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Coch Willan Hydro-Electric Scheme, Penrhyn, Gwynedd.
August 2016
V 1.0

Archaeological Watching Brief
Project Code: A0017.2
Report no. 0100

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Archaeological Watching Brief

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Project Code: A0017.2
Date: 01/09/2016
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Aeon Archaeology was commissioned by Carter Jonas LLP to carry out an archaeological watching brief during the construction of a new micro hydro-electric scheme located on the western bank of the Afon Ogwen, approximately 500.0m east of the farm of Pen Lan, Penrhyn, Gwynedd, as a condition of full planning permission.

The watching brief revealed a post-medieval structure and extant field boundary wall also of post-medieval date. In addition the watching brief provided the opportunity to record the historic mill race leat of the Penlan flint mill prior to it being breached for the insertion of the new hydro intake.

The watching brief can be seen as having fulfilled the spirit and intent of the archaeological condition and it is recommended that the condition now be discharged.

2.0 INTRODUCTION

Aeon Archaeology was commissioned by Carter Jonas LLP to carry out an archaeological watching brief during the construction of a new micro hydro-electric scheme located on the western bank of the Afon Ogwen, approximately 500.0m east of the farm of Pen Lan, Penrhyn, Gwynedd, as a condition of full planning permission (**ref: C13/1039/16/LL**) .

The scheme included an intake weir located on the Afon Ogwen and a c.500.0m long buried pipe to a turbine house located in a field to the west of the river. The pipe was made from 1500mm (external diameter) HDPE black plastic which was laid into the base of the historic Penlan flint mill-race once it had been emptied of silt and debris. In addition excavations for the installation of a screen box and fish bypass took place at the southern end of the mill race and immediately adjacent to the weir. The mill race was then in-filled with soil and the pipe was laid in the base of an existing modern culvert beneath the A55. Once it emerged on the northern side of the culvert the pipe was trenched through the edge of the historic mill race and buried through the field to the new turbine house.

A new cable then ran northwest along the edge of a large enclosed grazing field before and then across an unnamed road where it was joined to an existing power line (figure 1 and figure 2).

An archaeological assessment was carried out by Aeon Archaeology in November 2015 (Aeon report 0015) as part of a full planning application. This assessment studied the proposed development area, which included the water intake point, the hydro pipe route, the turbine house, the water outflow, the power cable route, and a 40.0m wide assessment corridor centred on the proposed pipeline route. In addition, a 1.0km search area centred on the proposed route was utilised for a search of the Gwynedd Historic Environment Record (HER). This provided a background historical narrative of the area and included source material from the Gwynedd Archives and Record Office. Information on Scheduled Ancient Monuments and Listed Buildings was obtained from Cadw.

The watching brief was maintained during intrusive groundworks, as detailed below.

A written Scheme of Investigation (WSI) was undertaken by Aeon Archaeology in January 2016 (appendix I) which outlined the principle aims of the watching brief and the methods by which they would be met. This formed the basis of a method statement submitted for the work.

Relevant UK legislation on heritage includes the Historic Environment Act (Wales) 2016 which sets out the requirement for Scheduled Ancient Monument Consent for any works of demolition, repair, and alteration that might affect a Scheduled Ancient Monument. For archaeological sites that are not covered by the above Act, protection is afforded through development control, the Town and Country Planning Act 1990, the Welsh Government's Planning Policy Wales (PPW 2012), and Welsh Office Circular 60/96.

Reference will be made to the guidelines specified in Standard and Guidance for Archaeological Watching Brief (Chartered Institute for Archaeologists, 2014).

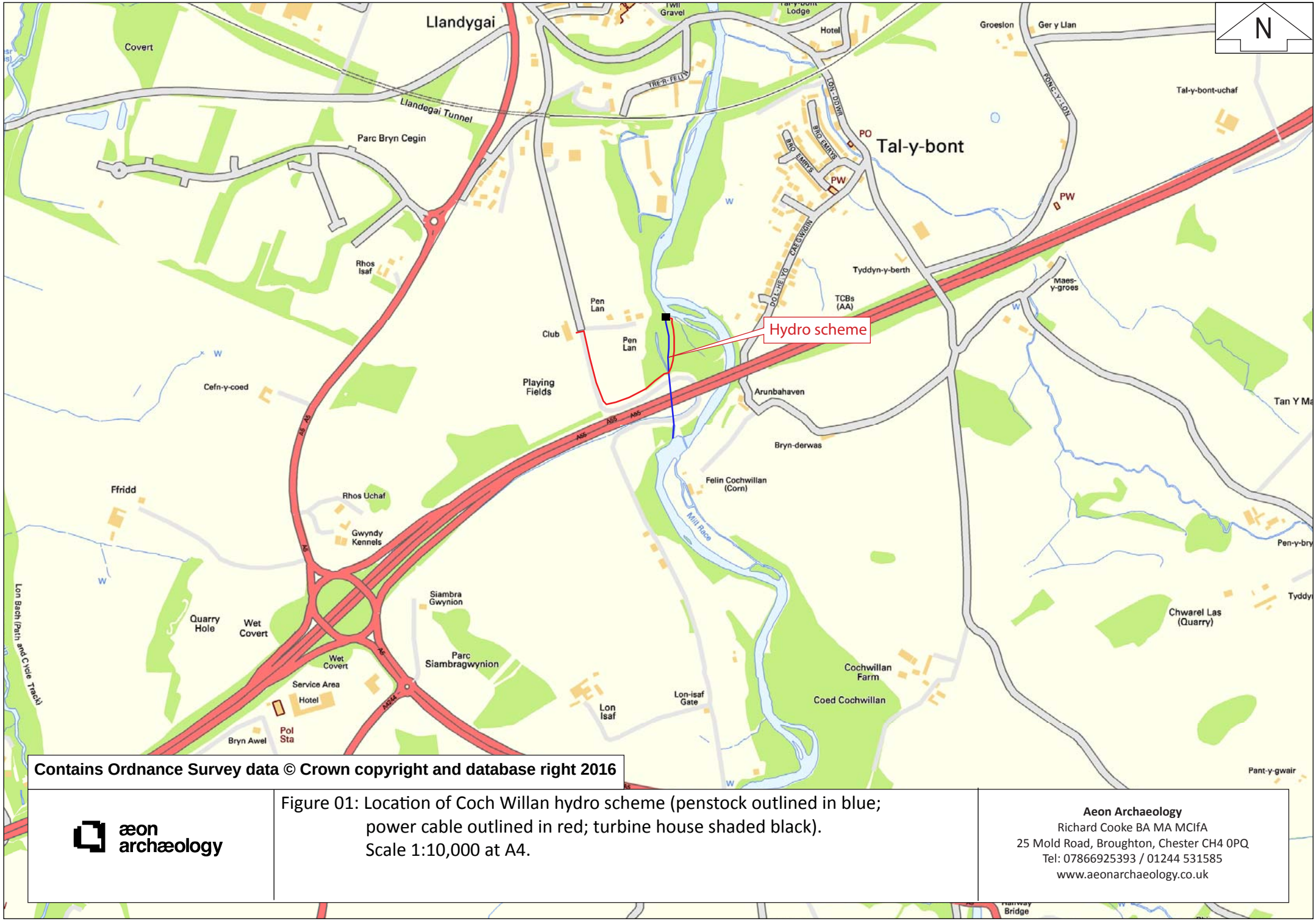

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Figure 01: Location of Coch Willan hydro scheme (penstock outlined in blue; power cable outlined in red; turbine house shaded black). Scale 1:10,000 at A4.

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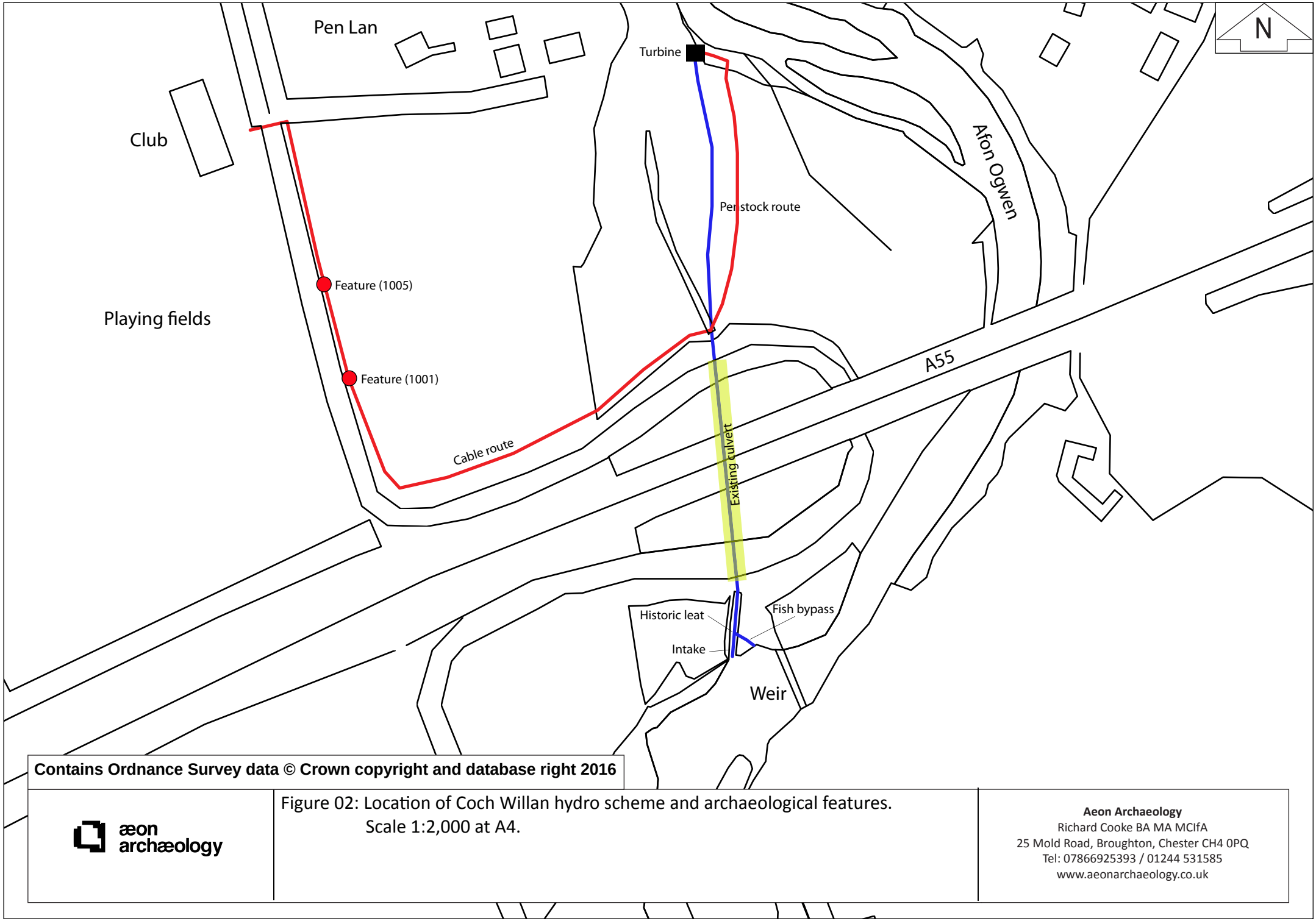

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Figure 02: Location of Coch Willan hydro scheme and archaeological features.
Scale 1:2,000 at A4.

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3.0 PROJECT AIMS

The watching brief was maintained during the following actions:

1. The removal of silt and debris within the historic mill race (feature 3).
2. The excavation of the screen box and fish by-pass.
3. The excavation of the penstock route in proximity to possible structure (feature 4).
4. The excavation of the pipe trench in the field north of the A55.
5. The excavation of the electrical cable trench within the farm track and unnamed road.

The CIfA maintains a standard for archaeological watching brief which states that:

An archaeological watching brief will record the archaeological resource during development within a specified area using appropriate methods and practices. These will satisfy the stated aims of the project, and comply with the Code of conduct and other relevant by-laws of CIfA.

An archaeological watching brief is defined by the CIfA as a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons (CIfA 2014). A watching brief will take place within a specified area within the Site where there is a possibility that archaeological deposits may be disturbed or destroyed.

The CIfA further identifies the purpose of a watching brief as allowing, within the resources available, the preservation by record of archaeological deposits, the presence and nature of which could not be established in advance of development or other potentially disruptive works.

It is also important to note that a watching brief provides an opportunity, if needed, for a signal to be made to all interested parties, before the destruction of the archaeological materials, that an archaeological find has been made for which the resources allocated to the watching brief itself are not sufficient to support treatment to a satisfactory and proper standard.

A watching brief is, therefore, not intended to reduce the requirement for excavation or preservation of known or inferred deposits, and it is intended to guide, not replace, any requirement for contingent excavation or preservation of possible deposits.

The aims of the watching brief were:

- To allow, within the resources available, the opportunity to gain information about and record the presence/absence, nature and date of archaeological remains on the Site affected by excavations and groundworks for the development, the presence and nature of which could not be established with sufficient confidence in advance of works which may disturb them.

- To provide the facility to signal to the relevant authorities, before irreversible impact to remains that an archaeological and/or historic find has been made for which the resources allocated to the watching brief itself are inadequate to support their treatment to an adequate and satisfactory standard.

The specific objectives of the watching brief were:

- To observe and recover any artefacts of archaeological significance.

- To record the location, dimensions and nature of any deposits, features, structures or artefacts of archaeological significance.

- To recover samples of any deposits considered to have potential for analysis for palaeoenvironmental data should the opportunity arise.

- Where the raw data allows, to construct a model of the depositional processes and stratigraphic sequence for the relevant parts of the site.

4.0 METHODOLOGY – ARCHAEOLOGICAL WATCHING BRIEF

4.1 Watching Brief

The methodology for the watching brief was prepared with reference to the CIfA's document Standards and Guidance for Archaeological Watching Brief (2014) and was kept under constant review during the project, in order to see how far it was meeting the terms of the aims and objectives, and in order to adopt any new questions which may arise.

Curatorial monitoring of the archaeological work on behalf of the Council was carried out by an officer(s) of GAPS. To facilitate the curatorial monitoring, the officer was provided with a minimum of two weeks' notice of the start of the archaeological work.

A suitably qualified and experienced archaeologist (Richard Cooke BA MA MCIfA) from Aeon Archaeology was commissioned for the maintenance of the watching brief. On arrival on site, the archaeologist reported to the site manager and conformed to the arrangements for notification of entering and leaving site. The archaeologist kept a record of the date, time and duration of all attendances at site, the names and numbers of archaeologists deployed and any actions taken. The archaeologist was provided with a Health & Safety Induction by the construction contractor and wore a safety helmet, safety footwear and high visibility jacket/vest at all times.

Any archaeological deposits, features and structures identified which could be investigated and recorded under the terms of the watching brief were to be excavated manually in a controlled and stratigraphic manner sufficient to address the aims and objectives of the project – subject to the limitations on site access.

The method of recording followed the normal principles of stratigraphic excavation and the stratigraphy was recorded in written descriptions even where no archaeological deposits had been identified. The archaeologist recorded archaeological deposits using proformae recording forms and was to locate any remains on a large-scale site plan related to the Ordnance Survey National Grid and Datum references.

The drawn record would comprise plans at scale 1:20 and sections at scale 1:10.

A photographic record was maintained throughout using a digital SLR camera (Canon 600D) set to maximum resolution and any subsurface remains would be recorded photographically, with detailed notations and measured drawings being undertaken if required.

The archive produced is held at Aeon Archaeology under the project code **A0017.2**.

4.2 Data Collection from Site Records

A database of the site photographs was produced to enable active long-term curation of the photographs and easy searching. The site records were checked and cross-referenced and photographs were cross-referenced to contexts. These records were used to write the site narrative and the field drawings and survey data were used to produce an outline plan of the site.

All paper field records were scanned to provide a backup digital copy. The photographs were organised and precisely cross-referenced to the digital photographic record so that the Gwynedd Historic Environment Record (HER) can curate them in their active digital storage facility.

4.3 Artefact Methodology

All artefacts were to be collected and processed including those found within spoil tips. They would be bagged and labelled as well any preliminary identification taking place on site. After processing, all artefacts would be cleaned and examined in-house at Aeon Archaeology. If required artefacts would be sent to a relevant specialist for conservation and analysis.

The recovery policy for archaeological finds was kept under review throughout the archaeological watching brief. Any changes in recovery priorities would be made under guidance from an appropriate specialist and agreed with the Client and the Gwynedd Archaeological Planning Service. There was a presumption against the disposal of archaeological finds regardless of their apparent age or condition.

4.4 Environmental Samples Methodology

The sampling strategy and requirement for bulk soil samples was related to the perceived character, interpretational importance and chronological significance of the strata under investigation. This ensured that only significant features would be sampled. The aim of the sampling strategy was to recover carbonised macroscopic plant remains, small artefacts particularly knapping debris and evidence for metalworking.

Advice and guidance regarding environmental samples and their suitability for radiocarbon dating, as well as the analysis of macrofossils (charcoal and wood), pollen, animal bones and molluscs would be obtained from Oxford Archaeology if required.

4.5 Report and dissemination

A full archive including plans, photographs, written material and any other material resulting from the project was prepared. All plans, photographs and descriptions were labelled, and cross-referenced, and will be lodged within a suitable repository to be agreed with the archaeological curator within six months of the completion of the project.

A draft copy of the report has been sent to the client and upon written approval from them paper and digital copies of the report will be sent to the regional HER, the Gwynedd Archaeological Planning Service, and will be logged with the online OASIS database. Copies of all notes, plans, and photographs arising from the watching brief will be stored at Aeon Archaeology under the project code **A0017.2** with the originals being lodged in a suitable repository to be agreed with the archaeological curator.

5.0 SITE LOCATION AND TOPOGRAPHICAL BACKGROUND

The hydro-electric scheme was located on the western bank of the Afon Ogwen, approximately 500.0m east of the farm of Pen Lan, Penrhyn, Gwynedd. The scheme included an intake weir located on the Afon Ogwen (NGR **SH 60122 69963**) and a c.500.0m long buried pipe to a turbine house located in a field to the west of the Afon Ogwen (NGR **SH 60127 70223**). A buried cable was then trenched northwest through a large enclosed grazing field and across an unnamed road to an existing power line at NGR **SH 59875 70247**. The site lies within the historic community of Llandygai within the unitary authority of Gwynedd.

The water intake consisted of the opening up of the existing overflow channel at approximately 40.0m OD. After which the pipe passed through an existing storm overflow culvert which runs through a large embankment for the A55 expressway for approximately 250.0m. The culvert emerges on the northern side of the A55 and the scheme passed through a reasonably flat enclosed grazing field for approximately 250.0m to a new turbine house at approximately 37.0m OD before emptying back into the Afon Ogwen. The new power cable utilised the penstock trench as far south as the current farm trackway, where it was then trenched through a large enclosed grazing field.

The bedrock geology is of the Nant Ffrancon Subgroup. A sedimentary siltstone bedrock that formed approximately 449 to 485 million years ago in the Ordovician Period when the local environment was dominated by shallow seas (British Geological Survey).

6.0 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

(Reproduced from Aeon Archaeology report 0015)

6.1 Prehistoric and Roman Period

The site lies within the Dyffryn Ogwen Landscape of Outstanding Historic Interest (HLW(Gw)10) so designated for its contrasting evidence of prehistoric and later land use, superimposed by the extensive and visually dramatic remains of the recent and continuing industrial exploitation of slate.

The prehistoric period is particularly well represented within this part of North Wales with a possible prehistoric settlement (PRN: 29434) having been identified through cropmarks approximately 207.0m to the northwest of the proposed hydro discharge point. Furthermore, a bronze age burnt mound (PRN: 815) has been found at Rhos Uchaf and approximately 393.0m to the southwest. In the wider landscape in the area around Llandegai the prehistoric period is particularly well represented with a henge monument and cursus (Scheduled Ancient Monument CN153) having been discovered under the existing industrial estate during excavations by C. Houlder in 1966-7. This revealed a sanctuary of two large henge monuments, the largest measuring 90.0m in diameter and constructed over an earlier Neolithic house. Between the two henges was the western end of a cursus which ran along the gravel ridge towards the Ogwen valley for approximately 130.0m.

Later excavations at Parc Bryn Cegin and approximately 570.0m northwest of the proposed hydro site in 2005, revealed features dating from the Early Neolithic to the medieval period overlaid by eighteenth and nineteenth-century field boundaries. The most significant discovery was the remains of an Early Neolithic rectangular timber building as well as several clusters of Mid to Late Neolithic pits. In addition sixteen burnt mounds were found, some very well preserved, dating from the Neolithic and Bronze Age, as well as the remains of a Mid Iron Age ring-groove roundhouse and a Late Iron Age/Romano-British settlement. Associated finds included a Roman seal box and evidence for glass bead making. A large cache of glass beads dating to the Roman period was probably related to the settlement despite being found some distance from it (GAT report 764. 2008).

The Roman period is also fairly well represented with the projected line of the Segontium-Canovium Roman road (PRN: 17567) located approximately 4.0m to the southeast. Furthermore, approximately 165.0m to the west lies the proposed line of the Caer Llugwy-Bangor Roman road (PRN: 17819) as theorised by Waddelove (1999, 77-101). The road is proposed to run from Caer Llugwy to a hypothetical camp at Penrhyn, Bangor following amongst other things, the line of the old coach road, the turnpike through Nant y Benglog and Lord Penrhyn's along the west side of the Nant Ffrancon. Neither of these routes have been proven within proximity of the proposed development area and further work is required to confirm their existence.

Approximately 707.0m to the northeast of the site an apparent right-angle in the field west of St. Cross Church is believed to have been the site of a Roman fortlet (PRN 2456), although this area has since been landscaped and thus destroyed. In very close proximity to the proposed development site a Roman coin (PRN: 6890) was found approximately 54.0m to the northwest of the site.

6.2 Early Medieval, Medieval and Post-Medieval Periods

Evidence of the early medieval period is located approximately 1.06km to the northeast where cropmarks show at least two small square barrows with slightly rounded corners, one with a central grave pit, the other, larger barrow with two central pits (PRN: 24776) (Driver, T. 2006). In close proximity to this site and approximately 1.16km northeast of the development site an extended inhumation cemetery was identified during the 1966/67 excavations at Llandygai, overlying the cursus and approximately c.50.0m from the western terminal. Over sixty graves were recorded within the areas excavated, lying within the cursus and extending beyond the ditches to the north and south. A particularly significant feature of this group was a single grave lying within a rectangular mortuary enclosure on the south side. The graves were identified during surface cleaning of the cursus area and covered a total excavation area of c.380m. A characteristic dark fill identified the features and their interpretation as graves was dependant on their elongated shape (the dimensions were consistent with known extended inhumations), a generally west-east alignment and the evidence from excavation or partial excavation of eighteen examples (GAT report 697).

By the 12th and 13th centuries the kingdom of Gwynedd was divided into administrative *commotes*, administered through a network of local centres governed by a royal court or *Llys*. The township of a commote associated with a llys was known as the *maerdref*, in which the Prince's agent would reside. The component parts of a llys included the royal hall and other buildings associated with the residence, as well as the royal demesne worked by bond tenants, and the settlements of these tenants which constituted small hamlets. The llys and royal lands became the property of the English King upon the conclusion of the conquest of Wales.

The nearest surviving remains of the medieval period to the proposed development site includes the grade II Listed Building (PRN: 3670) of Cochwillan - 'The dark red enclosure' - called this because of the purple shade of the Penrhyn slate, which reddens the soil. It lies approximately 790.0m to the southeast and there are many historical associations tied up with the house. For successive centuries have the virtues of the occupants of Cochwillan been the theme of bardic song. The only portion of the house remaining is the dining room - which appears to have formed the north side of a quadrangle (Barnwell, E.L. & Evans, J.E. 1866).

Further remains from the medieval period were found during the archaeological excavations in 2005 at Parc Bryn Cegin, where a single medieval corn-drier was discovered (GAT report 764. 2008).

In 1765 Richard Pennant inherited part of the Penrhyn estate, and in 1781 he gained control of the remainder. Slowly Pennant took direct control over the running of the slate quarries and land, aided by his quarry manager William Williams (appointed 1761) and agent Benjamin Wyatt (appointed 1785). Pennant had employed Benjamin's brother, Samuel, to rebuild the house at Penrhyn, and also to construct a new villa at Lime Grove, where Benjamin was to live. Samuel was impressed with slate as a building medium, and the influential Wyatt family were responsible for a number of the early contracts for roofing slates, and more importantly for raising overall awareness of the advantages of slate.

In 1790 Benjamin Wyatt designed new harbour facilities to deal with an increased output of slates. New stone quays with a small stone pier and a warehouse for storage were constructed. The name of the port was changed from Abercegin to Port Penrhyn, to reflect its new status as a slate port controlled by the Pennant family. Usage of the port was also increased by the establishment of a flint grinding mill (Penlan mill) in c.1795 that imported flints from Suffolk and Ireland, usually in the form of ship's ballast. These flints were then mixed with local cherts from a quarry at Llanllechid and ground to form a temper, which was then exported and used in the making of ceramics. The development of these industries was largely the influence of Samuel Worthington, encouraged by Pennant (GAT report 943).

John Evans' wrote of Penlan mill in 1812 that '*in the vicinity of Penrhyn, on the stream of the Ogwen, is a curious mill, to grind petrosilex, or chert, quartz, and flints, for the use of porcelain and delph ware potteries. The machinery is well contrived, and consists of two overshot wheels about twenty feet in diameter, having trundles on the beams, sixteen do. Which, working within the mill, impart power to another large horizontal trundle-wheel, lifting several upright levers, that again operate on others, two floors above. Circular vessels are paved at the bottom with gritstone, on each of these is a centre with several elbows, between which are placed large flat stones, moved rapidly round by the communicating motion.*

The chert and flints are previously roasted in kilns nearly similar to those used for the calcination of lime. The materials so prepared are put into the molindary vessles, with a portion of water, and ground into an impalpable powder.

The mass in a fluid state is let out into divers reservoirs, where, after undergoing various decantations, is carried to a drying stove, and then packed in casks, and shipped to different parts of the Kingdom.' (Evans, J. 1812.)

Penlan mill (PRN: 6387; NPRN: 40754) lies approximately 440.0m north of the proposed development area, and was fed by the sluice and mill race which it is proposed are utilised as the intake for the hydro-electric scheme.

The proposed micro hydro-electric scheme location is first depicted on the Penrhyn estate map for Penylann of 1768. The hydro route lies partly within a field labelled as *llain arw* meaning *rough plot* and partly within *llain Uchaf* meaning *upper plot*. The new cable route passes through a field labelled as *gallt cae* meaning *hill field*.

The site is again depicted on the Llandygai parish tithe map of 1841. The proposed development site is depicted as being rather different to how it exists today, as the A55 expressway had not been constructed. The majority of the proposed hydro scheme location lies within what is depicted as a single large field (field 86), lying between the Afon Ogwen to the east and Telford's A5 road to the west. This is indicative of the land tenanted by the nearby farm of Pen Lan as opposed to realistically depicting the layout of enclosed fields. The water intake and most southerly part of the scheme is shown as lying within a thin belt of woodland.

Table 1. Tithe apportionment of 1841.

Field Number	Field Name	Landowner	Occupier	A/R/P
86	Penylan	The Hon. Edward Gordon Douglas Pennant	Griffith Thomas	24/1/38

The accompanying tithe apportionment (table 2) for the parish tithe map names field 86 as *Penylan* which shows that the whole of that area was tenanted and farmed by that property. The apportionment names the tenant as Griffith Thomas who is recorded on the Wales census of 1840 as being a farmer of 55 years of age. The census also shows that he was living with his wife Catherine Thomas (50 years) and his son Griffith Thomas (20 years), as well as eleven farm labourers (6 male and 5 female) at the time of the census.

The landowner was the Hon. Edward Gordon Douglas Pennant, 1st Baron Penrhyn. Born Edward Gordon Douglas, he was the younger son of the Hon. John Douglas and his wife Lady Frances. James Douglas, 14th Earl of Morton, was his paternal grandfather and George Sholto Douglas, 17th Earl of Morton, his elder brother. He inherited the Penrhyn estate through his wife's father, George Hay Dawkins-Pennant, and changed his name to Douglas-Pennant by Royal license in 1841. He was the owner of Penrhyn Quarry near Bethesda, which under his ownership developed into one of the two largest slate quarries in the world. He was also involved in politics and sat as Member of Parliament for Caernarvonshire between 1841 and 1866. He also held the honorary post of Lord Lieutenant of Caernarvonshire. In 1866 he was raised to the peerage as 1st Baron Penrhyn, of Llandegai in the County of Carnarvon.

Lord Penrhyn married, firstly, Juliana Isabella Mary, daughter of George Hay Dawkins Pennant, in 1833. They had two sons and three daughters. After her death in 1842 he married, secondly, Maria Louisa, daughter of Henry FitzRoy, 5th Duke of Grafton, in 1846. They had eight daughters. He died in 1886, aged 85, and was succeeded in the barony by his eldest son, George (Dodd, 1968).

The proposed hydro scheme location is depicted in detail on the first, second and third edition county series 25" Ordnance Survey maps of 1889, 1900, and 1914 respectively. All three editions depict the weir across the Afon Ogwen, which still exists today, and is the location of the proposed water intake for the hydro scheme. Also depicted is a mill race which leaves the river on the western bank immediately upstream of the weir, and is almost certainly the open cut channel in existence today, which is to be utilised to carry water to the turbine house. The mill race is shown as running north and the majority of it was almost certainly replaced with the existing modern culvert during the construction of the A55 expressway. All three Ordnance Survey maps show the mill race continuing northward in the location of what is now the overflow channel north of the A55 road, and then it abruptly stops being depicted as it becomes a culvert for approximately 225.0m. After which the mill race is shown again as an open cut channel which continued north to feed the water wheels at the Penlan mill flint mill (PRN: 6387; NPRN: 40754).

The second and third edition Ordnance Survey maps depict a small building in the field north of the A55 expressway. This building was most probably a sheepfold or agricultural outbuilding, the remains of which can still be seen today.

7.0 QUANTIFICATION OF RESULTS

7.1 The Documentary Archive

The following documentary records were created during the archaeological watching brief:

Watching brief day sheets	11
Context sheets	5
Digital photographs	62

7.2 Environmental Samples

No environmental samples were taken as part of the watching brief as no suitable archaeological deposits were encountered.

7.3 Artefacts

No artefacts were recovered during the archaeological watching brief.

8.0 RESULTS OF THE ARCHAEOLOGICAL WATCHING BRIEF

Cable Trench

29th March – 2nd April 2016 (figures 1-5 and 9; plates 1-15)

The watching brief was maintained during the excavation of the new cable trench from the point it left the modern leat beneath the A55 and continued southwest along the southern edge of the enclosed grazing field, before turning northwest and running along the western edge of the field.

The cable trench measured on average 0.4m in width by 0.6m in depth and cut through a 0.2m deep dark red-brown silt-clay topsoil and a 0.25m deep mid orange-brown silt-clay subsoil into the light orange-brown natural glacial clay substrata. On the steep slope to the immediate southwest of the leat exit the topsoil and subsoil horizons were reduced to 0.15m and 0.2m deep respectively.

No archaeological remains or artefacts were uncovered until the trench had turned north-westward and was running alongside the western boundary of the grazing field. At NGR SH 59949 70093 a 10.0m wide structure (1001) (PRN: 61715) was encountered lying directly beneath the topsoil horizon. This structure had an apparent wall (1003) at the southern side measuring 1.35m in width by 0.25m in height and constructed from dry-bonded, medium sized sub-rounded and sub-angular grey stone cobbles. An opposing wall at the north end (1002) measured 1.52m in width by 0.25m in height and appeared to continue for approximately 1.6m further north on the eastern edge of the trench before disappearing into the eastern limit of excavation. The northern wall was also constructed from dry-bonded, medium sized sub-rounded and sub-angular grey stone cobbles and appeared to enclose an area measuring 5.6m and made up of dry-bonded, small and medium sized sub-rounded and sub-angular grey stone cobbles (1004). This central core did not appear to be structural and was likely an area of demolition from the exterior walls (1002) and (1003) that had collapsed, or been purposely demolished into, the internal part of the structure. The shape in plan of the structure was not apparent due to the narrow confines of the trench.

Upon cleaning of the opposing walls and central core, numerous sherds of post-medieval black-ware ceramic were recovered as well as unbutchered animal bone and clam shells. These finds were found sometimes loosely pressed into the remnants of the topsoil horizon and sometimes found well-embedded into the structure itself, the latter suggesting that they were in-situ. This would suggest that the structure was of post-medieval date although no such structure is depicted on the estate map of 1768, tithe map of 1841, or on the first, second or third edition 25" County Series Ordnance Survey maps of 1889, 1900 and 1914 respectively (see Aeon Archaeology report 0015). It is therefore probable that this feature was an agricultural structure, possibly an outbuilding or animal shelter which was not considered important enough to depict. The feature was retained in-situ with the new hydro-electric cable being laid over the top of it.

Approximately 40.5m further north of structure (1001) a stone wall (1005) was encountered immediately beneath the topsoil horizon and running from east to west (NGR SH 59938 70133) (PRN: 61716). This wall measured 1.22m in width by 0.6m in height and had an internal core of dry-bonded small and medium sized sub-rounded grey stone cobbles. On the north and south sides the wall had an outer face measuring 0.3m in width and constructed from dry-bonded large rounded grey stone cobbles. No artefacts were recovered during the cleaning and recording of the wall but the

structure is depicted on the second and third edition 25" County Series Ordnance Survey maps of 1900 and 1914 respectively (see Aeon Archaeology report 0015) as a field boundary wall dividing the current grazing field in two, and was therefore determined to be of post-medieval date.

The watching brief was again maintained during the excavation of the new cable trench from where it exited the modern leat (NGR SH 60106 70112) and ran northeast to the new turbine house H-pole at NGR SH 60108 70226). The cable trench again measured on average 0.4m in width by 0.6m in depth and cut through a 0.15m deep dark red-brown silt-clay topsoil directly into a light orange-brown natural glacial clay substrata. The shallow depth of topsoil and total lack of subsoil showed that the area had formerly been stripped on to the natural clay, almost certainly as part of the construction of the A55 expressway. As such no archaeological remains or artefacts were observed within this part of the field.

At the eastern end of the field the cable trench was carefully cut beneath the eastern stone wall of the historic mill race (feature 3; PRN: 37935). The structure was retained in-situ running over the top of the narrow cable trench however the trench did provide the opportunity to record the cut of the leat on its eastern side. This was shown to be a 1.0m deep cut with a concaved eastern edge and flat base extending 3.0m eastward of the edge of the leat wall and infilled with a dark red-brown silt-clay. This stratigraphic evidence shows that the leat was constructed first by the excavation of a wide channel measuring 3.0m wider on its eastern side, and presumably on its western side also. The leat walls were then constructed within the base of the cut after which it was backfilled to provide stability. This technique would have needed to be used so that there was enough working room to construct relatively high walls within the leat.

Intake leat

7th April – 12th April 2016 (figures 1, 2 and 6-9; plates 16-25)

The watching brief was maintained while a tracked excavator was utilised to empty the historic intake leat (feature 3; PRN: 37935) of debris. Once emptied the leat walls were found to measure on average 2.08m in height and were constructed from dry-bonded large sub-rounded and sub-angular grey stone cobbles interspersed with a core of dry-bonded small sub-angular grey stone cobbles. The base of the leat was of the natural glacial clay substrata apart from at the southern end where a base of modern concrete had been poured for the initial 2.06m north of the modern steel sluice gate. The eastern wall had seen a phase of post-medieval repair using unfrogged red-brick bonded by mortar at the southern end measuring 3.4m in length by >1.15m in height, and after construction had been keyed into the existing stone cobble wall by replacing stones over the top of the brick masonry. The upper 0.7m of both leat walls was obscured by dense vegetation and moss obscuring the individual stone cobbles.

The watching brief was also maintained while the leat walls were cut back by 1.2m on either side and beyond their limits for the construction of the hydro-electric intake. This provided the opportunity to observe a cross-section of the leat walls which showed that they had an outer face measuring 0.6m in width of dry-bonded large sub-rounded and sub-angular grey stone cobbles and a backfill core measuring 0.4m in width of dry-bonded small sub-angular grey stone cobbles, presumably within a foundation cut that was not apparent.

No additional archaeological features were observed and no artefacts recovered.

Plate 1: Cable trench, from the east. Scale 1.0m.

Plate 02: South facing section of cable trench, from the south. Scale 0.5m.

Plate 3: Cable trench, from the east. Scale 1.0m.

Plate 04: South facing section of cable trench, from the south. Scale 1.0m.

Plate 5: Cable trench, from the west. Scale 1.0m.

Plate 06: East facing section of cable trench, from the east. Scale 0.5m.

Plate 7: Post-medieval structure (1001), from the south. Scale 0.5m.

Plate 08: Post-medieval structure (1001) showing northern wall (1003), from the east. Scale 0.5m.

Plate 09: Post-medieval structure (1001) showing southern wall (1003), from the east. Scale 0.5m.

Plate 10: Wall (1005), from the east. Scale 0.5m.

Plate 11: Wall (1005), from the north. Scale 0.5m.

Plate 12: Wall (1005), from the south. Scale 0.5m.

Plate 13: Cable trench, from the west. Scale 0.5m.

Plate 14: South facing section of cable trench showing leat cut, from the south. Scale 1.0m.

Plate 15: South facing section of cable trench showing leat cut, from the southeast. Scale 1.0m.

Plate 16: West wall of historic intake leat, from the southeast. Scale 1.0m.

Plate 17: West wall of historic intake leat, from the northeast. Scale 1.0m.

Plate 18: East wall of historic intake leat, from the southwest. Scale 1.0m.

Plate 19: East wall of historic intake leat, from the northwest. Scale 1.0m.

Plate 20: Historic intake leat emptied of debris, from the south. Scale 1.0m.

Plate 21: Historic intake leat emptied of debris, from the north. Scale 1.0m.

Plate 22: Hydro intake excavation within historic intake leat, from the south. Scale 1.0m.

Plate 23: Hydro intake excavation within historic intake leat, from the north. Scale 1.0m.

Plate 24: Section across western historic intake leat wall, from the north. Scale 1.0m.

Plate 25: Section across eastern historic intake leat wall, from the north. Scale 1.0m.

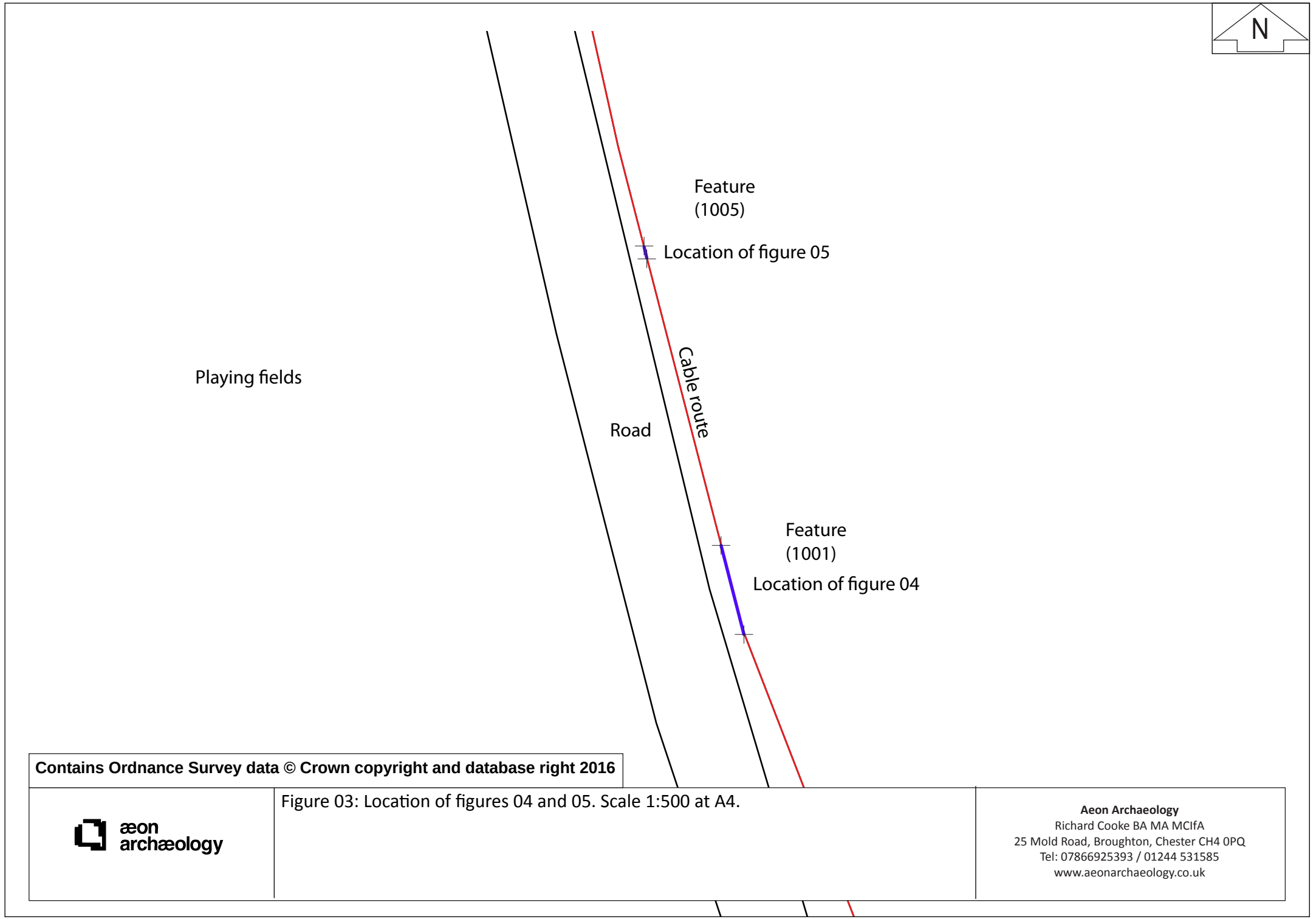

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Figure 03: Location of figures 04 and 05. Scale 1:500 at A4.

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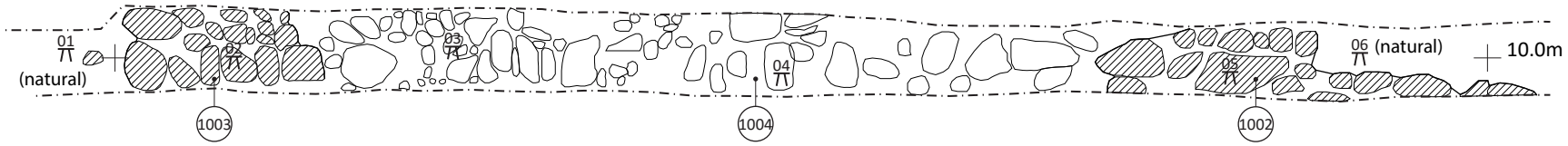
Spot Heights (reduced level OD (m)
1 = 51.42
2 = 51.57
3 = 51.56
4 = 51.58
5 = 51.70
6 = 51.31



Located on figure 03.

1:50

0 1 2m

Figure 04. Plan of structure (1001). Scale 1:50 at A4.

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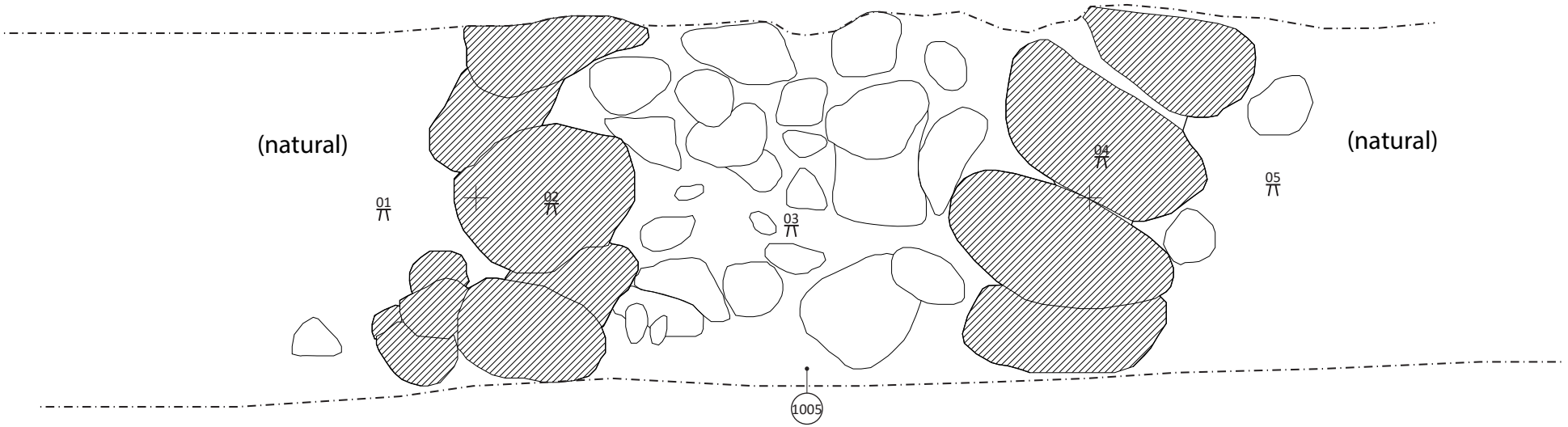
Spot Heights (reduced level OD (m)
1 = 51.48
2 = 51.83
3 = 51.06
4 = 51.50
5 = 51.52



Located on figure 03. 1:10

0 1m

Figure 05. Plan of wall (1005). Scale 1:10 at A4.

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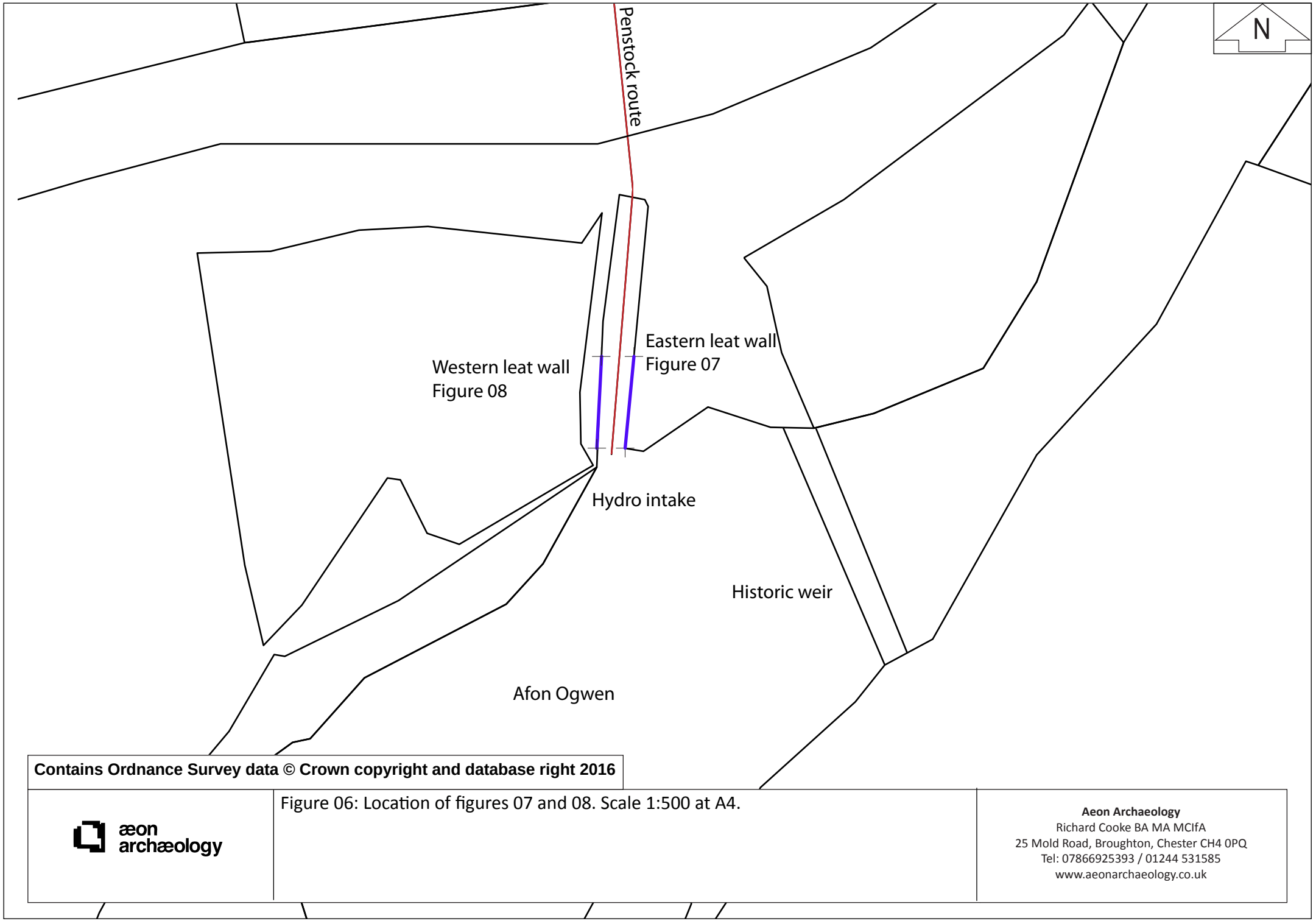

Figure 06: Location of figures 07 and 08. Scale 1:500 at A4.

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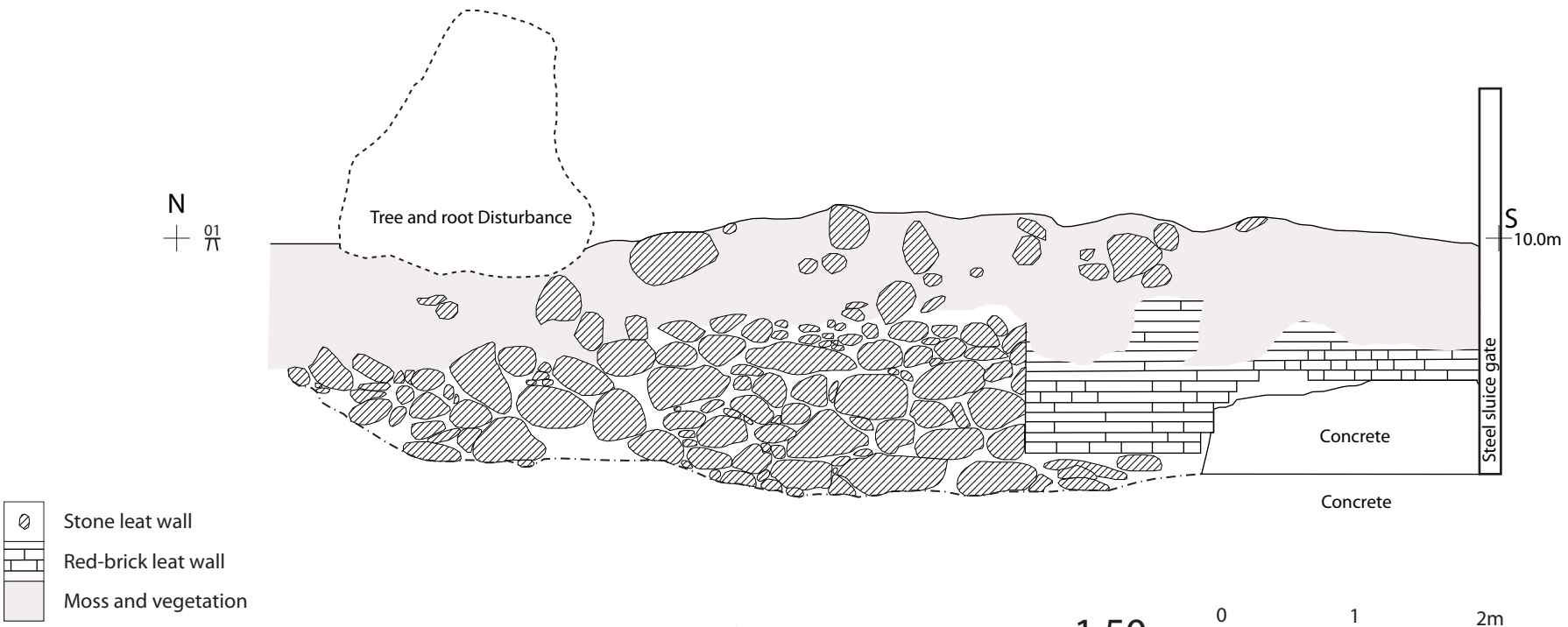
Spot Heights (reduced level OD (m)
1 = 19.77m



Located on figure 06.

1:50

Figure 07: Eastern leat wall, from the west. Scale 1:50 at A4.

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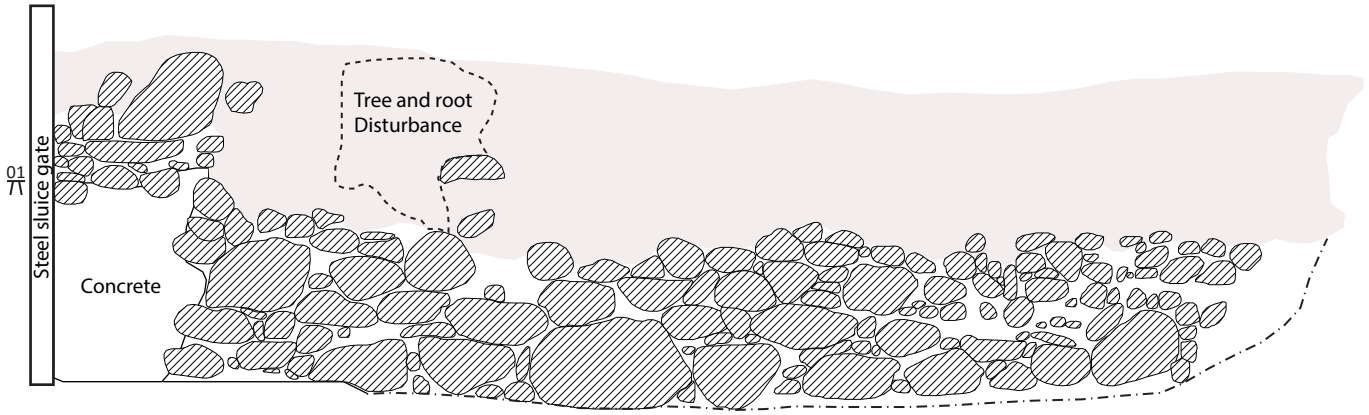
Spot Heights (reduced level OD (m)
1 = 19.2m



Stone leat wall

Vegetation

Located on figure 06.

1:50

0 1 2m

Figure 08. Western leat wall, from the east. Scale 1:50 at A4.

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Penstock trench and turbine footprint

19th April – 20th April 2016 (figures 1, 2 and 9; plates 26-29)

The watching brief was maintained during the excavation of the penstock trench from where it left the modern leat beneath the A55 expressway at NGR SH 60106 70112 and continued northeast across the field to the turbine location at NGR SH 60127 70223. The penstock trench measured 3.0m in width and was cut through a 0.15m deep mid red-brown silt-clay topsoil horizon and a 0.2m deep light red-brown subsoil onto a firm, light red-brown natural glacial clay substrata with frequent small rounded cobble inclusions. The thin topsoil horizon suggested that the area had been previously stripped on to the natural clay, perhaps as part of the construction of the A55 expressway, although this disturbance was less apparent than it had been during the excavation of the cable trench approximately 15.0m further to the south.

No archaeological remains or artefacts were uncovered.

The watching brief was also maintained during the excavation of the turbine footprint. This measured 17.0m in length by 13.0m in width orientated southwest to northeast and cut through a 0.43m deep dark mid red-brown silt-clay topsoil and a 0.4m deep light red-brown silt-clay subsoil horizon on to a mid red-brown natural glacial clay substrata with frequent large sized rounded and sub-rounded cobble inclusions.

No archaeological remains or artefacts were uncovered although it is likely that due to the high frequency of large cobble inclusions that any subtle or ephemeral features would have been almost impossible to identify. Moreover, the presence of a clay substrata would have meant that the field would have been prone to flooding prior to post-medieval land improvement, particularly during times of storm surge within the Afon Ogwen, and as such unsuitable to early occupation.

Plate 26: Penstock strip, from the southwest. Scale 1.0m.

Plate 27: Southeast facing section of penstock strip, from the southeast. Scale 0.5m.

Plate 28: Turbine house strip, from the northeast. Scale 1.0m.

Plate 29: Southeast facing section of turine house strip, from the southeast. Scale 0.5m.

Fish bypass excavation and river bank retaining wall breach

14th July 2016 (figures 1, 2 and 9; plates 30-34)

The watching brief was maintained during the excavation for the fish bypass located to the immediate east of the hydro intake and centred on NGR SH 60123 69981. A tracked excavator with toothless ditching bucket was utilised to excavate a 4.0m long by 2.0m wide sondage orientated northwest to southeast, through a 0.15m deep mid red-brown silt-clay topsoil and a 0.15m deep light red-brown silt-clay subsoil horizon on to a mid red-brown natural glacial clay substrata with frequent large sized rounded and sub-rounded cobble inclusions to a total depth of 2.0m.

At the south-eastern end the river bank retaining wall was uncovered on its inner face showing that it had been constructed as a battered wall measuring 0.87m in width by >1.1m in height. It had been constructed from large sub-rounded cobbles bonded by mortar and upon breaching was found to lie within a foundation cut measuring 1.15m in width by >2.0m in depth. This cut lay on the inward side and had a concaved edge and although the base was not encountered it was likely to have been relatively flat to provide a solid foundation for construction. After the wall was constructed a dark red-brown silt-clay was used as infill behind the wall to provide support.

Plate 30: River bank retaining wall prior to breach by fish bypass, from the southeast. Scale 1.0m.

Plate 31: River bank retaining wall exposed prior to breach by fish bypass, from the northwest. Scale 1.0m.

Plate 32: River bank retaining wall exposed prior to breach by fish bypass, from the southwest. Scale 1.0m.

Plate 33: River bank retaining wall breach for fish bypass, from the southwest. Scale 1.0m.

Plate 34: River bank retaining wall breach for fish bypass, from the north. Scale 1.0m.

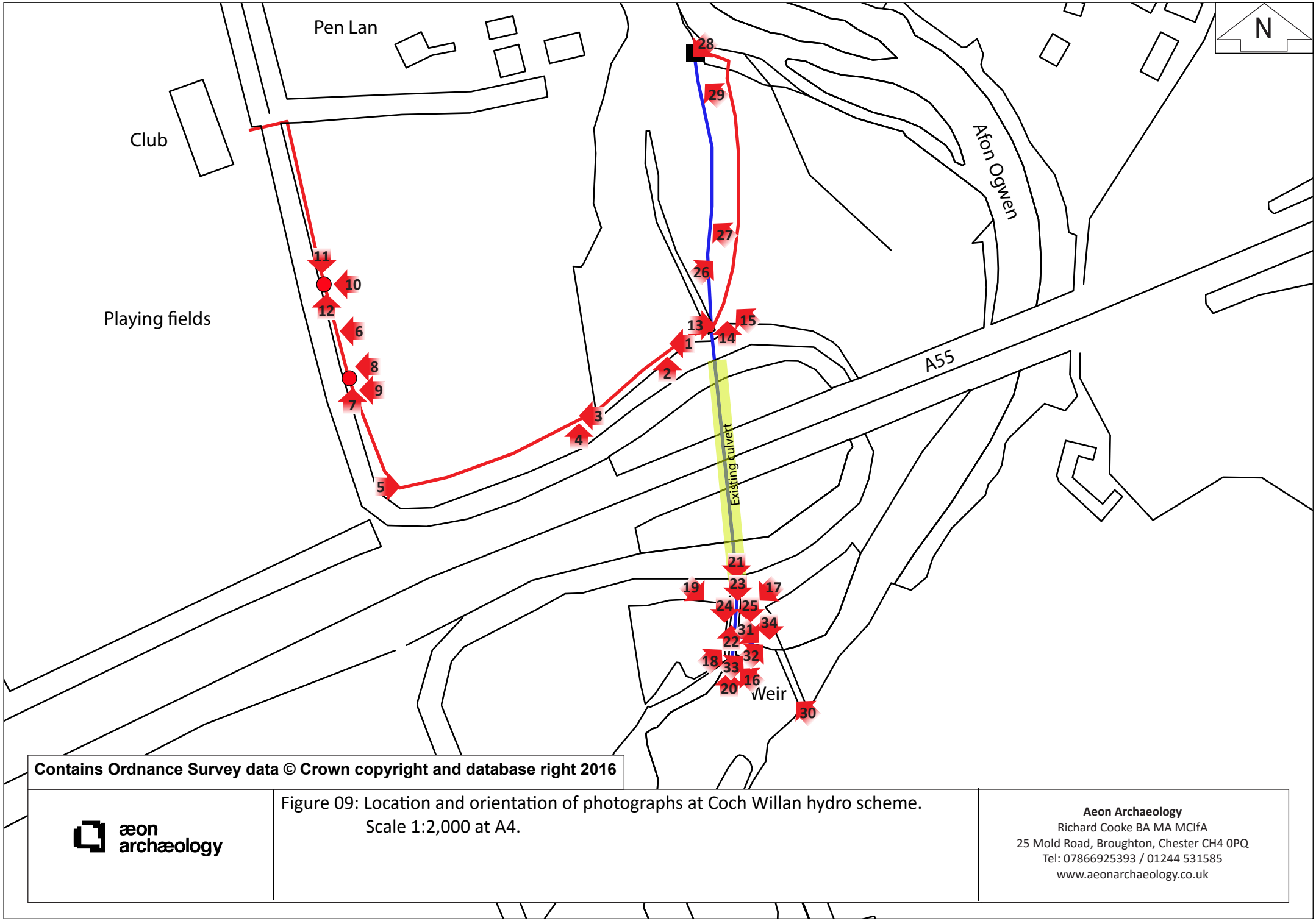

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Figure 09: Location and orientation of photographs at Coch Willan hydro scheme.
Scale 1:2,000 at A4.

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9.0 CONCLUSION AND RECOMMENDATIONS

The watching brief as part of the archaeological mitigation for the construction of a new hydro-electric scheme at Coch Willan, Penrhyn revealed a post-medieval structure and extant field boundary wall also of post-medieval date. In addition the watching brief provided the opportunity to record the regionally important historic mill race leat of the Penlan flint mill prior to it being breached for the insertion of the new hydro intake.

The watching brief can be seen as having fulfilled the spirit and intent of the archaeological condition and it is recommended that the condition now be discharged.

10.0 SOURCES

Sources

OS Maps

1st edition 25 inch Ordnance Survey Map of 1889, Sheet XIII.1.

2nd edition 25 inch Ordnance Survey Map of 1900, Sheet XIII.2.

3rd edition 25 inch Ordnance Survey Map of 1914, Sheet XIII.3

OS 1:10 000 Series sheet SH 56 NE, SH 56 SE, SH 56 SW, SH 56 NW, SH 57 NE, SH 57 SE, SH 57 SW, SH 57 NW, SH 66 NE, SH 66 SE, SH 66 SW, SH 66 NW, SH 67 NE, SH 67 SE, SH 67 SW, and SH 67 NW.

Aerial Photographs

RAF Aerial Photographs

CPE/UK/1996. Frames 1303, 1304, 2305, and 2306 taken 13th April 1947

541/178. Frames 3189, 3190 and 4210 taken 8th October 1948

541/38. Frame 4028 taken 21st May 1948

OS Aerial Photographs

Google Maps: 1999-2009

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Tithe Map and Apportionment of the Parish of Llandygai IR29/48 DEGWM 3

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Gwynedd Historic Environment Record (HER)

NMR Site Record Cards

The Chartered Institute for Archaeologists, 2014 *Standard and Guidance for Archaeological Watching Brief*

The Chartered Institute for Archaeologists, 2014. S*tandard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives*

APPENDIX I: WRITTEN SCHEME OF INVESTIGATION FOR ARCHAEOLOGICAL WATCHING BRIEF

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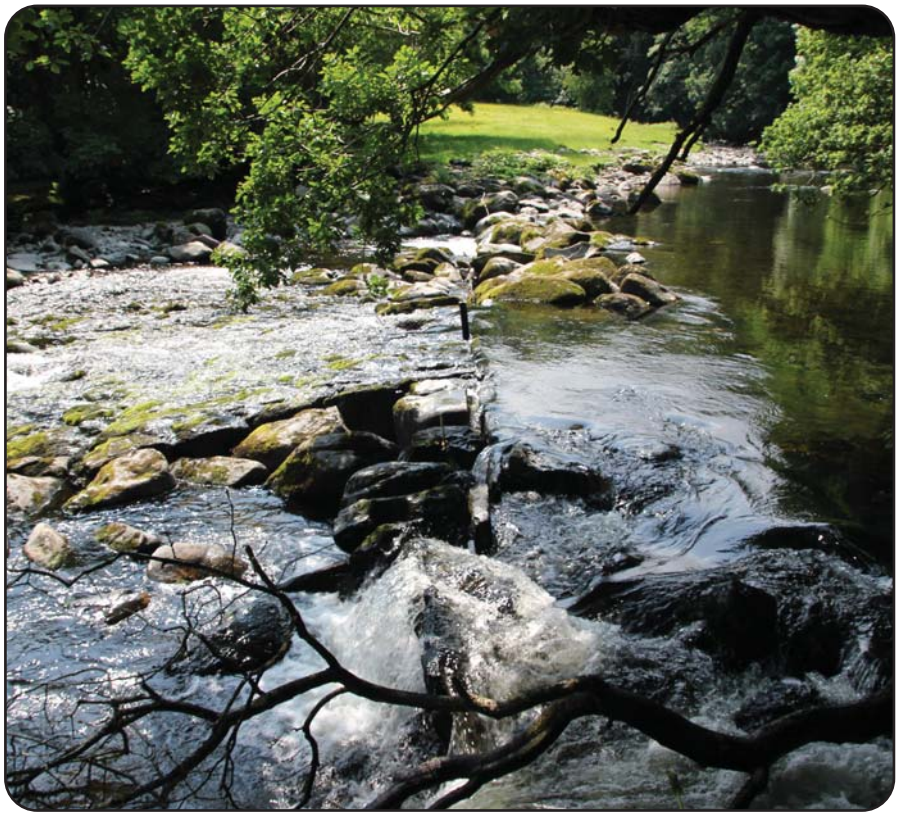
Coch Willan Hydro-Electric Scheme, Penrhyn, Gwynedd.
Written Scheme of Investigation for Archaeological Watching Brief



Archaeological WSI
Project Code: A0017.1

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1.0 INTRODUCTION

Planning permission has been secured by Carter Jonas LLP for the construction of a new micro hydro-electric scheme (**ref: C13/1039/16/LL**). The proposed scheme is to be located on the western bank of the Afon Ogwen, approximately 500.0m east of the farm of Pen Lan, Penrhyn, Gwynedd.

The scheme is to include an intake weir located on the Afon Ogwen and a c.500.0m long buried pipe to a turbine house located in a field to the west of the river . The pipe will be made from 1500mm (external diameter) HDPE black plastic which will be laid into the base of the historic mill race once it has been emptied of silt and debris. In addition excavations for the installation of a screen box and fish bypass will take place at the southern end of the mill race and immediately adjacent to the weir. The mill race will then be in-filled with soil and the pipe will enter and be laid in the base of the existing modern culvert beneath the A55. Once it emerges on the northern side of the culvert the pipe will be trenched through the edge of the historic mill race and be buried through the field to the new turbine house.

A new cable will then run northwest within the farm trackway. It will then be trenched northward along the unnamed road and into a field to the west where it will be joined to an existing power line (figure 1 and figure 2).

In addition to the proposed hydro-electric scheme the works will also include repair to the western bank and side of the weir as part of a wider flood-prevention scheme. This will involve diverting the water away from the left hand bank via excavation and installation of a galvanised steel drop plank frame into the river bed in a dry region on the river channel on the eastern side. When the frame is installed, boulder/gravel deposits will be removed to provide a new channel through the frame to accommodate flow during moderate river conditions. This will drop the water level above the weir, reducing diversion works required to dry the area at the eastern bank in need of repair. On completion, drop planks will be inserted in the frame restoring the original river level above the weir. The weir will be repaired using existing stones that have fallen from it.

During the construction a lay down compound for material storage will be used in the enclosed field beneath the A55 expressway and plant machinery will access the site via the existing trackways.

Aeon Archaeology is appointed as the Archaeological Consultant for this project and has prepared this document, which acts as a Written Scheme of Investigation (hereafter WSI) for an archaeological watching brief. This WSI is designed to comply with the spirit and intent of Planning Policy Wales, Welsh Office Circular 60/96, and the National Planning Policy Framework (NPPF) to achieve an investigation of archaeological remains, and to record and advance understanding of their significance before they are irreversibly impacted upon by construction works. The results of the investigative works will be reported and submitted to the Gwynedd Historic Environment Record (HER). If merited the results of the archaeological works will be published in a local or national journal, as appropriate. The records generated during the fieldwork (paper, photographic and digital) will be offered to a local museum and the Royal Commission on the Ancient and Historical Monuments in Wales (RCAHMW).

The watching brief will be maintained during intrusive groundworks, as detailed below.

An archaeological assessment was carried out by Aeon Archaeology in November 2015 (Aeon report 0015) as part of a full planning application. This assessment studied the proposed development area, which included the water intake point, the hydro pipe route, the turbine house, the water outflow, the power cable route, and a 40.0m wide assessment corridor centred on the proposed pipeline route. In addition, a 1.0km search area centred on the proposed route was utilised for a search of the Gwynedd

Historic Environment Record (HER). This provided a background historical narrative of the area and included source material from the Gwynedd Archives and Record Office. Information on Scheduled Ancient Monuments and Listed Buildings was obtained from Cadw.

This WSI states the aims, objectives and methodology for implementing the recommendations for archaeological watching brief made within the assessment report so as to meet the spirit and intent of the archaeological condition.

Reference will be made to the guidelines specified in Standard and Guidance for Archaeological Watching Brief (Chartered Institute for Archaeologists, 2014).

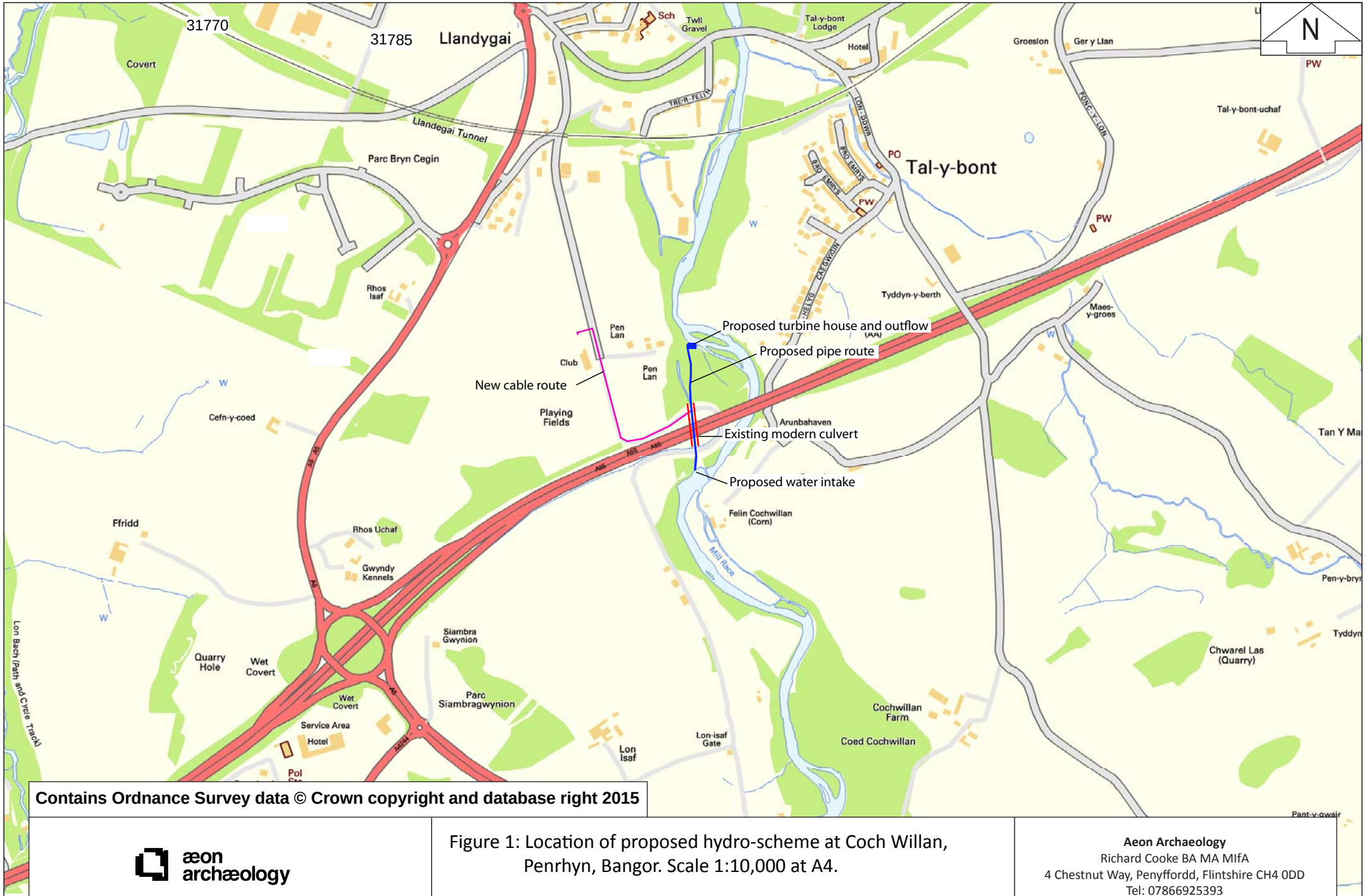

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Figure 1: Location of proposed hydro-scheme at Coch Willan, Penrhyn, Bangor. Scale 1:10,000 at A4.

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Figure 02: Location of new archaeological sites identified during the assessment (numbered circles) and archaeological deposit model (green shows area devoid of archaeology; red shows area with medium-high potential for buried remains; purple shows areas of unknown potential). Scale 1:3,500.

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2.0 SITE LOCATION AND TOPOGRAPHICAL BACKGROUND

The proposed hydro-electric scheme will be located on the western bank of the Afon Ogwen, approximately 500.0m east of the farm of Pen Lan, Penrhyn, Gwynedd. The scheme is to include an intake weir located on the Afon Ogwen (NGR **SH 60122 69963**) and a c.500.0m long buried pipe to a turbine house located in a field to the west of the Afon Ogwen (NGR **SH 60127 70223**). A buried cable will then be trenched northwest within the farm trackway and unnamed road to an existing power line at NGR **SH 59875 70247**. The site lies within the historic community of Llandygai within the unitary authority of Gwynedd.

The water intake will consist of the opening up of the existing overflow channel at approximately 40.0m OD. After which the pipe will pass through an existing storm overflow culvert which runs through a large embankment for the A55 expressway for approximately 250.0m. The culvert emerges on the northern side of the A55 and the proposed scheme will pass through a reasonably flat enclosed grazing field for approximately 250.0m to a new turbine house at approximately 37.0m OD before emptying back into the Afon Ogwen. The new power cable will utilise the penstock trench as far south as the current farm trackway, where it will then be trenched within the track to the unnamed road and continue northward within the road verge.

The bedrock geology is of the Nant Ffrancon Subgroup. A sedimentary siltstone bedrock that formed approximately 449 to 485 million years ago in the Ordovician Period when the local environment was dominated by shallow seas (British Geological Survey).

3.0 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

3.1 Prehistoric and Roman Period

The site lies within the Dyffryn Ogwen Landscape of Outstanding Historic Interest (HLW(Gw)10) so designated for its contrasting evidence of prehistoric and later land use, superimposed by the extensive and visually dramatic remains of the recent and continuing industrial exploitation of slate.

The prehistoric period is particularly well represented within this part of North Wales with a possible prehistoric settlement (PRN: 29434) having been identified through cropmarks approximately 207.0m to the northwest of the proposed hydro discharge point. Furthermore, a bronze age burnt mound (PRN: 815) has been found at Rhos Uchaf and approximately 393.0m to the southwest. In the wider landscape in the area around Llandegai the prehistoric period is particularly well represented with a henge monument and cursus (Scheduled Ancient Monument CN153) having been discovered under the existing industrial estate during excavations by C. Houlder in 1966-7. This revealed a sanctuary of two large henge monuments, the largest measuring 90.0m in diameter and constructed over an earlier Neolithic house. Between the two henges was the western end of a cursus which ran along the gravel ridge towards the Ogwen valley for approximately 130.0m.

Later excavations at Parc Bryn Cegin and approximately 570.0m northwest of the proposed hydro site in 2005, revealed features dating from the Early Neolithic to the medieval period overlaid by eighteenth and nineteenth-century field boundaries. The most significant discovery was the remains of an Early Neolithic rectangular timber building as well as several clusters of Mid to Late Neolithic pits. In addition sixteen burnt mounds were found, some very well preserved, dating from the Neolithic and Bronze Age, as well as the remains of a Mid Iron Age ring-groove roundhouse and a Late Iron Age/Romano-British settlement. Associated finds included a Roman seal box and evidence for glass bead making. A large cache of glass beads dating to the Roman period was probably related to the settlement despite being found some distance from it (GAT report 764. 2008).

The Roman period is also fairly well represented with the projected line of the Segontium-Canovium Roman road (PRN: 17567) located approximately 4.0m to the southeast. Furthermore, approximately 165.0m to the west lies the proposed line of the Caer Llugwy-Bangor Roman road (PRN: 17819) as theorised by Waddelove (1999, 77-101). The road is proposed to run from Caer Llugwy to a hypothetical camp at Penrhyn, Bangor following amongst other things, the line of the old coach road, the turnpike through Nant y Benglog and Lord Penrhyn's along the west side of the Nant Ffrancon. Neither of these routes have been proven within proximity of the proposed development area and further work is required to confirm their existence.

Approximately 707.0m to the northeast of the site an apparent right-angle in the field west of St. Cross Church is believed to have been the site of a Roman fortlet (PRN 2456), although this area has since been landscaped and thus destroyed. In very close proximity to the proposed development site a Roman coin (PRN: 6890) was found approximately 54.0m to the northwest of the site.

3.2 Early Medieval, Medieval and Post-Medieval Periods

Evidence of the early medieval period is located approximately 1.06km to the northeast where cropmarks show at least two small square barrows with slightly rounded corners, one with a central grave pit, the other, larger barrow with two central pits (PRN: 24776) (Driver, T. 2006). In close proximity to this site and approximately 1.16km northeast of the development site an extended inhumation cemetery was identified during the 1966/67 excavations at Llandygai, overlying the

cursus and approximately c.50.0m from the western terminal. Over sixty graves were recorded within the areas excavated, lying within the cursus and extending beyond the ditches to the north and south. A particularly significant feature of this group was a single grave lying within a rectangular mortuary enclosure on the south side. The graves were identified during surface cleaning of the cursus area and covered a total excavation area of c.380m. A characteristic dark fill identified the features and their interpretation as graves was dependant on their elongated shape (the dimensions were consistent with known extended inhumations), a generally west-east alignment and the evidence from excavation or partial excavation of eighteen examples (GAT report 697).

By the 12th and 13th centuries the kingdom of Gwynedd was divided into administrative *commotes*, administered through a network of local centres governed by a royal court or *Llys*. The township of a commote associated with a llys was known as the *maerdref*, in which the Prince's agent would reside. The component parts of a llys included the royal hall and other buildings associated with the residence, as well as the royal demesne worked by bond tenants, and the settlements of these tenants which constituted small hamlets. The llys and royal lands became the property of the English King upon the conclusion of the conquest of Wales.

The nearest surviving remains of the medieval period to the proposed development site includes the grade II Listed Building (PRN: 3670) of Cochwillan - 'The dark red enclosure' - called this because of the purple shade of the Penrhyn slate, which reddens the soil. It lies approximately 790.0m to the southeast and there are many historical associations tied up with the house. For successive centuries have the virtues of the occupants of Cochwillan been the theme of bardic song. The only portion of the house remaining is the dining room - which appears to have formed the north side of a quadrangle (Barnwell, E.L. & Evans, J.E. 1866).

Further remains from the medieval period were found during the archaeological excavations in 2005 at Parc Bryn Cegin, where a single medieval corn-drier was discovered (GAT report 764. 2008).

In 1765 Richard Pennant inherited part of the Penrhyn estate, and in 1781 he gained control of the remainder. Slowly Pennant took direct control over the running of the slate quarries and land, aided by his quarry manager William Williams (appointed 1761) and agent Benjamin Wyatt (appointed 1785). Pennant had employed Benjamin's brother, Samuel, to rebuild the house at Penrhyn, and also to construct a new villa at Lime Grove, where Benjamin was to live. Samuel was impressed with slate as a building medium, and the influential Wyatt family were responsible for a number of the early contracts for roofing slates, and more importantly for raising overall awareness of the advantages of slate.

In 1790 Benjamin Wyatt designed new harbour facilities to deal with an increased output of slates. New stone quays with a small stone pier and a warehouse for storage were constructed. The name of the port was changed from Abercegin to Port Penrhyn, to reflect its new status as a slate port controlled by the Pennant family. Usage of the port was also increased by the establishment of a flint grinding mill (Penlan mill) in c.1795 that imported flints from Suffolk and Ireland, usually in the form of ship's ballast. These flints were then mixed with local cherts from a quarry at Llanllechid and ground to form a temper, which was then exported and used in the making of ceramics. The development of these industries was largely the influence of Samuel Worthington, encouraged by Pennant (GAT report 943).

John Evans' wrote of Penlan mill in 1812 that '*in the vicinity of Penrhyn, on the stream of the Ogwen, is a curious mill, to grind petrosilex, or chert, quartz, and flints, for the use of porcelain and delph ware potteries. The machinery is well contrived, and consists of two overshot wheels about twenty feet in diameter, having trundles on the beams, sixteen do. Which, working within the mill, impart power to another large horizontal trundle-wheel, lifting several upright levers, that again operate on others, two floors above. Circular vessels are paved at the bottom with gritstone, on each of these is a centre with several elbows, between which are placed large flat stones, moved rapidly round by the communicating motion.*

The chert and flints are previously roasted in kilns nearly similar to those used for the calcination of lime. The materials so prepared are put into the molindary vessles, with a portion of water, and ground into an impalpable powder.

The mass in a fluid state is let out into divers reservoirs, where, after undergoing various decantations, is carried to a drying stove, and then packed in casks, and shipped to different parts of the Kingdom.' (Evans, J. 1812.)

Penlan mill (PRN: 6387; NPRN: 40754) lies approximately 440.0m north of the proposed development area, and was fed by the sluice and mill race which it is proposed are utilised as the intake for the hydro-electric scheme.

The proposed micro hydro-electric scheme location is first depicted on the Penrhyn estate map for Penylann of 1768. The hydro route lies partly within a field labelled as *llain arw* meaning *rough plot* and partly within *llain Uchaf* meaning *upper plot*. The new cable route passes through a field labelled as *gallt cae* meaning *hill field.*

The site is again depicted on the Llandygai parish tithe map of 1841. The proposed development site is depicted as being rather different to how it exists today, as the A55 expressway had not been constructed. The majority of the proposed hydro scheme location lies within what is depicted as a single large field (field 86), lying between the Afon Ogwen to the east and Telford's A5 road to the west. This is indicative of the land tenanted by the nearby farm of Pen Lan as opposed to realistically depicting the layout of enclosed fields. The water intake and most southerly part of the scheme is shown as lying within a thin belt of woodland.

Table 1. Tithe apportionment of 1841.

Field Number	Field Name	Landowner	Occupier	A/R/P
86	Penylan	The Hon. Edward Gordon Douglas Pennant	Griffith Thomas	24/1/38

The accompanying tithe apportionment (table 2) for the parish tithe map names field 86 as *Penylan* which shows that the whole of that area was tenanted and farmed by that property. The apportionment names the tenant as Griffith Thomas who is recorded on the Wales census of 1840 as being a farmer of 55 years of age. The census also shows that he was living with his wife Catherine Thomas (50 years) and his son Griffith Thomas (20 years), as well as eleven farm labourers (6 male and 5 female) at the time of the census.

The landowner was the Hon. Edward Gordon Douglas Pennant, 1st Baron Penrhyn. Born Edward Gordon Douglas, he was the younger son of the Hon. John Douglas and his wife Lady Frances. James Douglas, 14th Earl of Morton, was his paternal grandfather and George Sholto Douglas, 17th Earl of Morton, his elder brother. He inherited the Penrhyn estate through his wife's father, George Hay Dawkins-Pennant, and changed his name to Douglas-Pennant by Royal license in 1841. He was the owner of Penrhyn Quarry near Bethesda, which under his ownership developed into one of the two largest slate quarries in the world. He was also involved in politics and sat as Member of Parliament for Caernarvonshire between 1841 and 1866. He also held the honorary post of Lord Lieutenant of Caernarvonshire. In 1866 he was raised to the peerage as 1st Baron Penrhyn, of Llandegai in the County of Carnarvon.

Lord Penrhyn married, firstly, Juliana Isabella Mary, daughter of George Hay Dawkins Pennant, in 1833. They had two sons and three daughters. After her death in 1842 he married, secondly, Maria Louisa, daughter of Henry FitzRoy, 5th Duke of Grafton, in 1846. They had eight daughters. He died in 1886, aged 85, and was succeeded in the barony by his eldest son, George (Dodd, 1968).

The proposed hydro scheme location is depicted in detail on the first, second and third edition county series 25” Ordnance Survey maps of 1889, 1900, and 1914 respectively. All three editions depict the weir across the Afon Ogwen, which still exists today, and is the location of the proposed water intake for the hydro scheme. Also depicted is a mill race which leaves the river on the western bank immediately upstream of the weir, and is almost certainly the open cut channel in existence today, which is to be utilised to carry water to the turbine house. The mill race is shown as running north and the majority of it was almost certainly replaced with the existing modern culvert during the construction of the A55 expressway. All three Ordnance Survey maps show the mill race continuing northward in the location of what is now the overflow channel north of the A55 road, and then it abruptly stops being depicted as it becomes a culvert for approximately 225.0m. After which the mill race is shown again as an open cut channel which continued north to feed the water wheels at the Penlan mill flint mill (PRN: 6387; NPRN: 40754).

The second and third edition Ordnance Survey maps depict a small building in the field north of the A55 expressway. This building was most probably a sheepfold or agricultural outbuilding, the remains of which can still be seen today.

4.0 AIMS AND OBJECTIVES

The watching brief entails a presence on site during the ground works which take place during:

1. The removal of silt and debris within the historic mill race (feature 3).
2. The excavation of the screen box and fish by-pass.
3. The excavation of the penstock route in proximity to possible structure (feature 4).
4. The excavation of the pipe trench in the field north of the A55.
5. The excavation of the electrical cable trench within the farm track and unnamed road.

The CIfA maintains a standard for archaeological watching brief which states that:

An archaeological watching brief will record the archaeological resource during development within a specified area using appropriate methods and practices. These will satisfy the stated aims of the project, and comply with the Code of conduct and other relevant by-laws of CIfA.

An archaeological watching brief is defined by the CIfA as a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons (CIfA 2014a). The watching brief will take place within a specified area within the Site where there is a possibility that archaeological deposits may be disturbed or destroyed.

The CIfA further identifies the purpose of a watching brief as allowing, within the resources available, the preservation by record of archaeological deposits, the presence and nature of which could not be established in advance of development or other potentially disruptive works.

It is also important to note that a watching brief provides an opportunity, if needed, for a signal to be made to all interested parties, before the destruction of the archaeological materials, that an archaeological find has been made for which the resources allocated to the watching brief itself are not sufficient to support treatment to a satisfactory and proper standard.

A watching brief is, therefore, not intended to reduce the requirement for excavation or preservation of known or inferred deposits, and it is intended to guide, not replace, any requirement for contingent excavation or preservation of possible deposits.

The aims of the watching brief are:

- To allow, within the resources available, the opportunity to gain information about and record the presence/absence, nature and date of archaeological remains on the Site affected by excavations and groundworks for the development, the presence and nature of which could not be established with sufficient confidence in advance of works which may disturb them.

- To provide the facility to signal to the relevant authorities, before irreversible impact to remains that an archaeological and/or historic find has been made for which the resources allocated to the watching brief itself are inadequate to support their treatment to an adequate and satisfactory standard.

The specific objectives of the watching brief are:

- To observe and recover any artefacts of archaeological significance.

- To record the location, dimensions and nature of any deposits, features, structures or artefacts of archaeological significance.

- To recover samples of any deposits considered to have potential for analysis for palaeoenvironmental data should the opportunity arise.

- Where the raw data allows, to construct a model of the depositional processes and stratigraphic sequence for the relevant parts of the site.

4.0 METHODOLOGY

4.1 Archaeological Watching Brief

The methodology for the watching brief has been prepared with reference to the CIfA's document Standards and Guidance for Archaeological Watching Brief (2014a) and will be kept under constant review during the project, in order to see how far it is meeting the terms of the aims and objectives, and in order to adopt any new questions which may arise.

Curatorial monitoring of the archaeological work on behalf of the Council will be carried out by an officer(s) of GAPS. To facilitate the curatorial monitoring, the officer shall be provided with a minimum of two weeks' notice of the start of the archaeological work.

A suitably qualified and experienced archaeologist(s) from Aeon Archaeology will be commissioned for the maintenance of the watching brief. On arrival on site, the archaeologist(s) will report to the site manager and conform to the arrangements for notification of entering and leaving site. The archaeologist(s) will keep a record of the date, time and duration of all attendances at site, the names and numbers of archaeologists deployed and any actions taken. The archaeologist will be provided with a Health & Safety Induction by the construction contractor and wear a safety helmet, safety footwear and high visibility jacket/vest at all times.

If deposits and or artefacts are exposed during excavations for the development which require recording and recovery, it may be necessary to delay works whilst the proper investigation and recording takes place. Watching brief recording can often be undertaken without delay to groundworks, depending upon the specific circumstances and flexibility of all the staff on site.

Within the constraints of the terms of the watching brief work, the archaeologist will not cause unreasonable disruption to the maintenance of the work schedules of other contractors on site. In the event of archaeological discoveries the treatment of which (either arising from the volume/quantity of material and/or the complexity/importance of the material) is beyond the resources deployed Carter Jonas LLP will be notified and a site meeting/telephone consultation arranged with the development control archaeologist from GAPS. The aim of the meeting will be to confirm that an archaeological find has been made for which the resources allocated to the watching brief itself are not sufficient to support treatment to a satisfactory and proper standard and identify measures which would be sufficient to support treatment to a satisfactory and proper standard prior to destruction of the material in question.

Any archaeological deposits, features and structures identified which can be investigated and recorded under the terms of the watching brief will be excavated manually in a controlled and stratigraphic manner sufficient to address the aims and objectives of the project – subject to the limitations on site access.

It may not be necessary to excavate the complete stratigraphic sequence to geologically lain deposits but the inter-relationships between archaeological deposits, features and structures will be investigated sufficient to address the aims and objectives of the project and the complete stratigraphic sequence to geologically lain deposits will be investigated where practicable.

The method of recording will follow the normal principles of stratigraphic excavation and the stratigraphy will be recorded in written descriptions even where no archaeological deposits have been identified. The archaeologist will record archaeological deposits using proformae recording forms and locate them on a large-scale site plan related to the Ordnance Survey National Grid and Datum references.

The drawn record will comprise plans at scale 1:20 and sections at scale 1:10; propriety electronic hardware and software to prepare site drawings may be used as appropriate.

A photographic record will be maintained throughout, using a digital SLR camera (Canon 550D) set to maximum resolution and any subsurface remains will be recorded photographically, with detailed notations and measured drawings being undertaken if required.

The archive produced will be held at Aeon Archaeology under the project code **A0017.2**.

4.2 Watching brief report

A report on the results of the watching brief, in accordance with the recommendations in *Management of Archaeological Projects* (English Heritage, 1991), *Management of Research Projects in the Historic Environment Project Manager's Guide* (English Heritage 2006), and in the Chartered Institute for Archaeologists *Standard and Guidance for an archaeological watching brief* (2014) will be required to be produced upon conclusion of the archaeological fieldwork. The report will be completed within a maximum of six months of completion of work on site and may include examination and quantification leading to the identification of function, form, date, method of manufacture, material/fabric type, source, parallels, attributes and condition of artefacts; of the exploitation of wild or domesticated resources; the reconstruction of environments; and the nature of human populations.

Full analysis of the results of the project, including: dating and interpretation of excavated features; pottery and other finds analysis; analysis of industrial residues by an appropriate specialist or specialists; analysis of samples for environmental data (including pollen, plant macrofossils and beetles) by an appropriate specialist or specialists; radiocarbon dating; discussion of the results in their local, regional and national context, including relating the excavated features and palaeoenvironmental data to evidence from nearby sites, and discussion of the results in their local, regional and national context may be required.

4.3 Archive

A full archive including plans, photographs, written material and any other material resulting from the project will be prepared. All plans, photographs and descriptions will be labelled and cross-referenced, and lodged in an appropriate place (to be decided in consultation with the regional Historic Environment Record) within six months of the completion of the project. The report will also be lodged with the online OASIS database and the RCAHMW.

5.0 FURTHER ARCHAEOLOGICAL WORKS

The identification of significant archaeological features during the watching brief stage may necessitate further archaeological works. This will require the submission of new cost estimates to the contractor and may be subject to a separate WSI, to be agreed with GAPS prior to implementation.

This WSI does not include a methodology or cost for examination of, conservation of, or archiving of finds discovered during the watching brief, nor of any radiocarbon dates required, nor of examination of palaeoenvironmental samples associated with any peat deposits. The need for these will be identified in the post-fieldwork programme (if required), and a new WSI will be issued for approval by GAPS prior to implementation.

6.0 ENVIRONMENTAL SAMPLES

If necessary, relevant archaeological deposits will be sampled by taking bulk samples (a minimum of 10.0 litres and maximum of 30.0 litres) for flotation of charred plant remains. Bulk samples will be taken from waterlogged deposits for macroscopic plant remains. Other bulk samples, for example from middens, may be taken for small animal bones and small artefacts.

Bulk environmental samples will also be taken from any fills, deposits or structures which yield archaeological artefacts, charcoal flecks/ fragments, bone, or any other historic remains.

Advice and guidance regarding environmental samples and their suitability for radiocarbon dating, as well as the analysis of macrofossils (charcoal and wood), pollen, animal bones and molluscs will be obtained from Oxford Archaeology.

For guidance purposes the following volume criteria represent the minimum feature sampling requirements:

- 50% of each discrete feature (e.g. pits and postholes)
- 25% of the exposed areas of each liner feature and all terminals/intersections
- 50% of structural features (e.g. beamslots, ring-ditches)
- 50%-100% of domestic/industrial working features (e.g. hearths and ovens)

7.0 HUMAN REMAINS

Any finds of human remains will be left *in-situ*, covered and protected, and both the coroner and the Gwynedd Archaeological Planning Service informed. If removal is necessary it will take place under appropriate regulations and with due regard for health and safety issues. In order to excavate human remains, a 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. This will be applied for should human remains need to be investigated or moved.

8.0 SMALL FINDS

The vast majority of finds recovered from archaeological excavations comprise pottery fragments, bone, environmental and charcoal samples, and non-valuable metal items such as nails. Often many of these finds become unstable (i.e. they begin to disintegrate) when removed from the ground. All finds are the property of the landowner; however, it is recommended that all finds are donated to an appropriate museum where they can receive specialist treatment and study. Access to finds must be granted to Aeon Archaeology for a reasonable period to allow for analysis and for study and publication as necessary. All finds would be treated according to advice provided within *First Aid for Finds* (Rescue 1999). Aeon Archaeology staff will undertake initial identification, but any additional advice would be sought from a wide range of consultants.

The recovery policy for archaeological finds will be kept under review throughout the fieldwork phase. Any changes in recovery priorities will be under guidance from an appropriate specialist and agreed with GAPS. There will be a presumption against the disposal of archaeological finds with the exception of unstratified items dating to the twentieth or twenty-first centuries AD which will be recorded by material, type, form, identification and weight, and discarded.

All finds will be collected and processed including those found within spoil tips. Their location will be recorded; finds numbers attributed, bagged and labelled as well any preliminary identification

taking place on site. Where specialist advice is required provision will be made to do so at the earliest possible convenience.

After processing, artefacts which are suitable will be cleaned and conserved in-house. Artefacts requiring specialist cleaning and conservation will be sent to the relevant specialist. All finds will then be sent to a specialist for analysis, the results of which will then be assessed to ascertain the potential of the finds assemblage to meet the research aims of the project. The value of the finds will also be assessed in terms of the wider educational and academic contributions.

9.0 UNEXPECTED DISCOVERIES: TREASURE TROVE

Treasure Trove law has been amended by the Treasure Act 1996. The following are Treasure under the Act:

- *Objects other than coins* any object other than a coin provided that it contains at least 10% gold or silver and is at least 300 years old when found.

- *Coins* all coins from the same find provided they are at least 300 years old when found (if the coins contain less than 10% gold or silver there must be at least 10. Any object or coin is part of the same find as another object or coin, if it is found in the same place as, or had previously been left together with, the other object. Finds may have become scattered since they were originally deposited in the ground. Single coin finds of gold or silver are not classed as treasure under the 1996 Treasure Act.

- *Associated objects* any object whatever it is made of, that is found in the same place as, or that had previously been together with, another object that is treasure.

- *Objects that would have been treasure trove* any object that would previously have been treasure trove, but does not fall within the specific categories given above. These objects have to be made substantially of gold or silver, they have to be buried with the intention of recovery and their owner or his heirs cannot be traced.

The following types of finds are not treasure:

- Objects whose owners can be traced.

- Unworked natural objects, including human and animal remains, even if they are found in association with treasure.

- Objects from the foreshore which are not wreck.

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.

The British Museum 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.

10.0 STAFF & TIMETABLE

10.1 Staff

The work will be managed and undertaken by Richard Cooke BA MA MCIfA, Archaeological Contractor and Consultant at Aeon Archaeology.

10.2 Timetable

The evaluation work can currently be undertaken from late January 2016, although the client is encouraged to give as much notice as possible to Aeon Archaeology as project commitments are currently high.

11.0 HEALTH AND SAFETY

Aeon Archaeology has a Health and Safety Policy Statement which can be supplied upon request. Furthermore, site-specific Risk Assessments and Method Statements are compiled and distributed to every member of staff involved with the project prior to the commencement of works.

12.0 INSURANCE

Liability Insurance – Insignia Underwriting Policy 347002

- Employers' Liability: Limit of Indemnity £10m in any one occurrence
- Public Liability: Limit of Indemnity £2m in any one occurrence
- Legal Defence Costs (Health and Safety at Work Act): £250,000

The current period expires 07/09/16

Professional Indemnity Insurance – Insignia Underwriting Policy 347002

- Limit of Indemnity £500,000 any one claim

The current period expires 07/09/16

13.0 GENERAL

All project staff will adhere to the *Code of Conduct of the Chartered Institute for Archaeologists*.

The project will follow the requirements set down in the *Standard and Guidance for Archaeological Excavation* prepared by the Chartered Institute for Archaeologists.

A Method Statement and Risk Assessment will be prepared prior to the commencement of fieldwork and circulated to all staff concerned.

Please note the following:

Aeon Archaeology will not be held responsible for any delays to the work programme resulting from the discovery of archaeological sites or finds.

The cost quoted does not include examination of, conservation of or archiving of finds discovered during the archaeological programme, nor of any radiocarbon dates required, nor of examination of palaeoenvironmental samples.

SPECIALISTS

Specilaist advice required will be sought from the following list if required:

- Bone: Nora Bermingham
- Glass: Hilary Cool, Barbican Research Associates.
- Metal artefacts: Phil Parkes, Cardiff Conservation Services, Cardiff.
- Slag, burnt clay, hammerscale: Dr. Tim Young, Geoarch, Cardiff.
- Stone artefacts: Oxford Archaeology
- Wood artefacts: Jane Foley, Foley Conservation, Builth Wells.
- Leather: Quita Mould, Barbican Research Associates.
- Waterlogged environmental: Dr Mike Allen, Allen Environmental Archaeology.
- Environmental samples: Oxford Archaeology
- Numismatics: Peter Guest, Barbican Research Associates.
- Pottery (all periods): Oxford Archaeology
- Clay pipe: Oxford Archaeology

Depending upon the material of the remains the following experts will be consulted regarding the conservation of waterlogged material:

- Organic material: Mr Phil Parkes, Cardiff Conservation Services (tel: +44(0)29 2087 5628)
- Non-organic material: Mr Phil Parkes, Cardiff Conservation Services (tel: +44(0)29 2087 5628)