FFESTINIOG POWER STATION

Archaeological Assessment





Ymddiriedolaeth Archaeolegol Gwynedd Gwynedd Archaeological Trust

FFESTINIOG POWER STATION

Archaeological Assessment

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Front cover image: General view of power station, Trawsfynydd and Tan y Grisiau reservoir (Archive Image: G2532 02)

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CONTENTS

NON-TECHNICAL SUMMARY	4
1 INTRODUCTION	6
2 METHODOLOGY	8
2.1 Assessment (Desktop Study)	8
2.2 Walkover Survey	10
2.3 Gazetteer	11
3 RESULTS	12
3.1 Desk-Based Assessment	12
3.1.1 Location and Geological Summary	12
3.1.2 Statutory and Non-Statutory Designations	12
3.1.3 Environmental Remains and Soil Morphology	
3.1.4 Historical and Archaeological Background	
3.1.5 Cartographic Evidence	
3.1.6 Artefact Potential	
3.1.7 Aerial Photographs and Lidar	
3.2 The Walk-Over Survey	
3.3 Gazetteer of Eeatures	
Eeature 1 (PRN 67822: NPRN 306315: Plate 29, 44-45)	
Feature 2 (PRN 5490: Plate 30)	
Feature 3 (PRN 67823: NPRN 419351: Plates 22-29)	30
Feature 4 (PRN 67824: NPRN 419352: Plates 19-21, 29)	31
Feature 5 (PRN 67825; NPRN 409280; Plates 19-20, 22, 29)	32
Feature 6 (PRN 1500: Plate 16)	33
Feature 7 (PRN 21838: Plate 14, 17)	34
Feature 8 (PRN 20288: Plates 15-16)	35
Feature 9 (PRN 55764: NPRN 415606: Plates 1-10)	36
Feature 10 (PRN 67826: NPRN 401209: Plate 10, 33-34)	37
Feature 11 (PRN 18217: HI CA 17: Plate 10)	38
Feature 12 (PRN 67827: Plate 13)	30
Feature 13 (PRN 67814: Plates 11-13)	40
Feature 14 (PRN 67828: Plate 38)	
Feature 15 (PRN 67821: Plate 40-42)	۲۲- 42
4 CONCLUSIONS AND RECOMMENDATIONS	
41 Conclusion	
4.7 Conclusion	
5 ACKNOWI EDGEMENTS	ر، 20
6 SOLIBCES CONSULTED	50
6.1 Primary Sources	50
6.2 Secondary Sources	
Reproduction of Gwynedd Archaeological Trust project design for archaeological	
assessment July 2017	52
	5 <i>۸</i>
Reproduction of Gwynedd Archaeological Trust photographic metadata	
reproduction of onythead Archaeological Hast photographic includata	Э-т

APPENDIX III	55
Definition of Terms	55

Figures

Figure 01: Figure 01: Location Plan and Proximity Heritage Assets. Based on Ordnance Survey 1:10 000 Series Sheet SH 64. Scale as Shown

Figure 02: *Caulmert* Drawing 3251-CAU-XX-00-DR-S-1803 showing the eastern end of the Proposed Cable Replacement Route

Figure 03: *Caulmert* Drawing 3251-CAU-XX-00-DR-S-1804 showing the western end of the Proposed Cable Replacement Route

Figure 04: *Caulmert* Drawing 3251-CAU-XX-XX-DR-S-4403 showing the Proposed New Footpath Route to the North and West of the Power Station

Figure 05: 1863 Map of Proposed Route of Wrysgan Incline and Tramway (X/08/4/1167)

Figure 06: Ordnance Survey County Series 25 inch 1st Edition Map of 1889, Sheets III.6 & IV.13. Scale 1:6500@A4

Figure 07: Ordnance Survey County Series 25 inch 3rd Edition Map of 1919, Sheets III.6 & IV.13. Scale 1:6500@A4

Figure 08: Lidar Coverage (1m resolution DTM SH64)

Figure 09: Oblique Aerial view of the Ffestiniog Power Station construction works taken from the east and dating from the years following 1963. It demonstrates that the land on which the proposed footpath and car park works is situated was heavily disturbed (Image courtesy of First Hydro Company Ltd.).

Figure 10: Reproduction of Etive Ecology Ltd Phase 1 Habitat Survey (Scale: as shown).

Figure 11: Reproduction of Etive Ecology Ltd Phase 1 Habitat Survey (Scale: as shown).

Plates

Plate 01: Feature 09 - General view of Wrysgan incline (PRN55764) from power station roadside (archive reference: G2532_01).

Plate 02: Feature 09 - View of Wrysgan incline (PRN55764); scale: 1x1m (archive reference: G2532_03)

Plate 03: Feature 09 - Shot of Wrysgan incline profile (PRN55764); (archive reference: G2532_04).

Plate 04: Feature 09 - Detailed shot of surviving metal brace surviving on incline (PRN55764); scale: 1x1m (archive reference: G2532_05).

Plate 05: Feature 06 - Detailed shot of end of cable mechanism on the Wrysgan incline (PRN55764); scale: 1x1m (archive reference: G2532_06).

Plate 06: Feature 09 - Detailed shot of former slate wagon on incline (PRN55764); scale: 1x1m (archive reference: G2532_07).

Plate 07: Feature 09 - Detailed shot of former slate wagon on incline (PRN55764) from other side (descending) and view of descent; scale: 1x1m (archive reference: G2532_08).

Plate 08: Feature 09 - View of incline from upper road (PRN55764); scale: 1x1m (archive reference: G2532_09).

Plate 09: Feature 09 - View of incline (PRN55764) from upper road looking upwards towards incline tunnel (archive reference: G2532_10).

Plate 10: Features 09, 10 and 11 - General shot from trackway across to Tanygrisiau reservoir and power station (PRN55764, PRN18217) (archive reference: G2532_011).

Plate 11: Feature 13 - General shot of drystone wall (PRN678414) (archive reference: G2532_14).

Plate 12: Feature 13 - General shot of drystone wall and gateway (PRN67814); scale: 1x1m (archive reference: G2532_15).

Plate 13: Feature 09 and 13 - General view of drystone wall (PRN678414) from the west and incline (Feature 9; PRN55764); scale: 1x1m (archive reference: G2532_16).

Plate 14: Feature 08 - General shot of Chwarel Twm Feltiwr (PRN20288) with tailings; scale: 1x1m (archive reference: G2532_20).

Plate 15: Feature 08 - Close-up shot of quarry tailings (PRN20288); scale: 1x1m scale (archive reference: G2532_21).

Plate 16: Feature 08 - General view from west of platform and tailings relating to slate quarry (PRN20288); scale: 1x1m (archive reference: G2532_22).

Plate 17: Feature 07 - Shot of copper mine (PRN21838) face of quarry; scale: 1x1m (archive reference: G2532_23).

Plate 18: Feature 06 - Site of hut circle (PRN 1500) *not very clear evidence from the ground due to overgrown foliage*; scale: 1x1m (archive reference: G2532_24).

Plate 19: Feature 04 and 05 - general view of Moelwyn quarry on platform south of access track; scale: 1x1m (archive reference: G2532_26).

Plate 20: Feature 04 and 05 - close-up view of Moelwyn quarry on platform south of access track (archive reference: G2532_27).

Plate 21: Feature 04 - close-up view of quarry building; only survives at foundation level (archive reference: G2532_28).

Plate 22: Features 03 and 5 - shot of Moelwyn quarry mill (PRN419351 and PRN409280) (archive reference: G2532_30).

Plate 23: Features 03 and 05 - Detailed shot showing possible blocked up window (PRN419351 and PRN409280); scale: 1x1m (archive reference: G2532_33).

Plate 24: Features 03 and 05 - Portrait shot of Moelwyn Mill winding gear building (PRN419351, PRN409280); scale: 1x1m (archive reference: G2532_34).

Plate 25: Features 03and 05 - Shot of north-east facing wall of winding gear mill building (PRN419351 and PRN4092800; scale: 1x1m (archive reference: G2532_35).

Plate 26: Features 03 and 05 - View of isolated mill structure to the WNW of the other mill buildings (PRN419351 and PRN409280); scale: 1x1m (archive reference: G2532_37).

Plate 27: Features 03 and 05 - View of internal elements of possible mill structure (PRN419351 and PRN409280); scale: 1x1m scale (archive reference: G2532_38).

Plate 28: Features 03 and 05t - Detailed shot of slate lined window in mill building (PRN419351 and PRN409280); scale: 1x1m (archive reference: G2532_39).

Plate 29: Features 03 and 05 - View of Moelwyn slate mill from above (PRN419351 and PRN409280); scale: 1x1m (archive reference: G2532_40).

Plate 30: Feature 02 - General view of Stwlan dam (PRN5490) (archive reference: G2532_41).

Plate 31: Feature 02 - Shot of Llyn Stwlan reservoir showing dam (PRN5490) (archive reference: G2532_44).

Plate 32: Feature 02 - Shot of Llyn Stwlan reservoir showing inclines on far side of the lake (NGR SH666444; PRN5490) (archive reference: G2532_45).

Plate 33: Feature 10 - General shot of carpark and power station (archive reference: G2532_51).

Plate 34: Feature 10 - General shot of buildings on power station site (archive reference: G2532_53).

Plate 35: View west from Stwlan dam access track of revised cable route; scale 1.0m (archive image ref G2532_062).

Plate 36: View south southwest of revised cable route; scale: 1.0m (archive image ref G2532_064).

Plate 37: View southeast of revised cable route; scale: 1.0m (archive image ref G2532_065).

Plate 38: Feature 14 - View southwest of water management activity comprising a small dug pit at base of waterfall; scale: 1.0m (archive image ref G2532_067).

Plate 39: View southwest of revised cable route; scale: 1.0m (archive image ref G2532_069).

Plate 40: Feature 15 - View southwest of rectangular structure, with entrance on eastern side; scale: 1.0m (archive image ref G2532_070).

Plate 41: Feature 15 - Elevated view from the north; scale: 1.0m (archive image ref G2532_072).

Plate 42: Feature 15 - location shot of structure below lee of rock outcrop; scale: 1.0m (archive image ref G2532_075).

Plate 43: View southwest of revised cable route; scale: 1.0m (archive image ref G2532_077).

Plate 44: View northeast of revised cable route along narrow valley; scale: 1.0m (archive image ref G2532_080).

Plate 45: View southwest of revised cable route; scale: 1.0m (archive image ref G2532_082).

Plate 46: General view southwest from metalled trackway of the rocky outcrops and terracing along the cable route (archive image ref G2532_084).

Plate 47: General view north of The Wrysgan incline and quarry in background (archive image ref G2532_081).

NON-TECHNICAL SUMMARY

Gwynedd Archaeological Trust has been asked by Caulmert Ltd to carry out an archaeological assessment in advance of a mid-life refurbishment scheme at Ffestiniog Power Station, Gwynedd. The majority of the proposed refurbishment work is within the existing power station site and includes the installation of new turbines and switchgear, together with the erection of a replacement building and the provision of hard standings on previously disturbed ground and a new footpath. In addition, the scheme also includes the installation of a cable route, between the Llyn Stwlan reservoir and the power station.

The refurbishment within the power station site, including the proposed footpath and car parking area, is considered to have no archaeological impact. These areas were heavily disturbed during the construction process.

The proposed cable route crosses generally unimproved upland terrain, although for the majority of it route, the cable will be installed within the carriageway of the metalled east-west access road leading to the Stwlan dam. There is much scree and large boulders scattered over the hill-slopes, and some evidence of drystone walls, which formerly formed the boundaries of upland sheepwalks. Significant evidence of the quarrying of slate, and copper mining was encountered, including tailing mounds and scatter. Quarrying evidence survives in good quantity with good levels of archaeological preservation at the Moelwyn Quarry and the Wrysgan Incline to the east, which is a very dramatic survival, along with many original features. The cable route also crosses the track bed of the Ffestiniog Railway, although this section of it forms part of a modern deviation to avoid the power station.

A section of the proposed cable route that crosses the unimproved upland terrain extends downslope from the access road that serves Llyn Stwlan dam to a metalled access road that serves the Fisherman's car park. This portion of the proposed cable route comprised a steep valley slope, consisting of rocky outcrops, some of substantial size, and areas of natural terracing that was often boggy. A rectangular building was noted 50m northeast of the proposed cable route, which may have been associated with former quarrying or mining activity, or to have been a sheepfold. No other cultural activity was identified.

The archaeological assessment identified seventeen sites. Of these, three were modern, eleven were post-medieval, one is unknown but probably of late prehistoric date, and two of multi-period date. One of these, the Wrysgan Quarry incline, located some 800m to the north east, is considered to be of international significance, and avoidance is strongly

recommended. None of the sites are due to be significantly directly impacted upon by the proposed cable trenching, with avoidance or basic recording being recommended as archaeological mitigation.

In addition to the specific recommendations for identified features, two general recommendations are made. Due to its steep valley side nature, and being a mixture of rock outcropping and boggy terraces, it is not thought likely that significant archaeology will be encountered in the open mountain side portion of the cable route, but it is recommended that a partial watching brief is carried out to record the character of the deposits. Also, whilst the probability of finding significant deposits of peat in the boggy terrace areas is thought likely to be low to moderate, core sampling of peat deposits are recommended to be carried out in advance of the site works, in areas of high peat potential identified during the ecological Habitat Survey.

1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been asked by Caulmert Ltd to carry out an archaeological assessment in advance of a mid-life refurbishment scheme at Ffestiniog Power Station, Gwynedd (NGR SH67924437; Figures 02-04). The majority of the proposed refurbishment work will take place within the existing power station site and involves the installation of new turbines, switchgear, together with the erection of a workshop/storage building and the provision of hard standings on previously disturbed ground. Previous proposals to demolish on-site buildings will not now take place.

The scheme also includes the installation of a new cable route, between the power station and Llyn Stwlan, as detailed on Caulmert Drawings 3251-CAU-XX-00-DR-S-1803-4 (Figures 02-03). In addition, it is proposed to construct a section of new permanent footpath, carry out upgrading works to an existing footpath and construct a temporary footpath link to the "Fisherman's" car park., as detailed on drawing 3251-CAU-XX-DR-S-4403 (Figure 04).

A walkover survey of the proposed cable route corridor was undertaken, in accordance with a Written Scheme of Investigation (see Appendix 1), with a view to identifying an alignment which sought to minimise potential archaeological impacts, whilst satisfying, ecological, operational and engineering requirements. In particular, this has resulted in the selection of a proposed cable route alignment which avoids the Wrysgan Incline entirely

The proposed cable route crosses an area of unimproved upland terrain, although, for the majority of it route, the cable will be installed within the carriageway of the metalled east-west access road leading to the Stwlan dam.

For the approximately 500m long open mountainside section of the cable route, the cable will be laid without joints, in a 500mm wide trench with a minimum depth of 800mm. Where the minimum depth cannot be achieved, due to ground conditions, the cables will be placed in a ductile iron pipe for damage protection. Localised rock outcrops will be crossed by bolting galvanised steel ductwork to the surface, and in very wet areas the ducts will be immediately backfilled after laying to avoid erosion by water. The working width required for the installation of the cable will at no point exceed 5m (First Hydro Company, Cable Installation Method Statement). Construction matting will be used to safeguard the working width along the open mountainside section of the proposed cable route. The former cable will be abandoned where it is redundant and left *in situ*.

The assessment has been monitored by the Snowdownia National Park Authority archaeologist (SNPA) and Gwynedd Archaeological Planning Services (GAPS); the content of this report by GAT must be approved by SNPA/GAPS prior to final issue.

The assessment conforms to the guidelines specified in the Chartered Institute for Archaeologists Standard and Guidance for Historic Environment Desk-Based Assessment (Chartered Institute for Archaeologists, 2014) and requirements of section 2.3 of MoRPHE (English Heritage 2015) and MAP2 (English Heritage, 1991, Management of Archaeological Projects). Submission of digital archive information to the Royal Commission on the Ancient and Historical Monuments of Wales will be undertaken in accordance with the RCAHMW Guidelines for Digital Archives Version 1 (2015). Digital information will include the photographic archive and associated metadata. Information submitted to the regional Historic Environment Record will be in accordance with the required standards set out in Gwynedd Archaeological Trust's Historic Environment Record (HER) Guidelines for Archaeological Contractors (Version 1.3; draft)

Gwynedd Archaeological Trust is certified to ISO 9001:2008 and ISO 14001:2004 (Cert. No. 74180/A/0001/UK/En) and is a Registered Organisation with the Chartered Institute for Archaeologists and a member of the Federation of Archaeological Managers and Employers (FAME).

2 METHODOLOGY

2.1 Assessment (Desktop Study)

A desk-based assessment is defined as "a programme of study of the historic environment within a specified area or site on land, the inter-tidal zone or underwater that addresses agreed research and/or conservation objectives. It consists of an analysis of existing written, graphic, photographic and electronic information in order to identify the likely heritage assets, their interests and significance and the character of the study area, including appropriate consideration of the settings of heritage....Significance is to be judged in a local, regional, national or international context as appropriate" (CIfA 2014, 4).

The desk-based assessment included the following resources:

- The regional Historic Environment Register ((HER) Gwynedd Archaeological Trust, Craig Beuno, Ffordd y Garth, Bangor, Gwynedd LL57 2RT) was examined for information concerning the study area, defined as the power station and the extent of works on *Caulmert* Drawings 3251-CAU-XX-00-DR-S-1803-4 and 3251-CAU-XX-XX-DR-S-4403 (Figures 02-04), along with a wider assessment buffer. This included an examination of the core HER, the 1:2500 County Series Ordnance Survey maps and any secondary information held within the HER. All identified features were mapped, described and added to a gazetteer of sites and the relative importance of sites should be defined;
- The National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, Plas Crug, Aberystwyth SY23 1NJ) was checked for sites additional to the HER;
- Aerial photographs from the National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, National Monuments Record of Wales, Plas Crug, Aberystwyth SY23 1NJ) were examined for potential features;
- 4. An on-line catalogue search of the National Library of Wales (Penglais Rd, Aberystwyth SY23 3BU) was completed;
- 5. Archive data, including primary and secondary sources, historic maps and estate maps was examined at the regional archives (Gwasanaeth Archifau Gwynedd,

Cyngor Gwynedd, Caernarfon LL55 1SH and Meirionnydd Record Office, Bala Rd, Dolgellau LL40 2YF);

 Light Detection and Ranging (LiDAR) data was examined from the Lle Geo-Portal at <u>http://lle.gov.wales/home</u> for information on potential surface features using digital terrain modelling and digital surface modelling.

2.2 Walkover Survey

Walkover surveys were undertaken on 18/07/17 and on 07/08/17 to identify all known and any new archaeological features on the ground and accurately map and describe them on GAT pro-formas, within a 50m buffer of the development and cable route. All sites identified were then added to the overall gazetteer and their relative importance defined.

A photographic record was maintained in RAW format using a digital SLR set to maximum resolution (Nikon D5100; resolution: 4928 x 3264). Photographic images were archived in TIFF format (archive numbering system G2532_001 to G2532_084); cf. Appendix II).

2.3 Gazetteer

A gazetteer has been compiled for all known and new sites within and within proximity to the specified route; the gazetteer includes the following:

- 1. Feature Number
- 2. Site name
- 3. PRN number
- 4. Grid reference
- 5. Period
- 6. Site type
- 7. Assessment category
- 8. Description
- 9. Impact
- 10. Recommendation for further assessment/evaluation
- 11. Recommendation for mitigatory measures

3 **RESULTS**

3.1 Desk-Based Assessment

3.1.1 Location and Geological Summary

The proposed cable route crosses open terrain and follows existing access roads and links power station infrastructure at Llyn Stwlan and Ffestiniog Power Station (NGR SH67924437; Figure 01). The proposed cable route rises from the power station in the east at a height of about 180m OD to 500m at the dam at Llyn Stwlan 1.5km to the west, across upland pasture and former sheepwalks (ffriddoedd), with some survival of drystone walls. The route crosses boggy areas and significant rock outcrops and crags, some of which have been quarried for slate, and mined for copper, in historic times. The most significant features in the wider landscape are the Wrysgan incline (Feature 09) and the Moelwyn quarries Features (03-05).

The solid geology consists of Ffestiniog beds of Lingula Flags of the Cambrian era, with thick bands of grit and conglomerate coming to the surface (Smith and George 1961, 19). The soils which overlie them are complex, with Ironpan Stagnopodzols of the Hexworthy Association close to the Tanygrisiau Reservoir, with Humic Rankers of the Bangor Association on the higher ground, and Typical Brown Podzolic soils of the Moretonhampstead Association close to Llyn Stwlan (BGS 1980).

3.1.2 Statutory and Non-Statutory Designations

In addition to the known archaeological sites, the scheme is also located within the following:

- the Blaenau Ffestiniog Landscape of Outstanding Historic Interest (HLW (Gw) 3);
- the Llyn Stwlan/Llyn Ystradau Industrial Area Historic Landscape Character Area (HLCA 17); and
- the Upper Slopes Of The Moelwyn Range Historic Landscape Character Area (HLCA 16).

The Blaenau Ffestiniog Landscape of Outstanding Historic Interest is described as the foremost slate mining and quarrying landscape in Wales, sited in an elevated natural basin and its tributary valleys in south Snowdonia, containing an undisputed wealth of industrial

archaeological remains comprising visually imposing and extensive slate quarry and mine workings, waste tips, associated buildings, transport systems and settlements dating from the late 18th century to the early 20th centuries. The area also includes the Tanygrisiau hydroelectric pumped storage scheme, the first of its kind in Britain. (Cadw/ICOMOS 1999, 80).

There are no Scheduled Monuments (SM) or Listed Buildings (LB) within the 50m buffer of the proposed scheme. However the closest SM is the hut circle settlement at Nant Ddu (ME164; PRN 6112; SH67434380) located approximately 650m to the south of the site, with the next nearest being the Hut Circle settlement at Gelli Gonan (ME173; PRN 1515; SH692455), located 1.7km to the north east. *Managing Historic Setting of Historic Assets in Wales* (CADW 2017) indicates that planning applications within the setting of a Scheduled Monument trigger a requirement for consultation with Cadw on a sliding scale if it 'is within a distance of 1km from the perimeter of a Scheduled Monument and is 15 meters or more in height or has an area of 0.2 hectares or more' or if within 2km a height of 50m or has an area of 0.5 hectares or more' (Cadw 2017, 11). The potential impacts of the proposed developments on the setting are largely temporary and restricted to the construction phase. They may include the following elements:

- The parking of vehicles on the 'fisherman's car park'
- Change in the character of the existing public footpath to the west of the Power Station
- Increased levels of activity along the Portals Access Chambers access road and along the existing and proposed footpath links between the fisherman's car park and the Power Station site
- Lighting at the "fisherman's car park" and along the existing and proposed footpath links
- The introduction of activity on the section of proposed cable route between the Portals Access Chambers access road and the Llyn Stwlan Reservoir access road; and,
- Increased levels of activity along the upper sections of the Llyn Stwlan Reservoir access road

Whilst the above-mentioned matters may potentially result in an adverse impact on the setting of SM's in the locality, the majority of the potential impacts are likely to be localised and/or of relatively short duration. In particular:

- The replacement cable works between the Portals Access Chambers access road and Llyn Stwlan Reservoir are likely to proceed quickly with work progressing on a number of different sections simultaneously.
- The proposed temporary lighting to the "fisherman's car park" and existing and proposed footpath links will operate during the dawn and dusk periods only, if necessary, and will not operate during the night-time period.

Thus, during the construction phase, the proposed development may have a slight adverse visual impact of on the setting of SM's in the locality; however, upon completion of the proposed mid-life refurbishment project, there will be no material change to the setting of SM's in the locality, in comparson with the current position.

An examination of the regional Historic Environment Record (Gwynedd Archaeological Trust, Craig Beuno, Ffordd y Garth, Bangor, Gwynedd LL57 2RT) and the National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, Plas Crug, Aberystwyth SY23 1NJ), lists the following seven known archaeological sites within a 50m buffer of the proposed scheme route:

Primary	Site Name	Period	Туре	NGR
Reference				
Number				
(PRN)				
1500	Hut Circle, Afon Stwlan *	Unknown	Hut Circle	SH66964438
5490	Dam, Llyn Stwlan	Post-Medieval	Dam	SH66604440
18217	Llyn Stwlan/Llyn Ystradau Industrial Area Landscape, Ffestiniog	Multi-Period	Landscape	SH68104450
20288	Slate Quarry, Chwarel Twm Feltiwr	Post-Medieval	Slate Quarry	SH67104460
21838	Llyn Stwlan Mine, Ffestiniog	Post-Medieval	Copper Mine	SH67104460
55764	Wrysgan Quarry Incline, Tanygrisiau	Post-Medieval	Inclined Plane	SH6793245240
30157	Afon Stwlan Bridge**	Post- Medieval/Modern	Bridge Abutment	SH67844450

Gwynedd Historic Environment Record Sites

*lies 25m SE of road; **lies 17m E of cable route

National Monuments Record of Wales Royal Commission on the Ancient and Historical Monuments of Wales Sites

National	NMRW_name	Period	Туре	NGR
Primary				
Reference				
Number				
(NPRN)				
306315	Ffestiniog Pumped Storage	Modern	Reservoir	SH66424447
	Scheme: Llyn Stwlan Reservoir			
401209	Ffestiniog Pumped Storage	Modern	Hydroelectric	SH67914441
	Scheme: Ffestiniog Power		Power Station	
	Station, Tanygrisiau			
409280	Moelwyn Quarry Slate Mill	Post	Slate	SH6683244311
		Medieval	Processing	
			Works	
415606	Wrysgan Quarry Incline	19th	Inclined Plane	SH6793245240
		Century		
419351	Lake To Mill Incline, Moelwyn	19th	Inclined Plane	SH6668544340
	Slate Quarry	Century		
419352	Ruined Building Near Slate Mill,	19th	Office, Stable	SH6679944308
	Moelwyn Slate Quarry	Century		

3.1.3 Environmental Remains and Soil Morphology

The unimproved uplands consist of shallow soils and substantial rocky outcrops, where any environmental remains are thought likely to be of limited significance. The exception to this is the areas of boggy ground, which are fairly widespread over the study area, in the form of downslope natural terracing.

Whilst much of the proposed cable route follows an existing access road, where significant environmental remains are not expected, some of it is off-road. In these latter areas there are patches of boggy ground. Whilst the probability of finding significant deposits of peat in these area is thought likely to be low to moderate, as significant deposits of peat have been identified a proposal to study this should be drawn up. Peat sampling associated with the cycle tracks at Blaenau Ffestiniog was successful (Gwyn *et al.* 2009; Jenny Emmett *pers. comm.*) and it is possible that good deposits survive on site. A Phase 1 Habitat Survey was carried out in the autumn of 2017 by *Etive Ecology Ltd.* which characterised the terrain and identified two small areas of blanket bog on the proposed route, which form the most sensitive peat areas (areas **25** and **33**, Figures 10-11). Based on this study, investigative coring could be carried out in the peat identified areas. The route has been set in consultation with the ecologist to minimise disturbance to peat.

The proposed building works within the Power Station site itself are located on areas of previously disturbed ground and, consequently, no significant environmental remains are thought likely to be encountered within these areas.

3.1.4 Historical and Archaeological Background

Prehistoric and Roman

The nearest known extant funerary monument is of the Bronze Age period (1600BC-600BC), consisting of a stone cist is located at Nant-y-stradau some 16km to the south of the study area, so known early prehistoric sites are not known locally. There has also been a stone axe find at Llyn Stwlan, which is probably of Neolithic date and now in the National Museum of Wales, located approximately 130m northwest of the Llyn Stwlan dam (PRN 4331; SH66504450). This is indicative of early prehistoric activity in the area of which we have little other evidence. There is also a reference in 1875 to the existence of an 'old stone cist in Dolredyn' that had been cleared away by that time. From a manuscript attributed to the 19th century antiquarian Richard Williams (Wmffra Dafydd) it appears that the cist contained an urn cremation burial, which is likely to have been of Bronze Age date (Roberts 1994, 3).

The late prehistoric period in the study area is fairly well represented by settlement sites of circular houses and associated structures. One of these, the Afon Stwlan hut circle (Feature 06; PRN 1500; NGR SH 66964438) is located 25m southeast of the proposed cable trench, which consists of one or possibly two round huts with an irregular enclosing wall between them. Another possible group of huts is located 320m northwest of the Llyn Stwlan end of the scheme, although there is little information available about this site (PRN 1501; SH66404470). A more extensive group is located at Tanygrisiau at NGR SH 69264558. Two groups of hut circles are known above the western shore of Llyn Ystradau, one of which is a Scheduled Monument (SM) (PRN 6112, SM ME164), located approximately 650m to the south of the site at NGR SH67434380. These typically date to the Iron Age (600BC- 43AD) although occupation can continue into the Roman period. An example of this are the huts at Nant Du (PRN 6230; 67654410), located 330m southwest of the proposed cable route, which are thought to be occupied into Roman times. A possible late prehistoric field system and hut has been identified to the south-west of the Croesor quarry complex (PRN 30,151; centred on SH6522245458).

The Roman road of Sarn Helen between Segontium and Tomen-y-Mur passed south of the study area by way of Maentwrog and Rhyd. No further evidence of settlement or activity of Romano-British date is known within 1km of the study area. Some 'old Roman cash' was discovered by workmen building the Lord Quarry quay at Tyddyn Isaf in 1824 (Gwynedd Archives XD2/12699; Gwyn *et al.* 2009, 5). This quay is located at NGR SH62883945.

<u>Medieval</u>

The study area lies within the medieval cantref of Ardudwy, in the Commote of Ardudwy Uwch Artro and formed part of the parish and township of Ffestiniog. As the study area is one of uplands, extensive settlement is unlikely. The settlement site of Y Foel (PRN 6108; NGR SH 68704418) includes some rectangular long huts. Medieval long huts are known at Cwm Bowydd (PRN 6102; NGR SH 69784510) and Ffestiniog (PRN 14668; NGR SH 70364825), although the understanding of the patterns of settlement in the area remains limited. It is likely that there are more sites in the area than is currently known, and a farm settlement is mentioned in 1520 at Glanrafon Du. This was located near to the site of the later Moelwyn zinc mine and was demolished in the 19th century (Gwynedd Archives Z/DV/74; ab Owain 1995-6). Evidence of medieval settlement and field systems can be suggested south of the study area at Camfa Derw, where irregular drystone wall fields and paddocks have been identified (PRN 30,160; NGR SH6776644212), this settlement includes a possible house platform (PRN 30161), and trackways (PRN 30,162-3). The persistence of Hafod place name elements, particularly to the south of the study area, such as Hafod y Mynydd (SH63624324), Hafod y Llyn (SH65144083) and Hafod Uchaf (SH63864324), suggests medieval colonisation of upper slopes from more lowland hendrefi.

Post-Medieval

The principal estate within the wider study area by the late 18th century was the Griffiths, later the Oakley estate, centred on Plas Tan y Bwlch, Maentwrog, although other landowners, such as the Glynllifon estate and the Crown remained significant. Cwmorthin Uchaf formed part of William Ormsby-Gore's estate (Gwyn *et al.* 2009, 5). Prior to the development of quarrying and mining industry, the study area formed part of the extensive upland sheep farm of Tanygrisiau Isaf and also Wrysgan, then belonging to the estate of the Wynnes of Peniarth. Many of the agricultural remains in the area probably date from the 18th century, when there was an upsurge in sheep farming. Significant evidence for this is noted in the wider landscape, for example a sheepfolds at various locations (PRN 30,031, 30,050, 30,055, 30,099, 30,190). Clearance cairns, located at NGR SH6812844112 (PRN 30,177) and SH6812144114 (PRN 30,178) probably also date from this time, although they could possibly be earlier in date.

However this agricultural activity declined in the face of slate quarrying from the later part of the 18th century. The Moelwyn fulling mill of 1864 at Tanygrisiau, sited to the north of the main woollen manufacturing centre around Dolgellau, hints at the importance of the woollen industry to the region. This mill retains its stocks, and is the only fulling mill in Wales to survive complete (Gwyn *et al.* 2009, 9). Many field boundaries in the area probably date to this time also. The more lowland portions of the Tanygrisiau estate were later sold to Samuel Holland, who developed it for housing (*ibid*.).

There are abundant industrial sites throughout and beyond the study area that have been recently examined as part of an assessment associated with proposed mountain bike trails (Gwyn *et al.* 2009). The substantial Cwmorthin quarry was opened in 1810 by Thomas Casson. Production was only sporadic to begin with, and the quarry was abandoned by 1830 probably due to transportation difficulties, or the quality of the slate. In 1840 renewed interest in Cwmorthin lead to a succession of lessees, amongst whom were John Edwards of Teiliau Bach and W. B. Chorley. The quarry was worked by Alan Searell who had arrived from Devon in the 1861, and production increased substantially. He bought the freehold of the Cwmorthin estate, along with houses in Tan-y-Grisiau village in 1861, and erected mills and laid a branch railway and inclines to Ffestiniog (Gwyn *et al.* 2009, 8; Isherwood 1995).

It was during the early 1860s that the substantial underground workings at Cwmorthin were started, enabled by the construction of the tramway linking the quarry with the then recently completed Ffestiniog railway. At their peak the underground workings supported 3 mills,

containing approximately 50 saws and dressing machines. Pumping and haulage was required as the work progressed to deeper levels initially powered by steam, then electricity. The quarry out-put reached 10376 tons in 1882 and was employing over 500 men, however two years later production was down and in 1900 it was incorporated into the Oakley quarry. The tips associated with the quarry are extensive (PRN 20,290; centred on SH 681456). The 1930s saw a fresh period of working, however apart from a brief period during the 1950s production since then was fitful (Roberts, 1994). The quarry had been formally closed in 1946 (Richards 1991).

The quarry at Wrysgan was considerably smaller than that at Cwmorthin. The quarry was opened in the 1830s and substantially developed from the 1850s onwards (Gwynedd Archives XD8/4/1131-1202). Its first mill was built in 1855 and was joined by a second ten years later, with a combined capacity of 20 saws and 20 dressers. Water was supplied from Llyn y Wrysgan, though steam and electricity were later used to power the quarry. The turn of the 20th century saw a drop in production, the quarry being worked intermittently until the 1940s. In addition to the very visible incline (Feature 09; PRN 55764; NPRN 415606; Plates 1-10), extensive remains of the quarry buildings survive and have been studied (See Gwyn *et al.* 2009, 14-15; PRNs 30,072-30,094), including a drum house (PRN 30,074), smithy (PRN 30,077), wheel pit (PRN 30,078), workshops (PRN 30,079) and tramway (PRN 30,081). Further remains survive at the upper levels of the quarry. To the south of the quarry smaller adits and structures have been identified at Moel-yr-Hydd (PRNs 30,095 -30,097).

Given the exposed upland nature of the slate quarries, impressive transportation systems were required. The building of the Ffestiniog Railway (PRN 9623) between 1832 and 1836, with capital from Ireland, provided Blaenau with a far more cost-effective means of transporting slate than carts and boats, though the quarries were slow to make use of it. The section west of the power station was reconstructed on a different alignment during the refurbishment of the railway line to avoid the power station.

The Wrysgan incline is a drystone revetted self-acting incline that originally connected the Wrysgan slate quarry with the Ffestiniog railway 600ft below, was built in 1863-4 (Gwynedd Archives XD8/4/1167; Figure 05). The Wrysgan Quarry Incline (Feature 09; PRN 55764; NPRN 415606; Plates 1-10) is a remarkable piece of 19th century engineering, the upper part of the incline being in a tunnel the approach to the head placed in a cutting (Cadw/ICOMOS 1999, 78; Roberts, 1994). It is still in good condition apart from where it has been obliterated by the access road serving the Stwlan reservoir. The original drum house

associated with the incline has collapsed, however much of the drum gear remained on the site in 1994 (Roberts, 1994, 7).

During 1868-70 demand for slate exceeded the supply available, and there were increased trading opportunities brought about by the national expansion of the railway system and the development of harbours. By this time there were up to 25 smaller mines operating in the uplands at higher altitudes on the margins of the workable stone, including the Moelwyn Mine (Features 03 to 05; NPRN 409280; NGR SH6683244311; Plates 23-29), located at the foot of the Stwlan dam. Here at least three adits outcropping at multiple levels are noted, giving the impression that the site developed over time (Gwyn et al. 2009, 14). The lower levels of the mine are located south of the study area on the western bank of the Tanygrisiau Reservoir (PRN 30,159, 30166-30169). Chwarel Twm Feltiwr (Feature 08; PRN 20248; NGR SH67104460) was an even smaller operation. These mines suffered decline after 1878, and never really recovered from serious depopulation of the area, culminating in the First World War. A building platform is noted 85m east northeast of the proposed cable route at NGR SH6789044604 (PRN 30,156). This is likely to be associated with guarrying activity although its function is not known. A pile of stones forming a marker, and of unknown date, is also located 87m southwest of the proposed cable route (PRN 30,158; SH6779744308). 250m west southwest of the route is the remains of the former Camfa Derw incline (PRN 30,159; SH6762244291).

Copper was also mined within the study area. The Llyn Stwlan mine (Feature 07; PRN 21838; NGR SH67104460; Plates 14, 17), was a small undertaking, with seams of copper still visible in the shale quarry surface.

The Ffestiniog Power Station is a 360-megawatt (480,000 hp) hydroelectricity scheme. The power station at the lower reservoir has four water turbines, which can generate 360 megawatts of electricity within 60 seconds of the need arising. The station, commissioned in 1963, was the first major pumped storage system in the United Kingdom (NPRN 306315; NGR SH66424447). The upper reservoir, Llyn Stwlan, discharges 27 cubic metres per second of water to the turbine generators at the power station on the bank of Tanygrisiau reservoir. The building of the lower reservoir flooded the route of the Ffestiniog Railway which had to build a deviation around the reservoir and power station.

The upper reservoir was formed by enlarging Llyn Stwlan with a concrete dam 380m long and 34m high (Feature 02; PRN 5490; SH666444), the lower by damming the Afon Ystradau

near Tanygrisiau, with the Power Station built on its western side. The Stwlan dam is one of the most prominent man-made landmarks in Gwynedd (Cadw/ICOMOS 1999, 79).

3.1.5 Cartographic Evidence

The tithe map of the parish of Ffestiniog of 1842 shows the study area to cover three large irregular fields, with little detail given. The map is not included as a figure as it gives little additional information. The landowner was at this time an absentee who lived in Overton, Flintshire. The use of the name *Ffrith* is indicative of the use of the land for upland sheep pasture. The apportionment for these fields is given below:

Landowners	Occupiers	Numbers	Name and Description	Quantities of
		Referring to the of Lands and Premesis		Statute Measure
		Plan		ARP
Wynne, Revd	Richard	24	Ffrith Pengwein	71 - 17
Lloyd	Roberts			
		65	Pengwein	184 2 37
	Owen	25	Cymera Isaf	247 2 35
	Evans			
	Margaret	67	Cymera Uchaf	59 - 31
	Pierce			

A plan of 1863 shows the detail of the proposed Wrysgan Quarry incline, although there were some differences in the eventual construction of it (Gwynedd Archives XD8/4/1167; Figure 05). The detail of the quarrying activity in the study area is shown on the 1st and 3rd edition 25 inch County Series Ordnance Survey maps (Figures 06 to 07). On the 1st edition map (Figure 06), Feature 15, the rectangular structure, is shown as a sheepfold. The Moelwyn Quarry is shown as disused and the Incline Plane (Features 3 to 5) and Wrysgan Quarry and incline are shown as going concerns, along with various quarry working levels. Scattered farmsteads and their associated outbuildings are also shown, including Ael-Goch, formerly located on the site of the current Power Station, with Doppog to the north and Buarth Melyn to the south. These farmsteads seems to have occupied an intermediate ground between the improved low lying fields to the east in the Afon Ystradau valley, where the reservoir is now situated, and the industrialised uplands to the west (Figures 06-07). The dramatic natural topography of the valley slope is the main feature shown however, along with the Ffestiniog Railway occupying the same topographic line as the farmsteads, and running close to them. By the time of the 3rd edition map of 1919 (Figure 07), the Moelwyn Quarry and incline is again shown as being disused, otherwise but little change is indicated.

3.1.6 Artefact Potential

Although possible prehistoric activity has been identified close to the proposed cable route in the form of the Afon Stwlan hut circle (Feature 06), the potential for the identification of significant prehistoric to medieval artefacts is considered to be low, since much of the proposed cable trench follows the route of the former dam access road or is within the perimeter Ffestiniog Power Station. Although sections of the proposed cable route will be across undisturbed ground, much of the excavation works will be through previously disturbed areas. Extensive evidence of industrial artefacts is visible on the surface close to the study area within the industrialised landscape (Plates 05 to 07). The potential for the identification of artefacts associated with the post-medieval quarrying and mining activity is therefore considered to be moderate to high.

3.1.7 Aerial Photographs and Lidar

Aerial Photograph ADAS 9001 40/90 Film 450 frame 190 taken on 1st May 1990 was examined in detail. The topographic landscape and industrial archaeology features were shown in detail, but no new archaeological sites were identified. An oblique aerial photograph taken during the construction of the power station (*First Hydro Ltd.*; Figure 09) demonstrates that the area to the west of the site where the proposed footpath and car parking is due to be located, and the south-western end of the proposed cable route, was heavily disturbed as part of the construction process.

Light Detection and Ranging (LiDAR) data was examined from the Lle Geo-Portal at <u>http://lle.gov.wales/home</u> for information on potential surface features using digital terrain modelling and digital surface modelling. This showed the landscape topography and river systems clearly, but given their dramatic nature, this tended to obscure the more minor detail. The outline of structures relating to quarrying activity was identified, but no new archaeological sites were noted. The 1m resolution DTM data for SH64 is shown in Figure 08.

3.2 The Walk-Over Survey

The proposed development areas within the Power Station perimeter, along with the proposed cable route were originally examined on 17th July 2017. Conditions were warm and sunny, and very good for carrying out the survey, although summer growth of bracken had reduced the ground visibility in places. Within the Power Station perimeter itself all areas were identified as being disturbed by previous construction activity, and no archaeological evidence was thought likely to survive in these areas.

The proposed cable route crosses some unimproved upland terrain, although, for the majority of the route, the cable will be installed within the carriageway of the metalled east-west access road leading to the Llyn Stwlan dam. There is much scree and large boulders scattered over the hill-slopes, and some evidence of drystone walls, which formerly formed the boundaries of *ffriddoedd* or upland sheepwalks. These are probably of post medieval date (Feature 13; Plates 11-13). Significant evidence of the quarrying of slate, and copper mining was encountered, including tailing mounds and scatter (Plate 47). Quarrying evidence survives in good quantity with good levels of archaeological preservation at the Moelwyn Quarry (Sites 3-5; Plates 19-28) and the Wrysgan Incline to the east, which is a very dramatic survival, along with many original features (Feature 7; Plates 1-10). The route crosses the track bed of the Ffestiniog Railway, although this area was significantly modified during the construction of the power station (Feature 17).

No clear evidence of prehistoric activity was noted, although the bracken ground cover did make the identification of this type of feature more difficult. As there is one known possibly prehistoric hut-circle site (Feature 6; Plate 18), it is still possible that there is more unidentified archaeology. The wider landscape would appear to be rich in medieval and earlier archaeology, but no sites were identified within the buffer zone.

A section of the proposed cable route that crosses the unimproved upland terrain extends downslope from the access road that serves Llyn Stwlan dam to a metalled access road that serves the Fisherman's car park. This portion of the proposed cable route comprised a steep valley slope, consisting of rocky outcrops, some of substantial size, and areas of natural terracing that was often boggy (Plates 35-39). The ground cover was *juncus* (reeds and sedge) and bracken, with only low cover over the wetter areas.

The access road to Llyn Stwlan dam appeared to have been partly constructed on one of the upper terraces. There was evidence for water management in the form of pits and channels dug for the small cataracts that debouched down the hill slopes (Feature 14; Plate 38). A rectangular building (Feature 15; Plates 40-42), which measured 9.05m long x 5.55m wide was noted 50m northeast of the proposed cable route, which may have been associated either with former quarrying or mining activity, or agriculture in the form of a sheepfold. No other activity that had not been previously noted was identified.
3.3 Gazetteer of Features

The sites identified in the desk-top study and on the walk-over survey are listed below, and shown on Figure 01 (except Feature 12 modern drainage). <u>Any recommendations given are based on the current understanding of the scheme route and methodology. Any amendments to this may result in a requirement to amend the recommendations. A 'C' after the grid reference indicates the central point of a larger or linear feature</u>

Feature 1 (PRN 67822; NPRN 306315; Plate 29, 44-45)

Site Name: Ffestiniog Pumped Storage Scheme: Llyn Stwlan Reservoir Grid Reference: SH66424447 Period: Modern Category: B Impact: None Description: The Ffestiniog Power Station is a 360-megawatt (480,000 hp) hydroelectricity scheme. The power station at the lower reservoir has four water turbines, which can generate 360 megawatts of electricity within 60 seconds of the need arising. The station, commissioned in 1963, was the first major pumped storage system in the United Kingdom (NPRN 306315; NGR SH66424447). The upper reservoir, Llyn Stwlan, discharges 27 cubic metres per second of water to the turbine generators at the power station on the bank of

Tanygrisiau reservoir.

Recommendations for further assessment: None Recommendations for mitigatory measures: None Feature 2 (PRN 5490; Plate 30) Site Name: Dam, Llyn Stwlan Grid Reference: SH666444 Period: Modern Category: A Impact: None Description: The upper reservoir was formed by enlarging Llyn Stwlan with a concrete dam 380m long and 34m high (Feature 02; PRN 5490; SH666444). The Stwlan dam is one of the most prominent man-made landmarks in Gwynedd (Cadw/ICOMOS 1999, 79). Recommendations for further assessment: None

Feature 3 (PRN 67823; NPRN 419351; Plates 22-29)

Site Name: Lake to Mill Incline, Moelwyn Slate Quarry Grid Reference: SH6668544340 C Period: Post-Medieval Category: B Impact: None

Description: Part of the tramway route from the quarry to the slate mill now lies under Llyn Stwlan. This incline emerges from the foot of the concrete dam which impounds Llyn Stwlan, and follows the former outflow of the lake on a low, stone-faced embankment. The site of the drum house at the top is under the dam itself. Cables associated with the pumped-storage hydro-electricity scheme are buried along the route of the tramway.

Recommendations for further assessment: None

Feature 4 (PRN 67824; NPRN 419352; Plates 19-21, 29)

Site Name: Ruined Building near Slate Mill, Moelwyn Slate Quarry

Grid Reference: SH66794430

Period: Post-Medieval

Category: B

Impact: None

Description: This ruined building, located at the bottom of the Lake to Mill incline (Feature 03; NPRN 419351) may have been a stable associated with the quarry tramway; or it may have been an office or smithy associated with the adjacent slate mill.

Recommendations for further assessment: None

Feature 5 (PRN 67825; NPRN 409280; Plates 19-20, 22, 29)

Site Name: Moelwyn Slate Quarry Mill

Grid Reference: SH66834431

Period: Post-Medieval

Category: B

Impact: None

Description: The mill was probably built in the 1860s, using local rock rubble rather than slate. It contained six saw benches and seven dressing machines, driven by a 40ft (18.9m) diameter by 4ft (1.2m) wide waterwheel in a pit on the north side. There was a small stacking area to the east by the exit tramway, and a building to the west which may have been an office and store, which are now ruined. The very small tips of trimmings noted at the site testify to very small production at this site.

Recommendations for further assessment: None

Feature 6 (PRN 1500; Plate 16)

Site Name: Hut Circle, Afon Stwlan

Grid Reference: SH66964438

Period: Probably Prehistoric

Category: E

Impact: None

Description: Little detail is known about this site, which is 25m from the proposed cable route. It is described as a single oval structure, described by Waddington (2010) as 'recently robbed'. The search of the area identified this site as somewhat overgrown, and the area was covered in juncus and bracken at the time (Plate 18).

Recommendations for further assessment: None

Recommendations for mitigatory measures: Avoidance, with watching brief being carried out during cable trench excavation close to this site. The site should also be fenced off during ground works.

Feature 7 (PRN 21838; Plate 14, 17) Site Name: Llyn Stwlan Copper Mine Grid Reference: SH67104460 Period: Post-Medieval Category: C Impact: None Description: A small mine, visible as a quarried face. It was last worked in 1919, where lead, copper and zinc were extracted (Gwyn 1998). Recommendations for further assessment: None

Feature 8 (PRN 20288; Plates 15-16) Site Name: Chwarel Twm Feltiwr Grid Reference: SH67104460 Period: Post-Medieval Category: C Impact: None Description: A small slate quarry. Evidence of tailings and a platform, forming remains of the quarry were identified during the walk-over survey (Plates 15-16). Recommendations for further assessment: None

Feature 9 (PRN 55764; NPRN 415606; Plates 1-10) Site Name: Wrysgan Quarry Incline Grid Reference: SH67934524 C Period: Post-Medieval Category: A Impact: None

Description: The incline is a remarkable piece of 19th century engineering, the upper part of the incline being in a tunnel the approach to the head placed in a cutting $\frac{7}{6}$ of the way up the hillside (Cadw/ICOMOS 1999, 78; Roberts, 1994). It is still in good condition apart from where it has been obliterated by the access road serving the Stwlan reservoir. The original drum house associated with the incline has collapsed, however much of the drum gear remained on the site in 1994 (Roberts, 1994, 7). The structure is constructed of loose fieldstone rubble, with larger facing stones (up to 0.6m by 0.4m). Much of the associated incline infrastructure survives, including a machine spun cable and two incline waggons, along with a hook and a supporting brace. It is approximately 3.5m wide, and varies in height over uneven ground between 0.6 and 2.5m.

Recommendations for further assessment: None Recommendations for mitigatory measures: Avoidance

Feature 10 (PRN 67826; NPRN 401209; Plate 10, 33-34)

Site Name: Ffestiniog Power Station Grid Reference: SH67914441

Period: Modern

Category: B

Impact: Slight

Description: The Ffestiniog Power Station is a 360-megawatt (480,000 hp) hydroelectricity scheme. The power station at the lower reservoir has four water turbines, which can generate 360 megawatts of electricity within 60 seconds of the need arising. The station, commissioned in 1963, was the first major pumped storage system in the United Kingdom. The upper reservoir, Llyn Stwlan, discharges 27 cubic metres per second of water to the turbine generators at the power station on the bank of Tanygrisiau reservoir. The building of the lower reservoir flooded the route of the Ffestiniog Railway which had to build a deviation around the reservoir and power station.

Recommendations for further assessment: None

Feature 11 (PRN 18217; HLCA 17; Plate 10)

Site Name: Llyn Stwlan/Llyn Ystradau Industrial Area Landscape Grid Reference: SH68104450 Period: Post-Medieval Category: A

Impact: None

Description: An area which was developed initially particularly in the mid-19th century for slate and later on for zinc and setts. The Ffestiniog pumped storage scheme which dominates this character area was the first such in Britain: work began in 1957 and was completed in 1963. The upper reservoir was formed by enlarging Llyn Stwlan by a concrete dam, and the lower (315m below) was created by damming the Afon Ystradau near the satellite village of Tan-y-Grisiau. Two vertical shafts inside Moelwyn link the two to allow the system to work. The power station, on the west side of the reservoir, is of steel-framed construction faced with local stone, and was probably the largest stone building to be constructed in Wales since the times of Edward I. Care was taken with landscaping, the spoil from the upper dam was placed in the reservoir, and the face of the lower dam is covered by rocks from the excavation.

The area has been quarried for slate (principally at Moelwyn (SH 661442), with outlying quarries at Bwlch Stwlan (SH 656442) and Chwarel Twm Ffeltiwr (SH 671446), and a quarry for setts at Brookes' Quarry (SH681439).

Recommendations for further assessment: None

Feature 12 (PRN 67827; Plate 13) Site Name: Modern Drainage Grid Reference: Along the entire route Period: Modern Category: D Impact: Likely Description: Modern culverts and stone lined channels were noted along the proposed cable route adjacent to the dam access road. These are designed to control the flow of water from the higher slopes as it crosses the dam access road, and use local fieldstone to blend in with the landscape.

Recommendations for further assessment: None Recommendations for mitigatory measures: None

Feature 13 (PRN 67814; Plates 11-13)

Site Name: Drystone walls

Grid Reference: SH67204480 C

Period: Post-Medieval

Category: C

Impact: None

Description: Sinuous drystone walling of rough fieldstone, largest stones 600mm by 300mm. It is about 1.1m high and 0.5m wide (Plates 11-13). The wall continues its course parallel with the mountain slope, and there are a number of openings along its route. It probably formed the boundary between post-medieval upland *ffriddoed*, and is now somewhat collapsed.

Recommendations for further assessment: None

Feature 14 (PRN 67828; Plate 38)

Site Name: Water Management activity

Grid Reference: SH67254468 to SH67494464

Period: Post-Medieval

Category: D

Impact: None

Description: Localised water management features, comprising pits and channels, controlling flow from natural cataracts and rivers.

Recommendations for further assessment: None

Feature 15 (PRN 67821; Plate 40-42) Site Name: Rectangular Structure Grid Reference: SH67514472 Period: Post-Medieval Category: C

Impact: None

Description: Built from irregular shaped field stone and set in the lee of a large rock outcrop. The rectangular building was roofless and measured 9.05m long x 5.55m wide x 1.65m high. The entrance was located on the southeast side and measured 1m wide; the walls at this point were 0.9m thick. There was a small internal division wall on the same side as the entrance but at the opposite end; the function of which was unknown. The building was a sheepfold, but was probably later associated with local mining or quarrying industry.

Recommendations for further assessment: None

Feature 16 (PRN 30157)

Site Name: Afon Stwlan Bridge

Grid Reference: SH6784144500

Period: Post-Medieval/Modern

Category: C

Impact: None

Description: A 2m wide rough boulder-built bridge abutment surviving on both banks of the Afon Stwlan. A good face survives on the north side and is 1.5m high, constructed of large fieldstone boulders. The base of the abutment is approximately 3m wide, and there are some signs of a trackway (Brooks and Laws 2009).

Recommendations for further assessment: None

Recommendations for mitigatory measures: Avoidance, with fencing off during groundworks

Feature 17 (PRN 9623)

Site Name: Ffestiniog Railway Grid Reference: SH67844439 C Period: Modern (at this location) Category: A

Impact: Slight

Description: The building of the Ffestiniog Railway between 1832 and 1836, with capital from Ireland, provided Blaenau Ffestiniog with a far more cost-effective means of transporting slate than the carts and boats that had previously been used. The quarries appear to have been slow to make effective use of it however. The proposed cable route will cross the track bed at NGR SH67844439, with the impact of the cable expected to be slight. The location of the track bed in this area was significantly modified as a result of the construction of the power station (Boyd 1975; Figure 09). The old line was on a continuous downward gradient towards Tanygrisiau station, but the new line is on an uphill gradient to pass the power station (Feature 01) and is more sharply curved than the original one (Hollingsworth 1981).

Recommendations for further assessment: None

Recommendations for mitigatory measures: Observe as part of watching brief during works associated with the cable crossing

4 CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusion

The archaeological assessment carried out at the Ffestiniog Power Station and of the proposed cable route between there and the reservoir at Llyn Stwlan identified 17 sites within 50m of the proposed ground works. Of these, three were modern, eleven were post-medieval, one is unknown but probably of late prehistoric date, and two of multi-period date. The Wrysgan Quarry incline (Feature 9), located some 800m to the north east, is considered to be of **international** significance and this will be avoided. The Ffestiniog Railway (Feature 17) is also of **international** significance, although the track bed at the cable crossing point has been modified significantly during the refurbishment of the line and as part of the deviation of the route of the railway to avoid the power station (Hollingsworth 1981), and the proposed impact is slight. The remaining eleven post medieval sites and the modern power station infrastructure are individually of **national** and **local** significance. None of these sites are due to be significantly directly impacted upon by the cable trenching, with avoidance or basic recording being recommended as archaeological mitigation.

Developments within the perimeter of the Power Station itself and adjacent to it will not have any significant archaeological impact, and the initially proposed demolition of structures within the curtilage of the site will no longer take place. The south-eastern portion of the proposed cable route, and the proposed footpath and car park up to the mountain gate, can be shown to have been heavily disturbed as part of the construction process in the 1960s (Figure 09), and no archaeological mitigation is recommended here. The scale of the works at the Power Station also does not suggest that there will be a significant permanent visual impact upon the surrounding landscape. The limited nature of the works means that Blaenau Ffestiniog Landscape of Outstanding Historic Interest (HLW (Gw) 3), the Llyn Stwlan/Llyn Ystradau Industrial Area Historic Landscape Character Area (HLCA 17) and the Moelwyn Range Historic Landscape Character Area (HLCA 16) will not be permanently affected by the scheme. No further archaeological mitigation is therefore suggested here.

The north-western part of the proposed cable route will be installed within the existing Llyn Stwlan dam access road, where no archaeological impact is expected. The route however passes close by the Afon Stwlan Hut Circle (Feature 6), and it is recommended that this is fenced off prior to the commencement of the ground works. It is recommended that an archaeologist should be present during work carried out close to the Afon Stwlan Hut Circle (Feature 6) and during its fencing off, in order to ensure avoidance of the feature. The surviving evidence for post-medieval quarrying and mining activity is robust, and will not be affected by the scheme (Feature 3-5, 7-9).

The route then runs downslope from the Stwlan reservoir access track to a metalled track in the vicinity of the Fisherman's car park. This section of the proposed route comprised a steep valley slope, consisting of rocky outcrops, some of substantial size, and areas of natural terracing that is often boggy. In this area, one site, a rectangular structure (Feature 15), was identified, although this is sufficiently far from the proposed cable route that there will be no direct impact upon it.

In addition to the specific recommendations noted in relation to the identified features, <u>the</u> Afon Stwlan bridge abutments (Feature 16) is also recommended to be fenced off and avoided. The work associated with the crossing of the Ffestiniog Railway track bed (Feature 17) should also be observed as part of the general watching brief discussed below, although the track bed at this point is considered to be modern in date.

Due to its steep valley side nature, and being a mixture of rock outcropping and boggy terraces, it is not thought likely that very significant archaeology will be encountered on the mountain slopes. However, there is some possibility of archaeological remains surviving on the terracing. It is proposed that the working width for the cable laying works will be a maximum of 5m, and the trench 500mm wide, so the level of impact and ground disturbance is not sufficient to require a full-time archaeological watching brief to take place. A partial watching brief visit from the archaeologist during ground works to record the character of the deposits encountered is however recommended.

The boggy terraces may contain peat deposits, and therefore the need to carry out of programme of sampling and analysis has to be considered. Whilst the probability of finding significant deposits of peat in these areas is thought likely to be low to moderate, significant deposits have been encountered locally. It is therefore recommended that investigative cores are taken in the areas defined as peat in the Phase 1 Habitat Survey carried out by *Etive Ecology Ltd*.

4.2 Table of Sites and Recommendations

Feature No	PRN	Site Name	Period	NGR	Recommendations for Further Assessment	Mitigation Recommendations
01	67822	Ffestiniog Pumped Storage Scheme: Llyn Stwlan Reservoir	Modern	SH66424447	None	None
02	5490	Dam, Llyn Stwlan	Post-Medieval	SH66604440	None	None
03	57823	Lake To Mill Incline, Moelwyn Slate Quarry	19th Century	SH6668544340	None	None
04	67824	Ruined Building Near Slate Mill, Moelwyn Slate Quarry	19th Century	SH6679944308	None	None
05	67825	Moelwyn Quarry Slate Mill	Post Medieval	SH6683244311	None	None
06	1500	Hut Circle, Afon Stwlan	Unknown	SH66964438	None	Avoidance, with watching brief being carried out during cable trench excavation close to this site. The site should also be fenced off during works.
07	21838	Llyn Stwlan Mine, Ffestiniog	Post-Medieval	SH67104460	None	Avoidance
08	20288	Slate Quarry, Chwarel Twm Feltiwr	Post-Medieval	SH67104460	None	Avoidance

Feature No	PRN	Site Name	Period	NGR	Recommendations for Further Assessment	Mitigation Recommendations
09	55764	Wrysgan Quarry Incline, Tanygrisiau	Post-Medieval	SH6793245240	None	Avoidance
10	67826	Ffestiniog Pumped Storage Scheme: Ffestiniog Power Station, Tanygrisiau	Modern	SH67914441	None	None
11	18217	Llyn Stwlan/Llyn Ystradau Industrial Area Landscape, Ffestiniog	Multi-Period	SH68104450	None	None
12	67827	Modern Drainage	Modern	-	None	None
13	67814	Drystone walls	Post-Medieval	SH67204480	None	Basic Recording
14	67828	Water Management	Post-Medieval	SH67254468 to SH67494464	None	Basic Recording
15	67821	Rectangular Building	Post-Medieval	SH67514472	None	Basic Recording
16	30157	Afon Stwlan Bridge	Post- Medieval/Modern	SH6784144500	None	Avoidance. The site should also be fenced off during works.
17	9623	Ffestiniog Railway track bed	Modern (at this point)	SH6784544390 C	None	Observe during Watching Brief

5 ACKNOWLEDGEMENTS

Howard Jones of *Caulmert Ltd.* is thanked for commissioning this project, and for providing much help and guidance. The help of Jenny Emmett and Ashley Batten of GAPS with this project is gratefully acknowledged. The staff of *First Hydro* at the Ffestiniog Power Station, including Sue McLaren, are thanked for their assistance in carrying out the walk-over survey, and also in the provision of information which is included in this report.

6 SOURCES CONSULTED

6.1 Primary Sources

Gwynedd Archives, Caernarfon

XD2/12699 Glynllifon Estate quarry papers

XD8/4/1131-1202 Papers relating to the Wrysgan Slate and Slab Quarries, dating from 1845 to *c*.1910, belonging to Robert Roberts

XD8/4/1162 Agreement for the sale and purchase of the Wrysgan Slate and Slab Quarries on lands formerly part of Tanygrisiau farm and the Wrysgan Graig and other sheepwalks

XD8/4/1167 Map of Part of Tanygrisiau showing the proposed line of the incline and tramway from Wrysgan Slate Quarry to the Ffestiniog Railway

XD8/4/1199 Counterpart Lease for 21 years of an inclined plane railway or tramway at Tanygrisiau. Rent £50 *per annum*

XD8/4/1312 Counterpart Licence to construct a dam and to raise the level of water in Llyn Stwlan near Tanygrisiau, parish of Festiniog. Term of lease 31 years. Rent £10 *per annum*.

XS/1326/1/234 Photograph of Llyn Stwlan during the construction of the Hydro-Electric Pumped storage Scheme, August 1961

Gwynedd Archives, Dolgellau

Z/DV/74 Oakley Quarry Collection

Register of Aerial Photography, Welsh Government

Aerial Photograph ADAS 9001 40/90 Film 450 frame 190 taken on 1st May 1990

<u>Other</u>

Caulmert Drawing 3251-CAU-XX-00-DR-S-1803

Caulmert Drawing 3251-CAU-XX-XX-DR-S-4403

Etive Ecology Ltd Phase 1 Habitat Survey – November 2017 Plan

First Hydro Company Ltd. Aerial Photograph of Ffestiniog Power Station under Construction

6.2 Secondary Sources

Boyd, J.I.C. 1975 The Ffestiniog Railway 1800-1974 Volume 1

British Geological Survey 1980 Soils of Wales- Sheet 2

Cadw 2017 Managing Setting of Historic Assets in Wales

Cadw/ICOMOS 1999 Landscapes of Historic Interest in Wales. Part 2.1: Landscapes of Outstanding Historic Interest

Davidson, A., Jones, G.P. and Gwyn, D. Rh. 1994 *Gwynedd Quarrying Landscapes- Slate Quarries (G1107)*. Unpublished GAT Report No. **129**

English Heritage, 1991, Management of Archaeological Projects

English Heritage, 2015, Management of Research Projects in the Historic Environment (MoRPHE).

First Hydro Company 2017 Ffestiniog Power Station Refurbishment Project: Stwlan Cable Replacement. Cable Installation Method Statement

Gwyn, D. 1998 Gwynedd Metal Mines Survey (G1468). Unpublished GAT Report No. 291

Gwyn, D., Brooks, I.P. and Laws, K. 2009 *Archaeological Assessment of the Proposed Trail Development, Bro Ffestiniog (in two volumes).* Unpublished EAS Client Report **2009/03**

Hollingsworth, B. 1981 Ffestiniog Adventure - The Ffestiniog Railway's Deviation Project

Isherwood, G. 1982 Cwmorthin Slate Quarry

Owain, S ab 1995 Neuadd y Farchnad, Blaenau Ffestiniog: Cipdrem ar ei Hanes (Blaenau Ffestiniog)

Richards, A. J. 1991 A Gazetteer of the Welsh Slate Industry (Capel Garmon)

Roberts, 1994. *Proposed Hydro-electric Scheme, Cwmorthin.* Unpublished GAT Report No. **108**

Royal Commission on Ancient and Historic Monuments of Wales 2015 *Guidelines for digital* archives

Smith, B. and George, T.N. 1961 British Regional Geology; North Wales (London)

Standard and Guidance for Historic Environment Desk-Based Assessment (Chartered Institute for Archaeologists, 2014).

Waddington, K. 2010 Early Celtic Societies in North Wales



Figure 01: Location Plan and Proximity Heritage Assets. Based on Ordnance Survey 1:10 000 Series Sheet SH 64. Scale as Shown







Figure 04: Caulmert Drawing 3251-CAU-XX-XX-DR-S-4403 showing the Proposed New Footpath Route to the North and West of the Power Station





Figure 06: Ordnance Survey County Series 25 inch 1st Edition Map of 1889, Sheets III.6 & IV.13. Scale 1:6500@A4



Figure 07: Ordnance Survey County Series 25 inch 3rd Edition Map of 1919, Sheets III.6 & IV.13. Scale 1:6500@A4





Figure 09: Oblique Aerial view of the Ffestiniog Power Station construction works taken from the east and dating from the years following 1963. It demonstrates that the land on which the proposed footpath and car park works is situated was heavily disturbed (Image courtesy of *First Hydro Company Ltd.*).



Figure 10: Reproduction of Etive Ecology Ltd Phase 1 Habitat Survey (Scale: as shown).



Figure 11: Reproduction of Etive Ecology Ltd Phase 1 Habitat Survey (Scale: as shown).


Plate 01: Feature 09 - General view of Wrysgan incline (PRN55764) from powerstation roadside (archive reference: G2532_01).



Plate 02: Feature 09 - View of Wrysgan incline (PRN55764); scale: 1x1m (archive reference: G2532_03).



Plate 03: Feature 09 - Shot of Wrysgan incline profile (PRN55764; (archive reference: G2532_04).



Plate 04: Feature 09 - Detailed shot of surviving metal brace surviving on incline (PRN55764); scale: 1x1m (archive reference: G2532_05).



Plate 05: Feature 06 - Detailed shot of end of cable mechanism on the Wrysgan incline (PRN55764); scale: 1x1m (archive reference: G2532_06).



Plate 06: Feature 09 - Detailed shot of former slate wagon on incline (PRN55764); scale : 1x1m (archive reference: G2532_07).



Plate 07: Feature 09 - Detailed shot of former slate wagon on incline (PRN55764) from other side (descending) and view of descent; scale: 1x1m (archive reference: G2532_08).



Plate 08: Feature 09 - View of incline from upper road (PRN55764); scale: 1x1m (archive reference: G2532_09).



Plate 09: Feature 09 - View of incline (PRN55764) from upper road looking upwards towards incline tunnel (archive reference: PRN55764).



Plate 10: Features 09, 10 and 11 - General shot from trackway across to Tanygrisiau reservoir and power station (PRN55764, PRN18217) (archive reference: G2532_011).



Plate 11: Feature 13 - General shot of drystone wall (PRN678414) (archive reference: G2532_14).



Plate 12: Feature 13 - General shot of drystone wall and gateway (PRN67814); scale: 1x1m (archive reference: G2532_15).



Plate 13: Feature 09 and 13 - General view of drystone wall (PRN678414) from the west and incline (Feature 9; PRN55764); scale: 1x1m (archive reference: G2532_16).



Plate 14: Feature 08 - General shot of Chwarel Twm Feltiwr (PRN20288) with tailings; scale: 1x1m (archive reference:G2532_20).



Plate 15: Feature 08 - Close-up shot of quarry tailings (PRN20288); scale: 1x1m scale (archive reference: G2532_21).



Plate 16: Feature 08 - General view from west of platform and tailings relating to slate quarry (PRN20288); scale: 1x1m (archive reference: G2532_22).



Plate 17: Feature 07 - Shot of copper mine (PRN21838) face of quarry; scale: 1x1m (archive reference: G2532_23).



Plate 18: Feature 06 - Site of hut circle (PRN 1500) *not very clear evidence from the ground due to overgrown foliage*; scale: 1x1m (archive reference: G2532_24).



Plate 19: Feature 04 and 05 - general view of Moelwyn quarry on platform south of access track; scale: 1x1m (archive reference: G2532_26).



Plate 20: Feature 04 and 05 - close-up view of Moelwyn quarry on platform south of access track (archive reference: G2532_27).



Plate 21: Feature 04 - close-up view of quarry building; only survives at foundation level (archive reference: G2532_28).



Plate 22: Features 03 and 5 - shot of Moelwyn quarry mill (PRN419351 and PRN409280) (archive reference: G2532_30).



Plate 23: Features 03 and 05 - Detailed shot showing possible blocked up window (PRN419351 and PRN409280); scale: 1x1m (archive reference: G2532_33).



Plate 24: Features 03 and 05 - Portrait shot of Moelwyn Mill winding gear building (PRN419351, PRN409280); scale: 1x1m (archive reference: G2532_34).



Plate 25: Features 03and 05 - Shot of north-east facing wall of winding gear mill building (PRN419351 and PRN4092800; scale: 1x1m (archive reference: G2532_35).



Plate 26: Features 03 and 05 - View of isolated mill structure to the WNW of the other mill buildings (PRN419351 and PRN409280); scale: 1x1m (archive reference: G2532_37).



Plate 27: Features 03 and 05 - View of internal elements of possible mill structure (PRN419351 and PRN409280); scale: 1x1m scale (archive reference: G2532_38).



Plate 28: Features 03 and 05 - Detailed shot of slate lined window in mill building (PRN419351 and PRN409280); scale: 1x1m (archive reference: G2532_39).



Plate 29: Features 03 and 05 - View of Moelwyn slate mill from above (PRN419351 and PRN409280); scale: 1x1m (archive reference: G2532_40).



Plate 30: Feature 02 - General view of Stwlan dam (PRN5490) (archive reference: G2532_41).



Plate 31: Feature 02 - Shot of Llyn Stwlan reservoir showing dam (PRN5490) (archive reference: G2532_44).



Plate 32: Feature 02 - Shot of Llyn Stwlan reservoir showing inclines on far side of the lake (NGR SH666444; PRN5490) (archive reference: G2532_45).



Plate 33: Feature 10 - General shot of carpark and powerstation (archive reference: G2532_31).



Plate 34: Feature 10 - General shot of buildings within powerstation site (archive reference: G2532_53).



Plate 35: View west from Stwlan dam access track of revised cable route; scale 1.0m (archive image ref G2532_062).



Plate 36: View south southwest of revised cable route; scale: 1.0m (archive image ref G2532_064).



Plate 37: View southeast of revised cable route; scale: 1.0m (archive image ref G2532_065).



Plate 38: Feature 14 - View southwest of water management activity comprising a small dug pit at base of waterfall; scale: 1.0m (archive image ref G2532_067).



Plate 39: View southwest of revised cable route; scale: 1.0m (archive image ref G2532_069).



Plate 40: Feature 15 - View southwest of rectangular structure, with entrance on eastern side; scale: 1.0m (archive image ref G2532_070).



Plate 41: Feature 15 - Elevated view from the north; scale: 1.0m (archive image ref G2532_072).



Plate 42: Feature 15 - location shot of strucure below lee of rock outcrop; scale: 1.0m (archive image ref G2532_075).



Plate 43: View southwest of revised cable route; scale: 1.0m (archive image ref G2532_077).



Plate 44: View northeast of revised cable route along narrow valley; scale: 1.0m (archive image ref G2532_080).



Plate 45: View southwest of revised cable route; scale: 1.0m (archive image ref G2532_082).



Plate 46: General view southwest from metalled trackway of the rocky outcrops and terracing along the cable route (archive image ref G2532_084).



Plate 47: General view north of The Wrysgan incline and quarry in background (archive image ref G2532_081).

APPENDIX I

Reproduction of Gwynedd Archaeological Trust project design for archaeological assessment, July 2017

FFESTIONIOG POWER STATION (G2532)

WRITTEN SCHEME OF INVESTIGATION FOR ARCHAEOLOGICAL ASSESSMENT

Prepared for

Caulmert Ltd

July 2017

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

Name

Signature

Date

FFESTIONIG POWER STATION

WRITTEN SCHEME OF INVESTIGATION FOR ARCHAEOLOGICAL ASSESSMENT

Prepared for Caulmert Ltd, July 2017

CONTENTS

1 INTRODUCTION	5
2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND	7
3 METHODOLOGY	9
3.1 Assessment (Desktop Study)	9
3.2 Walkover Survey	11
3.3 Gazetteer	12
3.4 Data processing and report compilation	13
4 PERSONNEL	14
5 INSURANCE	15
6 SOURCES CONSULTED	16
FIGURE 01	17
Reproduction of First Hydro Company Drawing No. SK01252 detailing scheme route	17
FIGURE 02	18
Location of scheme route and 50m assessment buffer	18

1 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been asked by *Caulmert Ltd* to prepare a written scheme of investigation for an archaeological assessment in advance of a mid-life refurbishment scheme at Ffestiniog Power Station, Gwynedd (NGR SH67924437; Figure 01). The majority of the proposed refurbishment will be within the existing power station site and involves the installation of new turbines, switchgear etc., together with the erection of a replacement building and the provision of hardstandings on previously disturbed ground. In addition, the scheme will also include the replacement of an existing power cable route, as detailed on *First Hydro Company Drawing No*. SK01252 (Figure 01). The route will partly use existing cable routes and access roads and will link power station infrastructure at Llyn Stwlan and Tanygrisiau reservoirs.

The assessment will conform to the guidelines specified in the Chartered Institute for Archaeologists *Standard and Guidance for Historic Environment Desk-Based Assessment* (Chartered Institute for Archaeologists, 2014). The format of this written scheme of investigation corresponds to the requirements of section 2.3 of MoRPHE (English Heritage 2015) and to MAP2 (English Heritage, 1991, *Management of Archaeological Projects*). The assessment is scheduled to be completed in July 2017.

The assessment will be monitored by the Snowdownia National Park Authority archaeologist (SNPA) and Gwynedd Archaeological Planning Services (GAPS); the content of this written scheme of investigation and all subsequent reporting by GAT must be approved by SNPA/GAPS prior to final issue.

Gwynedd Archaeological Trust is certified to ISO 9001:2008 and ISO 14001:2004 (Cert. No. 74180/A/0001/UK/En) and is a Registered Organisation with the Chartered Institute for Archaeologists and a member of the Federation of Archaeological Managers and Employers (FAME).

1.1 Proposed Methodology

Within the curtilage of the Power Station itself, the proposed works include the removal of a planting are for the construction of a muster area, a proposed delivery parcel shelter, a proposed first floor extension to the administration block and a small area of road widening.

A small 5m by 4m and 3.75m high flat roofed building is also proposed to the rear of the Power Station, and a small existing building to the rear of it is also to be demolished, to be replaced by a 5m by 4m and 3.75m high flat roofed building. An existing store building is also to be demolished and an area of hardstanding to be created, along with other minor modifications. These will be assessed for any archaeological impact. The route of a proposed path to the west of the Power Station will also be examined, along with a further path to the east, running north-south, along with an associated induction cabin site.

Within the road sections between the power station and Llyn Stwlan, the cables will be installed in the middle of the road, although there will be a short off-road section. All plant and machinery is to be located on existing hard-standing. The proposed methodology is to lay:

- 2 x 150mm ducts (black) for one power cable and one spare.
- 1 x 100mm duct (green) for communications cable.
- 185mm² 4 core triplex XLPE cable.
- 48 core single mode fibre cable.

Within the road sections between the power station and Llyn Stwlan, the cables will be installed in the middle of the road, although there will be a short off-road section. All plant and machinery is to be located on existing hard-standing. The proposed methodology is to lay the cables in a trench approximately 900mm deep x 600mm wide. An allowance of a 10m working width either side of the excavation between the power station and the road and up the Wrysgan incline is proposed. This route, along with a 25m buffer either side of it, will be archaeologically assessed.

2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

The Ffestiniog Power Station is a 360-megawatt (480,000 hp) hydroelectricity scheme. The power station at the lower reservoir has four water turbines, which can generate 360 megawatts of electricity within 60 seconds of the need arising. The station, commissioned in 1963, was the first major pumped storage system in the United Kingdom. The upper reservoir, Llyn Stwlan, discharges 27 cubic metres per second of water to the turbine generators at the power station on the bank of Tanygrisiau reservoir. The building of the lower reservoir flooded the route of the Ffestiniog Railway which had to build a deviation around the reservoir and power station.

A brief examination of the regional Historic Environment Record (Gwynedd Archaeological Trust, Craig Beuno, Ffordd y Garth, Bangor, Gwynedd LL57 2RT) and the National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, Plas Crug, Aberystwyth SY23 1NJ), lists the following known archaeological sites within a 50m buffer of the proposed scheme route:

Primary Reference Number (PRN)	Site_Name	Period	Туре	NGR
1500	Hut Circle, Afon Stwlan *	Unknown	Hut Circle	SH66964438
5490	Dam, Llyn Stwlan	Post- Medieval	Dam	SH66604440
18217	Llyn Stwlan/Llyn Ystradau Industrial Area Landscape, Ffestiniog	Multi-Period	Landscape	SH68104450
20288	Slate Quarry, Chwarel Twm Feltiwr	Post- Medieval	Slate Quarry	SH67104460
21838	Llyn Stwlan Mine, Ffestiniog	Post- Medieval	Copper Mine	SH67104460
55764	Wrysgan Quarry Incline, Tanygrisiau**	Post- Medieval	Inclined Plane	SH6793245240

Gwynedd Historic Environment Record Sites

*lies 25m SE of road; ** lies on route of scheme

National Monuments Record of Wales Royal Commission on the Ancient and
Historical Monuments of Wales Sites

National Primary Reference Number (NPRN)	NMRW_name	Period	Туре	NGR
306315	Ffestiniog Pumped Storage Scheme: Llyn Stwlan Reservoir	Modern	Reservoir	SH66424447
401209	Ffestiniog Pumped Storage Scheme: Ffestiniog Power Station, Tanygrisiau	Modern	Hydroelectric Power Station	SH67914441
409280	Moelwyn Quarry Slate Mill	Post Medieval	Slate Processing Works	SH6683244311
415606	Wrysgan Quarry Incline	19th Century	Inclined Plane	SH6793245240
419351	Lake To Mill Incline, Moelwyn Slate Quarry	19th Century	Inclined Plane	SH6668544340
419352	Ruined Building Near Slate Mill, Moelwyn Slate Quarry	19th Century	Office, Stable	SH6679944308

Wrysgan Quarry Incline (PRN 55764; NPRN 415606) is the only site located on the route of the scheme. The site is a drystone revetted self-acting incline that originally connected the Wrysgan slate quarry with the Ffestiniog railway. As summarised in Roberts, 1994 (GAT Report 108), the incline is a remarkable piece of 19th century engineering, the upper part of the incline being in a tunnel the approach to the head placed in a cutting. Built in 1850, it is still in good condition apart from its lower end, where it has been obliterated by the new road serving the Stwlan reservoir. The original drum house associated with the incline has collapsed, however much of the drum gear remains on the site (Roberts, 1994. GAT Report 108).

In addition to the known archaeological sites, the scheme is also located within the following:

- the Blaenau Ffestiniog Landscape of Outstanding Historic Interest (HLW (Gw) 3);
- the *Llyn Stwlan/Llyn Ystradau Industrial Area* Historic Landscape Character Area (HLCA 17); and
- the Upper Slopes Of The Moelwyn Range Historic Landscape Character Area (HLCA 16).

There are no Scheduled Monuments or Listed Buildings within the 50m buffer of the proposed scheme.

3 METHODOLOGY

3.1 Assessment (Desktop Study)

A desk-based assessment is defined as "a programme of study of the historic environment within a specified area or site on land, the inter-tidal zone or underwater that addresses agreed research and/or conservation objectives. It consists of an analysis of existing written, graphic, photographic and electronic information in order to identify the likely heritage assets, their interests and significance and the character of the study area, including appropriate consideration of the settings of heritage....Significance is to be judged in a local, regional, national or international context as appropriate" (CIFA 2014, 4).

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

- The regional Historic Environment Register ((HER) Gwynedd Archaeological Trust, Craig Beuno, Ffordd y Garth, Bangor, Gwynedd LL57 2RT) will be examined for information concerning the study area, defined as the power station and the extent of works on *First Hydro Company Drawing No*. SK01252 (Figure 01), along with a 50m assessment buffer. This will include an examination of the core HER, the 1:2500 County Series Ordnance Survey maps and any secondary information held within the HER. All identified features will be mapped, described and added to a gazetteer of sites and the relative importance of sites should be defined;
- The National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, Plas Crug, Aberystwyth SY23 1NJ) will be checked for sites additional to the HER;
- Aerial photographs from the National Monuments Record of Wales (Royal Commission on the Ancient and Historical Monuments of Wales, National Monuments Record of Wales, Plas Crug, Aberystwyth SY23 1NJ) will be examined for potential features;
- 4. On-line catalogue search of the National Library of Wales (Penglais Rd, Aberystwyth SY23 3BU);
- Archive data, including primary and secondary sources, historic maps and estate maps will be examined at the regional archives (Gwasanaeth Archifau Gwynedd, Cyngor Gwynedd, Caernarfon LL55 1SH and Meirionnydd Record Office, Bala Rd, Dolgellau LL40 2YF);

6. Light Detection and Ranging (LiDAR) data will be examined from the Lle Geo-Portal at http://lle.gov.wales/home for information on potential surface features using digital terrain modelling and digital surface modelling.

3.2 Walkover Survey

A walkover survey will be undertaken that will examine the extent of works zone as detailed on *First Hydro Company Drawing No*. SK01252 (Figure 01). The walkover survey will identify all known and new archaeological features on the ground and accurately map and describe them on GAT pro-formas. The sites will then be added to the overall gazetteer and their relative importance defined. The potential for sub-surface archaeology will be estimated and defined.

A photographic record will be maintained in RAW format using a digital SLR set to maximum resolution (Nikon D3000; resolution: $3,872 \times 2,592$ [10.2 effective megapixels]) and photographic metadata table will be completed and included in the report. Photographic images will be archived in TIFF format; the archive numbering system will start from **G2532_001**. A handheld GPS unit will also be used during the walkover survey

3.3 Gazetteer

A gazetteer will be compiled for any identified sites within and within proximity to the specified route based on information sourced from the regional HER; the gazetteer will include:

- 1. Feature Number
- 2. Site name
- 3. PRN number
- 4. Grid reference
- 5. Period
- 6. Site type
- 7. Assessment category
- 8. Description
- 9. Impact
- 10. Recommendation for further assessment/evaluation
- 11. Recommendation for mitigatory measures
3.4 Data processing and report compilation

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

1. Front cover;

- 2. Inner cover;
- 3. Figures and Plates List
- 4. Non-technical summary;
- 5. Introduction;
- 6. Methodology
 - i. Desk-based assessment
- 7. Results
 - a. Desk based assessment
 - i. Location and geological summary
 - ii. Statutory and non-statutory designations
 - iii. Environmental remains and soil morphology
 - iv. Historical and archaeological background
 - v. Cartographic evidence
 - vi. Artefact potential
 - vii. Aerial photographs and LiDAR;
 - b. Gazetteer of features
- 8. Conclusions and recommendations
 - a. Conclusion
 - b. Table of sites and recommendations
- 9. Acknowledgements
- 10. Bibliography
 - a. Primary sources
 - b. Secondary sources
- 11. Figures; inc.:
 - location plan;
 - historic mapping;
 - location plan with identified features
- 12. Appendix I (approved written scheme of investigation)
- 13. Appendix II (Sites listed on GAT Historic Environment Record)
- 14. Appendix III (Definition of mitigation terms)
- 15. Appendix IV Photographic metadata (walkover survey)
- 16. Back cover

Illustrations will include plans of the location of the study area and archaeological sites. Historical maps, when appropriate and if copyright permissions allow, will be included.

A draft copy of the report will be completed by August 2017 and will be sent to SNPA/GAPS and *Caulmert Ltd.* Once approved, a copy of the report will immediately be submitted to SNPA/GAPS, *Caulmert Ltd* and to the GAT HER. Submission of digital information to the Royal Commission on the Ancient and Historical Monuments of Wales will be undertaken in accordance with the RCAHMW Guidelines for Digital Archives Version 1 (2015). Digital information will include the photographic archive and associated metadata.

4 PERSONNEL

The project will be managed by John Roberts, Principal Archaeologist GAT Contracts Section. The assessment will be completed by a project archaeologist who will have responsibility for completing the desk based assessment, maintaining the site archive, liaising with SNPA/GAPS and *Caulmert Ltd* and submitting the draft report and final report. The project manager will be responsible for reviewing and approving the report prior to submission.

5 INSURANCE

Public Liability

Limit of Indemnity- £5,000,000 any one event in respect of Public Liability INSURER Aviva Insurance Limited POLICY TYPE Public Liability POLICY NUMBER 24765101CHC/000405 EXPIRY DATE 22/06/2018

Employers Liability

Limit of Indemnity- £10,000,000 any one occurrence. The cover has been issued on the insurers standard policy form and is subject to their usual terms and conditions. A copy of the policy wording is available on request. INSURER Aviva Insurance Limited POLICY TYPE Employers Liability POLICY NUMBER 24765101CHC/000405 EXPIRY DATE 22/06/2018

Professional Indemnity

Limit of Indemnity- £5,000,000 in respect of each and every claim INSURER Hiscox Insurance Company Limited POLICY TYPE Professional Indemnity POLICY NUMBER HU PI 9129989/1208 EXPIRY DATE 23/07/2018

6 SOURCES CONSULTED

- 1. First Hydro Company Drawing No. SK01252
- 2. English Heritage, 2015, Management of Research Projects in the Historic Environment (MoRPHE).
- 3. English Heritage, 1991, Management of Archaeological Projects
- 4. Roberts, 1994. Proposed Hydro-electric Scheme, Cwmorthin. GAT Report 108
- 5. Royal Commission on Ancient and Historic Monuments of Wales 2015 *Guidelines for digital archives*
- 6. Standard and Guidance for Historic Environment Desk-Based Assessment (Chartered Institute for Archaeologists, 2014).

FIGURE 01

Reproduction of *First Hydro Company Drawing No*. SK01252 detailing scheme route



FIGURE 02

Location of scheme route and 50m assessment buffer



APPENDIX II

Reproduction of Gwynedd Archaeological Trust photographic metadata

File	Project		Area sub-		View		Туре		Originating	Originating	Plates
reference	name	Project phase	division	Description	from	Scales		Date	person	organisation	
G2532_01	Ffestiniog	Archaeological	Feature	General view of	SSE	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	1
	Power	assessment	09	Wrysgan incline			Photograph			Archaeological	
	Station			from						Trust	
	cable			powerstation							
	route			roadside							
G2532_02	Ffestiniog	Archaeological	-	General view of	NNE	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	
	Power	assessment		powerstation,			Photograph			Archaeological	
	Station			Trawsfynydd						Trust	
	cable			and Tan y							
	route			Grisiau reservoir							
G2532_03	Ffestiniog	Archaeological	Feature	View of	SSE	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	2
	Power	assessment	09	Wrysgan incline			Photograph			Archaeological	
	Station			(Feature 09)						Trust	
	cable										
	route										
G2532_04	Ffestiniog	Archaeological	Feature	Shot of Wrysgan	SW	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	3
	Power	assessment	09	incline profile			Photograph			Archaeological	
	Station									Trust	
	cable										
	route										
G2532_05	Ffestiniog	Archaeological	Feature	Detailed shot of	WNW	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	4
	Power	assessment	09	surviving metal			Photograph			Archaeological	
	Station			brace surviving						Trust	
	cable			on incline							
	route										
G2532_06	Ffestiniog	Archaeological	Feature	Detailed shot of	NW	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	5
	Power	assessment	09	end of cable			Photograph			Archaeological	
	Station			mechanism on						Trust	
	cable			the Wrysgan							
	route			incline							
G2532_07	Ffestiniog	Archaeological	Feature	Detailed shot of	SSE	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	6

File	Project		Area sub-		View		Туре		Originating	Originating	Plates
reference	name	Project phase	division	Description	from	Scales		Date	person	organisation	
	Power	assessment	09	former slate			Photograph			Archaeological	
	Station			wagon on						Trust	
	cable			incline							
	route										
G2532_08	Ffestiniog	Archaeological	Feature	Detailed shot of	NNW	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	7
	Power	assessment	09	former slate			Photograph			Archaeological	
	Station			wagon on						Trust	
	cable			incline from							
	route			other side							
				(descending)							
				and view of							
				descent							
G2532_09	Ffestiniog	Archaeological	Feature	View of incline	NWN	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	8
	Power	assessment	09	from upper			Photograph			Archaeological	
	Station			road						Trust	
	cable										
	route										
G2532_10	Ffestiniog	Archaeological	Feature	View of incline	SSE	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	9
	Power	assessment	09	from upper			Photograph			Archaeological	
	Station			road looking						Trust	
	cable			upwards							
	route			towards incline							
	-6			tunnel							
G2532_11	Ffestiniog	Archaeological	Feature 9,	General shot	S	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	10
	Power	assessment	10, 11	from trackway			Photograph			Archaeological	
	Station			across to						Trust	
	cable			Tanygrisiau							
	route			reservoir and							
00500 15				power station				47/07/221-			
G2532_12	Ffestiniog	Archaeological	Feature	View of modern	NW	1x1m	Digital	1//07/2017	M.S.Lynes	Gwynedd	
	Power	assessment	11	walls as part of			Photograph			Archaeological	

File	Project		Area sub-		View		Туре		Originating	Originating	Plates
reference	name	Project phase	division	Description	from	Scales		Date	person	organisation	
	Station			drainage system						Trust	
	cable			(SH678451)							
	route										
G2532_13	Ffestiniog	Archaeological	Feature	Shot of water	NW	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	
	Power	assessment	12	drainage chute			Photograph			Archaeological	
	Station			leading down						Trust	
	cable			from road							
	route										
G2532_14	Ffestiniog	Archaeological	Feature	General shot of	NE	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	11
	Power	assessment	13	drystone wall			Photograph			Archaeological	
	Station									Trust	
	cable										
00500.45	route		- ·		65		D : 1	47/07/2017			12
G2532_15	Ffestiniog	Archaeological	Feature	General shot of	SE	1x1m	Digital	1//0//201/	M.S.Lynes	Gwynedd	12
	Power	assessment	13	arystone wall			Photograph			Archaeological	
	Station			and gateway						Trust	
	cable										
62522 16	Ffortiniog	Archaoological	Eosturo 0	Conoral view of	\\\\\\\\	1v1m	Digital	17/07/2017	MSLypos	Gwwnodd	12
02332_10	Power	Alchaeological	± 12	drystone wall	VVINVV	TXTIII	Digital	1//0//201/	IVI.J.Lyries	Archaeological	12
	Station	assessment	1 15	from the west			rnotograph			Trust	
	cable			and incline						Trast	
	route			(Feature 9)							
G2532 17	Ffestiniog	Archaeological	Feature	General view of	NW	1x1m	Digital	17/07/2017	M.S.Lvnes	Gwynedd	
	Power	assessment	13	drystone wall in			Photograph		,,	Archaeological	
	Station			, context from			0 1			Trust	
	cable			roadside							
	route										
G2532_18	Ffestiniog	Archaeological	-	Modern water	SE	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	
_	Power	assessment		management/			Photograph			Archaeological	
	Station			drainage						Trust	

File	Project		Area sub-		View		Туре		Originating	Originating	Plates
reference	name	Project phase	division	Description	from	Scales		Date	person	organisation	
	cable			drystone wall							
	route										
G2532_19	Ffestiniog	Archaeological	-	Modern water	NW	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	
	Power	assessment		management/			Photograph			Archaeological	
	Station			drainage						Trust	
	cable			drystone wall							
C2522 20	route Ffectioica	Archeeological	Faatura	Concept abot of	C F	1.1.1.00	Disital	17/07/2017	MCLuppo	Cumunada	1.4
G2532_20	Flestiniog	Archaeological	reature	cite 08 Chuerel	SE	TXTU	Digital	1//0//201/	IVI.S.Lyries	Gwynedd	14
	Station	assessment	07	Two Foltiwr			Photograph			Truct	
	cable			with tailings						Trust	
	route			with tanings							
62532 21	Ffestining	Archaeological	Feature	Close-up shot of	s	1v1m	Digital	17/07/2017	M S Lynes	Gwynedd	15
02332_21	Power	assessment	08	site 08 guarry		1/111	Photograph	17,07,2017	Will Silly rics	Archaeological	13
	Station			tailings						Trust	
	cable			0							
	route										
G2532_22	Ffestiniog	Archaeological	Feature	General view	WNW	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	16
	Power	assessment	08	from west of			Photograph			Archaeological	
	Station			platform and						Trust	
	cable			tailings relating							
	route			to slate quarry							
G2532_23	Ffestiniog	Archaeological	Feature	Shot of copper	SSE	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	17
	Power	assessment	07	mine (Site 07)			Photograph			Archaeological	
	Station			face						Trust	
	cable										
	route			-							
G2532_24	Ffestiniog	Archaeological	Feature	Site of hut circle	S	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	18
	Power	assessment	06	(Feature 06)			Photograph			Archaeological	
	Station			*not very clear						Trust	
	cable			evidence from							

File	Project		Area sub-		View		Туре		Originating	Originating	Plates
reference	name	Project phase	division	Description	from	Scales		Date	person	organisation	
	route			the ground due							
				to overgrown							
				foilage*							
G2532_25	Ffestiniog	Archaeological	Feature	Shot of	N	-	Digital	1//0//201/	M.S.Lynes	Gwynedd	
	Power	assessment	05	will building			Photograph			Archaeological	
	Station									Trust	
	route			(Site US)							
62532.26	Ffestining	Archaeological	Feature	General view of	N	1v1m	Digital	17/07/2017	MSIVNes	Gwynedd	19
02332_20	Power	assessment	04 + 05	sites 04 and 05		IXIII	Photograph	17,07,2017	IVI.S.Lyncs	Archaeological	15
	Station			Moelwyn guarry						Trust	
	cable			on platform							
	route			south of access							
				track							
G2532_27	Ffestiniog	Archaeological	Feature	General view of	N	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	20
	Power	assessment	04 + 05	sites 04 and 05			Photograph			Archaeological	
	Station			Moelwyn quarry						Trust	
	cable			on platform							
	route			south of access							
				track (Close-up)							
G2532_28	Ffestiniog	Archaeological	Feature	Close-up view of	Ν	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	21
	Power	assessment	04	quarry building			Photograph			Archaeological	
	Station			04, only						Trust	
	cable			survives at							
	route			foundation level							
G2532_29	Ffestiniog	Archaeological	Feature	General shot of	SE	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	
	Power	assessment	01	dam			Photograph			Archaeological	
	Station									Trust	
	cable										
00500.00	route		-		6			47/07/201-			
G2532_30	Ffestiniog	Archaeological	Feature	Shot of	S	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	22

File	Project		Area sub-		View		Туре		Originating	Originating	Plates
reference	name	Project phase	division	Description	from	Scales		Date	person	organisation	
	Power	assessment	03/05	Moelwyn quarry			Photograph			Archaeological	
	Station			mill (Site 05)						Trust	
	cable										
	route										
G2532_31	Ffestiniog	Archaeological	Feature	Portrait shot of	S	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	
	Power	assessment	03	Moelwyn Mill			Photograph			Archaeological	
	Station			buildings						Trust	
	cable										
	route				_						
G2532_32	Ffestiniog	Archaeological	Feature	Shot of	E	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	
	Power	assessment	03	Moelwyn Mill			Photograph			Archaeological	
	Station			buildings with						Trust	
	cable			the dam (Site 1)							
	route			in the							
C2522 22	Efectinieg	Archaoological	Eosturo	Datailed chot		1v1m	Digital	17/07/2017	MSLypos	Gwwpodd	22
02332_33	Power	Archaeological	03	showing		TVTIII	Photograph	1//0//201/	IVI.J.LyTTES		23
	Station	assessment	05	nossihle			Thotograph			Trust	
	cable			blocked up						must	
	route			window							
G2532 34	Ffestiniog	Archaeological	Feature	Portrait shot of	N	1x1m	Digital	17/07/2017	M.S.Lvnes	Gwvnedd	24
	Power	assessment	03	Moelwyn Mill			Photograph	, - , -	- ,	Archaeological	
	Station			, winding gear						Trust	
	cable			building							
	route										
G2532_35	Ffestiniog	Archaeological	Feature	Shot of north-	NE	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	25
	Power	assessment	03	east facing wall			Photograph			Archaeological	
	Station			of winding gear						Trust	
	cable			mill building							
	route										
G2532_36	Ffestiniog	Archaeological	Feature	Internal shot of	SSW	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	

File	Project		Area sub-		View		Туре		Originating	Originating	Plates
reference	name	Project phase	division	Description	from	Scales		Date	person	organisation	
	Power	assessment	03	Moelwyn Mill			Photograph			Archaeological	
	Station			building						Trust	
	cable			(SH668443)							
	route										
G2532_37	Ffestiniog	Archaeological	Feature	View of isolated	E	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	26
	Power	assessment	03	mill structure to			Photograph			Archaeological	
	Station			the WNW of the						Trust	
	cable			other mill							
	route			buildings							
G2532_38	Ffestiniog	Archaeological	Feature	View of internal	SW	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	27
	Power	assessment	03	elements of			Photograph			Archaeological	
	Station			possible mill						Trust	
	cable			structure							
	route										
G2532_39	Ffestiniog	Archaeological	Feature	Detailed shot of	SSW	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	28
	Power	assessment	03	slate lined			Photograph			Archaeological	
	Station			window in mill						Trust	
	cable			building							
	route										
G2532_40	Ffestiniog	Archaeological	Feature	View of	NW	1x1m	Digital	17/07/2017	M.S.Lynes	Gwynedd	29
	Power	assessment	03-05	Moelwyn slate			Photograph			Archaeological	
	Station			mill from above						Trust	
	cable										
	route										
G2532_41	Ffestiniog	Archaeological	Feature	General view of	NE	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	30
	Power	assessment	02	Stwlan dam			Photograph			Archaeological	
	Station									Trust	
	cable										
	route										
G2532_42	Ffestiniog	Archaeological	Feature	General view	NW	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	
	Power	assessment	02	looking back			Photograph			Archaeological	

File	Project		Area sub-		View		Туре		Originating	Originating	Plates
reference	name	Project phase	division	Description	from	Scales		Date	person	organisation	
	Station			over the route						Trust	
	cable			from Llyn							
	route			Stwlan							
G2532_43	Ffestiniog	Archaeological	Feature	General	WNW	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	
	Power	assessment	02	landscape shot			Photograph			Archaeological	
	Station			towards						Trust	
	cable			Bleanau from							
	route			the road to dam							
G2532_44	Ffestiniog	Archaeological	Feature	Shot of Llyn	NNE	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	31
	Power	assessment	01	Stwlan reservoir			Photograph			Archaeological	
	Station			showing dam						Trust	
	cable										
	route			-							
G2532_45	Ffestiniog	Archaeological	Feature	Shot of Llyn	ENE	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	32
	Power	assessment	01	Stwlan reservoir			Photograph			Archaeological	
	Station			showing inclines						Trust	
	cable			on far side of							
	route			the lake							
62522.46	E (A	E	(SH666444)			Distud	47/07/2047			
G2532_46	Frestiniog	Archaeological	Feature	General view of	NNVV	-	Digital	1//0//201/	IVI.S.Lynes	Gwynedd	
	Power	assessment	10	powerstation			Photograph			Archaeological	
	Station									Trust	
	cable										
62522 47	Efectinion	Archaeological	Fosturo	Conoral view of		_	Digital	17/07/2017	MSLypes	Gwynedd	
02552_47	Power	Archideological	10	nowerstation		-	Digital	1//0//2017	IVI.J.LyTTES	Archaeological	
	Station	assessment	10	powerstation			Filotograph			Truct	
	cable									TUSL	
	route										
62532 48	Ffestiniog	Archaeological	Feature	General view of		_	Digital	17/07/2017	MSIvnes	Gwynedd	
52552_40	Power	assessment	10	powerstation	141477		Photograph	1,0,72017	141.3.Lyric3	Archaeological	

File	Project		Area sub-		View		Туре		Originating	Originating	Plates
reference	name	Project phase	division	Description	from	Scales		Date	person	organisation	
	Station									Trust	
	cable										
	route										
G2532_49	Ffestiniog	Archaeological	Feature	General view of	SSE	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	
	Power	assessment	10	powerstation			Photograph			Archaeological	
	Station									Trust	
	cable										
	route										
G2532_50	Ffestiniog	Archaeological	Feature	General view of	SSE	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	
	Power	assessment	10	powerstation			Photograph			Archaeological	
	Station									Trust	
	cable										
02522 54	route		5		005		Distud	47/07/2047			22
G2532_51	Frestiniog	Archaeological	Feature	General shot of	SSE	-	Digital	1//0//201/	WI.S.Lynes	Gwynedd	33
	Power	assessment	10	carpark and			Photograph			Archaeological	
	Station			powerstation						Trust	
	cable										
62522 52	Efectinion	Archaeological	Fosturo	General shot of		_	Digital	17/07/2017	MSLypes	Gwwnedd	
02332_32	Power	assassment	10	buildings to be		-	Photograph	1//0//201/	IVI.J.Lyrres	Archaeological	
	Station	assessment	10	knocked down			rnotograph			Trust	
	cable			on nowerstation						must	
	route			site (Front)							
G2532 53	Ffestiniog	Archaeological	Feature	General shot of	ENE	-	Digital	17/07/2017	M.S.Lynes	Gwvnedd	34
	Power	assessment	10	buildings to be			Photograph			Archaeological	
	Station			knocked down			0 1			Trust	
	cable			on powerstation							
	route			site (Side shot							
				of both)							
G2532_54	Ffestiniog	Archaeological	Feature	General shot of	ENE	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	
	Power	assessment	10	buildings to be			Photograph			Archaeological	

File	Project		Area sub-		View		Туре		Originating	Originating	Plates
reference	name	Project phase	division	Description	from	Scales		Date	person	organisation	
	Station			knocked down						Trust	
	cable			on powerstation							
	route			site (Close-up)							
G2532_55	Ffestiniog	Archaeological	Feature	General shot of	SSE	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	
	Power	assessment	10	buildings to be			Photograph			Archaeological	
	Station			knocked down						Trust	
	cable			on powerstation							
	route			site (Side shot)							
G2532_56	Ffestiniog	Archaeological	Feature	Shot of storage	NNW	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	
	Power	assessment	10	yard next to			Photograph			Archaeological	
	Station			buildings						Trust	
	cable										
	route										
G2532_57	Ffestiniog	Archaeological	Feature	Shot of storage	WSW	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	
	Power	assessment	10	yard next to			Photograph			Archaeological	
	Station			buildings						Trust	
	cable										
	route										
G2532_58	Ffestiniog	Archaeological	Feature	General shot of	S	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	
	Power	assessment	10	carpark and			Photograph			Archaeological	
	Station			powerstation						Trust	
	cable										
	route										
G2532_59	Ffestiniog	Archaeological	Feature	General shot of	SSE	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	
	Power	assessment	10	carpark and			Photograph			Archaeological	
	Station			powerstation						Trust	
	cable										
	route										
G2532_60	Ffestiniog	Archaeological	Feature	General shot of	SSE	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	
	Power	assessment	10	main building			Photograph			Archaeological	
	Station			side on						Trust	

File	Project		Area sub-		View		Туре		Originating	Originating	Plates
reference	name	Project phase	division	Description	from	Scales		Date	person	organisation	
	cable										
	route										
G2532_61	Ffestiniog	Archaeological	Feature	General shot	SE	-	Digital	17/07/2017	M.S.Lynes	Gwynedd	
	Power	assessment	10	across carpark			Photograph			Archaeological	
	Station			and main						Irust	
	cable			building							
C2522 C2	route	Anabaaalaaiaal		Chart of nouto	14/	11	Disital	07/00/2017	D. Even	Commended.	25
G2532_62	Flestiniog	Archaeological		Start of route	vv	TXTW	Digitai	07/08/2017	R. Evans	Gwynedd	35
	Power	assessment					Photograph			Truct	
	station			access track						TTUSL	
	route										
62532 63	Efectining	Archaeological		View of route	F	1v1m	Digital	07/08/2017	S Roilly	Gwynedd	
02332_03	Power	assessment		from neg 3	L.	IVIII	Photograph	0770072017	5. Kenty		
	Station	ussessment		showing access			1 HotoBraph			Trust	
	cable			road terrace						11000	
	route										
G2532_64	Ffestiniog	Archaeological		View of route	ENE	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	36
	Power	assessment		from peg 6			Photograph			Archaeological	
	Station			across boggy						Trust	
	cable			upland moor							
	route										
G2532_65	Ffestiniog	Archaeological		View of route as	NW	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	37
	Power	assessment		boggy ground			Photograph			Archaeological	
	Station			falls away to the						Trust	
	cable			SE							
	route					-					
G2532_66	Ffestiniog	Archaeological		View of route as	NW	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	
	Power	assessment		boggy ground			Photograph			Archaeological	
	Station			falls away to the						Irust	
	cable			SE, steeper							

File	Project		Area sub-		View		Туре		Originating	Originating	Plates
reference	name	Project phase	division	Description	from	Scales		Date	person	organisation	
	route			lower section							
G2532_67	Ffestiniog	Archaeological	Feature	View of small	NE	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	38
	Power	assessment	14	dug pit at base			Photograph			Archaeological	
	Station			of waterfall						Trust	
	cable			where							
	route			debouches over							
				rocks; cultural							
				water							
				management							
				activity							
G2532_68	Ffestiniog	Archaeological		View along	SSE	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	
	Power	assessment		cable route			Photograph			Archaeological	
	Station			from the						Trust	
	cable			junction of right							
	route			angle turn							
G2532_69	Ffestiniog	Archaeological		View along	NE	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	39
	Power	assessment		cable route			Photograph			Archaeological	
	Station			from the						Trust	
	cable			junction of right							
	route			angle turn							
G2532_70	Ffestiniog	Archaeological	Feature	View of	NNE	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	40
	Power	assessment	15	rectangular			Photograph			Archaeological	
	Station			structure [15]						Trust	
	cable			with entrance							
	route			on E side							
G2532_/1	Ffestiniog	Archaeological	Feature	View of	N	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	
	Power	assessment	15	rectangular			Photograph			Archaeological	
	Station			building [15]						Trust	
	cable										
02522 72	route		E	D'ale a l				07/00/2017	C. D. III		
G2532_72	Ffestiniog	Archaeological	Feature	Birds eye view	N	1x1m	Digital	0//08/2017	S. Reilly	Gwynedd	41

File	Project		Area sub-		View		Туре		Originating	Originating	Plates
reference	name	Project phase	division	Description	from	Scales		Date	person	organisation	
	Power	assessment	15	of rectangular			Photograph			Archaeological	
	Station			building [15]						Trust	
	cable										
	route										
G2532_73	Ffestiniog	Archaeological	Feature	Location shot of	N	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	
	Power	assessment	15	structure [15]			Photograph			Archaeological	
	Station									Trust	
	cable										
	route										
G2532_74	Ffestiniog	Archaeological	Feature	View of	NE	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	
	Power	assessment	15	structure [15]			Photograph			Archaeological	
	Station			entrance						Trust	
	cable										
	route										
G2532_75	Ffestiniog	Archaeological	Feature	Location shot of	SSE	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	42
	Power	assessment	15	structure [15],			Photograph			Archaeological	
	Station			in lee of rock						Trust	
	cable			outcrop							
	route										
G2532_76	Ffestiniog	Archaeological		General view	S	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	
	Power	assessment		along cable			Photograph			Archaeological	
	Station			trench route						Trust	
	cable										
	route										
G2532_77	Ffestiniog	Archaeological		View of route as	SW	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	43
	Power	assessment		it changes			Photograph			Archaeological	
	Station			direction to the						Trust	
	cable			NE							
	route										
G2532_78	Ffestiniog	Archaeological		General view of	W	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	
	Power	assessment		cable route			Photograph			Archaeological	

File	Project		Area sub-		View		Туре		Originating	Originating	Plates
reference	name	Project phase	division	Description	from	Scales		Date	person	organisation	
	Station			across boggy						Trust	
	cable			moorland							
	route										
G2532_79	Ffestiniog	Archaeological		General view	ESE	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	
	Power	assessment		across terraced			Photograph			Archaeological	
	Station			boggy ground						Trust	
	cable			looking up the							
	route			valley							
G2532_80	Ffestiniog	Archaeological		General view	SW	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	44
	Power	assessment		looking through			Photograph			Archaeological	
	Station			small valley on						Trust	
	cable			cable route							
	route			slope							
G2532_81	Ffestiniog	Archaeological		The Wrysgan	S	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	47
	Power	assessment		incline and			Photograph			Archaeological	
	Station			quarry in						Trust	
	cable			background							
	route										
G2532_82	Ffestiniog	Archaeological		General view	ENE	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	45
	Power	assessment		upslope on			Photograph			Archaeological	
	Station			lower terrace						Trust	
	cable										
	route										
G2532_83	Ffestiniog	Archaeological		View along	SE	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	
	Power	assessment		cable route			Photograph			Archaeological	
	Station			from the						Trust	
	cable			entrance off							
	route			metalled							
				trackway							
G2532_84	Ffestiniog	Archaeological		General view	ENE	1x1m	Digital	07/08/2017	S. Reilly	Gwynedd	46
	Power	assessment		from metalled			Photograph			Archaeological	

File	Project		Area sub-		View		Туре		Originating	Originating	Plates
reference	name	Project phase	division	Description	from	Scales		Date	person	organisation	
	Station			trackway of the						Trust	
	cable			rocky outcrops							
	route			and terracing							
				along the cable							
				route							

APPENDIX III

Definition of Terms

Categories of importance

The following categories were used to define the importance of the archaeological resource.

Category A - Sites of National Importance.

Scheduled Ancient Monuments, Listed Buildings of grade II* and above, as well as those that would meet the requirements for scheduling (ancient monuments) or listing (buildings) or both.

Sites that are scheduled or listed have legal protection, and it is recommended that all Category A sites remain preserved and protected *in situ*.

Category B - Sites of regional or county importance.

Grade II listed buildings and sites which would not fulfil the criteria for scheduling or listing, but which are nevertheless of particular importance within the region.

Preservation *in situ* is the preferred option for Category B sites, but if damage or destruction cannot be avoided, appropriate detailed recording might be an acceptable alternative.

Category C - Sites of district or local importance.

Sites which are not of sufficient importance to justify a recommendation for preservation if threatened.

Category C sites nevertheless merit adequate recording in advance of damage or destruction.

Category D - Minor and damaged sites.

Sites that are of minor importance or are so badly damaged that too little remains to justify their inclusion in a higher category.

For Category D sites, rapid recording, either in advance of or during destruction, should be sufficient.

Category E - Sites needing further investigation.

Sites, the importance of which is as yet undetermined and which will require further work before they can be allocated to categories A - D are temporarily placed in this category, with specific recommendations for further evaluation. In this report several sites of unknown potential have been allocated to this category.

Definition of Impact

The impact of the proposed development on each feature was estimated. The impact is defined as *none, slight, unlikely, likely, significant, considerable or unknown* as follows:

None:

There is no construction impact on this particular site.

Slight:

This has generally been used where the impact is marginal and would not by the nature of the site cause irreversible damage to the remainder of the feature, *e.g.* part of a trackway or field bank.

Unlikely:

This category indicates sites that fall within the band of interest but are unlikely to be directly affected. This includes sites such as standing and occupied buildings at the margins of the band of interest.

Likely:

Sites towards the edges of the study area, which may not be directly affected, but are likely to be damaged in some way by the construction activity.

Significant:

The partial removal of a site affecting its overall integrity. Sites falling into this category may be linear features such as roads or tramways where the removal of part of the feature could make overall interpretation problematic.

Considerable:

The total removal of a feature or its partial removal which would effectively destroy the remainder of the site.

Unknown:

This is used when the location of the site is unknown, but thought to be in the vicinity of the proposed works.

Definition of field evaluation techniques

Field evaluation is necessary to fully understand and assess most class E sites and to allow the evaluation of areas of land where there are no visible features but for which there is potential for sites to exist. Two principal techniques can be used for carrying out the evaluation: geophysical survey and trial trenching. Topographic survey may also be employed where sites are thought to survive as earthworks.

Geophysical survey most often involves the use of a magnetometer, which allows detection of some underground features, depending on their composition and the nature of the subsoil. Other forms of geophysical survey, including resistivity survey and ground penetrating radar might also be of use.

Trial trenching allows a representative sample of the development area to be investigated at depth. Trenches of appropriate size can also be excavated to evaluate category E sites. Trenching is typically carried out with trenches of between 20 to 30m length and 2m width. The topsoil is removed by machine and the resulting surface is cleaned by hand, recording features. Depending on the stratigraphy encountered the machine may be used to remove stratigraphy to deeper levels.

Definition of Mitigatory Recommendations

Below are the measures that may be recommended to mitigate the impact of the development on the archaeology.

None: No impact so no requirement for mitigatory measures.

Detailed recording:

This requires a full photographic record and measured survey prior to commencement of works.

Archaeological excavation may also be required depending on the particular feature and the extent and effect of the impact.

Basic recording:

Requiring a photographic record and full description prior to commencement of works.

Strip, Map and Sample:

The technique of Strip, Map and Sample involves the examination of machine-stripped surfaces to identify archaeological remains. The stripping is undertaken under the supervision of an archaeologist. Stripping and removal of the overburden is undertaken in such as manner as to ensure damage does not take place to surfaces that have already been stripped, nor to archaeological surfaces that have not yet been revealed.

Stripping is undertaken in as careful a manner as possible, to allow for good identification of archaeological features. A small team of archaeologists will be responsible for subsequently further cleaning defined areas where necessary. Complex sites which cannot be avoided will need to be fully excavated.

Watching brief:

This is a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive.

Avoidance:

Features, which may be affected directly by the scheme, or during the construction, should be avoided. Occasionally a minor change to the proposed plan is recommended, but more usually it refers to the need for care to be taken during construction to avoid accidental damage to a feature. This is often best achieved by clearly marking features prior to the start of work.

Reinstatement:

The feature should be re-instated with archaeological advice and supervision.



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