

Archaeology Wales

Afon Croesor, Brondanw Estate Gwynedd

Desk-Based-Assessment and Heritage Impact Assessment



By
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and Irene Garcia Rovira

Report No. 1675

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
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Table of Contents

List of Figures	iii
List of Plates	iv
<i>Summary</i>	1
1 Introduction	2
2 Site Description	2
2.1 Location and proposed development plans	2
2.2 Geology	3
3 Method	3
4 Archaeological and Historical Background	5
4.1 Previous Archaeological Studies	5
4.2 The Historic Landscape (Figure 4).....	6
4.3 Listed Buildings	8
4.4 Known Archaeological Remains and Historical Development	12
4.5 Prehistoric	12
4.6 Roman (AD 43 – AD 410) & Early Medieval (AD 410 – AD 1086)	13
4.8 Early Medieval (AD 410 – AD 1086) & Medieval (AD 1086 – AD 1536)	13
4.9 Post-Medieval (AD 1536 – AD 1899) & Modern	13
4.10 Undated	16
5 Map Regression	17
5.1 Llanfrothen Parish Tithe Map, 1841	17
6 Aerial Photographs and LiDAR (Figure 16)	19
7 Site Visit.....	20
8 Impact Assessment	22
8.1 Assessment of Potential and Significance	22
8.2 Previous Impacts	24
8.3 Potential Impacts of the Proposed Development	24
8.4 Designated Sites and Landscape	24
8.5 Non-designated Archaeological Sites	25
9 Conclusions	26
9.1 Impacts on Designated Assets	26
9.2 Impacts on Non-designated Assets	27
9.3 Mitigation	28

10	Sources.....	29
	General.....	29
	Maps.....	29
	Remote imagery.....	30
	LiDAR 2m imagery Natural Resources Wales [downloaded April 2018].....	30

Appendix I: Gazetteer of sites and designated sites recorded on the regional HER
Appendix II: WSI

List of Figures

- Figure 1: Location map
- Figure 2: Location plan
- Figure 3: Scheduled Ancient Monuments and Registered Landscape data, Cadw
- Figure 4: Historic Landscape Characterisation, GAT
- Figure 5: Listed Buildings
- Figure 6: Listed Buildings in the Parc
- Figure 7: Prehistoric and Roman sites within the GAT HER
- Figure 8: Medieval sites within the GAT HER
- Figure 9: Post-medieval and modern sites within the GAT HER
- Figure 10: Post-medieval and modern sites within Parc from the GAT HER
- Figure 11: Undated sites within the GAT HER
- Figure 12: Llanfrothen Parish Tithe map 1841
- Figure 13: OS County Series, 1st edition 1888, 1:2500
- Figure 14: OS County Series, 2nd edition 1900, 1:2500
- Figure 15: OS County Series, 4th edition 1953, 1:2500
- Figure 16: LiDAR 2m DSM
- Figure 17: Sites in proximity to proposed penstock route
- Figure 18: Map noting areas discussed during site visit

List of Plates

Plate 1: Location of Intake (SH62610 44257), looking SE

Plate 2: View to intake location. Looking NE

Plate 3: View toward PRN1493 from intake location

Plate 4: View of PRN1493, looking NW

Plate 5: View toward intake from PRN1493

Plate 6: Penstock route at approximately SH62592 44241. Looking SW

Plate 7: Penstock route, c. SH62534 44202. Looking NE

Plate 8: Penstock route, c. SH62526 44191. Looking SW.

Plate 9: View toward PRN1493. Looking NW.

Plate 10: View toward the eastern bank of the river.

Plate 11: View of penstock route c. SH62501 44165. The route will cut through the dry -stone wall shown.

Plate 12: View of penstock route looking SW.

Plate 13: Penstock route c. SH62445 44123. Looking NE.

Plate 14: Penstock route c. SH62417 44093. Looking NE.

Plate 15: Roof tiles encountered at SH 62427 44097.

Plate 16: Penstock route c. SH62417 44091. Looking NW.

Plate 17: Remains of structure, possibly sheep fold. Looking NW.

Plate 18: Remains of structure, possible sheep fold. Oblique view.

Plate 19: View toward east from c. SH62447 44123.

Plate 20: View toward west from c. SH62447 44123.

Plate 21: Penstock route c. SH62384 44062. Looking SW.

Plate 22: View E from SH62384 44062.

Plate 23: Penstock route c. SH62380 44060. Looking SW.

Plate 24: View east c. SH62380 44060.

Plate 25: Penstock route c. SH62312 44008, Looking SW.

Plate 26: View E from SH62312 44008.

Plate 27: Penstock route c. SH62294 43999.

Plate 28: View E toward mill SH62294 43999.

Plate 29: Penstock route c. SH62259 43994.

Plate 30: View W from SH62259 43994.
Plate 31: Remains of dry-stone wall recorded in OS historical maps. Looking SW.
Plate 32: Remains of dry-stone wall recorded in OS historical maps. Looking S.
Plate 33: Penstock route c. SH62199 43941. Looking SW.
Plate 34: View E from SH62199 43941.
Plate 35: Penstock route c. SH62177 43905. Looking SW.
Plate 36: View toward penstock route from SH62096 43897. Looking ESE.
Plate 37: View toward penstock route from SH62118 43820. Looking NE.
Plate 38: View of possible archaeological remains located c. SH62176 43837.
Plate 39: Turbine House location. Looking ESE.
Plate 40: View E from Turbine House area.
Plate 41: View WSW toward development from Parc.
Plate 42: View WSW toward development area from Parc.
Plate 43: View W toward proposed development from Parc (access track)
Plate 44: View N toward proposed development from Parc.
Plate 45: View of track proposed as access track. LB4816 and LB19842.
Plate 46: View of LB4816 and LB19842. Looking ENE.
Plate 47: LB4773, looking SE.
Plate 48: LB4817, looking E.
Plate 49: May 1946. Sortie 106G UK 1467 RAF B&W 3191-93
Plate 50: 3 May 1946. Sortie 106G UK 1467 RAF B&W 3191-93
Plate 51: 4 June 1971. Sortie OS 71 286 OS B&W 086
Plate 52: 17 April 1973. Sortie OS 73 082 OS B&W 402-4

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Summary

The following report has been compiled to present the results of an archaeological desk-based assessment, Heritage Impact Assessment and Site Visit at the Brondanw Estate, Gwynedd in association with a proposal a hydro-electric scheme including the installation of an intake weir, penstock pipe, turbine house, and a cable run (Planning application NP5-68-221B).

No designated assets in the vicinity are intervisible with the proposed penstock route or have any link to it and the settings of these are unlikely to be impacted. However, a Scheduled hut circle settlement (SAM ME170) lies in close proximity to the intake location and although it will probably not be impacted, close monitoring and protection of the Scheduled area must be taken. A number of Listed Buildings in the Parc estate exist in proximity to the access track for the development but any impact from this is indirect and temporary.

No designated assets from the HER will be impacted indirectly or directly by the development. The penstock pipe will however, pass through several drystone field boundaries. It will also pass in proximity to two structures, a wall and a mound. There is also the potential for buried remains in the area of the pipe, as roof tiles were found along the route. Another potential site, tentatively identified from aerial photographs, is 35m above the development on a plateau and is unlikely to be impacted.

An archaeological watching brief should be maintained during ground works. Close monitoring of works in proximity to the Scheduled Ancient Monument is essential and it is recommended that a physical boundary, is erected around the Scheduled area when the development is under construction. Warning notices should be displayed and toolbox talks arranged for staff.

An archaeological record of the field boundaries should be made although the possibility of tunnelling beneath walls maybe an alternative to demolition and reconstruction.

1 Introduction

Archaeology Wales (AW) was commissioned by Renewables First Ltd to carry out a Heritage Impact Assessment (HIA) with Archaeological Desk-Based Assessment (DBA) and Site Visit, undertaken in association with a proposed development of a hydroelectric scheme on land at the Brondanw Estate, Gwynedd (between NGR SH 62610 43457 and SH 62045 43746) (henceforth “the site”) (Figures 1 and 2). This has been prepared prior to the submission of a planning application (planning reference number NP5-68-221B). The local planning authority is Snowdonia National Park Authority (SNPA).

The proposal includes the construction of an intake weir, transport of water through a buried penstock pipe to a turbine house/outfall location and has an associated cable run. A pole mounted transformer will be located at SH 62231 43984 and the cable will connect to existing overhead 11kV cable close to an existing track which will also be the access track to the development.

The proposed development is within a landscape which is particularly rich in late medieval and post-medieval archaeology. It also lies close to the registered Historic Park and Garden of Parc (GD35) and a Scheduled Ancient Monument (ME170), the prehistoric settlement east of Garth-y-Foel.

A DBA was produced by AW for an earlier design of the scheme at a different location but near to the site of the current proposal (AW 2016).

The purpose of the proposed HIA, DBA and Site Visit is to provide SNPA with the information they are likely to request in respect of the proposed development. SNPA has stated that given the proximity to known archaeological remains, including designated heritage assets, a Heritage Impact Statement is required in line with the Welsh Government best practice guidance ‘*Heritage Impact Assessment in Wales*’ (2017); in addition there is a requirement for a DBA and Site Visit (Thomas, 2018), as set out in the Welsh Assembly Government, Planning Policy (revised edition 9, 2016), Section 6.5 and Technical Advice Note (TAN) 24: The Historic Environment (2017). The work is to highlight and assess the impact upon standing and buried remains of known and potential archaeological interest.

2 Site Description

2.1 *Location and proposed development plans*

The site is on the Brondanw Estate, which is owned by the Clough Williams-Ellis Foundation charitable trust. The proposed hydroelectric power (HEP) scheme is to be located on the Afon Croesor to the immediate southwest of the settlement of Croesor within Snowdonia National Park, Gwynedd. The current scheme differs from the previous proposal as it is on the north bank of the Afon Croesor and the intake location is 50m further upstream; the penstock run is shorter at 760m and entirely underground. It passes through 480m of lightly wooded areas; the remainder is open hillside and moorland (Figure 2).

The intake site is at an elevation of approximately 134m AOD, and falls southwest to 75m AOD at the turbine/outfall site.

Access tracks: access to the site will be reached through an existing track that runs through Parc toward the location of the intake weir. The existing track runs from SH 63022 44179 to SH 62453 44066. Once reaching the location of the intake, existing drawings note the creation of an access track running parallel to the penstock route. The following possibilities are envisaged for the access track running along the penstock route:

- 1) Run vehicles over existing ground with no damage to possible buried archaeology (preferred solution).
- 2) Use of a temporary trackway or bog mats along the penstock to protect the ground.
- 3) 500m strip followed by temporary stone track (reinstate following construction).

Intake weir: standard design with exposed stone wall mimicking the existing dry-stone walls located to the E to the river bank.

Penstock route: proposed designs note that the pipe will be buried c. 1m deep. This may vary according to the ground levels and ensuring sufficient fall in the pipe.

2.2 Geology

According to the British Geological Survey (BGS) the solid geology is defined by the Nant Ffrancon Formation, composed of siltstone formed during the Ordovician Period and is partially overlain by Devensian Diamicton Till from the Quaternary Period (BGS 2018).

3 Method

The method for this assessment follows that set out in the Written Scheme of Investigation (WSI) approved by Gwynedd Archaeological Planning Service (GAPS), in their capacity as archaeological advisors.

The objective is to assess the impact of the development proposal on the historic environment by means of a DBA, HIA and Site Visit. This work will be undertaken following the guidance laid out within *Managing Heritage Impact Assessment in Wales*, produced by Cadw in May 2017.

It will take full account of the merits of designated and non-designated heritage assets and their settings. It will gather enough information to understand the significance of any heritage assets affected and assess the impact of the proposals on these. This will help inform future decision making, design solutions, and potential mitigation strategies.

The report will provide information of sufficient detail to allow informed planning decisions to be made which can safeguard the heritage resource; it will establish the historical significance of the asset and its relationship to the wider historical environment.

The assessment will consider the following:

a) The significance of designated heritage assets, their setting, and their relationship to adjacent and non-designated heritage assets. It also considers the nature, extent and degree of survival of archaeological sites, structures, deposits and landscapes within the study area through assessment of various readily available primary sources:

1. Collation and assessment of all relevant information held in the regional Historic Environment Record (HER), including designated and non-designated sites, within a 1km radius of the proposed development route. This includes both designated and non-designated assets.
2. Assessment of all available excavation reports and archives, including unpublished material, affecting the site and its setting.
3. Assessment of all relevant extant photographic evidence, including available historic photographs.
4. All sources indexed in the County Archive and, as appropriate, site files held by the RCAHMW.
5. Map regression analysis using all relevant cartographic sources; e.g. all editions of the Ordnance Survey County Series, tithe and early estate maps (as available).
6. Records held by the developer or site owner; e.g. borehole logs, geological/geomorphological information, aerial photographs, maps, plans, and LiDAR data.
7. Place name evidence.
8. Historic documents; e.g. charters, registers, estate papers etc.

b) The significance of the assets in their local, regional and national context and in light of the findings of the assessment.

c) The potential impact of any proposed development on existing historical assets and their setting.

This work conforms to the *Standard and Guidance for Archaeological Desk-Based Assessment*, as produced by the Chartered Institute for Archaeologists (CIfA 2014) and the Welsh Government best practice guide *Setting of Heritage Assets in Wales* (2017).

4 Archaeological and Historical Background

4.1 *Previous Archaeological Studies*

A large number of archaeological studies have been undertaken within 1km of the site. Generally, the events recorded refer to periods of survey and recording of the archaeology of Snowdonia though a number of events refer to desk-based assessments produced in advance of some developments around the area researched. These are summarised below:

- An excavation was carried out of a multiperiod rock shelter at Garreg Hyllidrem, Llanfrothen, (HER 44404), in 2011-12 by Bangor University. This revealed evidence for human activity from the early Mesolithic to the early Bronze Age (Robinson 2013).
- An archaeological assessment of a proposed mountain bike trail around Blaenau Ffestiniog was undertaken in 2009 by Engineering Archaeological Services Ltd (HER 45056).
- In addition the assessment area has been included in Scheduling enhancement work; four projects have been undertaken between 2011 and 2014 by Gwynedd Archaeological Trust (GAT) on behalf of Cadw to assess medieval and post-medieval agricultural features (HER 44846), Mills (HER 44907 & 45048), and Holy Wells (HER 45033). A desk-based evaluation in 2008-10 of the GAT HER considered sites from prehistoric, Roman and other periods that had not previously been assessed for threat (HER 45041).
- Cadw undertook field investigations in 1996 at a number of sites including a round barrow (HER 43389), medieval and post-medieval house platforms (HER 43146 & 43388) and a post-medieval stone barn (HER 43390). The Ordnance Survey also carried out a field survey of a two level platforms at Llanfrothen in 1973 (HER 43145).
- Several DBAs have been carried out in the area, including one for a hydro-electric scheme at Afon Maesgwm, Llanfrothen in 1994 (HER 40244) by GAT. Also by GAT was the Tir-Gofal Management plan: Bodlondeb in 2008 (HER 44403). Two earlier site visits had been carried out for Tir Gofal in 2002 (HER 45094) and 20033 (HER 452233) at Cefn Dreiniog. Another DBA was undertaken at Ty Hen Parc by Aeon Archaeology in 2014 (HER 44550).
- Other desk-based studies in the area include Glastir Private Woodland Management Polygonisation project (HER 44558), a study by GAT in 2014 to identify new sites within private woodland. There was also the Gwynedd Slate Quarrying Landscape study in 1994 (HER 40138) with a further associated DBA and survey in 1995 (HER 44419).
- Another project by Bangor University in 2010 conducted desk-based research into settlement from the late Bronze Age to the early medieval period in northwest Wales (HER 44557).

- The area has been considered in a number of broad surveys carried out by GAT, such as the Gwynedd Metal Mines Survey in 1998 (HER 40413), the Pan-Wales Prehistoric Funerary and Ritual Sites Survey in 2005 (HER 40527), a similar survey of Meirionnydd in 2001 (HER 40529), and Roman Roads in northwest Wales 2004, 2005 and 2007 (HER 40544, 40538 & 40542). There were also the Vale of Ffestiniog Historic Landscape Characterisation in 2003 (HER 40558), a hut circle settlement survey in 1998 (HER 40782) and a deserted rural settlement survey in 1996 (HER 40835).

4.2 *The Historic Landscape (Figure 4)*

The main part of the development lies outside the boundary of the Registered Historic Park and Garden of Parc (GD35), which is delimited by the southern bank of the Afon Croesor; it is however within the essential setting of the park. The access track, which utilises an existing track way, and the cable connection will pass through the park itself.

Parc has exceptional stone-built garden terraces of probable 17th century date, associated with a group of buildings and historical features set within a contemporary small, walled park which includes a gatehouse and view point. Clough Williams-Ellis made improvements in the Parc during the mid-20th century. There are three houses (the fourth demolished), and an L-shaped agricultural range, all Grade II* Listed; other features are listed as Grade II. The first house (dated to the mid- 16th century) has been demolished but the garden opposite survives and may be contemporary. The second and third houses date from the late 16th century, one of which has been restored. The fourth houses dated 1671 is in good condition. There is also a 16th century gatehouse, agricultural buildings, a third barn Beudy Newydd, dated 1666, lies on the edge of the park. The houses were built by the Anwyl family and the estate remained with them until it was sold in the 18th century.

The Parc also bears witness to the industrial activity which changed the character of the area in the late post-medieval period. The area includes part of the course of the Croesor tramway, a stone revetted embankment which carried a level railway, two inclines, and also a slab quarry.

The area of Parc constitutes a historic character area , the houses were sited around a courtyard at the top of a steep valley side. The park may contain the remains of possibly medieval long huts. The garden areas, now neglected are on three terraces retained by stone walls.

There are three Scheduled Ancient Monuments (SAMs) within 1km of the proposed development. The prehistoric unenclosed hut circle settlement east of Garth-y-Foel (SAM ME170 / HER 1492 & 1493) lies between 3 and 6m to the north of the penstock route, near the intake location. The monument probably dates to the Iron Age or Romano-British period. The Scheduled area comprises

the remains and the areas within which evidence may be expected to survive (Figure 3).

Another unenclosed hut circle settlement at Bryn Derw lies 960m south of the proposed turbine house (SAM ME178 / HER 5153 & 6103) and is also likely of Iron Age or Romano-British date. It consists of the foundations of four well-preserved round houses.

960m east-southeast of the intake is Pont Maesgwm deserted medieval rural settlement (SAM ME193 / HER 15617), comprising three houses and a mill built on artificial terraces beside a stream.

The Registered Historic Landscape of Aberglaslyn (HLW (GW) 7) lies on the edge of the assessment area, 800m to the southwest at its closest point to the development. The area is Traeth Mawr, the former tidal estuary of the Afon Glaslyn, and it represents an ambitious 19th century reclamation scheme including the Porthmadog Cob embankment, the Georgian town of Tremadog and the large port of Porthmadog. The area includes the reclaimed land up to the base of the cliffs or slopes surrounding the former estuary. The scheme contributed greatly to the expansion of industry and commerce, as well as the development of towns.

Although outside the limits of the registered Historic Landscape described above, the proposed penstock route is within the Historic Landscape Characterisation area of the Vale of Ffestiniog and the route passes through the partly enclosed intermediate slopes of the Moelwyn mountain range (HLC area 26) (figure 4). The area has pockets of woodland, open areas and moorland, the farming is low grade pasture, the farm houses usually squat low stone structures. Stone wall field boundaries survive but are not well maintained. It has been exploited since medieval times for lead and other minerals and also for timber. The remains of these activities and the transportation infrastructure are evident in the area. Much of the afforestation is comparatively recent.

Within the assessment area and neighbouring the intermediate slopes is the Brondanw slopes (HLC area 30), a small area historically dominated by the houses at Parc and Plas Brondanw. It has a lot of ancient woodland and some small scale 19th century slate quarrying, evidenced by remnants of structures and traces of inclines. The underlying field pattern (small fields) is difficult to interpret but may be early. The concentration of houses in Llanfrothen may indicate the growing economic importance of this area in the 16th and 17th centuries when it would have been on the coast.

Croesor (HLC area 11) is a 19th century slate quarry village, it developed on the 18th century turnpike from Tan y Bwlich to Nanmor and developed mainly to house quarrymen from the Rhosydd and Croesor quarries. The growth of the settlement was assisted by the old Croesor tramway which opened in 1856. It

is characterised as a small settlement with chapel and school. The houses are built of large coursed stones from the quarries and are substantial.

There are no registered Conservation Areas, World Heritage Sites or Registered Battlefields within the site or within a 1km radius of the site.

4.3 Listed Buildings

There are seventeen listed buildings (LBs) within the 1km search radius (Figure 5).

NUMBER	NAME	GRADE
19805	Pont Garreg-Hylldrem	II
19806	Limekiln	II
19837	Cae Glas	II
19838	Barn 25m SE of Cae Glas	II
19839	Barn 100m NE of Cae Glas	II
19842	Barn at Parc	II
19843	Walls and Revettments to Upper Terrace Garden at Parc	II
19844	Revetment Walls to Terracing at Parc including Walls and Revettments to Enclosure adjoining to SE	II
19845	Boulder-built Boundary Walls above the Upper Drive at Parc	II
19846	Bridge at Parc	II
19847	Walls to Enclosure adjoining L-shaped Agricultural Range at Parc	II
20505	Ceunant-y-Parc	II
4773	Parc	II*
4815	Beudy Newydd	II
4816	L-shaped Agricultural Range at Parc	II*
4817	Middle Parc including Fountain Basin adjoining to W	II*
4818	Gattws Parc including Boulder Wall adjoining to NW	II*

The majority of these are part of the Parc estate which lies 220m or more southeast of the penstock route (Figure 6). The buildings include a complex of domestic blocks, and a gatehouse, as well as associated stable and agricultural ranges; these date mainly from the 17th century. The buildings are an example of the local 'unit' system of growth and enlargement of the estate. The following are all Grade II* Listed, including: Parc House (LB 4773), two-and-a-half storeys of T shaped-plan; Middle Parc (listed with fountain) (LB 4817), an L-shaped building of two conjoined ranges or cottages; the Gatehouse or Gattws Parc (listed with boulder wall) (LB 4818), a small

rectangular building of rubble construction; and an L-shaped range of two conjoined barns southwest of Parc (LB 4816).

- ***Parc (4773)***: Parc 4, now the main house, is detached from the main group and is dated externally 1671. However, this date probably relates to a late 17th century remodelling of a second quarter 17th century lodgings range. In its original arrangement this building appears to have been split up into a series of lodgings or apartments, probably designed to serve as guest or overspill household accommodation; two ground-floor and both first and second-floor entrances are still visible, though blocked or altered. Each lodging was therefore originally independently accessible, the upper floors being reached via external stepped access, long since removed. The only clear parallel for this extraordinary plan-form is a lodgings block at Plas Newydd (near Penrhyndeudraeth), a similar unit-planned complex built for a cadet branch of the Anwyls in the later 17th century; here the external stairs survived intact until very recently. The 1671 phase saw the conversion of the range into a single house, with a rear stair and service projection and the addition of a curious vernacular pediment to the centre of the front elevation; it was apparently carried out for Lewis and Katherine Anwyl (married in 1668), whose initials appear on the datestone. The building is listed as a Grade II* building and it is located on an elevated site above the Afon Maesgwm, approximately 2km southwest of Croesor; accessed via a long drive running southwest from the Garreg to Croesor road.
- ***L-shaped Agricultural Range at Parc (4816)***: The main section of the agricultural range is an exceptionally-fine primary barn which is probably also part of William Lewis Anwyl's remodelling and may, like its parallel at Plas Newydd, have originated as a stable range with accommodation over; evidence of partitioning and even ceiling over of one central section of the first floor, make this a possibility. To this was added a further barn range in the later 17th or early 18th century, forming a flush, continuously-roofed range of ten bays in all; the fine gable parapet of the primary barn's right-hand gable was reused to serve the newer section. At the same time a series of what appear to have been two light mullioned windows on both floors of the primary range were carefully reduced to form neat vertical ventilation slits. A contemporary or near-contemporary addition was a three-bay carthouse, built at right-angles with the primary barn to the northeast. The range is listed as a Grade II* building and it is located immediately to the west of Parc, facing a farmyard to the north.
- ***Middle Parc including Fountain Basin adjoining to W (4817)***: The northern section of Middle Parc is a much-altered link-block between the second and third houses, the latter being represented by the main section to the southwest. Both blocks have elegant cylindrical chimneys which, if original would be unparalleled in north Walian vernacular. It is however possible that these are additions of the second-quarter or mid-19th century, and are 'Tudorbethan' cosmetic alterations. Both blocks were altered by Clough

Williams-Ellis, owner of the Brondanw Estate, who converted the buildings for modern use after the last war. The adjoining fountain basin is likely to have served both as spring, conduit and washing basin and probably relates to one of the earliest phases at Parc. In its location to the side of the main domestic group and away from the formal garden areas, it can be presumed always to have had a service function. Middle Parc and its fountain are listed as Grade II* and located on an elevated site above the Afon Maesgwm, approximately 2km southwest of Croesor; sited some 50m northwest of Parc.

The remaining buildings are Grade II listed structures also on the Parc estate, they include a 17th century barn (LB 19842) and Beudy Newydd (LB 4815) a large cow house, which is an outlier of the main group of buildings, 338m to the south of the route. It is a T-shaped, single-storey agricultural complex of unusual plan, including an L-shaped accommodation wing which is dated 1666 and restored in the mid-20th century.

The following Listed structures relate to the garden: there are 17th century walls and revetments (LB 19843) of terraced gardens, enclosures (LB 19844 & 19847), as well as boundary walls (LB 19845) and a road bridge (LB 19846). Many are Listed as having group value.

- ***Barn at Parc (19842)***: The barn forms one of three surviving agricultural or service components within the site's important unit-planned complex; it is likely to be of second-half 17th century date. The barn is listed as a Grade II building and located some 40m northwest of Parc, facing a farmyard to the southeast and set against a slope to the northwest.
- ***Walls and Revetments to Upper Terrace Garden at Parc (19843)***: It is likely that the primary house was rebuilt or remodelled during the 17th century and that the large revetted terrace which now survives was a contemporary addition. As such it is the earliest of the various garden structures on the site, and presumably relates to the 17th century gardens described by Machno. The house itself (Parc 1), which would have faced the terrace and stood immediately above it, has long since been demolished, though its platform remains visible. The walls and revetments are Grade II and are located some 50m east of Parc, facing the valley and in front of the site of the (now demolished) primary house at Parc.
- ***Revetment Walls to Terracing at Parc including Walls and Revetments to Enclosure adjoining to SE (19844)***: An associated rubble-walled and revetted enclosure, perhaps relating to an earlier or contemporary walled orchard. The revetment walls are Grade II listed and are located within the Parc drive down to the Afon Maesgwm, between Parc Cottages and Gattws Parc.

- ***Boulder-built Boundary Walls above the Upper Drive at Parc (19845)***: It is probable that these boundary walls were built in the 17th century. They would have defined the plot of the house to the north, while at the same time excluding game from the immediate landscape. Two crude arched niches or seats within the wall at the northern corner appear to be contemporary features and were presumably garden features relating to the formal gardens. The walls are listed as Grade II and located to the north of Parc between the barn and Gattws Parc.
- ***Bridge at Parc (19846)***: Road bridge possibly built to serve the drive to Parc. The latter appears to have been superseded by the top drive in the 17th century. It is presumed that the bridge has to predate the terracing and may therefore be of early 17th century origin. The bridge was partly rebuilt during the 19th century. The bridge is listed as Grade II and it is located approximately 150m from Gattws Parc.
- ***Walls to Enclosure adjoining L-shaped Agricultural Range at Parc (19847)***: Walled enclosure, belonging to the 17th century and in its position in relation to the main house and gardens perhaps originating as a walled produce garden. The walls are listed as Grade II and are located to south of and adjoining the main L-shaped agricultural range at Parc.
- ***Ceunant-y-Parc (20505)***: House originally built as an office for the Parc slate quarry. Parc quarry was developed as underground workings in the 1860s after the construction of Croesor Tramway. The quarry main output was specialist slabs and ridging slates. The office was used to show the varied products of the quarry. The building is said to have been adapted by Clough Williams Ellis as part of the Plas Brondanw estate. The building is listed as Grade II and it is located 1km northeast of Plas Brondanw and 0.2km southwest of Parc.

Remaining listed buildings outside of Parc are Cae Glas Farm (LB 19837), a 16th century house which lies 430m to the northeast and has lower service and byre additions of the late 17th/early 18th century with 19th and 20th century alterations to openings. It is associated with two 3-bay boulder-built barns (LB 19838), probably late 17th century, which incorporates two possibly late medieval crucks and a late 17th/early 18th century barn 520m northeast of the intake location (LB 19839).

An early limekiln, probably late 18th century/early 19th century, lies 530m to the south (LB 19806). Pont Garreg-Hyllidrem is a single span segmentally arched 19th century road bridge 800m to the southwest (LB 19805).

4.4 Known Archaeological Remains and Historical Development

A search was made of the Portable Antiquities Scheme (PAS) database, covering a similar area to the 500m radius study area. No records were found.

The GAT HER reveals 96 undesignated sites within 1km of the site (Figure 7 to 11). Sites are also recorded in the Royal Commission on Ancient and Historic Monuments in Wales (RCAHMW) database; these are duplicates of the HER data. The sites are briefly described below, according to period; they are incorporated into a summary of the historical development of the area.

4.5 Prehistoric: Palaeolithic (c.450,000 – 10,000 BC), Mesolithic (c.10,000 – 4,400 BC), Neolithic (4,400 BC – 2,300 BC), Bronze Age (2,300 BC – 700 BC) & Iron Age (700 BC – AD 43)

The following prehistoric remains have been found within the assessment area (Figure 7).

The closest feature to the site is the Scheduled round hut settlement at Garth-y-Foel, immediately to the north of the proposed penstock route near the intake site (SAM ME170 / HER 1492 & 1493). The monument is probably Iron Age or Romano-British in date and comprises three closely grouped huts of 8m, 5m and 4m diameter; a fourth sits on a higher shelf. There are a number of associated enclosures: the HER records the remains of an enclosure wall, and two huts have an unusual sub-circular design. It has been suggested that the settlement could have been occupied for a long period of time. The HER record point 1492 appears to be 80m further west than the Scheduled area and is probably in an incorrect position. However, the Scheduled polygon appears to include a slope whereas a plateau exists immediately west of the designated map area and it is likely the plateau is the actual Scheduled area. This needs to be confirmed. The Scheduled site is 6m from the proposed route, above the banks of the river.

275m to the south is a possible round barrow, a prehistoric date being suggested by surrounding field names. It is possible that this mound, 9m in diameter and 2.5m high, on the top of a spur, is natural or a Victorian garden feature and it has certainly been reused as such.

Some 600m northeast of the intake location is another hut circle settlement at Cae Glas, on a shelf above a trackway; one has been partially rebuilt as a rectangular hut. There are also traces of an enclosure wall (HER 5168).

A bronze spearhead (HER 4740) was found in 1910 in loose scree near a ruined cottage 675m west of the proposed turbine house.

Garred Hyllidrem rockshelter, 850m to the southwest, was excavated by the University of Bangor (see above). It revealed human activity from the early Mesolithic to the Bronze Age, primarily from midden deposits (HER 55789).

Another group of four round huts of Iron Age or Romano-British period are found at Bryn Derw (SAM ME178 / HER 5153 & 6103), situated on a shelf

adjacent to a small stream parallel to an old trackway 960m south of the turbine house location (The HER records are the same monument, one is shown in the wrong location outside of the Scheduled area).

The presence of Prehistoric remains on the proposed development is considered to be high.

4.6 Roman (AD 43 – AD 410) & Early Medieval (AD 410 – AD 1086)

A number of possible Iron Age or Romano-British settlements are found within the assessment area (discussed above) (Figure 7).

970m north of the proposed intake location is HER 1509, the Olion Rhufeiniog trackway; the name means Roman track. The terrace is depicted on Ordnance Survey (OS) maps and probably led to a crossing of Afon Dylif.

Running along the eastern border of the assessment area, 610m northeast of the proposed intake location at its closest point, is a probable Roman road. It is generally accepted that the old coal road from Tan-y-Bwlch to Croesor is Roman and probably followed an early packhorse trail, deep cut hollows can be traced. A reference to a stone paved section which could be 18th century is well outside of the assessment area (Hopewell, 2007).

The presence of Roman remains on the proposed development is considered to be high.

4.8 Early Medieval (AD 410 – AD 1086) & Medieval (AD 1086 – AD 1536)

Medieval remains are known to exist within the assessment area (Figure 8).

Two house platforms (HER 4742) lie 140m south of the proposed route and are probably the site of a medieval homestead; these are no longer visible due to trampling by livestock. Another house platform is located 280m southeast of the route (HER 5881), situated on an outcrop. A single course of stones is visible. Both of these structures lie within the Parc estate and indicate an earlier settlement here.

960m east southeast of the intake is Pont Maesgwm (ME193 / HER 15617), the well-preserved remains of a small, medieval deserted rural settlement. It comprises four buildings, three of which were probably occupied as houses and one which may have been a mill. The three long huts average 13m by 7m and were built on artificial terraces beside the stream. Two of the huts are simple structures but the third may be more elaborate with some suggestion of a chimney. The fourth building is L-shaped and its proximity to a channel suggests that it could have been a water powered mill.

4.9 Post-Medieval (AD 1536 – AD 1899) & Modern

A number of sites are recorded on the northern slopes above the Afon Croesor near the proposed intake location (figure 9 & 10). 220m northwest is a sluice with reservoir above, although no evidence of a mill was found (HER 36843). A ruined building (HER 16561) and a tip (HER 16562) near Cae Glas are located

250m northeast. A stone-built shelter lies 160m to the west of these (HER 16564).

A number of post-medieval mills are located along the river downstream of the proposed turbine house (measurements given are in metres from this part of the proposed development).

Pandy'r Parc (HER 34591) is a ruined fulling mill 40m to the south; made up of an L-shaped building and smaller rectangular structure, the wheelpit and spillway remain. Other records, 170m to the southwest (HER 34589 and 36690), also refer to Pandy'r Parc. The confusion may be due to misidentification from early map sources. The first record is actually to Rhaiadr y Pandy, and Pandy, or formerly Tan-ty is made up of two buildings further downstream.

Also to the southwest are Gelli Mill (HER 6399), a ruined corn mill at 340m, with surviving gable end, and the Mill House, a three storey water mill with the remains of a sluice 500m away (HER 36689). This is recorded as Factory Park on the historic OS maps. A sluice on the Afon Croesor was also found 725m northeast of the intake (HER 36845).

The Parc estate lies on the opposite bank of the Afon Croesor; the Parc gardens (HER 4466) are a rare survival of exceptional stone-built garden terraces probably of 17th century date, associated with a group of interesting buildings and historical features set within a contemporary small walled park which includes a gatehouse and view-point. Clough Williams-Ellis made improvements in the Parc during the mid 20th century. He converted the drumhouse on the quarry incline into a summer house and reversed the staircase in the derelict third house. The features recorded here are c.270m southeast of the proposed route.

The Parc has a large number of listed buildings from the 16th and 17th centuries (see above) including Parc House (LB 4773), Middle Parc (LB 4817), the Gatehouse (LB 4818), and an L-shaped range of two conjoined barns southwest of Parc (LB 4816). All are Listed grade II*. The estate was owned by the Anwyl family until it was sold in the 18th century. On the death of William Lewis Anwyl in 1642, the bard Huw Machno mentions 'his new house of immense construction', also gardens, orchards, parks and 'fair towers'.

A 17th century barn (LB 19842) and Beudy Newydd (LB 4815), lying 338m to the south of the route, are grade II listed. Various garden features of a similar date are also Listed, including walls and revetments of terraced gardens (LB 19843), enclosures (LB 19844 & 19847), a boundary wall (LB 19845) and a road bridge (LB 19846).

Undesignated features within Parc include the house platform of (possibly) the first Parc house, probably of mid-16th century date (HER 55935), a terrace revetment wall 46m long on the southern boundary of the courtyard (HER 55931), and another 26m long courtyard boundary of drystone wall (HER 55930). There is a modern square pool constructed of slate slabs (HER 55933) that receives water from a post-medieval gully feature (HER 55932), which is

a run-off from an older square pool. A modern garage or fuel store constructed of slate blocks (possibly by Clough Williams-Ellis) (HER 55936) is located here. A 1.5m wide northwest-southeast trackway runs for 47m to connect the old drive with the garage, and was probably added by Clough Williams-Ellis in the 20th century (HER 55934).

A number of industrial features can be found within the Parc boundary. A small, narrow trial adit (HER 55771) was cut into the slope above the track which runs through Parc; 350m southeast of the proposed intake, opposite and immediately down slope, is the associated waste tip.

The remains of the 19th drumhouse to serve the incline (HER 55768), connecting Parc quarry with the Croesor tramway, is located 430m south of the proposed turbine house. Immediately west of the drumhouse is a stone-revetted former incline (HER 27009), built c.1878, to connect the Parc quarry with the Croesor tramway.

Northeast of the incline is the partly cobbled trackway (HER 55770) and Parc slate quarry (HER 20259). The quarry opened underground workings in 1866 and closed in 1930. Ceunant-y-Parc is a 19th century house originally constructed as an office for Parc slate quarry (LB 20505), is recorded here as are a building to house a compressor, a wheelpit and incline. Across the neighbouring stream are ruins of the main mill, with preserved hydraulic system and a collapsed adit lies nearby. These features lie between 415-520m southeast of the proposed route.

Although the assessment area is characterised being exploited in earlier periods for minerals and timber, the economic growth and development in the 18th and 19th centuries resulted in a huge impact on the local resources and character of the area. Particularly assisted by the reclamation of land by William Alexander Madocks at the Taeth Mawr estuary. The building of an embankment – the cob, improved communications by creating passage over the estuary, it also created a harbour for sea going vessels and reclaimed land for new towns such as Tremadoc and Porthmadog at the turn of the 19th century. The chief industry of the area was quarrying slate, centred in Blaenau Ffestiniog to the east.

Further evidence of industrial activity is found in the assessment area. One group lies 650m or more to the east of the proposed intake location. This includes an aqueduct near Penrallt (HER 30788), Rhaiadar Copper Mine (HER 21893), Parc slab slate quarry (HER 20264), and an associated stone revetted track which is probably the bed of an incline (HER 55773). There is also a slate tip (HER 55772). The quarry ceased production before the First World War.

A number of features identified from early OS maps are located 800-930m southeast of the proposed route; they include a leat (HER 18564) and reservoir (HER 30790) at Penrallt. Also located here is Hafodty slate quarry (HER 20262) with two buildings (HER 57363). Another slate quarry, at Bryn Y Gelynen, lies 220m east of these. Both sites were discovered during the Gwynedd Quarrying Landscapes desktop survey.

Near the edge of the assessment area is Garreg Uchaf slate quarry (HER 20263) 916m east of the intake.

Some post-medieval houses are recorded in the HER including one 660m west of the proposed turbine, Creua (HER 61605), which is shown on 1st edition OS maps. The other is to the south c.600m away near the road on the southern boundary of Parc, Coed Ty (HER 30791).

At the turbine house end of the route the following features have been identified. Gareg Fawr; a farmstead including house, outbuildings and enclosure is situated c.850m to the southeast (HER 57364). This was identified from early OS maps, as were a number of other features which are probably related to it, including a building to the south (HER 57365), a structure to the west (HER 57366) and an enclosure to the southwest (HER 57367). Other features identified from early OS maps include enclosures (HER 57360) 725m to the southwest and 975m to the northwest (HER 57298).

At the intake end of the development the following features have been located; a length of walling which forms part of a field boundary shown on the tithe map, 790m to the east. It is suggested this is a remnant of an earlier field pattern (HER 55774). 560m or more to the northeast, near Croesor, are a number of agricultural sites at Cae Glas: field clearance (HER 16565), a ruined house and enclosure (HER 16552) further enclosures (HER 16554 & 16553), a sheepfold/ enclosure at Gelli Iago (HER 39239), sheepfolds (HER 39240 & 57362), barns (HER 16560 & 16566) and a building (HER 57361) identified from early maps. A bridge over Afon Dylif with drystone abutments lies 975m to the north (HER 16568).

Some other modern features can be noted from the HER, including an outdoor swimming pool at Croesor, 615m northeast of the intake, fed by nearby stream and possibly built for the local community by Sir Clough Williams-Ellis (HER 34658).

A modern small slate-slab bridge over Afon Maesgwm (HER 55765) is found 500m south of the proposed turbine; map evidence shows that a bridge has been present since at least the 19th century.

4.10 Undated

There are a large number of undated features in the area (Figure 11).

A remnant of wall is the closest recorded undated feature, 280m northeast of the intake (HER 16563). 230m beyond this is a group of features including structures (HER 16556 & 16557) and a trackway (HER 16555) recorded during the Tir Gofal farm visit. The Holy Well of Elen can be found here (HER 4741) on the side of Sarn Elen, which probably gave it its name; there is no genuine Medieval tradition concerning it.

Another group lies approximately 600m south of the route on the south side of the Parc road. This includes a sheepfold (HER 30782), a building, Rhaiadr (HER 30782), and three other structures (HER 30783, 30784 & 30785); all are known from documentary sources. 365m west of these is a building (HER 30787) also recorded from early maps.

A group 375m south of the proposed turbine house consists of a field bank on a north-south axis that is cut by a later quarry and tracks (HER 55769), a drystone structure near the river crossing with two entrances (HER 55766), and another ruined structure that is probably an agricultural building (HER 55767).

A further set of monuments lie c.800m east of the intake, on the far side of the Croesor road; this includes the remains of a low bank, with a possible hollow way by a stream (HER 55778). It has been suggested these may be related to the nearby Roman road. Other remains include a sub-rectangular stone and earth banked structure (HER 55775), a wedge shaped drystone structure, and a possible abutment, these may be industrial in nature or represent a clearance cairn (HER 55777). Also present is a sub-circular feature 0.5m high and level on top (HER 55779). There is also a track through a slight hollow (HER 55776) and a possible enclosure made of large boulders in a curvilinear setting with an adjoining trackway (HER 5874).

Further to the southeast, 780m and more from the intake, are three more monuments: a long hut, Pont Maesgwm (HER 1495), a bridge over the Afon Maesgwm (HER 30789), and Penallt House (HER 30781). All are recorded in documentary sources.

5 Map Regression

5.1 *Llanfrothen Parish Tithe Map, 1841*

The tithe map of Llanfrothen parish contains very little detail (Figure 12). The fields on the north bank of the river which the scheme passes through are: 25 (Caeglass), in the ownership of Miss Edna Evans, tenant William Davies; 4 (Garthfoel) occupied by William Rowland; and possibly 5 (Garregghyllhem), tenant Peter Roberts. The last two are in the same ownership (Hugh Reverley Esq.) as Parc (shown here as field 1a, Park and Gilli). No state of cultivation is recorded.

Few roads or buildings are shown and the Parc estate is devoid of features. One house is present on the southern edge of the estate, reached by two tracks; this may represent one of the Parc houses, perhaps the Gatehouse, as it is north of the Afon Maesgwm. The accuracy of the tithe in this location may not be very high, the field boundaries and some of the roads are difficult to reconcile with modern or other historic map depictions. The irregular shape of some of the field boundaries is probably a reflection of the topography though some of the smaller fields from later maps appear not to be shown.

5.2 *Ordnance Survey Historic Maps*

Ordnance Survey 1st Edition 1888 1:2500 map (Figure 13)

The area is divided by generally rectilinear though irregular field boundaries varying greatly in size. This is likely a reflection of topography, with steeply

sloping areas making up the larger fields and more level areas, particularly around farmsteads creating smaller enclosures. The irregularity of shape is also most likely a reflection of topography and follow breaks in slope.

The historic characterisation of Brondanw which surrounds the area of the Parc has been described as possibly early. The generally rectilinear nature of the field enclosures suggests it is post-medieval, though the small scale of some plots and irregular shapes suggest a medieval date. Some remnants will follow boundaries which are much older, such as old route ways. The area has never been intensively farmed, mostly used as poor pasture and for timber which has probably resulted in the survival of the pattern evident in the historic mapping.

The 1st Edition Ordnance Survey mapping shows stepping-stones across the Afon Croesor, a short distance north of the propose intake. The north bank of the river is characterised by discrete areas of woodland and rough pasture and very craggy slopes. A small structure possibly a sheepfold or a mill is present between the line of the penstock route and the river. A small reservoir is present north of the river (HER 36843) and a sheepfold is indicated further inland. Garth-y-foel farmstead is present.

The location of the current river crossing is shown here as a ford, a foot bridge lies further upstream. Downstream from the development is the homestead of Gelli (HER 6399) on the north bank. Other river crossings are present, including another footbridge and more stepping-stones. A sluice is shown above Factory Park which is recorded in the HER (HER 36843).

On the south side of the river a number of buildings are shown within Parc and the Gatehouse is labelled. A number of quarries or workings are labelled 'old levels', and Park Quarry (slate) is indicated (HER 20259). The Croesor tramway is marked and two inclined planes (including HER 27009), cross the Parc from northeast to southwest. Another tramway and inclined plane are shown running from the quarry on the south side of the Afon Maesgwm; aqueducts and a smithy are also shown. The tramway passes the tear-shaped mound which may be prehistoric (HER 5882), and its neighbour, a similar but larger mound. This tramway crosses the river and joins the Croesor tramway.

Ordnance Survey 2nd Edition 1900 1:2500 (Figure 14)

On the 1900 map there are very few differences discernible. An airshaft for underground workings is shown to the east of the Parc quarry. The mill or house Tan-ty is now labelled Pandy; another building to the northeast is now labelled Rhaiadr y Pandy. The larger of the two earthworks near the slate quarry has been extended and is much larger and may be a spoil tip.

Ordnance Survey 4th Edition 1953 (Figure 15)

By 1953 the Smithy is no longer indicated and the slate quarry is marked as disused. The tramway is no longer labelled. By 1977 both tramways are shown

as dismantled. The drumhouse on the upper incline (HER 55768), had been remodelled by Clough Williams-Ellis as a banqueting hall for the Aberconway family; the enlarged building is shown here.

The 1977 maps shows a bridge crossing Afon Croesor in the location formerly indicated as a ford. The sheepfold or mill structure on the north bank between the proposed route and the river is still present.

6 Aerial Photographs and LiDAR (Figure 16-; Plates 49-52)

A number of aerial photographs of the area of the proposed scheme were viewed, these are discussed below. They show some of the features recorded in the HER. In recent satellite imagery from Google and Esri World Imagery there appears to be a plateau to the immediate west of the Scheduled hut circle settlement Garth-y-Foel (SAM ME170), 35m northwest of the penstock route. There may be circular features present within it, although these are not clear. This is possibly the location of the features mentioned in the Scheduling and the area currently indicated as designated is incorrectly positioned, especially as this area is mostly slope. The actual location of the hut circles must be confirmed.

3 May 1946. Sortie 106G UK 1467 RAF B&W 3191-93 Scale - Various

The river and neighbouring fields can be seen. A large, elongated teardrop-shaped mound is visible to the south of the river. This may be the remains of industrial activity and can be seen on historic OS maps.

4 June 1971. Sortie OS 71 286 OS B&W 085-6 Scale – 1:27,000

The trackways and buildings are visible on the southeast side of the stream. The large mound is still visible.

17 April 1973. Sortie OS 73 082 OS B&W 402-4 Scale 1:7500

This series of photographs clearly show the buildings at Parc. Stone walls and probable field boundaries are also visible. Beudy Newydd can be seen and a ruinous building with walls surviving but no roof. This structure is visible on the 1st edition OS map and it is likely to be a sheep fold or small cowshed possibly associated with Beudy Newydd. The incline is clearly visible. To the north of the stream is the remains of a stonewalled structure. The large mound to the south of Beudy Newydd is visible.

LiDAR

LiDAR imagery was available at 2m resolution for the whole site and at 1m for the southwestern part (Figure 16). The Digital Surface Model shows the remains of linear features in the area, including old tramways and field boundaries and, possibly, the terraces within Parc. It is not of sufficient detail to pick out smaller

features. The plateau adjoining the platform containing hut circles in the Scheduled area, seen in aerial photography, is visible.

7 Site Visit

(Plates 1–41)

A site visit was carried out on the 18th April 2018. The conditions were dry and bright with good visibility. The route of the penstock and installations was walked; a c.30m corridor of the surrounding area was also examined to determine the presence of buried or standing archaeological remains. The survey was divided into six parts; the intake location and stretches A, B, C, D and E incorporating the turbine house. Particular attention was given to assessing the impact of the development on designated and non-designated assets in the intake and turbine house area as well as along the route.

The penstock route is c.780m long. The area of the intake is located on SH62610 44257 and the turbine house and outfall location are at SH 62045 43746.

Intake location:

The intake location is characterised by light woodland on the west bank of the river (Plate 1). The topography of the area rises to the east and west of the intake location; the views of the surrounding area are restricted (Plate 2).

The hut circle Garth Y Foel (HER 1493 & 1492; SAM ME170) is located 7m northwest of the proposed intake. This hut group is on a raised plateau but the intake is not visible due to the topography and the presence of trees and a dry-stone wall running parallel to the stream. The hut circles are on two raised plateaus above the river and, whilst buried remains may exist in proximity to the intake, it is likely that the main settlement is limited to the higher ground (Plates 3-5).

Penstock Route – Stretch A -SH62610 44257 to SH62503 44167

In this area the penstock will cut through a lightly wooded area adjacent to the river bank, following a route defined to avoid tree disturbance (Plates 6-8). Views from and towards known assets appear inhibited on this stretch by the topography and by trees.

Plate 9 shows no visibility between the route and the hut circle groups. Similarly, Plate 10 demonstrates that views from and to assets located at to the east of the scheme are also inhibited by vegetation cover and landscape.

No archaeological remains were identified during the site visit on Stretch A.

Penstock Route – Stretch B -SH62501 44165 to SH62446 44123

This area is defined by two parallel drystone walls, located on SH62501 44165 and SH62446 44123 respectively. On this stretch the route runs between 18m - 44m distance west away from the river bank, following areas devoid of tree cover.

The route will cut through two post-medieval dry-stone walls. The first is located at SH62501 44165 and is defined by a continuous wall aligned E/W. At least 2m of the wall will be affected during the installation of the pipe. The latter is located at SH62446 44123. A c.2m gap exists on this wall, which could allow the installation of the pipe with minimal impact (Plates 11-13).

No other buried or standing archaeological remains were found in this area. Visibility from and to other heritage assets was inhibited by vegetation and by the topography.

Penstock Route – Stretch C -SH62501 44165 to SH62446 44123

This area is characterised by open fields. The existing overgrown vegetation made it difficult to determine the presence or absence of archaeological remains in the area (Plate 14).

Roof slates were found in this field, at SH62427 44097 (Plate 15) but no other structural remains were located so it is not known if they are the remains of a structure.

Plate 16 shows the view to the northwest, demonstrating the lack of intervisibility between the penstock route and any designated or non-designated assets.

The penstock will cut through a drystone wall at c. SH62403 44092. A rectangular structure was found 4m to the east of the route. It is 9m long and 1m wide and can be tentatively interpreted as the remains of a sheepfold (Plates 17 and 18).

Penstock Route – Stretch D–SH62404 44090 to SH62199 43939

This section combines areas of moorland and lightly wooded areas. In a number of instances the overgrown vegetation made it difficult to determine the presence or absence of archaeological remains (Plates 21, 23, 25).

No views to heritage assets concentrated at Parc and its surroundings were observed (Plates 22, 24, 26). No views toward the remains of the mill located on SH62303 43989 were possible. Furthermore, plates 42 to 49 demonstrate no visibility from Parc to any element of the proposed development.

Plate 29 shows an area where the penstock route cuts through a drystone wall. This is also shown on Plates 31 to 32, where a protruding wall of uncertain origin can be seen; this is documented on historical OS maps.

Penstock Route – Stretch E– SH62196 43941 to SH62380 44060 and Turbine House

This stretch is mostly characterised by open field moorland. Due to safety concerns this area – largely overgrown vegetation and bog - of the penstock route was not walked but examined from a raised area located to the west (Plates 33-37).

An elongated earthwork feature was observed west of the penstock route. This is probably at a sufficient distance from the development not to be affected but the potential impact cannot be fully assessed without further examination of the feature (Plates 37-38). No other evidence of remains was found in this area.

The proposed turbine house will be sited on a natural drop between the river bank and the surrounding area. No archaeological remains were observed in this location. No views of designated or non-designated assets were identified here, nor will the turbine house be visible from the heritage sites due to vegetation cover and the nature of the topography.

8 Impact Assessment

8.1 Assessment of Potential and Significance

Reference No.	Name	Site Type	Period	NGR	Significance
ME 170	Garth y foel hut circle	Scheduled remains	Iron Age/Romano British	SH62566 44263	National
n/a	Wall	Part of field boundary	Unknown	SH62228 43974	Local
n/a	Roof tiles	Poss buried remains	Unknown	SH62432 44101	Local

n/a	Sheepfold	Structure	Unknown	SH62412 44090	Local
n/a	Poss Hut circle	Cropmark	Poss Iron Age / Romano British	SH62511 44254	At least regional
n/a	Mound	Poss clearance cairn	Unknown	SH621484386 7	Local
n/a	Mill/sheepfold	Structure	Unknown	SH62299 43987	Local

Table 1: heritage assets in or adjoining the proposed development area (figure 15)

The proposed area of development lies on the northwest bank of the Afon Croesor; a hut circle settlement is known to exist in proximity to the site. This hut circle settlement has been designated as a Scheduled Ancient Monument as it is a site of national importance. There is the potential for further associated remains to exist surrounding the Scheduled Area, although this is considered more likely to be confined to the plateau, and not the area of proposed development.

The registered Historic Park and Garden of Parc (GD35) runs as far as the southern banks of the Afon Croesor. As a registered parkland this area is also considered to be a site of National importance. However, the proposed development lies outside this area, within its essential setting. This area of open moorland and hillside, with some light woodland, is an area of regional importance due to its association with the registered parkland.

The area contains the remains of old agricultural buildings and enclosures and is crossed by drystone wall boundaries which may be remnants of old field systems. The route of the penstock pipe will pass through several of these walls. A ruinous stone structure which may be a sheepfold was identified in proximity to the site, a section of wall, and in another location a find of roof tiles was also located on the proposed route, which may suggest that the remains of another building exist nearby. A structure which can be seen on early and modern maps lies close to the north bank, between the penstock pipe and the river is either a mill or sheepfold; there is a potential impact on this. Finally, a mound of uncertain function was seen near the turbine house location. These features are generally distinctive elements of the historic upland agricultural landscape, they provide physical and visual evidence of how the landscape was managed and utilised by local communities during the post-medieval period. These remains are extensive throughout the landscape, therefore the elements potentially affected by the proposed development are considered to be of local archaeological value.

8.2 Previous Impacts

There is no information about previous impacts on the site; the area has been used as rough pasture with dispersed farmsteads and agricultural buildings. The area is also known for industrial activity in the late post-medieval period, particularly mining and quarrying and associated infrastructure. The majority of evidence for this is on the southeastern bank of the Afon Croesor.

A number of water mills are known on the river banks and it is possible that there were others in the area. Some evidence for structures on this side of the river was found during the site visit.

8.3 Potential Impacts of the Proposed Development

The proposed development for the hydro-electric scheme, including groundworks, excavation, construction, and installation of facilities could impact directly on standing and buried heritage assets. The construction of the scheme will create a greater visual impact on the setting of the heritage assets than when complete when the penstock pipe will not be visible, including the access of site traffic to the site. The inlet and outlet buildings, the pole mounted transformer and the cable run along the existing track to connect to existing overhead power lines will be a long term impact on the assets.

Any of the following activities associated with the proposed development could therefore expose, damage, or destroy heritage remains:

- Excavation of the pipe route
- Construction works
- Enabling works, such as the installation of the contractor's compound, construction of access roads, parking areas, storage areas and associated services
- Landscaping and terracing works
- Construction of roads
- Service installation

The proposed development has the potential to generate indirect effects on other heritage assets in the wider area, such as altering the setting of sites and landscapes or their character.

8.4 Designated Sites and Landscape

There are three Scheduled Ancient Monuments in the assessment area but only one is in close proximity to the proposed development site. The site visit showed that there is limited visibility from the route to the wider landscape due to tree cover and the steep topography and none of the Scheduled Monuments were intervisible with the site, including the unenclosed hut circle settlement

6m north of the development (SAM ME170). This was separated from the development by a drystone wall running parallel to the river; the plateaux containing the remains were not intervisible with the route or intake location. It is thought that the hut circle settlement is limited to the two plateaux, but it is possible that buried remains could extend beyond the Scheduled area and could be directly impacted by the development. It has also been suggested that the area mapped as Scheduled is not in the correct location and this needs to be confirmed. It will be important to maintain a physical boundary and warning signs around the Scheduled area to ensure that the designated site is respected and not accidentally damaged during construction works. It is likely that these works will temporarily create a noise, vibration and other disturbance but this is not likely to adversely affect the condition of the monument.

There are seventeen Listed Buildings within the assessment area; most are within the Parc estate which is 220m or more southeast of the penstock route. There are four grade II* buildings here and eight are listed grade II. The access track for the development will make use of an existing drive which passes through Parc and could have a temporary impact whilst the development is under construction. There will be an increase in noise and vibration in this area from the works traffic but this will be for a limited period of time and could be reduced by traffic control measures.

The cable run will also enter the Parc and connect to existing overhead cables. This will have a permanent impact on the heritage assets here but the extent will be limited to the area next to the track. It is unlikely to change the setting significantly as there are existing overhead power cables and will be limited to the vicinity of the existing track. This is 100m northwest from the nearest listed building, Barn at Parc (LB 19842 / HER 64499).

The five remaining Listed buildings are 430m or more distant from the development. None of the listed buildings are intervisible with the development. None are close enough to be impacted by the development either directly or indirectly.

8.5 *Non-designated Archaeological Sites*

There are non-designated assets which are in proximity with the proposed development, as laid out in section 8.1, which are likely to be directly or indirectly impacted by the development. There is potential impact on others in the surrounding area.

Field boundaries in the path of the penstock route will be directly impacted. Other previously unknown remains which are in the proximity of the development could be indirectly or directly impacted, including a stone structure

(sheepfold), wall and possible buried remains from a building evidenced by roof tiles. The existence of a plateau next to the hut circle settlement may have buried remains, but the distance from the development (35m) suggests that disturbance is unlikely. The site visit demonstrated that the mill or sheepfold structure was not intervisible with the development even though it is in close proximity to it. The mound discovered during the site visit lies beyond the development and is also unlikely to be directly affected.

The setting of the field boundaries along the route maybe unchanged depending on the construction method for laying the pipe, and therefore the impact of the construction is potentially very low once the site is completed.

The pole mounted transformer on the north bank will have a localised impact on the setting of surrounding features such as field boundaries and enclosures in this area.

There is only one non-designated monument in the HER recorded at less than 100m distance from the route of the penstock pipe and its inlet/outlet. Pandy'r Parc or Rhaiadr y Pandy is a ruined fulling mill (HER 34591), 40m south of the proposed turbine house on the south bank of the river. No intervisibility with this or other undesignated sites in the HER was apparent during the site visit. This site will not be directly or indirectly impacted.

A number of non-designated assets exist in the Parc estate. An access track for the development will pass through here; it is possible these could be temporarily indirectly impacted from the works traffic on the road.

The cable will connect to overhead power lines in the vicinity of the track, this is unlikely to greatly alter the setting but it will have some localised impact on setting in the vicinity of the track. The nearest assets are house platforms 30m northeast (HER 4742).

Other monuments in the assessment area are not intervisible with the development and have no other links to it so will not be impacted directly or indirectly.

9 Conclusions

9.1 *Impacts on Designated Assets*

The proposed development is for a hydro-electric scheme including the installation of an intake weir, penstock pipe, turbine house, pole mounted transformer and a cable run. This may have an impact on assets in the wider area especially during the construction including from site traffic. After the construction much of the penstock pipe will not be visible and the method of

construction used to pass through existing features such as field boundaries can greatly limit the impact from the development.

The cable run will run along the existing track and connect to overhead power cables already present in the Parc. This will have an impact with anything in the immediate vicinity and any assets which are intervisible with it. However, the likelihood is that given the overhead lines are already present the impact on the setting will be limited and localised.

No Listed Buildings in the vicinity are intervisible with the site or have any link to it and so are not considered to be impacted. There is no intervisibility with Scheduled Ancient Monuments within the assessment area either, although a hut circle settlement (SAM ME170) is in close proximity to the intake location.

A number of Listed Buildings in the Parc estate exist in proximity to the access track for the development but any impact from this is indirect and temporary.

No other designated assets from the HER will be impacted indirectly or directly by the development.

9.2 *Impacts on Non-designated Assets*

The penstock pipe will pass through drystone field boundaries. It will also pass in proximity to two structures, a wall and a mound. There is potential for buried remains in the area of the pipe, roof tiles were found along the route. Another potential site, tentatively identified from aerial photographs, is 35m above the development on a plateau and is unlikely to be impacted. Depending on the method, the impact of the pipe during construction could be minimal. After construction it will not be visible, the intake and outlet points will be visible, as will the pole mounted transformer.

During construction assets in proximity to the access track may be impacted by an increase in traffic. After the site works are completed the connection of the cable to existing overhead cables will likely impact on local assets in the vicinity, the nearest asset is the platform houses c.30m to the east (HER 4742). The impact on the setting is likely to be localised and limited as there are existing overhead powerlines.

The character and setting of the monuments in the area is not likely to be greatly affected by the development as there appears to be no intervisibility with sites, except to those in proximity to the cable run and access track. There are a number of undesignated sites in the Parc estate which are in proximity to the access track for the development but any impact from this is indirect and temporary, with the exception to those in proximity to the pole mounted transformer.

9.3 Mitigation

The development will impact directly on assets of low significance including field boundaries. There is also the potential for the existence of buried remains in the development area. The development is in proximity to undesignated and one designated asset. Therefore the following is considered appropriate mitigation.

An archaeological watching brief should be maintained during ground works, especially any topsoil stripping.

An archaeological record of the field boundaries should be made before any demolition and reinstatement of the walls to ensure any heritage assets are preserved through record. It may be worth investigating the possibility of tunnelling beneath walls as an alternative to demolition and reconstruction.

Close monitoring of works in proximity to the Scheduled Ancient Monument is essential and it is recommended that a physical boundary, such as Heras fencing, is erected around the Scheduled area to ensure that the designated site is respected and not accidentally damaged when the development is under construction. Warning notices should be displayed and toolbox talks arranged for staff.

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Ordnance Survey 4th Edition 1953 1 mile to 6 inch map

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Ordnance Survey 1977 1:2500

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LiDAR 2m imagery Natural Resources Wales [downloaded April 2018]

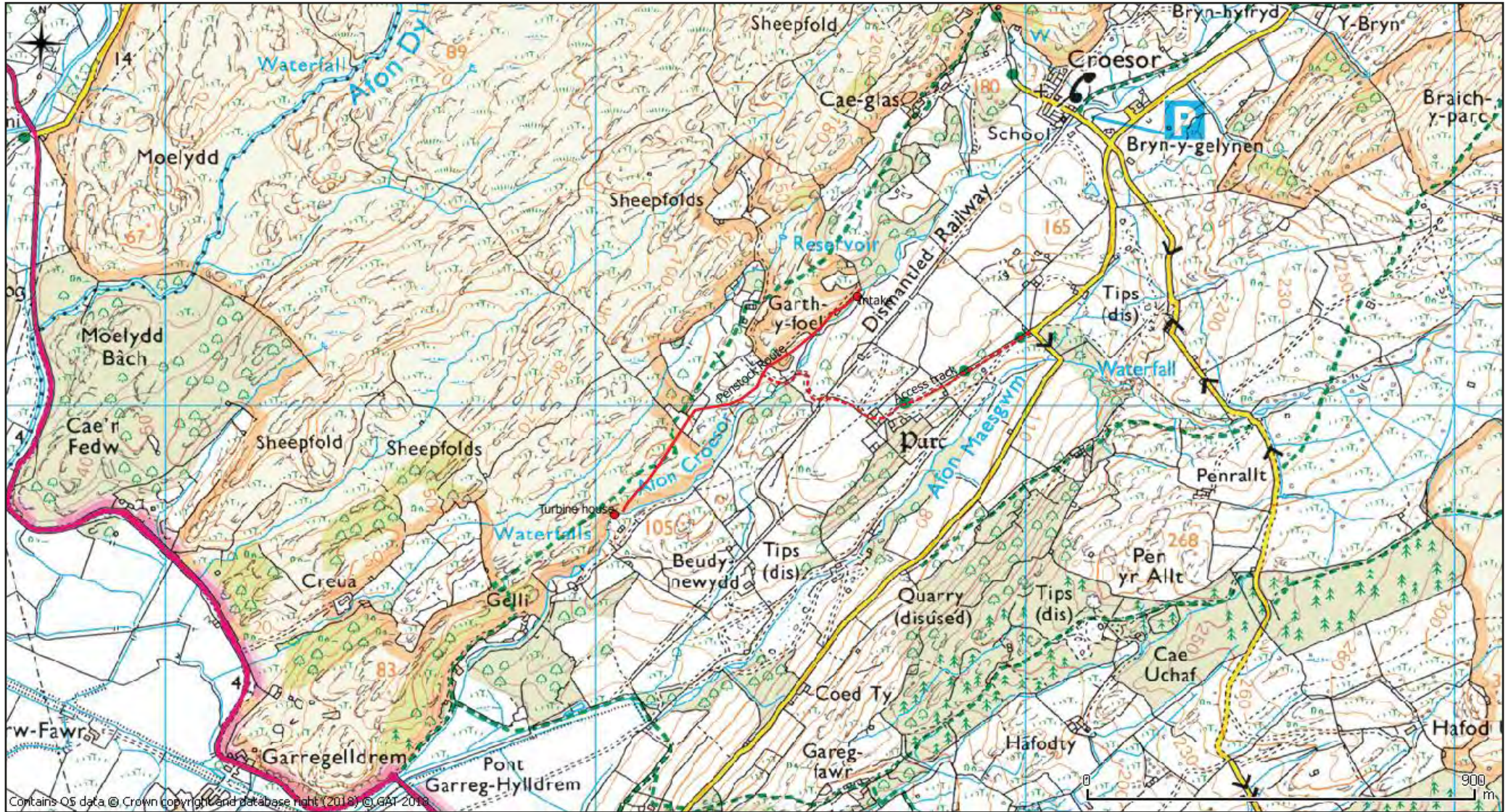
Aerial Photographs

3 May 1946. Sortie 106G UK 1467. RAF. B&W. 3191-93. Scale - Various

4 June 1971. Sortie OS 71 286. OS. B&W. 085-6. Scale – 1:27,000

17 April 1973. Sortie OS 73 082. OS. B&W. 402-4. Scale 1:7500

ESRI World Imagery



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Figure 1: Location map

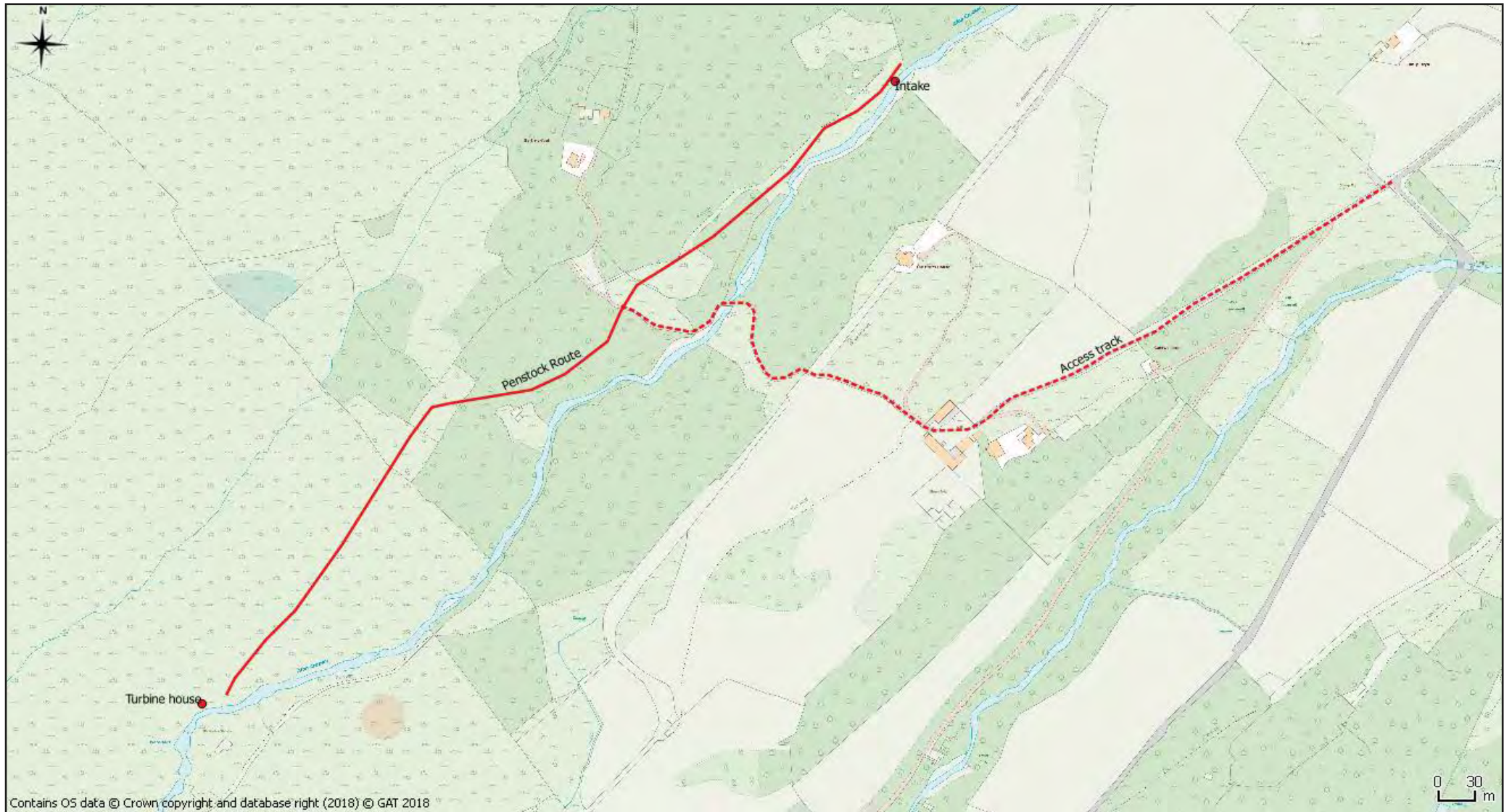


Figure 2: Location plan

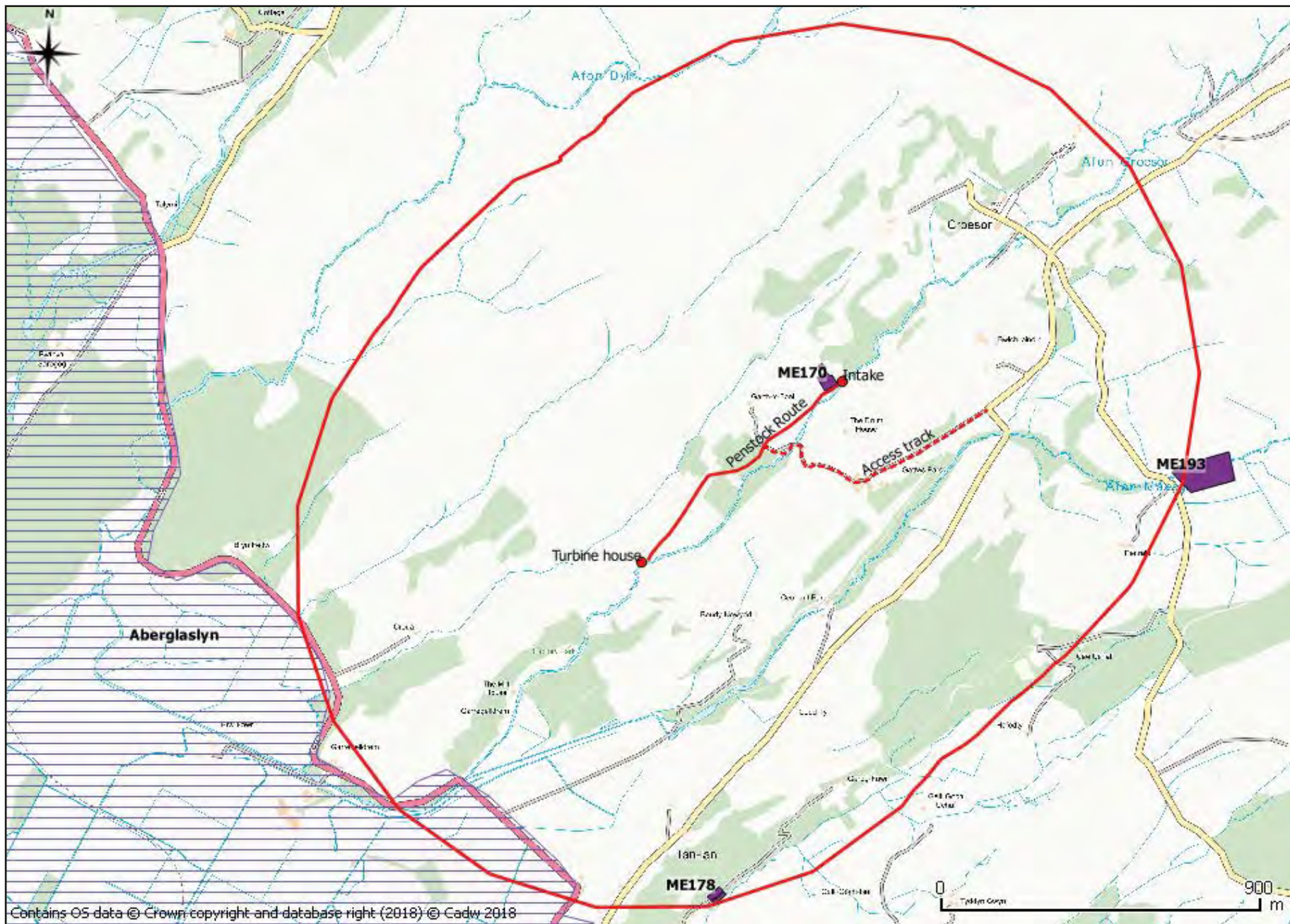


Figure 3: Scheduled Ancient Monuments and Registered Landscape data, Cadw

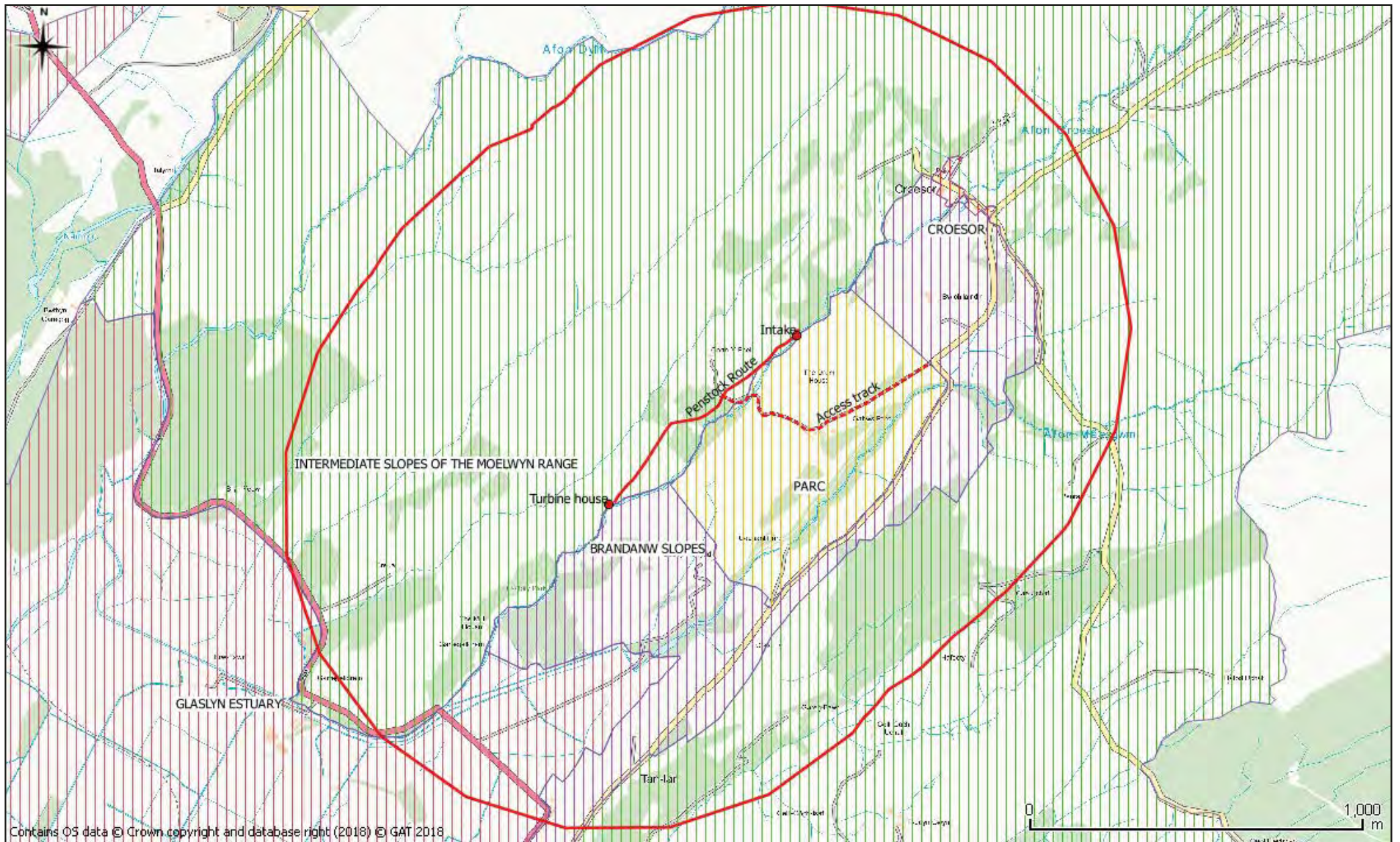


Figure 4: Historic Landscape Characterisation, GAT

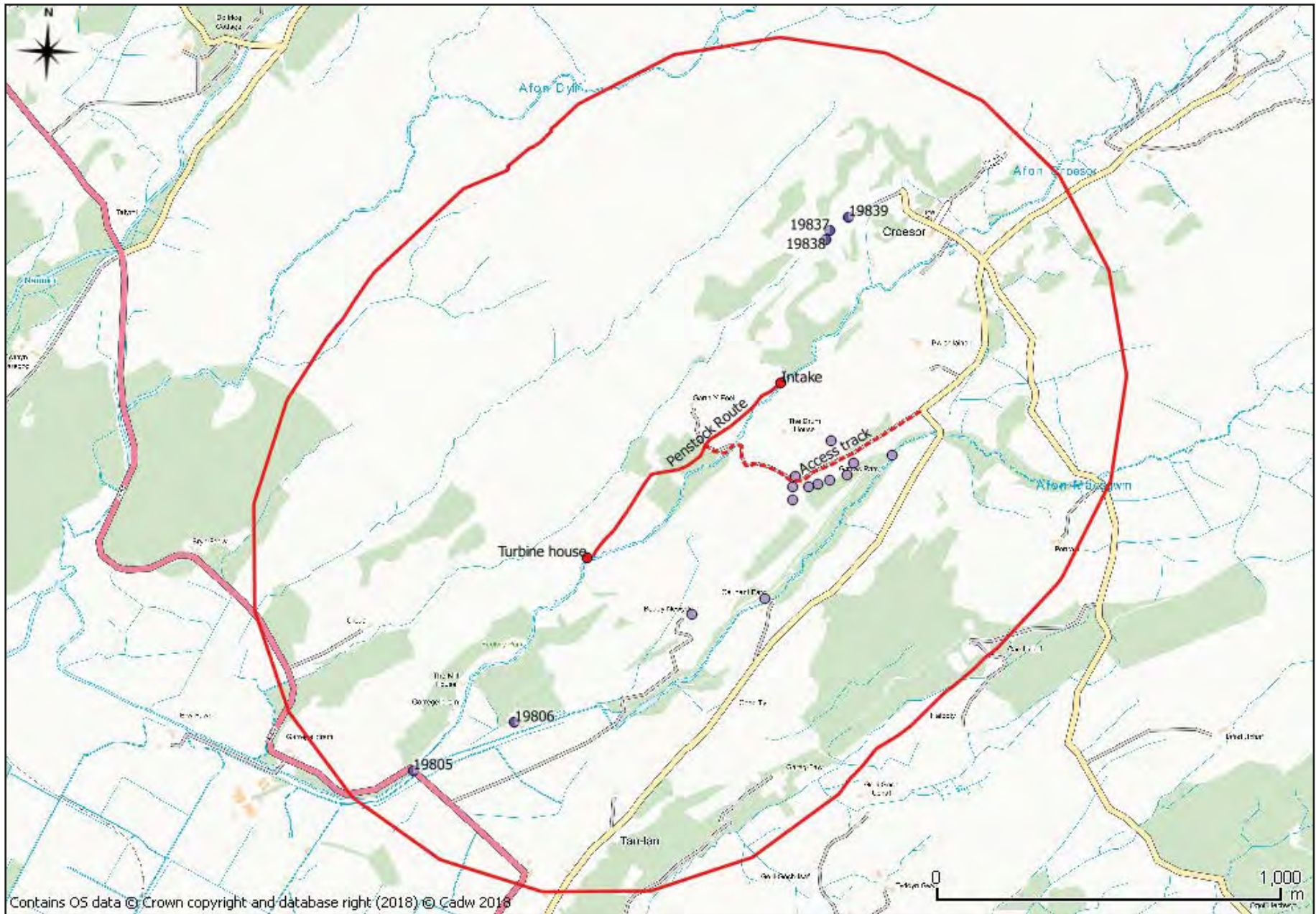


Figure 5: Listed Buildings



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Figure 6: Listed Buildings in the Parc

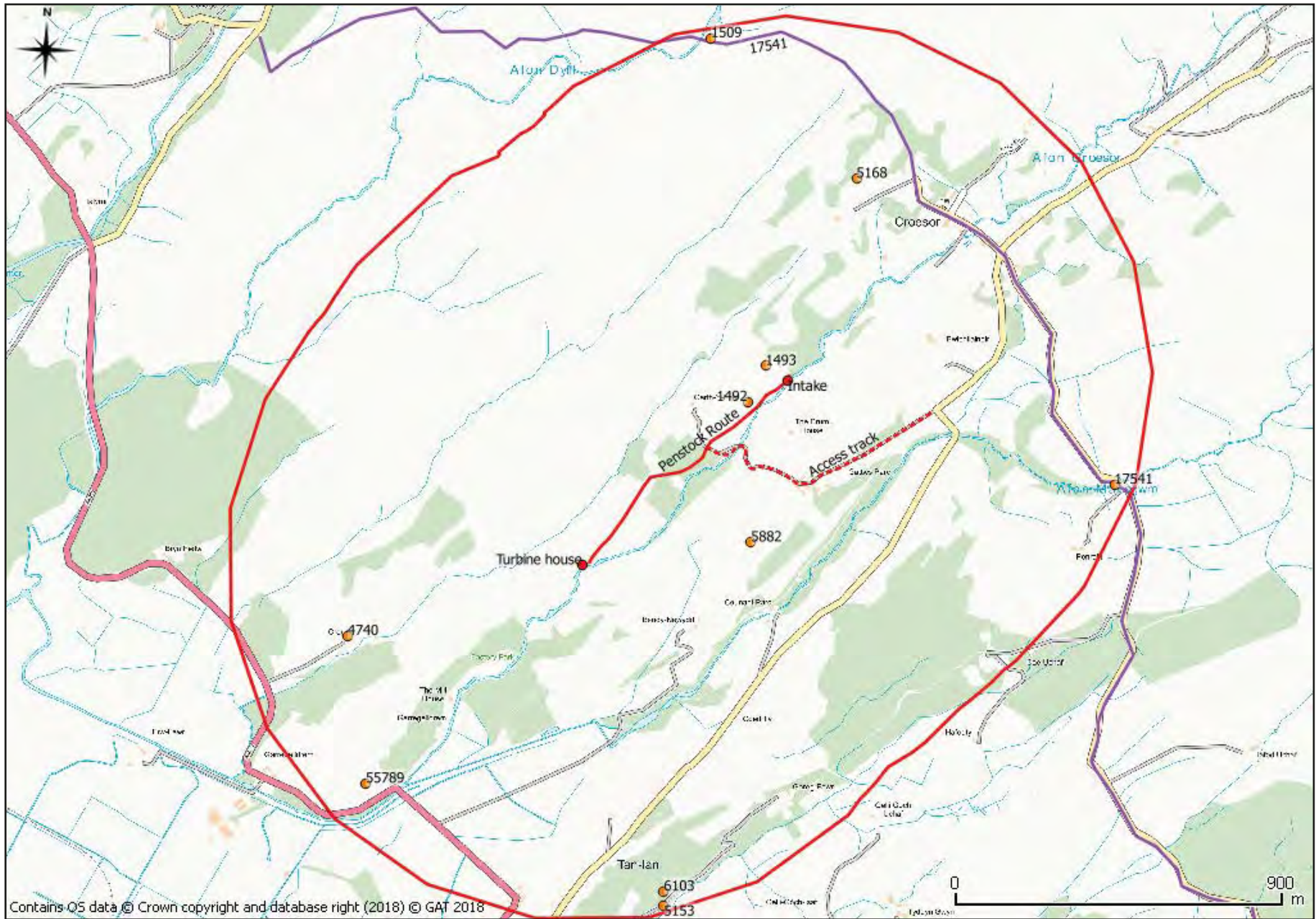


Figure 7: Prehistoric and Roman sites within the GAT HER

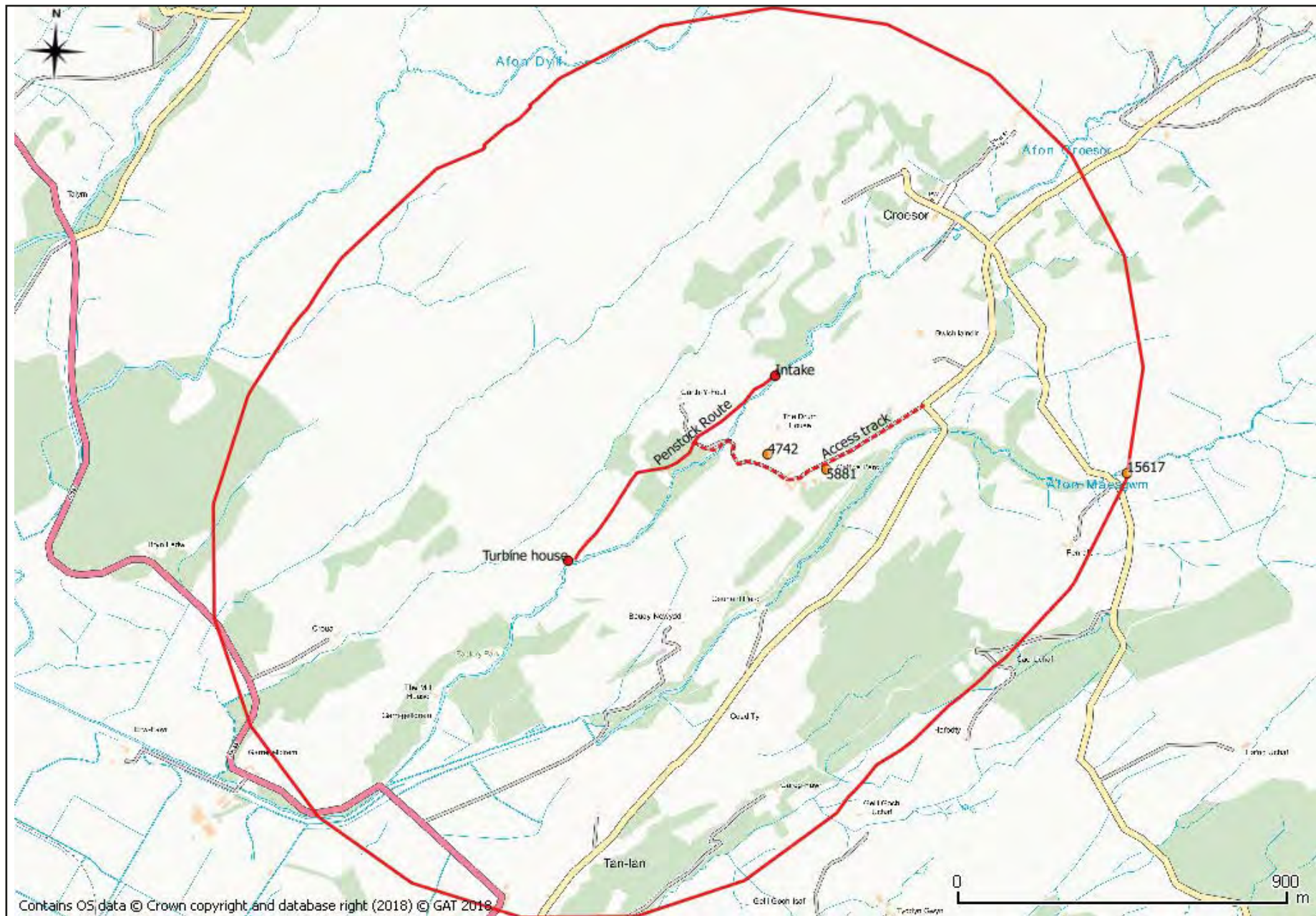


Figure 8: Medieval sites within the GAT HER

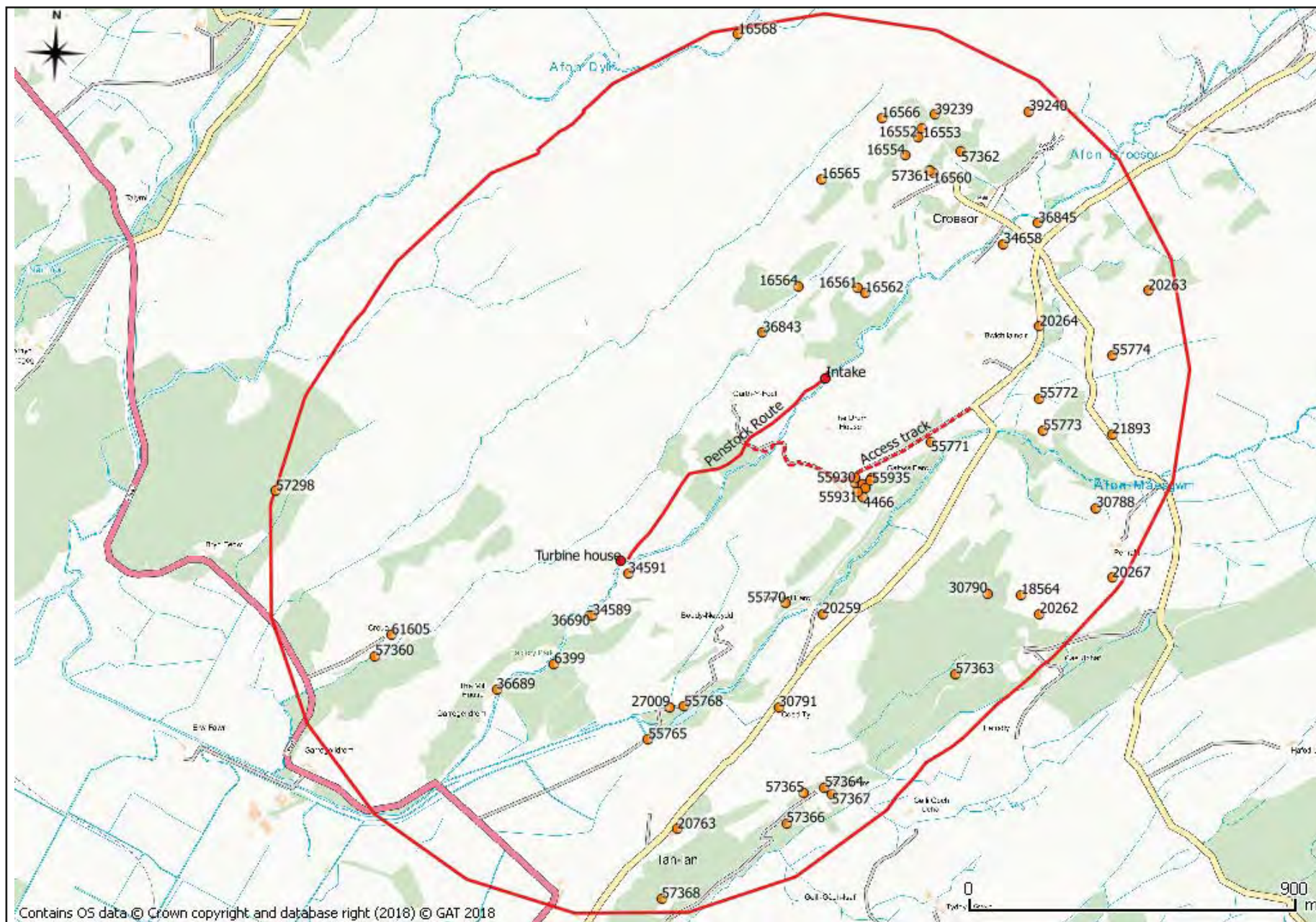


Figure 9: Post-medieval and modern sites within the GAT HER

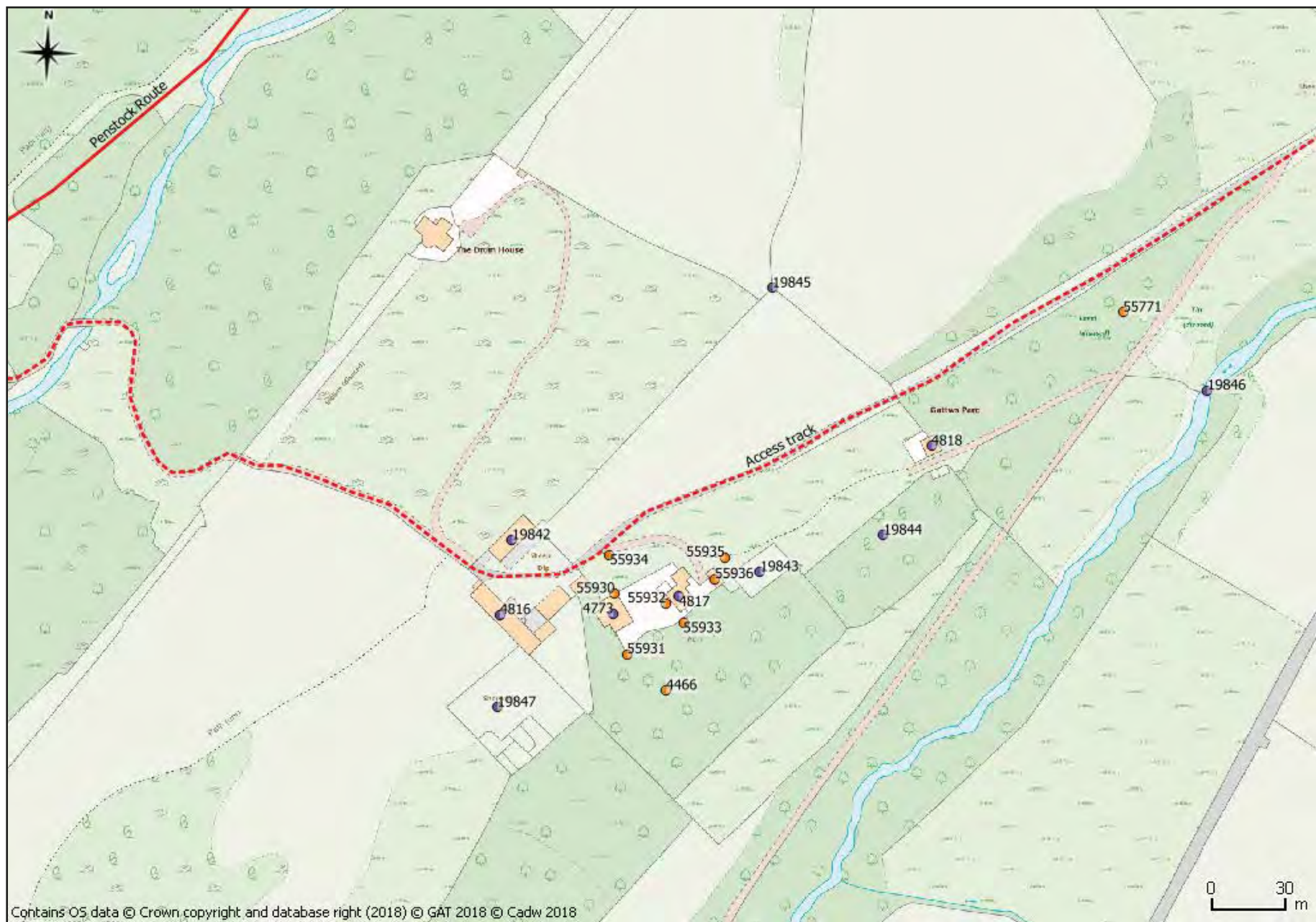


Figure 10: Post medieval and modern sites within Parc from the GAT HER

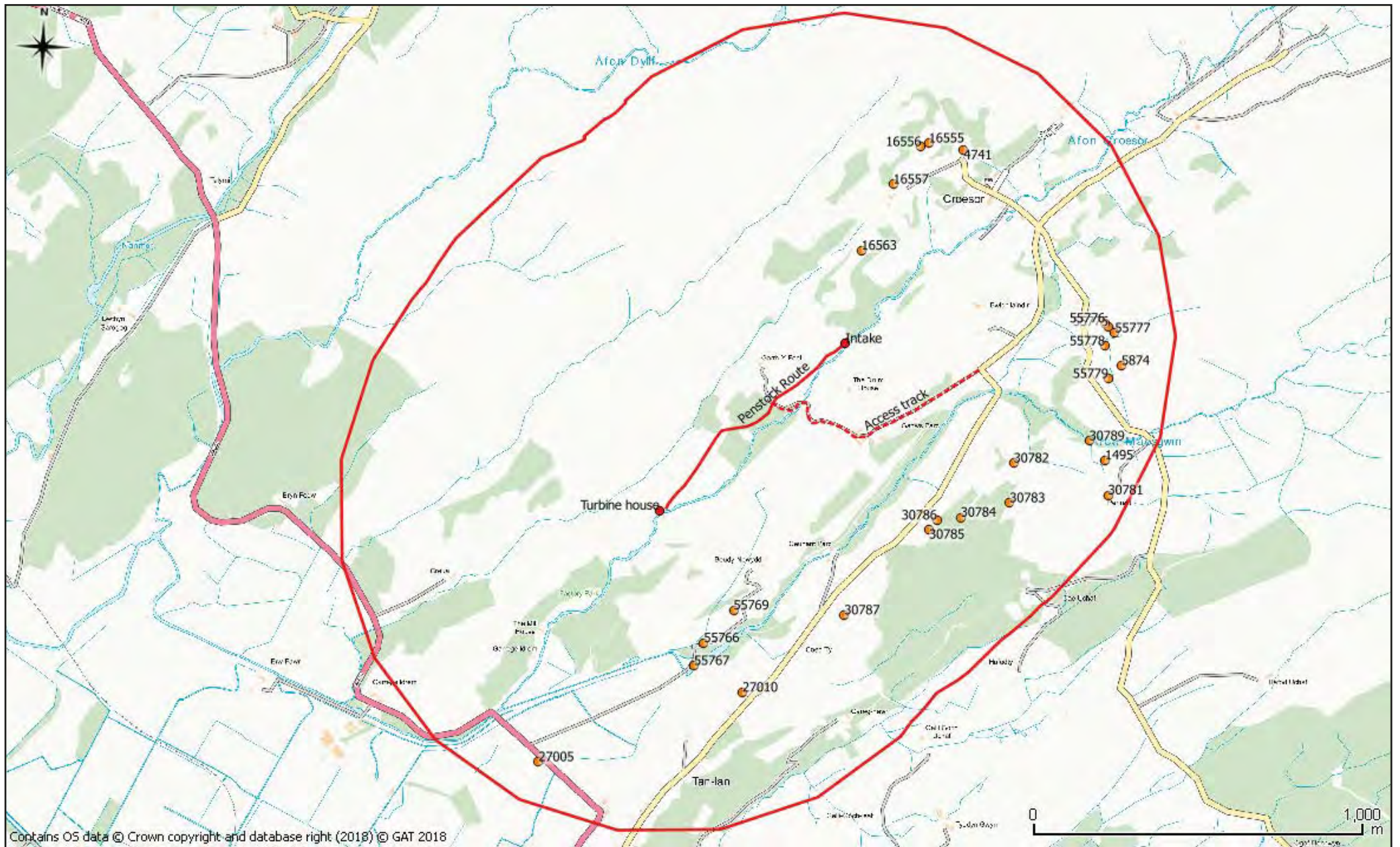


Figure 11: Undated sites within the GAT HER



Figure 12: Llanfrothen Parish Tithe map 1841

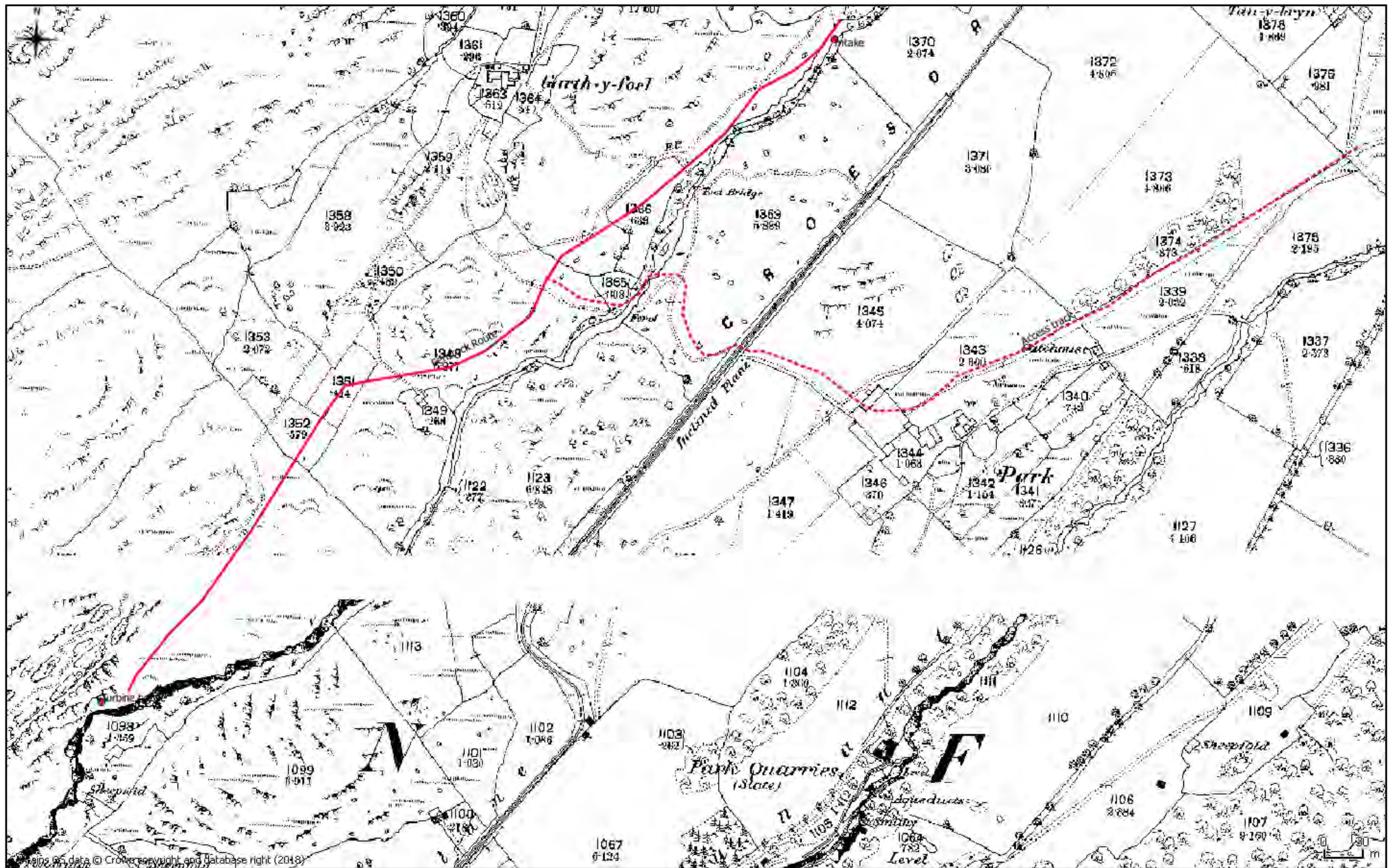


Figure 13: Ordnance Survey 1st Edition 1888 1:2500 map (development marked in red).

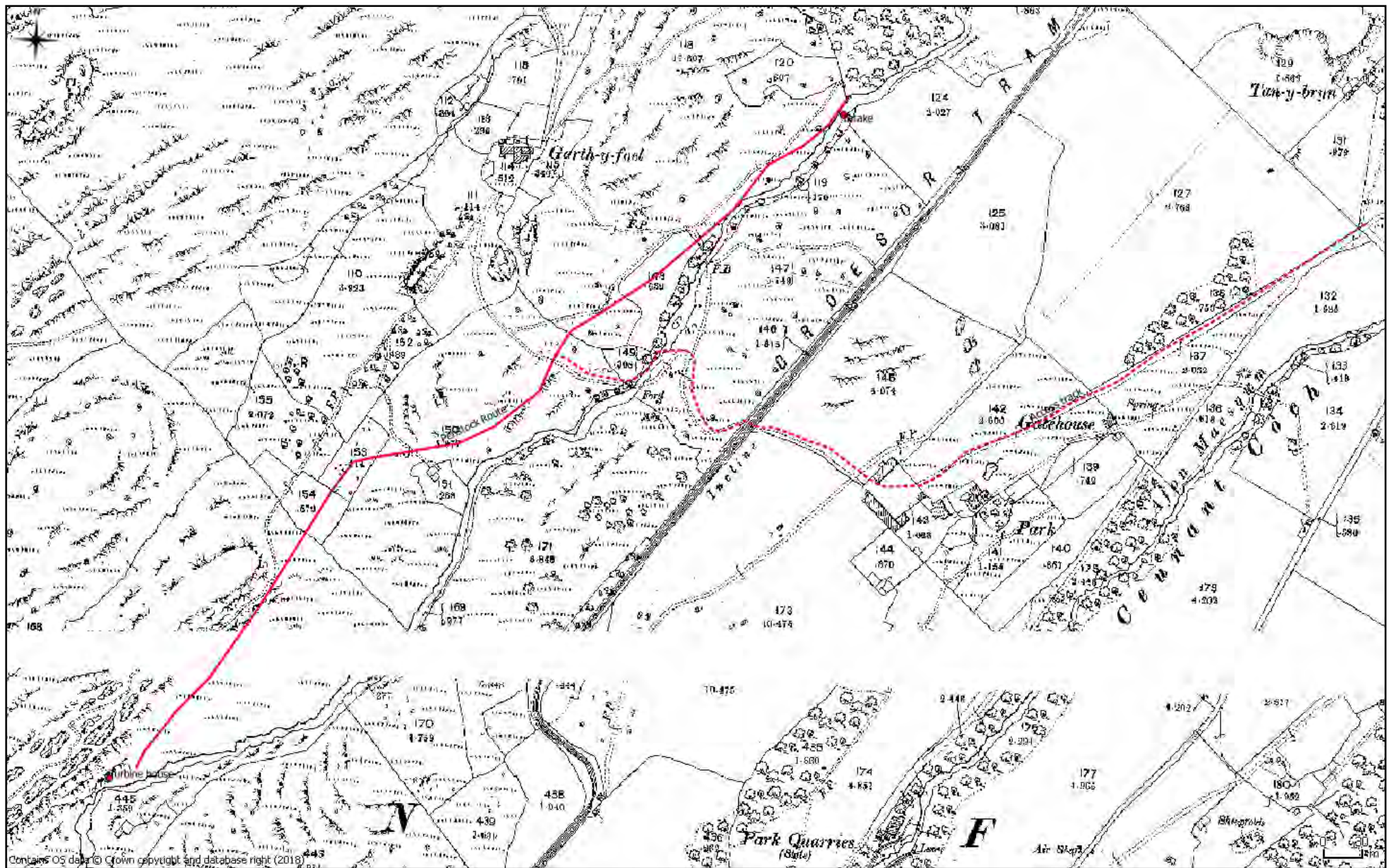
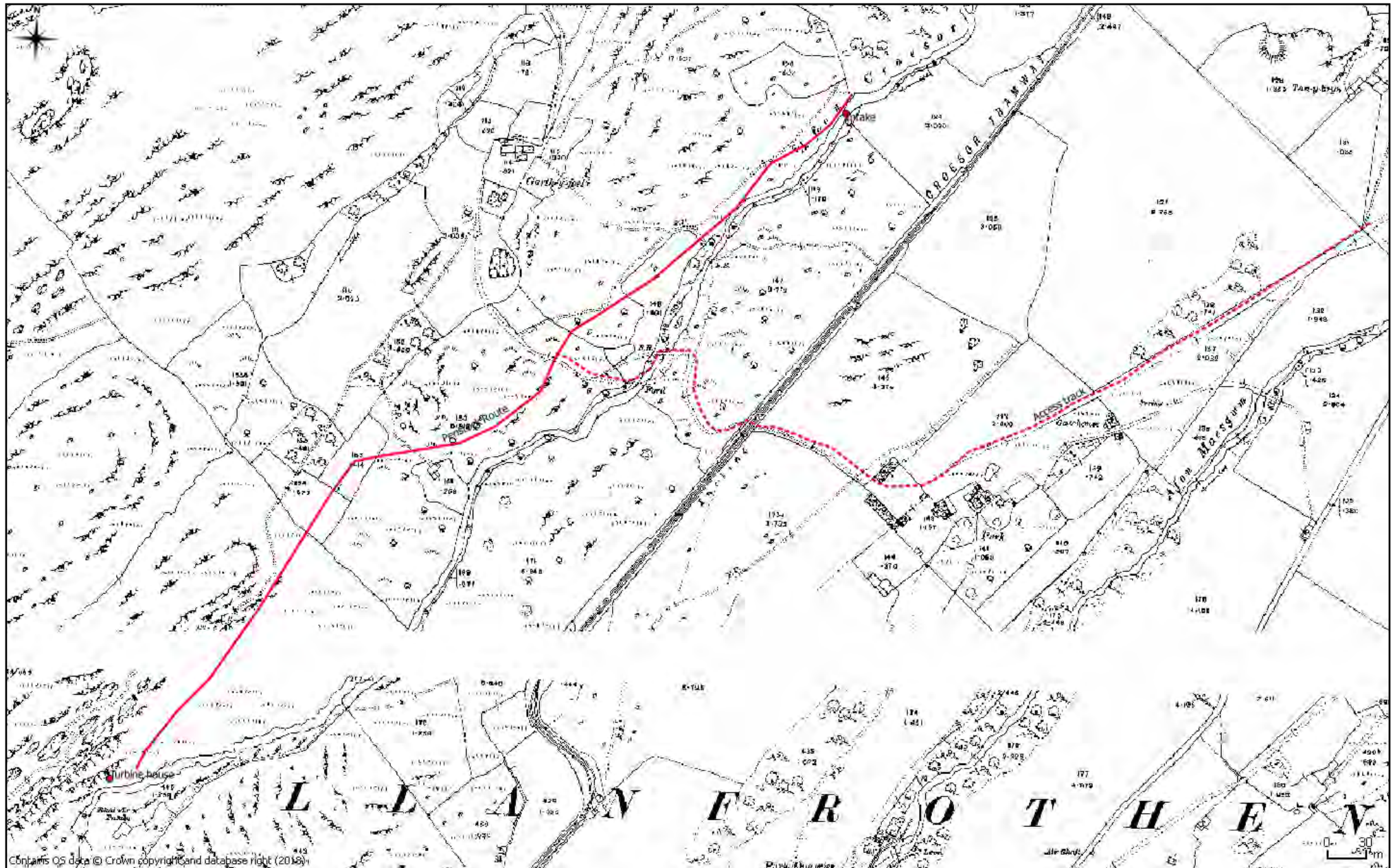
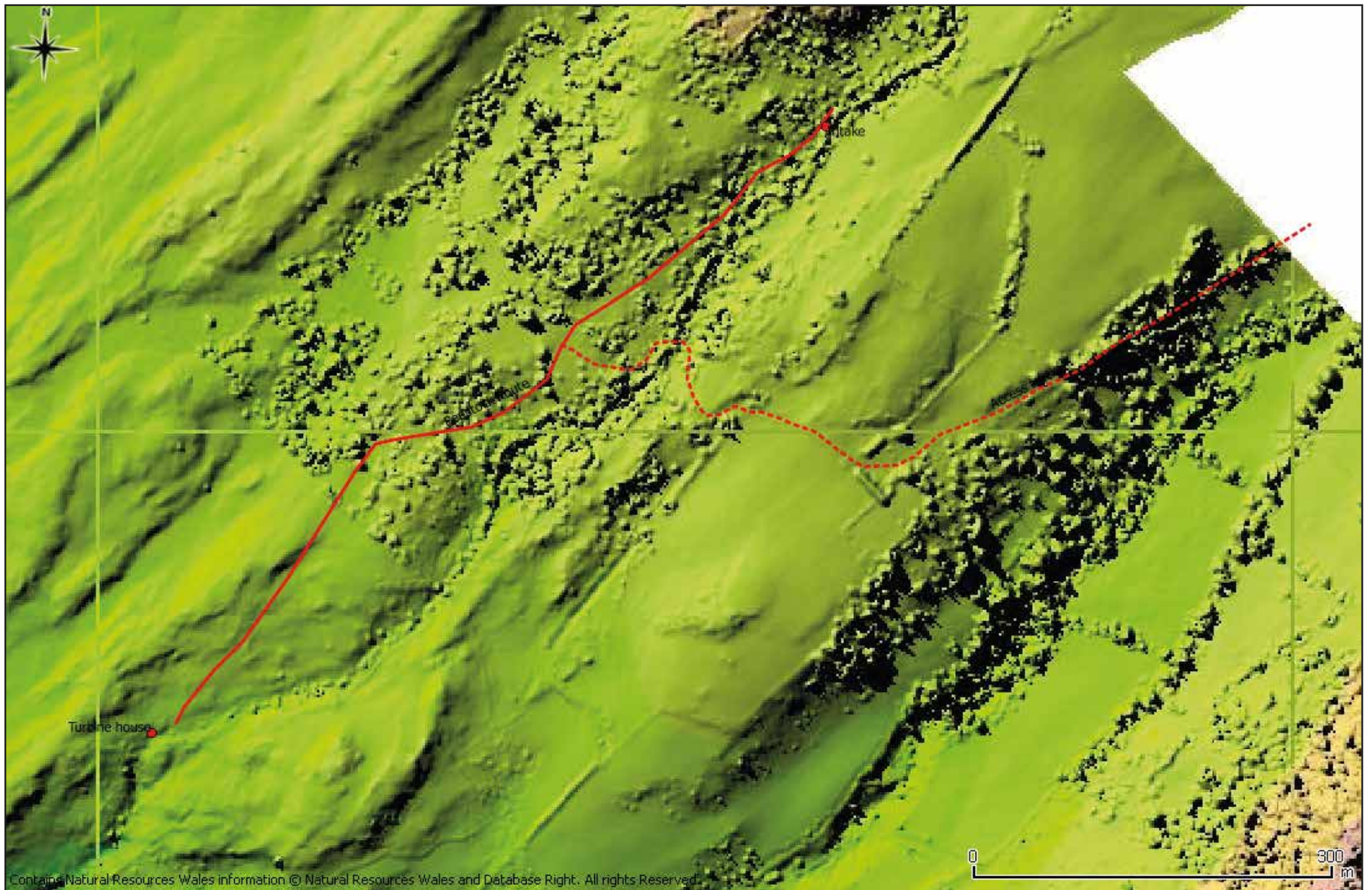


Figure 14: Ordnance Survey 2nd Edition 1900 1:2500



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Figure 15: Ordnance Survey 4th Edition 1953 (development marked in red).



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Figure 16: LiDAR 2m Digital Surface Model

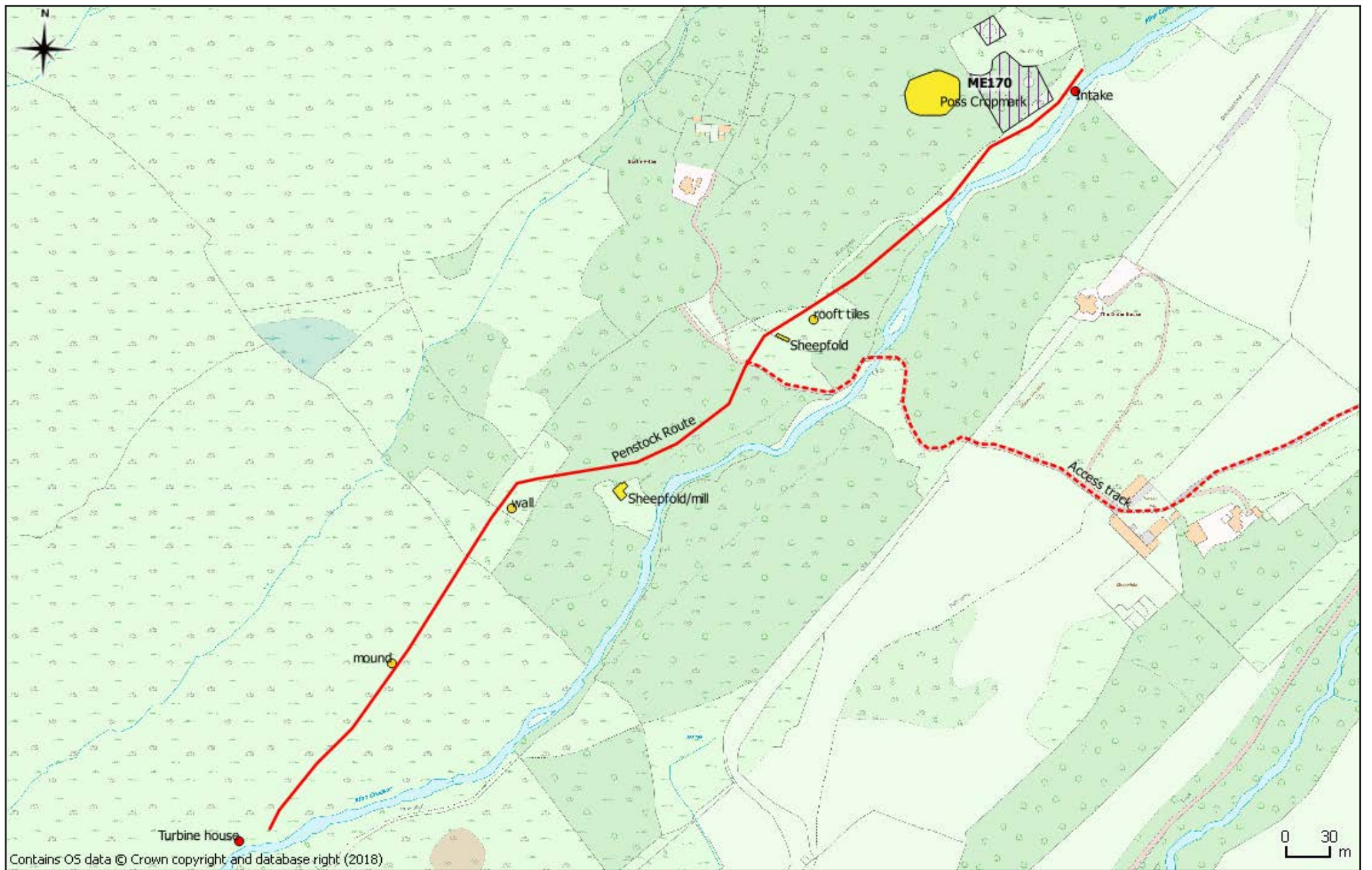
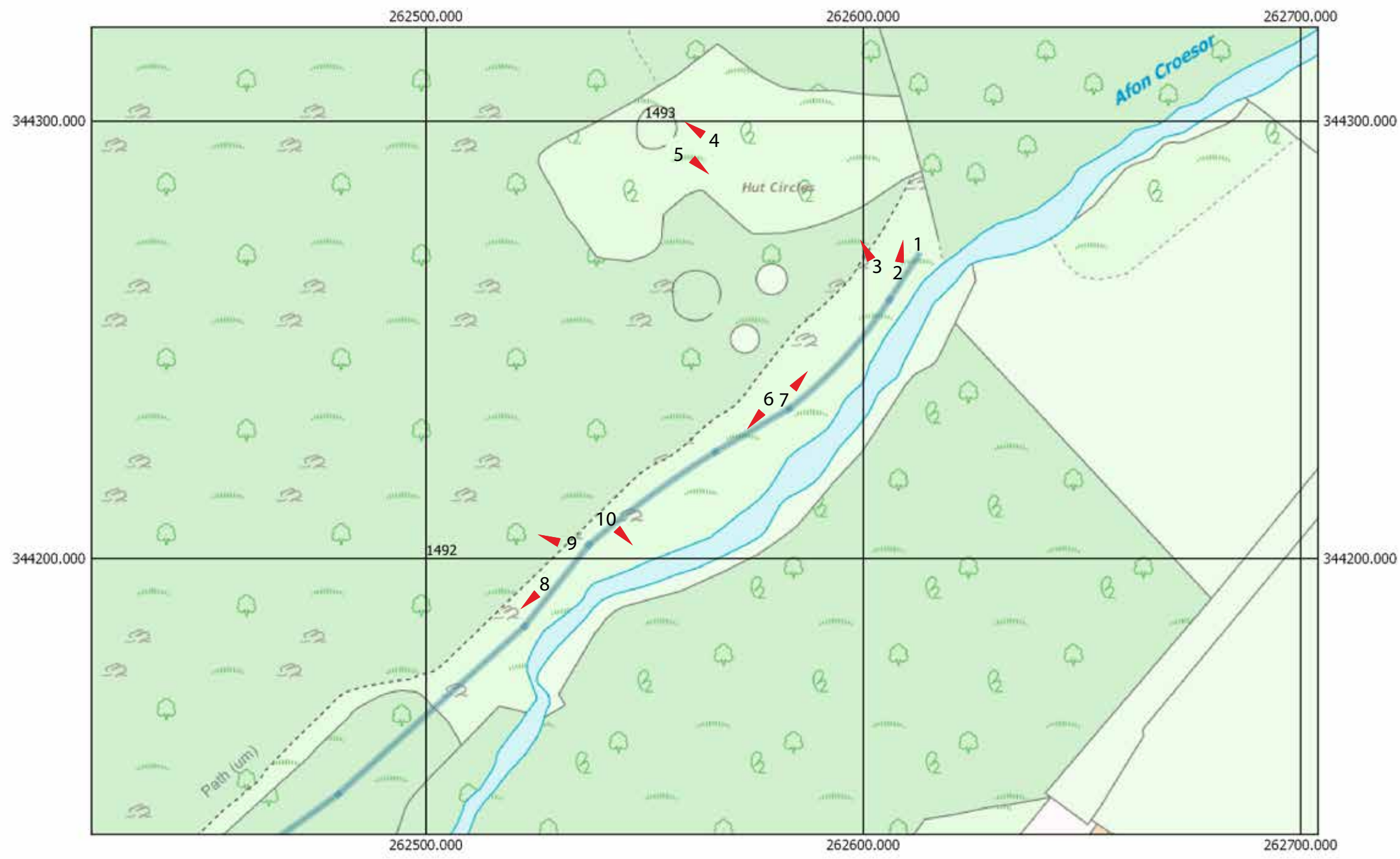
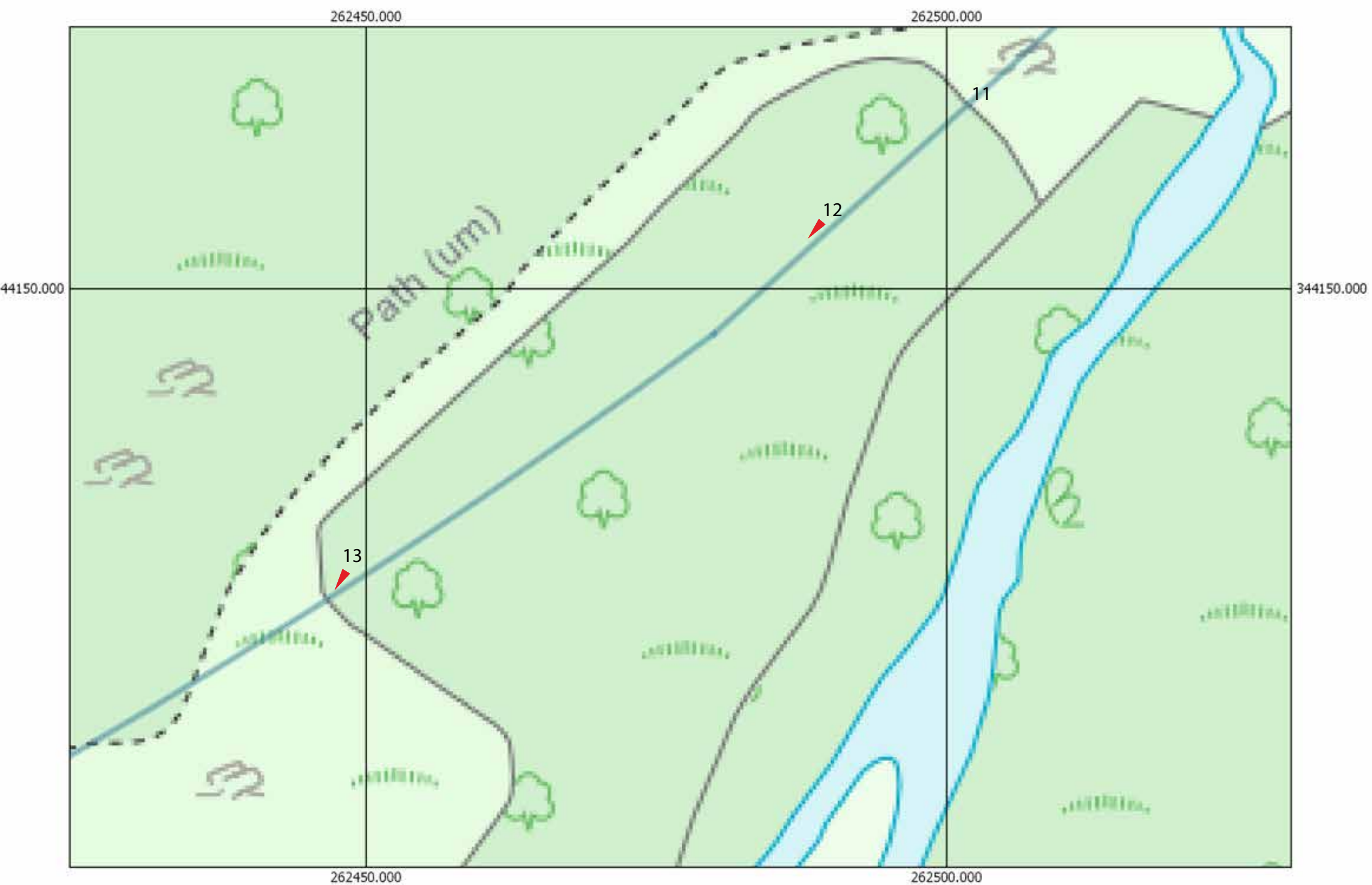


Figure 17: Sites in proximity to proposed penstock route





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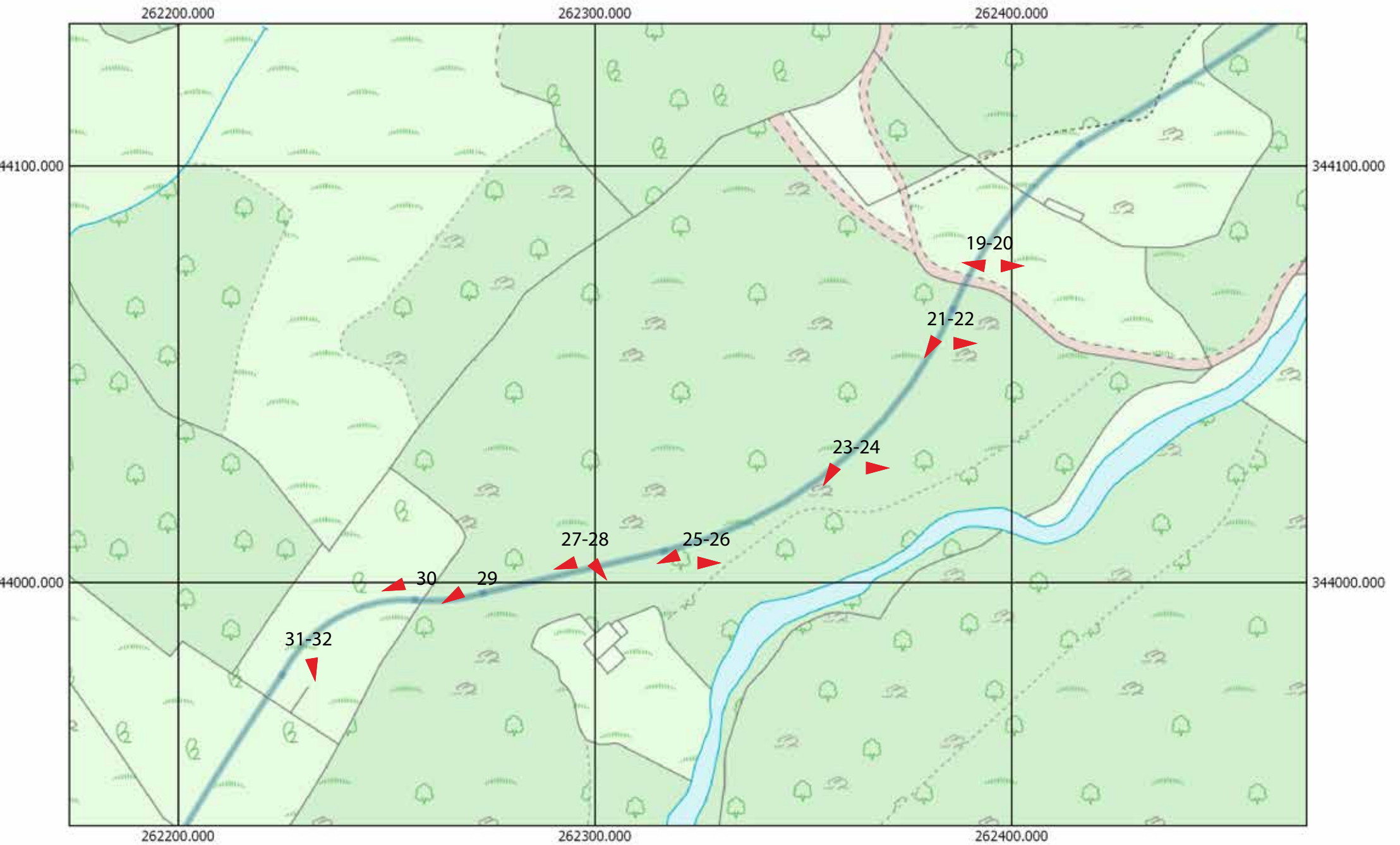
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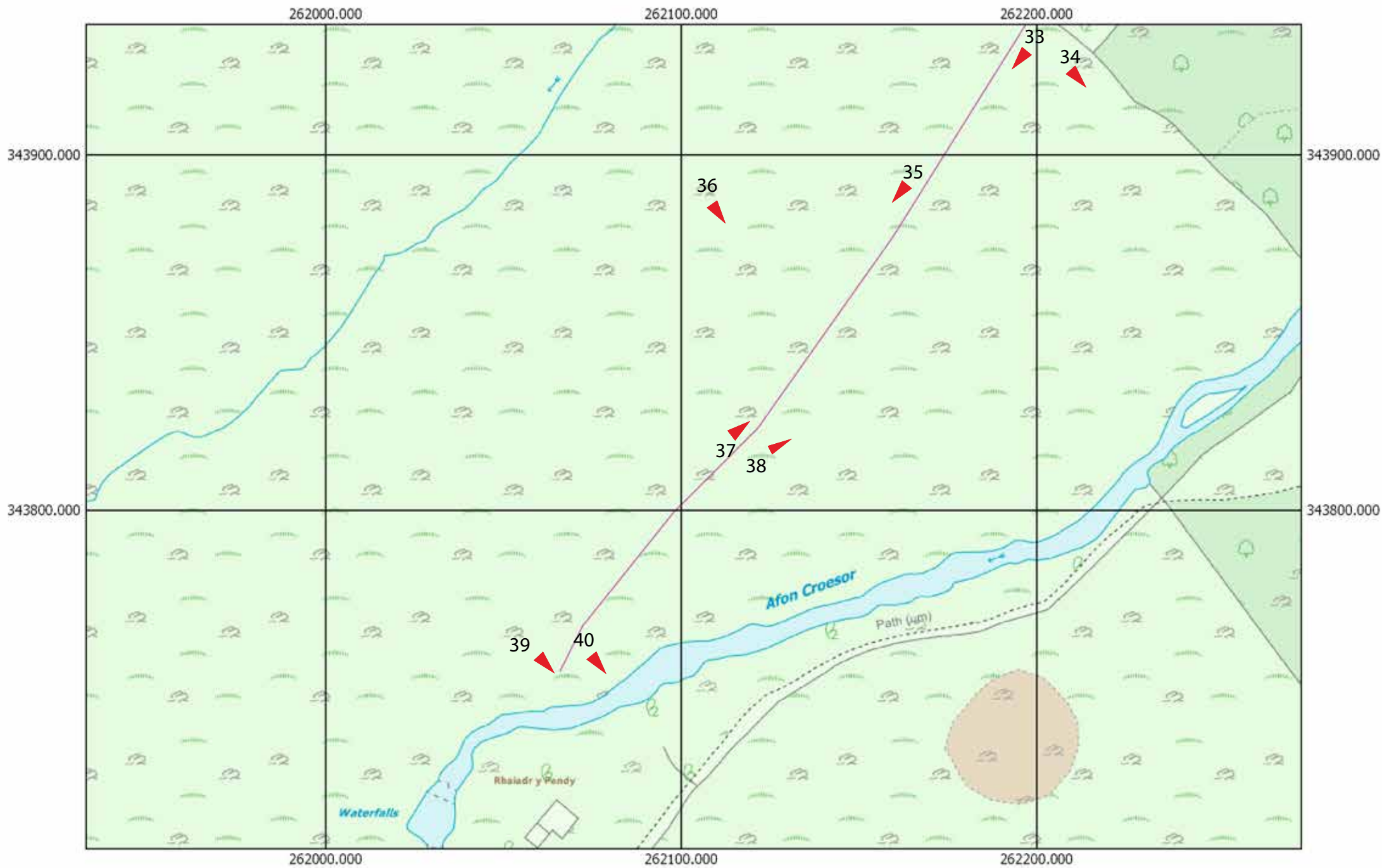




Plate 1. Location of Intake (SH62610 44257), looking SE.



Plate 2. View to intake location, demonstrating lack of visibility to heritage assets located in the settlement of Croesor. Looking NE.



Plate 3. View toward PRN1493 from intake location.



Plate 4 .View of PRN1493, looking NW.



Plate 5. View toward intake from PRN1493.



Plate 6. Penstock Route at approximately SH62592 44241. Looking SW.



Plate 7. Penstock route, c. SH62534 44202. Looking NE.



Plate 8. Penstock route, c. SH62526 44191. Looking SW.



Plate 9. View toward PRN1493, demonstrating no visibility between the heritage asset and the penstock route. Looking NW.



Plate 10. View toward the eastern bank of the river.



Plate 11. View of penstock route c. SH62501 44165. The route will cut through the dry -stone wall shown.



Plate 12. View of penstock route looking SW.



Plate 13. Penstock route c. SH62445 44123. Looking NE.



Plate 14. Penstock route c. SH62417 44093. Looking NE.



Plate 15. Roof tiles encountered at SH 62427 44097.



Plate 16. Penstock route c. SH62417 44091. Looking NW.



Plate 17. Remains of structure, possibly sheep fold. Looking NW.



Plate 18. Remains of structure, possible sheep fold. Oblique view.



Plate 19. View toward east from c. SH62447 44123.



Plate 20. View toward west from c. SH62447 44123.



Plate 21. Penstock route c. SH62384 44062. Looking SW.



Plate 22. View E from SH62384 44062.



Plate 23. Penstock route c. SH62380 44060. Looking SW.



Plate 24. View east c. SH62380 44060.



Plate 25. Penstock route c. SH62312 44008, Looking SW.



Plate 26. View E from SH62312 44008.



Plate 27. Penstock route c. SH62294 43999.



Plate 28. View E toward mill SH62294 43999.



Plate 29. Penstock route c. SH62259 43994.



Plate 30. View E from SH62259 43994.



Plate 31. Remains of dry-stone wall recorded in OS historical maps. Looking SW.



Plate 32. Remains of dry-stone wall recorded in OS historical maps. Looking S.



Plate 33. Penstock route c. SH62199 43941. Looking SW.



Plate 34. View E from SH62199 43941.



Plate 35. Penstock route c. SH62177 43905. Looking SW.



Plate 36. View toward penstock route from SH62096 43897. Looking ESE.



Plate 37. View toward penstock route from SH62118 43820. Looking NE.



Plate 38. View of possible archaeological remains located c. SH62176 43837.



Plate 39. Turbine House location. Looking ESE.



Plate 40. View E from Turbine House area.



Plate 41: View WSW toward development from Parc.



Plate 42: View WSW toward development area from Parc.



Plate 43: View W toward proposed development from Parc (track to be used as access track)



Plate 44: View N toward proposed development from Parc.



Plate 45: View of track proposed as access track. LB4816 and LB19842.



Plate 46: View of LB4816 and LB19842. Looking ENE.



Plate 47: LB4773, looking SE.



Plate 48: LB4817, looking E.

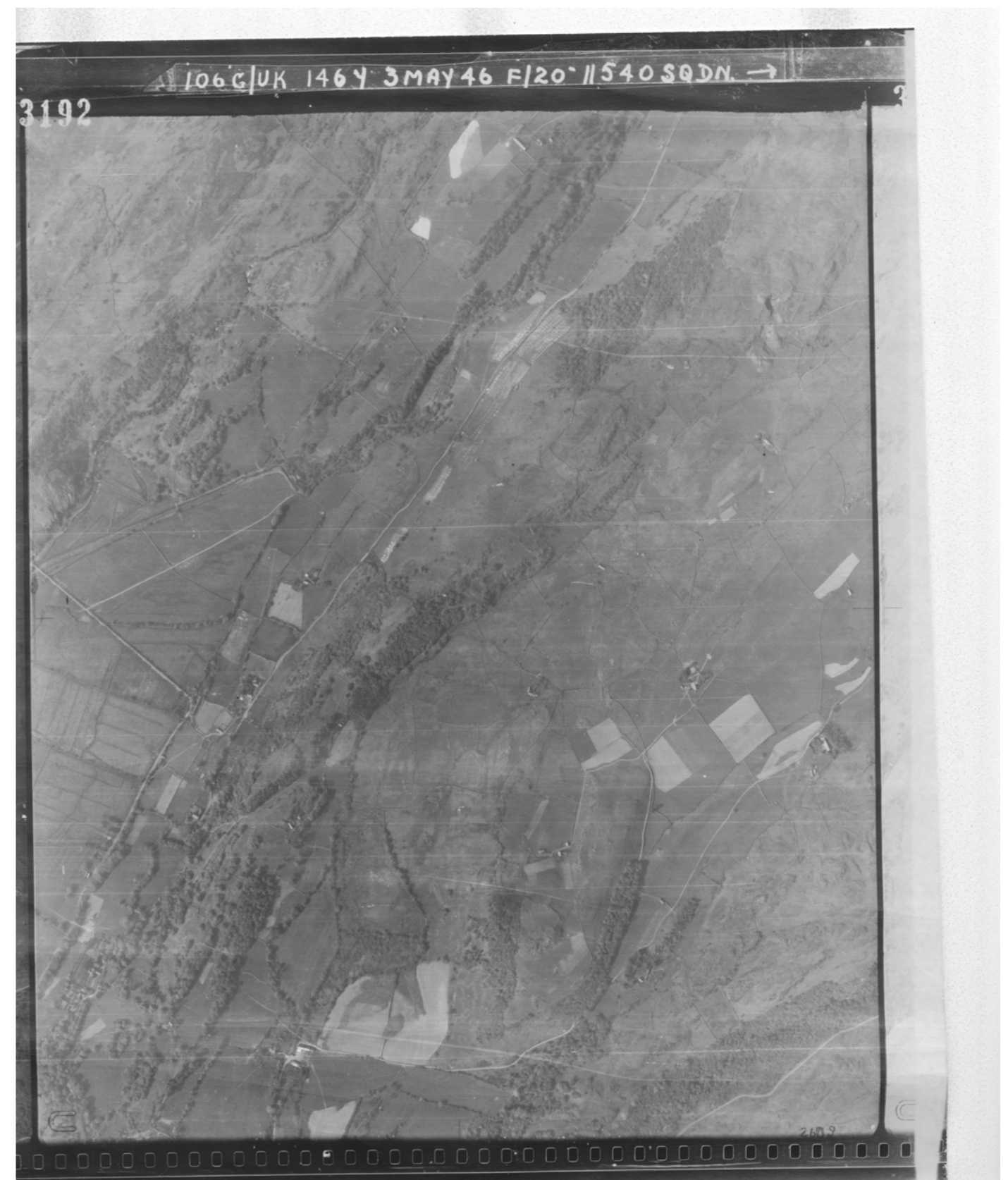
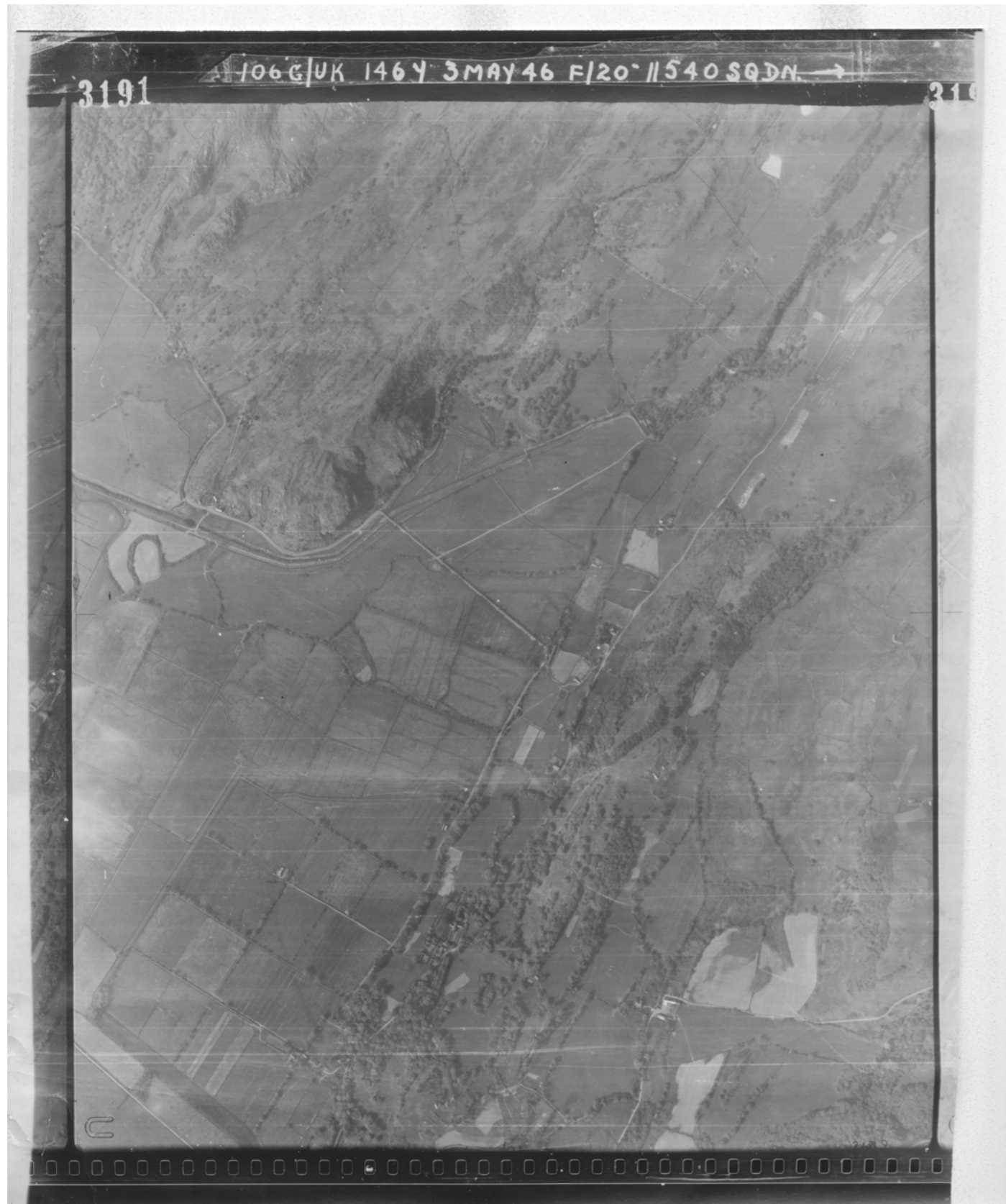


Plate 49: 3 May 1946. Sortie 106G UK 1467 RAF B&W 3191-93



Plate 50: 3 May 1946. Sortie 106G UK 1467 RAF B&W 3191-93



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Plate 51: 4 June 1971. Sortie OS 71 286 OS B&W 086

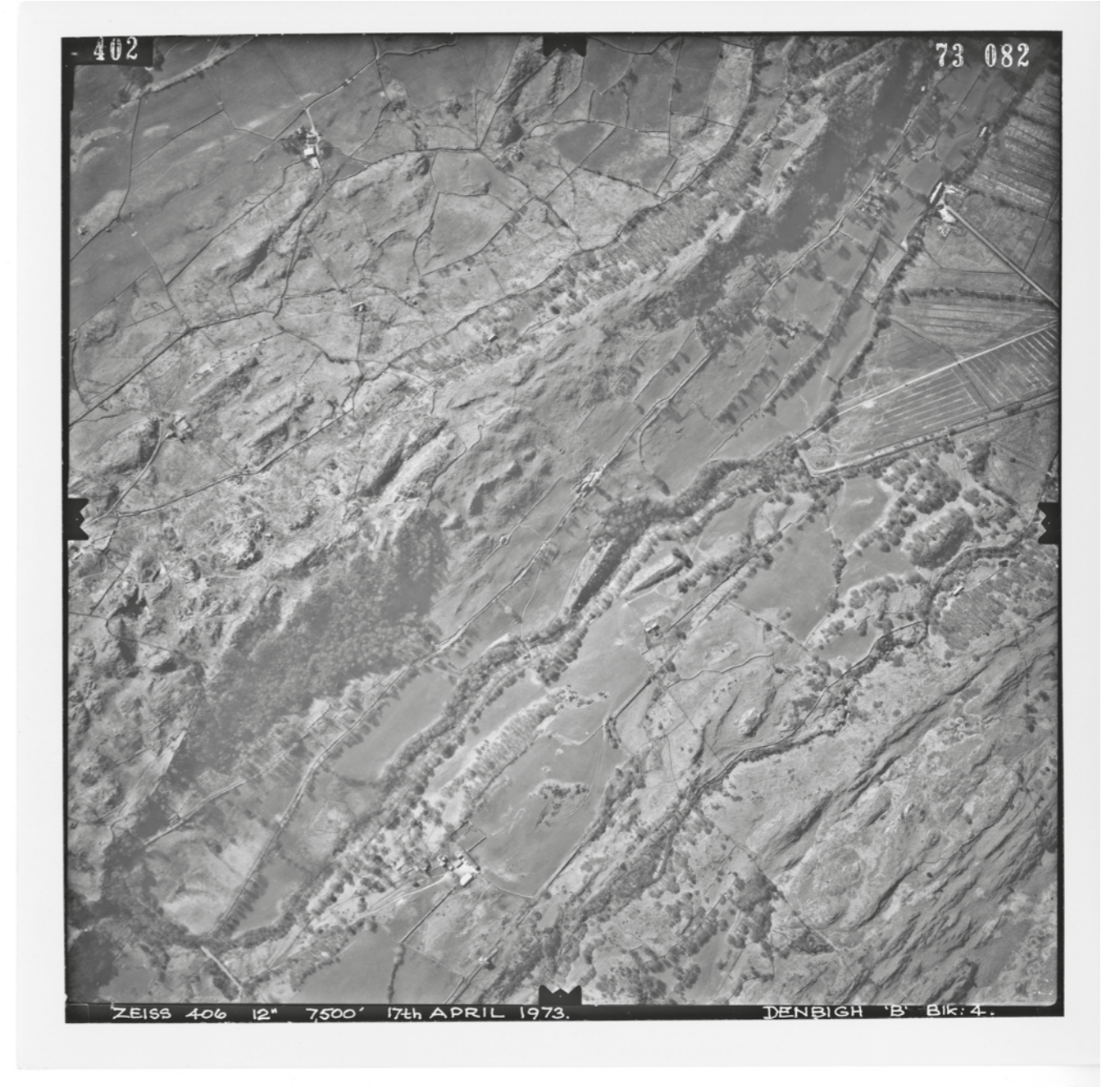
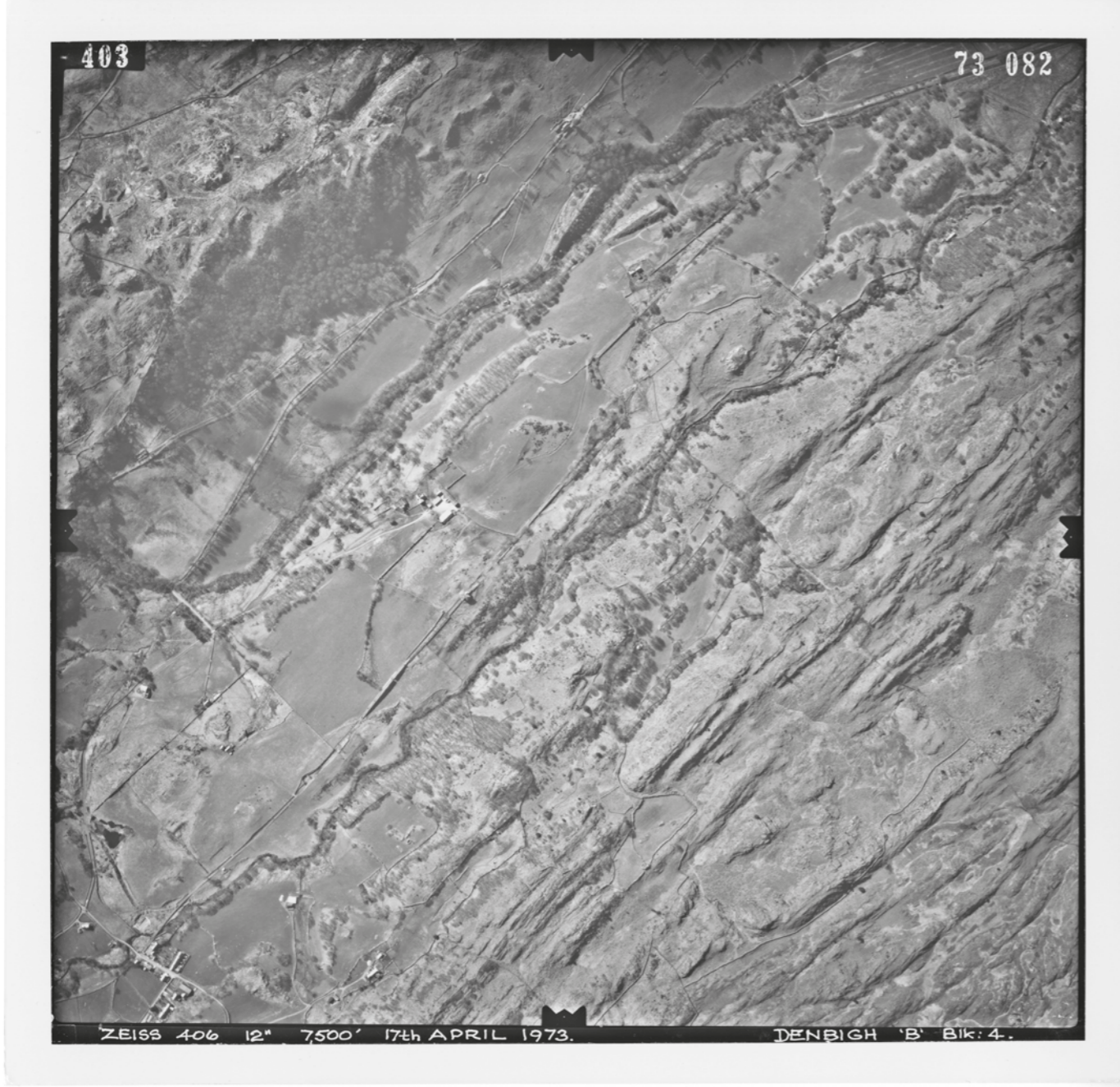


Plate 52: 17 April 1973. Sortie OS 73 082 OS B&W 402-4

WRITTEN SCHEME OF INVESTIGATION

FOR AN ARCHAEOLOGICAL

DESK-BASED ASSESSMENT AND A HERITAGE IMPACT

ASSESSMENT

AT BRONDANW ESTATE, GWYNEDD

Prepared for:

Renewables First Ltd

Project No: 240

11th April 2018



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Contents	Page
Summary	3
1. Introduction and planning background	3
2. Development Details & Site Description	4
3. Objectives	4
4. The proposed archaeological work	5
4.1. Method Statement for a Detailed Desk Based Study (Stage 1)	5
4.2. The Site Visit (Stage 2)	6
4.2. The production of an illustrated report (Stage 3)	7
4.4 Archiving (Stage 4)	8
5. Staff	8
Additional Considerations	8
6. Health and Safety	8
6.1. Risk assessment	8
6.2. Other guidelines	9
7. Insurance	9
8. Quality Control	9
8.1. Professional standards	9
8.2. Project tracking	9
9. Arbitration.....	9
10. References.....	9

Figure 1. Site location

Figure 2. Proposed development plan

Summary

This Written Scheme of Investigation (WSI) details the proposal for an archaeological Desk Based Assessment and a Heritage Impact Assessment associated with a proposed installation of a hydro scheme between NGR - SH62610 44257 and SH62380 44060 located on the Afon Croesor just to the southwest of the settlement of Croesor, Gwynedd. It has been prepared by Archaeology Wales Ltd for Renewables First Ltd prior to the proposed submission of a planning application. The associated Planning Reference No. is NP5-68-221B.

In 2016, Archaeology Wales produced a DBA following a previous development design. The work noted that the proposed development was located within Dyffryn Ffestiniog, an area particularly rich in later medieval and post-medieval archaeology. Moreover, the initial design cut across the Historic Park and Garden of Parc (GD35). No Scheduled Ancient Monuments (SAM) were affected by the hydroelectric scheme. The closest SAM was the Unenclosed Hut Circle Settlement East of Garth-y-Foel (ME170) located c. 140m northwest from the proposed intake area. It was noted that due to the topography and vegetation of the area, there would be no intervisibility between the site and the Scheduled Ancient Monument. The proposed turbine house would have a slight visual impact on the sub-medieval structure of Gelli Cornwydydd (NPRN 406470) and on Gelli Mill (NPRN 6399). The penstock route would have intersected the Croesor incline in two places.

All work will be undertaken in accordance with the standards and guidelines of the Chartered Institute for Archaeologists (2014), and in line with Welsh Government best practice guidance Setting of Heritage Assets in Wales (2017).

1. Introduction and planning background

This WSI details the proposal for an archaeological Desk Based Assessment and a Heritage Impact Assessment to be undertaken in association with the proposed development of a hydro scheme between NGR SH62610 44257 and SH62380 44060 located on the Afon Croesor just to the southwest of the settlement of Croesor, Gwynedd (Figure 1 and 2). The associated Planning Application No. is NP5-68-221B.

This WSI has been prepared by Dr Irene Garcia Rovira, Project Manager, Archaeology Wales Ltd (henceforth - AW) at the request of Renewables First Ltd.

The methodology set out in this WSI has been agreed with GAPS in its capacity as archaeological advisors to Gwynedd Council. GAPS has recommended that an

archaeological Desk Based Assessment and a Heritage Impact Assessment of the development site is undertaken prior to the submission of a planning application to assess the impact of the proposed development on the archaeological resource.

All work will conform to the *Standard and Guidance for Archaeological Desk Based Assessment* (CIfA 2014), and the Heritage Impact Assessment will be produced in line with the Welsh Government best practice guidance *Setting of Heritage Assets in Wales* (2017). The work will be undertaken by suitably qualified staff to the highest professional standards. AW is a Registered Organisation with the CIfA.

2. Development Details & Site Description

The proposed development includes the installation of hydro scheme between NGR SH 62610 4457 and SH 62045 43746 located on the Afon Croesor just to the southwest of the settlement of Croesor, Gwynedd (Figure 2).

It is proposed that an intake structure would be constructed taking water through a buried penstock pipe to the turbine house / outfall location. The penstock would run on the opposite side of the water course through lightly wooded areas as well as open hill and moorland.

The underlying geology is defined by the Nant Ffrancon Formation composed of siltstone formed during the Ordovician Period. The British Geological Survey does not hold records of the superficial soils of this area (BGS 2018). The topography oscillates between 75m AOD at the outfall location and 134m AOD at the location of the intake.

3. Objectives

The primary objective will be to assess the impact of the development proposals on the historic environment by means of a Desk Based Assessment, a Heritage Impact Assessment and Site Visit. This work will follow the guidance laid out within *Managing Heritage Impact Assessment in Wales*, produced by Cadw in May 2017, and will conform to the *Standard and Guidance for Archaeological Desk Based Assessment* (CIfA 2014).

The aim will be to take a full account of the archaeological resource, including adjacent and non-designated heritage assets and their settings. It will gather enough information to understand the significance of any heritage assets affected and assess the impact of the proposals on those assets. This will help inform future decision making, design solutions and potential mitigation strategies.

The work will include a comprehensive assessment of regional context within which the evidence rests and will aim to highlight any relevant research issues within national and regional research frameworks. The work will result in a report that will provide information of sufficient detail to allow informed planning decisions to be made which can safeguard the heritage resource.

4. The proposed archaeological work

The aim of the work will be to establish and make available information about the historical significance of the affected area, and its relationship to the wider historical environment. The work will include the following elements:

- Detailed desk-based study (Stage 1)
- A site visit (Stage 2)
- The production of an illustrated report (Stage 3)
- Archiving (Stage 4)

4.1. Method Statement for a Detailed Desk Based Study (Stage 1)

The desk-based study will consider the following:

- a) The nature, extent and degree of survival of archaeological sites, structures, deposits and landscapes within the study area through assessment of various readily available primary sources:
 1. Collation and assessment of all relevant information held in the regional HER Gwynedd Archaeological Trust, within a 1km radius of the centre of the site. This will include both designated and non-designated sites.
 2. Assessment of all available reports and archives including unpublished and unprocessed material affecting the site and its setting.
 3. Assessment of all relevant extant photographic evidence, including available historic photos.
 4. All sources indexed in the County Archive, and as appropriate, site files held by the RCAHMMW.

5. Map regression analysis using all relevant cartographic sources e.g. All editions of the Ordnance Survey County Series, Tithe and early estate maps (as available).
6. Records held by the developer or site owner e.g. bore hole logs, geological/geomorphological information.
7. Aerial photographs, maps, plans, LIDAR data.
8. Assessment of environmental and artefactual potential of the archaeological deposits through existing data or by inference.
9. Place name evidence.
10. Historic documents (e.g. Charters, registers, estate papers).
 - a) The significance of the assets in their context both regionally and nationally and in light of the findings of the assessment.
 - b) The significance of any remains in their context locally, regionally and nationally and in light of the findings of the desk based study.

4.2. The Site Visit (Stage 2)

The site visit will be a visual walked search of the entire development area. The ground surface will be visually inspected for all earthworks, structures and finds. The location of any environmental archaeological deposits, or areas which may have a potential for such deposits, will also be taken into account along with the more traditional 'visible' archaeology.

All located sites or finds encountered during the visit will be accurately fixed by means of GPS. Each individual find or site location will have an accurate NGR reference attached. Where a close cluster of related features is identified a single NGR for the centre of the cluster will be used, and each constituent feature separately described in the text.

The character, function, condition, vulnerability, potential dating and relationship to other features of each identified site or find will be described fully. The importance of the site or find will be assessed in terms of local, regional or national significance.

Written, drawn and photographic records of an appropriate level of detail will be maintained throughout the course of the project. Digital photographs, including metric scales, will be taken using cameras with resolutions of 10 mega pixels or above. Photographs will be taken in RAW format.

Illustrations will be drawn to a scale of 1:50, 1:20 and 1:10 as required, and these will be related to Ordnance Survey datum and published boundaries where appropriate.

4.2. The production of an illustrated report (Stage 3)

A report will be produced which synthesises the results of stages 1 and 2 and thereby assesses the total archaeological resource within the development area.

The results will be presented in such a way that data and supporting text are readily cross-referenced. The regional HER Officer will be contacted to ensure that any sites or monuments not previously recorded in the HER are given a Primary Record Number (PRN) and that data structure is compatible with the HER. The historical development of the site will be presented in phased maps and plans comprising clearly, the outline of the site.

Within the report an attempt will be made to indicate areas of greater or lesser historical significance and the sites will be ranked in level of overall historical importance (locally, regionally and nationally).

All relevant historic photographs and historic maps will be included and be fully referenced. Any site photographs included in the report will be appropriately captioned and clearly located on a suitably scaled site plan.

The report will specifically include the following:

1. a copy of the design brief
2. a location plan
3. all identified sites plotted on an appropriately scaled plan of the proposal site
4. A description of the assets and their setting
5. A summary of the significance of the assets and their setting
6. a gazetteer of all located sites and finds with full dimensional and descriptive detail including grid reference and period

Copies of the report will be sent Renewable First and for inclusion in the regional HER. Digital copies will be provided in pdf format if required.

4.4 Archiving (Stage 4)

A project archive will be prepared in accordance with the National Monuments Record (Wales) agreed structure and be deposited with the National Monuments Records, held and maintained by the RCAHMW, Aberystwyth, on completion of site analysis and report production. It will also conform to the guidelines set out ' *The National Standard and Guidance to Best Practice for Collecting and Depositing Archaeological Archives in Wales 2017* (National Panel for Archaeological Archives in Wales 2017). The digital archive will be deposited with the NMR.

Although there may be a period during which client confidentiality will need to be maintained, the report and the archive will be deposited not later than six months after completion of the work.

Other significant digital data generated by the survey (ie AP plots, EDM surveys, CAD drawings, GIS maps, etc) will be presented as part of the report on a CD/DVD. The format of this presented data will be agreed with the curator in advance of its preparation.

5. Staff

The project will be managed by Dr Irene Garcia Rovira (AW Project Manager) and the fieldwork undertaken by Loretta Nicolik. Any alteration to staffing before or during the work will be brought to the attention of GAPS and Renewable First Ltd.

Additional Considerations

6. Health and Safety

6.1. Risk assessment

Prior to the commencement of work AW will carry out and produce a formal Health and Safety Risk Assessment in accordance with *The Management of Health and Safety Regulations 1992*. A copy of the risk assessment will be kept on site and be available for inspection on request. A copy will be sent to the client (or their agent as necessary) for their information. All members of AW staff will adhere to the content of this document.

6.2. Other guidelines

AW will adhere to best practice with regard to Health and Safety in Archaeology as set out in the FAME (Federation of Archaeological Managers and Employers) health and safety manual *Health and Safety in Field Archaeology (2002)*.

7. Insurance

AW is fully insured for this type of work, and holds Insurance with Aviva Insurance Ltd and Hiscox Insurance Company Limited through Towergate Insurance. Full details of these and other relevant policies can be supplied on request.

8. Quality Control

8.1. Professional standards

AW works to the standards and guidance provided by the *Chartered Institute for Archaeologists*. AW fully recognise and endorse the Chartered Institute for Archaeologists' *Code of Conduct*, *Code of Approved Practice for the Regulation of Contractual Arrangements in Field Archaeology* and the *Standard and Guidance for archaeological watching briefs* currently in force. All employees of AW, whether corporate members of the Chartered Institute for Archaeologists or not, are expected to adhere to these Codes and Standards during their employment.

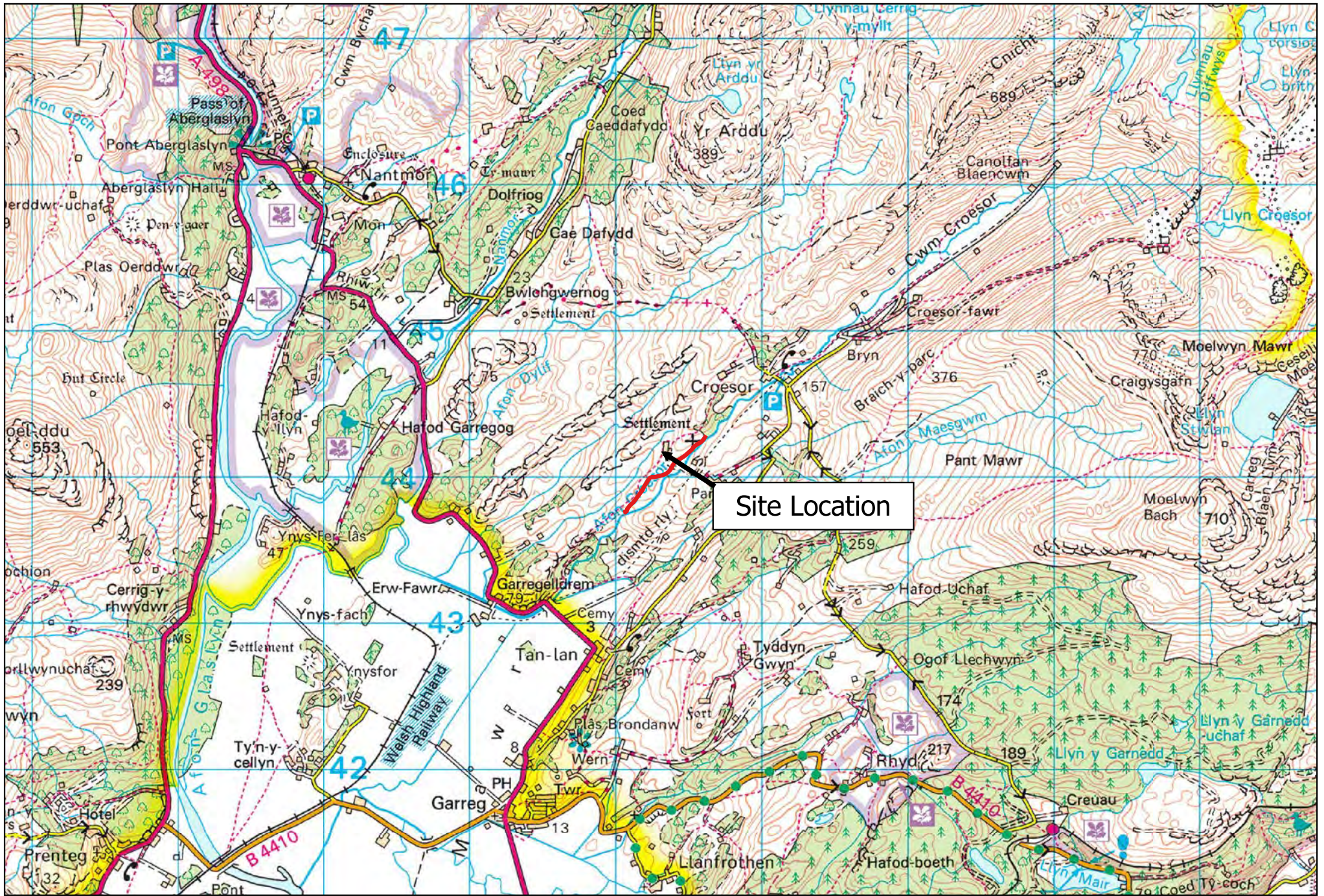
8.2. Project tracking

The designated AW manager will monitor all projects in order to ensure that agreed targets are met without reduction in quality of service.

9. Arbitration

Disputes or differences arising in relation to this work shall be referred for a decision in accordance with the Rules of the Chartered Institute of Arbitrators' *Arbitration Scheme for the Institute for Archaeologists* applying at the date of the agreement.

10. References



Site Location

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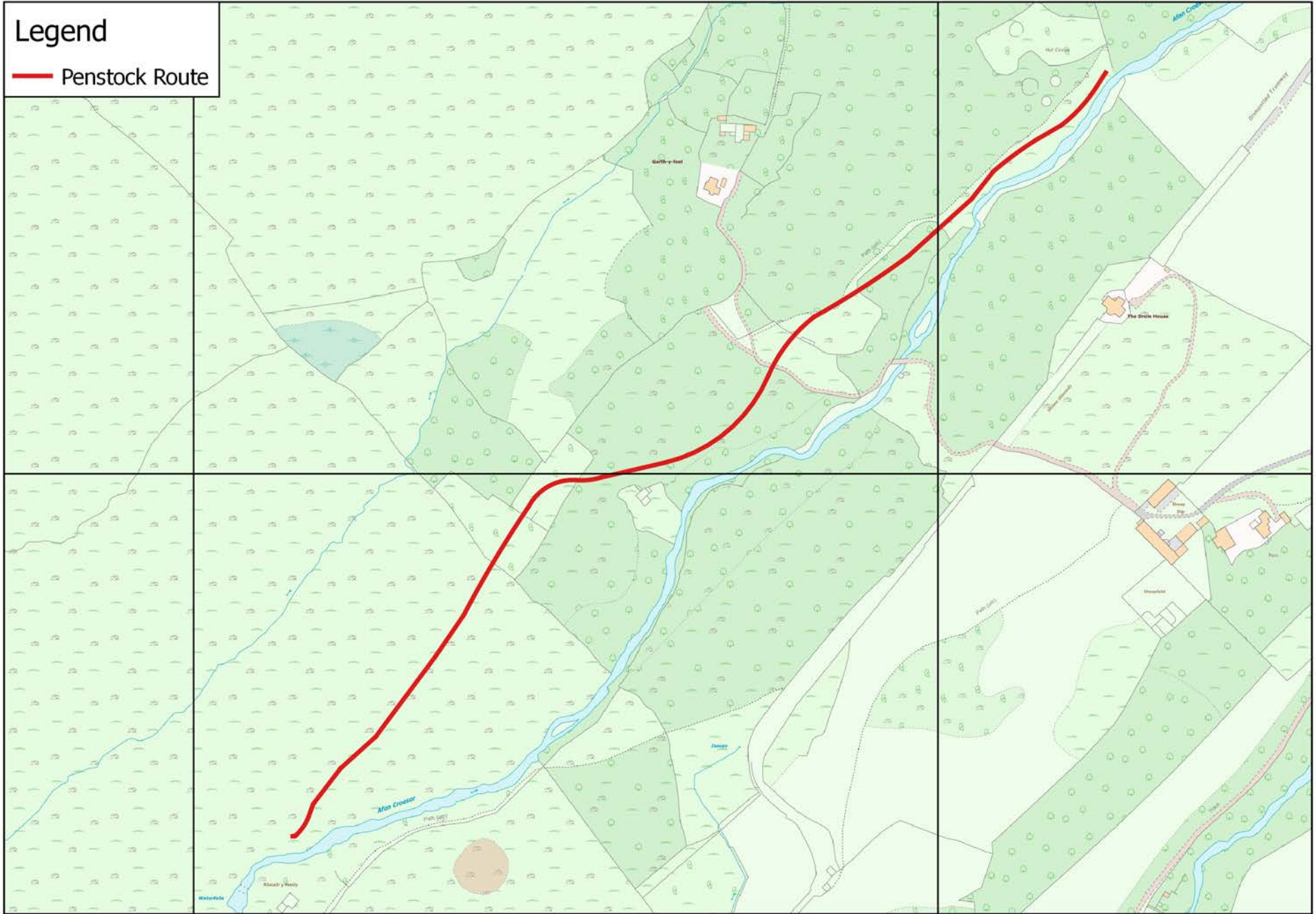
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