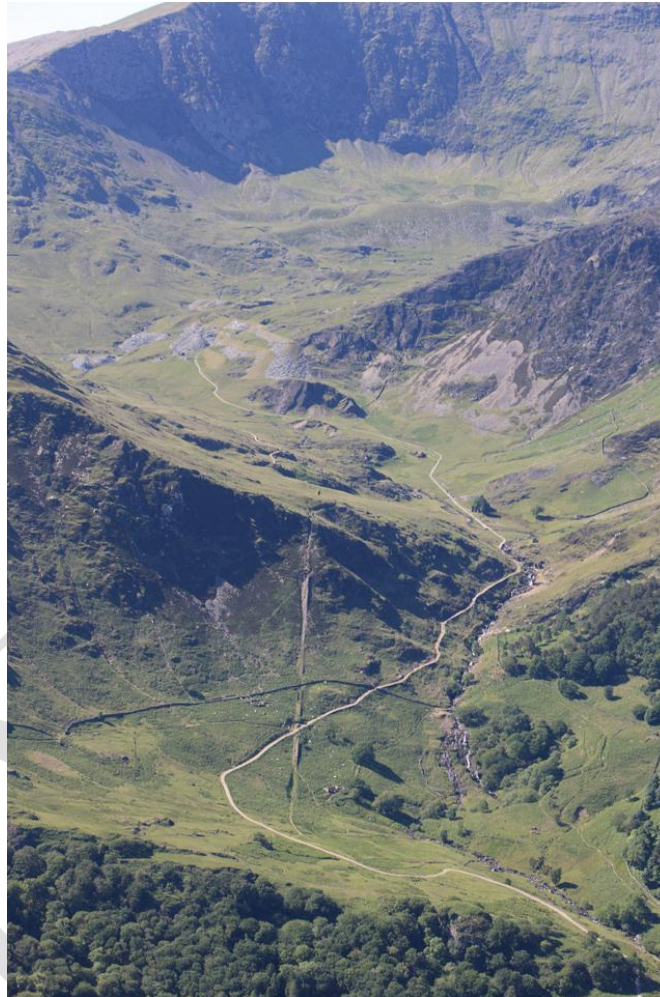


govannon consultancy

Consultant **Dr David Gwyn** MCIfA FSA

Nant y Felin, Llanllyfni Road, Caernarfon, LL54 6LY, UK

☎ +44 (0)1286 881857 govannonconsult@hotmail.com



HAFOD Y LLAN AND PRINCE OF WALES SLATE QUARRIES SUITABILITY FOR INCLUSION IN WORLD HERITAGE BID

for

Snowdonia National Park Authority

January 2016

Govannon Report GC393

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Author: Dr David Gwyn MCIfA FSA

Date: January 216

Client: Snowdonia National Park Authority

The following abbreviations are standard:

BU: Bangor University

CRO: Caernarfon Record Office

NPRN: National Primary Record Number

PRN: Primary Record Number

RCAHMW: Royal Commission on the Ancient and Historical Monuments of Wales

SNPA: Snowdonia National Park Authority

UNESCO: United Nations Educational, Scientific and Cultural Organization

GWYNEDD COUNCIL SLATE INDUSTRY OF NORTH WALES WORLD HERITAGE BID HERITAGE ASSESSMENT OF HAFOD Y LLAN AND PRINCE OF WALES QUARRIES

1 INTRODUCTION

John Griffith Roberts, SNPA archaeologist, has commissioned Govannon Consultancy to assess the suitability of two disused slate quarries and their transport routes for inclusion in the Gwynedd County Council bid to UNESCO for *The Slate Industry of North Wales* to be inscribed as a World Heritage site, and to embody the conclusions in a report (the present document). Neither site was recommended for inclusion by Govannon report 295 (2012), *Baseline Study and Technical Evaluation: The Slate Industry of North Wales Tentative World Heritage Site*.

The brief was to reconsider Prince of Wales slate quarry (PRN: 20221; NPRN: 40567) and Hafod y Llan slate quarry (PRN: 20255; NPRN: 40536) and their associated transport routes.

2 LOCATION

Both quarries are located within the SNPA, Prince of Wales slate quarry SH 5491 4980 and Hafod y Llan slate quarry at SH 6115 5239.

3 METHODOLOGY

3.1 Slate industry of North Wales

The history and archaeology of the slate industry of North Wales, and of the smaller workings in other parts of the country, are described in Gwyn 2015. Since initial archaeological surveys were carried out in the 1990s, it has increasingly been recognised as an industry which in its 19th century hey-day had a world-wide reach, was recognised as the global leader, and sustained a remarkable culture.

3.2 UNESCO requirements

The suitability of these two sites was considered in terms of their potential contribution to the Outstanding Universal Value which World Heritage sites must demonstrate. The Technical Evaluation of the bid submitted by Gwynedd Council to the DCMS in November 2015 summarises the Outstanding Universal Value of the Slate Industry of North Wales bid thus:

From the mountains of Snowdonia, the slate quarries of North Wales produce a practical and durable roofing material which finds a ready market all over the world. Much of industrial revolution Britain is roofed in Welsh slate. So too are many great buildings on every continent.

This industry comprises both the dramatic landscapes of quarrying itself and the social and linguistic tradition that shapes the culture of Snowdonia.

The immense quarries with their sprawling tips of waste rock, their distinctive settlements clustered around nonconformist chapels and their well-engineered transport systems bear witness to the craft-skill and ingenuity of a working people who made the best of their challenging circumstances and who evolved their own communities and social structures. Welsh slate is quarried today, keeping alive these specialist skills. The towns and villages are vibrant places, and the railways that served

the industry remain in operation. This historic landscape is shaped not only by innovative technology but also by a unique culture.

Outstanding Universal Value is embodied in attributes, the elements of a World Heritage Site which embody Outstanding Universal Value and which must therefore be first identified then managed appropriately to safeguard that value.

UNESCO *Operational Guidelines* specify (para 89) that 'Properties nominated as cultural landscapes, should contain key interrelated, interdependent and visually integral elements.' They suggest (Annex 5) that the following types of attributes might be considered as conveying or expressing Outstanding Universal Value:

1. form and design
2. materials and substance
3. use and function
4. traditions, techniques and management systems
5. location and setting
6. language and other forms of intangible heritage
7. spirit and feeling
8. other internal/external factors

UNESCO *Operational Guidelines* admit that 'Attributes such as spirit and feeling do not lend themselves easily to practical applications of the conditions of authenticity, but nevertheless are important indicators of character and sense of place, for example, in communities maintaining tradition and cultural continuity.'

In practice, there is considerable variation from one World Heritage site to another as to how attributes are defined, and UNESCO guidance is not always clear on this point, with the words 'attributes', 'elements' and 'components' being used apparently interchangeably. The present document considers attributes to be three-fold:

- features and tangible properties
- qualities of the foregoing that can be measured, and which give it significance and Outstanding Universal Value
- the abstract and intangible dimensions of each property.

3.3 Features of National Significance

The methodology for assessing these two sites included consideration of whether features within them had been identified as of national significance and hence suitable for Scheduling as Ancient Monuments by Cadw.

Cadw Criteria

Features considered to be of national significance may be considered suitable for Scheduling as Ancient Monuments by Cadw, on the basis of the following eight criteria:

1. **Period** All types of monuments that characterize a category or period should be considered for preservation.

2. **Rarity** There are some monument categories which in certain periods are so scarce that all surviving examples which still retain some archaeological potential should be preserved. In general, however, a selection must be made which portrays the typical and commonplace as well as the rare. This process should take account of all aspects of the distribution of a particular class of monument, both in a national and a regional context.
3. **Documentation** The significance of a monument may be enhanced by the existence of records of previous investigation or, in the case of more recent monuments, by the supporting evidence of contemporary written records.
4. **Group value** The value of a single monument (such as a field system) may be greatly enhanced by its association with related contemporary monuments (such as a settlement and cemetery) or with monuments of different periods. In some cases, it is preferable to protect the complete group of monuments, including associated and adjacent land, rather than to protect isolated monuments within the group.
5. **Survival/condition** The survival of a monument's archaeological potential both above and below ground is a particularly important consideration and should be assessed in relation to its present condition and surviving features.
6. **Fragility/vulnerability** Highly important archaeological evidence from some field monuments can be destroyed by a single ploughing or unsympathetic treatment. Vulnerable monuments of this nature would particularly benefit from the statutory protection which scheduling confers. There are also existing standing structures of particular form or complexity whose value can again be severely reduced by neglect or careless treatment and which are similarly well suited by scheduled monument protection, even if these structures are already listed historic buildings.
7. **Diversity** Some monuments may be selected for scheduling because they possess a combination of high quality features, others because of a single important attribute. 8. **Potential** On occasion, the nature of the evidence cannot be specified precisely, but it may still be possible to document reasons anticipating its existence and importance and so to demonstrate the justification for scheduling. This is usually confined to sites rather than upstanding monuments.
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Cadw Criteria in Practice

In practice, the definition of site and monument has evolved over the years, with progressively more extensive areas being scheduled, such as *Garn Fadrun hillfort* (1.092 km²) or the *Llangollen canal* from Gledrid to Llantysilio. Industrial monuments covering large areas that have been scheduled include *Gorsedda slate quarry* (0.1740 km²) and *Iron and coal patching at Pen-ffordd-goch (Keeper's Pond)*, *Blaenavon* (MM227, 0.4660 km²), a World Heritage site.

Practice has evolved informally. GAT officers were advised in 1994 to consider scheduling of industrial sites by delineating key features in such a way as to protect the broader landscape value of

the site. Such features were for the most part built structures. Subsequent advice has been to take a more wide-ranging view of scheduling.

In this connection it is noted that Historic Scotland has recently (2015) scheduled a large area of the Easdale Slate Quarry (Argyll and Bute).

UNESCO Requirements

UNESCO Guidelines

Operational Guidelines for the Implementation of the World Heritage Convention (WHC, 13/01 July 2013) Paragraph 98 states: Legislative and regulatory measures at national and local levels should assure the survival of the property and its protection against development and change that might negatively impact the Outstanding Universal Value, or the integrity and/or authenticity of the property. States Parties should also assure the full and effective implementation of such measures.

It is understood that this is interpreted as meaning that an inscribed property be afforded the highest level of statutory protection that the jurisdiction permits.

3.4 Approach

3.4.1 Site visits

The two sites were visited by Dr David Gwyn of Govannon consultancy and by John Griffith Roberts of the SNPA, Hafod y Llan on 19 October 2015 and Prince of Wales on 15 December 2016 (on which occasion Louise Barker, Investigator with the RCAHWW, was also present). Principal features were photographed. Weather conditions were adequate to form an assessment of the two sites.

3.4.2 Review of existing studies

Existing archaeological studies of the two quarries and their transport systems were reviewed, at the Gwynedd Archaeological Trust, particularly Report 154, written in 1994-5, and the archives of the Plas Tan y Bwlch (SNPA study centre) 'Practical Industrial Archaeology' course, as were secondary sources (see **Bibliography**).

GAT report 154 forms the basis of the record, as the only so-far existing archaeological study that attempts to cover the most important sites in the industry, and the most significant features within each site, in a comprehensive way. Features from the two quarries have been listed in the present document as they were reported in Report 154, with grid references added (not present in the GAT report). In addition, the present document includes the assessment criteria from GAT 154 as a basis for judgement. All features were assessed for:

Significance (appears as **S** in the list below) – this criterion was applied in the field to all features

Condition (C) – this criterion was applied in the field to all features

Fragility (F) – this criterion was applied in the field to all features

Vulnerability (V) – this criterion was applied in the field to all features

Period (P) – this criterion was only used if the date of the structure under consideration was known to be a particularly early or late example of that structure type. The criterion was not applied in the field, but after all the fieldwork had been completed. This criterion was only applied if the date of the structure was thought to raise its archaeological significance, in which case the entry is marked with a 'Y' in the database.

Rarity (R) – this criterion was applied after completion of all the fieldwork, when those structures discovered to be rare were marked as such with a ‘Y’ in the database. No entry in this field means the structure is typical of its type, with a number of examples surviving.

Potential (PO) – this criterion appears with a ‘Y’ in the field if there appears to be sufficient archaeological potential to raise the value of the feature.

These factors were assessed on a scale of 1 to 3, with 1 being the preferred state in each case. In addition, certain factors were assessed for:

Group Value (GV) – this criterion was used to describe the archaeological value of the inter-relationship of features. The entry has a ‘Y’ if the feature added archaeological value to another feature, and if the result or the relationship was greater than the value attributed to the two features independently.

Consideration of a monument as a candidate for scheduling was based on an overall evaluation of all the relevant criteria (defined individually below) and supported by a professional interpretation.

The slate industry is now much better understood in Welsh terms and in terms of international comparisons than it was in 1994-5, through the work of the RCAHMS, the researches of private individuals and the surveys carried out by the SNPA study centre’s courses. The archive of the Snowdonia National Park’s ‘Practical Industrial Archaeology’ courses, held at Plas Tan y Bwlch, were not available for consultation in 1994-5 but have now been catalogued and archived at the Snowdonia National Park study centre. Hafod y Llan quarry has never been studied by the course, but a record of Prince of Wales quarry which was undertaken in 1974 proved invaluable to understanding the site for the purposes of the present document. Not only do these provide an existing archaeological record, but also in many cases include details of the documentation about date of construction, use *etc.*

Analysis of these site visits and of written sources, and of the conclusions drawn from them, on the basis of 3.1, 3.2 and 3.3, forms this report.

4 FINDINGS OF ASSESSMENT - HAFOD Y LLAN

4.1 Location

Hafod y Llan quarry is situated at SH 61300 52455 in the historic parish of Beddgelert, at the head of Cwm Llan, a tributary valley of the Afon Glaslyn, on the southern slopes of Snowdon.

4.2 Existing studies

No detailed study has been carried out of this site. It was assessed by GAT report 154, and the most significant features were identified, but no features were identified as of national importance and therefore possible for designation as Scheduled Ancient Monuments. The site’s history is covered in outline by Bick 1982, 69-73 and by Boyd 1988, 118-120.

The adjacent area of copper-mining and -processing centred on SH 6212 5202 has been covered by EAS 2013, which makes recommendations concerning the mines, mills and the transport systems which served them, which included cart and barrow roads, slides, shuts, an incline railway and a remarkable stone-block tramway.

The quarry transport system (Hafod y Llan quarry railway, PRN: 59329) was identified by the GAT 2014 survey but no field work was carried out on this site as part of the project, and individual features have not been identified.

4.3 Summary history

Hafod y Llan slate quarry is a disused open working, believed to have been active by the 1840s.

The quarry was developed by the Devonian Alan Searell, who developed various mining and quarrying interests in North Wales from his arrival in the area c. 1842. The main period of development was from the 1860s to the 1870s as the 'South Snowdon quarry', when a railway involving two inclines superseded an earlier cart road to connect the workings with the Gwynant valley. From there, material was carted to the Croesor Tramway for carriage to Porthmadog. The construction of the South Snowdon wharf at Porthmadog appears to be confirmed by reports in the *Cambrian News* for 19 June 1869 and 22 October 1870.

A mill was under discussion in 1865. It was to be powered by a water wheel operating six sawing machines, two planers, a saw-sharpener, a grindstone, a travelling crane and twelve dressers (BU: Searell 9). A plan of 1869 (CRO: BJC/X/391) shows the north-easterly part of the mill ('machine house') in existence, powered by a turbine, and indicates the quarry working on four levels. The other part of the mill was constructed at an unknown later date.

In 1864 'existing cottages' were under repair and barracks were under construction (BU: Searell 8 letters 226 and 238). Work continued the following year (BU: Searell 9). The Beddgelert census for 1871 records them as uninhabited, though William E. Parry, the manager, is recorded as living in Hafod y Llan itself. The quarry closed during the 1880s.

4.4 Site description

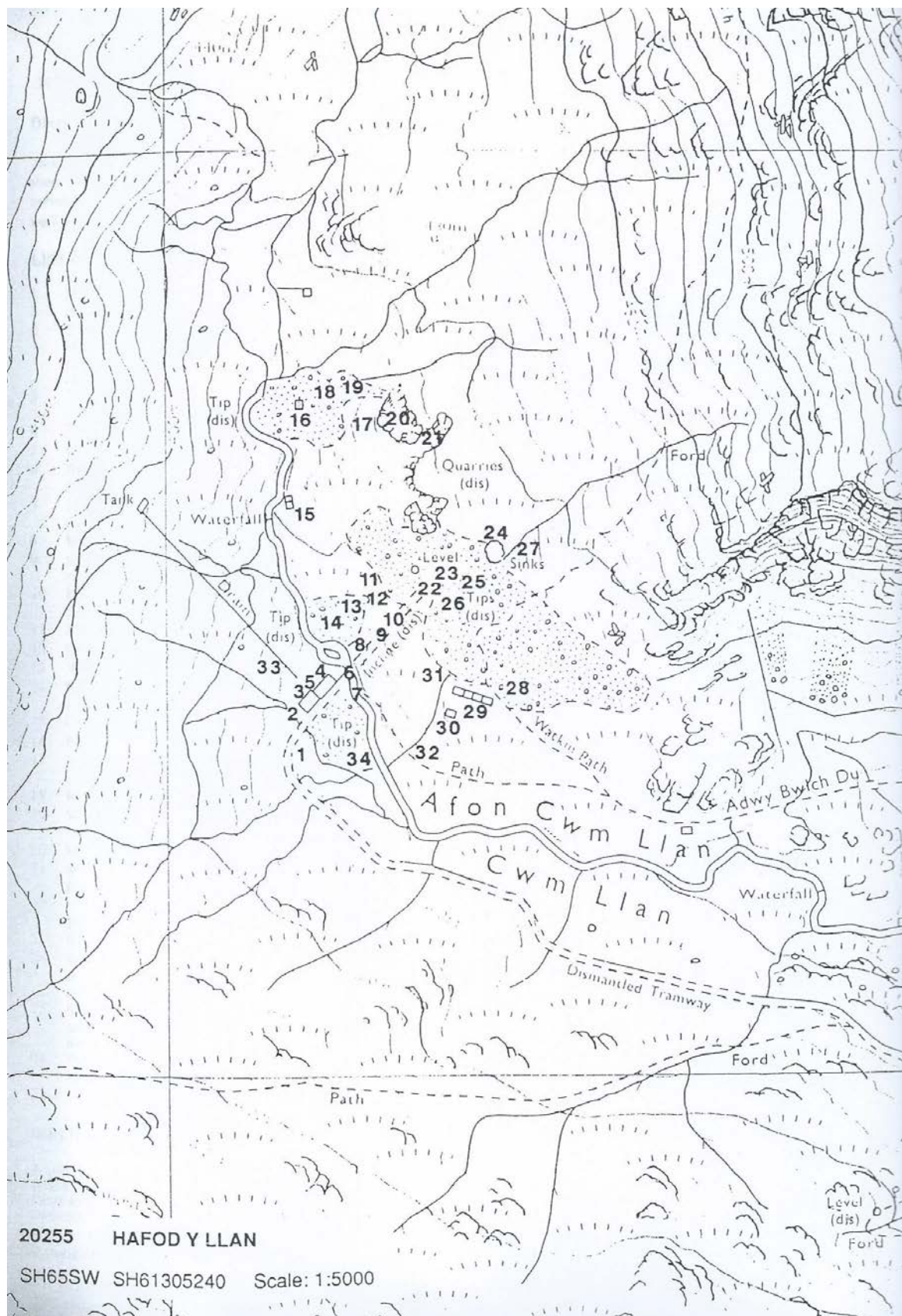
Surviving remains include galleried workings on several levels, an internal counterbalance incline linking the quarry face to a mill, and a barracks.

The water-powered mill is orientated east to west and appears to have been built in two phases, the earlier to the east, and seems to have been powered by a turbine. It survives as a dilapidated and roofless structure on the lowest level of the quarry, near the course of the exit railway. The suggestion in Richards 1991 that it was converted to turbine operation in 1869 (having previously presumably been powered by some other means) is unconfirmed, but there is no apparent evidence of a water-wheel pit on site; it is more likely that the intention to use a waterwheel was changed at the design stage.

The tips are more extensive than those indicated on the map of 1869, and there are significant tips extending from the mill buildings, indicating that the quarry was worked on at least a moderate scale into the 1870s at least.

The quarry railway to Nant Gwynant is a remarkable feature. It is built on a contour formation from the quarry stack-yard as far as the summit of a catenary-profile counter-balanced incline, from the foot of which another contour section leads to a shorter incline to an exchange yard with the cart road. It is a good example of the many slate-carrying railways built in Gwynedd during the industry's boom period. It crosses an unusual mineral-handling system from the copper mine at Braich yr Oen to the crushing mill at Hafody Llan, evident as a double row of stone blocks, possibly for bridge rails (Bick 1982, 68-73).

4.5 Identified features (from GAT report)



Map 1: Hafod y Llan – features identified in 1994-1995

	Feature	Grid reference	S	C	F	V	P	R	PO	GV
1	RAILWAY - continues along impressive formation, via two Inclines to loading bay	SH 6115 5239 to 6271 5118	1	1	1	1	/	/	/	/
2	STRUCTURE - function obscure	SH 6158 5238	3	2	2	1	/	/	/	/
3	MILL (bay type) - 5-door transverse mill, truss-level line shafting; large windows evident	SH 6116 5240	3	1	1	1	/	/	/	/
4	MILL (bay type) - 4-door transverse mill; large windows evident	SH 6117 5242	3	3	2	1	/	/	/	/
5	PELTON WHEEL site	SH 6116 5241	3	3	2	1	/	/	/	/
6	BRIDGE – abutments only survive	SH 6120 5244	3	3	2	1	/	/	/	/
7	BRIDGE	SH 6120 5242	1	1	1	1	/	/	/	/
8	ADIT – collapsed?	SH 6122 5247	/	/	/	/	/	/	/	/
9	INCLINE counterbalance	SH 6129 5253 to 6120 5244	3	3	2	1	/	/	/	/
10	BRIDGE (abutments only) designed to take tramway over (9)	SH 6123 5247	3	3	3	1	/	/	/	/
11	ADIT – flooded	SH 6127 5254	1	1	1	1	/	/	/	/
12	WEIGHBRIDGE HOUSE	SH 6126 5254	3	1	1	1	/	/	/	/
13	INCLINE DRUMHOUSE ('through' type)	Uncertain	3	1	1	1	/	/	/	/
14	INCLINE counterbalance – degraded and tipped over	Uncertain	3	3	3	1	/	/	/	/
15	BARRACKS	SH 6113 5262	3	2	2	1	/	/	/	/
16	WEIGHBRIDGE HOUSE	SH 6115 5272	3	1	1	1	/	/	/	/
17	BRIDGE	Uncertain	1	1	1	1	/	/	/	/
18	GWAL	SH 6117 5273	3	3	3	1	/	/	/	/
19	ADIT	SH 6124 5274	1	1	1	1	/	/	/	/
20	QUARRY PIT	SH 6126 5270	1	1	1	1	/	/	/	/
21	QUARRY FACE	SH 6130 5270	1	1	1	1	/	/	/	/
22	INCLINE DRUMHOUSE ('through' type)	SH 6129 5253	3	2	1	1	/	/	/	/
23	WEIGHBRIDGE HOUSE	SH 6131 5254	3	2	2	1	/	/	/	/
24	QUARRY PIT	SH 6136 5256	1	1	2	4	/	/	/	/
25	ADIT (to 24) - collapsed	SH 6133 5255	/	/	/	/	/	/	/	/
26	BRIDGE (crosses tip run from 25); abutments only survive	SH 6132 5249	3	2	2	1	/	/	/	/
27	QUARRY FACE	SH 6137 5257	2	2	2	1	/	/	/	/
28	TIPS – tip run on s.e. side of Watkin path is lower than on n.w. side	SH 6136 5246	1	1	1	1	/	/	/	/
29	BARRACKS – two-storey, large	SH 6133 5241	3	3	3	1	/	/	/	/
30	DWELLING – two-storey	SH 6131 5239	3	3	3	1	/	/	/	/
31	PRIVY	SH 6126 5235	3	3	3	1	/	/	/	/
32	ROAD	SH 6120 5242 to 6271 5059	1	1	1	1	/	/	/	/
33	WATER-CHANNEL	SH 6097 5261 to 6116 5241	1	1	1	1	/	/	/	/
34	MILL WASTE TIP	SH 6119 5238	1	1	1	1	/	/	/	/

4.6 Existing statutory protection

None

4.7 Conclusions of Baseline study

The following were the conclusions of the Baseline study:

Should not form part of WH bid. Though the quarry and its transport systems constitute impressive landscape features, the area as a whole contains nothing that is not better represented elsewhere.

4.8 Potential attributes of Hafod y Llan slate quarry

(shown in bold on the matrix)

Galleried quarries	{	Extraction	}	• galleries
Pit quarries		Tipping		• first level tips • secondary level tips
Mines				• adits • levels • drainage levels
		Transport		• paths • roads • bridges • railways• railway incline planes • engine sheds • aerial ropeways (blondins and chain inclines) • cranes • weighbridges
		Power-generation		• engine house • boiler house • engine • steam engine • water-wheel • wheel pit • hydroelectric power house •electricity sub-station • electricity pole • flat-rods •compressor house
		Pumping		• water-pumps • pumping shaft
		Explosives		• powder magazine • blast wall
SLATE PROCESSING				
Hand-processing sites	Quarry shelter		•gwaliau	
Mechanical processing sites	Slate mills, slate processing works		•radial mills • transverse mills • longitudinal mills • bay mills • multi-floor mills • mill tips	
	Machinery		• swing saws • Greaves saws • Hunter saws • diamond saws • trimming machinery • power sources • power transmission	
	Power-generation		• engine house • steam engine • water-wheel • wheel pit	
Slate yards	Slate yards		• slate yards	
Maintenance				
Maintenance facilities			• blacksmiths’ workshops • engineering workshops	
Social/ health				
	Caban		• caban	
	Hospital		• hospital	
SLATE TRANSPORT (overland)				
Road transport sites	Routeways		•paths • industrial roads • drove roads • toll-roads	
	Bridges		• clapper bridges • beam bridges • arch bridges	

	Toll-houses	• toll-houses
Water transport sites	Route	• canal feature • canal building • canal embankment • quay • canal office
	Vessels	• wrecks
Railway transport site	Formation	• contour formations • railway cutting • railway embankments • railway bridges • railway inclined planes
	Permanent way	• ballast • sleepers • track
	Railway stations, and railway workshops	• railway engineering works • railway workshop • railway station building
	Locomotives and railway wagons	• motive power • slate wagons • workers' carriages
All transport sites	Inter-modal exchange	• rail-rail exchange • road-rail exchange
SLATE TRANSPORT (maritime)		
Dock and harbour installations	Port, dock, harbour, quays	• quays • docks • harbours • slate sheds • port authority office
	vessels	• wrecks containing slate cargo
SLATE COMMUNITIES - DOMESTIC		
Settlement	town	• houses • places of worship • libraries • reading rooms • town halls • market halls • public houses
	village	• houses • places of worship • libraries • reading rooms • public houses
	model settlement	• houses • places of worship
	squatter settlement	• houses • places of worship
Country house estate		• country house gardens • country houses • estate wall • gate lodge
SLATE END USE		
Split slates	randoms/early roofs	• randoms/early roofs
	later roofs	• later roofs
	wall hangings	• wall hangings
	writing slates	• writing slates
Slabs	architectural	• architectural components • walling material
	other	• slate fence (<i>crawiau</i>) • gravestones

5 FINDINGS OF ASSESSMENT - PRINCE OF WALES

5.1 Location

Prince of Wales quarry is situated at SH 5495 4994 at the head of the Dwyfor valley in the historic parish of Llanfihangel y Pennant.

5.2 Existing studies

A detailed survey was carried out by the Plas Tan y Bwlch 'Practical Industrial Archaeology' course under the tutorship of Dr Michael Lewis in August 1974. The archive of this course is preserved at Plas Tan y Bwlch, and was consulted as part of the present study. The site's history is covered in outline by Boyd 1988. It was assessed by GAT 154, and the most significant features were identified, but no features were identified as of national importance and therefore possible for designation as Scheduled Ancient Monuments.

The quarry transport system was identified by the GAT report 1207 (Gorsedda Junction and Portmadoc Railways, PRN: 59327) but no field work was carried out on this site as part of the project, and individual features have not been identified.

5.3 Summary history

Early workings are believed to have been on the upper floors; finished slates were carted to the turnpike at Rhyd Ddu and on to Caernarfon through Bwlch y Ddwy Elor, a mountain pass by which the quarry was known locally; its English name reflects the public excitement at the marriage of the Prince of Wales to Princess Alexandra of Denmark in 1863.

The quarry was extensively developed during the boom in the slate trade in the early 1860s until the financial crash of March 1866. It is possible that three levels were worked in this period. Floors were numbered from the top of the quarry.

The water-powered slab mill (NPRN 287785) dates from 1864; a report of 31 December in the *Mining Journal* states that it had been roofed, that the waterwheel was in position and saws and planers were being installed. A report of the following year is more detailed; the wheel measured 30' by 4', and the mill included Francis' patent machines, four saws and two planers by the Caernarfon firm of De Winton. It was originally served by horse and cart, since the incline was not ready to receive rails until August 1866 (*Mining Journal* 4 August 1866).

Its situation, away from the quarry and at a considerably lower level, illustrates the lengths to which quarry engineers were prepared to go to make use of water-power rather than steam. Slate blocks, having been carted or lowered down inclines, would then have to be hauled up again to be loaded into carts for transport to Caernarfon, a cumbersome and time-consuming process, only brought to an end with the construction of the railway from Porthmadog to the mill site itself in 1873.

The transverse pattern of slab mill is repeated, together with the style of doorway, in the two mills constructed by Penrhyn Quarry at the Felin Fawr site, believed to date from 1866-7. It is worth noting that John Francis II, a Penrhyn agent, and son of the manager, had certainly invested considerable sums in the Prince of Wales Quarry, and was publicising the venture enthusiastically, by 1870, much to Lord Penrhyn's annoyance (CRO: XPQ921), and his father ended up as manager of the quarry after his dismissal from Penrhyn in 1874. It is quite possible therefore that this was a 'dry run' for the two slab mills they constructed at Felin Fawr. One other example has been identified, at Arthog (SH 6548 1573), dated 1866. Reduction of roofing slate took place on the levels.

In 1873 a railway access was completed to the sea at Porthmadog. The lower part of this route used the track-bed of the disused railway that had formerly served the Gorsedda quarry. This revived the quarry's fortunes to some extent; further levels were started until seven were operating, five of them linked to the main incline. Some underground working took place on floors 3, 4, 5, 6, and 7.

At its peak the quarry employed 200 men, producing 5000 tons per annum. The *Mining Journal* for 31 December 1865 speaks of barracks for about fifty men as having already been built, but more were contemplated. The 1871 census for the parish of Llanfihangel y Pennant only gives three residents, a slate miner, a slate quarry labourer and a stonemason, all married, staying by themselves in the barracks.

The quarry closed in 1886 though some informal and small-scale working went on in the 1920s, apparently using an internal combustion engine to power a saw table. Output was presumably carted or barrowed from the site.

5.4 Site description

The quarry is worked partly by means of open levels, *sincs* (shafts sunk on working floors and opened out laterally) and partly by limited underground chambering accessed by adits, in a poorly-cleaved and faulted vein of slate. Workings levels are numbered 1-7, starting from the upper part of the quarry.

The remains of buildings survive on each working level. These include *gwaliau*, blast shelters, barracks, weighbridge houses and an office. The PTyB archive suggests that the earlier structure to the west of the barracks on floor 3 is a kitchen, and that the large structure to the rear of 12 is a stable. The presence of a stable seems a reasonable supposition, as the trackway through Bwlch y Ddwy Elor was the exit route before the Gorseddau Junction and Portmadoc Railway was built.

Internal movement was carried out by railways on the levels, connecting to a main counterbalance incline from floor 2, serving floors 3, 4, 5 and 6, from the foot of which runs a contour railway to a further counterbalance incline to the mill.

The dam which powered the mill is a substantial feature. It blocks a small stream to form a large lake on its northern side. The dam itself consists of two large walls constructed from dressed rubble blocks, the northernmost being approx. 20m long and a maximum height of 3m. The southernmost wall measures approx. 5m in height and the stonework is flush, giving an ashlar appearance. In the middle of the dam is a large void that continues into the hillside, suggesting that it was initially intended to be larger. The trace of a construction railway for the dam is evident to the east of the reservoir.

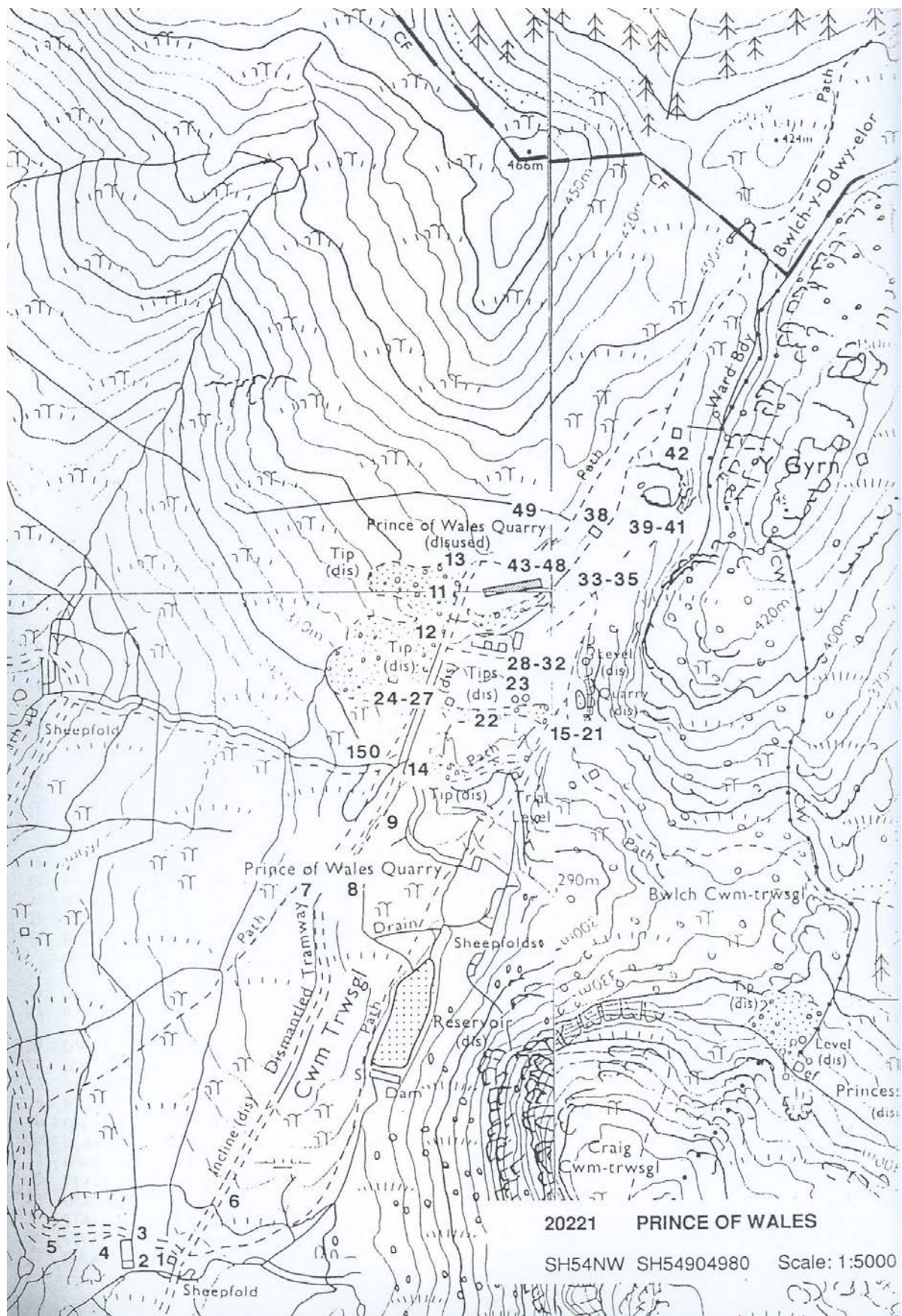
Downstream, the water-supply to the mill water-wheel pit is evident as a row of dilapidated launder supporting a now-vanished launder deriving water from a reservoir impounded by a substantially-constructed dam.

The slate mill is a rectangular building internally measuring 9m by 25m, with slate walls 0.8m thick and a slate floor. It is of the transverse pattern, anticipating those built a few years later at Penrhyn slate quarry. On the east wall there are three arched doorways with radial slate stones at the top as framing; one archway has collapsed leaving only two intact. All three archways are complete on the west wall and the south gable is intact but the north gable and roof timbers and slates are missing. The archways themselves are 2.5m high, 2m across and are partly filled with slate rubble. The wall heights vary from 3m to 3.5m at the long elevations to 5m to 6m at the gables. Two joist holes in each gable can be seen at the height of the eaves and are positioned slightly off-centre. The mill also contains a wheel pit approx. 4m deep, and there is an additional opening above the entrance door to control water-flow. The building was later re-used as a sheepfold.

To the west is a tip created by waste from the mill.

The course of the railway from the quarry to the harbour at Porthmadog is evident, as is the route of the extension to the Cwm Dwyfor copper mine, which passes through a deep cutting to the east of the mill. Nearby is Cwm Trwsgl farm house, where the manager lived, a ruinous single storey stone dwelling roughly 12m by 7.5m with a central entrance, a window to either side of the entrance and two chimneys, one in each gable end. The walls of the main dwelling stand to roof height with chimneys intact. Phasing is evident in the different building materials used, country rock in the earliest phase of the main dwelling and some of the outbuildings with later additions using sawn slate offcuts.

5.5 Identified features (from GAT report)



Map 2: Prince of Wales – features identified in 1994-1995

	Feature	Grid reference	S	C	F	V	P	R	PO	GV
1	LAUNDER SYSTEM - pillars	SH 54593 49271	3	2	1	1	/	/	/	Y
2	WATERWHEEL PIT	SH 5452 4926	1	1	1	1	/	/	/	Y
3	MILL (transverse type) – 3-tramway transverse mill, flattened arch doors	SH 54531 49267	2	1	1	1	/	/	/	Y
4	MILL WASTE TIP	SH 54497 49282	1	1	1	1	/	/	/	Y
5	RAILWAY	SH 5411 5054 to 5525 4391	1	1	1	1	/	/	/	Y
6	INCLINE (counterbalance)	SH 54707 49499 to 54590 49280	1	1	1	1	/	/	/	Y
7	INCLINE DRUMHOUSE (through type)	SH 54707 49499	1	1	1	1	/	/	/	Y
8	YARD – at head of (6)	SH 5472 4950	1	1	1	1	/	/	/	Y
9	RAILWAY	SH 5472 4950 to 5482 4976	1	1	1	1	/	/	/	Y
10	INCLINE (counterbalance)	SH 5482 4976 to 5488 4994	1	1	1	1	/	/	/	Y
11	INCLINE (counterbalance)	SH 5488 4994 to 5492 5004	1	1	1	1	/	/	/	Y
12	INCLINE DRUMHOUSE – inserted feature; course of incline goes straight through this feature suggesting that it was extended by means of (11) to (13) or that it was cut back to (12)	SH 5488 4994	2	2	1	1	/	/	/	Y
13	INCLINE DRUMHOUSE (remote type)	SH 5492 5004	1	1	1	1	/	/	/	Y
14	EMBANKMENT	SH 5488 4981	1	1	1	1	/	/	/	Y
15	WEIGHBRIDGE PIT	uncertain	1	1	1	1	/	/	/	Y
16	ADIT – collapsed	uncertain	/	/	/	/	/	/	/	Y
17	QUARRY PIT	SH 5503 4987	1	1	1	1	/	/	/	Y
18	ADIT – to shaft	SH 5497 4982	1	1	1	1	/	/	/	Y
19	ADIT	SH 5494 4978	1	3	1	1	/	/	/	Y
20	STRUCTURE	uncertain	2	2	1	1	/	/	/	Y
21	GWAL	uncertain	3	3	1	1	/	/	/	Y
22	RAILWAY – equipment; slab sleepers for 6 chairs, other slate sleepers visible on same level	SH 5492 4987	1	1	1	1	/	/	/	Y
23	BLAST SHELTER - two circular huts	SH 5496 4988 and 5497 4988	2	2	2	1	/	/	/	Y
24	WEIGHBRIDGE HOUSE	SH 5489 4988	1	2	2	1	/	/	/	Y
25	INCLINE INTERMEDIATE LEVEL – access from 10	SH 5486 4988	2	2	1	1	/	/	/	Y
26	GWALIAU	SH 5483 4990	2	1	2	1	/	/	/	Y
27	BRIDGE – abutments only	SH 5487 4989	3	1	1	1	/	/	/	Y
28	GWALIAU	SH 5493 4994	3	2	2	1	/	/	/	Y
29	WEIGHBRIDGE HOUSE	SH 5494 4993	1	1	2	1	/	/	/	Y
30	STRUCTURE – function obscure; in 3 blocks. The most northerly includes a door and a window. The central block is a <i>gwal</i> (very high state of preservation). The southernmost	SH 5496 4995	1	1	1	1	/	/	/	y

	has a door and a window.									
31	PRIVY	uncertain	3	2	2	1	/	/	/	Y
32	STACKYARD	SH 5499 4997	1	1	1	1	/	/	/	Y
32B	STACKYARD	uncertain	3	3	1	1	/	/	/	Y
33	STRUCTURE	Uncertain	3	2	2	1	/	/	/	Y
34	STRUCTURE	uncertain	3	3	1	1	/	/	/	Y
35	ADIT - collapsed	SH 5511 5009	/	/	/	/	/	/	/	Y
36	ROAD	SH 5494 4995 to 5499 4998	1	1	1	1	/	/	/	Y
37	RETAINING WALL	SH 5502 5003	1	1	1	1	/	/	/	Y
38	GWALIAU	SH 5497 5000	2	2	2	1	/	/	/	Y
39	STACKYARD	SH 5494 4995	1	1	1	1	/	/	/	Y
40	QUARRY PIT	SH 5511 5013	1	1	1	1	/	/	/	Y
41	STRUCTURE	uncertain	3	3	3	1	/	/	/	Y
42	DEAD NUMBER? Magazine?	/	/	/	/	/	/	/	/	Y
43	WEIGHBRIDGE HOUSE	SH 5499 5000	1	2	2	1	/	/	/	Y
44	GWALIAU	SH 5497 5000	1	2	2	1	/	/	/	Y
45	BARRACKS	SH 5494 5000	1	1	2	1	/	/	/	Y
46	OFFICE – may predate (45) as there is a window in the east wall blocked by the gable end of (45)	SH 5499 5001	2	1	2	1	/	/	/	Y
47	STRUCTURE	SH 5493 5001	2	1	2	1	/	/	/	Y
48	PRIVY	uncertain	2	1	2	1	/	/	/	Y
49	RAILWAY	SH 5492 5004 to 5507 5016	1	1	1	1	/	/	/	Y
50	INCLINE INTERMEDIATE LEVEL	SH 5490 4999	2	2	1	1	/	/	/	Y
51	INCLINE – differential gradient type, cf Penrhyn Quarry felin fawr incline	Duplicate entry?	2	2	1	1	/	/	/	Y

5.6 Existing statutory protection

None

5.7 Conclusions of Baseline study

The following were the conclusions of the Baseline study:

Should not form part of WH bid. An attractive location and a text-book example of quarrying methods of the mid-19th century but without the striking visual appeal or archaeological density of neighbouring Gorsedda quarry and its mill at Ynysypanyd.

5.8 Potential attributes of Prince of Wales slate quarry

(shown in bold on the matrix)

Galleried quarries	{	Extraction	}	• galleries
Pit quarries		Tipping		• first level tips • secondary level tips
Mines				• adits • levels • drainage levels
		Transport		• paths • roads • bridges • railways • railway incline planes • engine sheds • aerial ropeways (blondins and chain inclines) • cranes • weighbridges
		Power-		• engine house • boiler house • engine • steam

		generation	engine • water-wheel • wheel pit • hydroelectric power house • electricity sub-station • electricity pole • flat-rods • compressor house
		Pumping	• water-pumps • pumping shaft
		Explosives	• powder magazine • blast wall
SLATE PROCESSING			
Hand-processing sites	Quarry shelter		• gwaliau
Mechanical processing sites	Slate mills, slate processing works		• radial mills • transverse mills • longitudinal mills • bay mills • multi-floor mills • mill tips
	Machinery		• swing saws • Greaves saws • Hunter saws • diamond saws • trimming machinery • power sources • power transmission
	Power-generation		• engine house • steam engine • water-wheel • wheel pit
Slate yards	Slate yards		• slate yards
Maintenance			
Maintenance facilities			• blacksmiths' workshops • engineering workshops
Social/ health			
	<i>Caban</i>		• caban
	Hospital		• hospital
SLATE TRANSPORT (overland)			
Road transport sites	Routeways		• paths • industrial roads • drove roads • toll-roads
	Bridges		• clapper bridges • beam bridges • arch bridges
	Toll-houses		• toll-houses
Water transport sites	Route		• canal feature • canal building • canal embankment • quay • canal office
	Vessels		• wrecks
Railway transport site	Formation		• contour formations • railway cutting • railway embankments • railway bridges • railway inclined planes
	Permanent way		• ballast • sleepers • track
	Railway stations, and railway workshops		• railway engineering works • railway workshop • railway station building
	Locomotives and railway wagons		• motive power • slate wagons • workers' carriages
All transport sites	Inter-modal exchange		• rail-rail exchange • road-rail exchange
SLATE TRANSPORT (maritime)			
Dock and harbour installations	Port, dock, harbour, quays		• quays • docks • harbours • slate sheds • port authority office
	vessels		• wrecks containing slate cargo
SLATE COMMUNITIES - DOMESTIC			
Settlement	town		• houses • places of worship • libraries • reading rooms • town halls • market halls • public houses
	village		• houses • places of worship • libraries • reading rooms • public houses
	model settlement		• houses • places of worship
	squatter settlement		• houses • places of worship

Country house estate		• country house gardens • country houses • estate wall • gate lodge
SLATE END USE		
Split slates	randoms/early roofs	• randoms/early roofs
	later roofs	• later roofs
	wall hangings	• wall hangings
	writing slates	• writing slates
Slabs	architectural	• architectural components • walling material
	other	• slate fence (<i>crawiau</i>) • gravestones

6 DISCUSSION

6.1 Principles

Any decision as to the suitability of either site must be made on the basis of UNESCO criteria for OUV rather than on national criteria for Scheduling as an Ancient Monument. In this sense it is irrelevant that previous assessments have identified no features of national importance, if attributes of Outstanding Universal Value can be shown to exist.

It is clear that GAT report 154 is a useful starting point for identifying possible additional surface features in slate quarries that are potentially of national significance, if it is used cautiously and in the light of the considerable expansion in knowledge that has taken place over twenty years (3.1). Such features may constitute ‘attributes’ which exemplify Outstanding Universal Value.

As 4.8 and 5.8 demonstrate, potential attributes can be identified in both locations, but it is also clear that many can also be identified in any slate quarry in Wales. It therefore becomes a matter of professional judgement, based on an informed understanding of the archaeological and cultural resource, as to which are the sites where potential attributes eloquently embody OUV.

National criteria for Scheduling as Ancient Monuments remain relevant to the World Heritage process in that UNESCO will expect a site forming part of a bid to be protected to the highest level the jurisdiction permits. In the case of a relict quarry site, this will mean Scheduling as an Ancient Monument. It is important to note here that, as section 3 **Methodology** observes, both knowledge of the resource and Scheduling practice have evolved since the 1994-5. Scheduling enhancement programmes intended to contribute to the gazetteer and to a conservation management plan for the World Heritage bid will therefore need to take into account the need to identify potential attributes which demonstrate strong group value.

It is significant in this context that group value is identified as particularly strong in the case of Prince of Wales quarry in the 1994-5 report (GAT 154).

6.2 Landscape Context

Group value will contribute considerably to a site’s potential. Slate quarries are comparatively easy to read as landscape features because of the strong visual relationship between different components. Group value is therefore strong. The criterion here (‘In some cases, it is preferable to protect the complete group of monuments, including associated and adjacent land, rather than to protect isolated monuments within the group’) is an existing and accepted rationale for scheduling a wide area.

The rationale is set out in Gwyn 2015:

... individual sites, and the structures and artefacts within them, also acquire a meaning within a broader pattern. The essential in each case is the working face or the mine entrance, which cuts into the hill-slope, and, extending from it, the huge tips of waste rock. Other elements add to the mix, such as the long, low mill buildings. In addition, cart-roads and winding single-track railways make their way down narrow valleys and precipitous slopes to quaysides or to yards on the main line. It is often said that mineral-working is a process which significantly destroys evidence of its own history, yet this is by no means the case – processing and tipping areas in slate quarries were chosen with considerable care so as not to preclude further extraction, and the extent of underground working is only evident in landscape terms as surface tips. What makes slate quarries comparatively easy to ‘read’ as archaeological sites is the way in which the eye is drawn to their main internal transport routes, which until the 1960s was nearly always a narrow-gauge railway. Whether as contour features or in the form of inclined planes, often built on massive embankments of slate rubble, they indicate process flow, from the workings to the tips or to the mills and to the stack-yards, then away from the quarry to navigable water or to a main line. Water channels often aid understanding in the same way, showing how a reservoir on the mountainside above the quarry might feed a wheel-pit built into the gable of a mill building. These and other structures – smithies, workshops, locomotive sheds, offices, hospitals, barracks – even in ruin exhibit their form and design, as well as their use and function (Gwyn 2015, 26).

In this respect, the group value identified in Prince of Wales quarry by GAT 154 is significant. The relationship of features with each other is very strong in this particular site. Hafod y Llan forms part of a remarkable cultural landscape and is scenically spectacular, but the present document confirms the findings of GAT 154 that the group value of quarry-related features is not particularly high.

The criteria evolved by Cadw meet the needs of national statutory protection within the UK jurisdiction but need re-interpretation to meet the requirements of a UNESCO world heritage bid. UNESCO will expect all sites for inscription to be protected by the highest level of statutory protection the jurisdiction permits.

The **rarity** criterion (‘In general ... a selection must be made which portrays the typical and commonplace as well as the rare’) needs review for the requirements of a World Heritage bid.

7 CONCLUSIONS

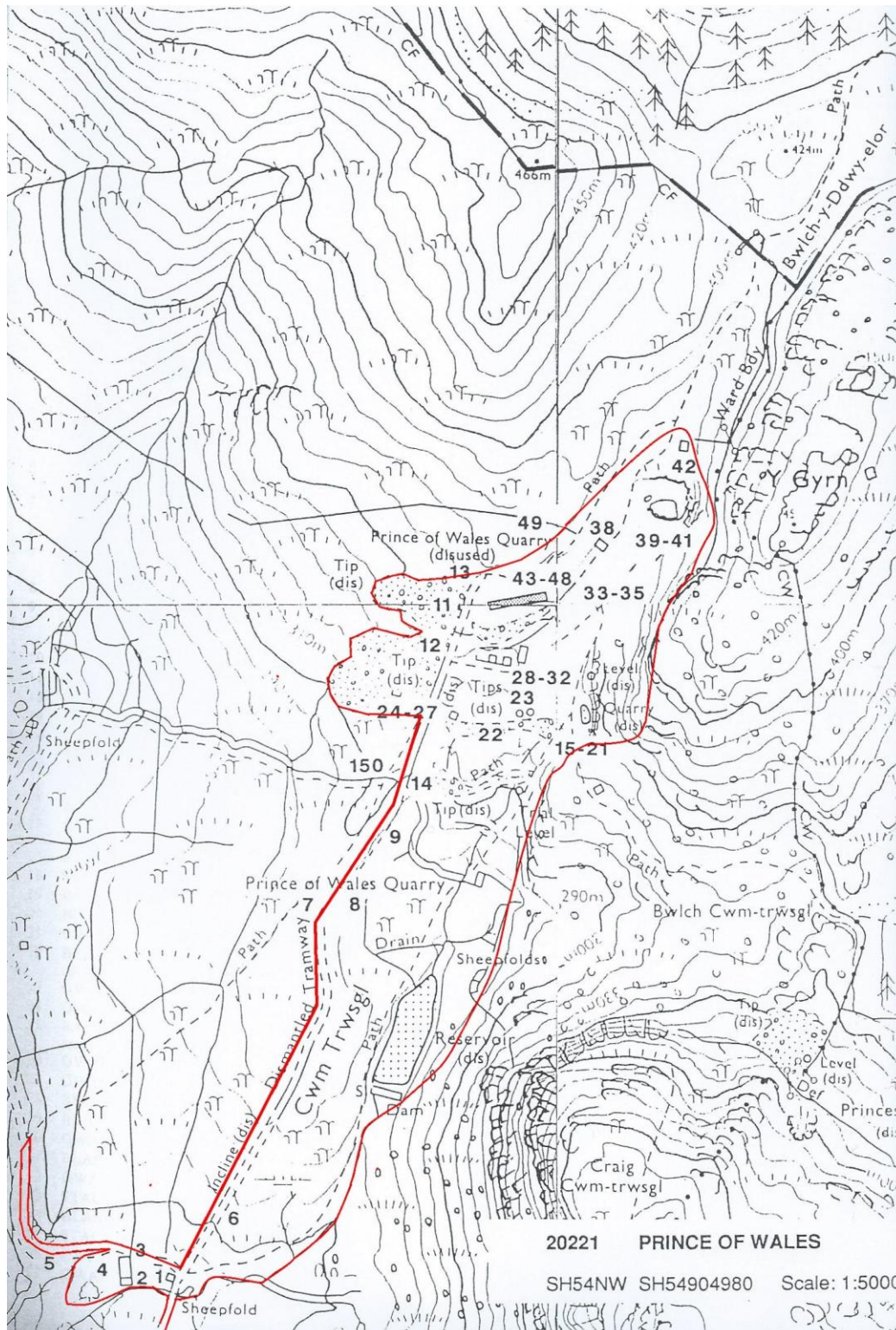
This report concludes on the basis of section 4 above, that Hafod y Llan slate quarry and its railway do not demonstrate the landscape/spatial relationship of its constituent features which would justify inclusion in the World Heritage bid, though they form a powerful cultural landscape in their own right, and are located in a spectacular natural environment.

This report concludes on the basis of section 5 above, that Prince of Wales slate quarry should, contrary to the recommendation of the baseline study, be included in the World Heritage, on the basis of the eloquent landscape/spatial relationship of its various features, its parallels with the evolution of technology in other sites, and for its testimony to rash commercial optimism, though individual features can be paralleled elsewhere.

It is also concluded that the track-bed of the Gorsedda Junction and Portmadoc Railways associated with the Prince of Wales quarry should be considered for inclusion in the World Heritage bid, subject to field-work assessment and identification of individual features.

8 RECOMMENDATIONS

It is recommended that the Prince of Wales quarry and the Gorsedda Junction and Portmadoc Railways be included in the Gwynedd Council World Heritage bid. A suggested outline is shown below.



Map 3: Prince of Wales – recommended area for Scheduling

It is recommended that Hafod y Llan slate quarry should not be included in the Gwynedd Council World Heritage bid.

However

It is recommended that consideration be given to full survey and the development of a Conservation Management Plan for Hafod y Llan slate quarry, including stabilisation of the features.

It is recommended that consideration be given to full survey, including documentary research, and the development of a Conservation Management Plan for Hafod y Llan copper mill, the Braich yr Oen copper mine and their associated transport features, including stabilisation of the features, as recommended by EAS 2013 with a view to Scheduling as an Ancient Monument.

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Richards AJ 1991: *Gazetteer of the Welsh Slate Industry* (Capel Garmon)

9.2 Journals

Mining Journal, as noted.

9.3 Official documents

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9.4 Unpublished reports

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Gwynedd Slate Industry Transport Routes (for Cadw, 2014: Report 1207)

9.4.2 Plas Tan y Bwlch:

Archive of 1974 'Practical Industrial Archaeology' course

9.4.3 Engineering Archaeological Services:

Hafod y Llan Hydro Scheme Watching Brief (for National Trust, 2013)

9.4.4 Govannon consultancy:

9.5 Archival sources

9.5.1 BU

Searell papers

9.5.2 CRO

Breese Jones and Casson (BJC)

(end of main document; appendix follows)

DRAFT

APPENDIX: PHOTOGRAPHS
HERITAGE ASSESSMENT OF HAFOD Y LLAN AND PRINCE OF WALES QUARRIES

APPENDIX: Figures 1-6 Hafod y Llan quarry; figures 7-12 Prince of Wales quarry

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Fig. 1: Hafod y Llan quarry from the air

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Fig. 2: Hafod y Llan quarry from the south-west

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Fig. 3: Hafod y Llan mill

© SNP



Fig. 4: Hafod y Llan – bridge and mill tip

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Fig. 5: Hafod y Llan quarry barracks

© SNP



Fig. 6: Hafod y Llan – exit railway and incline

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Fig. 7: Prince of Wales quarry from the air

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Fig. 8: Prince of Wales mill from the west

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Fig. 9: Inclines and working levels from the south

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Fig. 10: Floor 4, *gwaliau* and office

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Fig. 11: Structure on floor 3

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Fig. 12: *Gwaliau* with reservoir in distance

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