Dinorwig Power Station, Llanberis

Archaeological Watching Brief

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

Dinorwig Power Station, Llanberis

Archaeological Watching Brief

Prosiect Rhif / Project No. G2486

Adroddiad Rhif / Report No. 1388

Prepared for: First Hydro

May 2017

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Published by Gwynedd Archaeological Trust
Gwynedd Archaeological Trust
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Approvals Table				
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Revision History			
Rev No.	**Summary of Changes**	**Ref Section**	**Purpose of Issue**

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Figure 01 Site Location Map, based on 1:100000 Ordnance Survey County Series Map Sheet SH56SE. Scale 1:5,000 @ A4. Crown Copyright. All Rights Reserved. License number AL100020895.

Figure 02: Reproduction of 1st edition 25 inch Caernarvonshire County Series Ordnance Survey Map (1888-1889). Scale 1:5,000 @ A4.

Figure 03: Reproduction of 2nd edition 25 inch Caernarvonshire County Series Ordnance Survey Map (1900). Scale 1:5,000 @ A4.

Figure 04: Reproduction of 3rd edition 25 inch Caernarvonshire County Series Ordnance Survey Map (1918). Scale 1:5,000 @ A4.

NON-TECHNICAL SUMMARY

Gwynedd Archaeological Trust (GAT) was contracted by Atkins on the behalf of First Hydro to conduct an archaeological watching brief during clearance works at Dinorwig Power Station, Llanberis. The archaeological watching brief focused on the excavation work within the temporary compound and the borrow area, as well as recording and monitoring the condition of a circular blast shelter identified during the pre-work site assessment as being at risk from the clearance works.

The excavation work did not uncover any archaeological structures associated with the former slate quarry and the clearance work did not damage the circular blast shelter. The survey of the shelter revealed an engraved date within the lime mortar render of July 1952.

Contractwyd Ymddiriedolaeth Archeolegol Gwynedd (GAT) gan Atkins ar ran First Hydro i gynnal brîff gwylio archeolegol yn ystod gwaith clirio yng Ngorsaf Bŵer Dinorwig, Llanberis. Canolbwyntiodd y briff gwylio archeolegol ar y gwaith cloddio o fewn y compownd dros dro ac hefyd yr ardal benthyg, yn ogystal â chofnodi a monitro cyflwr lloches chwyth cylchol a nodwyd yn ystod yr asesiad safle cyn-waith a all fod mewn perygl oddi wrth y gwaith clirio.

Ni datgelodd y gwaith cloddio unrhyw strwythurau archeolegol a oedd yn gysylltiedig â'r hen chwarel lechi a ni amharodd y gwaith clirio ar y lloches chwyth. Datgelodd arolwg y lloches dyddiad Gorffennaf 1952 wedi ei engrafu yn y rendr calch.

1.0 INTRODUCTION

Gwynedd Archaeological Trust (GAT) was contracted by *Atkins* on the behalf of *First Hydro* to conduct an archaeological watching brief during clearance works at Dinorwig Power Station, Llanberis, (NGR SH59345996; Figure 01). Dinorwig Power Station is located within the former Dinorwig Slate Quarry (NPRN 40538), along the shore of the Llyn Peris Reservoir.

First Hydro wanted to undertake urgent safety work within the quarry to remove a section of cliff face at the 'Cockerel' as it was in danger of collapsing (Plate 01) further to rock falls in recent months. The work was undertaken as permitted development but the project was monitored by Gwynedd Archaeological Planning Service (GAPS). A project design, defining the scope and methodology for the archaeological watching brief, was submitted to GAPS by GAT in November 2016 (Appendix I).

The archaeological watching brief was completed in accordance with the following guidance:

- Standard and Guidance for an archaeological watching brief (Chartered Institute for Archaeologists, 2014);
- Management of Archaeological Projects (English Heritage, 1991);
- Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide (Historic England, 2015); and
- Guidelines for digital archives Royal Commission on Ancient and Historic Monuments of Wales 2015.

Gwynedd Archaeological Trust is a Chartered Institute for Archaeologists *Registered Archaeological Organisation*.

2.0 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Dinorwig Power Station is located within the grounds of the former Dinorwig Slate Quarry (NPRN 40538). Dinorwic Quarry includes the remains of the Braich levels of the Dinorwig Slate Quarry which operated from around 1770 to 1969. Many of the levels remain intact following the construction of Dinorwig Pumped Storage Power Station (NPRN 408885). The series of 'A' inclines from Gilfach Ddu (NPRN40559) and the Anglesey barracks have been scheduled and preserved.

The surviving remains of the site include four substantial counterbalanced inclines, complete with rails, sleepers and drumhouses, a weighbridge house, locomotive sheds, water tanks and an office and caban. There is also a blondin with winding house and an electric compressor house. There is a large slate mill with two integral engine houses and saws, catslide extension and smithing hearth.

In 1972 the site opened to the public as a museum. Equipment was collected from other slate quarries and parts of the site were restored. It is now the National Slate Museum and part of the National Museum of Wales.

There are no known or registered upstanding archaeological remains within the site boundary. The safety clearance work area was immediately adjacent to but did not physically affect two archaeological sites: NPRN 408885 Dinorwig pumped-storage hydro-electric power station and NPRN 40570 Victoria inclined plane (Figure 01). The scheduled monument CN 337 is located to the immediate northeast of the work area but it was not physically or visually impacted upon by the proposed safety clearance work.

A brief examination of the first to third edition 1 mile to 25 inch Ordnance Survey maps of Dinorwig Power Station (1889, 1900 and 1918 respectively), reveal general information about the historic development of the slate quarry at the turn of the 19th and 20th century. The first and second edition Ordnance Survey maps (Figures 02 and 03) are broadly similar, depicting intensive quarry working, with a series of incline planes and tunnels radiating out from what is now referred to as the 'Cockerel'. By the time of the third edition Ordnance Survey map (Figure 04), the 'Cockerel' is more clearly defined and the Victoria inclined plane is now evident, which indicates that it was constructed at some point between 1900 and 1918.

3.0 METHODOLOGY

3.1 Introduction

The definition of an archaeological watching brief is a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive.

An archaeological watching brief can divided into four categories:

- comprehensive (present during all ground disturbance)
- intensive (present during sensitive ground disturbance)
- intermittent (viewing the trenches after machining)
- partial (as and when seems appropriate).

A **partial** watching brief was required by GAPS via correspondence (email 03.11.16). The watching brief monitored the initial clearance works conducted by Jones Bros Ltd. with particular emphasis on:

- The slate waste temporarily removed from the borrow area to create temporary access inclines; and
- The re-fuelling area.

In addition due to the proximity and potential negative impact of the safety work on a circular blast shelter:

- A survey and record of the circular blast shelter adjacent to the east quarry hole was conducted due to proximity to access to the quarry hole for to tip the excess waste slate material and the collapsed rock from the ‘Cockerel’, and
- A targeted watching brief of the circular blast shelter was maintained for erection of protective bank and during the groundworks to ensure it was not damaged/ destroyed.

The timing of the GAT watching brief site visits were dictated by the groundworks programme. The groundworks commenced on 31st January and were completed by the week commencing 1st May 2017. The watching brief was conducted under the supervision of GAPS.

The archaeological watching brief was undertaken in accordance with:

- Standard and Guidance for an archaeological watching brief (Chartered Institute for Archaeologists, 2014).

3.2 Fieldwork Methodology

- The location of the circular blast shelter was surveyed in.

- The circular blast shelter was recorded through scaled photographs using a digital SLR (Nikon D3100) camera set to maximum resolution (4,608 ×3,072 14.2 effective megapixels) in RAW format and its current condition and make-up was documented using GAT pro-formas.

- All attendances and identified features were recorded using GAT watching brief pro-formas.

- Photographic images were taken using a digital SLR (Nikon D3100, D3000 and D40) camera set to maximum resolution (this ranges from 3008 x 2000 6.1 effective megapixels of the D40 to 4,608 × 3,072 14.2 effective megapixels of the D3100) in RAW format and has been converted to TIFF and JPEG format for archiving using Adobe Photoshop. In total 76 photographs were taken for this watching brief. A complete table of metadata with details of each photographic image taken, including descriptions and directions of shot, were produced using Microsoft Access (archive images G2486_001 to G2488_076; see Appendix II for a reproduction of the metadata).

4.0 RESULTS

4.1 Pre-commencement work site assessment

In advance of the commencement of the safety works, an archaeological assessment of the site was conducted on 31st October 2016 to gauge what (if any) buildings of the former Dinorwig slate quarry would be affected.

The site is accessed via an established trackway from a turn off the A4086, before the village of Nant Peris, which passes through the eastern edge of the former Dinorwig slate quarry. Located at the southwestern end of the site are the substantial remains of Victoria inclined plane (NPRN 40570) (Plate 02) alongside the remnants of a slate dry stone wall that extends northeast from the incline (Plate 03). The wall is in poor condition, with an approximate surviving height of 1.00m and width of 1.30m. Toward the northeastern limit of the wall there are the remnants of a small, rectangular stone and mortar building (Plate 04) that has an exterior length of 5.00m, width of 2.50m and surviving height of 1.50m.

The assessment did not identify any upstanding remains within the temporary compound, (Plate 05) borrow area (Plate 06) or re-fuelling depot. At the base of the southern face of the 'Cockerel' there is the rusted remains of an old cast iron quarry truck (Plate 07) and attached to the south face of unstable rock were two cast iron quarry ladders (Plate 08). The lower of the two ladders was no longer plane to the rock face but was more or less in its original position, while the upper of the two ladders was still fastened in place by a chain that was anchored by the remnants of a dry stone wall. According to Meirion Pritchard, a former Dinorwig quarry worker, he helped to set the ladder in place in January 1946 for the purpose of allowing the engineer responsible for safety to inspect the 'Cockerel' (Bryan Williams, First Hydro engineer, pers. comm.) These quarry features were documented as they were removed during the safety works but due to the rock face being unstable it was not safe to access this part of the 'Cockerel' to take measurements.

The circular blast shelter was noted during this assessment but was not recorded as at this stage of the pre-commencement works the rock fall material off the 'Cockerel' was to be tipped at the eastern edge of the site as opposed to the east quarry hole.

Aside from the quarry ladders and anchor wall it was determined that none of the other quarry features examined during the archaeological assessment would be physically or visually impacted by the safety works.

4.2 Archaeological watching brief of groundworks

The watching brief of the groundworks commenced on 31st January 2017 with limited excavation work conducted by Jones Bros Ltd. as the temporary compound was established.

Six trial holes were excavated by a 360° excavator for the project ecologist to check for the presence of slow worms and lizards (Plate 09). The trial holes were concentrated in areas of dense vegetation within the borrow area (the area of the site that was used to create temporary ramps to allow plant access to the 'Cockerel'). The trial holes had an average length of 2.50m and width of 2.00m and cleared the vegetation onto the surface of the underlying quarry slate waste. The area was subsequently inspected by the ecologist. No wildlife or archaeological remains were identified during this work.

The temporary compound was located along the southern edge of the site boundary, adjacent to old quarry slate faces (Plate 10), off the track that extended north – south through the work area. The re-fuelling depot was positioned at the southern edge of the compound. A rectangular trench that measured 9.00m long by 3.50m wide was excavated by a 360° excavator fitted with a toothless bucket for the re-fuelling depot (Plate 11). The trench was excavated through quarry slate waste to a depth of 0.40m, lined with heavy sheet plastic and subsequently backfilled.

At the northern end of the temporary compound a second trench was excavated with a length of 8.00m, width of 4.00m and depth of 0.50m for the toilet block tank (Plate 12). It was excavated by a 360° excavator fitted with a toothless bucket. The trench was excavated through quarry slate waste that was mixed with the occasional piece of scrap metal, wood and brick. No in situ structures or archaeological remains were noted in either trench.

By 7th February Jones Bros Ltd. had cleared the vegetation off the surface of the borrow area (Plate 13) and had commenced removing the quarry slate waste to form the temporary access incline (Plate 14) by the south face of the 'Cockerel'. The excavation of the quarry slate waste was focused along the western edge of the borrow area, alongside a former quarry track, overlooking the Llyn Peris reservoir. The material was excavated by a 360° excavator fitted with a large toothed digging bucket, loaded onto two Volvo dumper trucks and deposited at the base of the south face of the 'Cockerel'. The excavation had an approximate depth of 2.00m (Plate 15). The quarry slate waste within the borrow area was mixed with occasional blocks of reinforced concrete, timber and waste metal (girders and re-bar) (Plate 16). No in situ structures or archaeological remains were noted and the material mixed with the slate waste was indicative of 20th century activity.

By the third site visit on 20th February, the temporary access incline had been installed and work continued along the western and northern edge of the 'Cockerel' to create bunds on the lower ledges (Plate 17) to protect the hydroelectric power station below. The bunds consisted of quarry slate waste excavated from the borrow area. During the site visit work commenced on the rock fall clearance on the 'Cockerel'; this was undertaken by a 36 tonne 360° excavator (Plate 18). In addition, boulders had been placed to protect the circular blast shelter.

A fourth site visit was undertaken a month later (21st March) to document site progress and assess the condition of the circular blast shelter. The work to clear the rock fall material off the 'Cockerel' had been completed and an upper bund, consisting of quarry slate waste, had been constructed (Plate 19). This work had removed the two cast iron quarry ladders secured to the rock face by a cast iron chain attached to a dry-stone wall built on the edge of the ledge. In addition, Jones Bros Ltd. were in the process of breaking up boulders (Plate 20) following a minor blast to remove unsafe rock face along the north western face of the 'Cockerel'.

The fifth and last site visit was conducted on 10th May once the groundworks had been completed. The borrow area had been completely reinstated along with the vegetation that had been removed in advance of the works (Plate 21). On the 'Cockerel' the rock fall material had been removed, along with the unsafe rock face. In addition bunds comprised of quarry slate waste had been created along the edge of the rock face ledges in the event of additional rock falls. Since the last visit additional waste material from the 'Cockerel' had been deposited in the east quarry hole; this material would appear to have been tipped directly into the quarry hole (Plate 22) from the level of the borrow area rather than being transported along the track past the circular blast shelter. This has not had a negative impact physically or visibly on the surrounding quarry works and is only visible from a limited area at the eastern side of the old quarry.

4.3 Circular Blast Shelter

Due to the proximity and potential negative impact of the safety work on a circular blast shelter identified during the initial site inspection in October 2016, the structure was recorded (as outlined in section 3.2) and incorporated within the archaeological watching brief.

The circular blast shelter is located to the east of the 'Cockerel', at the base of a vertical slate quarry face and immediately adjacent to a quarry track (Plate 23) and the east quarry hole. In advance of the rock fall clearance from the 'Cockerel' and deposition of this material into the east quarry hole the shelter was surveyed in, photographed and recorded on GAT watching brief pro-formas.

The circular blast shelter is of roughly coursed dry stone build, comprised of roughly dressed angular slate blocks of various lengths, with a corbelled roof (Plate 24). The wall of the shelter had an average height of 1.62m with the corbelled roof being approximately 0.62m high; combined height of 2.24m. It has an internal circumference of 1.85m and approximate external circumference of 3.90m and wall thickness of 1.36m. There is a single narrow (1.00m) entrance on the west face. The interior of the blast shelter, including the entrance, was lined by a fine, coarse light greyish white lime mortar that has an engraved date (*July 1952*) on the eastern wall (Plate 25), opposite the entrance. The ceiling of the shelter consists of seven lengths of timber (Plate 26), most of which still retained bark, whereas the ceiling of the entrance comprises of nine narrow steel bars (Plate 27). This is a well-built structure designed to protect the quarry workers during blasting of quarry faces.

Subsequent to recording the circular blast shelter on 7th February but when the project archaeologist was not on site, Jones Bros Ltd. set eight large angular slate boulders along the eastern edge of the quarry track (Plate 28); the boulders were noted during the third site visit on 20th February. The boulders were set in place instead of a bank to protect the circular blast shelter from the Volvo dumper trucks as the rock fall material was cleared from the 'Cockerel' and deposited in the east quarry hole. The shelter was visited again on 21st March and during the last site visit on 10th May.

5.0 CONCLUSIONS

Gwynedd Archaeological Trust (GAT) was contracted by *Atkins* on the behalf of *First Hydro* to conduct an archaeological watching brief during clearance works at Dinorwig Power Station, Llanberis. The archaeological watching brief focused on the excavation work within the temporary compound and the borrow area, as well as recording and monitoring the condition of a circular blast shelter identified during the pre-work site assessment as being at risk from the clearance works.

The limited excavation works within the compound and the ecological trial holes did not uncover or disturb any in situ remains or structures associated with the slate quarry works of Dinorwig. While the work within the borrow area was more extensive it did not reveal or disturb archaeological structures associated with the slate quarry. The material that was excavated to create the access incline to the 'Cockerel' was quarry slate waste but given the presence of 20th century debris, such as steel beams and steel re-bars, it is highly likely that it was deposited in this part of the quarry during the construction work associated with the hydroelectric power station. The spoil from the excavations alongside the heaps of waste slate were tipped into the old or into the deeper parts of Llyn Peris (People's Collection Wales). In addition, on the Third Edition OS map there is a large quarry hole to the immediate south of the 'Cockerel' (Figure 04) which is evidently no longer present.

The circular blast shelter does not appear on any of the available OS maps and cannot be dated through map regression but the engraved date within the lime mortar render would place its construction quite succinctly to July 1952. The shelter was not damaged or altered during the safety works but the protective boulders have been left in situ which does alter the immediate setting of the shelter.

6.0 SOURCES CONSULTED

1. Chartered Institute for Archaeologists, 2014. Standard and Guidance for an archaeological watching brief;
2. First Hydro *Quarry main activity location plan;*
3. First edition 1 mile to 25 inch Ordnance Survey (1889);
4. Second edition 1 mile to 25 inch Ordnance Survey (1900);
5. Third edition 1 mile to 25 inch Ordnance Survey (1918);
6. https://www.peoplescollection.wales/story/378125;
7. Royal Commission on Ancient and Historic Monuments of Wales 2015 Guidelines for digital archives.

FIGURE 01

Site Location Map

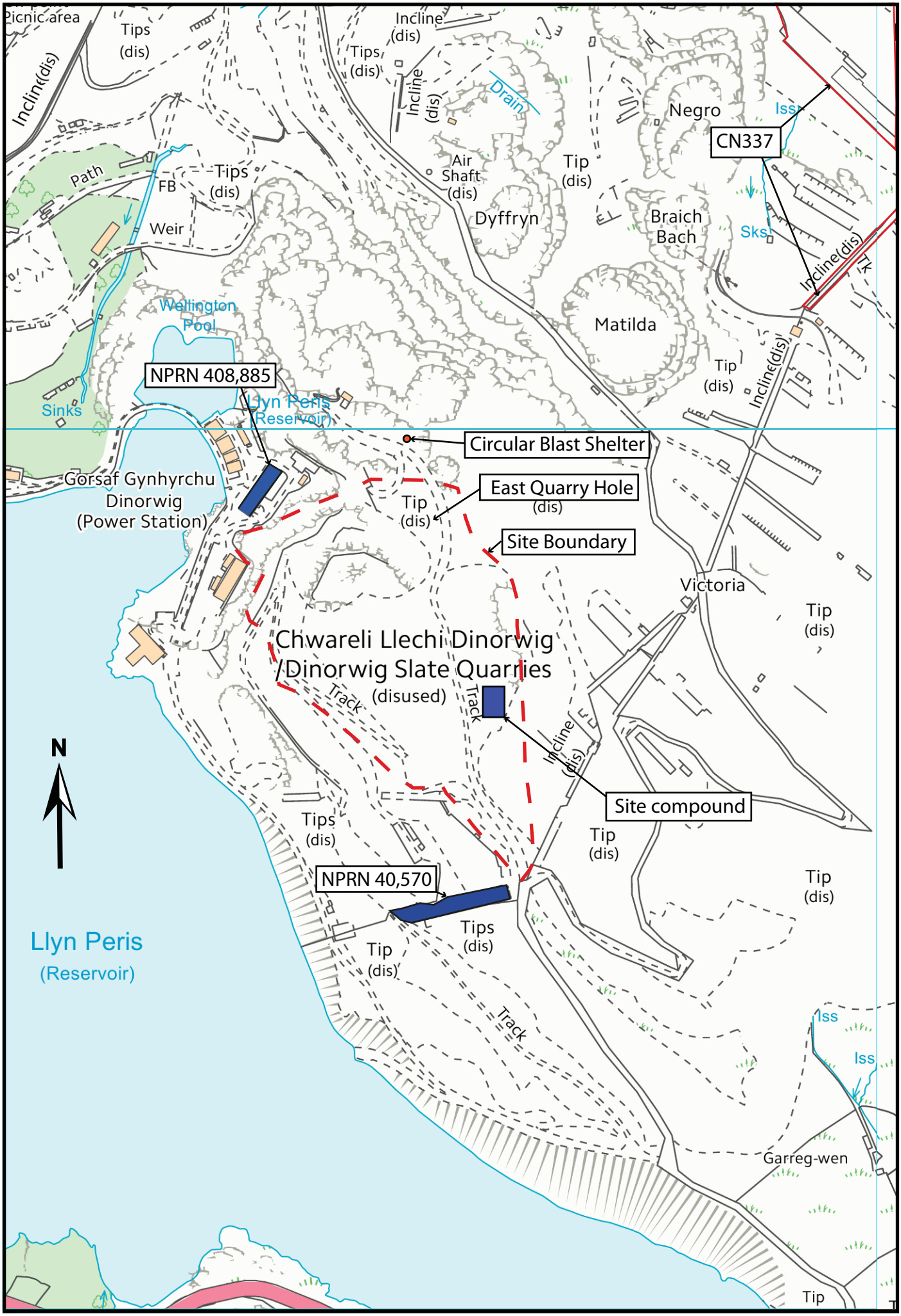

Figure 01 Site Location Map, based on 1:100000 Ordnance Survey County Series Map Sheet SH56SE. Scale 1:5,000 @ A4. Crown Copyright. All Rights Reserved. License number AL100020895.

FIGURE 02

Reproduction of 1st edition 25 inch Caernarvonshire County Series Ordnance Survey Map (1888-1889). Scale 1:5,000 @ A4.

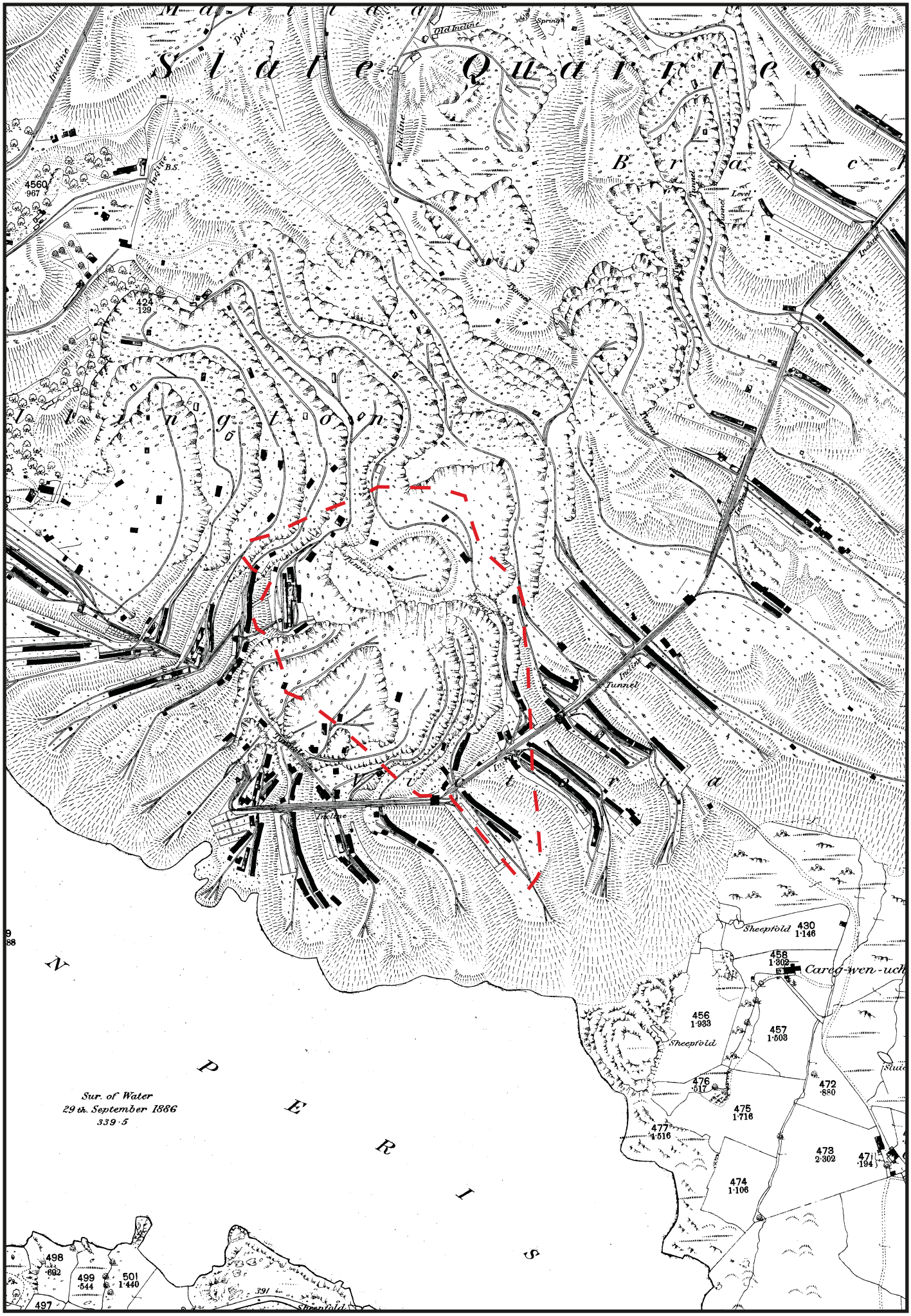

Figure 02: Reproduction of 1st edition 25 inch Caernarvonshire County Series Ordnance Survey Map (1888-1889). Scale 1:5,000 @ A4.

FIGURE 03

Reproduction of 2nd edition 25 inch Caernarvonshire County Series Ordnance Survey Map (1900). Scale 1:5,000 @ A4.

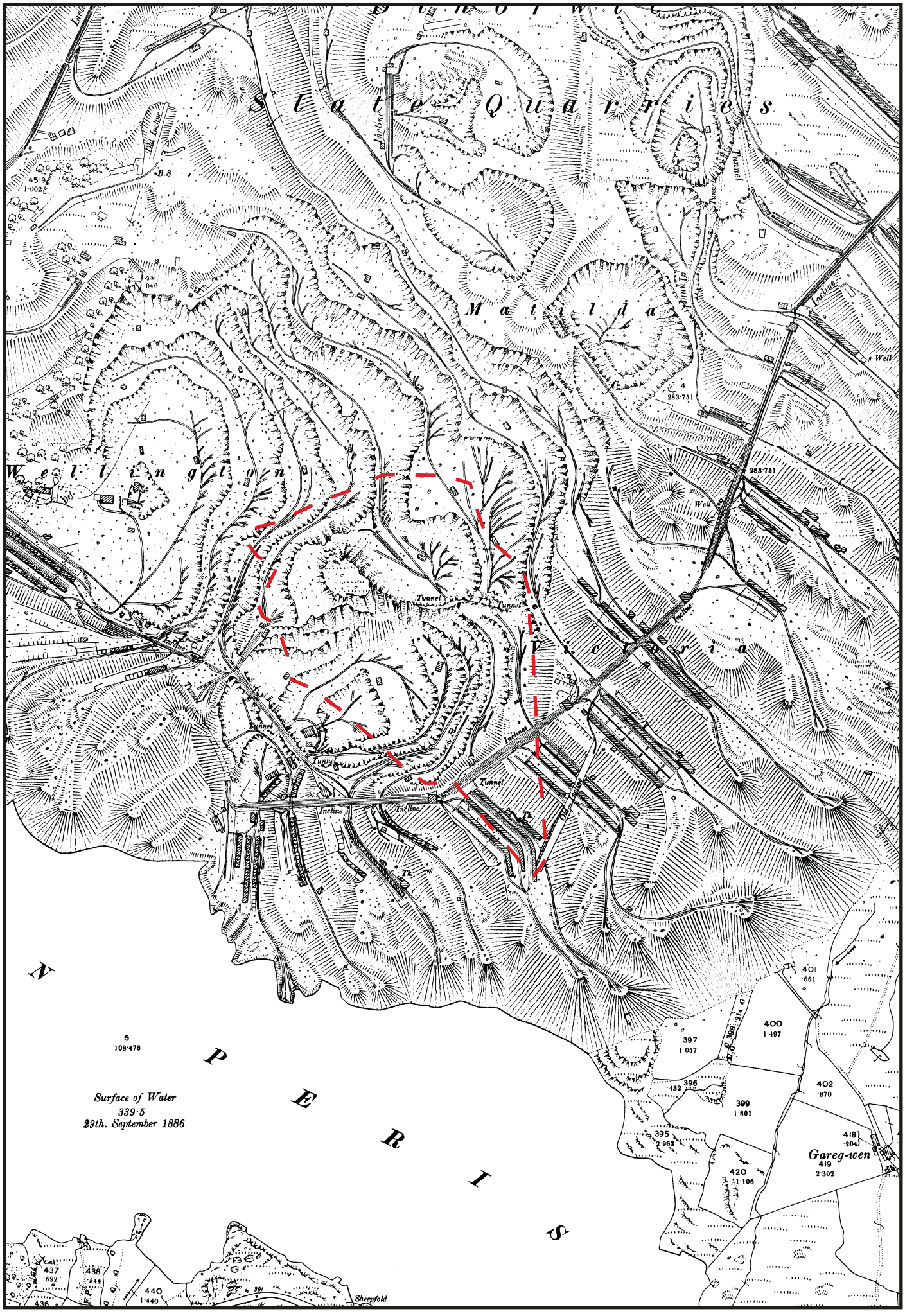

Figure 03: Reproduction of 2nd edition 25 inch Caernarvonshire County Series Ordnance Survey Map (1900). Scale 1:5,000 @ A4.

FIGURE 04

Reproduction of 3rd edition 25 inch Caernarvonshire County Series Ordnance Survey Map (1918). Scale 1:5,000 @ A4.

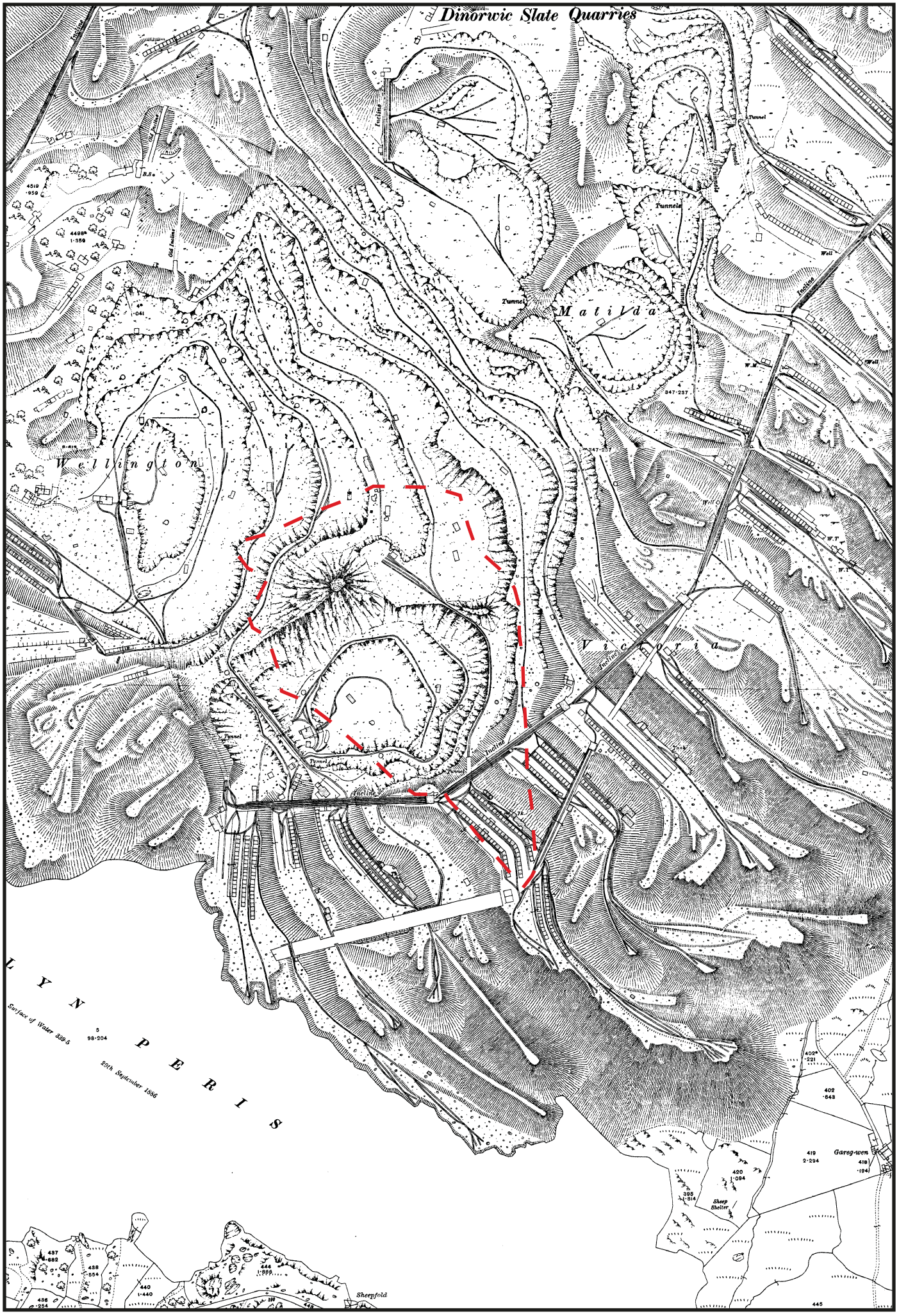

Figure 04: Reproduction of 3rd edition 25 inch Caernarvonshire County Series Ordnance Survey Map (1918). Scale 1:5,000 @ A4.

PLATES 01 - 28

Plate 01: Collapsing section of cliff face at the 'Cockerel', with metal ladders and dry-stone wall. View from the southwest (Photographic archive ref. G2486_025).

Plate 02: Victoria inclined plane (NPRN 40570). View from the northwest (Photographic archive ref G2486_010).

Plate 03: Remnants of slate dry stone wall adjacent to Victoria inclined plane. View from the northwest (Photographic archive ref. G2486_009).

Plate 04: Remnants of mortar and stone building set within wall. Scale 1.0m. View from the southeast (Photographic archive ref. G2486_008).

Plate 05: Location of temporary site compound. Scale 1.0m. View from the north (Photographic archive ref. G2486_019).

Plate 06: Borrow area prior to extraction of waste quarry slate. View from the south-southeast (Photographic archive ref. G2486_014).

Plate 07: Cast iron quarry truck adjacent to south face of the 'Cockerel'. Scale 1.0m. View from the north-northwest (Photographic archive ref. G2486_026).

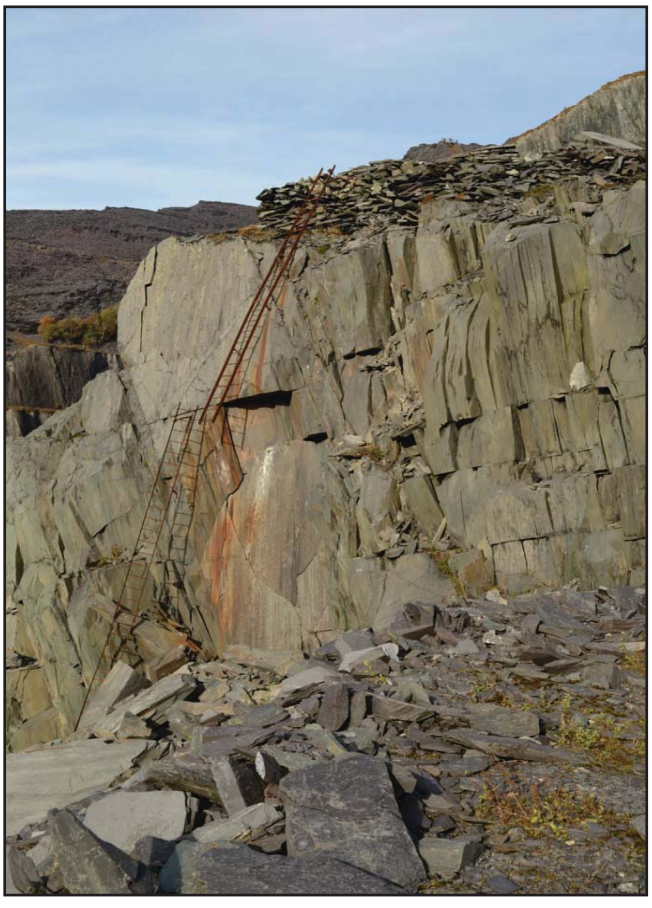

Plate 08: Unstable rock face with cast iron quarry ladders and dry stone wall. View from the southwest (Photographic archive ref. G2486_023).

Plate 09: Excavation of ecological trial hole. View from the northwest (Photographic archive ref. (G2486_033).

Plate 10: Location of Jones Bros Ltd compound. View from the southeast (Photographic archive ref. G2486_038).

Plate 11: Re-fuelling depot excavated. View from the northeast (Photographic archive ref. G2486_036).

Plate 12: Trench for toilet block tank excavated. View from the northwest (Photographic archive ref. G2486_037).

Plate 13: Vegetation cleared off borrow area. Scale 1.0m. View from the northwest (Photographic archive ref. G2486_041).

Plate 14: Access incline being constructed beside the 'Cockerel'. Scale 1.0m. View from the southeast (Photographic archive ref. G2486_042).

Plate 15: Excavation of the borrow area. Scale 1.0m. View from the southeast (Photographic archive ref. G2486_039).

Plate 16: Example of material mixed with quarry slate waste. Scale 1.0m. View from the northwest (Photographic archive ref. G2486_040).

Plate 17: Catchment area and bunds below the 'Cockerel'. View from the southeast (Photographic archive ref. G2486_059).

Plate 18: Start of rock fall clearance work. View from the southeast (Photographic archive ref. G2486_060).

Plate 19: Upper bund along edge of the 'Cockerel'. View from the south (Photographic archive ref. G2486_064).

Plate 20: Breaking up boulders from unstable rock face of the 'Cockerel'. View from the south (Photographic archive ref. G2486_065).

Plate 21: Reinstated borrow area after completion of groundworks. View from the south (Photographic archive ref. G2486_067).

Plate 22: Waste slate dumped into east quarry hole from the 'Cockerel'. View from the north-northeast (Photographic archive ref. G2486_076).

Plate 23: Location of circular blast shelter. View from the southeast (Photographic archive ref. G2486_043).

Plate 24: The circular blast shelter. Scale 1.0m. View from the west (Photographic archive ref. G2486_044).

Plate 25: Engraved date within lime mortar render of circular blast shelter. View from the west (Photographic archive ref. G2486_051).

Plate 26: Timber ceiling of circular blast shelter. View from the west (Photographic archive ref. G2486_052).

Plate 27: Ceiling of the entrance of the circular blast shelter. View from the west (Photographic archive ref. G2486_050).

Plate 28: Slate boulders to protect the circular blast shelter. Scale 1.0m. View from the west (Photograhic archive ref. G2486_057).

APPENDIX I

Copy of the Gwynedd Archaeological Trust project design

DINORWIG POWER STATION (G2486)

PROJECT DESIGN FOR ARCHAEOLOGICAL WATCHING BRIEF

Prepared for

FIRST HYDRO

November 2016

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

Approvals Table				
	Role	**Printed Name**	**Signature**	**Date**
Originated by	Document Author			
Reviewed by	Document Reviewer			
Approved by	Principal Archaeologist			

Revision History			
Rev No.	**Summary of Changes**	**Ref Section**	**Purpose of Issue**
1	Included additional points on Health and Safety constraints on recording of features and a contingency measure to use a drone to help mitigate for said constraints, if required. More emphasis on the site being a slate quarry of 19th/20th century date and recovered artefacts are likely to date from this period and may require more attention.	3.2 Fieldwork methodology 3.5 Artefacts	Requested by GAPS
2	Changes to the location of the proposed tipping area and updated plans from First Hydro. Plus additional work to record a circular blast shelter which could be negatively impacted upon.	3.2 3.7 Removed: Plate 05 and Figure 06. Figures 01 and 05 updated.	To accommodate changes proposed by First Hydro.

Dinorwig Power Station, Llanberis

PROJECT SPECIFICATION FOR ARCHAEOLOGICAL WATCHING BRIEF

Prepared for *First Hydro*, November 2016

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FIGURE 04 26
Reproduction of 3rd edition 25 inch Caernarvonshire County Series Ordnance Survey Map (1918). Scale 1:5,000 @ A4 26
FIGURE 05 27

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1.0 INTRODUCTION

Gwynedd Archaeological Trust (GAT) has been asked by *First Hydro* to prepare a project design to undertake an archaeological watching brief at Dinorwig Power Station, Llanberis, (NGR SH59345996; Figure 01), further to conducting a walkover survey and feedback from Gwynedd Archaeological Planning Service (GAPS). Dinorwig Power Station is located within the former Dinorwig Slate Quarry (NPRN 40538), along the shore of the Llyn Peris Reservoir.

First Hydro proposes to undertake safety work within the quarry to remove a section of cliff face at the 'Cockrell' as it is in danger of collapsing (Plate 01). The work will be undertaken as permitted development but GAPS will be provided with a copy of this archaeological project design and will be contacted well in advance of the archaeological watching brief.

The archaeological watching brief will be completed in accordance with the following guidance:

- Standard and Guidance for an archaeological watching brief (Chartered Institute for Archaeologists, 2014);
- Management of Archaeological Projects (English Heritage, 1991);
- Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide (Historic England, 2015); and
- Guidelines for digital archives Royal Commission on Ancient and Historic Monuments of Wales 2015.

Gwynedd Archaeological Trust is a Chartered Institute for Archaeologists *Registered Archaeological Organisation*.

2.0 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Dinorwig Power Station is located within the grounds of the former Dinorwig Slate Quarry (NPRN 40538). Dinorwic Quarry includes the remains of the Braich levels of the Dinorwig Slate Quarry which operated from around 1770 to 1969. Many of the levels remain intact following the construction of Dinorwig Pumped Storage Power Station (NPRN 408885). The series of 'A' inclines from Gilfach Ddu (NPRN40559) and the Anglesey barracks have been scheduled and preserved.

The surviving remains of the site include four substantial counterbalanced inclines, complete with rails, sleepers and drumhouses, a weighbridge house, locomotive sheds, water tanks and an office and caban. There is also a blondin with winding house and an electric compressor house. There is a large slate mill with two integral engine houses and saws, catslide extension and smithing hearth.

In 1972 the site opened to the public as a museum. Equipment was collected from other slate quarries and parts of the site were restored. It is now the National Slate Museum and part of the National Museum of Wales.

There are no known or registered upstanding archaeological remains within the site boundary. The proposed safety work area though will be immediately adjacent to but should not directly affect two archaeological sites: NPRN 408885 Dinorwig pumped-storage hydro-electric power station (Figure 01) and NPRN 40570 Victoria inclined plane (Plate 02). The scheduled monument CN 337 is located to the immediate northeast of the work area but it should not be physically or visually impacted upon by the proposed safety work.

A brief examination of the first to third edition 1 mile to 25 inch Ordnance Survey maps of Dinorwig Power Station (1889, 1900 and 1918 respectively), reveal general information about the historic development of the slate quarry at the turn of the 19th and 20th century. The first and second edition Ordnance Survey maps (Figures 02 and 03) are broadly similar, depicting intensive quarry working, with a series of incline planes and tunnels radiating out from what is now referred to as the 'Cockrell'. By the time of the third Ordnance Survey map (Figure 04), the 'Cockrell' is more clearly defined and the Victoria inclined plane is now evident, which indicates that it was constructed at some point between 1900 and 1918.

3.0 METHODOLOGY

3.1 Introduction

The definition of an archaeological watching brief is a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive.

An archaeological watching brief can divided into four categories:

- comprehensive (present during all ground disturbance)
- intensive (present during sensitive ground disturbance)
- intermittent (viewing the trenches after machining)
- partial (as and when seems appropriate).

A **partial** watching brief is proposed for the safety works after correspondence with GAPS (email 03.11.16). The watching brief will monitor the initial clearance works within the site boundary (Figure 05), in particular:

- The source of slate waste to be used to create temporary access inclines (Plate 03); and
- The proposed re-fuelling area (Plate 04).

In addition due to the proximity and potential negative impact of the safety work on a circular blast shelter:

- Survey and record a circular blast shelter adjacent to the East Quarry Hole due to proximity to access to the quarry hole for to tip the excess waste slate material and the collapsed rock from the Cockrell; and
- Maintain a targeted watching brief of the circular blast shelter for erection of protective bank and during the ground works to ensure it is not damaged/ destroyed.

The timing of the GAT watching brief site visits will be dictated by the ground works programme. At present First Hydro intend to commence the safety works on week commencing 9th January 2017. Once a more concise programme has been installed this will be incorporated within the project design and the information will be shared with GAPS to allow for curatorial archaeological site visits, if required.

The archaeological watching brief will be undertaken in accordance with:

- Standard and Guidance for an archaeological watching brief (Chartered Institute for Archaeologists, 2014).

3.2 Fieldwork Methodology

- The location of the circular blast shelter will be surveyed in with a *Trimble* R8 GPS unit.

- The circular blast shelter will be recorded through scaled photographs using a digital SLR (Nikon D3100) camera set to maximum resolution (4,608 ×3,072 14.2 effective megapixels)) in RAW format and its current condition and make-up will be documented using GAT pro-formas.

- All attendances and identified features will be recorded using GAT watching brief pro-formas (Appendix I).

- Photographic images will be taken using a digital SLR (Nikon D3100) camera set to maximum resolution (4,608 ×3,072 14.2 effective megapixels)) in RAW format and will be converted to TIFF and JPEG format for archiving using Adobe Photoshop; a photographic record will be maintained on site using GAT pro-formas (Appendix II) and digitised in *Microsoft Access* as part of the fieldwork archive and dissemination process.

- Any subsurface remains will be recorded photographically, with detailed notations and a measured survey.

- All archaeological features/deposits/structures encountered will be manually cleaned and examined to determine extent, function, date and relationship to adjacent features. If encountered, the following minimum sampling strategy will apply: 50% sample of each sub-circular feature, 10% sample of each linear feature. However, if discrete features are identified within the site boundary, these may be 100% excavated as will any exposed segments of linear features. If significant features are encountered, a greater proportion of excavation than the minimum sampling strategy may be required. The extent of sampling in this instance will be subject to agreement with GAPS.

- If required, sections will be drawn at a minimum 1:10 scale using GAT A4 or A2 pro-forma permatrace.

- All plans to be at a minimum 1:20 scale. Plans will be drawn on GAT A4 or A2 pro-forma permatrace. A plan will be completed detailing the location, orientation and

width of the drainage trench. The area within the site boundary will be located using a *Trimble* R8 GPS unit.

- The archaeological watching brief and any associated recording of existing or newly identified features will only be conducted if it is safe to do so, i.e. close examination of features identified along the section of cliff face at the 'Cockrell' will not be conducted by GAT archaeologists due to the high risk of collapsing rock.

- If significant archaeological features are identified during the watching brief that are located in unsafe locations a drone may be employed to record them. This will only be undertaken after consultation with First Hydro and GAPS.

Should dateable artefacts and/or ecofacts be recovered, an interim report will be submitted summarising the results, along with an assessment of potential for analysis specification (in line with the MAP2 process).

3.3 Ecofacts

Should any deposits deemed suitable for dating, they will be taken from sealed contexts, with bulk samples from ditches and pit fills proposed as not less than 10 litres from each context. The sampling strategy will be undertaken in accordance with the principles set out in *Environmental Archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation* (English Heritage, 2011). Recourse will be made to relevant specialists for palaeoenvironmental analysis and dating. Any required specialists will be consulted during the watching brief to advise GAT on a sampling strategy.

3.4 Human Remains

It is understood that while it is highly unlikely that human remains will be uncovered during the course of the safety works at Dinorwig Power Station, this section of the project design will be retained in the event this does occur. It is also GAT protocol to anticipate and prepare as much as is practical for potential scenarios that may arise during a watching brief.

Should any finds of human remains be encountered, they will be left *in-situ*, covered and protected, and both the coroner and the GAPS Archaeologist informed. If removal is necessary it will take place under appropriate regulations and with due regard for health and safety issues. In order to excavate human remains, a Ministry of Justice licence is required under Section *25* of the Burials Act 1857 for the removal of any body or remains of any body from any place of burial. This will be applied for should human remains need to be investigated or moved.

If human remains are recovered that are deemed suitable for further assessment/analysis, this will be completed in accordance with *Human Bones from Archaeological Sites Guidelines for producing assessment documents and analytical reports* (Historic England, 2004). This will include the appointment of a Project Osteologist, as recommended by the guidelines. This will be an external appointment using a non-GAT specialist. Based on their feedback during the course of the fieldwork, proposals for further assessment and/or analysis will be made in a further archaeological works design.

3.5 Artefacts

The proposed safety work will take place within the grounds of the former Dinorwig Slate Quarry that was active primarily during the 19th and 20th centuries. As such it is highly likely that artefacts retrieved during the watching brief will date from this period. Diagnostic artefacts recovered from features and/or phases of quarry activity will be retained for further examination and identification. Pottery sherds of 19th and 20th century date will be examined on site and the context from which they were retrieved noted but the sherds will not be retained. The artefacts will be treated according to guidelines issued by the UK Institute of Conservation (Watkinson and Neal 2001) in particular the advice provided within *First Aid for Finds* (Rescue 1999) and Historic England.

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

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

The National Museums and Galleries of Wales will decide whether they or any other museum may wish to acquire the object. If no museum wishes to acquire the object, then the Secretary of State will be able to disclaim it. When this happens, the coroner will notify the occupier and landowner that he intends to return the object to the finder after 28 days unless he receives no objection. If the coroner receives an objection, the find will be retained until the dispute has been settled.

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

3.6 Further Archaeological Works

The identification of significant archaeological features during the watching brief may necessitate the production of a new project specification and the submission of new cost estimates to the client.

The application of a further archaeological works design (FAWD) will be dependent on the initial identification, interpretation and examination of an archaeological feature and the identification of activity that cannot be addressed within the provisions of the current design, e.g., structures. The requirement for an FAWD will be determined in conjunction with GAPS through established communication lines and the monitoring process.

The FAWD will be instigated through a GAT produced document that will include:

- feature specific methodologies;
- ecofact specialist requirements, with detail of appropriate specialist analysis
- artefact specialist requirements, with detail of appropriate specialist analysis;
- timings, staffing and resourcing;
- additional costs.

The FAWD document will need to be approved by GAPS.

3.7 Monitoring Arrangements

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

Jenny Emmett jenny.emmett@heneb.co.uk | 01248 370926

It is anticipated that the archaeological watching brief will completed during January 2017. If the watching brief extends beyond January or the proposed commencement date changes GAPS will be informed of these changes.

3.8 Fieldwork Archiving

Following the completion of the fieldwork, a programme of field work archiving will be completed based on following task list;

1. Pro-formas: all cross referenced and complete;
2. Photographic Metadata: completed in *Microsoft Access* and cross-referenced with all pro-formas;
3. Sections: all cross referenced and complete;
4. Survey data: downloaded using a Computer Aided Design package;
5. Plans: all cross referenced and complete;
6. Artefacts (if relevant): quantified and identified; register completed;
7. Ecofacts (if relevant): quantified and register completed;
8. Context register (if relevant): quantified and register completed;

All data will be processed, final illustrations will be compiled and a report will be produced which will detail and synthesise the results.

4.0 PROCESSING DATA, ILLUSTRATION, REPORT AND ARCHIVING

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

1. Non-technical summary
2. Introduction
3. Aims and purpose
4. Specification
5. Methods and techniques, including details and location of project archive
6. Watching Brief Results
7. Summary and conclusions
8. List of sources consulted.
9. Appendix I – approved GAT project specification

Illustrations will include plans of the location, site plans and elevations. Historical maps, when appropriate and if copyright permissions allow, will be included. A draft copy of the report will be sent to the regional curatorial archaeologist (GAPS) and to the client prior to production of the final report.

5.0 DISSEMINATION AND ARCHIVING

A full archive including plans, photographs, written material and any other material resulting from the project will be prepared. The archaeological mitigation outlined in this project design will start week commencing 9th January 2017. A draft report will be submitted within one month of fieldwork completion (tbc); a final report will be submitted to the Historic Environment within six months of submitting the draft report (tbc).

The following dissemination will apply:

- A digital report will be provided to GAPS (draft report then final report).
- A paper report plus a digital report will be provided to the regional Historic Environment Record, Gwynedd Archaeological Trust; this will be submitted within six months of report completion (final report only).
- A digital report and archive (including photographic and drawn) data will be provided to Royal Commission on Ancient and Historic Monuments, Wales (final report only).
- A paper report(s) plus digital report(s) will be provided to the client (draft report then final report).
- Submission of digital information to the Royal Commission on the Ancient and Historical Monuments of Wales shall be undertaken in accordance with the *RCAHMW Guidelines for Digital Archives Version 1*. Digital information will include the photographic archive and associated metadata.
- Dependent on the results of the watching brief a summary note or a specific article will be included in the Council for British Archaeology Wales publication *Archaeology in Wales*. This shall be agreed with GAPS, and client in advance of publication along with all publication content. GAPS involvement in the project will be acknowledged therein.

6.0 HISTORIC ENVIRONMENT RECORD

In line with the regional Historic Environment Record (HER) requirements, the HER must be contacted at the onset of the project to ensure that any data arising is formatted in a manner suitable for accession to the HER. At the onset, the HER Enquiry Form provided by the HER, will be completed and submitted.

7.0 PERSONNEL

The project will be managed by John Roberts, Principal Archaeologist GAT Contracts Section and attended by a team of project archaeologists. The project archaeologist will be responsible for completing the watching brief, including all field management duties, e.g. liaison with GAPS and client. The project archaeologists will be responsible for completing day record sheets as well as all other on site pro-formas and the fieldwork archive itemised in para. 3.9. The project archaeologists will also be responsible for submitting a draft final report for project manager review and approval. The report will then be submitted as per the arrangements defined in para. 5.

8.0 HEALTH AND SAFETY

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

9.0 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 22/06/2017

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 22/06/2017

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 23/07/2017

10.0 SOURCES CONSULTED

1. Chartered Institute for Archaeologists, 2014. Standard and Guidance for an archaeological watching brief;
2. First Hydro *Quarry main activity location plan;*
3. First edition 1 mile to 25 inch Ordnance Survey (1889);
4. Second edition 1 mile to 25 inch Ordnance Survey (1900);
5. Third edition 1 mile to 25 inch Ordnance Survey (1918);
6. Royal Commission on Ancient and Historic Monuments of Wales 2015 Guidelines for digital archives.

FIGURE 01

Site Location Map

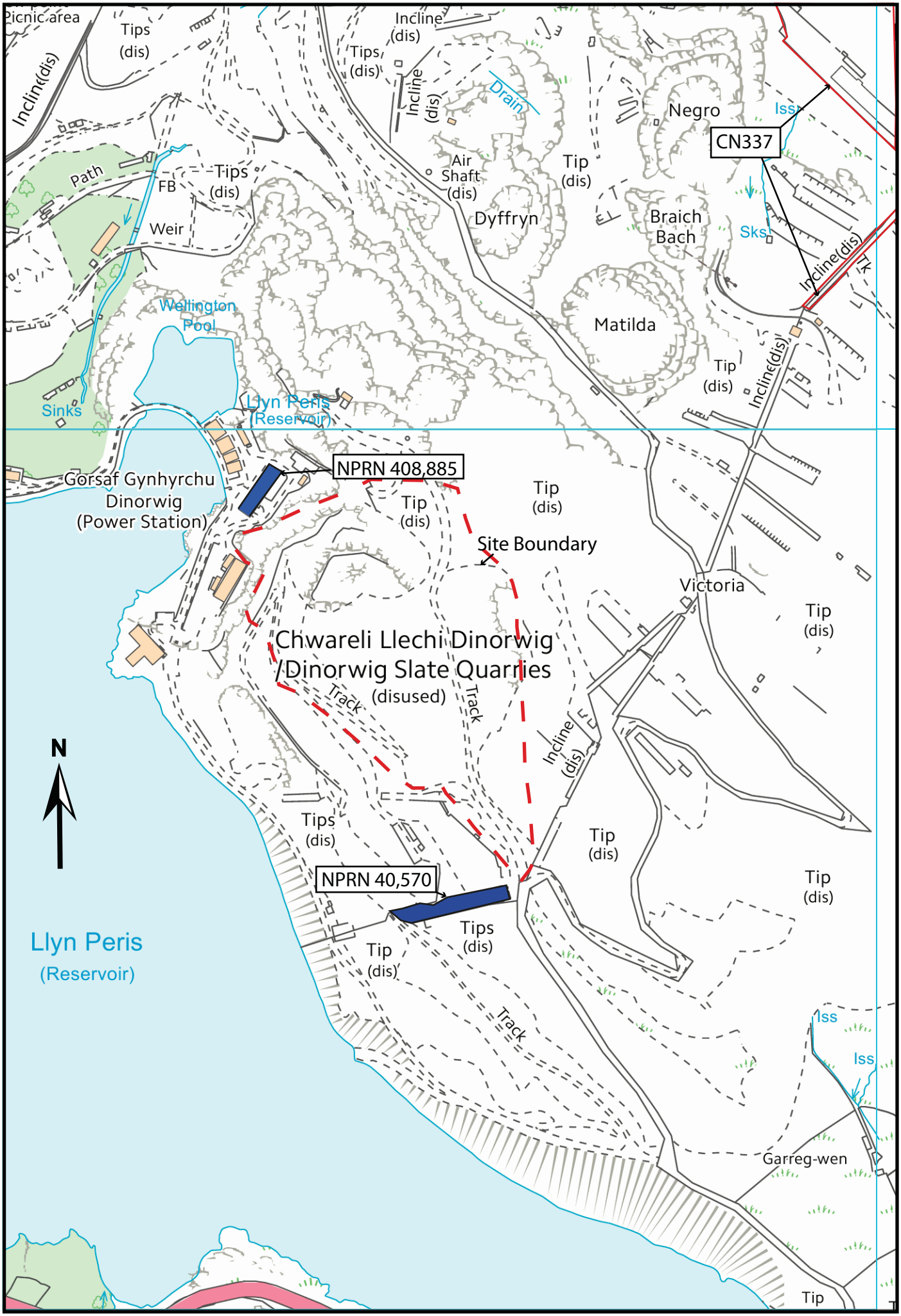

Figure 01 Site Location Map, based on 1:100000 Ordnance Survey County Series Map Sheet SH56SE. Scale 1:5,000 @ A4. Crown Copyright. All Rights Reserved. License number AL100020895.

FIGURE 02

Reproduction of 1st edition 25 inch Caernarvonshire County Series Ordnance Survey Map (1888-1889). Scale 1:5,000 @ A4.

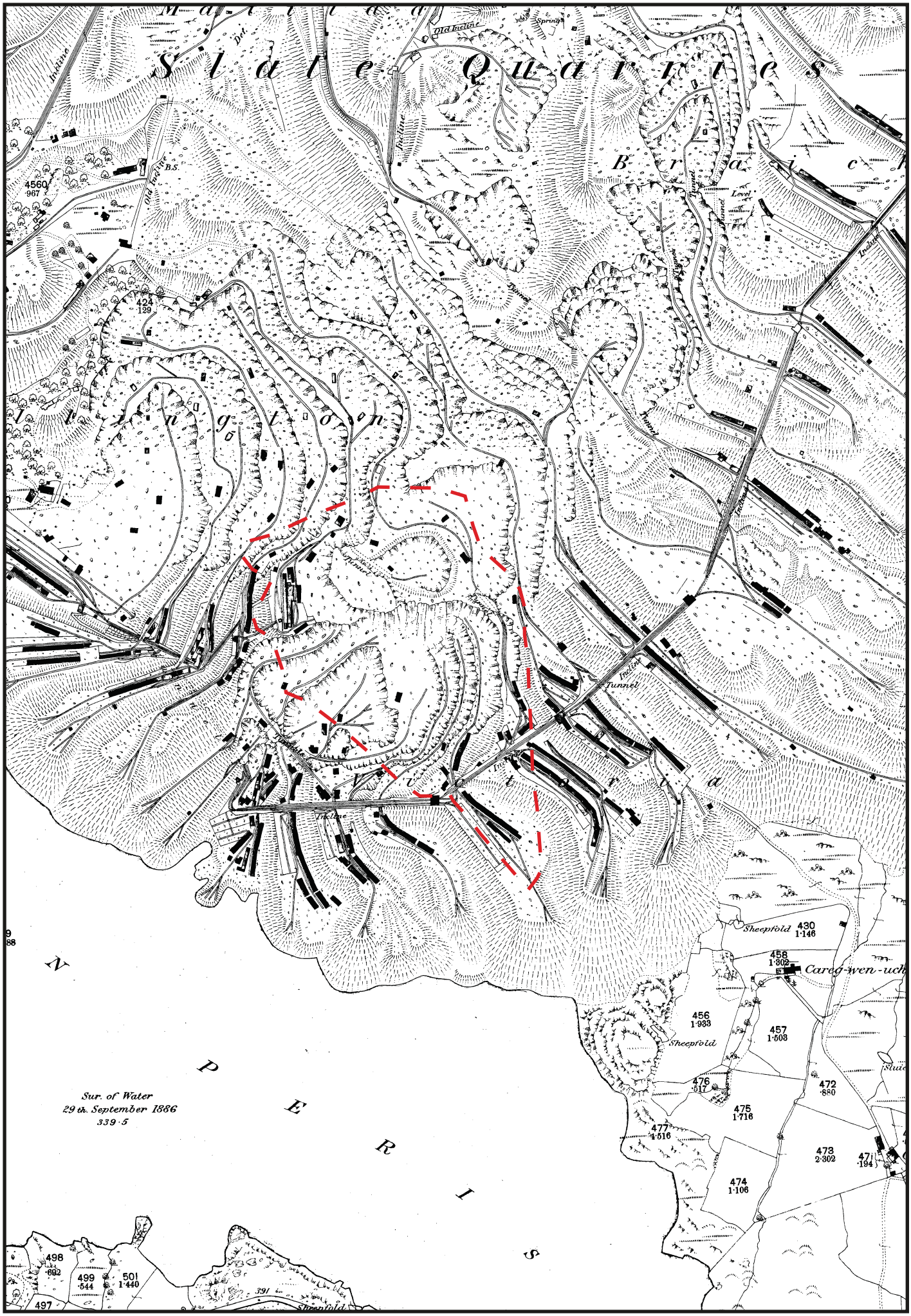

Figure 02: Reproduction of 1st edition 25 inch Caernarvonshire County Series Ordnance Survey Map (1888-1889). Scale 1:5,000 @ A4.

FIGURE 03

Reproduction of 2nd edition 25 inch Caernarvonshire County Series Ordnance Survey Map (1900). Scale 1:5,000 @ A4.

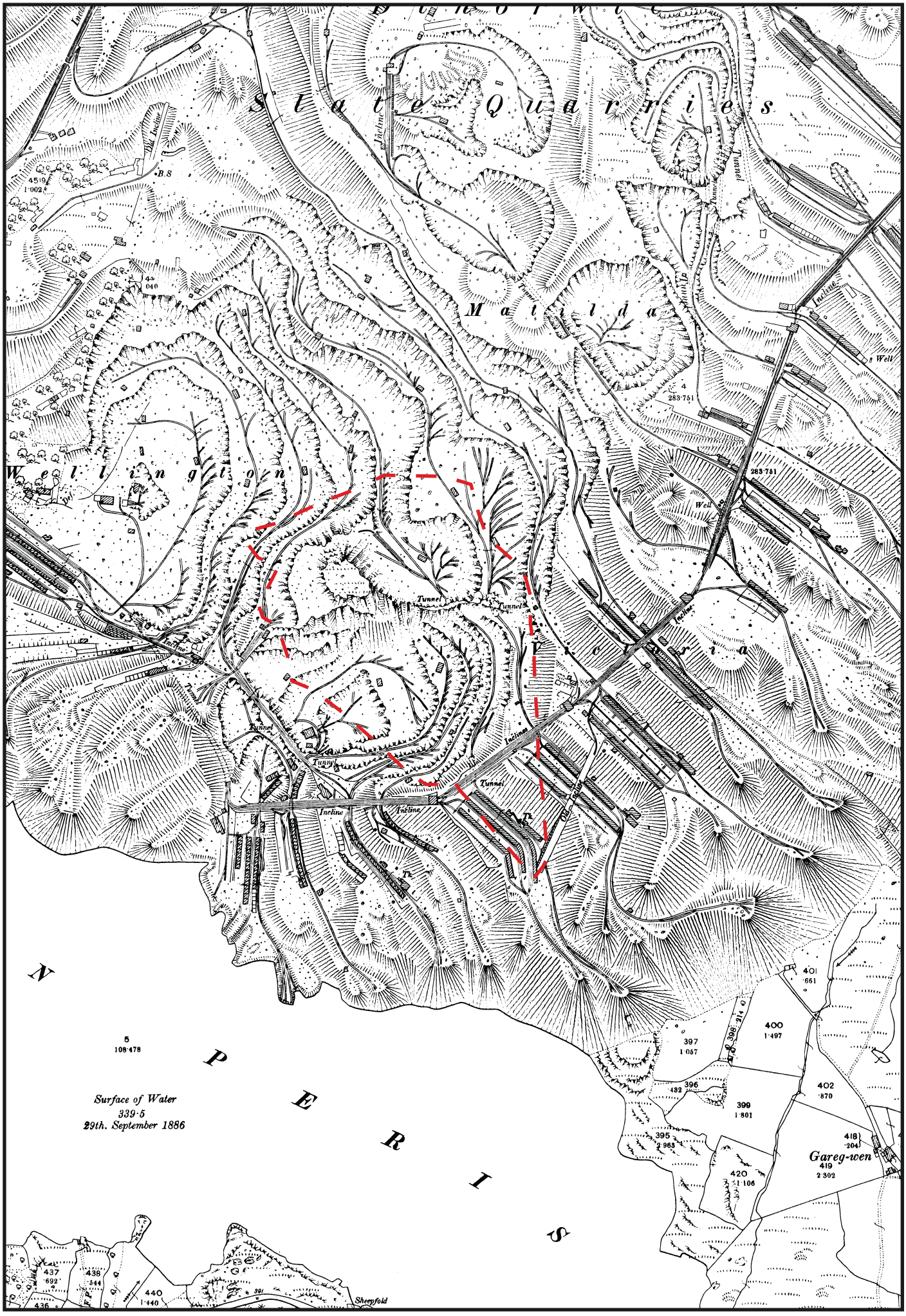

Figure 03: Reproduction of 2nd edition 25 inch Caernarvonshire County Series Ordnance Survey Map (1900). Scale 1:5,000 @ A4.

FIGURE 04

Reproduction of 3rd edition 25 inch Caernarvonshire County Series Ordnance Survey Map (1918). Scale 1:5,000 @ A4.

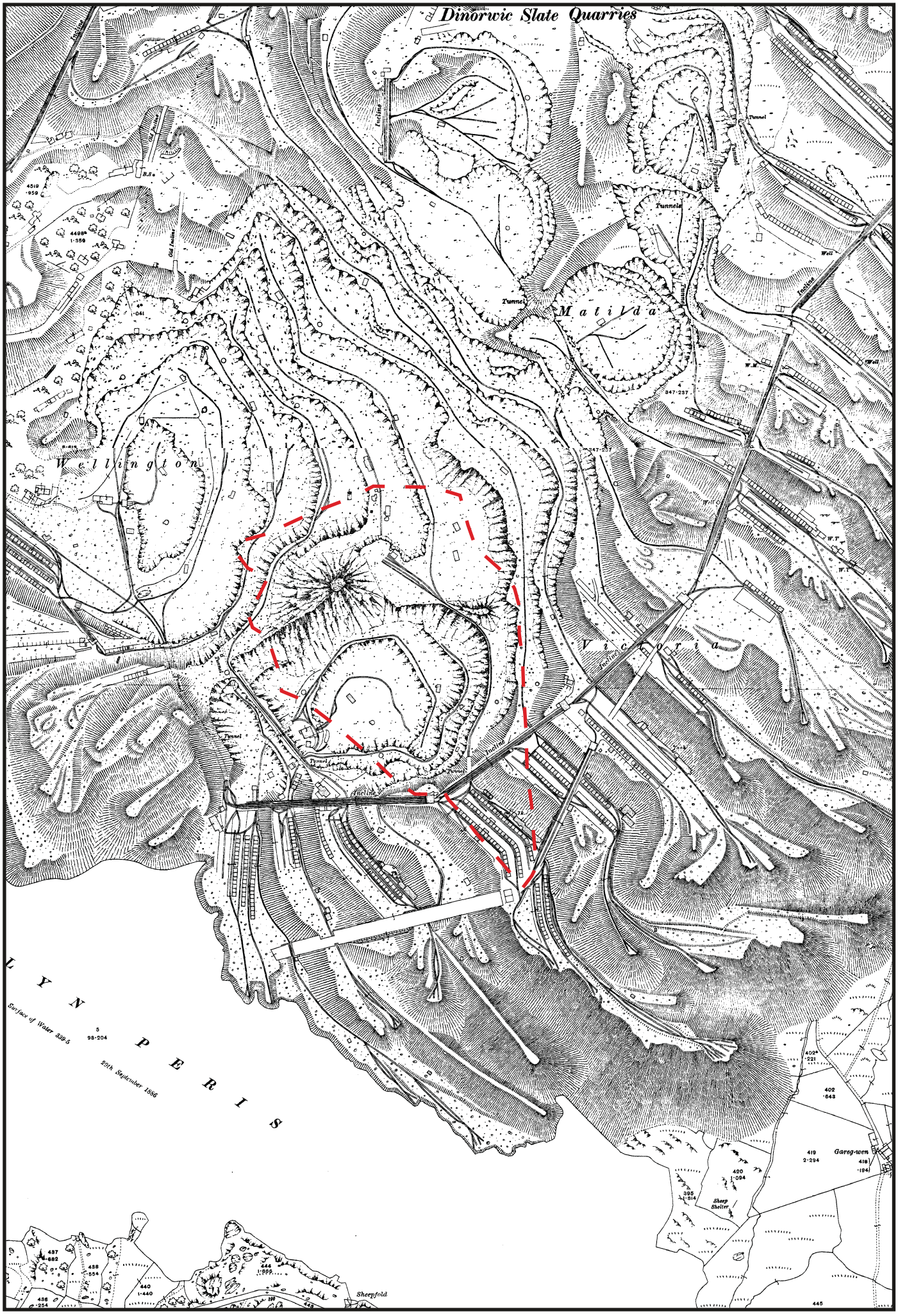

Figure 04: Reproduction of 3rd edition 25 inch Caernarvonshire County Series Ordnance Survey Map (1918). Scale 1:5,000 @ A4.

FIGURE 05

Reproduction First Hydro Company Drawing Number Figure 3

IF IN DOUBT ASK

Section Lines:

1 & 2 Borrow / Fill Areas
3 & 4 Eastern fill Area
5 to 7 Upper Ramp & Filling Behind

Reference Drawings:

See Figure 4 for Sections 1 to 7

Photographs:

P1 - Lower noses to be re-profiled (1,500m3) (Circled)
P2 - West facing unstable rock face to be re-profiled (1,000m3)
P3 - South facing unstable rock face to be re-profiled (150m3) (Circled)

- Rock Excavation Areas (pictured)
- Lower Bund
- Upper Bund
- Lower Ramp (Temporary)
- Lower Clearance Area
- Middle Clearance Area
- Upper Clearance Area
- Rockfall Catch Fencing

East Quarry Hole Filling

Tunnel 1 Portal

Upper Ramp and Filling Behind

Borrow Area

Geobrugg Rockfall Fence 500A-R 3.0m high

Temporary storage area for low level spoil in sterile area

First Hydro Company

Dinorwig Power Station
Llanberis Gwynedd
LL55 4TY

Tel: +44(0)1286-873390
Fax: +44(0)1286-873200
DinoCAD@engie.com

ISSUE	PLANNING	01
DRAWN	N.B	N.B
CHECKED	A.O	A.O
APPROVED	J.R.G	J.R.G
RECORDED		
FILMED		

Mod. description

FIGURE 05
Reproduction First Hydro Company Drawing Number Figure 3

Rockfall Earthworks - Proposed Permanent Features - Plan / Photos

Drawing Number	Sheet No	No of Sheets	
Figure 3	1	1	A1

SCALE: – 1: 750 | CONTRACT No.

PLATES 01-04

Plate 01: Collapsing section of cliff face at the 'Cockrell', with metal ladders and dry-stone wall. View from the southwest.

Plate 02: Victoria inclined plane (NPRN 40570). View from the northwest.

Plate 03: The proposed source of slate waste to be used to creat temporary access inclines. View from the southeast.

Plate 04: The proposed re-fuelling area, with dry-stone wall in the background. Scale 1x1m. View from the south.

APPENDIX I

Gwynedd Archaeological Trust photographic metadata pro-forma

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

Digital Photographic Record

Include main context numbers for each shot, drawing numbers for sections and any other relevant numbers for cross referencing.
Delete any unwanted photos **immediately** from the camera. Regularly upload photographs to computer.

Project Name:			Project Number:				
Photo No.	**Trench**	**Description**	**Contexts**	**Scales**	**View From**	**Initials**	**Date**

APPENDIX II

Gwynedd Archaeological Trust watching brief pro-forma

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

APPENDIX II

Gwynedd Archaeological Trust photographic metadata pro-forma

File reference	Project name	Project phase	PRN	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Plates
G2486_Dinorwig_001	Dinorwig	Assessment		Gated entrance into safety work area (SH59639) BNG 59538	N	1m	Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_002	Dinorwig	Assessment	NPRN 40570	Gated entrance with Victoria Inclined plane in the background	NE	1m	Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_003	Dinorwig	Assessment	NPRN 40570	Victoria incline plane; general shot	NE	1m	Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_004	Dinorwig	Assessment	NPRN 40570	View of the Victoria incline plane leading to Llyn Peris	E	1m	Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_005	Dinorwig	Assessment	NPRN 40570	Interior of the incline plane structure (SH59618) BNG 59525	SW	1m	Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_006	Dinorwig	Assessment		Photo of proposed refuelling area	S	1m	Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	

File reference	Project name	Project phase	PRN	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Plates
G2486_Dinorwig_007	Dinorwig	Assessment		Remnants of dry stoe slate wall that extends from incline plane	E	1m	Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_008	Dinorwig	Assessment		Remnants of small stone and mortar building, built into the wall SH59590 BNG59581	SE	1m	Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	Plate 4
G2486_Dinorwig_009	Dinorwig	Assessment	NPRN 40570	View of wall, incline plane and gated entrance	NW		Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	Plate 3
G2486_Dinorwig_010	Dinorwig	Assessment	NPRN 40570	View of Victoria incline plane	NW		Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	Plate 2
G2486_Dinorwig_011	Dinorwig	Assessment		Disused incline plane to the NE of the gated entrance	W	1m	Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	

File reference	Project name	Project phase	PRN	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Plates
G2486_Dinorwig_012	Dinorwig	Assessment		Shot of relatively level area and alternative location for refuelling zone	SE	1m	Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_013	Dinorwig	Assessment		View of the safety work area and the Cockerel in the background	SE		Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_014	Dinorwig	Assessment		View of source slate waste material for use in incline	SSE		Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	Plate 6
G2486_Dinorwig_015	Dinorwig	Assessment		View of source slate waste material for use in incline	W	1m	Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_016	Dinorwig	Assessment		View of make-up of slate waste	S	1m	Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_017	Dinorwig	Assessment		View of source slate waste material for use in incline	NW		Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	

File reference	Project name	Project phase	PRN	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Plates
G2486_Dinorwig_018	Dinorwig	Assessment		View of proposed tipping area (by the cliff)	W		Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_019	Dinorwig	Assessment		Closer view of proposed tipping area	N	1m	Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	Plate 5
G2486_Dinorwig_020	Dinorwig	Assessment		Northern face of the Cockerel, with stone walls on levels	N		Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_021	Dinorwig	Assessment		Lower bench levels and area for rock catch fence	N		Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_022	Dinorwig	Assessment		Lower bench levels and area for rock catch fence (close-up)	N		Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_023	Dinorwig	Assessment		Location of unstable rock with ladder and dry stone wall/anchor	SW		Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	Plate 8

File reference	Project name	Project phase	PRN	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Plates
G2486_Dinorwig_024	Dinorwig	Assessment		View of collapsed stone from Cockerel	SW		Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_025	Dinorwig	Assessment		Wide view of unstable rock area	SW		Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	Plate 1
G2486_Dinorwig_026	Dinorwig	Assessment		Ruted cast iron cart adjacent to Cockerel SH59445 BNG59800	NNW	1m	Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	Plate 7
G2486_Dinorwig_027	Dinorwig	Assessment		Shed along bench level of the Cockerel	SE	1m	Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_028	Dinorwig	Assessment		Shed along bench level of the Cockerel	E	1m	Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_029	Dinorwig	Assessment		Shed along bench level of the Cockerel	S	1m	Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_030	Dinorwig	Assessment		Levels of quarry and buildings opposite the Cockerel	S	-	Photograph	31/10/2016	Stuart Reilly	Gwynedd Archaeological Trust	

File reference	Project name	Project phase	PRN	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Plates
G2486_Dinorwig_031	Dinorwig	Watching Brief		Removal of vegetation in burrow area for ecologist	SW	-	Photograph	31/01/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_032	Dinorwig	Watching Brief		Close-up of test hole in burrow area	SW	-	Photograph	31/01/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_033	Dinorwig	Watching Brief		Test hole burrow area, adjacent to the Cockerel	NW	-	Photograph	31/01/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 9
G2486_Dinorwig_034	Dinorwig	Watching Brief		Test hole adjacent to the 'Cockerel' excavated	SE	-	Photograph	31/01/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_035	Dinorwig	Watching Brief		Excavation for re-fuelling area	NE	-	Photograph	31/01/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_036	Dinorwig	Watching Brief		Re-fuelling area excavated	NE	-	Photograph	31/01/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 11
G2486_Dinorwig_037	Dinorwig	Watching Brief		Hole for toilet tank excavated	NW	-	Photograph	31/01/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 12
G2486_Dinorwig_038	Dinorwig	Watching Brief		Location of contractor's compound	SE	-	Photograph	31/01/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 10

File reference	Project name	Project phase	PRN	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Plates
G2486_Dinorwig_039	Dinorwig	Watching Brief		General shot of excavation of the burrow area along SE edge	SE	1x1m	Photograph	07/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 15
G2486_Dinorwig_040	Dinorwig	Watching Brief		Close-up of material mixed in with slate waste	NW	1x1m	Photograph	07/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 16
G2486_Dinorwig_041	Dinorwig	Watching Brief		Shot of the area cleared of vegetation in burrow area	NW	1x1m	Photograph	07/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 13
G2486_Dinorwig_042	Dinorwig	Watching Brief		Shot of ramp and cleared area of vegetation against the 'Cockerel'	SE	1x1m	Photograph	07/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 14
G2486_Dinorwig_043	Dinorwig	Watching Brief		Location shot of blast shelter along quarry trackway	SE	-	Photograph	07/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 23
G2486_Dinorwig_044	Dinorwig	Watching Brief		The circular blast shelter and entrance	W	1x1m	Photograph	07/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 24

File reference	Project name	Project phase	PRN	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Plates
G2486_Dinorwig_045	Dinorwig	Watching Brief		The rear of the circular blast shelter	N	1x1m	Photograph	07/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_046	Dinorwig	Watching Brief		Side view of circular blast shelter	SSE	1x1m	Photograph	07/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_047	Dinorwig	Watching Brief		Circular blast shelter as viewed from the trackway	S	1x1m	Photograph	07/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_048	Dinorwig	Watching Brief		Circular blast shelter entrance and mortar lining	W	1x1m	Photograph	07/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_049	Dinorwig	Watching Brief		Exterior shot of circular blast shelter	W	1x1m	Photograph	07/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_050	Dinorwig	Watching Brief		The 'ceiling' of circular blast shelter entrance	W	-	Photograph	07/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 27
G2486_Dinorwig_051	Dinorwig	Watching Brief		Datum graffiti	W	-	Photograph	07/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 25
G2486_Dinorwig_052	Dinorwig	Watching Brief		The 'ceiling' of the circular blast shelter	W	-	Photograph	07/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 26

File reference	Project name	Project phase	PRN	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Plates
G2486_Dinorwig_053	Dinorwig	Watching Brief		Photo of terrace and walls along N/NW face of the 'Cockerel'	N	-	Photograph	07/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_054	Dinorwig	Watching Brief		Photo of lower terrace and Furst Hydro buildings	N	-	Photograph	07/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_055	Dinorwig	Watching Brief		General shot of NW/W face of the 'Cockerel'	N	-	Photograph	07/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_056	Dinorwig	Watching Brief		Location shot of circular blast shelter adjacent to bottom of the trackway	NW	-	Photograph	07/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_057	Dinorwig	Watching Brief		Photo of slate boulders set along quarry track to protect circular blast shelter	W	1x1m	Photograph	20/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 28

File reference	Project name	Project phase	PRN	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Plates
G2486_Dinorwig_058	Dinorwig	Watching Brief		Photo of slate boulders set along quarry track to protect circular blast shelter	SE	1x1m	Photograph	20/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_059	Dinorwig	Watching Brief		View of catchment area at base of the 'Cockerel'	SE	-	Photograph	20/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 17
G2486_Dinorwig_060	Dinorwig	Watching Brief		Shot of start of work to remove boulders from the 'Cockerel'	SE	-	Photograph	20/02/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 18
G2486_Dinorwig_061	Dinorwig	Watching Brief		Photo of circular blast shelter	W	1x1m	Photograph	21/03/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_062	Dinorwig	Watching Brief		Photo of circular blast shelter and adjacent track with protective boulders	W	1x1m	Photograph	21/03/2017	Stuart Reilly	Gwynedd Archaeological Trust	

File reference	Project name	Project phase	PRN	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Plates
G2486_Dinorwig_063	Dinorwig	Watching Brief		View of NW edge of the 'Cockerel' and new or widened track at base	NE	-	Photograph	21/03/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_064	Dinorwig	Watching Brief		View of S face of the 'Cockerel' minus ramp and rock debris	S	-	Photograph	21/03/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 19
G2486_Dinorwig_065	Dinorwig	Watching Brief		Work in progress shot (rock breaking) at W side of the 'Cockerel'	S	-	Photograph	21/03/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 20
G2486_Dinorwig_066	Dinorwig	Watching Brief		Freshly broken rock removed from the 'Cockerel' and placed in burrow area	N	1x1m	Photograph	21/03/2017	Stuart Reilly	Gwynedd Archaeological Trust	

File reference	Project name	Project phase	PRN	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Plates
G2486_Dinorwig_067	Dinorwig	Watching Brief		Completion of groundworks - general shot of the works area	S	-	Photograph	10/05/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 21
G2486_Dinorwig_068	Dinorwig	Watching Brief		Western side of reinstated burrow area and lane	SE	1x1m	Photograph	10/05/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_069	Dinorwig	Watching Brief		Reinstated burrow area and vegetation	SE	1x1m	Photograph	10/05/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_070	Dinorwig	Watching Brief		Northern edge of burrow area, with base of 'Cockerel' and edge protection in background	W	1x1m	Photograph	10/05/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_071	Dinorwig	Watching Brief		The 'Cockerel' after completion of groundworks	W	-	Photograph	10/05/2017	Stuart Reilly	Gwynedd Archaeological Trust	

File reference	Project name	Project phase	PRN	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Plates
G2486_Dinorwig_072	Dinorwig	Watching Brief		Close-up of south face of the 'Cockerel' after completion of groundworks	S	-	Photograph	10/05/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_073	Dinorwig	Watching Brief		Burrow area after completion of groundworks	N	-	Photograph	10/05/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_074	Dinorwig	Watching Brief		Close-up of circular blast shelter after completion of groundworks	NW	1x1m	Photograph	10/05/2017	Stuart Reilly	Gwynedd Archaeological Trust	
G2486_Dinorwig_075	Dinorwig	Watching Brief		Circular blast shelter, boulders and quarry road after completion of groundworks	NW	1x1m	Photograph	10/05/2017	Stuart Reilly	Gwynedd Archaeological Trust	

File reference	Project name	Project phase	PRN	Description	View from	Scale (s)	Type	Date	Originating person	Originating organisation	Plates
G2486_Dinorwig_076	Dinorwig	Watching Brief		Dump of waste slate moved from the 'Cockerel' to quarry hole on eastern side	NNE	-	Photograph	10/05/2017	Stuart Reilly	Gwynedd Archaeological Trust	Plate 22

Gwynedd Archaeological Trust
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