Wales (Penglais Rd, Aberystwyth SY23 3BU); and
5. Archive data, including primary and secondary sources, historic maps and estate maps will be examined at the regional archives, if open and accessible. Archive data will include historic mapping such as the local tithe map and schedule.

3.3 Watching Brief: Ground Investigation Works

An archaeological watching brief is defined by the Chartered Institute for Archaeologists as a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive (CIfA, 2014).

The watching brief will monitor the geotechnical ground investigations detailed on Black & Veatch Drawing No. 123242-BVL-ZZ-00-PT-GE-00001 (cf. [Figure 02](#)), currently scheduled in advance of the proposed reservoir improvement works. The ground investigations will be undertaken in January 2021 within the reservoir site and immediate area and will include:

- Sixteen hand excavated trial pits (to a maximum depth of 1.2 m bgl), three of which will be required to expose the downstream surface of the lower reservoir embankment (Embankment D) and two along the northern embankment (Embankment B);
- Eleven hand augers to refusal;
- Ten surface water and silt/sediment samples, with five deeper silt samples to be taken from within the reservoirs where possible (i.e. to depth of bed); and
- In-situ testing including soakaway tests and hand shear vanes.

The following watching brief methodology will be applied:

- All attendances and any identified features will be recorded using GAT watching brief pro-formas ([Appendix III](#));
- The ground investigation works will be monitored as far as the glacial horizon, any archaeological horizon or the limit of excavation, whichever is encountered first. The project archaeologist will be afforded sufficient time and opportunity to investigate any archaeological activity, or suspected archaeological activity, encountered.
- Photographic images will be taken using a digital SLR camera set to maximum resolution in RAW format; a photographic record will be maintained on site using GAT pro-formas ([Appendix II](#)) and digitised in *Microsoft Access* as part of the fieldwork archive and dissemination process. Photographic images will be archived in TIFF format using Adobe Photoshop; the archive numbering system will start from the next

archive number following from the photographic record. When practical, a photographic ID board will be used during the watching brief to record site code, image orientation and any relevant context numbers;

- Any subsurface features will be recorded photographically, with detailed notations and a measured survey (completed using a *Trimble* R8 GPS unit);
- Any archaeological features/deposits/structures encountered will be manually cleaned and examined to determine extent, function, date and relationship to adjacent activity. It is expected that the archaeology encountered will be associated with lead and zinc mining, but the following excavation strategy will generally apply: 50% sample of each sub-circular feature, 10% sample of each linear feature (terminal ends and intersection points with other features will be prioritised). However, if discrete features are identified these will be 100% excavated as will any exposed segments of linear features. *In the event of the identification of extensive/complex remains (for example burials, structures or preserved wooden or organic artefacts), additional time, resourcing and costs may be required for GAT to complete an appropriate programme of works;*
- Any required plans or sections to be drawn at a minimum 1:10 scale using GAT A4, A3 or A2 pro-forma permatrace;
- Should dateable artefacts, human remains and/or ecofacts be recovered, an **interim report** will be submitted summarising the results of the watching brief, along with an assessment of potential for analysis post-excavation project design (in line with the MAP2 process). *Additional time, resourcing and costs will be required to undertake any post-excavation programme of works.*
- The watching brief will be preceded by a tool box talk from GAT to the GI contractor, defining the scope and procedures of the archaeological works.
- *Black & Veatch* and *Natural Resources Wales* will kept informed by GAT of the general results and any significant observations, during the course of the watching brief; this will be communicated primarily via email.

3.4 Human Remains

Whilst it is not expected that human remains are to be encountered, if any human remains identified are to be excavated, and cannot be preserved in situ this will take place under appropriate regulations and with due regard for health and safety issues. In order to excavate human remains, a Ministry of Justice licence is required under Section 25 of the Burials Act 1857 for the removal of any body or remains of any body from any place of burial. In accordance with the Ministry of Justice licence, recovered remains will be reburied once the investigation and/or assessment/analysis are complete.

Non-fragmented skeletal remains will be excavated using wooden tools and collected and stored in polyethylene bags (with appropriate references for context, grave number, et al) and placed in a lidded cardboard archive box (note: separate boxes for each grave) and stored in a suitable manner within GAT premises. If significant quantities of human remains are encountered, a human osteologist should be contacted and appointed to advise the team during the fieldwork. The osteologist will be an external appointment: Dr. Genevieve Tellier | Tel: 01286 238827 | email: northwalesosteology@outlook.com who will assist in devising the excavation, recording and sampling strategy for features containing human remains. The osteologist should also help to ensure that adequate post-excavation processing of human remains is carried out so that the material is in a fit state for assessment during the post-excavation stage. For inhumations, this will involve washing, drying, marking and packing.

If human remains are recovered that are deemed suitable for further assessment/analysis, this will be completed in accordance with the osteologist's requirements and with *Human Bones from Archaeological Sites Guidelines for producing assessment documents and analytical reports* (Chartered Institute for Archaeologists, 2017).

3.5 Ecofacts

Due to the existing ground conditions and the depth of the proposed works it is unlikely that suitable deposits will be encountered. If they are however, bulk samples will be taken by the GAT archaeologist for further assessment and analysis. If any waterlogged/organic deposits are encountered, the GAT archaeologist will monitor and record the depth and context of the deposit or deposits but will not recover samples. Based on potential, e.g., an extensive depth of waterlogged deposits, recourse may be made to a specialist (via Lucy Whittingham | Project Manager (post-excavation) | AOC Archaeology | telephone: 0208 843 7380 | email: lucy.whittingham@aocarchaeology.com) for advice on a palaeoenvironmental assessment and analysis strategy.

For any ecofact samples taken from human burials, this will be completed in accordance with an appointed osteologist's guidance.

3.6 Artefacts

Diagnostic artefacts will be retained for further examination and identification. Pottery sherds of 19th and 20th century date will be examined on site and the context from which they were retrieved noted but the sherds will not be retained. Retained artefacts will be treated according to guidelines issued by the UK Institute of Conservation, in particular the advice provided within First Aid for Finds (Watkinson and Neal 2001).

Any waterlogged artefacts (e.g. wood or leather) that are to be recovered for post-excavation assessment and analysis will be processed in accordance with *Environmental Archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation* (English Heritage, 2011) and specifically in accordance with Brunning and Watson (2010) for waterlogged wood and Historic England (2012) for waterlogged leather. In such cases an external specialist will be contacted to agree an appropriate sampling and recovery strategy via Jackeline Robertson (AOC Archaeology | telephone: 0208 843 7380).

All finds are the property of the landowner; however, it is Trust policy to recommend that all finds are donated to an appropriate museum (in this case Conwy Archive Service, Old Board School, Lloyd Street, Llandudno LL30 2YG) where they can receive specialist treatment and study. Access to finds must be granted to the Trust for a reasonable period to allow for analysis and for study and publication as necessary. Trust staff will undertake initial identification, but any additional advice would be sought from a wide range of consultants used by the Trust, including National Museums and Galleries of Wales at Cardiff.

All finds of treasure must be reported to the coroner for the district within fourteen days of discovery or identification of the items. Items declared Treasure Trove become the property of the Crown, on whose behalf the Portable Antiquities Scheme acts as advisor on technical matters, and may be the recipient body for the objects.

The Treasure Valuation Committee, based at the British Museum, and informed by the Portable Antiquities Scheme, will decide whether they or any other museum may wish to acquire the object. If no museum wishes to acquire the object, then the Secretary of State will be able to disclaim it. When this happens, the coroner will notify the occupier and landowner that he intends to return the object to the finder after 28 days unless he receives no objection. If the coroner receives an objection, the find will be retained until the dispute has been settled.

GAT will contact the landowner for agreement regarding the transfer of artefacts, initially to GAT and subsequently to the relevant museum (Conwy Archive Service). A GAT produced pro-forma will be issued to the landowner where they are given the option to donate the finds or to record that they want them returning to them once analysis and assessment has been completed. Artefacts to be donated will then be transferred to Conwy Archive Service in accordance with their guidelines.

3.7 Data Management Plan

Archiving will be completed based on following task list;

1. Pro-formas: all cross referenced and scanned for digital archiving;
2. Photographic Metadata: cross-referenced with all pro-formas and completed in *Microsoft Excel*;
3. Project register (*Microsoft Excel* format): cross-referenced with all pro-formas and completed in *Microsoft Excel*; and
4. Measured drawings (permatrace) – if applicable: all cross referenced and scanned for digital archiving.

This data will then be used as the basis for the physical and digital dataset archives. Information from these will be used to compile the project report. The physical archive will be stored in a designated project folder and the location confirmed in the Trust project database; the digital dataset will be stored on a dedicated Trust server, with the location confirmed in the Trust project database via a specific hyperlink. External datasets for the HER and RCAHMW are as defined in the dissemination strategy below. De-selected digital data will be confirmed in an updated digital management plan appended to the final report.

A draft report will be submitted within one month of fieldwork completion and a final report will be submitted to the regional Historic Environment Record within six months of project completion. The report will include the following:

1. Non-technical summary (Welsh and English)
2. Introduction
3. Background
4. Methodology
5. Results
6. Conclusion
7. List of sources consulted.
8. Appendix I – approved GAT project specification
9. Appendix II – photographic metadata

On final approval, the following dissemination and archiving of the report and digital dataset will apply:

- A digital report(s) will be provided to the client and GAPS (draft report then final report);
- A digital report will be provided to the regional Historic Environment Record; this will be submitted within six months of project completion (final report only), along with a digital dataset comprising an Event PRN summary. The report and dataset will be submitted in accordance with the required standards set out in *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)* (Version 1.1); and
- A digital report and digital archive dataset will be provided to Royal Commission on Ancient and Historic Monuments, Wales (final report only), in accordance with the *RCAHMW Guidelines for Digital Archives Version 1*. The dataset will be prepared in the format required by RCAHMW and will include:
 - Photographic metadata (Microsoft Access);
 - Photographic archive (TIFF format);
 - Project Information form (Excel);
 - File Information form (Excel) – Microsoft Word report text final;
 - File Information form (Excel) – Photographic metadata (general);
 - File Information form (Excel) – Adobe PDF report final; and
 - File Information form (Excel) - Photographic metadata (detail).

4 PERSONNEL

The project will be managed by John Roberts, Principal Archaeologist GAT Contracts Section with attendances on-site undertaken by a GAT Project Archaeologist. The Project Archaeologist will be responsible for the following:

- All archaeological watching brief duties on site;
- Client/contractor liaison;
- GAPS liaison, with regular updates;
- specialist liaison (if relevant);
- completing all on site pro-formas and the fieldwork archive;
- sourcing Primary Reference Numbers (PRN) from the GAT HER for any new features identified;
- completing an event summary and creating or updating PRN data, dependent on results; and
- for submitting a draft final report (or interim report) for project manager review and approval, to then be submitted as per the arrangements defined above.

5 HEALTH AND SAFETY

The GAT Project Archaeologist(s) will be CSCS certified. Copies of the site specific risk assessment will be supplied to the client and site contractor prior to the start of fieldwork. Any risks and hazards will be indicated prior to the start of work via a submitted risk assessment. All staff will be issued with required personal safety equipment, including high visibility jacket, steel toe-capped boots and hard hat. GAT staff will abide by Trust Covid-19 guidelines and site contractor guidelines.

6 SOCIAL MEDIA

One of the key aims in the GAT mission statement is to improve the understanding, conservation and promotion of the historic environment in our area and inform and educate the wider public. To help achieve this, GAT maintains an active social media presence and seeks all opportunities to promote our projects and results. With permission, GAT would like the opportunity to promote our work on this scheme through our social media platforms. This could include social media postings during our attendance on site as well as any postings to highlight results. In all instances, approval will be sought from client prior to any postings.

7 INSURANCE

7.1 Public/Products Liability

Limit of Indemnity- £5,000,000 any one event in respect of Public Liability

INSURER Aviva Insurance Limited

POLICY TYPE Public Liability

POLICY NUMBER 24765101CHC/UN/000375

EXPIRY DATE 21/06/2021

7.2 Employers Liability

Limit of Indemnity- £10,000,000 any one occurrence.

The cover has been issued on the insurers standard policy form and is subject to their usual terms and conditions. A copy of the policy wording is available on request.

INSURER Aviva Insurance Limited

POLICY TYPE Employers Liability

POLICY NUMBER 24765101 CHC / UN/000375

EXPIRY DATE 21/06/2021

7.3 Professional Indemnity

Limit of Indemnity- £5,000,000 in respect of each and every claim

INSURER Hiscox Insurance Company Limited

POLICY TYPE Professional Indemnity

POLICY NUMBER PL-PSC10002389775/00

EXPIRY DATE 22/07/2021

8 SOURCES CONSULTED

1. Bennett, J. & Vernon, R., 1995 , Mines of the Gwydyr Forest Part 6
2. Brunning, R and Watson, J 2010, *Waterlogged Wood: Guidelines on the Recording*,
3. Chartered Institute for Archaeologists, 2014, *Standard and Guidance for Archaeological Watching Brief*
4. Chartered Institute for Archaeologists, 2014, *Standard and guidance for the collection, documentation, conservation and research of archaeological materials*
5. Chartered Institute for Archaeologists, 2014. *Standard and Guidance for Archaeological Watching Brief*;
6. Chartered Institute for Archaeologists, 2017, *Updated Guidelines to the Standards for Recording Human Remains*
7. Chartered Institute for Archaeologists, 2020, *Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives*
8. Chartered Institute for Archaeologists, 2020. *Standard and Guidance for Desk Based Assessment*;
9. English Heritage, 1991, *Management of Archaeological Projects (MAP2)*
10. English Heritage, 2011, *Environmental Archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation*
11. Frost, P. & Thomas, D. , 1998 , Forest Enterprise Welsh Heritage Assets Survey
12. Gwyn, D. , 1998 , Gwynedd Metal Mines Survey
13. Historic England, 2012, *Waterlogged Organic Artefacts Guidelines on their Recovery, Analysis and Conservation Sampling, Conservation and Curation of Waterlogged Wood* (3rd edition)
14. Historic England, 2015, *Management of Research Projects in the Historic Environment (MoRPHE)*
15. Ordnance Survey Second Edition 1-inch to 25-mile Anglesey County Series Map Sheet XVIII.8 (1889)
16. Ordnance Survey Second Edition 1-inch to 25-mile Anglesey County Series Map Sheet XVIII.8 (1900)

17. Ordnance Survey Third Edition 1-inch to 25-mile Anglesey County Series Map Sheets Sheet XVIII.8 (1913)
18. Royal Commission on Ancient and Historic Monuments of Wales, 2015, *Guidelines for digital archives*
19. The Welsh Archaeological Trusts, 2018, *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)*
20. Thompson D, 2004, Historic Landscape Characterisation: Mawddach. Gwynedd Archaeological Trust Report 492
21. Watkinson, D and Neal, V, 2001, *First aid for finds* (3rd edition)

FIGURE 01:

Location Plan, based on Ordnance Survey County Series 1:10000 map sheet SH76. Scale 1:7500@A4 © Crown Copyright. All Rights Reserved. License Number AI100020895

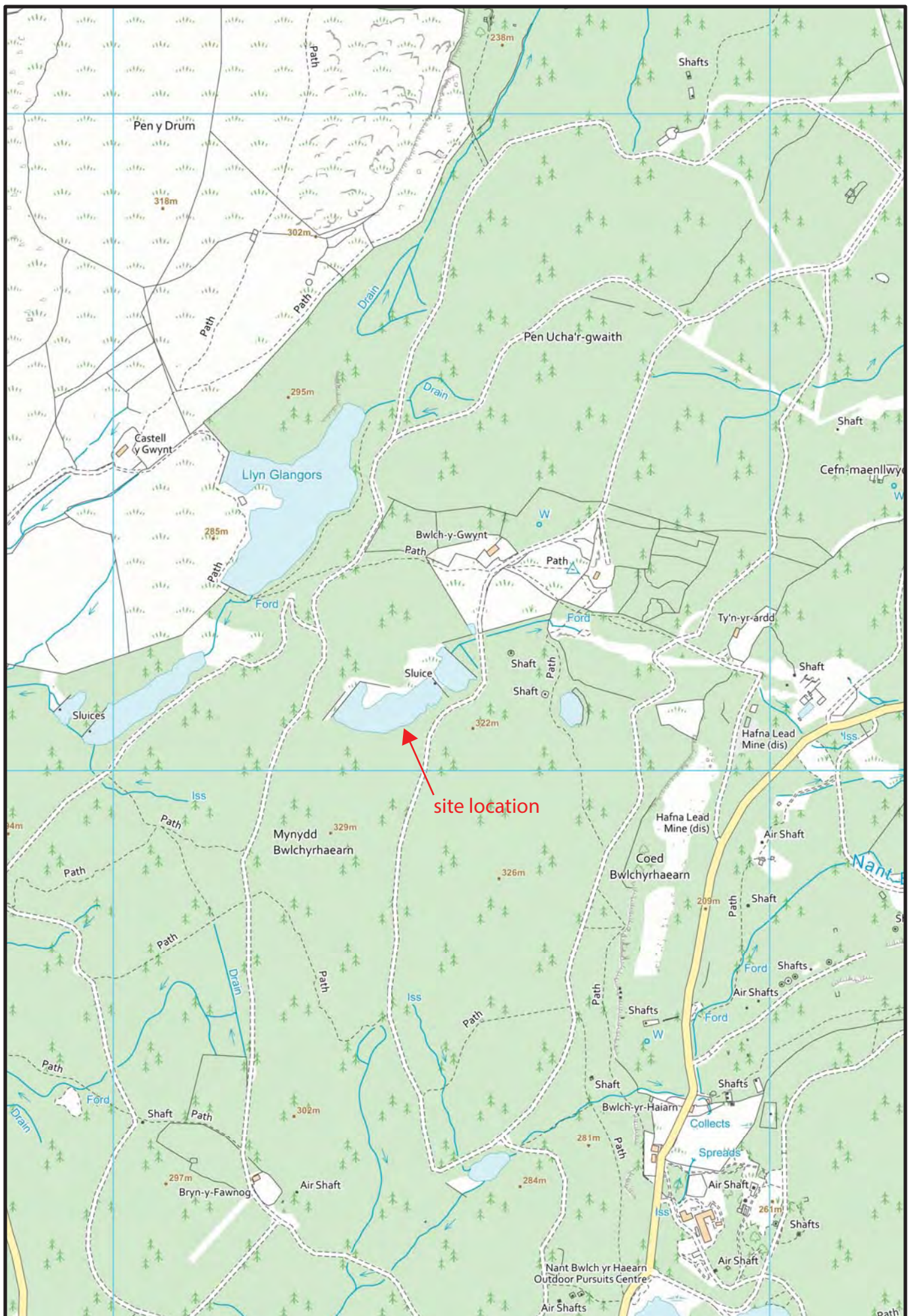


FIGURE 01: Location Plan, based on Ordnance Survey County Series 1:10000 map sheet SH76.
Scale 1:7500@A4 © Crown Copyright. All Rights Reserved. License Number AI100020895

FIGURE 02:

**Reproduction of Black & Veatch drawings Black & Veatch Drawing No.
123242-BVL-ZZ-00-PT-GE-00001, 123242-BVL-ZZ-00-DR-C-
00001.P01-S2, 123242-BVL-ZZ-00-DR-C-00030.P01-S2 and 123242-
BVL-ZZ-00-DR-C-00031.P01-S2**



BLACK & VEATCH

Pen Y Gwaith Reservoir works
Exploratory hole location plan

Sketched: CRDE Date: 05.11.20

Scale - as shown

SKETCH **BLACK & VEATCH**

Purpose: This sketch is an informal tool for communicating and collaborating on projects. It shall not be considered as a project output, part of a project output or as satisfying a contractual requirement. All details are indicative and subject to further design and collaboration.

Originator: CRDE

Sketch Name: Pen Y Gwaith Exploratory Hole Locations Plan

Date: 05/11/2020

Key:

Hand excavated trial pit

Hand auger

Exploratory hole depths:

AU01 - to refusal
AU02 - to refusal
AU03 - to refusal
AU04 - to refusal
AU05 - to refusal
AU06 - to refusal
AU07 - to refusal
AU08 - to refusal
AU09 - to refusal
AU10 - to refusal
AU11 - to refusal

TP01 - 1.2m
TP02 - 1.2m
TP03 - 1.2m
TP04 - 1.2m
TP05 - 1.2m
TP06 - 1.2m
TP07 - 1.2m
TP08 - 1.2m
TP09 - 1.2m

TP10 - 1.2m and carefully expose surface of embankment
TP11 - 1.2m and carefully expose surface of embankment
TP12 - 1.2m and carefully expose surface of embankment

TP13 - 1.2m
TP14 - 1.2m
TP15 - 1.2m
TP16 - 1.2m

Two additional hand pits will be required to the east of the site on mine spoil to be confirmed on site.

*Note - all exploratory hole locations are indicative and are subject to change pending the issue of the phase 1 report, detailed service searches and topographical surveys. Site locations and depths of exploratory holes are subject to change during site investigation by investigation supervisor.

Water and sediment samples to be taken from the reservoir as directed by the investigation supervisor.

Google Earth

© 2020 Google

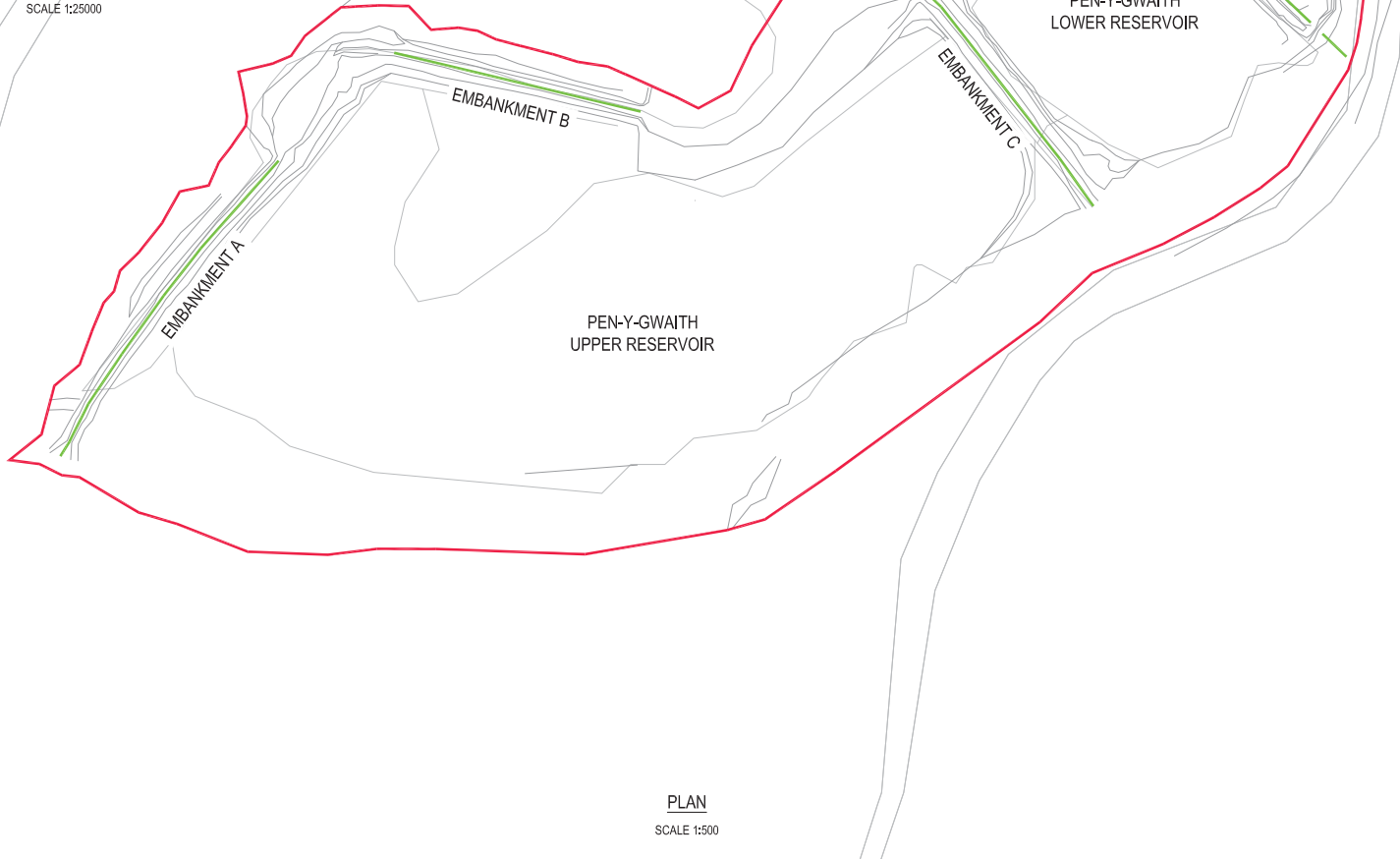
100 m





LOCATION PLAN

SCALE 1:25000



PLAN

SCALE 1:500



Notes: The levels, including the height and depths of the Works, shown in this drawing are not to be taken as binding the obligations of the contractor under Contract.

This Map is Reproduced from the Ordnance Survey Map by Natural Resources Wales with Permission of Her Majesty's Stationery Office Crown Copyright ©. Unauthorised reproduction infringes Crown Copyright and may lead to civil proceedings. Licence Number 100019741.

Notes

1. All dimensions in millimetres unless stated otherwise.
2. All levels in metres above Ordnance Datum (m OD) unless stated otherwise.

Legend

Working area boundary

Safety, Health and Environmental Information	
In addition to the hazards or risks normally associated with the types of work detailed on this drawing, the following significant residual risks should be noted. Further details are included in the CDM Design Risk Management Register.	
Construction:	
S.1	Reservoir is a statutory reservoir under the Reservoirs Act 1975.
S.2	Historic mine works known to be present throughout the Gwydyr Forest and around the site location.
S.3	Uncharted services – existing third party abstraction pipework and electricity supply located within the area downstream of the north-eastern embankment (Embankment D).
S.4	Risk of inclement weather with absent prior warning.
S.5	Existing embankment dam fill may be unstable when disturbed.
Maintenance, cleaning and operation:	
S.2	Historic mine works known to be present throughout the Gwydyr Forest and around the site location.
S.4	Risk of inclement weather with absent prior warning.
Decommissioning or demolition:	
Risks are likely to be similar to the construction stage but should be reconsidered in advance of decommissioning, demolition, future refurbishment or replacement.	



Rev	Drawn	Chd	Rivet	Appt	Date	Description
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Designed by: MRC Date: 07/12/20

Status: S2 Suitable for Information



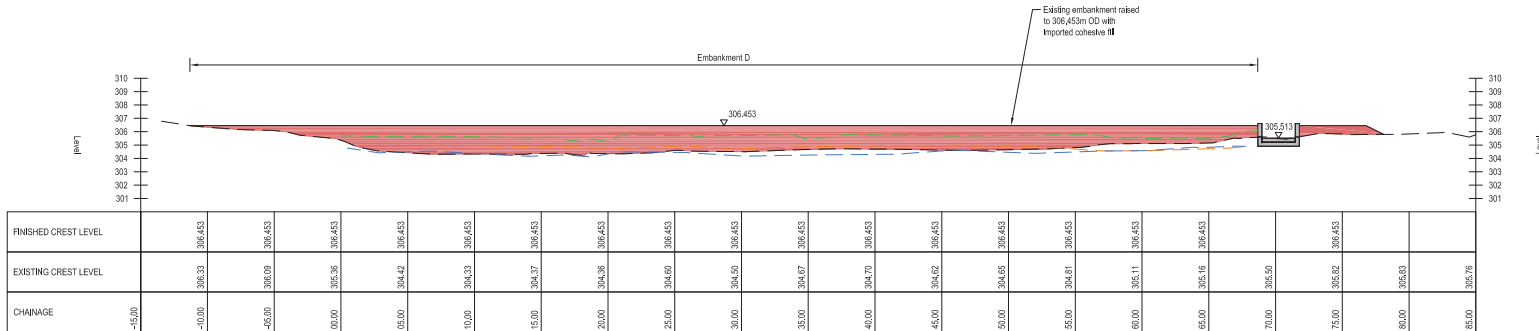
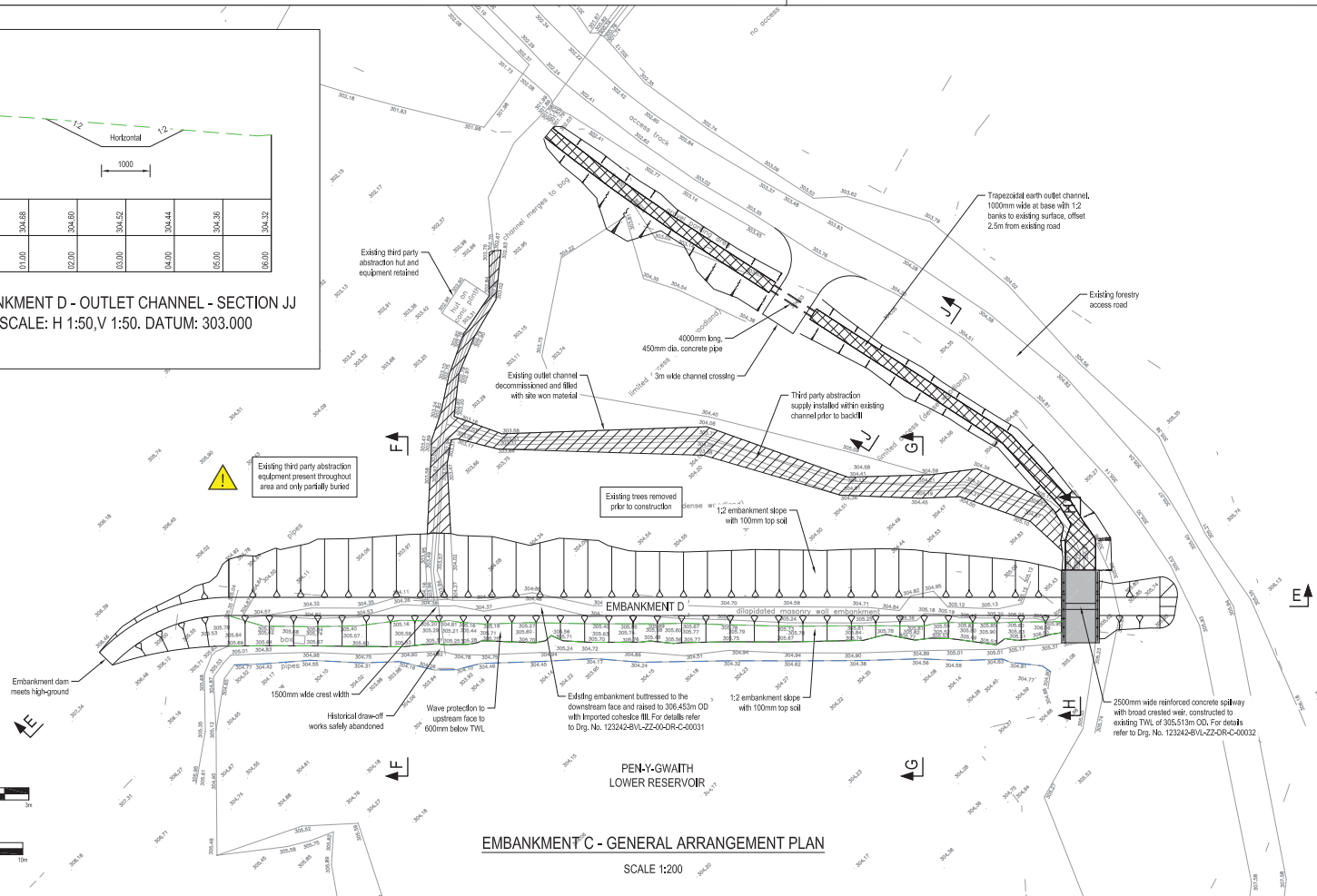
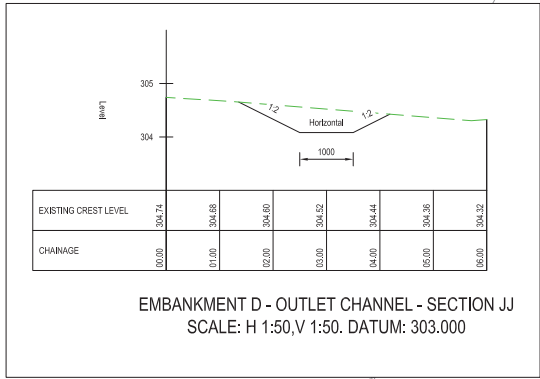
Client Drawing No. Revision



Black & Veatch Limited
60 High Street, Royal Wexham, Reading, RG2 0EX, United Kingdom
Tel: +44(0)1753 774100

Project
PEN-Y-GWAITH
RESERVOIR IMPROVEMENTS
Drawing title
LOCATION PLAN

Drawing scale: AS SHOWN Sheet size: A1
Drawing no. 123242-BVL-ZZ-00-DR-C-00001 Revision P01



Notes:

- All dimensions in millimetres unless stated otherwise.
- All levels in metres above Ordnance Datum (m OD) unless stated otherwise.

Legend:

- Existing crest
- Existing upstream toe
- Existing sill
- Existing ground at section
- Imported cohesive fill
- Concrete
- 1m wide outlet channel
- Existing outlet channel infill

References:

123242-BVL-ZZ-00-DR-C-00031 EMBANKMENT D - SECTIONS
123242-BVL-ZZ-00-DR-C-00032 EMBANKMENT D - SPILLWAY - PLAN & SECTIONS

Safety, Health and Environmental Information

In addition to the hazards or risks normally associated with the types of work detailed on this drawing, the following significant residual risks should be noted. Further details are included in the CDM Design Risk Management Register.

Construction:

S.1 Reservoir is a statutory reservoir under the Reservoirs Act 1975.
S.2 Historic mine works known to be present throughout the Gwydyr Forest and around the site location.
S.3 Uncharted services - existing third party abstraction pipework and electricity supply located within the area downstream of the north-eastern embankment (Embankment D).
S.4 Risk of inclement weather with absent prior warning.
S.5 Existing embankment dam fill may be unstable when disturbed.

Maintenance, clearing and operation:

S.2 Historic mine works known to be present throughout the Gwydyr Forest and around the site location.
S.4 Risk of inclement weather with absent prior warning.

Decommissioning or demolition:

Risks are likely to be similar to the construction stage but should be reconsidered in advance of decommissioning, demolition, future refurbishment or replacement.

Client: Cyfoeth Naturiol Cymru Natural Resources Wales

Client Drawing No. Revision

Black & Veatch Building a world of difference

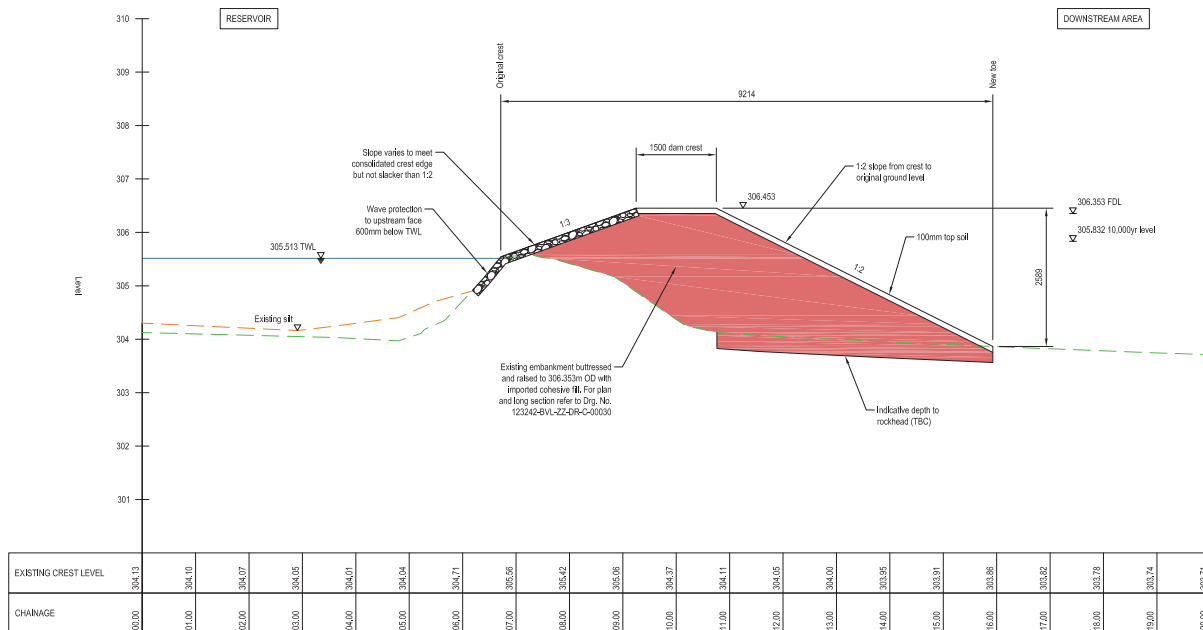
Black & Veatch Limited 60 High Street, Redditch, Warwickshire, CV2 3NU, United Kingdom Tel: +44(0)1827 774100

Project: PEN-Y-GWAITH RESERVOIR IMPROVEMENTS

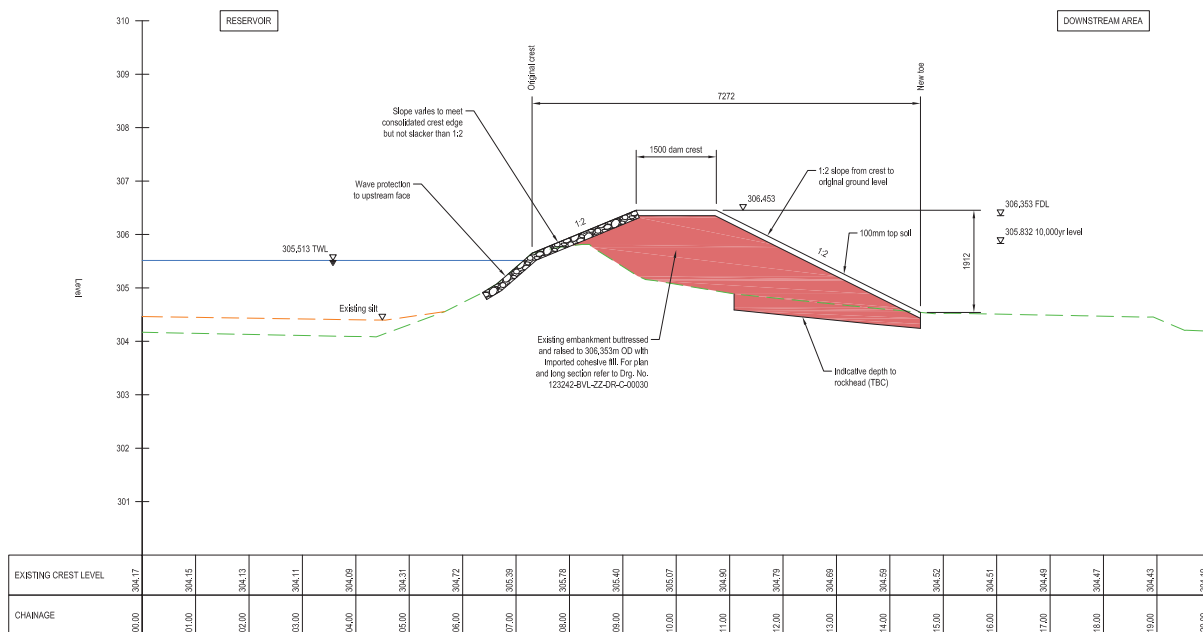
Drawing title: EMBANKMENT D GENERAL ARRANGEMENT & LONG-SECTION

Drawing no. AS SHOWN Sheet size: A1

Drawing no. 123242-BVL-ZZ-00-DR-C-00030 Revision P01



EMBANKMENT D - TYPICAL CROSS-SECTION BASED ON FF
SCALE: H 1:50, V 1:50. DATUM: 300.000



EMBANKMENT D - TYPICAL CROSS-SECTION BASED ON GG
SCALE: H 1:50, V 1:50. DATUM: 300.000

Notes:

- The levels, including the height and depths of the Works, shown in this drawing are not to be taken as limiting the obligations of the contractor under Contract.

Notes

- All dimensions in millimetres unless stated otherwise.
- All levels in metres above Ordnance Datum (m OD) unless stated otherwise.

Legend

- Existing ground
- Existing sill
- Imported cohesive fill

References

123242-BVL-ZZ-DR-C-00030 EMBANKMENT D - GENERAL ARRANGEMENT & LONG-SECTION

Safety, Health and Environmental Information

In addition to the hazards or risks normally associated with the types of work detailed on this drawing, the following significant residual risks should be noted. Further details are included in the CDM Design Risk Management Register.

Construction:

- S.1 Reservoir is a statutory reservoir under the Reservoirs Act 1975.
- S.2 Historic mine works known to be present throughout the Gwydyr Forest and around the site location.
- S.3 Uncharted services - existing third party abstraction pipework and electricity supply located within the area downstream of the north-eastern embankment (Embankment D).
- S.4 Risk of indement weather with absent prior warning.
- S.5 Existing embankment dam fill may be unstable when disturbed.

Maintenance, clearing and operation:

- S.2 Historic mine works known to be present throughout the Gwydyr Forest and around the site location.
- S.4 Risk of indement weather with absent prior warning.

Decommissioning or demolition:

Risks are likely to be similar to the construction stage but should be reconsidered in advance of decommissioning, demolition, future refurbishment or replacement.



P01	SPJ	LJM	SPC	SPC	16/12/20	For Information
Rev	Drawn	Chd	Rwd	Appt	Date	Description

Designed by: MRC Date: 07/12/20

Status: S2 Suitable for Information

Client



Client Drawing No. Revision



Black & Veatch Limited
60 High Street, Royal Wexham, Reading, RG9 1PR, United Kingdom
Tel: +44(0)1753 774100

Project

PEN-Y-GWAITH

RESERVOIR IMPROVEMENTS

Drawing title

EMBANKMENT D

SECTIONS

Drawing scale: 1:50 Sheet size: A1

Drawing no. 123242-BVL-ZZ-DR-C-00031 Revision P01

FIGURE 03:

**Reproduction of Ordnance Survey First Edition 1-inch to 25-mile
Caernarvonshire County Series Map Sheet XVIII.8 (1889). Scale
1:7500@A4.**

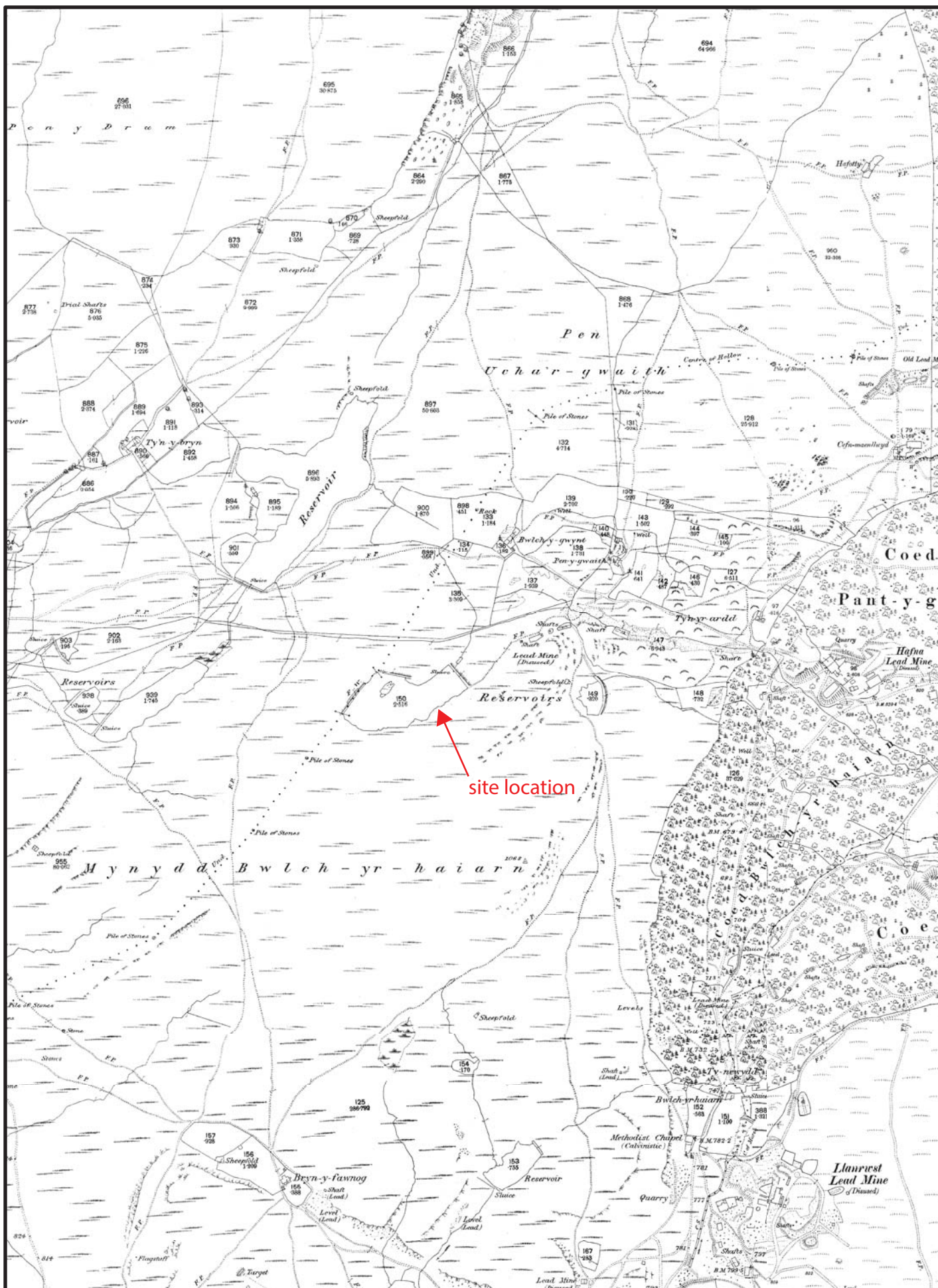


FIGURE 03: Reproduction of Ordnance Survey First Edition 1-inch to 25-mile Caernarvonshire County Series Map Sheet XVIII.8 (1889). Scale 1:7500@A4.

FIGURE 04:

**Reproduction of Ordnance Survey Second Edition 1-inch to 25-mile
Caernarvonshire County Series Map Sheet XVIII.8 (1900) Scale
1:7500@A4.**

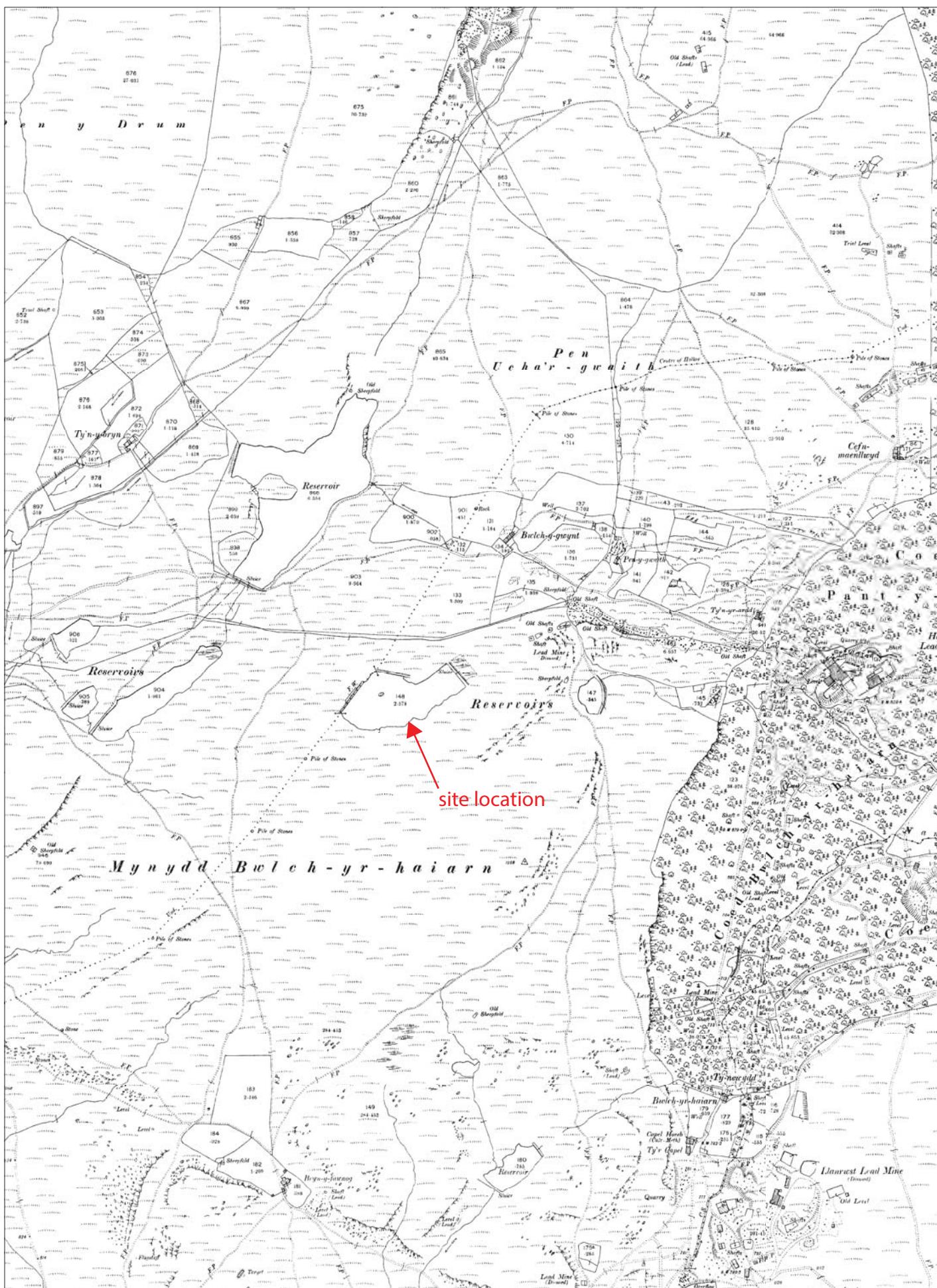


FIGURE 04: Reproduction of Ordnance Survey Second Edition 1-inch to 25-mile Caernarvonshire County Series Map Sheet XVIII.8 (1900) Scale 1:7500@A4.

FIGURE 05:

**Reproduction of Ordnance Survey Third Edition 1-inch to 25-mile
Caernarvonshire County Series Map Sheet XVIII.8 (1913) Scale
1:7500@A4.**

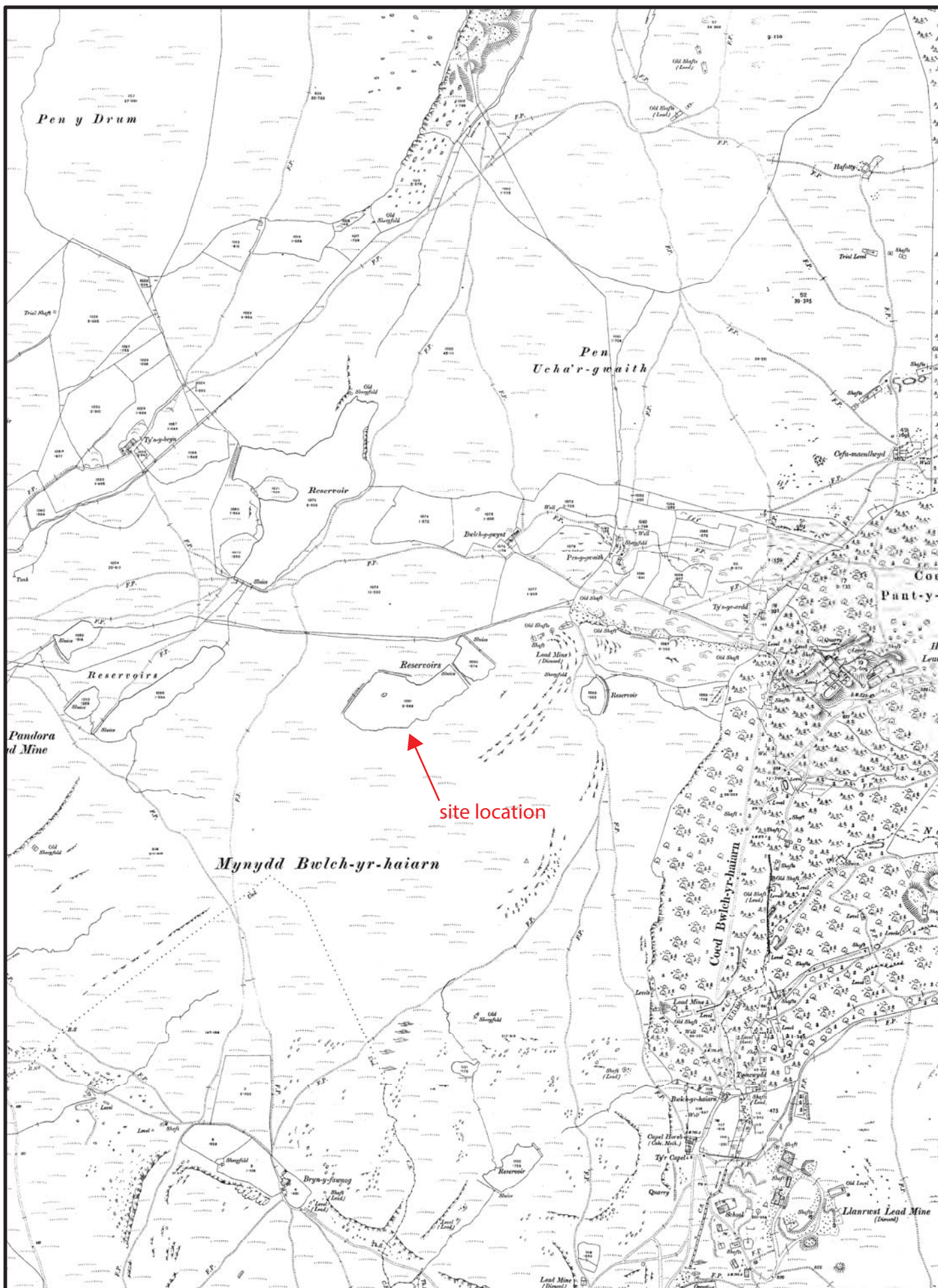


FIGURE 05: Reproduction of Ordnance Survey Third Edition 1-inch to 25-mile Caernarvonshire County Series Map Sheet XVIII.8 (1913) Scale 1:7500@A4.

APPENDIX I

Gwynedd Archaeological Trust Basic Recording pro-forma

YMDDIRIEDOLAETH ARCHAEOLEGOL GWYNEDD ARCHAEOLOGICAL TRUST		
BASIC RECORDING FORM	Project name	Project number
Feature name		Feature Number
NGR		
Description		
Recommendations for further assessment		
Photographic record numbers		
Digital		
	Visit date	Visit by

APPENDIX II

Gwynedd Archaeological Trust Photographic Metadata pro-forma



Digital Photographic Record

Include main context numbers for each shot, drawing numbers for sections and any other relevant numbers for cross referencing.

Delete any unwanted photos **immediately** from the camera.

Regularly upload photographs to computer.

[illegible]

APPENDIX III

Gwynedd Archaeological Trust Watching Brief pro-forma

YMDDIRIEDOLAETH ARCHAEOLEGOL GWYNEDD ARCHAEOLOGICAL TRUST		
WATCHING BRIEF DAY RECORD		Date
Project name	Project number	Compiler
Location		
Description		
Times of travelling and on-site		
Drawn record details		
Photographic record details		

APPENDIX IV

Gwynedd Archaeological Trust Fee Proposal

G2674_Pen_y_Gwaith: photographic record

PROJECT RATES

Daily Rates	Day Rate	Hourly Rate
Project Manager	£300.00	£40.00
Project Archaeologist	£262.50	£35.00

ex VAT

ex VAT

PROJECT COSTS

Management	DAYS	COST
Project Archaeologist	1	£262.50
SUBTOTAL	1	£262.50

ex VAT

Photographic Record inc. expenses	DAYS	COST
Project Archaeologist	2	£630.00
SUBTOTAL	2	£630.00

ex VAT

Desk Based Research	DAYS	COST
Project Archaeologist	1	£262.50
SUBTOTAL	1	£262.50

ex VAT

Report	DAYS	COST
Project Archaeologist	2	£525.00
SUBTOTAL	2	£525.00

ex VAT

sub-total £1,680.00 ex VAT

ALL PRICES EXCLUSIVE OF VAT

G2674_Pen_y_Gwaith: watching brief (ground investigation)

PROJECT RATES

Daily Rates	Day Rate	Hourly Rate
Project Manager	£300.00	£40.00
Project Archaeologist	£262.50	£35.00

ex VAT

ex VAT

PROJECT COSTS

Management	DAYS	COST
Project Manager	1	£262.50
Project Archaeologist	0.5	£131.25
SUBTOTAL	1.5	£393.75

ex VAT

Watching Brief inc. expenses	DAYS	COST
Project Archaeologist	1	£315.00
Project Archaeologist	1	£315.00
Project Archaeologist	1	£315.00
Project Archaeologist	1	£315.00
Project Archaeologist	1	£315.00
Project Archaeologist	1	£315.00
SUBTOTAL	6	£1,890.00

ex VAT

Report	DAYS	COST
Project Archaeologist	2	£525.00
SUBTOTAL	2	£525.00

ex VAT

sub-total £2,808.75 ex VAT

ALL PRICES EXCLUSIVE OF VAT

APPENDIX II

Reproduction of Gwynedd Archaeological Trust Photographic Record

APPENDIX II

PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	Plates
G2674_001	G2674_Pen_y_Gwaith	Photographic_record	Embankment D - location shot		SE	1x1m	Stuart Reilly	15/01/2021	Gwynedd Archaeological Trust	01
G2674_002	G2674_Pen_y_Gwaith	Photographic_record	Embankment D close-up of sand bags at SE terminal		SE	1x1m	Stuart Reilly	15/01/2021	Gwynedd Archaeological Trust	
G2674_003	G2674_Pen_y_Gwaith	Photographic_record	Spillway adjacent to Embankment D		E	1x1m	Stuart Reilly	15/01/2021	Gwynedd Archaeological Trust	07
G2674_004	G2674_Pen_y_Gwaith	Photographic_record	Old sluice Embankment D		E	Not Used	Stuart Reilly	15/01/2021	Gwynedd Archaeological Trust	04
G2674_005	G2674_Pen_y_Gwaith	Photographic_record	Old sluice through Embankment D - plastic sheeting and sandbags		SE	1x1m	Stuart Reilly	15/01/2021	Gwynedd Archaeological Trust	05
G2674_006	G2674_Pen_y_Gwaith	Photographic_record	Embankment D - location shot		NW	1x1m	Stuart Reilly	15/01/2021	Gwynedd Archaeological Trust	06
G2674_007	G2674_Pen_y_Gwaith	Photographic_record	Embankment C - location shot		NW	1x1m	Stuart Reilly	15/01/2021	Gwynedd Archaeological Trust	11

PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	Plates
G2674_008	G2674_Pen_y_Gwaith	Photographic_record	Reservoir looking toward Embankment D from Embankment C		W	Not Used	Stuart Reilly	15/01/2021	Gwynedd Archaeological Trust	
G2674_009	G2674_Pen_y_Gwaith	Photographic_record	Probable location of leat from Embankment D		SE	1x1m	Stuart Reilly	15/01/2021	Gwynedd Archaeological Trust	
G2674_010	G2674_Pen_y_Gwaith	Photographic_record	Location of Trial Pits 04 & 06 beyond Embankment C		NW	Not Used	Stuart Reilly	15/01/2021	Gwynedd Archaeological Trust	
G2674_011	G2674_Pen_y_Gwaith	Photographic_record	Embankment B - location		SE	1x1m	Stuart Reilly	15/01/2021	Gwynedd Archaeological Trust	15
G2674_012	G2674_Pen_y_Gwaith	Photographic_record	Embankment B - location		NW	1x1m	Stuart Reilly	15/01/2021	Gwynedd Archaeological Trust	14
G2674_013	G2674_Pen_y_Gwaith	Photographic_record	Embankment A		NNE	1x1m	Stuart Reilly	15/01/2021	Gwynedd Archaeological Trust	18
G2674_014	G2674_Pen_y_Gwaith	Photographic_record	Embankment A location with		W	Not Used	Stuart Reilly	15/01/2021	Gwynedd Archaeological Trust	

PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	Plates
			Embankment B in background							
G2674_015	G2674_Pen_y_Gwaith	Photographic_record	Location of Trial Pits beside Embankment D		E	Not Used	Stuart Reilly	15/01/2021	Gwynedd Archaeological Trust	
G2674_016	G2674_Pen_y_Gwaith	Photographic_record	Location of Trial Pit 15		SE	Not Used	Stuart Reilly	15/01/2021	Gwynedd Archaeological Trust	
G2674_017	G2674_Pen_y_Gwaith	Photographic_record	Location of Trial Pit 16		SE	Not Used	Stuart Reilly	15/01/2021	Gwynedd Archaeological Trust	
G2674_018	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Pre-ex of location of Trial Pit 20		SW	1x1m	Stuart Reilly	18/01/2021	Gwynedd Archaeological Trust	
G2674_019	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Pre-ex of location of Trial Pit 19; actually auger 14		SW	1x1m	Stuart Reilly	18/01/2021	Gwynedd Archaeological Trust	
G2674_020	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Pre-ex of location of Trial Pit 18; actually auger 13		SW	1x1m	Stuart Reilly	18/01/2021	Gwynedd Archaeological Trust	
G2674_021	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Trial Pit 20 excavated		NW	1x1m	Stuart Reilly	18/01/2021	Gwynedd Archaeological	24

PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	Plates
									Trust	
G2674_022	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Pre-ex of location of Trial Pit 18		SE	1x1m	Stuart Reilly	18/01/2021	Gwynedd Archaeological Trust	
G2674_023	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Embankment A - location		W	1x1m	Stuart Reilly	18/01/2021	Gwynedd Archaeological Trust	19
G2674_024	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Embankment A, view of northwest face		NW	1x1m	Stuart Reilly	18/01/2021	Gwynedd Archaeological Trust	
G2674_025	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Post-ex of Trial Pit 19		NW	1x1m	Stuart Reilly	18/01/2021	Gwynedd Archaeological Trust	
G2674_026	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Post-ex of Trial Pit 18 (relocated to on top of Embankment A)		NW	1x1m	Stuart Reilly	18/01/2021	Gwynedd Archaeological Trust	23
G2674_027	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	North face of Embankment B		N	1x1m	Stuart Reilly	18/01/2021	Gwynedd Archaeological Trust	
G2674_028	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Oblique view of Embankment B		NW	1x1m	Stuart Reilly	18/01/2021	Gwynedd Archaeological Trust	16
G2674_029	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	North face of Embankment		N	1x1m	Stuart Reilly	18/01/2021	Gwynedd Archaeological	17

PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	Plates
			B - tumble at centre						Trust	
G2674_030	G2674_Pen_y_Gwaith	Watching_Brief_GI_Works	Post-ex of Trial Pit 01		E	1x1m	Stuart Reilly	18/01/2021	Gwynedd Archaeological Trust	20
G2674_031	G2674_Pen_y_Gwaith	Watching_Brief_GI_Works	North face of Embankment B		E	1x1m	Stuart Reilly	18/01/2021	Gwynedd Archaeological Trust	
G2674_032	G2674_Pen_y_Gwaith	Watching_Brief_GI_Works	Oblique view of south face of Embankment B		SSE	1x1m	Stuart Reilly	18/01/2021	Gwynedd Archaeological Trust	
G2674_033	G2674_Pen_y_Gwaith	Watching_Brief_GI_Works	Post-ex of Trial Pit 02		NE	1x1m	Stuart Reilly	18/01/2021	Gwynedd Archaeological Trust	
G2674_034	G2674_Pen_y_Gwaith	Watching_Brief_GI_Works	Oblique view of southwest face of Embankment C		W	1x1m	Stuart Reilly	18/01/2021	Gwynedd Archaeological Trust	10
G2674_035	G2674_Pen_y_Gwaith	Watching_Brief_GI_Works	Sluice marker along southwest face of Embankment C		NE	Not used	Stuart Reilly	18/01/2021	Gwynedd Archaeological Trust	13
G2674_036	G2674_Pen_y_Gwaith	Watching_Brief_GI_Works	Southwest face of		S	1x1m	Stuart Reilly	18/01/2021	Gwynedd Archaeological	

PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	Plates
			Embankment C						Trust	
G2674_037	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Northeast face of Embankment C		NW	1x1m	Stuart Reilly	18/01/2021	Gwynedd Archaeological Trust	12
G2674_038	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Post-ex of Trial Pit 03		NNE	1x1m	Stuart Reilly	19/01/2021	Gwynedd Archaeological Trust	
G2674_039	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Location of Trial Pit 03 around exposed bedrock		NNE	1x1m	Stuart Reilly	19/01/2021	Gwynedd Archaeological Trust	
G2674_040	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Post-ex of Trial Pit 05		SE	1x1m	Stuart Reilly	19/01/2021	Gwynedd Archaeological Trust	
G2674_041	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Post-ex of Trial Pit 04		NNW	1x1m	Stuart Reilly	19/01/2021	Gwynedd Archaeological Trust	
G2674_042	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Post-ex of Trial Pit 06		W	1x1m	Stuart Reilly	19/01/2021	Gwynedd Archaeological Trust	
G2674_043	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Post-ex of Trial Pit 15		S	1x1m	Stuart Reilly	19/01/2021	Gwynedd Archaeological Trust	
G2674_044	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Post-ex of Trial Pit 14		NW	1x1m	Stuart Reilly	19/01/2021	Gwynedd Archaeological Trust	

PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	Plates
G2674_045	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Post-ex of Trial Pit 11		NE	1x1m	Stuart Reilly	19/01/2021	Gwynedd Archaeological Trust	22
G2674_046	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Post-ex of Trial Pit 10		NW	1x1m	Stuart Reilly	19/01/2021	Gwynedd Archaeological Trust	
G2674_047	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Post-ex of Trial Pit 09		SW	1x1m	Stuart Reilly	20/01/2021	Gwynedd Archaeological Trust	
G2674_048	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	North face of Embankment D		N	1x1m	Stuart Reilly	20/01/2021	Gwynedd Archaeological Trust	02
G2674_049	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Oblique view of north face of Embankment D		SE	1x1m	Stuart Reilly	20/01/2021	Gwynedd Archaeological Trust	03
G2674_050	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Post-ex of Trial Pit 08		NW	1x1m	Stuart Reilly	20/01/2021	Gwynedd Archaeological Trust	21
G2674_051	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Location of spillway adjacent to eastern terminal of Embankment D		SSW	1x1m	Stuart Reilly	20/01/2021	Gwynedd Archaeological Trust	08
G2674_052	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Post-ex of Trial Pit 12		SE	1x1m	Stuart Reilly	20/01/2021	Gwynedd Archaeological	

PHOTO RECORD NUMBER*	PROJECT NAME	PROJECT PHASE	DESCRIPTION*	CONTEXT NUMBER (S)	VIEW FROM	SCALE(S)	CREATOR OF DIGITAL PHOTO*	DATE OF CREATION OF DIGITAL PHOTO*	ORIGINATING ORGANISATION	Plates
									Trust	
G2674_053	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	View of possible leat		SE	1x1m	Stuart Reilly	20/01/2021	Gwynedd Archaeological Trust	09
G2674_054	G2674_Pen_y_Gwaith	Watching_Brief_ GI_Works	Post-ex of Trial Pit 13		NNW	1x1m	Stuart Reilly	20/01/2021	Gwynedd Archaeological Trust	



Gwynedd Archaeological Trust
Ymddiriedolaeth Archaeolegol Gwynedd

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Ffon: 01248 352535. Ffacs: 01248 370925. email: gat@heneb.co.uk

