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INTRODUCTION

Scope of this Report

Overview of the Proposed Development

- 8.1 This report, prepared by Andrew Josephs Associates on behalf of Breendon Trading Ltd, presents the findings of a cultural heritage assessment for a proposed lateral extension to Penrhyn Quarry. The centre of the Proposed Extension Area (PEA) is at approximately NGR SH 6090 6380. The PEA comprises approximately 2.3ha (of which 1.3ha is proposed extraction) of rough grazing.
- 8.2 The working scheme is set out in detail in Chapter 3 of this Volume, together with working and restoration plans.

Geology, Soils and Land Use of the PEA

- 8.3 The upland environment of the PEA is dominated by boulders probably derived from glacial activity at the end of the last Ice Age, forming a terrace on which features of archaeological interest are located. This is orientated approximately north-east to south-west and to the north and west is unenclosed peat bog, while to the south and south east are rising mountain slopes. To the east and north east is the current quarry.
- 8.4 Soils are defined as very acid loamy upland soils with a wet peaty surface and locally poorly drained (Soilscapes). Drift geology is Till overlying bedrock of the Padarn Tuff Formation comprising interbedded Siltstone And Limestone (BGS).

Scope of Cultural Heritage

- 8.5 Cultural heritage is represented by a wide range of assets and features that result from past human use of the landscape. These include historic structures, many still in use, above ground and buried archaeological monuments and remains of all periods, artefacts of anthropological origin and evidence that can help reconstruct past human environments. In its broadest form cultural heritage is represented by the landscape and townscape itself.
- 8.6 The assessment considers both direct and indirect effects upon cultural heritage. Indirect effects can occur as a result of changes to the setting of a landscape or asset, whether permanent or temporary. This is particularly relevant to designated cultural heritage assets, such as World Heritage Sites, Scheduled Monuments, Listed Buildings, Conservation Areas, Registered Parks and Gardens and Registered Historic Landscapes.

Authorship

- 8.7 This Assessment and Heritage Statement has been written by Andrew Josephs, Ian Meadows and David Robertson of Andrew Josephs Associates (AJA), a consultancy specialising in archaeology and cultural heritage founded in 2002.

- 8.8 Andrew Josephs is Managing Director of AJA and has extensive experience of all periods and facets of cultural heritage, including the authorship of over 900 Heritage Statements. He was previously Principal Consultant (Director of Heritage and Archaeology) at AMEC (now Wood) and Wardell Armstrong, where he started in 1992, becoming of the UK's first consultants in the post-PPG16 era of developer-funded archaeology. Prior to 1992, he worked as a field-based archaeologist and researcher for universities and units in the UK, Europe and the USA. He graduated with a BA (Honours) in Archaeology and Environmental Studies in 1985 from the University of Wales Lampeter. He has a specific interest in medieval and industrial archaeology.
- 8.9 Ian Meadows, BA Archaeology and Geology, Dip.Mus, is an archaeologist with over 30 years' experience in a variety of professional areas. He was Senior Project Officer with Northamptonshire Archaeology (now MOLA) from 1992 until 2014 when he joined AJA. Ian is highly experienced project manager of large landscape projects such as long running quarries. Ian has a particular interest in the Roman period and is currently Director of the excavations at Irchester Roman town.
- 8.10 In addition to his fieldwork he is engaged in regular outreach sessions to both professional and amateur groups as part of his role dealing with both adults and children. He has been teaching archaeology and landscape history to adults and children since the late 1980's, previously being engaged as a tutor by Cambridge University, Anglia Ruskin University, Bath University and the WEA and feels it is important to disseminate the information derived from projects to a wider audience.
- 8.11 David Robertson has worked as a heritage consultant since August 2018, writing desk-based assessments, preparing Environment Statement chapters and providing advice on the historic environment implications of a broad range of developments. He currently works for the Forestry Commission. Prior to this he was Historic Environment Planning Officer for Norfolk County Council Historic Environment Service for 12 years and led on rural heritage for the Association of Local Government Archaeological Officers (from January 2017). He holds a BA in Geography and History from the University of Wales Aberystwyth and a MA in Archaeology from Reading University and is a full Member of the Chartered Institute for Archaeologists.

METHODOLOGY

Desk Based Research

- 8.12 In order to assess the effects of the potential scheme, cultural heritage information within and up to 3km from the PEA was examined. This was based upon topographical modelling and was considered an appropriate distance within which to assess archaeological potential and the effects upon designated heritage assets. This radius was agreed in consultations at the EIA scoping stage.
- 8.13 A variety of sources were consulted including the Gwynedd Historic Environment Record, Cadw's database for the locations of designated sites, Coflein (the online catalogue of archaeology, buildings, industrial and maritime heritage in Wales), reports of previous archaeological investigations, maps and readily available local history materials.
- 8.14 All work has been undertaken in accordance with *Standard and Guidance for Archaeological Desk-Based Assessment* (Chartered Institute for Archaeologists 2008, revised 2012).

Field-based research

- 8.15 Site visits to the PEA and its environs were undertaken on several occasions between 2017 and 2019 to assess whether any part of the PEA had already been damaged or disturbed by activities in the modern period and whether any aspects of specific archaeological interest could be identified. A photographic record of the current state and use of the land was taken.
- 8.16 Visits were made to designated cultural heritage receptors in the study area to assess indirect effects.
- 8.17 Staged field survey and evaluation was undertaken. This included walkover survey (GAT 2009), Stage 1 test pitting (GAT September 2017), geophysical survey (Tigergeo October 2017) and Stage 2 trenching (GAT February 2018) that verified the results of the geophysical survey.

Scoping and Consultations

- 8.18 In North Wales the mineral planning authority works across council areas and, as a result, Flintshire County Council provided a scoping opinion on 29 January 2019. In this Cadw, the Welsh Government's historic environment service, stated that scheduled monuments within 3km of The PEA should be identified and assessed in the Environmental Statement. They also advised that The PEA is within the Dyffryn Ogwen registered historic landscape and close to a Candidate World Heritage Site, both of which are material considerations. Gwynedd Archaeological Planning Service also provided a scoping letter. These are appended (**Appendix 8/1**).
- 8.19 Consultations were held with Neil Maylan, Senior Historic Environment Planning Officer, Cadw to agree the scope of the assessment of designated assets and landscapes, and throughout the course of the fieldwork with Jenny Emmett, Development Control Archaeologist GAPS. We are grateful for their advice.
- 8.20 The ASIDOHL2 assessment was reviewed by CADW prior to the writing of this report.

Assessment Methodology and Significance Criteria

- 8.21 In accordance with the EIA Regulations the significance of an impact or effect should be identified.
- 8.22 Four criteria have been considered in evaluating the significance of the residual effects of the proposed development, taking into account any proposed mitigation measures.

Type of Impact

- 8.23 Impacts may be positive, beneficial, negative, adverse, neutral (i.e. no discernible effect) or none. They may be permanent or temporary, of long, medium or short duration, direct or indirect. They may also be cumulative or combined with other impacts occurring in the vicinity.
- 8.24 Direct impacts have a physical effect upon an archaeological site, structure or cultural heritage asset. This may lead to the partial or total destruction of that asset.

8.25 Indirect impacts of development upon scheduled monuments, listed buildings, parks and gardens and other designated assets of the cultural heritage landscape are more difficult to assess. Consideration should include the context (or setting) of a cultural heritage asset (or place) and how we should assess its significance. Contextual relationships may be visual, but can also be, for example, historical, functional or intellectual.

Likelihood of the impact occurring

8.26 An assessment is made as to the likelihood of the identified impact occurring. Probability is considered as certain, likely, unlikely or not known.

Sensitivity

8.27 Three categories of sensitivity are identified: high, medium and low. These are expanded upon in **Table 8-1**, below.

Table 8-1
Definitions of Sensitivity

| Sensitivity | Definition |
|-------------|---|
| High | PEAs and settings of <i>national importance</i> . Scheduled Monuments. Registered Battlefields. Grade I and Grade II* Listed Buildings and Registered Historic Parks and Gardens. Registered Historic Landscapes. PEAs may also be discovered as a result of new research that are also of national importance and are candidates for scheduling. |
| Medium | PEAs and settings of <i>regional importance</i> . Archaeological sites and features that are not considered sufficiently important or well-preserved to be protected as Scheduled Monuments. Grade II Listed Buildings and Grade II Registered Historic Parks and Gardens. Conservation Areas. |
| Low | Archaeological sites and structures, and other components of the historic environment that contribute to the local landscape. Locally designated assets. |

Magnitude

8.28 The magnitude of change to a cultural heritage asset or landscape is considered in terms of its vulnerability, its current condition and the nature of the impact upon it. With respect to sub-surface archaeology, there may be a degree of uncertainty of the magnitude of change, and where this is the case it is noted. Magnitude is assessed as high, medium, small or none and the criteria used in this assessment are set out in **Table 8-2**, below.

Table 8-2
Criteria for Assessing Magnitude of Change

| Magnitude of Change | Description of Change |
|---------------------|---|
| High | Complete destruction of a well-preserved archaeological site, historic structure or element of the cultural heritage landscape Change to the setting of a cultural heritage asset such that our ability to understand the resource and its historical context is permanently changed |
| Medium | Destruction of an archaeological site or other cultural heritage asset already in degraded condition Change to the setting of a cultural heritage asset such that our ability to understand the resource and its historical context is partly or temporarily changed |
| Small | Destruction of an archaeological site or other cultural heritage asset already in highly degraded condition Change to the setting of a cultural heritage asset such that our ability to understand the resource and its historical context is slightly or temporarily changed |
| None | No physical effect upon an archaeological site or other asset of the cultural heritage landscape No discernible effect upon the setting of a cultural heritage asset, or our ability to understand the resource and its historical context |

Assessing Significance

8.29 The four criteria are considered together to reach a conclusion upon the significance of residual effects taking into account any mitigation measures. In accordance with the EIA Regulations these are quantified as significant, not significant or neutral (i.e. no change to the existing situation). They may be beneficial or adverse. In some cases it may not be possible to quantify the significance of an effect, for example due to a gap in information, and this is noted.

8.30 **Table 8-3** presents a matrix of the inter-relationship of sensitivity with magnitude.

Table 8-3
Inter-relationship of Sensitivity with Magnitude

| Magnitude → Sensitivity ↓ | High | Medium | Small | None |
|------------------------------|------------------------|------------------------|-----------------|---------|
| High | Significant | Moderately Significant | Not significant | Neutral |
| Medium | Moderately Significant | Not significant | Not significant | Neutral |
| Low | Not significant | Not significant | Not significant | Neutral |

Relevant Legislation, Policy and Guidance

8.31 The importance of cultural heritage is clearly recognised at a national level. Certain assets that are deemed to be of particular importance are given legal protection through the *Ancient Monuments and Archaeological Areas Act 1979* and (Scheduled Monuments), the *Planning (Listed Building and Conservation Areas) Act 1990* and *The Historic Environment (Wales) Act 2016* (Scheduled Monuments, historic parks and gardens, Listed Buildings, historic place names, historic environment records and the Advisory Panel for the Welsh Historic Environment).

- 8.32 Planning Policy Wales sets out the Welsh Governments' land-use planning policies (2021, edition 11). It is supplemented by a series of Technical Advice Notes, Welsh Government Circulars, policy clarification letters and regulations.
- 8.33 **Appendix 8/2** sets out the relevant sections of legislation, policy and guidance that have been used in this assessment.

BASELINE CONDITIONS

Designated Heritage Assets

Scope

- 8.34 A search area of 3km from the PEA was assessed and potential effects upon setting based upon a Zone of Theoretical Visibility (ZTV). Designated Assets are shown overlain onto the ZTV on **Figure 8.1**. The ZTV models only visibility and topography and does not take account of intervening development or vegetation.
- 8.35 No designated assets of cultural heritage importance lie within the boundary of the PEA.

Scheduled Monuments

- 8.36 As part of the scoping opinion, Cadw recommended identifying and assessing the impact of the proposed development on seven scheduled monuments within a 3km radius. Gwynedd Archaeological Planning Service suggested a 5km radius. In subsequent email correspondence Cadw confirmed a 3km radius was appropriate.
- 8.37 The locations of the Scheduled Monuments are shown on **Figure 8.2**. These are a Neolithic chambered tomb, a Bronze Age burial cairn, remains of medieval buildings (including a tower), a group of post medieval slate-makers booths and three monuments designated in 2021 that reflect the significance of the slate industry: relict areas, quarry hospital and underground levels at Penrhyn Quarry, a railway and railroad that served it .
- 8.38 Further details are provided in **Table 8-4**.
- 8.39 An assessment of impact upon the scheduled monuments is presented in **Table 8-12**.

Table 8-4
Scheduled Monuments within 3 km of the PEA

| Cof National Assets of reference | Cymru/ Historic Wales | Fig. 8.1/2 ref. | Description | Distance from PEA |
|----------------------------------|-----------------------|-----------------|---|-------------------|
| CN297 | | 3 | Slate Gwaliau at Felin Fawr Penrhyn “The monument consists of an exceptionally well preserved group of gwaliau or slate-makers' booths which were used in conjunction with the important Felin Fawr slate mills of Penrhyn Quarry. There are six booths in a curving row, with mono-pitched roofs, open-fronted to the east. An unusual awning survives to the fronts of some of the booths. A stock of slate slabs is left at the north end. The mill complex produced slabs and most roofing slates were made at the quarries themselves. The gwaliau here may have trimmed slates broken in transit or remainders from the slab mills, but it is likely that they operated as a 'showcase' for visitors to the quarries. Penrhyn was the largest slate quarry in the world by the early nineteenth century. It was connected to Port Penrhyn by a railway built in 1801, and the Felin Fawr mills were established by 1803 where the railway crossed a river. The monument is an exceptionally well-preserved and prestigious example of these key slate quarry structures and is of national importance for its potential to enhance our knowledge of construction practices. It retains significant archaeological potential, with a strong probability of the presence of associated archaeological features and deposits. The scheduled area comprises the remains described and areas around them within which related evidence may be expected to survive.” (http://cadwpublic-api.azurewebsites.net/reports/sam/FullReport?lang=en&id=3959 ; accessed 29 October 2019) | 2650m |
| CN219 | | 4 | Ty'n Twr “There is considerable medieval activity on the site, including a probable 14th century building, possibly overlying an earlier structure. Documentary evidence suggests a tower or some building of considerable significance stood on the boss of rock at this site during the 13th century. The monument is of national importance for its potential to enhance our knowledge of medieval settlement. It retains significant archaeological potential, with a strong probability of the presence of associated archaeological features and deposits. The structures themselves may be expected to contain archaeological information concerning chronology and building techniques. The scheduled area comprises the remains described and areas around | 2800m |

| Cof National Assets of reference | Cymru/ Historic Wales | Fig. 8.1/2 ref. | Description | Distance from PEA |
|----------------------------------|-----------------------|-----------------|--|-------------------|
| | | | them within which related evidence may be expected to survive.” (http://cadwpublic-api.azurewebsites.net/reports/sam/FullReport?lang=en&id=1407 ; accessed 29 October 2019) | |
| CNF119 | | 1 | Sling Burial Chambered Tomb “The monument comprises the remains of a chambered tomb, dating to the Neolithic period (c. 4,400 BC - 2,900 BC). Chambered tombs were built and used by local farming communities over long periods of time. There appear to be many regional traditions and variations in shape and construction. The remains of this burial chamber are situated on the side of a hill facing to the west and have been incorporated in a modern stone wall. A large rectangular capstone measuring 4.5m long, 1.4m wide and 0.5m thick is supported on one side by a single upright 0.8m in height, while the other end rests on the ground. The remains of another upright lie under the capstone. The monument is of national importance for its potential to enhance our knowledge of prehistoric burial and ritual. The monument is an important relic of a prehistoric funerary and ritual landscape and retains significant archaeological potential, with a strong probability of the presence of both intact burial or ritual deposits and environmental and structural evidence, including a buried prehistoric land surface. Chambered tombs may be part of a larger cluster of monuments and their importance can further enhanced by their group value. The scheduled area comprises the remains described and areas around them within which related evidence may be expected to survive.” (http://cadwpublic-api.azurewebsites.net/reports/sam/FullReport?lang=en&id=3440 ; accessed 29 October 2019) | 2900m |
| CN374 | | 2 | Oel y Ci Cairn “The monument comprises the remains of a burial cairn, probably dating to the Bronze Age (c.2300 BC-800 BC) and situated within enclosed moorland on the leading edge of the NW-facing side of the summit of Moel y Ci. The stone built cairn is circular on plan and measures about 14m in diameter and up to 0.9m in height. The cairn commands fine views. A concrete triangulation pillar has been erected on its summit. On the NW side a modern shelter c.1m high and 4m wide has been constructed using stone moved from the cairn. The monument is of national importance for its potential to enhance our knowledge of prehistoric burial and ritual. The monument is an important relic of a prehistoric funerary and ritual landscape and retains significant archaeological potential, with a strong probability of the presence of both intact burial or ritual deposits and environmental and structural evidence, including a buried prehistoric land surface. The scheduled area comprises the remains described and an area around them within which related evidence may be expected to survive. It is | 2800m |

| Cof National Assets of reference | Cymru/ Historic Wales | Fig. 8.1/2 ref. | Description | Distance from PEA |
|----------------------------------|-----------------------|-----------------|--|--------------------|
| | | | circular and measures 22m in diameter.” (http://cadwpublic-api.azurewebsites.net/reports/sam/FullReport?lang=en&id=4094 ; accessed 29 October 2019) | |
| CN416 | | 5 | <p>Penrhyn Quarry: relict areas, quarry hospital and underground levels</p> <p>The monument, designated in August 2021, comprises the relict remains of Penrhyn Quarry along with its quarry hospital and underground haulage and drainage system. Situated on the north slopes of Mynydd Elidir southwest of Bethesda, the quarry exploits the Cambrian slate formation of the west flank of the Ogwen Valley. The quarry has remained in constant use for more than 200 years and at one time represented the largest manmade excavation in the world. Active quarrying continues around the scheduled area today. Penrhyn Quarry is 16th century in origin but major exploitation began in 1782 under Richard Pennant, the first Lord Penrhyn. As a hillside quarry, Penrhyn pioneered gallery working under Benjamin Wyatt who became estate manager in 1799. Over the following 100 years the benched galleries extended into a massive quarry pit as production expanded to meet the international demand for roofing slate. By the end of the 19th century, the quarry was the most substantial undertaking of the North Wales slate industry regularly producing more than 100,000 tonnes of slate per annum and employing nearly 3000 men. Strict management of the quarry led to the development of an elaborate quarry plan, arranged with defined areas for extraction, processing and tipping. The Ordnance Survey third edition map (1914) illustrates galleries with blast shelters and working levels with large numbers of gwaliau for hand splitting. All of the working areas interconnected using a counterbalance inclines and a complex internal rail system leading out to slate waste tips to the northwest and southeast. Utilising innovations more common to the coal mining industry, water balances were used extensively at Penrhyn to haul rock from the base of the increasingly deep quarry pit. Penrhyn Quarry was both innovative and influential, many of the developments at the quarry later used elsewhere in other quarries across Gwynedd and further afield. The Penrhyn Quarry Railroad (CN415) which connected the quarry to the harbour at Porth Penrhyn in Bangor was the first of its type in the industry. The first on-site Quarry Hospital was also developed at Penrhyn between 1840-42.</p> | Nearest area 1000m |

| Cof National Assets of reference | Cymru/ Historic Wales | Fig. 8.1/2 ref. | Description | Distance from PEA |
|----------------------------------|-----------------------|-----------------|---|-------------------|
| | | | <p>While the process of ongoing quarrying during the 20th Century has led to the loss of physical functional connections, several coherent and well-preserved relict areas remain intact. The designated area is divided into five parts: Penrhyn Quarry Hospital (Area A), Penrhyn Quarry processing area (Area B), Galleries (Area C), Southeast tips (Area D) and Penrhyn Quarry underground drainage and haulage levels including water balance shafts and head frames (Area E). Area A: Penrhyn Quarry Hospital. The Quarry Hospital (Yspytty Brynllwyd) was built in 1842 and contained three wards, a surgery, and a waiting room. It was a very early adopter of anaesthetic with an amputation carried out under ether in 1847. The ruined remains of the hospital survive in woodland to the east of the modern quarry and north of the quarry pit. The main building is a roofless two-storey structure which faces northeast and measures 16m E-W by 11m transversely. The interior is partially filled with collapsed rubble but some internal walls and fireplaces survive intact. The external elevations survive to full height and are part rendered with evidence of slate cladding to the rear. The main hospital buildings is surrounded by ancillary structures associated with its operation including a mortuary, greenhouses, sheds, and garden paths situated within a large oval enclosure partly defined by a slate slab wall. The west part of Area A includes the location of a rail connection that provided access from the quarry. Area B: Penrhyn Quarry Processing Area. Only a small number of historic working levels survive at Penrhyn. Area B includes all of the remaining levels as shown on the Ordnance Survey first edition map (1889) including 'Twllyndwr', 'Agor Boni' and 'Red Lion' levels. The infrastructure survives much as illustrated on the Ordnance Survey third edition map (1914). There are several well-preserved features including the relict remains of the Twllyndwr to Red Lion counterbalance incline, the Red Lion to Twllyndwr uphaulage incline, weigh house, locomotive shed, railway tunnel, bridge abutments, gwaliau and the remains of a blondin base. Area C: Galleries. The remaining relict parts of the galleried pit that have not been tipped over during the 20th Century. The galleries are a significant landscape feature that contain an area of distinctive sloping slabs, indicating a fault in the slate that can be seen in historic photographs of the quarry. A rectangular revetted platform with dimensions of about 12m x 8m can</p> | |

| Cof National Assets of reference | Cymru/ Historic Wales | Fig. 8.1/2 ref. | Description | Distance from PEA |
|----------------------------------|-----------------------|-----------------|--|-------------------|
| | | | <p>be seen on one of the upper levels and is probably the base for a chain incline. Area D: Southeast Tips. This relict area of tipping mostly dates to the period of peak output towards the end of the 19th century and survives unaltered since the production of the Ordnance Survey third edition map (1914). It retains branching tipping runs, tipping cobs and several small shelters. Area E: Penrhyn Quarry underground drainage and haulage levels including water balance shafts and head frames. Due to the depth of the quarry pit at Penrhyn a complex system of underground haulage levels were excavated to connect the lower galleries of the quarry pit with the surface processing areas via eight water balance shafts. The water balance system utilised vertical shafts with mechanical head-frames, in which tanks surmounted on cages were filled with water at the top of the shaft and emptied at the bottom, their superior weight hauling up an empty tank, attached to which was a fully loaded waggon. These were constructed at Penrhyn Quarry after a drainage adit was driven between the quarry hole and Tan Ysgafell between 1845 and 1849. The drainage adit and all of the associated shafts are well preserved. The shafts and haulage levels are no longer used but the drainage adit still serves its original function by connecting the quarry pit to an outfall on the Ogwen River some 1.9km north. Belowground survival of artefacts relating to haulage and drainage is excellent. 'George' level retains a well-preserved, in situ, double-track railway system including points and point levers, while the pump chamber preserves an impressive hydraulic engine. Aboveground are two well-preserved head-frames, including tanks and cages. 'Sebastopol', constructed in 1858 was supplied by DeWinton's Union ironworks in Caernarfon while 'Princess May', was built in 1895 by Radcliffe's of Hawarden, a firm which supplied machinery to mining concerns all over the world. The monument is of national importance as a well preserved relic of the slate quarry industry and for its potential to enhance our understanding of the industry. The quarry has remained in constant use for more than 200 years and while the process of ongoing quarrying has removed much of the earlier evidence, several well-preserved relict areas remain intact, demonstrating a wide range of quarry structures and their functional relationships. The quarry also includes rare survivals such as the first quarry hospital and two very rare water balance headframes.</p> | |

| Cof National Assets of reference | Cymru/ Historic Wales | Fig. 8.1/2 ref. | Description | Distance from PEA |
|----------------------------------|-----------------------|-----------------|---|-------------------|
| | | | <p>The scheduled area comprises the remains described and an area around them within which related evidence may be expected to survive. The scheduled area is divided into 5 parts: Area A is an irregular polygon c.140m N-S by c.100m transversely centred on NGR 262450, 365796. Area B is an irregular polygon c.450m N-S by c.220m transversely centred on NGR 261968, 365160. Area C is an irregular polygon c.330m NE-SW by c.150m transversely centred on NGR 262252, 364769. Area D is a large irregular polygon c.900m NE-SW by c.400m transversely at its widest point, centred on NGR 262701, 364593. Area E is a complex of inter-connecting linear polygons representing the underground drainage and haulage system laid out between NGR 262150, 365090 and 261560, 366860.</p> <p>https://cadwpublic-api.azurewebsites.net/reports/sam/FullReport?lang=&id=4428 (accessed 17/03/22)</p> | |
| CN417 | | 6 | <p>Penrhyn Quarry Railway</p> <p>The monument, designated in September 2021, comprises the relict remains of the Penrhyn Slate Quarry Railway, developed during the 1870s to replace the Penrhyn Quarry Railroad (CN415). The railway utilised a similar route to the 1801 railroad between Felin Fawr Slate-Slab Mills and Dinas Incline, in part, using the same formation. However, at Tregarth, the route diverted west along the Cegin Valley to Porth Penrhyn, Bangor. Powered by steam locomotive from the outset the railway used a 2' gauge rail. It was built to a similar design as the Ffestiniog Railway although it was unusually steep - a maximum gradient of 1/33 was used in order to avoid the need for inclined planes as used by its predecessor. It followed a more circuitous route than the railroad, being almost 10km in length, with passing-loops at Felin Hen and Tregarth. The Penrhyn Quarry Railway was designed by Charles Easton Spooner of the Ffestiniog Railway for the sole use of Penrhyn Slate Quarry (CN416), although a passenger service was also operated for the quarrymen from 1880 to 1947. It remained in operation until 1962, and was dismantled three years later. The railway today survives as four relict sections: Area A – Felin Fawr to Hendurnpike, Area B – Hendurnpike to Tregarth, Area C – Moel Y Ci to Rhydau Duon, and Area D – Pont Felin Hen to Coed Hywel Uchaf. Area A: Felin Fawr to Hendurnpike. At the N end of the Felin Fawr Slate-Slab Mills the railway formation sits within a cutting beneath a footbridge. From here, the 1870s railway originally followed the line of the earlier Railroad (CN415) but by the 1890s a new section was completed to the E. The first 150m</p> | 2000m |

| Cof National Assets of reference | Cymru/ Historic of Wales | Fig. 8.1/2 ref. | Description | Distance from PEA |
|----------------------------------|--------------------------|-----------------|---|-------------------|
| | | | <p>of this route survives as a slate formation on a pre-existing slate waste tip until it reaches St Anne’s Hill. This section has been partly restored in recent years. The timber bridge and abutments of St Anne’s Bridge were cleared in the 1980s but the formation north of the road survives, partly buried by slate waste and in overgrown woodland. At the summit of the Ty’n Y Clwt inclined plane the railway bisects the earlier railroad and continues along a well-preserved slate causeway c.5m high, crossing the Pen y Ffriddoedd footpath on a bridge made of rolled iron joists. The railway continues north, first as a cutting flanked by crawiau (traditional slate and wire fences) then as a substantial embankment c.4m high on the E elevation. The formation continues to Nant y Graean Isa where its route becomes fossilised up to Hendurnpike level crossing where a small ‘crossing-keeper’s cabin’ remains in use as a domestic outbuilding. Whilst much of the track was salvaged after the railway was decommissioned, some sleepers remain in situ and fragments of rail and other ferrous artefacts have been discovered along and adjacent to the railway in Area A. Area B: Hen Durnpike to Tregarth. The southern extent of Area B follows the route of the Penrhyn Quarry Railroad for the first c700m until it reaches the summit of the Dinas Incline. The first 350m from Hendurnpike flanks the W side of the turnpike road. It is rock cut on the upslope and supported on a massive rubble-built embankment on the downslope side, c.4m above the modern road. The next 350m follows the contour but also retains a substantial slate-slab retaining wall. Visible stratigraphy is evident along this length, presumed to be evidence of the transition during the 1870s from horse haulage to steam, and from railroad to railway. Some evidence of the Dinas Incline winder house survives but this area was mostly cleared by 1879. The Penrhyn Quarry Railway, then turns sharply on a slate-rubble embankment and continues west for c. 300m flanked on both sides by crawiau. It reaches the road from Hendurnpike to Tregath where the slate-rubble abutments and wingwalls of the Corrig Llwydion railway bridge survive. Thereafter the railway is carried over the Bethesda branch of the London & North Western Railway on a brick-built, single-arch skew bridge and then continues; first as a terrace cut into the bedrock, then as a substantial earthwork for a further 550m west to the location of Tregarth Station. Here an in-filled, stone-built arched bridge carries the main street of Tregarth over the course of the railway. Area C: Moel Y Ci to Pont Felin Hen. To the W of Tregarth the railway followed the natural topography. While the route is fossilised there are no extant physical remains apparent until the Moel y Ci allotments where an engineered cutting is visible, in use as a public footpath. Here the formation retains a bank surmounted by slate crawiau along the southern flank and a wrought iron post and rail fence defines the north of the area. Occasional in situ sleepers survive along this section. The cutting extends</p> | |

| Cof National Assets of reference | Cymru/ Historic of Wales | Fig. 8.1/2 ref. | Description | Distance from PEA |
|----------------------------------|--------------------------|-----------------|--|-------------------|
| | | | <p>for c.250m then emerges as a low earthwork before being buried around the Moel y Ci Nurseries. The Ordnance Survey 1st Edition map (1889) illustrates a farm track to Moel y Ci farm which crossed the railway. The single-arch-stone overbridge survives here although is no longer in use. Thereafter for around 200m west the formation survives as a mostly buried feature and is just visible through scrub and trees as a cutting before turning north towards Rhydau Duon. The cutting at Rhydau Duon survives for c.150m in woodland and is exceptionally well preserved with in situ sleepers and sections of rail evident. The substantial cutting is up to 25m in width and in some places more than 5m deep illustrating the archaeological potential of the buried sections further east. Beyond the cutting, the formation makes use of a large earth causeway some 7m wide and that today supports the driveway to Rhydau Duon. The causeway incorporates a large culvert at its base that carries a nearby watercourse beneath the route of the railway. An area of significant archaeological potential survives at Pont Felin Hen. While the bridge itself has been removed the southern abutments and wing walls remain in situ. The ruinous remains of the Felin Hen waiting shelter survive alongside a set of slate steps that provided a foot crossing. A large milestone is recorded as having been located in this area during the 1940s and may survive in the surrounding woodland. Area D: Pont Felin Hen to Coed Hywel Uchaf. To the north of the Pentir Road the formation descended via a steep gradient and today survives as a well-preserved cutting. The cutting includes some stone revetments and is partly flanked by crawiau for c.600m through dense woodland. The route of the London & North Western Railway is carried by a bridge across the railway formation and the cutting survives for a further c.100m through agricultural land to the northeast before being infilled. The monument is of national importance for its potential to enhance our understanding of the slate quarrying industry, specifically the evolution of transport systems and the development of international export. The railway includes several substantial structures including slate- and earth-built causeways and embankments. The monument also incorporates much of the earlier 1801 Penrhyn Quarry Railroad (CN415) formation and as such retains significant archaeological potential.</p> <p>https://cadwpublic-api.azurewebsites.net/reports/sam/FullReport?lang=&id=4429 (accessed 17/03/22)</p> | |
| CN415 | | 7 | Penrhyn Slate Quarry Railroad | 2400m |

| Cof National Assets of reference | Cymru/ Historic Wales | Fig. 8.1/2 ref. | Description | Distance from PEA |
|----------------------------------|-----------------------|-----------------|--|-------------------|
| | | | <p>The monument, designated in August 2021, comprises the relict remains of the Penrhyn Slate Quarry Railroad, developed to take slates from Penrhyn Quarry (CN416), Bethesda to Felin Fawr slate mills and onwards to Porth Penrhyn, Bangor for international export. The railroad ran for a distance of almost 8km utilising the relatively steady gradient adjacent to the river Ogwen to navigate the route between Bethesda and Bangor. Construction of the railroad was complete by 1801. Built as a horse-drawn system using wagons with double-flanged wheels on iron rails, it utilised technologies developed within the internal quarry system at Penrhyn that were to become a standard across the North Wales slate quarries, such as the 2' gauge rail. It was the first railroad of its type in the industry, developed at a time when most quarries used packhorses to transport material to the nearest navigable watercourse, for export via river wharf. The railroad was designed by Thomas Dadford, an engineer from the West Midlands. The unusual use of three inclined planes – Marchogion, Dinas and Ty'n Y Clwt – is thought to be evidence of Dadford's background in canal construction. The railroad remained in use until 1879 when it was replaced by the steam-locomotive powered Penrhyn Quarry Railway (CN417) that utilised a more circuitous route between Felin Fawr Slab Mills and Porth Penrhyn which required no inclined planes. The railroad today survives as five relict sections: Area A - Ty'n Y Clwt Incline to Bron Ogwen Cottages, Area B - Dinas Incline to Halfway House Bridge, Area C - Lôn Isaf to Tyddyn Iolyn, Area D - A55 to Llandygai Village and Area E - Home Farm to the Cegin Viaduct. Area A: Ty'n Y Clwt Incline to Bron Ogwen Cottages. The southern end of area A comprises a short, rock-cut section of railroad and the buried remains of the Ty'n Y Clwt inclined plane and winder house. Slate waste had been tipped over the incline prior to the publication of the Ordnance Survey 1st Edition map (1889) and today only the lowest few metres are now visible as a low rubble stone embankment bisected by the footpath that runs W from Tan Ysgafell. North of the footpath, the next 150m of railroad is a well-preserved marshalling yard that includes substantial, stone-built wharves. This area is illustrated on the 1875 survey by Spooner and is shown to include sidings and other buildings of uncertain function. Whilst these ancillary structures are not immediately visible today this area should</p> | |

| Cof National Assets of reference | Cymru/ Historic Wales | Fig. 8.1/2 ref. | Description | Distance from PEA |
|----------------------------------|-----------------------|-----------------|---|-------------------|
| | | | <p>be considered to retain significant archaeological potential. The formation continues NNW for a further 380m, partly forming the track to Tyn Y Clwt Isa and then forming a small footpath until it is subsumed within the gardens of Bron Ogwen Cottages. Area B: Dinas Incline to Halfway House Bridge. The southern extent of Area B adjoins the later Penrhyn Quarry Railway (CN417), the construction of which is thought to have destroyed the Dinas Incline winder house. Visible stratigraphy at the top of the incline illustrates the way in which some elements of the railroad were incorporated into the later railway. The ephemeral remains of the Dinas Incline survive as a low earthwork crossing the fields to the SE of Dinas Farm at an oblique angle to the natural hill slope. A bridge carries Ffordd Y Lord across the incline and it is again visible as a heavily overgrown cutting to the S of Pen Isa'r Allt ('the lower end of the inclined plane'). The formation has been part-buried by the construction of the adjacent water treatment works but survives as a well-built stone bank on its E face until it becomes a clearly defined rock-cut shelf with substantial retaining walls supporting it 4m above the Ogwen River. The railroad extends circa 300m N where it turns W to cross the Tregarth Road at the junction with Halfway House Bridge but has been destroyed thereafter by later road improvements. Area C: Lôn Isaf to Tyddyn Iolyn. Area C comprises a sinuous 900m length of railroad which survives as an earthwork in pasture to the East of Lôn Isaf. The formation is clearly defined along its length and is generally well preserved. The central section survives as a substantial earthwork with stones eroding from the E face. Several field walls surmount the southern half of area B whilst the northern section is heavily wooded. At Tyddyn Iolyn the formation is subsumed within gardens and then survives only as a slight earthwork in the fields to the north, clearest when viewed using LiDAR (aerial laser scanning technology). Area D: A55 to Llandygai Village. To the north of the A55 the formation survives as a well preserved, low earthwork c.550m in length gradually becoming more substantial and well defined at the north end. In situ bank material is visible along stretches of the E face. The W face is visible on LiDAR despite erosion from historic ploughing. A public footpath and historic field boundary have helped to ensure the preservation of this length but N of Bryn the railroad survives only as a fossilised route. Area E: Home</p> | |

| Cof National Assets reference | Cymru/ Historic of Wales | Fig. 8.1/2 ref. | Description | Distance from PEA |
|-------------------------------|--------------------------|-----------------|---|-------------------|
| | | | <p>Farm to the Cegin Viaduct. Some of the best-preserved elements of the Penrhyn Quarry Railroad survive within Area E. To the NW of Home Farm a small bridge carries the main road to Bangor over the railroad formation. The formation emerges from a narrow cutting to the E of the road and follows the W face of the Penrhyn Estate wall for circa 500m to the north until it reaches Incline Cottage (Listed Building reference 4085). Situated at the summit of the Marchogion Incline, Incline Cottage was the original winder house for the Marchogion Incline. To the north of the cottage, the Marchogion Incline connects the contour section of railroad with the Afon Cegin section some 20m below. It is by far the best preserved of the surviving inclines and is a unique survival, designed for both counterbalance operation and for up-haulage by means of an adjacent horse-whim. The upper part of the Marchogion Incline comprises a massive slate and earth construction in the garden N of Incline Cottage that rises to first floor level where it would have interacted with the winding mechanism. The east face of this section has been lost and is bisected by the driveway to Incline Cottage. From here, the incline survives as a well-preserved but much overgrown cutting running parallel with the track that connects Incline Cottage and Nursery Cottage. The lower section survives as a well-preserved relict structure opening out into a marshalling yard in dense woodland. At the base of the incline the railroad connects with Pont Marchogion, a single-arched stone bridge with evidence of phasing that appears to have carried both a road on a raised level to the NE and the railroad on a lower ledge against the SW face. From here the railroad continues along a well-engineered ledge for a further 250m on the west bank of the Afon Cegin until it reaches the Cegin Viaduct (Scheduled Monument reference CN380), probably the oldest multi-arched rail bridge in the world. The monument is of national importance for its potential to enhance our understanding of the slate quarrying industry, specifically the evolution of transport systems and the development of international export. It is the progenitor for the Ffestiniog Railway and all subsequent descendants. At the time of construction, the Penrhyn Quarry Railroad was the longest overland railroad system in the world. Several well-preserved relict sections remain intact</p> | |

| Cof National Assets reference | Cymru/ Historic of Wales | Fig. 8.1/2 ref. | Description | Distance from PEA |
|-------------------------------|--------------------------|-----------------|--|-------------------|
| | | | <p>along with monumental structures such as Pont Marchogion. The less well-preserved sections and those which survive as low earthworks retain significant archaeological potential.</p> <p>https://cadwpublic-api.azurewebsites.net/reports/sam/FullReport?lang=&id=4427 (accessed 1/03/22)</p> | |

World Heritage Site

8.40 Gwynedd Council and its partners – the Welsh Government, National Museum of Wales, the Royal Commission on the Ancient and Historical Monuments of Wales, the Snowdonia National Park, the National Trust, Bangor University and key landowners – have been developing a World Heritage Site nomination for the *Slate Landscape of Northwest Wales* since 2009. In 2011 it was included on the United Kingdom’s list of nominated properties and in 2011 announced as the next bid to be presented to UNESCO by the UK Government. It was added to UNESCO’s tentative list on 27 January 2012. The formal bid was presented to UNESCO in 2019 and in 2021 The Slate Landscape of Northwest Wales was inscribed onto the World Heritage List at the 44th Session of the World Heritage Committee in Fuzhou, China.

8.41 Gwynedd Council’s World Heritage Site *Management Plan for Public Engagement* (2019, 6 & 10) states:

‘The Slate Landscape of Northwest Wales was formed by the quarrying, processing and transportation of slate to produce roofing materials and architectural materials for global markets, from the late eighteenth century to the twentieth. As well as the quarries and mines themselves, this landscape has also been shaped by the need to create huge tips of waste rock; to process and transport slate; to manage water to power machinery; to house quarrymen and their families, and to provide for their material, moral and intellectual well-being.’

8.42 **Appendix 8/3** presents the Statement of Universal Value that that has been adopted by UNESCO.

UNESCO defines World Heritage Sites as ‘places of Outstanding Universal Value to the whole of humanity. This means that their cultural and/or natural significance is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity’. It is the highest recognition of heritage value.

8.43 The World Heritage Site comprises seven component parts, each of which demonstrate the full range and variety of the slate industry in Northwest Wales:

1. Penrhyn Slate quarry and Bethesda, and the Ogwen Valley to Port Penrhyn (**Figure 8.3**)
2. Dinorwig Slate Quarry Mountain Landscape
3. Nantlle Valley Slate Quarry Landscape
4. Gorseddau and Princes of Wales Slate Quarries, Railways and Mills
5. Ffestiniog: its Slate Mines and Quarries, ‘city of slates’ and Railway to Porthmadog
6. Bryneglwys Slate Quarry, Abergnolwyn Village and the Talyllyn Railway
7. Aberllefenni Slate Quarry

8.44 Each one includes a relict slate quarry or quarries, associated processing areas and a quarry settlement or settlements. Most include elements related to the transport of slate.

8.45 The attributes of the World Heritage Site include:

Heritage assets, including quarries, working faces, waste tips, historic buildings, monuments and railway systems.

Inhabited settlements with historic street patterns, garden-plots, slate-slab field boundaries, wrought-iron gates and 19th-century dwellings.

Transport, including railways, stations, works buildings, engineering workshops.

The use of slate for roofing, architectural components, field boundaries and walls.

The use of building material brought in through international trade, including bricks bought in by railway and Canadian timber.

The Welsh language, traditions, spirit and feeling.

Dyffryn/Ogwen Valley and Dinorwig registered historic landscapes

8.46 The Register of Historic Landscapes is an advisory, non-statutory register. It provides information on and raises the awareness of a selection of the most important and significant landscape areas in Wales to aid their protection and conservation.

8.47 In *Planning Policy Wales 2018* the Welsh Government's objectives include protecting historic landscapes on the register. This document states that the implications of developments which meet the criteria for Environmental Impact Assessment on registered historic landscapes must be considered. In the scoping opinion (dated 29 January 2019) Cadw stated they would require assessment of the impact of the proposed development on registered historic landscapes.

8.48 *A Guide to Good Practice on Using the Register of Landscapes of Historic Interest in the Development Process* provides a staged process for assessing the significance of the impact of development on registered historic landscapes (ASIDOHL2). This process has been used to assess the implications of the proposed development on the two registered historic landscapes located within 3km: 'Dyffryn/Ogwen Valley' and 'Dinorwig' and the results are presented in **Appendix 8/4**.

8.49 The PEA is located within the Ogwen Valley registered historic landscape, with the Dinorwig registered historic landscape about 310m to the west.

8.50 Using GIS data provided by Gwynedd Historic Environment Record, and visual scanning of published Arfon Historic Landscape Character information,¹ 17 character areas were identified within 3km of the centre point of the PEA (**Figure 8.4**) (listed below). Of these, 14 are partly or completely within the zones of theoretical visibility for the PEA, and these are marked with an asterisk below.

8 Allt Ddu

*11 Dinorwig, Marchlyn, Gallt y Llan slate quarries and Llanberis copper mine

*12 Bethesda and Llanllechid

¹ (<http://www.heneb.co.uk/hlc/arfon.html>; accessed 28 October to 18 November 2019),

- *14 Penrhyn Quarry
- 15 Pen isa'r Nant
- 16 Nant Ffrancon - valley floor
- *17 Nant Ffrancon – valley slopes
- *32 Ogwen valley
- *33 Mynydd Llandygai
- *36 Unenclosed mountain (North Carneddau)
- *37 Enclosed fields above Bethesda
- *38 Fieldscape around Llanllechid
- *40 Sling
- *41 Moel y Ci/Gwaen Gynfi unenclosed uplands
- *42 Gwaen Gynfi enclosed area
- *52 Telford's Road
- *53 Hillslopes below Moel y Ci / Rhiwen

8.51 The proposed development would directly affect one of the historic character areas. The PEA is within 41 Moel y Ci/Gwaen Gynfi unenclosed uplands. This character area is included in the ASIDOHL2 assessment.

8.52 In discussions with Neil Maylan of Cadw it was agreed that ten character areas closest to the PEA ZTV should be included in the ASIDOHL assessment (emails dated 31 October and 4-5 November 2019).

8.53 These are:

- 11 Dinorwig, Marchlyn, Gallt y Llan slate quarries and Llanberis copper mine
- 12 Bethesda and Llanllechid
- 14 Penrhyn Quarry
- 17 Nant Ffrancon – valley slopes
- 32 Ogwen Valley
- 33 Mynydd Llandygai (quarry village)
- 36 Unenclosed mountain (North Carneddau)
- 37 Enclosed fields above Bethesda
- 40 Sling
- 53 Hillslopes below Moel y Ci/Rhiwen.

- 8.54 Although outside the ZTV, 15 Pen isa'r Nant was also included, on the basis it is immediately adjacent to character area 14.
- 8.55 **Figure 8.4** shows the boundaries of the registered historic landscapes, historic characterisation areas and the PEA.

Listed Buildings

- 8.56 Listed buildings in the vicinity of the PEA are shown on **Figure 8.5** with references in parentheses.
- 8.57 The Grade II quarry office (1) – lies at the heart of the current workings. This single-storey building is a simpler version of the free Italianate style used for the Penrhyn Estate office at Porth Penrhyn.
- 8.58 Outside the quarry's limits are a group of six listed buildings at Coed-y-Parc (2) that relate to slate working and are also designated a scheduled monument. They include the grade II* slab mill which is part of a "*remarkable complex of buildings at the Felin Fawr Slate works; the mills are amongst the finest of their kind in Wales*" (listing description). The site is historically important as marking the introduction of industrial processes to the sawing of slates.
- 8.59 Two Grade II listed bridges are situated on the Ogwen river: Pont Twr (3) and Pont Ogwen (4).
- 8.60 To the north east at Braichmelyn (5) is a grade II mid-19th century terrace of twelve single-storey two-room cottages built for slate workers. Another group of workers cottages is situated to the north at Bryn Eglwys (6) that were built c1850 as part of a small planned community for workers at the nearby Penrhyn Slate Quarry, by the Penrhyn Estate.

Archaeological Background

Introduction

- 8.61 A 2km search of the known sites held within the Gwynedd Archaeological Trust's Historic Environment Record (GATHER) was carried out and the help of Sean Derby is gratefully acknowledged. The area contained a large number of entries, many of which were related to the recent slate quarrying, and they appeared to be largely in discrete clusters. The clustering may reflect previous focussed fieldwork as opposed to the true distribution; however for clarity the clusters will be considered separately as individual entries may inter-relate. Additionally, a thin scatter of isolated entries is present across much of the study area.
- 8.62 In the discussion below, the HER entries are divided into groups to reflect their geographical position and relationship to The PEA and current quarry.

Archaeology within the PEA

- 8.63 The PEA has been subjected to walkovers and other evaluation techniques including geophysical survey and trenching. Although GATHER includes over 20 entries, as set out in **Table 8-5** and shown on **Figure 8.6**, several are repeated in multiple entries and in essence most form part of the overarching Gwaen Gynfi Settlement (5380) but have been allocated separate numbers.

Table 8-5
Archaeological Entries within or immediately adjacent to the PEA

| HER No. | NGR | Name/Description | Date |
|---------|--------------|---|---------------|
| 5380 | 6090 6388 | Gwaen Gynfi. Settlement. Two conjoining enclosures of rectangular pan with a hut circle against the inner wall of the eastern enclosure. | Prehistoric |
| 12305 | 6091 6395 | From a 4m wide gap in the N wall of the central paddock a trackway winds downhill for 200m | Prehistoric |
| 12315 | 6089 6397 | 60m north of the paddocks and immediately west of the track is a 1m length of wall, 0.7m high and 0.5-0.7m thick. Possible robbed to build the modern sheepfold. | Prehistoric |
| 12327 | 6097 6398 | Hafod. Remains of a rectangular enclosure or building in stony ground just to the west of a trackway. It has external dimensions of 6x2.5m and the interior is on two levels (N end 0.5m lower than S end). It could be along hut or hafod but could just be a simple animal pen. | Medieval |
| 12328 | 6098 6398 | Trackway 1.5m wide formed of ground cleared of stones that have been piled to the sides. It meanders around larger natural boulders. No evidence of the surface. | Medieval |
| 12348 | 6106 6397 | Clearance cairn, oval pile of stones 6 x 5m. May have been a BA burial cairn. When excavated in 2013 proved to be a rectangular structure probably a peat or hay drying platform | Post medieval |
| 12349 | 6106 6404 | A sub-rectangular enclosure 5 x 2.5m built of roughly coursed walling up to 1m high. A sheep pen is the most likely function | Post medieval |
| 29989 | 6089 6385 | Post medieval sheep fold of multicellular form. It is roughly 29m in diameter and stands c 1.5m high and is divided up into 18 cells arranged around a central larger cell. | Post medieval |
| 60373 | 6087 6383 | Five enclosures or paddocks defined by wandering walls typical of prehistoric settlement in this area. The walls stand no more than 0.3m high. | Prehistoric |
| 60374 | 6085 6387 | Five enclosures or paddocks defined by wandering walls typical of prehistoric settlement in this area. The walls stand no more than 0.3m high. | Prehistoric |
| 60375 | 6091 6389 | Five enclosures or paddocks defined by wandering walls typical of prehistoric settlement in this area. The walls stand no more than 0.3m high. | Prehistoric |
| 60376 | 6093 6392 | Five enclosures or paddocks defined by wandering walls typical of prehistoric settlement in this area. The walls stand no more than 0.3m high. | Prehistoric |
| 60377 | 6093 6393 | Five enclosures or paddocks defined by wandering walls typical of prehistoric settlement in this area. The walls stand no more than 0.3m high. | Prehistoric |

| HER No. | NGR | Name/Description | Date |
|---------|--------------|---|-------------|
| 60378 | 6095 6391 | A small hut circle (5.5m diam) built into the northeastern wall of enclosure prn 60376. Defined by piled rubble wall about 1m thick and with an entrance on the northwest side. | Prehistoric |
| 60379 | 6078 6390 | A possible outlying paddock defined by natural scarps with the appearance that some stone clearing may have occurred with boulders piled on the edge of the scarps. | Prehistoric |
| 60380 | 6087 6393 | A possible outlying paddock defined by natural scarps. Some possible evidence for clearance with stones piled along the edge of the scarps | Prehistoric |
| 60381 | 6098 6394 | A stone clearance cairn. | Prehistoric |
| 60382 | 6101 6395 | Roughly circular group of boulders forming a possible structure 4-5m diameter. On trenching it proved to be of natural origin. | Natural |
| 60383 | 6098 6397 | A small hut circle (c3m diam) defined by rough stone walls of boulders 0.3m high | Prehistoric |
| 60384 | 6095 6399 | Roughly circular possible structure 4-5m diameter | Prehistoric |
| 60385 | 6094 6399 | Roughly circular possible structure 4-5m diameter | Prehistoric |
| 60386 | 6099 6388 | A possible outlying paddock defined by natural scarps. There appears to be so clearance with stones piled on the edge of the scarp | Prehistoric |
| 60387 | 6092 6390 | Two linked roughly built structure forming possible animal pens or a hut circle with small annex | Prehistoric |

8.64 Gwaen Gynfi Settlement is described in GATHER as follows:

“To the immediate north and north east of a multi-cellular sheepfold are two conjoining enclosures of rectangular plan. There is a hut circle against the inner E wall of the E enclosure. Five enclosures or paddocks defined by wandering walls typical of prehistoric settlement in this area. The walls are no more than 0.3m high and consist of roughly piled small stones linking, probably in situ, natural boulders. The interior of the enclosures is partially cleared of stone. In the eastern corner of one enclosure are two linked, roughly built, small pens with dimensions of 9.0 x 5.0m and 2.5m x 2.0m. A narrow passage leads into one enclosure.

A small hut circle with an overall diameter of 5.5m is built into the north-eastern wall of one enclosure. The hut circle is well defined with piled rubble walls 1.0m thick and an entrance on the north-west. Two further probable outlying paddocks to the north-west are defined by natural scarps. There appears to have some clearance here, with stones piled among the natural boulders on the edge of the scarp. There may also have been some clearance to the north-east although the stone

appears to have been dumped among the natural boulders as opposed to have been made into wandering walls. A 1.5m wide meandering trackway approaches the settlement from the north and runs into one enclosure and then passes through the south-eastern wall. It is not clear if this is contemporary with the settlement or a later path.

The settlement occupies a natural terrace within the boulder fields on the edge of the bogs to the north-west and west. The area is well-drained and sheltered by the higher ground to the south and south-east. The site was presumably partially cleared during the construction of the multicellular sheepfold. The partial remains of straight stone-built walls are spread across the site, perhaps being part of the settlement enclosure wall.

Remains of an enclosure complex at 370m OD, on more or less flat ground beneath a 5m high boulder field on a generally north- west facing slope. A large sheepfold stands in the centre of the site, doubtless accounting for the robbed-out state of most of the surviving features.

Five large paddocks or enclosures ranging in size from 20m x 15m to 50m x 50m, defined by 'wandering walls' composed of small stones and generally 1.0m thick. Within the eastern-most paddock, and of one build with its east wall, is a hut circle, 5.5m diameter overall, with rubble walls 1.0m thick. In the south-east corner of the central paddock are two roughly built linked enclosures, 9.0m x 4.0m and 2.5m x 2.0m internally. From the larger of these a passage 4.0m long and 0.75m - 1.0m wide, faced on both sides with large stones, leads into the eastern paddock. This feature was doubtless used for stock control. From a gap 4.0m wide in the north wall of the central paddock, a trackway 1.5m-1.9m wide winds downhill through rocky ground, intermittently, traceable for 200m (to SH60866411). 60m north of the paddocks, immediately west of the track, is a 1.0m long stretch of walling, 0.7m high at most and 0.5m-0.75m wide, built of roughly piled large stones. Most of the ground to the west of the track was overgrown with bracken, obscuring any features which may lie between this wall and the paddocks. 60m to the south-west of the paddocks, a second stretch of trackway, 35m long, runs southwards through rocky ground, with cleared stones piled to either side."

- 8.65 This settlement has been subjected to both geophysical survey (Tigergeo 2017) and trial trench excavation (GAT 2018, report 1423) which refined the understanding of the remains to a smaller more focussed area that included the possibility of ironworking.

Group 2 – north of the PEA

- 8.66 This group of entries lies to the north of the PEA. There would be no direct impact on any of the sites identified.
- 8.67 Most of this group of entries relate to either undated features, such as stone clearance mounds or structures whose date is either unknown (although likely to be post-medieval). Some of the possible buildings relate to former agricultural activity and earlier quarrying. The exceptions are two hut circles, towards the centre of this group, which are assigned a broadly prehistoric date.

Table 8-6
Archaeological Entries to the North of the PEA

| HER No | NGR | Name/description | Date |
|--------|--------------|--|---------------|
| 5670 | 6115 6445 | Hut circle c10m diam surrounded by other possibly associated features. Entrance possibly on the north-west side | Prehistoric |
| 12194 | 6119 6470 | Earth and stone bank about 2m wide and 0.7m high running NE from dredged mud beside lake for 26m before turning NW for 2 m. Coincides with location of a building on late C19 OS maps and it may be the remains of this structure | Post-medieval |
| 12195 | 6106 6452 | Hut circle 6.2m diameter with walls c0.7m thick on the edge of marshy ground. | Prehistoric |
| 12196 | 6120 6458 | A bank and ditch emerging from beneath quarry tips and traced for 200m. The ditch is 4m wide and 1.3m deep with a slight upcast bank on north side. It is very straight and is shown on the 1889 OS mapping but not on 1900 or 1914. Presumed leat feeding into a further leat running into the lake | Post medieval |
| 12197 | 6120 6447 | Roughly rectangular structure 3.0 x 2.3m internally. Walls of natural boulders about 1.1m high. Possible hide or butt erected for military exercises or shelter erected for a shepherd | Modern |
| 12209 | 6106 6450 | An overgrown hollow way 1.8m wide traceable for c 80m | Undated |
| 12260 | 6121 6446 | A rectangular structure built against natural boulders comprising roughly built walls up to 0.8m high and enclosing an area about 1.3 x 1m. Possible shooting stand or shepherds' shelter | Modern |
| 12272 | 6122 6463 | A 2m wide 1.2m wide ditch that is now dry. IT has a slight bank on the northeast side. It is blocked with large boulders and a bank at the southeast end. Shown on the 1889 Ordnance Survey 25" but not on subsequent editions. | Post medieval |
| 12280 | 6118 6448 | Roughly built stone structure consisting of stones piled up to delimit an area 3.5 x 2.75m and reaching a height of 0.5m. It is a possible shooting butt of a temporary shelter for a shepherd. | Modern |
| 12287 | 6108 6449 | L-shaped arrangement of wall 2m x 1.4m up to 0.7m high. Possibly the remains of a structure | Unknown |
| 37184 | 6114 6445 | A roughly circular pile of large stones 5m diameter and up to 0.5m high | Unknown |
| 37185 | 6120 6444 | A possible enclosure comprising a south wall 7m long composed of a rough line of large stones, traces of both and east and west wall (no sign of the north wall) but a natural scree suggest the enclosure was originally about 5m wide. | Unknown |
| 37187 | 6117 6440 | A horseshoe shaped structure built against a large boulder. It measured 2.9 x 2.4m and was open to the north. | Unknown |
| 37188 | 6114 6442 | A ruined rectangular structure 4.2 x 3.1m lying SW/NE with walls c0.5m thick and surviving to a height of 0.4m | Unknown |
| 37189 | 6112 6443 | A partly overgrown pile of stones c 4m diameter possibly a clearance cairn | Unknown |
| 37190 | 6112 6448 | Roughly rectangular area 11.2 x 8.5m defined by now indistinct and possibly robbed walls. There was a slight suggestion of a second enclosure on the south side. | Unknown |

| HER No | NGR | Name/description | Date |
|--------|----------------|--|---------------|
| 37191 | 6118 6441 | Grassed over pile of stones 4 x 3.5m possibly a clearance cairn. | Unknown |
| 37192 | 6117 6443 | A structure 4 x 3m with the walls almost completely grassed over | Unknown |
| 37193 | 6113 6439 | A horse shoe shaped structure 2.8 x 2.6m defined by an arc of stones open to the southwest | Unknown |
| 37194 | 6110 6450 | A short length of track 4.2m wide and 11m long running between rocks with stones dumped to either side forming a revetment | Unknown |
| 60717 | 61216 64538 | A slight earthwork visible on Aps but not noticed on the ground. Comprised a channel almost entirely infilled but would have formed an open leat. Part of a major drain through the quarry | Post medieval |

Group 3 – west of current quarry

8.68 This group forms a slight outlier to a larger group (Group 4) which encompasses the present works. It includes elements of housing, presumably associated with earlier working, and also some of the structures associated with nineteenth and early twentieth century operations.

Table 8-7
Archaeological Entries to the west of current quarry

| HER no | NGR | Name/Description | Date |
|--------|--------------|--|---------------|
| 58483 | 614 652 | A series of dwellings of nineteenth century pattern but with some twentieth century building material. The 1889 and 1914 map show a row of eight terraced cottages along a track with outbuildings. Derelict and partly demolished by 1947. | Post medieval |
| 59484 | 6139 6532 | A small holding, probably post 1840. Comprised a cottage with attached farm building. Walls stand to eaves height but roof collapsed | Post medieval |
| 58485 | 615 653 | The remains of a field boundary marked by a line of boulders, also marking a distinct break of slope perhaps created by ploughing | Post medieval |
| 58486 | 6145 6531 | A rectangular structure at the top of a terrace comprising a level platform c4m square. 'Jumper' marks on the stones date it to post eighteenth century | Post medieval |
| 58487 | 6151 6531 | A small bridge over a stream, possibly also built as a dam as it curves upstream to withhold the pressure. Shown on the 1914 OS map | Post medieval |
| 58488 | 615 654 | A sequence of footpaths assumed to be for access to the upper levels of the quarry | Post medieval |
| 58589 | 6144 6547 | A dam on the lower side of a small reservoir. 1.5m high and 3m tick with sluice in northwest corner. Probably for agricultural use associated with Braich y Gwair farmstead. The reservoir is oval in plan. No sign of a leat but the water presumably was used to power machinery in the farmstead. | Post medieval |

| HER no | NGR | Name/Description | Date |
|--------|--------------|--|---------------|
| 58490 | 6147 6553 | A farmstead of nineteenth century date, if not earlier. Two groups of buildings. Most building survive to eaves height but roofs now missing. | Post medieval |
| 58491 | 6150 6526 | A 2m wide track lined with stone walls c1m high, with a ford where it crosses the stream. Shown on the 1889 and 1914 OS maps | Post medieval |
| 58492 | 6151 6525 | Slate steps built into the slate heap, overgrown at the base but exposed higher up. The steps are c1m wide and lead to a path along the heap and into the quarry. Shown on the 1889 and 1914 mapping | Post medieval |
| 60087 | 6170 6518 | Large incline winding house with a first floor capable of holding an electric motor to power the haulage drum. No machinery in it now and it is now also roofless | Post medieval |
| 60088 | 6170 6517 | Small slate-built shelter for men working the winding house, now buried under slate waste. | Post medieval |
| 60091 | 6170 6520 | Slate built structure built for labourers working the tip run. Now destroyed or burial under waste. | Post medieval |
| 60733 | 6150 6516 | Track running over spoil heap now blocked with large boulders. Slate revetment on one side and boulders along other. Recent quarry track. | Post medieval |
| 60734 | 6145 6554 | A small building with other structures attached. The main building is nearly square and could be a small dwelling with attached pens and sheds. What appears to be a wheel pit is present in the middle of the structure but no fixings for a wheel or leats are visible. Part of Braich y Gwair farmstead | Post medieval |
| 60735 | 6151 6541 | The remains of two inverted quarry wagons, without their wheels. They are partly buried at base of a spoil heap. | Post medieval |
| 60739 | 6150 6508 | Small discontinuous area of slate heaps on the western side of the quarry that are shown on the 1914 25-inch map. | Post medieval |

Group 4 – The Current Works

- 8.69 Group 4 is concentrated around the existing works and needless to say is largely made up of entries relating to both past and present working on the site. As a group it numbers in excess of a hundred entries all of which lie outside the PEA. The entries will be presented in broad categories with their PRN's listed to ease reference to previous reports in which more extensive summary data has been included.
- 8.70 The quarry as a whole entity has been given the numbers 15840 and 20061 in the Gwynedd Historic Environment Record but then individual elements such as bridges, buildings and blast shelters have then been issued with their own individual identifier.
- 8.71 There are 7 mills (33373, 60002 – 60005, 60082, 60135) presumably all for slate, 17 undefined structures (59997, 60001, 60006, 60011, 60014, 60017, 60031, 60043, 60046, 60063, 60070, 60085, 60089, 60097, 60713, 60723, 60724), 3 undefined buildings (60725 – 60728), 2 cabins (60079, 60722), 1 office (60096), 1 winding house (60095) 3 smithies (60012, 60045, 60059), 3 electricity

substations and 1 transformer house (60008, 60009, 60027 and 60022), 4 weighbridges (60028, 60040, 60067, 60083), 3 lifts (59999, 60010, 60013), 3 loco sheds (60018, 60038, 60041), 2 Blondin motor sheds and 1 Blondin base (60047, 60048 and 60729), 5 bridges or bridge abutments (60025, 60034, 60056, 60065, 60077), 4 corbelled arches (60030, 60093, 60137, 60138), 3 tunnels and 1 shaft (60058, 60072, 61785 and 60000), 1 platform (60050), 1 wagon (60029), 1 toilet block (60080), 1 belfry (60086), 1 rock cannon (60071), 1 silt trap (62735), 3 records of hydraulic equipment or pipework for compressed air (60015, 60049, 60074), 1 water tank (60039), 1 water supply system (60078) and 2 water channels (60024, 60044). There are several (7) structures described as shelters (60023, 60026, 60033, 60061, 60062, 60073, 60084) or blast shelter (60042, 60068, 60069) reflecting the exposed nature of work in the quarry. There are also 8 inclines or incline drumhouses (60035, 60036, 60055, 60075, 60076, 60090, 60094, 60136) and one horizontal shreave (60092). The remaining entries in this group relate to a Fullersite plant (60019), a quarry pit (60716), a concrete pad (60730) and two water balance shafts (60742, 60743), two areas of possible original levels that may, if they could be examined safely, preserve features (60714, 60715) as from a distance it appeared that wooden ladder remained.

Northern scatter

- 8.72 To the northwest of Groups 1-4 and largely beyond the quarry in the surrounding settlement areas and moorland, a series of relatively isolated entries are recorded in the HER. These entries comprised a mixture of agricultural and industrial features as well as a number of listed buildings of nineteenth century date in the settlement of Mynydd Llandegai. Although a standing stone is given a possibly prehistoric date the remaining entries are entirely post medieval or recent and are dominated by the ochre mine and buildings.

Table 8-8
Archaeological Entries to the North

| HER no | NGR | Name/Description | Date |
|--------|--------------|--|------------------------|
| 12384 | 6041 6386 | A sub-square wash fold c5m square. The fold utilises a double sluice gate and dam to create a wash pond on the west side. Shown on both the first edition OS and the current mapping | Post medieval |
| 15864 | 5970 6460 | Unenclosed upland landscape traditionally used as a sheepwalk | Multi period landscape |
| 16070 | 6053 6561 | Cattle rubbing stone with smooth sides. | |
| 30811 | 6070 6570 | Ochre mine | Post medieval |
| 29296 | 5921 6391 | A rectangular area marked on the Llandeiniolen tithe map and marked as a turbarry. Small circular feature son the 1947 aerial photographs may be peat stacks but now the area is overplanted with a conifer plantation which is likely to have destroyed all traces. | Post medieval |
| 29298 | 5928 6507 | Parts of a field boundary composed of slate fencing typical of the Penrhyn estate. | Post medieval |

| HER no | NGR | Name/Description | Date |
|--------|----------------|--|------------------------|
| 32604 | 5939 6406 | A possible prehistoric standing stone | Possibly prehistoric |
| 56241 | 61077 65857 | Building on early Ordnance Survey maps | Post medieval |
| 56242 | 6109 6589 | A probably early C20 footbridge across the Afon Galedffwd, a concrete carriageway 1.2m wide with side rails. Probably to serve workers of Penrhyn quarry who came from Mynydd Llandygai. | Post medieval |
| 62285 | 6055 6547 | A wall consisting of mortared rubble and capped with concrete up to a height of 1.2m that appears to form a yard wall of a former farmstead (Pen-y-Bont) | Post medieval |
| 62286 | 6057 6549 | A wall forming the north side of Parc yr Ocar | |
| 62287 | 6108 6593 | A small mound of slate waste 2m high and 5m diameter probably the result of small-scale quarrying first shows on the 1900 OS map and by 1914 mapping is described as old quarry. | Post medieval |
| 62288 | 6109 6597 | A small foot bridge over a tributary of the Afon Galedffwd comprising a single slab constructed over piers of stone on either side | Post medieval |
| 62289 | 6061 6548 | A road bridge over the Afon Galedffwd constructed of rubble fieldstone. Pre dates the main C19 expansion of Penrhyn Quarry. | Post medieval |
| 62290 | 6078 6584 | A C19/C20 pipeline and supports | Post medieval |
| 62292 | 6108 6584 | A now partially blocked tunnel thought to be the entrance to the original Yr Ocar ochre mine. It is not clear how far the tunnel extends but it is thought to have been used as an air raid shelter by locals during the Second World War. | Post medieval |
| 62357 | 6080 6574 | A modern C20 brick and concrete structure about 4 x 3m and 1m tall along with a former WC hut. They are believed to be associated with the storm drain from the Arafon housing estate. | Post medieval |
| 62479 | 6010 6550 | Llwybr Main/ Tan y Bwich conservation area | Multi period landscape |
| 64188 | 5988 6562 | A C19 cottage (Grade II listed) | Post medieval |
| 64194 | 5988 6563 | Slate fencing/boundary wall (Grade II listed) | Post medieval |
| 64196 | 6019 6532 | Boundary walls/Slate fencing 24 & 25 Tan y Bwich (Grade II listed) | Post medieval |
| 64202 | 6034 6558 | 23 Llwybr Main. A C19 cottage (Grade II listed) | Post medieval |

| HER no | NGR | Name/Description | Date |
|--------|--------------|---|---------------|
| 64206 | 6034 6560 | Boundary walls/slate fencing 23 & 24 Llwybr Main (Grade II listed) | Post medieval |
| 64209 | 6013 6577 | 8 Llwybr Main. A house (Grade II listed) | Post medieval |
| 64220 | 6012 6577 | 7 Llwybr Main. A house (Grade II listed) | Post medieval |
| 64228 | 6019 6530 | 24 Tan y Bwich outbuildings (Grade II listed) | Post medieval |
| 64232 | 6035 6558 | 24 Llwybr Main. Nineteenth century house (Grade II listed) | Post medieval |
| 64237 | 5989 6561 | 4 Tan y Bwich. A nineteenth century house (Grade II listed) | Post medieval |
| 64240 | 6022 6529 | 25 Tan y Bwich. A house (Grade II listed) | Post medieval |
| 64241 | 6019 6531 | 25 Tan y Bwich. A house (Grade II listed) | Post medieval |
| 64283 | 6035 6557 | 23 & 24 Llwybr Main privies (Grade II listed) | Post medieval |
| 64284 | 6011 6578 | 7 Llwybr Main, privy (Grade II Listed) | Post medieval |
| 65241 | 6107 6585 | Yr Ocar a substantial rubble and slate house. Formerly an outbuilding in the grounds of Yr Ocar now converted to a dwelling | Post medieval |

Southern scatter

8.73 This group of entries encompasses the southern edge of the present quarry operation, but lies largely to its south and southwest and comprises a further 30 records. This area lies beyond current settlements, reflected by the fact that there are no entries for listed buildings and very few structures, other than those directly related to agriculture and quarrying. The occurrence of multiple sheepfolds and shelters not otherwise mapped reflects the temporary and small-scale nature of many of these structures.

Table 8-9
Archaeological Entries to the South

| HER no | NGR | Name/Description | Date |
|--------|--------------|--|---------------|
| 6137 | 6204 6278 | A small shelter 5m square and up to 1.4m high of rough drystone walls. Possibly a walker's shelter | Post medieval |

| HER no | NGR | Name/Description | Date |
|--------|--------------|---|---------------|
| 12409 | 6063 6345 | Ruined sheepfold built against north face of an enormous boulder. Enclosure measures 8.5x6m with walls 0.6m thick and up to 1.4m high | Post medieval |
| 12445 | 6078 6340 | A rough stone shelter in a hollow. Stones have been piled to create an oval 'cell' 3 x 1.6m | Post medieval |
| 12446 | 6083 6294 | A leat emerging from below Marchlyn Mawr Dam running NW. Mortared stone piers for a bridge where it crossed a stream survive | Post medieval |
| 12640 | 6133 6349 | Ruined sheepfold 7.1 x 5.7m with walls 1m thick | Post medieval |
| 20093 | 6020 6280 | Marchlyn Quarry opened as part of the larger Dinorwig Quarry. No workings here in early C20 and only limited working by 1954, expanded but was disused by 1978. | Post medieval |
| 22563 | 6228 6396 | A post medieval path | Post medieval |
| 22564 | 6241 6384 | A small rectangular sheepfold not shown on the 25" series maps but visible on AP's | Post medieval |
| 22565 | 6271 6381 | A substantial two-roomed rubble stone building perhaps associated with the copper mine (prn 20805). It is shown on the 25" maps | Post medieval |
| 29292 | 6075 6269 | A six plus celled sheepfold of drystone and large earthfast boulders. It is shown on the 1 st edition OS but not on the 1843 tithe map. Overall, it measures 35m long and 15m wide surviving up to 2.5m high | Post medieval |
| 29293 | 6064 6275 | Section of road built in 1975 to provide access to Marchlyn Mawr reservoir. Generally, a slate bed up to 2m high with tarmac surface. | Post medieval |
| 29294 | 5979 6312 | Post medieval hollow forming an area of undulations and ponds. They do not appear before the maps of 1978 and only appear after work starts on Marchlyn Quarry and are presumably associated with it. | Post medieval |
| 29365 | 5970 6307 | Road running along the northern limit of the Deiniolen settlement and the western edge of Gwaen Gynfi. Shown on the 1889 OS map | Post medieval |
| 29366 | 5993 6303 | A slate tip associated with Marchlyn Quarry to the west. The material was deposited between 1954 and 1969. | Post medieval |
| 29367 | 5982 6261 | A slate tip associated with Marchlyn Quarry to the north dumping between 1954 and 1969 | |
| 39543 | 6032 6308 | Sheepfold not on the 1889 or 1914 OS, presumably C20 in date. | Post medieval |
| 39542 | 6102 6232 | Sheepfold shown on the 25" county series maps | Post medieval |

| HER no | NGR | Name/Description | Date |
|--------|--------------|---|---------------|
| 39548 | 6032 6230 | A sheep shelter not shown on the 25" county series maps | Post medieval |
| 39549 | 6013 6219 | A sheepfold not shown on the 25" county series maps. | Post medieval |
| 39558 | 6157 6285 | A sheepfold not shown on the 25" county series maps | Post medieval |
| 60127 | 6107 6284 | A leat that emerges from landscaping below Marchlyn Mawr dam and runs NW before running NE for 1.1km towards the quarry. Mortared stone piers from a bridge are present where it crossed a stream. | Post medieval |
| 60136 | 6259 6491 | Part of an incline which although damaged comprises large slabs of slate. It is shown on the 1900 and 1914 25" maps but not the 1889. | Post medieval |
| 60137 | 6259 6490 | A corbelled arch through the incline to allow passage by the tramway under the incline. The 1889 map shows the tramway running under a small bridge and it is likely this arch is part of that bridge incorporated into the incline | Post medieval |
| 60138 | 6255 6484 | A short section of the incline (60136) probably of a different phase of construction. | Post medieval |
| 60706 | 6255 6462 | Part of the Penrhyn road running up Nant Ffrancon from Ogwen Bridge but now completely obscured by slate heaps. The road was built by Lord Penrhyn in 1790-1 to carry slates from the quarry to the port | Post medieval |
| 60715 | 6219 6471 | Small area where original levels are visible. No safe access but levels are well preserved and there are likely to be structure surviving on them. From a distance wooden ladders can be seen between some of the levels. | Post medieval |
| 60716 | 6226 6522 | Deep pit at the end of the galleries opened around 1905 and still in use in the 1980's but flooded by 2003. Now a lake. | Post medieval |
| 60722 | 6228 6471 | A slate cabin with a main room containing a stove base. Slate roof. Not shown on the 1914 25" map or earlier | Post medieval |
| 60723 | 6227 6472 | Small rectangular slate building largely collapsed. | Post medieval |
| 60724 | 6226 6473 | A well preserved small square slate building not shown on the 25" maps but perhaps too small. | Modern |
| 60725 | 6228 6481 | Square slate building not shown on 1914 25" map | Modern |
| 60741 | 6258 6440 | Small discontinuous areas of slate heaps on the northeastern side of the quarry that appear on the 1914 25" map | Post medieval |

Discussion²

- 8.74 Within the PEA a multicellular sheepfold is present, possibly associated with a post-medieval hafod, and a small prehistoric site which includes evidence for ironworking. These were examined by archaeological evaluation.
- 8.75 The study area contains two very different archaeological landscapes. To the east of the PEA is the extensive industrial landscape of Penrhyn slate quarries. The PEA and the area to the west consist of the mostly unenclosed peat bogs and boulder fields of Gwaen Gynfi. A group of hitherto unrecognised cairns and standing stones were recorded on Gwaen Gynfi by Cymdeithas Archaeolog Llandegai a Llanllechid in 1987 (Caffell 1988). A survey was subsequently carried out by the society and Gwynedd Archaeological Trust as part of the 1989 Upland Survey programme. The bogs were found to show extensive signs of peat cuttings.
- 8.76 A range of monuments are recorded on drier, raised ground, particularly around the boulder fields. These included cairnfields that are often assumed to be the result of field clearance. However, some exhibit kerb stones and are closely bunched together. Local historian H.D. Hughes recorded that *'on opening two or three old cairns in 1856...workmen found in each a stone cist and quern'* (Hughes 1866, trans Caffell 1988) suggesting burial cairns.
- 8.77 Hut circle settlements are usually dated to the Iron Age or Romano-British period although upland settlements of this type (i.e. small huts and wandering walls, a good example being at Cwm Ffriddlas Bethesda) may well date from the Bronze Age. Further research is needed in North Wales but it is likely that at least some upland settlement was abandoned after a change in to a wetter, cooler climate in the centuries 1,300 to 1,000 BC.
- 8.78 Other than the possible medieval hafod (upland summer dwelling) within the PEA and associated trackway, there are no known medieval sites in the study area.
- 8.79 The development of Penrhyn quarry has dominated the Ogwen Valley throughout the 19th and 20th centuries.
- 8.80 The earliest record of quarrying in the area is in the rent-roll of Gwilym ap Griffith in 1413 where a number of tenants were paid 10d each for working 5,000 slates. The present quarry, established at a location called Cae Braich Y Cafn, dates from 1782 when Richard Pennant bought out the existing leases and the Penrhyn estate embarked on a rapid expansion of the slate quarrying industry. In 1784 Pennant secured a lease from the Crown covering the hundred of Uchaf which included the parish of Llandegai and a lease from Bishop Warren for building the quay at Port Penrhyn.
- 8.81 Initial piecemeal quarrying methods were improved in 1798 by an innovative gallery system where the working face was terraced at regular intervals allowing large numbers of men to work simultaneously. The slate was initially transported to a small quay at the mouth of the river Cegin by wagons. This was upgraded in 1801 with the construction of a horse-drawn tramway running to a new quay at Port Penrhyn.

² Sources include: GAT report 837; Richards A.J. 1991; Davies, J., and Lynch, F., 2000; Crew, P and Musson, S., 1996; CADW 1998; The Slate Landscape of Northwest Wales Steering Group, 2019.

- 8.82 Expansion continued throughout the 19th century and the quarries at Penrhyn and Dinorwig dominated the industry. In 1862 there was record output from Penrhyn of 130,000 tons and 3,285 men were employed at the quarry. This in turn led to the development of the communities of Bethesda, Mynydd Llandegai, Tregarth and others including Lord Penrhyn's model village with 'no corrupting alehouse' at Llandegai. Steam locomotives were introduced in 1876.
- 8.83 The industry gradually declined in the latter parts of the 19th century culminating in the Penrhyn strike and lockout in 1900-03. Extraction has however continued throughout the 20th century with expansion to the south-west towards Gwaen Gynfi following a deep vein of high-quality slate.

Geophysical Survey

Introduction

- 8.84 Detailed geophysical survey of the PEA was undertaken by TigerGeo in October 2017. The report is appended (**Appendix 8/5**).
- 8.85 Survey was undertaken using a hand-carried array of caesium vapour magnetometers to prospect for buried features possibly of archaeological interest and specifically to locate possible iron production activity associated with a chance find of tap slag in Phase 1 trenching. The geophysical survey report was written before the results of Phase 2 trenching were available.
- 8.86 The survey took place across a rocky area of upland fitted between areas of outcrop and upstanding structures as small panels of survey. The survey was completed wherever access was possible within undisturbed land of the PEA and totalled 0.7ha of coverage.
- 8.87 Interpretation is shown on **Figure 8.7**.
- 8.88 The report³ has been submitted to the Development Control Archaeologist, GAPS, advisor to Gwynedd County Council.

Data Character

- 8.89 Data quality is reasonable; there is some motion noise which is inevitable given the roughness of the terrain but this has not compromised the utility of the data. Gaps in coverage are present only where survey could not physically proceed due to tall vegetation (mainly bog grasses) or areas of boulders.
- 8.90 Magnetic contrast is fairly high with background variation of the order of a couple of nano-Tesla and anomalies potentially of archaeological interest are of similar amplitude. It is likely that small discrete weak anomalies from features potentially of archaeological interest may not be differentiable from this background but linear ones have been recognised.

³ Penrhyn Quarry, Gwynedd, Wales: Geophysical Survey Report. TigerGeo Ltd (2017, updated 2020) Report PQG171.

Geology and Environment

- 8.91 The upland environment is dominated by boulders probably derived from glacial activity at the end of the last Ice Age, forming a terrace on which the features of archaeological interest are located. This is orientated approximately northeast to southwest and to the north and west is unenclosed peat bog while to the south and east are rising mountain slopes.
- 8.92 Strong lateral variations dominate the site and these are likely due to changes in soil depth and soil iron chemistry, these both influencing surface magnetic character. The northeast part [10]⁴ of the site is more strongly magnetic than elsewhere and this area is potentially slightly drier than further west so again changes in geochemical properties are likely.
- 8.93 There is a general northwest to southeast grain within the magnetic data and this may reflect long term drainage downslope, through the formation and refilling of channels and translocation of sediments.

Archaeology and Land use

- 8.94 The surveyed area overlaps a series of enclosures of presumed medieval and prehistoric date and although the upstanding nature of these has tended to define individual areas of survey, there are signs within the data of other linear boundaries. These are mostly evident as reduced magnetic intensity anomalies with widths from just under a metre to just over and these would be typical of either stony banks or peaty fills within ditches. Circumstantially the former seems more likely but the data alone doesn't indicate either way.
- 8.95 Their form is necessarily vague against the strong background variation and it is not obvious to which phase of activity they might belong. Examples [6] and [9] seem quite thick and might relate to the presumed prehistoric enclosures but [1], [3] and [5] lack obvious association with mapped features and appear parallel to lines of boulders evident on the aerial photograph used as base mapping.
- 8.96 The principal result is the apparent association between the find spot of the tap slag and an area [7] of strongly elevated magnetic intensity within a round hut. While the survey data alone can only indicate a material or object that is intensely magnetic, the apparent association raises the possibility of this being a smelting hearth, albeit perhaps also used for domestic purposes. Likewise, by association an area [8] of more magnetic ground outside the hut and just beyond its north-facing entrance is itself not remarkable within the context of the whole survey but within its immediate location it is anomalous. It also seems to be within a metre or so from the tap slag location and therefore it is possible that the anomaly represents more of the same material. Taken together, the hut, slag and the two anomalies could suggest there was metal processing at this location.
- 8.97 Evidence for similar activity within the surveyed area is lacking although a smaller intense anomaly at [11] may be worth further investigation if [7] is a hearth. However, [11] lacks any of the context associated with [7] and could be caused by an iron object rather than a structure.

⁴ Numbers in [n] refer to **Table 8-10** and **Figure 8.7**.

8.98 Whether the area [10] of large amorphous anomalies hides further industrial activity or is related to extraction or the dumping of materials is uncertain but there are no intense discrete anomalies typical of hearths.

8.99 A summary of anomalies and interpretation is set out in **Table 8-10**.

Table 8-10
Geophysical Survey Catalogue

| Label | Anomaly Type | Feature Type | Description |
|-------|--------------------------------|---------------------------|--|
| 1 | Reduced intensity linear | Structure | Possible stony bank or wall footing up to 0.75m wide |
| 2 | Weak enhanced intensity linear | Fill? - Ditch? | Uncertain, could be natural but cannot discount the possibility of it being a ditch fill |
| 3 | Reduced intensity linear | Structure? | One of a pair (with [4], parallel, about 4m away) of thin (< 0.5m) linear anomalies that might mark wall footings or similar stony or peat-filled structures |
| 4 | Reduced intensity linear | Structure? | See [3] |
| 5 | Weak reduced intensity linear | Natural? | Uncertain |
| 6 | Reduced intensity linear | Structure? | Possible stony bank or wall footing but may be spread. Approximately 1m wide though this is uncertain |
| 7 | Strong enhanced discrete | Hearth / magnetised fill? | A roughly circular very strong anomaly up to 2m across and weakly dipolar, less so than might be expected from a ferrous object. Its strength is matched by just one other anomaly that looks more typical of debris and hence this example stands out. It is within a possible hut circle so could be a hearth type structure, maybe related to iron smelting given the presence of tap slag about 5m away |
| 8 | Enhanced discrete | Fill / spread? | Although this broad and fairly amorphous type of anomaly is naturally common at this site, this particular example is more noteworthy as being outside the doorway of the hut containing [7] and is within an area devoid of similar natural sources. This could hint at a functional origin within the context of the hut, e.g. a dump of heated soil or other magnetised material This is especially pertinent given it approximately coincides with the tap slag location |
| 9 | Reduced intensity linear | Structure? | Possible stony bank or wall footing up to 1.7m wide |
| 10 | Texture | Natural? | Strong background variation, likely to be of natural origin although without more detailed work the exact mechanism of enhancement is not well known |
| 11 | Strong enhanced discrete | Debris | Uncertain |

Test Pitting and Trenching

Introduction

- 8.100 Stage 1 of the evaluation was conducted by GAT in August and September 2017. It consisted of the hand excavation of six 5m x 0.80m test trenches and thirty 0.3m x 0.3m test pits. A second stage was undertaken after the completion of the geophysical survey and comprised the hand excavation of four 3m x 0.80m test trenches and five 0.50m x 0.50m test pits, that targeted potential archaeological features identified in the magnetometer survey.
- 8.101 The aim of the evaluation and survey is to determine the archaeological nature of these features as well as assess the age and significance of the suggested prehistoric settlement and provide sufficient information to allow discussions to be held with the MPA and Cadw regarding the planning application and appropriate mitigation.

Results

- 8.102 The results are summarised below. The report⁵ has been submitted to GAPS and as an **Appendix 8/6** to this chapter.
- 8.103 The archaeological evaluation focused on the potential late prehistoric settlement (HER 5380), in particular the walls and interiors of the paddocks/enclosures, and in Stage 2, the investigation of possible features identified by the geophysical survey (**Figures 8.8 and 8.9**).
- 8.104 Stage 1 of the evaluation confirmed the presence of drystone walls in Trenches 1 to 5 that uniformly consisted of locally sourced stones, most likely from field clearance, which were built on top of and between earthfast boulders to form rather sinuous, wandering boundaries that loosely defined paddocks/enclosures. There was no evidence for foundation cuts or any sealed horizons and in the majority of cases the basal stones were set directly on top of earthfast boulders and/or the underlying natural clay. The one exception to this was wall (604) which was built on top of the subsoil layer (602). No artefacts or ecofacts were retrieved from the trenches that could be used to aid the dating of these drystone walls.
- 8.105 Indeed, aside from the walls, there were no archaeological features or deposits found within the trenches. The majority of the test pits hand excavated in the settlement also did not produce archaeological material, the exception being test pit 18, where a small quantity of iron smelting slag was recovered.
- 8.106 The subsequent magnetometer survey undertaken by TigerGeo identified a series of potential archaeological features, some of which, such as Features 7 and 8, were associated with the iron slag retrieved from test pit 18. The trenches and test pits hand excavated at the location of these potential archaeological features revealed that the possible linear or structural features were actually geological in nature, typically being seams or concentrations of earthfast boulders.

⁵ Reilly, S. 2018. *Quarry Realignment Project, Penrhyn Quarry, Bethesda, Gwynedd: Archaeological Evaluation and Survey*. GAT Report 1423

8.107 Test pit 31 was located immediately adjacent to test pit 18 but did not produce additional iron slag or material associated with it. Test pit 32 within the nearby circular structure identified a probable cut with a fill that included charcoal and slag and the underlying natural clay had been oxidised. Given the nature of the fill and the oxidised natural it is highly likely that this was an area of iron smelting set within a rough shelter or a smithy.

Discussion

8.108 The presence of a probable dump of iron slag to the immediate north of the circular structure Feature 7, as well as evidence for iron smelting within it, has broad parallels with other excavated upland sites in northwest Wales, at enclosed and unenclosed settlements.

8.109 Enclosed upland settlements would include hillforts, such as Bryn y Castell, Ffestiniog that was excavated by Peter Crew. It is a small stone-walled fort occupied during the late first millennium BC to the first century AD, abandoned and then re-used non-defensively for iron working during the second and third centuries AD (Smith 2008). Inside the northwest entrance of the fort, there was a *“circular structure with a central hearth and four internal post holes, later re-built in an unusual snail-shape and used for refining and smithing of iron”* (Crew 2008). To the immediate north of the hillfort, outside of the defensive wall, there as another small stone structure associated with iron smelting and smithing. Associated with the hut there was *“a 650kg dump of slag, with many examples of plano-convex smithing hearth bottoms.”* (Crew 2008).

8.110 To the south of Bryn y Castell, there is a broadly contemporary unenclosed settlement at Crawcwellt, Ffestiniog. The upland settlement is comprised of a series of large enclosures that cover an area of four hectares, defined by low wandering walls. Successive seasons of excavation conducted by Peter Crew revealed that Crawcwellt had been an iron production site, with at least five stake-wall round houses associated with iron working, with a sequence of smelting furnaces positioned within these structures. Outside each structure there was an associated dump of slag. It has been estimated that over 6,000kg of slag was produced at the site (Crew 2008).

8.111 The Research Framework for the Archaeology of Wales (2016) was consulted to help to provide context for the late prehistoric activity identified within the PEA during the phased evaluation. The current iteration of the research agenda does not include an update for Late Bronze Age and Iron Age Wales (1500 BC to 43 AD) but key areas were identified in earlier stages. In previous iterations it was determined that the following points should be focused on for research:

- Building chronologies,
- Settlement evidence,
- Palaeobotanical evidence,
- Social change and social processes,
- Climate change and the impact on resource utilisation.

8.112 Based upon the Research Framework and the need to better understand the site in advance of discussions on mitigation, a sample retrieved from (3202) was sent to AOC for specialist

assessment. While this determined that the slag was the result of ironworking from a bloomery furnace, it was most likely a dump of material similar to that identified in test pit 18, rather than the location of a furnace. Given the nature of the material it was not possible to provide a concise date for it based on examination of the morphology alone. In addition, the limited charcoal recovered from the sample belonged to oak (*Quercus* sp), which is not viable for radiocarbon dating. As such, while the specialist assessment has provided more information about the type of iron smelting that took place on site, on this occasion it cannot produce a concise date for this activity and by association the settlement.

DIRECT IMPACTS AND MITIGATION

Direct Impacts

- 8.113 The nature of mineral extraction results in the total loss of the archaeological resource wherever extraction takes place, and the potential loss or damage in other areas associated with infrastructure and landscaping.
- 8.114 The PEA lies within a landscape important for prehistoric and industrial archaeology, but without much evidence for the intervening period. The field-based evaluation within the PEA has successfully identified the archaeological potential and allowed a mitigation strategy to be designed.

Mitigation of Direct Impacts

Overview

- 8.115 In accordance with planning policy, loss of archaeology needs to be offset by a programme of mitigation. *Planning Policy Wales* proposes that where preservation *in situ* cannot be achieved an appropriate approach to mitigation is to ensure preservation by record through archaeological excavation, recording, analysis and publication appropriate to significance of the archaeological resource.
- 8.116 This approach has been agreed with the Development Control Archaeologist, GAPS, as advisor to Gwynedd County Council.
- 8.117 These works would be undertaken by suitably qualified archaeologists. As work progresses, components may be completed and signed off with the agreement of the Development Control Archaeologist, GAPS or her nominee to allow development to commence.
- 8.118 Details of methodologies, in the form of a Written Scheme of Investigation (WSI), would be agreed with Gwynedd County Council. The work would be secured via a planning condition.

The Sheepfold

- 8.119 The sheepfold (**Figure 10**) is of post-medieval date, but may contain earlier elements. A programme of recording and controlled demolition would be instigated prior to development. This would meet the Level 3 standard as set out in Historic England guidelines *Understanding Historic Buildings: A*

guide to good recording practice (2016) that are considered to be the industry standard for this type of work.

8.120 Work would include:

- A comprehensive visual record through photography and measured drawings, including detail of specific features of architectural interest;
- Monitoring of demolition, including archaeological excavation where deemed appropriate, to record constructional phases and any earlier construction underlying or contained within the sheepfold;
- Reporting, including a review of the local and regional historical context of the structure;
- A fully integrated archive suitable for long-term deposition in order to 'preserve by record' the structure.

8.121 A Written Scheme of Investigation would be approved by GAPS/Gwynedd County Council prior to work commencing.

The settlement site

8.122 Within the area of the settlement site a set- piece archaeological excavation would be carried out.

8.123 This would involve a combination of manual excavation and mechanical assistance where the latter can be carried out without compromising the integrity of the archaeology.

8.124 The key aims for the project are:

- to undertake archaeological excavation and recording appropriate to establish the character of archaeological features and aim to date the sequence of structures;
- where present, to recover samples of organic material and industrial residues in order to understand site formation processes, economic activities and the landscape setting of the PEA;
- to contribute to national archaeological research priorities set out in the Research Framework for the Archaeology of Wales (2016);
- to encourage interdisciplinary involvement and open access to the project for academic and scientific purposes;
- to integrate the results with those that have been obtained from previous interventions at the Quarry;
- to promote educational and public outreach.

8.125 A Written Scheme of Investigation would be approved by GAPS/Gwynedd County Council prior to work commencing.

The remainder of the PEA

8.126 Outside the settlement site an archaeologist would monitor soil stripping and any archaeology found would be excavated according to best-practice.

ASSESSMENT OF EFFECTS UPON DESIGNATED ASSETS

Scope

8.127 The assessment of effects upon cultural heritage assets and landscapes took into account a number of factors including:

- The type and significance of asset or landscape
- The nature and scale of the development
- Working methodology
- Temporality
- Topography
- Visibility, screening and physical separation
- Proximity
- The critical views of, and from the asset or landscape
- Accessibility, interpretation and public appreciation

8.128 A site visit was carried out in October 2019 to assess potential impacts of the proposed development upon the setting of designated assets, and examine the influences of topography, intervening vegetation and existing development. The weather was poor and the photographs obtained have partly been replaced by images from Google Streetview that are available in clearer weather conditions.

8.129 Specifically, the site visit considered the following potential impacts and effects upon the designated assets:

- Visual impact of the PEA
- Effects upon the World Heritage Site
- Effects upon the Ogwen Valley and Dinorwig registered historic landscapes
- Effects upon scheduled monuments and other designated heritage assets

- Potential for a cumulative or combined adverse effect upon a group of heritage assets in same visual envelope

Registered Historic Landscapes

- 8.130 Detailed assessment of the potential impacts and effects of working the PEA has been undertaken using the methodology set out in *Guide to Good Practice on using the Register of Landscapes of Historic Interest in Wales in the Planning and Development Process* (ASIDOHL2).
- 8.131 This is included at **Appendix 8/4**.
- 8.132 The PEA is located within the Ogwen Valley registered historic landscape (**Figure 8.4**). The PEA would be within 260m of the Dinorwig registered historic landscape. Both these registered historic landscapes are of national importance and outstanding value.
- 8.133 The PEA would have direct and indirect impacts on one historic landscape character area. This is 41 Moel y Ci/Gwaen Gynfi unenclosed uplands, which includes unenclosed upland, small holdings/early turbaries, early 19th-century water catchment systems, forestry, and prehistoric and medieval archaeological remains. This impact includes the loss of a very small part of the character area (about 0.22%) and changes in land-use (grazed unenclosed upland to quarry).
- 8.134 The PEA would moderately change views to and from the 41 Moel y Ci/Gwaen Gynfi unenclosed uplands. When the direct and indirect are combined, the ASIDOHL2 process has graded the related reduction in value as 'low' and the significance of the overall impact of the proposed development on 41 Moel y Ci/Gwaen Gynfi unenclosed uplands as 'moderate'. This 'moderate' grading is influenced by the high value of the historic character area.
- 8.135 The ASIDOHL2 process has assessed the potential for the proposed development to change views from locations within the eleven other historic character areas (14, 36, 11, 12, 15, 17, 32, 33, 37, 40 and 53). In most inter-visible locations, the PEA would merge into the mass of the existing quarry and tips. As a result, the proposed development would have a slight indirect visual impact on nine high value historic character areas (14, 36, 11, 12, 17, 32, 33, 37 and 53), a very slight indirect visual impact on one high value historic character area (40) and a very slight indirect visual impact on one medium value historic character area (15).
- 8.136 The ASIDOHL2 process has graded the significance of the overall impact of the proposed development on the 12 Bethesda and Llanllechid historic character area as 'moderate'. This 'moderate' grading is strongly influenced by the high value of the historic character area, rather than the scale of indirect impacts of the proposed development and related reduction in value (both of which are graded as 'very low').
- 8.137 Photographs that illustrate the findings are included in **Appendix 8/4**.

World Heritage Site

- 8.138 The PEA has the potential to affect the buffer zone of the Penrhyn Slate quarry and Bethesda, and the Ogwen Valley to Port Penrhyn components of the World Heritage Site. The detailed assessment

is included at **Appendix 8/7**. The proposed development would have no direct impact on the World Heritage Site.

Indirect impacts

- 8.139 The PEA is located within the World Heritage Site buffer zone, adjacent to element 1.5: Mynydd Llandygai – Settlement; planned housing for quarrymen and their families; element 1.1 (Penrhyn Slate Quarry – relict stepped benches with extensive areas of slate tipping to either side); and Element 1.6 (Bethesda – Village; created by quarrymen who preferred not to live on the Penrhyn Estate).
- 8.140 The indirect impacts of the proposed development on the three component parts (1.1, 1.5 and 1.6) have been assessed as part of the ASIDOHL2 assessment of two registered historic landscapes. As a consequence, the results of the ASIDOHL assessment are directly relevant to the assessment of the indirect impact on the World Heritage Site.

Conclusion

- 8.141 Objective 7 of the *World Heritage Site Management Plan for Public Engagement* is ‘A sustainable slate industry’. Policy 7.1 states quarrying would not take place within the boundary of the World Heritage Site, but (under policy 7.2) would be permitted within the Buffer Zone, providing quarrying does not impact on the Outstanding Universal Value of the property. These policies reflect the need to support the slate industry to continue to flourish and develop for the future (Gwynedd County Council 2019, 118).
- 8.142 The proposed development would have no direct impact on the World Heritage site nor its Outstanding Universal Value. This is because the proposed extension is outside its boundaries. The PEA is located within the buffer zone. Extraction would have a slight impact on views to and from the World Heritage Site. Objective 7 and policy 7.2 allow for quarrying in the buffer zone.
- 8.143 Policy MWYN3 in the *Anglesey and Gwynedd Joint Local Development Plan 2011-2026* seeks to avoid significant adverse impacts on sites of international heritage importance, including World Heritage Sites. The slight impact of the proposed development is in accordance with this policy.

Assessment of Indirect Effects Upon Other Designated Assets

Scope

- 8.144 Conservation *Principles for the Sustainable Management of the Historic Environment in Wales* (Cadw 2011) states that:

“The historic environment is a vital part of the cultural identity of Wales. It is made up of many individual historic features which are known as historic assets. Historic assets include individual historic buildings and archaeological remains, historic parks and gardens, conservation areas and townscapes, historic landscapes and World Heritage Sites. All these historic assets contribute to the distinctive character of all our places and to the quality of Welsh life. It is also a finite, non-renewable resource that we should sustain for the benefit of our own and future generations.”

Conservation means managing change carefully so that we protect what is important and special about our historic assets. When we make decisions about change, we need to understand what is significant about them, and what the likely impact of any change will be.”

The methodology used for the assessment follows the 4-stage approach set out in PPW TAN 24 (2017) *Setting of Historic Assets in Wales*:

- Stage 1: Identify the historic assets that might be affected by a proposed change or development and their significance.
- Stage 2: Define and analyse the settings to understand how they contribute to the ways in which the historic assets are understood, appreciated and experienced.
- Stage 3: Evaluate the potential impact of a proposed change or development on those settings.
- Stage 4: Consider options to mitigate the potential impact of a proposed change or *development on those settings*.

8.145 The assessment should then be documented.

Stage 1: Identify which historic assets might be affected

8.146 Although a number of designated assets lie within 3km of the PEA, the ZTV and field assessment very few could be affected through inter-visibility.

8.147 The following listed buildings were scoped out of assessment, with reasons given:

Table 8-11
Listed Buildings Scoped Out of Assessment

| Listed Building | Rationale |
|--|--|
| Quarry office | Within quarry setting that would not change |
| <i>Felin Fawr Slate works Coed-y-parc</i> | Assessed as part of scheduled monument |
| Bridges over the Ogwen river: Pont Twr and Pont Ogwen | In valley bottom. Views to the PEA filtered by trees lining river. Immediate context of Pont Ogwen is a holiday park |
| Braichmelyn slate workers cottages | Terrace faces north away from the PEA with cliff face at rear of property preventing views |
| Bryn Eglwys slate workers community | The PEA would be visible from the rear of the properties, but absorbed within existing quarry landscape at >600m distance. Historical link is relevant |

Stage 2: Define and Analyse the Settings

- 8.148 The cultural value of the assets, their current and historic settings, and visual relationship to the PEA are summarised in **Table 8-12**.

Table 8-12
Analysis of Setting of Scheduled Monuments within 3 Km of the PEA

| Cof Cymru/ National Historic Assets of Wales reference | Fig. 8.1/2 ref. | Description | Value (evidential, historical, aesthetic and/or communal) | Current and historic setting | Intervisibility | Distance from PEA |
|---|-----------------------|-------------------------------------|---|---|--|----------------------|
| CN297 | 3 | Slate Gwaliau at Felin Fawr Penrhyn | Evidential: historic fabric and detail Historical: work of slate-makers. Aesthetic value: showcase for visitors, location, setting | Historic: within Penrhyn Quarry Current: within Penrhyn Quarry (Ogwen valley historic character area 14 Penrhyn Quarry). | Outside ZTV. Views are blocked by existing buildings, trees and tips. Figure 8.11 and 8.12 | 2650m |
| CN219 | 4 | Ty'n Twr | Evidential: historic fabric above and below ground; archaeological features and deposits Historical: documentary evidence Aesthetic value: location and setting | Historic: on boss of rock beside River Ogwen Current: on boss of rock, within wooded valley, on edge of Bethesda town. Close to A5 and B4409. Close to the edge of existing Penrhyn Quarry. Within Ogwen Valley historic character area 32 Ogwen Valley. | Outside ZTV. Views are blocked by existing buildings, trees and tips. Figure 8.13. | 2800m |

| Cof Cymru/ National Historic Assets of Wales reference | Fig. 8.1/2 ref. | Description | Value (evidential, historical, aesthetic and/or communal) | Current and historic setting | Intervisibility | Distance from PEA |
|---|-----------------------|-----------------------------|--|--|--|----------------------|
| CNF119 | 1 | Sling Burial Chamber | Evidential: historic fabric above and below ground; archaeological and palaeo-environmental features and deposits, potentially including burials/human remains. Historical value: archaeological evidence for Neolithic beliefs. Aesthetic value: location and setting | Historic: Hillside facing west. Current: hillside facing west, within Ogwen Valley historic character area 40 Sling. On opposite side of road to houses. Incorporated into modern stone wall. | Outside ZTV. No inter-visibility between PEA and scheduled monument. Views are blocked by topography and trees Figure 8.14 and 8.15. | 2900m |
| CN374 | 2 | Oel y Ci Cairn | Evidential: historic fabric above and below ground; archaeological features and deposits, potentially including burials/human remains. Historical value: archaeological evidence for Bronze Age beliefs. Aesthetic value: location and setting | Historic: Leading edge of NW-facing side of summit of Moel y Ci. Current: Leading edge of NW-facing side of summit of Moel y Ci. Within Ogwen Valley historic character area 41 Moel y Ci/ Gwaen Gynfi unenclosed uplands. Modern shelter built into NW side. | Outside ZTV. No inter-visibility between the scheduled monument and the PEA. The monument is on the NW side of the summit of Moel y Ci, while the PEA is to the SE and east of the summit. | 2800m |

| Cof Cymru/ National Historic Assets of Wales reference | Fig. 8.1/2 ref. | Description | Value (evidential, historical, aesthetic and/or communal) | Current and historic setting | Intervisibility | Distance from PEA |
|---|-----------------------|---|--|---|---|----------------------|
| CN416 | 5 | Relict remains at Penrhyn Quarry including quarry hospital and underground haulage and drainage system | Evidential: historic fabric and detail Historical: relicts of slate-making including early example of worker's hospital. | Historic: within Penrhyn Quarry Current: within Penrhyn Quarry (Ogwen valley historic character area 14 Penrhyn Quarry). | Outside ZTV. No inter-visibility between PEA and all areas of the scheduled monument due to natural topography and workings of Penrhyn Quarry | 1000m (nearest area) |
| CN417 | 6 | Penrhyn Railway | Evidential: historic fabric, earthworks and detail Historical: relict of late 19 th C railway related to transportation of slates. | Historic: linking Penrhyn Quarry with Penrhyn Quarry (CN416), Bethesda to Felin Fawr slate mills and onwards to Porth Penrhyn, Bangor for international export. Current: Current: within Ogwen Valley historic character area 32. Largely rural setting with woodland. | Outside ZTV. No inter-visibility between PEA and scheduled monument due to natural topography, development and workings of Penrhyn Quarry | 2000m |
| CN415 | 7 | Penrhyn Railroad | Evidential: historic fabric, earthworks and detail | Historic: linking Penrhyn Quarry with Penrhyn Quarry (CN416), Bethesda to Felin | Outside ZTV. No inter-visibility between PEA and scheduled monument due to natural topography, | 2400m |

| Cof Cymru/ National Historic Assets of Wales reference | Fig. 8.1/2 ref. | Description | Value (evidential, historical, aesthetic and/or communal) | Current and historic setting | Intervisibility | Distance from PEA |
|---|-----------------------|-------------|---|---|--|----------------------|
| | | | Historical: horse-drawn railroad from 1801 related to transportation of slates. | Fawr slate mills and onwards to Porth Penrhyn, Bangor for international export. Current: Current: within Ogwen Valley historic character area 32. Largely rural setting with woodland. | development and workings of Penrhyn Quarry | |

Stage 3: Evaluate the potential impact of a proposed change or development on those settings

Direct impacts

8.149 The PEA would have no direct effect on scheduled monuments.

Indirect impacts

8.150 Mineral extraction can indirectly affect the significance of heritage assets and their settings in a broad range of ways. These can include altering views (including principal or key views) from and to heritage assets and disturbance including increased noise, vibration, dust and light.

8.151 The indirect impacts of proposed development on the significance of scheduled monuments within 3km have been assessed. All of these heritage assets are of national importance.

8.152 Distance and a lack of inter-visibility means that the immediate settings of the scheduled monuments would not be affected.

8.153 No monument would have any views to the PEA due to topography and intervening quarry development.

8.154 The magnitude of change is assessed as 'none'. As a result, the impact of the development on these designated heritage assets would be neutral (i.e. no change to the existing situation).

8.155 The assessment is summarised in **Table 8-13** based upon criteria set out in **Tables 8.1-8.3**.

Table 8-13
Assessment of Effects upon Setting of Scheduled Monuments within 3 km of The PEA

| Name | Grade - sensitivity | Fig 8.1/ 2 ref | Cof Cymru/ National Historic Assets of Wales ref. | Existing impacts on setting | Potential indirect impacts associated with proposed development | Mitigation measures included in proposed development | Nature of change caused by proposed development | Timeframe of change caused by proposed development | Magnitude of change caused by proposed development | Significance of change caused by development |
|-------------------------------------|---------------------------|----------------|---|---|---|--|---|--|--|--|
| Slate Gwaliau at Felin Fawr Penrhyn | Scheduled Monument - high | 3 | CN297 | Modern industrial buildings. Derelict historic buildings. Degree of separation from historic Penrhyn quarry. | No additional impact. | Not required, as no additional impact. | None | N/A | None | Neutral |
| Ty'n Twr | Scheduled Monument - high | 4 | CN219 | Noise and vehicle emissions from A5 and B4409. Existing tips. Possible noise from existing quarry. Proximity of modern buildings in Bethesda. | No additional impact. | Not required, as no additional impact. | None | N/A | None | Neutral |
| Sling burial chambered tomb | Scheduled Monument - high | 1 | CNF119 | Noise from road. Nearby housing. Incorporated into modern stone wall. | No additional impact. | Not required, as no additional impact. | None | N/A | None | Neutral |

| Name | Grade - sensitivity | Fig 8.1/ 2 ref | Cof Cymru/ National Historic Assets of Wales ref. | Existing impacts on setting | Potential indirect impacts associated with proposed development | Mitigation measures included in proposed development | Nature of change caused by proposed development | Timeframe of change caused by proposed development | Magnitude of change caused by proposed development | Significance of change caused by development |
|----------------------------------|---------------------------|----------------|---|--|---|--|---|--|--|--|
| | | | | Possibly noise from existing quarry. | | | | | | |
| Huts 90m n of Cil Twllan | Scheduled Monument - high | 2 | CN144 | Distant views of existing and historic quarry and tips Figure 8.14. | No additional impact. | Not required, as no additional impact. | None | N/A | None | Neutral |
| Relict remains at Penrhyn Quarry | Scheduled Monument - high | 5 | CN416 | Within quarry | No additional impact. | Not required, as no additional impact. | None | N/A | None | Neutral |
| Penrhyn Railway | Scheduled Monument - high | 6 | CN417 | Degraded in sections. Otherwise well-preserved | No additional impact. | Not required, as no additional impact. | None | N/A | None | Neutral |
| Penrhyn Railroad | Scheduled Monument - high | 7 | CN | Degraded in sections. Otherwise well-preserved | No additional impact. | Not required, as no additional impact. | None | N/A | None | Neutral |

Stage 4: Consider options to mitigate the potential impact of a proposed change or development on the settings

8.156 No mitigation is required.

Document the assessment

8.157 The assessment is documented in **Table 8-13**.

Cumulative and Combined Impacts

8.158 Although the PEA is an industrial feature, it is part of an existing substantial complex and would largely be absorbed into the profile and massing of the current quarry.

8.159 There are no other planned major developments within the vicinity of the PEA that in combination could affect the setting of designated heritage assets.

ASSESSMENT OF SIGNIFICANCE OF EFFECTS

8.160 In accordance with the EIA Regulations the significance of an effect should be identified taking into account implementation of the proposed mitigation (i.e. the residual effects). This is achieved using policy, guidance and methodology set out at the beginning of this chapter.

8.161 The results of the evaluation of significance are drawn together in **Table 8-14**, below, together with the rationale behind the evaluation.

Table 8-14
Effects and Evaluation of Significance

| | Type of Effect | Probability of Effect Occurring | Sensitivity | Magnitude of Effect | Significance | Rationale |
|--|----------------|---------------------------------|-------------|---------------------|-----------------|---|
| Adverse direct effects upon statutorily designated assets of the historic environment excluding the historic landscape of the Ogwen Valley | None | Certain | High | None | Neutral | Other than the Ogwen Valley historic landscape, the proposed development would not directly impact upon designated assets of the historic environment |
| Adverse direct effects upon Ogwen Valley historic landscape | Negative | Certain | High | Small | Not significant | The PEA would have a direct impact on one historic landscape character area (HLCA): Moel y Ci/Gwaen Gynfi unenclosed uplands. The loss would comprise a very small part of the HLCA (about 0.22%). |
| Direct effects upon buried archaeology within PEA | Negative | Certain | Medium | Medium | Not significant | The PEA lies within a landscape important for prehistoric and industrial archaeology, but without much evidence for the intervening period. The field-based evaluation within the PEA has successfully identified the archaeological potential and allowed a mitigation strategy to be designed. This would involve archaeological excavation, structural recording and a watching brief. The results would be an important contribution to national research objectives. |
| Indirect effects upon setting of scheduled monuments within 3km | None | Certain | High | None | Neutral | There is no intervisibility. The nearest scheduled monument is 1000m distance and forms part of the historic quarry workings. |
| Indirect effects upon setting of World Heritage Site (WHS) | Negative | Certain | High | Small | Not significant | Objective 7 of the World Heritage Site Management Plan for Public Engagement is 'A sustainable slate industry'. Policy 7.1 states quarrying would not take place within the boundary of the WHS, but is permitted within the Buffer Zone, providing |

| | Type of Effect | Probability of Effect Occurring | Sensitivity | Magnitude of Effect | Significance | Rationale |
|--|----------------|---------------------------------|-------------|-------------------------------|---|---|
| | | | | | | <p>quarrying does not impact on the Outstanding Universal Value of the property.</p> <p>The proposed development would have no direct impact on the WHS nor its Outstanding Universal Value.</p> <p>The PEA is located within the buffer zone. Policy MWYN3 in the Anglesey and Gwynedd Joint Local Development Plan 2011-2026 seeks to avoid significant adverse impacts on sites of international heritage importance, including World Heritage Sites. The small impact of the proposed development is in accordance with this policy.</p> |
| Indirect effects upon setting of the historic landscape of Ogwen Valley and Dinorwig | Negative | Certain | High | Small Medium (Bethesda) | Not significant Moderately significant | <p>The ASIDOHL2 process has assessed the potential for the proposed development to change views from locations within the eleven HLCA within the two registered landscapes. In most inter-visible locations, the proposed extension would merge into the mass of the existing quarry and tips. Although the existing visual impact of the existing quarry and tips would continue, the proposed development would have only a slight indirect visual impact on nine high value HLCA, a very slight indirect visual impact on one high value HLCA and a very slight indirect visual impact on one medium value HLCA.</p> <p>The ASIDOHL2 process has graded the significance of the overall impact of the proposed development on the Bethesda and Llanllechid HLCA as 'moderate'. This 'moderate' grading is strongly influenced by the high value of the historic character area, rather than the scale of indirect impacts of the proposed development and related reduction in value (both of which are graded as 'very low').</p> |
| Cumulative and combined effects upon heritage | None | Certain | High | None | Neutral | <p>Although the PEA is an industrial feature, it is part of an existing substantial complex and would largely be absorbed into the profile and massing of the current quarry. There are no other planned major developments within the vicinity of The PEA that in combination could affect the setting of designated heritage assets.</p> |

SUMMARY AND CONCLUSIONS

Scope of Work and Results

- 8.162 This chapter presents the findings of a cultural heritage assessment for a proposed lateral extension to Penrhyn Quarry. The PEA comprises approximately 2.3ha of rough grazing.
- 8.163 Cultural heritage is represented by a wide range of assets that result from past human use of the landscape. These include historic structures, many still in use, above ground and buried archaeological monuments and remains of all periods, artefacts of anthropological origin and evidence that can help reconstruct past human environments. In its broadest form cultural heritage is represented by the landscape and townscape itself.
- 8.164 This assessment considers both direct and indirect effects upon cultural heritage. Direct effects are those that physically affect a cultural heritage asset. Indirect effects can occur as a result of significant changes to the setting of a cultural heritage landscape or asset, whether permanent or temporary. This is particularly relevant to designated assets such as Scheduled Monuments, a World Heritage Site, Listed Buildings, Conservation Areas, Registered Parks and Gardens and Registered Historic Landscapes.
- 8.165 Desk-based research, a site walkover and visits to designated heritage assets were carried out. Geophysical survey and trial-trenching of the PEA was undertaken in 2017 and 2018.

Direct Effects upon Archaeology and Mitigation

- 8.166 The PEA lies within a landscape important for prehistoric and industrial archaeology, but without much evidence for the intervening period. The field-based evaluation within the PEA has successfully identified the archaeological potential and allowed a mitigation strategy to be designed.
- 8.167 In accordance with *Planning Policy Wales* (PPW) an appropriate approach to mitigation is to ensure preservation by record through archaeological excavation, recording, analysis and publication appropriate to significance of the archaeological resource.
- 8.168 This would involve archaeological excavation of a prehistoric settlement site with evidence of small-scale iron working, structural recording of a post-medieval sheepfold and a watching brief over the remainder of the PEA.
- 8.169 The results would be an important contribution to national research objectives.
- 8.170 This approach has been agreed with the Development Control Archaeologist, Gwynedd Archaeological Planning Service (GAPS), as advisor to Gwynedd County Council.
- 8.171 These works would be undertaken by suitably qualified archaeologists.
- 8.172 Details of methodologies, in the form of a Written Scheme of Investigation, would be agreed with Gwynedd County Council. The work would be secured via a planning condition.

8.173 The direct effects upon archaeology are assessed as of medium sensitivity and medium magnitude. Taking into account the proposed mitigation the effects are not significant.

Effects upon Designated Heritage Assets

8.174 The PEA is situated in a rural landscape, with locally strong influences of ongoing quarrying. The quarry has had a long history dating back to at least 1782 and is of national importance as both an historical and economic resource.

8.175 An assessment of potential effects upon the designated heritage assets, landscapes and their setting within 3km of the PEA was undertaken that included consideration of:

- visual impact of the PEA
- effects upon the World Heritage Site 'Slate Landscape of Northwest Wales'
- effects upon the Ogwen Valley and Dinorwig registered historic landscapes
- Effects upon scheduled monuments, listed buildings and other designated heritage assets
- potential for a cumulative or combined adverse effect upon a group of heritage assets in same visual envelope

8.176 The assessments followed methodology set out in *Guide to Good Practice on using the Register of Landscapes of Historic Interest in Wales in the Planning and Development Process (ASIDOHL2)* and the 4-stage approach set out in PPW TAN 24 (2017) *Setting of Historic Assets in Wales*.

8.177 The ASIDOHL2 assessment concluded that the PEA would have a direct impact on one historic landscape character area (HLCA) within the registered Ogwen Valley landscape (Moel y Ci/Gwaen Gynfi unenclosed uplands) but that the loss would comprise a very small part of the HLCA (about 0.22%).

8.178 The effect of this impact was assessed under the EIA Regulations as of small magnitude and not significant.

8.179 Other than the Ogwen Valley historic landscape, the proposed development would not directly impact upon designated assets of the historic environment.

8.180 The vast majority of designated heritage assets within a 3km radius of the PEA were scoped out of assessment due to there being no visibility based upon the Zone of Theoretical visibility (ZTV) that analyses topography or, after verification by field survey, intervening development and vegetation.

8.181 There is no inter-visibility between the seven scheduled monuments within 3km and the PEA, and at between 1.0km and 2.9km distance the settings of the scheduled monuments would not be affected. This is assessed as a neutral situation under the EIA regulations (i.e. no change to the existing situation).

- 8.182 The proposed development would have no direct impact on the World Heritage Site nor its Outstanding Universal Value. It would lie within its buffer zone where quarrying is permitted. Under the EIA Regulations, the effect of this impact was assessed as of small magnitude and not significant.
- 8.183 The proposed development would have slight or very slight indirect visual impacts on eleven HLCA within the registered landscapes of Ogwen Valley and Dinorwig. Under the EIA Regulations this is assessed as of small magnitude and not significant, with the exception of the impact upon Bethesda and Llanllechid HLCA which is assessed as moderately significant. This is a result of the high value of the historic character area, rather than the scale of indirect impacts or reduction in value, both of which are graded as 'very low'.
- 8.184 In respect to all offsite heritage assets, the PEA would merge into the existing mass of the quarry. This would keep the adverse effects on the setting of heritage assets and landscapes to a minimum.

Cumulative and Combined Effects

- 8.185 Although the proposed extraction is an industrial feature, it is part of an existing substantial complex and would largely be absorbed into the profile and massing of the current quarry. There are no other planned major developments within the vicinity of the PEA that in combination could affect the setting of designated heritage assets.

Conclusion

- 8.186 Having regard to the baseline conditions, the nature of the proposed development and the proposed measures that would be effective in mitigating the impacts of the scheme, there would be no significant residual effects (direct, indirect, cumulative or combined) upon known cultural heritage assets. The proposed development therefore fully accords with both local and national cultural heritage policy. It is supported by Objective 7 of the World Heritage Site Management Plan that promotes a sustainable slate industry.

