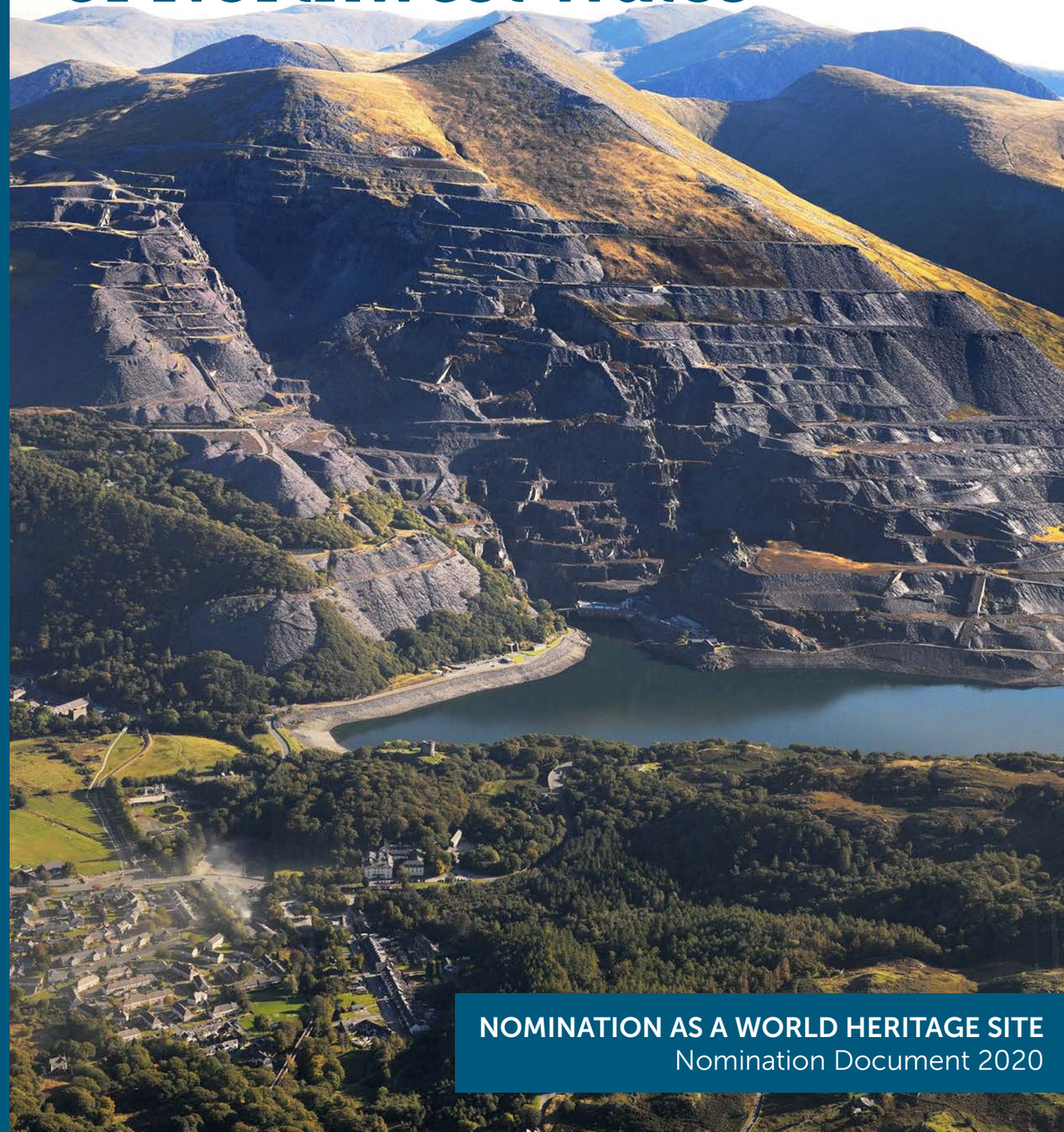
The Slate Landscape of Northwest Wales was formed by the quarrying, processing and transportation of slate to produce roofing materials and architectural materials for global markets, from the late eighteenth century to the twentieth. As well as the quarries and mines themselves, this landscape has also 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.

Tirwedd Llechi Gogledd Orllewin Cymru
The Slate Landscape of Northwest Wales

Llechi Cymru
Wales Slate

Tirwedd Llechi Gogledd Orllewin Cymru

The Slate Landscape of Northwest Wales



NOMINATION AS A WORLD HERITAGE SITE
Nomination Document 2020

Tirwedd Llechi Gogledd Orllewin Cymru

The Slate Landscape of Northwest Wales

NOMINATION AS A WORLD HERITAGE SITE

Nomination Document
2020

The Slate Landscape of Northwest Wales Partnership Steering Group
This World Heritage Nomination is led by Gwynedd Council

Llechi Cymru
Wales Slate

CYNGOR GWYNEDD COUNCIL

Other organisations committed to The Slate Landscape of Northwest Wales nomination for World Heritage Status are:

Cadw

Llywodraeth Cymru
Welsh Government

Parc Cenedlaethol Eryri
Snowdonia National Park

CBHC
RCAHMW

Prifysgol Bangor University

Ymddiriedolaeth Genedlaethol
National Trust

national slate museum
amgueddfa llechi cymru

Foreword

The Rt Hon Helen Whately
Member of Parliament,
Minister for Arts, Heritage and Tourism

On behalf of the United Kingdom Government, as State Party to the World Heritage Convention, I submit the nomination dossier for *The Slate Landscape of Northwest Wales* for inclusion on the World Heritage List.

We are very proud of our 32 World Heritage sites, which span the breadth of our collective past – from early sites such as The Heart of Neolithic Orkney, to the modern Jodrell Bank Observatory. These sites are unique and varied, exemplifying some of the most important stages in global development. *The Slate Landscape of Northwest Wales* is equally deserving of this high accolade for its contribution to the exceptional collection of sites that form the UK's globally important industrial heritage.

The Slate Landscape of Northwest Wales provided roofing and architectural materials for national and international markets, becoming the world leader by the end of the nineteenth century. Today there remains compelling landscape evidence of not only the technological advancements made and the quarries themselves, but also for the processing and transport of slate, and for the lives of the owners, communities of workers and their families.

I present this nomination dossier detailing the case for this extraordinary site to take its rightful place on the World Heritage list. I wish to thank Gwynedd Council and its partners – the Welsh Government; National Museum Wales; the Royal Commission on the Ancient and Historical Monuments of Wales; Snowdonia National Park; the National Trust and Bangor University, and the many landowners and stakeholders across Gwynedd for their work in developing this nomination over the past ten years.

Ar ran Llywodraeth y Deyrnas Unedig, fel Gwladwriaeth sy'n Barti i'r Confensiwn Treftadaeth y Byd, cyflwynaf enwebiad ar gyfer Tirwedd Llechi Gogledd Orllewin Cymru i'w gynnwys ar Restr Treftadaeth y Byd.

Rydym yn ymfalchïo yn ein 32 o safleoedd Treftadaeth y Byd, sy'n ymdrin ag ehangder ein gorffennol – o safleoedd cynnar megis Calon Ynysoedd Erch Neolithig, i safle modern Arsyllfa Jodrell Bank. Dyma safleoedd unigryw ac amrywiol, sy'n enghreifftiau o rai o'r camau pwysicaf yn natblygiad y byd. Mae Tirwedd Llechi Gogledd Orllewin Cymru yn llwyr haeddu'r anrhydedd hynod hon am ei gyfraniad i'r casgliad eithriadol o safleoedd sy'n ffurfio treftadaeth ddiwydiannol o bwys rhyngwladol yn y Deyrnas Unedig.

Darparodd Tirwedd Llechi Gogledd Orllewin Cymru ddeunyddiau toi a phensaernïol i farchnadoedd cenedlaethol a rhyngwladol, gan arwain y gad yn fyd-eang erbyn diwedd y bedwaredd ganrif ar bymtheg. Heddiw, erys tystiolaeth rymus, nid yn unig o'r datblygiadau technolegol a gyflawnwyd a'r chwareli eu hunain, ond hefyd ddulliau o brosesu a chludo llechi, ac o fywydau'r perchnogion, a chymunedau o weithwyr a'u teuluoedd.

Cyflwynaf yr enwebiad sy'n manylu pam y dylai'r safle hynod hwn gael ei le haeddiannol ar y Rhestr Treftadaeth y Byd. Dymunaf ddiolch i Gyngor Gwynedd a'i bartneriaid – Llywodraeth Cymru; Amgueddfa Genedlaethol Cymru; Comisiwn Brenhinol Henebion Cymru; Parc Cenedlaethol Eryri; yr Ymddiriedolaeth Genedlaethol a Phrifysgol Bangor, a'r tirfeddianwyr a'r budd-ddeiliaid niferus ledled Gwynedd am eu gwaith wrth ddatblygu'r enwebiad hwn dros y deng mlynedd diwethaf.

Y Gwir Anrhydeddus Helen Whately
Aelod Seneddol;
Gweinidog ar gyfer y Celfyddydau, Diwylliant a Thwristiaeth

Au nom du gouvernement de la Grand Bretagne et en tant qu'État partie à la Convention du Patrimoine Mondial, je souhaite présenter le dossier de nomination du *Paysage Ardoisier du nord-ouest du Pays de Galles* en vue de son inclusion sur la liste du Patrimoine Mondial.

Nous sommes très fiers de nos 32 sites classés au Patrimoine Mondial. Ils reflètent l'étendue de notre vaste passé collectif, qu'il s'agisse de sites anciens comme le Cœur des Orcades Néolithiques, ou de sites modernes comme l'Observatoire de Jodrell Bank. Ces sites, uniques et variés, sont de parfaits exemples de certaines des étapes les plus importantes du développement mondial. Le *Paysage Ardoisier du nord-ouest du Pays de Galles* mérite à son tour de recevoir cette éminente distinction, pour sa contribution à l'exceptionnel ensemble de sites qui constituent le patrimoine industriel du Royaume-Uni, patrimoine dont l'importance historique va au-delà de nos frontières.

Le *Paysage Ardoisier du nord-ouest du Pays de Galles* a pendant longtemps fourni des matériaux de construction et de couverture pour les marchés nationaux et internationaux, faisant de la région le leader mondial de l'ardoise à la fin du dix-neuvième siècle. Aujourd'hui encore, ce paysage reste profondément marqué par ce passé. Les carrières, les avancées technologiques qui ont permis leur exploitation, la transformation et le transport de l'ardoise : ces choses ont façonné la vie des propriétaires, des communautés de travailleurs et de leurs familles.

Je présente ce dossier de candidature afin que ce site extraordinaire puisse prendre la place qui lui revient sur la liste du Patrimoine Mondial. Je souhaite remercier Gwynedd Council et ses partenaires, le gouvernement gallois, le Musée National du Pays de Galles, la Commission Royale pour les Monuments Anciens et Historiques du Pays de Galles, le parc national de Snowdonia, le National Trust et l'Université de Bangor, ainsi que les nombreux propriétaires terriens et parties prenantes partout dans le comté de Gwynedd pour leur travail au cours de ces dix dernières années, qui a permis d'élaborer cette candidature.

La Très Honorable Helen Whately
députée; Ministre des Arts, du Patrimoine et du Tourisme

Foreword

The Rt Hon Mark Drakeford
Assembly Member and Privy Counsellor,
First Minister of Wales

The landscapes of Wales bear the evidence of centuries of history and of the activities of generations of women and men who have lived, worked and shaped the land where we live today.

Some of our most dramatic landscapes are those shaped by quarrying and mining. The Industrial Revolution was powered by coal from the South Wales Valleys but the homes people lived in and the factories people worked in were covered with slate, which had been quarried by hard-working and skilled men in the mountains of Northwest Wales. Shipped from harbours in Gwynedd to ports across the globe, Welsh slate can still be found on the roofs of buildings around the world.

I am delighted the Welsh Government has been able to support the nomination of *The Slate Landscape of Northwest Wales* for World Heritage status. This cultural landscape nomination represents one of the most ancient and fundamental human economic activities – extracting and working stone. The bid emphasises the important role of technology in quarrying, processing and moving slate but it also celebrates the profound cultural and societal changes which industrialisation brought to this region.

The culture and language of the quarry communities of Northwest Wales was distinctive. The working men and women made their own world – in religion, politics and the creative arts. Today, this unique industrial and cultural landscape survives not only as a testament to the international distribution of an important commodity but also as a tribute to the people, their resilience and their passion for the Welsh language and culture.

I would like to express my thanks to the many people and organisations who have worked in partnership to develop this nomination document for a compelling site. On behalf of the Welsh Government, I am delighted to give my full support to this nomination for World Heritage status.

Mae tirweddau Cymru yn dangos ôl canrifoedd o hanes a gweithgareddau cenedlaethau o ferched a dynion oedd yn byw, yn gweithio ac yn ffurfio'r tir lle'r ydym ni'n byw heddiw.

Yn wir, rhai o'n tirweddau mwyaf dramatig yw'r rhai a ffurfiwyd gan weithgareddau'r chwareli a'r pyllau glo. Glo o Gymoedd De Cymru a daniodd y Chwyldro Diwydiannol – ond llechi oedd yn rhoi to ar gartrefi pobl ac ar y ffatrïoedd lle'r oeddynt yn gweithio – llechi oedd wedi'u cloddio gan ddynion crefftus oedd yn llafurio'n galed ym mynyddoedd Gogledd Orllewin Cymru. Câi'r llechi eu cludo o harbyrau yng Ngwynedd i borthladdoedd ledled y byd, ac fe ellir gweld llechi Cymru ar doeau adeiladau ar draws y byd hyd heddiw.

Pleser o'r mwyaf i mi yw bod Llywodraeth Cymru wedi medru cefnogi enwebiad bid *Tirwedd Llechi Gogledd Orllewin Cymru* am statws Treftadaeth y Byd. Mae'r enwebiad tirwedd diwylliannol hwn yn cynrychioli un o weithgareddau mwyaf hynafol a sylfaenol bodau dynol – echdynnu a gweithio carreg. Mae'r bid yn pwysleisio rôl bwysig technoleg wrth chwarela, prosesu a symud llechi, ond mae hefyd yn dathlu'r newidiadau diwylliannol a chymdeithasol dwys a ddaeth i'r rhanbarth hwn yn sgil diwydiannaeth.

Roedd diwylliant ac iaith cymunedau chwarel Gogledd Orllewin Cymru yn unigryw. Lluniodd y dynion a'r merched gweithgar hyn eu byd eu hunain – yn grefyddol, yn wleidyddol ac yn y celfyddydau creadigol. Heddiw, mae'r dirwedd ddiwydiannol a diwylliannol unigryw hon yn goroesi nid yn unig fel arwydd o ddosbarthiad rhyngwladol deunydd o bwys ond hefyd fel teyrnged i'r bobl, i'w gwytnwch ac i'w hangerdd tuag at yr iaith Gymraeg a diwylliant Cymreig.

Hoffwn fynegi fy ngwerthfawrogiad i'r bobl a'r sefydliadau lu sydd wedi gweithio mewn partneriaeth i ddatblygu'r ddogfen enwebiad hon ar gyfer safle mor rymus. Ar ran Llywodraeth Cymru, mae'n bleser gen i roi cefnogaeth lwyr i'r enwebiad hwn am statws Treftadaeth y Byd.

Y Gwir Anrhydeddus Mark Drakeford
Aelod Cynulliad a Chyfrin Gynghorydd,
Prif Weinidog Cymru

Les paysages du Pays de Galles portent la trace de plusieurs siècles d'histoire et des activités de générations de femmes et d'hommes qui ont vécu et travaillé dans cette région, et qui ont façonné le territoire sur lequel nous vivons aujourd'hui.

Certains de nos paysages les plus pittoresques ont été marqués par l'exploitation des carrières et des mines. C'est le charbon des vallées du sud du Pays de Galles qui a permis la révolution industrielle, mais c'est l'ardoise des montagnes du nord-ouest du Pays de Galles, taillée par des hommes habiles et durs à la peine, qui a recouvert les demeures des habitants et les toits des usines où ils travaillaient. Cette ardoise galloise, qui a quitté les ports du Gwynedd pour traverser les mers, se retrouve encore aujourd'hui sur les toits de nombreux bâtiments autour du monde.

Je suis enchanté que le gouvernement du Pays de Galles ait pu soutenir la nomination du *Paysage Ardoisier du nord-ouest du Pays de Galles* afin qu'il soit classé au Patrimoine Mondial. La nomination de ce paysage culturel recouvre l'une des activités économiques les plus anciennes et les plus fondamentales : l'extraction et le travail de la pierre. Cette candidature insiste sur le rôle essentiel de la technologie pour l'exploitation des carrières, la transformation et le transport de l'ardoise ; elle célèbre aussi les profonds changements culturels et sociétaux que l'industrialisation a apportés à cette région.

Les communautés qui travaillaient dans les carrières d'ardoise du nord-ouest du Pays de Galles possédaient leur propre culture et leur propre langue. Ces ouvriers et ouvrières bâtirent leur propre monde, en religion, en politique et dans les arts. Aujourd'hui, ce paysage industriel et culturel unique demeure, non seulement comme témoignage du commerce international d'une marchandise importante, mais aussi comme hommage à ce peuple, sa résilience et sa passion pour la langue et la culture galloises.

Je souhaite exprimer mes remerciements aux nombreuses personnes et organisations qui ont collaboré au partenariat afin de mettre sur pied cette nomination pour un site fascinant. Au nom du gouvernement gallois, je suis très heureux de soutenir de tout cœur cette nomination au statut de site du Patrimoine Mondial.

Le Très Honorable Mark Drakeford
Membre de l'Assemblée nationale du Pays de Galles,
membre du Conseil privé de Sa Majesté, Premier Ministre du Pays de Galles

Preface

Dafydd Wigley
The Rt Hon the Lord Wigley of Caernarfon,
Privy Counsellor

As chair of the Partnership Steering Group promoting World Heritage status for *The Slate Landscape of Northwest Wales*, it gives me great pleasure, to introduce this dossier on behalf of Gwynedd Council, which sets out the case for inscription by UNESCO.

Slate, quarried from mountain-slope and valley-floor, or mined from the bowels of the earth, hewn by sweat, blood and silicotic lungs, was the all-purpose material of our community. It roofed our homes, and the off-cut waste provided ready-made walling blocks. Placed on end, slate slabs – *crawiau* – were the natural field dividers. Even water-troughs on farms were constructed from carefully mortised slate. The doorsteps of our homes were of slate, as were our gateposts, the slabs on which we walked and the name-plates by our doors, not to mention our gravestones. In global terms, it was a major export, carried on small wooden schooners to Hamburg, Szczecin, Melbourne and New York, as well as to countless harbours and ports elsewhere. A roof of purple Cambrian slate or grey Ordovician slate, instantly recognisable in any town or city in any continent, is testament to the ways in which our quarries provided the materials for the great building boom of the nineteenth century, and powerfully influenced both architectural style and civic order.

It was not only the slate itself that was exported; many quarrymen and their families went to Canada, to the United States and to Australia to open quarries. A rock-hard environment and the harsh climate made these people what they were – rock-solid, reliable and enduring; *Cadernid Gwynedd* ('the dependability of Gwynedd') is the motto of our county. The harsh working climate, in which industrial disease was endemic, created a community where inter-dependence was essential. The slate-quarrying communities of northwest Wales were in the vanguard of the struggle for employee rights, social reform and educational opportunity; and were an inspiration to others further afield. Yet there was more to them even than this. There is always a danger in a marginal area like Gwynedd, and wherever an ancient minority language remains strong, that we imagine these communities, rugged and hard-working as they undoubtedly were, to be lacking in both inventiveness and diligence. Our slate story tells us otherwise. New towns and villages came into being to house the workforce; these are excellent examples of industrial-era communities, but they also have their unique Welsh character. The slate railways of Northwest Wales, carved through rock cuttings or carried across mountain streams on high stone causeways, proved a model for similar systems in mountain environments across the world. Engineers, managers and technicians made informed choices about new handling systems, machinery for pumping or tunnelling, or saws for squaring slate blocks. These are just some of the many good reasons why I believe that the world will want to know more about *The Slate Landscape of Northwest Wales*, and will appreciate and enjoy its significance.

I therefore heartily commend this *The Slate Landscape of Northwest Wales* for consideration by UNESCO as a World Heritage site.

Fel cadeirydd Grŵp Llywio'r Bartneriaeth sy'n hyrwyddo statws Treftadaeth y Byd ar gyfer Tirwedd Llechi Gogledd Orllewin Cymru, pleser o'r mwyaf yw cyflwyno'r goflen hon ar ran Cyngor Gwynedd, sy'n amlinellu'r achos dros arysgrifiad gan UNESCO.

Llechi wedi'u cloddio o lethrau'r mynyddoedd a lloriau'r dyffrynnoedd, neu o grombil y ddaear, wedi'u naddu gan chwys, gwaed ac ysgyfaint silicotig, oedd y deunydd ar gyfer bob dim yn ein cymuned. Rhoddodd y llechi do uwch ein pennau, ac roedd y gwastraff yn ddeunydd cyfleus i godi waliau. Gosodwyd slabiau llechi yn y ddaear i greu crawiau, oedd yn waliau terfyn naturiol mewn caeau. Câi hyd yn oed cafnau dŵr ar ffermydd eu creu o lechen oedd wedi'i morteisio'n ofalus. Roedd carreg yr aelwyd, pyst giatiau, y slabiau o dan ein traed, placiau enwau ein tai, heb anghofio am ein cerrig beddi, oll wedi'u llunio o lechi. O ran allforio byd-eang, roedd hwn yn gynnyrch o bwys mawr, ac fe gariwyd y llechi ar sgwneri pren bychan i Hamburg; Szczecin, Melbourne ac Efrog Newydd, yn ogystal â harbyrau a phorthladdoedd dirifedi eraill ledled y byd. Mae to o lechi Camriaidd piws neu lechi Ordoficiaidd llwyd, sy'n adnabyddus yn syth mewn unrhyw dref neu ddinas ar unrhyw gyfandir, yn dystiolaeth o sut y bu i'n chwareli ddarparu'r deunyddiau ar gyfer y ffyniant mawr a fu yn y maes adeiladu yn y bedwaredd ganrif ar bymtheg, ac a fu'n ddylanwad pwerus ar arddull pensaernïol a threfn ddinesig.

Nid y llechi eu hunain gafodd eu hallforio cofiwch chi; bu i nifer o chwarelwyr a'u teuluoedd fynd draw i Ganada, yr Unol Daleithiau ac Awstralia i agor chwareli. Roedd yr amgylchedd galed a'r hinsawdd garw yn rhan o hunaniaeth y bobl hyn – pobl solet, dibynadwy a goddefgar; Cadernid Gwynedd yw arwyddair ein sir. Bu i'r amodau gwaith caled, lle roedd afiechydon diwydiannol yn endemig, greu cymuned lle roedd yn hanfodol fod pawb yn medru dibynnu ar ei gilydd. Roedd cymunedau chwareli llechi gogledd orllewin Cymru ar flaen y gad yn y frwydr i ennill hawliau i weithwyr, diwygio cymdeithasol a chyfleoedd addysgiadol; ac roeddynt yn ysbrydoliaeth i eraill ymhell i ffwrdd. Ac eto, roedd cymaint mwy iddynt na hyn. Mae perygl yn llechu bob amser mewn ardal ymlol fel Gwynedd, a lle bynnag y mae iaith frodorol hynafol yn parhau'n gryf - rydym yn dychmygu bod y cymunedau hyn – er mor arw a gweithgar yr oeddynt, yn wan o ran eu harloesedd a'u diwydrwydd. Ond, mae'n stori llechi ni yn wahanol. Cafodd trefi a phentrefi newydd eu creu i gartrefu'r gweithlu; dyma enghreifftiau gwych o gymunedau o'r oes ddiwydiannol, ond mae iddynt hefyd gymeriad Cymreig unigryw. Bu i reilffyrdd llechi Gogledd Orllewin Cymru, a naddwyd drwy greigiau neu a gludwyd dros nentydd mynyddig ar sarnau cerrig uchel, ddarparu model ar gyfer systemau tebyg mewn amgylcheddau mynyddig ledled y byd. Gwnaeth peirianwyr, rheolwyr a thechnegwyr benderfyniadau deallus ynghylch systemau trin newydd, peiriannau ar gyfer pwmpio neu dwnelu, neu lifiau i'w defnyddio i sgwaru blociau llechi. Dyma flas ar rai o'r rhesymau eithriadol y credaf pam y bydd y byd am wybod rhagor am Dirwedd Llechi Gogledd Orllewin Cymru, ac y bydd yn gwerthfawrogi ac yn mwynhau ei arwyddocâd.

Felly, rwyf yn argymell yn frwd bod Tirwedd Llechi Gogledd Orllewin Cymru yn cael ei ystyried gan UNESCO fel Safle Treftadaeth y Byd.

Dafydd Wigley
Y Gwir Anrhydeddus Arglwydd Wigley o Gaernarfon,
Cyfrin Gynghorydd

En tant que président du comité directeur du partenariat chargé de promouvoir la candidature du *Paysage Ardoisier du nord-ouest du Pays de Galles* afin qu'il obtienne le statut de site du Patrimoine Mondial, c'est pour moi un immense plaisir que de

présenter, au nom de Gwynedd Council, ce dossier qui définit les arguments pour son inscription par l'UNESCO.

L'ardoise, durement gagnée au prix de la sueur, du sang et du souffle des poumons silicotiques des mineurs, sur les pentes des montagnes et au fond des vallées, ou extraite des entrailles de la terre, était autrefois le matériau par excellence dans nos communautés. L'ardoise était le toit de nos demeures, et les déchets de coupe nous fournissaient des blocs prêts à être employés pour les murs. Les plaques d'ardoise appelées *crawiau* qui se dressaient dans les champs servaient à en marquer les limites. Même les abreuvoirs des fermes étaient construits à partir de plaques d'ardoise soigneusement mortaisées. Nos pas de porte étaient en ardoise, les chambranles de nos portails, les dalles sur lesquelles nous marchions, les plaques à nos noms à côté de nos portes, et finalement nos pierres tombales. L'ardoise était exportée partout dans le monde, transportée par goélettes jusqu'à Hambourg, Szczecin, Melbourne ou New-York, ainsi que de nombreux autres ports. Un toit d'ardoise cambrienne violette, ou d'ordovicienne grise, est instantanément reconnaissable dans n'importe quelle ville sur n'importe quel continent: c'est le témoin de la façon dont nos carrières ont fourni les matériaux qui ont servi au grand boom du bâtiment au dix-neuvième siècle, et ont puissamment influencé à la fois le style architectural et l'ordre civique.

Mais l'ardoise n'a pas été la seule à s'exporter: de nombreux ouvriers et leurs familles partirent pour le Canada, les États-Unis et l'Australie, où ils exploitèrent de nouvelles carrières. La dureté de la pierre et la rudesse du climat, leur environnement de tous les jours, façonnèrent ces gens à leur image: d'une solidité, d'une fiabilité et d'une endurance à toute épreuve. « Cadernid Gwynedd », « solide comme Gwynedd », telle est la devise de notre comté. Ce climat de dur labeur, dans lequel les maladies industrielles étaient endémiques, créa une communauté où il était essentiel que chacun puisse compter sur tous. Les communautés du nord-ouest du Pays de Galles qui exploitaient les carrières d'ardoise furent à l'avant-garde des luttes pour les droits des travailleurs, pour les réformes sociales et les opportunités éducatives; elles furent l'inspiration d'autres communautés à leur tour. Et ce n'est pas tout. Pour un territoire isolé, éloigné comme le Gwynedd, à un endroit où une langue ancienne et minoritaire garde son influence, le danger serait de s'imaginer que ces communautés, robustes et dures à la peine comme elles l'étaient sans l'ombre d'un doute, aient manqué d'inventivité et de zèle. L'histoire de l'ardoise nous apprend qu'il n'en est rien. De nouveaux bourgs et villages furent construits pour loger les travailleurs: ce sont d'excellents exemples de communautés industrielles, mais qui gardent aussi leur caractère gallois unique. Les chemins de fer du nord-ouest du Pays de Galles qui servirent à transporter l'ardoise, taillés dans le roc ou franchissant des torrents de montagnes sur de vertigineuses chaussées de pierre, se sont avérés être un modèle pour des systèmes similaires en milieu montagneux partout dans le monde. Ingénieurs, maîtres d'œuvre et techniciens firent des choix judicieux pour de nouveaux systèmes de manutention, des machines pour pomper ou creuser des tunnels, des scies pour équarrir des blocs d'ardoise. Et ce ne sont que quelques-unes des excellentes raisons pour lesquelles je suis persuadé que le monde entier sera enchanté d'en savoir plus sur le *Paysage Ardoisier du nord-ouest du Pays de Galles*, et saura apprécier et goûter son importance.

C'est pourquoi je soutiens de tout cœur la candidature du *Paysage Ardoisier du nord-ouest du Pays de Galles* afin qu'elle soit prise en considération par l'UNESCO pour en faire un site du Patrimoine Mondial.

Dafydd Wigley

Le Très Honorable Lord Wigley de Caernarfon,
membre du Conseil privé de Sa Majesté.

Figure E.2. A slate-maker at work splitting a block in Penrhyn Quarry in 1911.

Contents

Executive Summary

State Party
United Kingdom

State, Province or Region
County of Gwynedd (Wales)

Name of Property
The Slate Landscape of Northwest Wales

Geographical Coordinates to the Nearest Second

Component Part 1
Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn
Coordinates of central point: N 53°09'51" W 004°03'51"

Component Part 2
Dinorwig Slate Quarry Mountain Landscape
Coordinates of central point: N 53°07'26" W 004°06'13"

Component Part 3
Nantlle Valley Slate Quarry Landscape
Coordinates of central point: N 53°03'17" W 004°14'28"

Component Part 4
Gorseddau and Prince of Wales Slate Quarries, Railways and Mill
Coordinates of central point: N 52°58'25" W 004°09'26"

Component Part 5
Ffestiniog: its Slate Mines and Quarries, 'city of slates' and Railway to Porthmadog
Coordinates of central point: N 53°00'12" W 003°56'35"

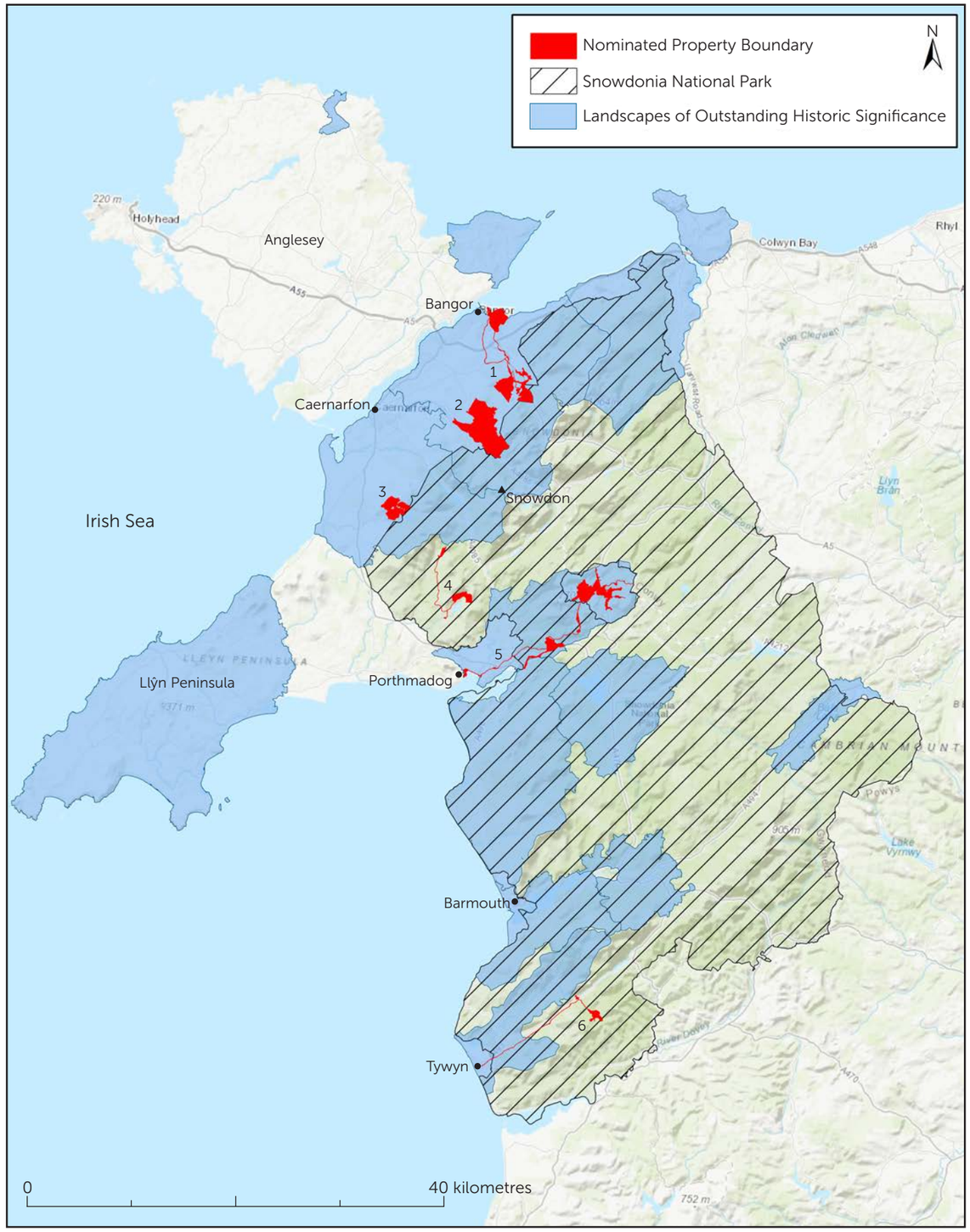
Component Part 6
Bryneglwys Slate Quarry, Abergynolwyn Village and the Talyllyn Railway
Coordinates of central point: N 52°37'50" W 003°55'47"

Textual Description of the Boundaries of the Nominated Property

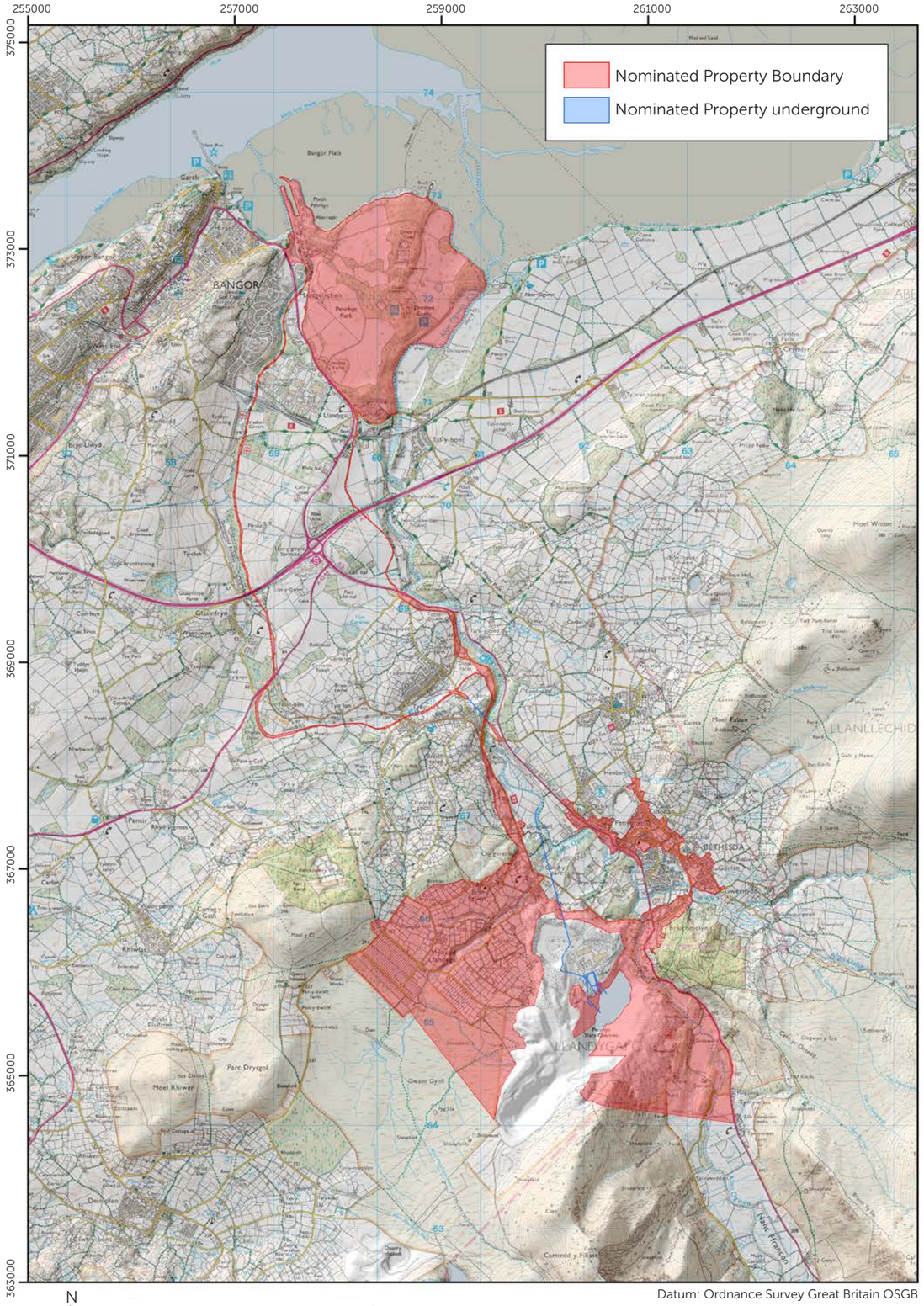
The Nominated Property comprises six separate Component Parts within the County of Gwynedd, Wales. The boundaries in each case have been drawn to include all the attributes which form tangible expressions of proposed Outstanding Universal Value, including quarries and mines, settlements in which quarrymen and their families lived, the road and railway systems which connected quarries and mines with the sea and with the national railway network, and quays and harbours where slate was transferred to boats and ships. The area of the Nominated Property is **?????** hectares.

A wider protected area serves the purpose of a Buffer Zone. It comprises the Snowdonia National Park and contiguous and immediately adjacent Landscapes of Outstanding Historic Significance in Wales. This area comprises **?????** hectares and takes in all significant views within, towards and out of the Nominated Property.

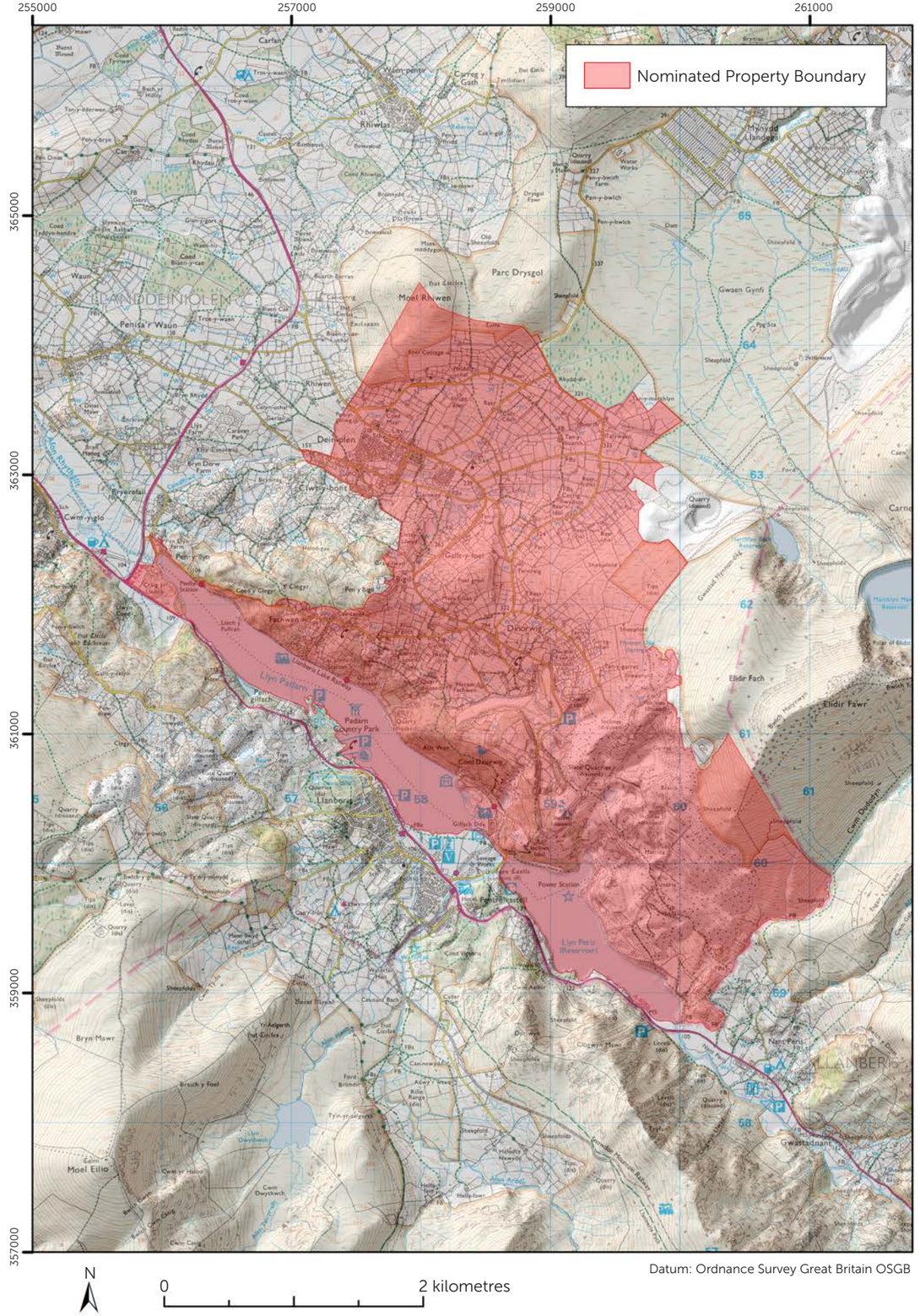
Maps of the Nominated Property



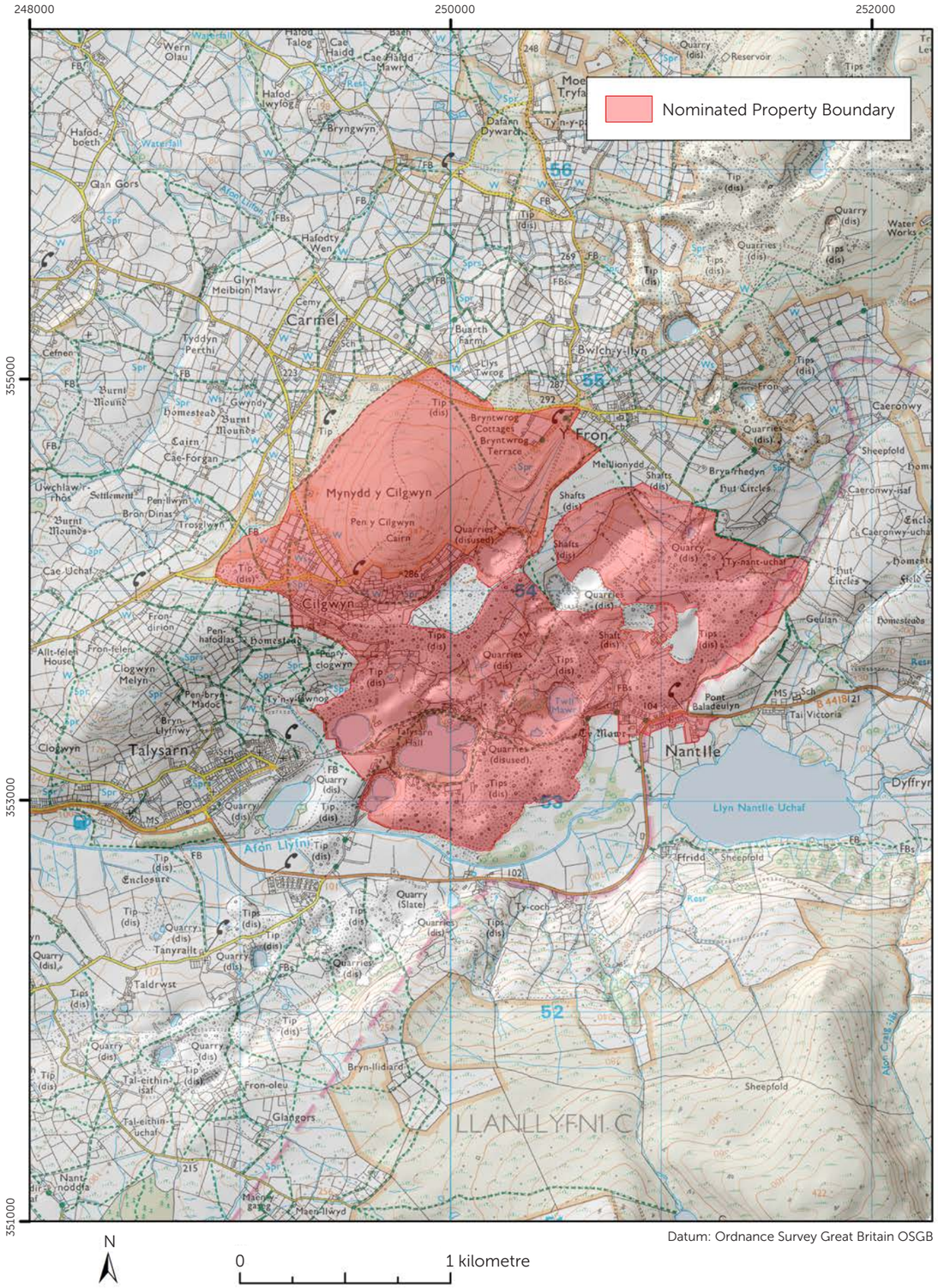
Map E1. Map showing the boundaries of the Nominated Property in Northwest Wales, the wider protected area of the Snowdonia National Park and Landscapes of Outstanding Historic Significance which serve the purpose of a Buffer Zone for the Nominated Property (Scale 1:500,000).



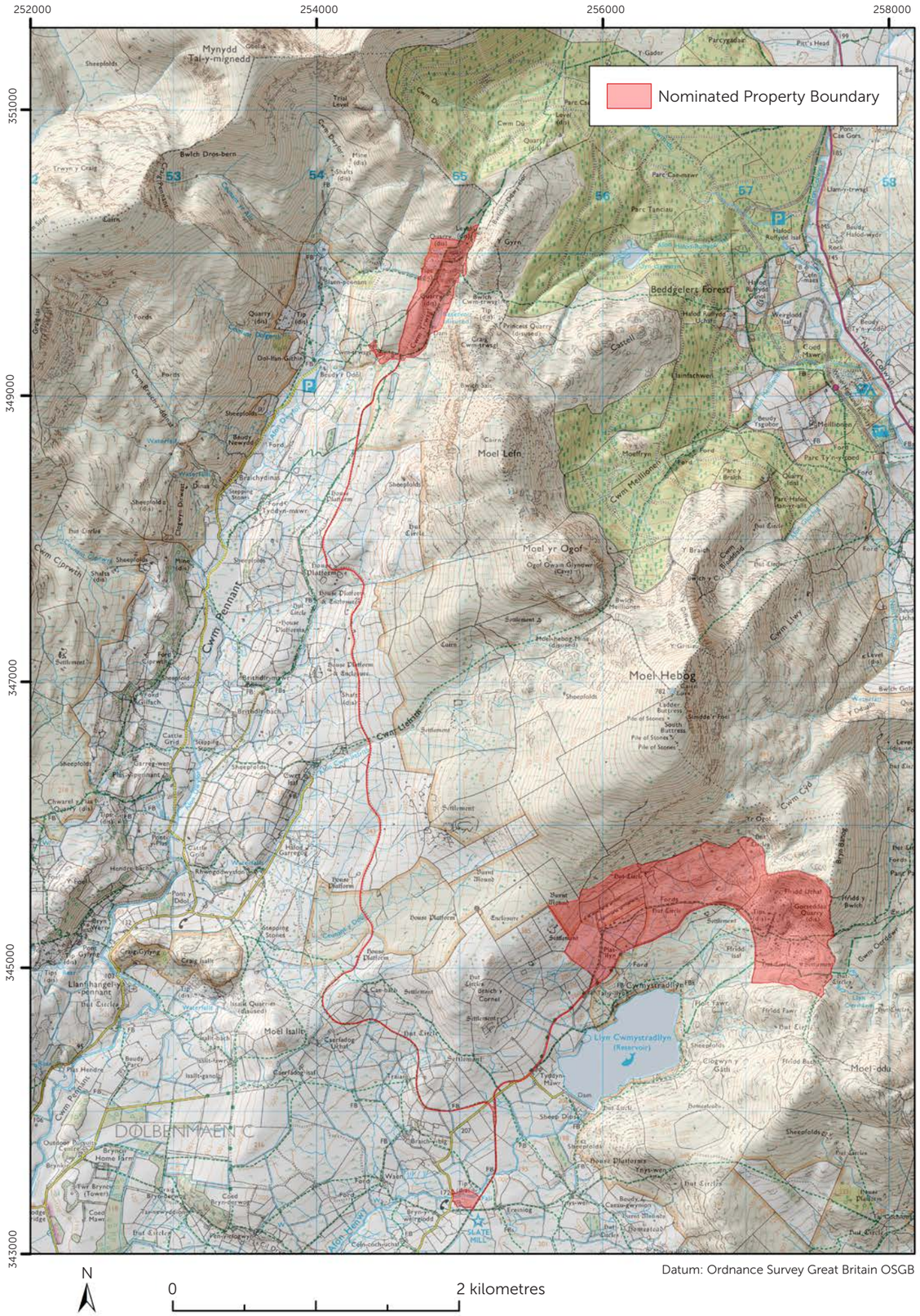
Map E2. Map showing the boundaries of Component Part 1: Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn (Scale 1:50,000).



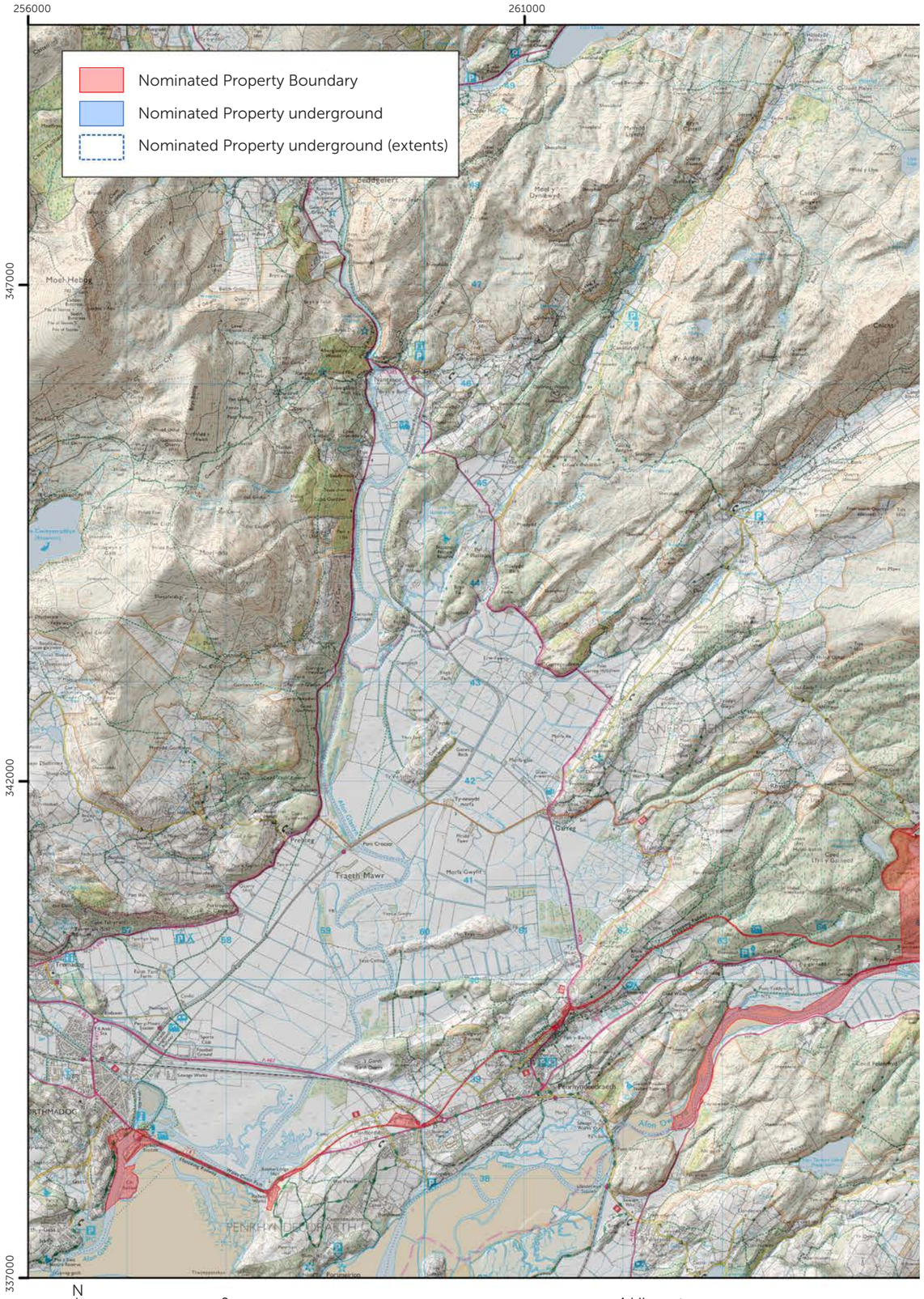
Map E3. Map showing the boundaries of Component Part 2: Dinorwig Slate Quarry Mountain Landscape (Scale 1:40,000).

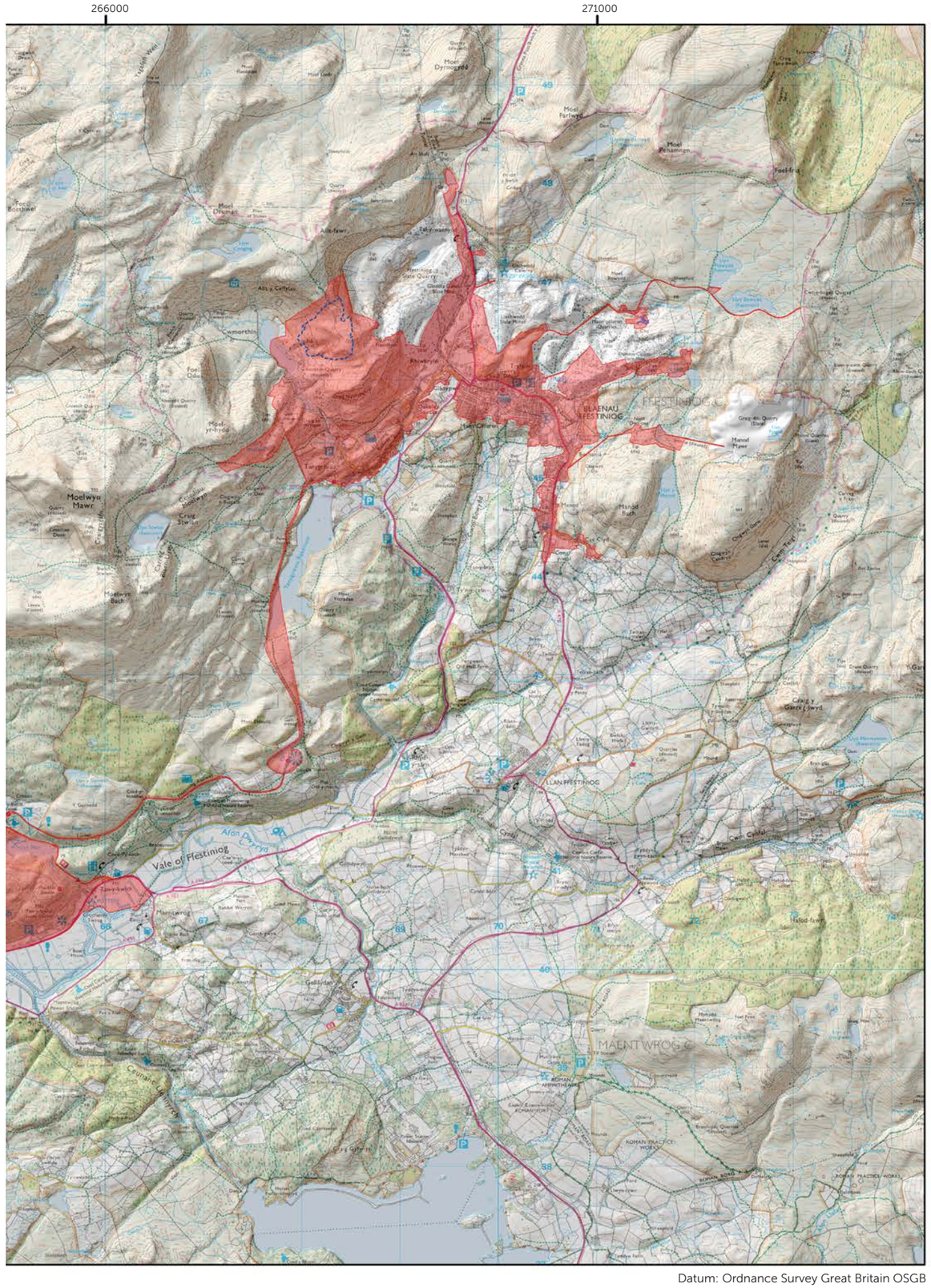


Map E4. Map showing the boundaries of Component Part 3: Nantlle Valley Slate Quarry Landscape (Scale 1:25,000).



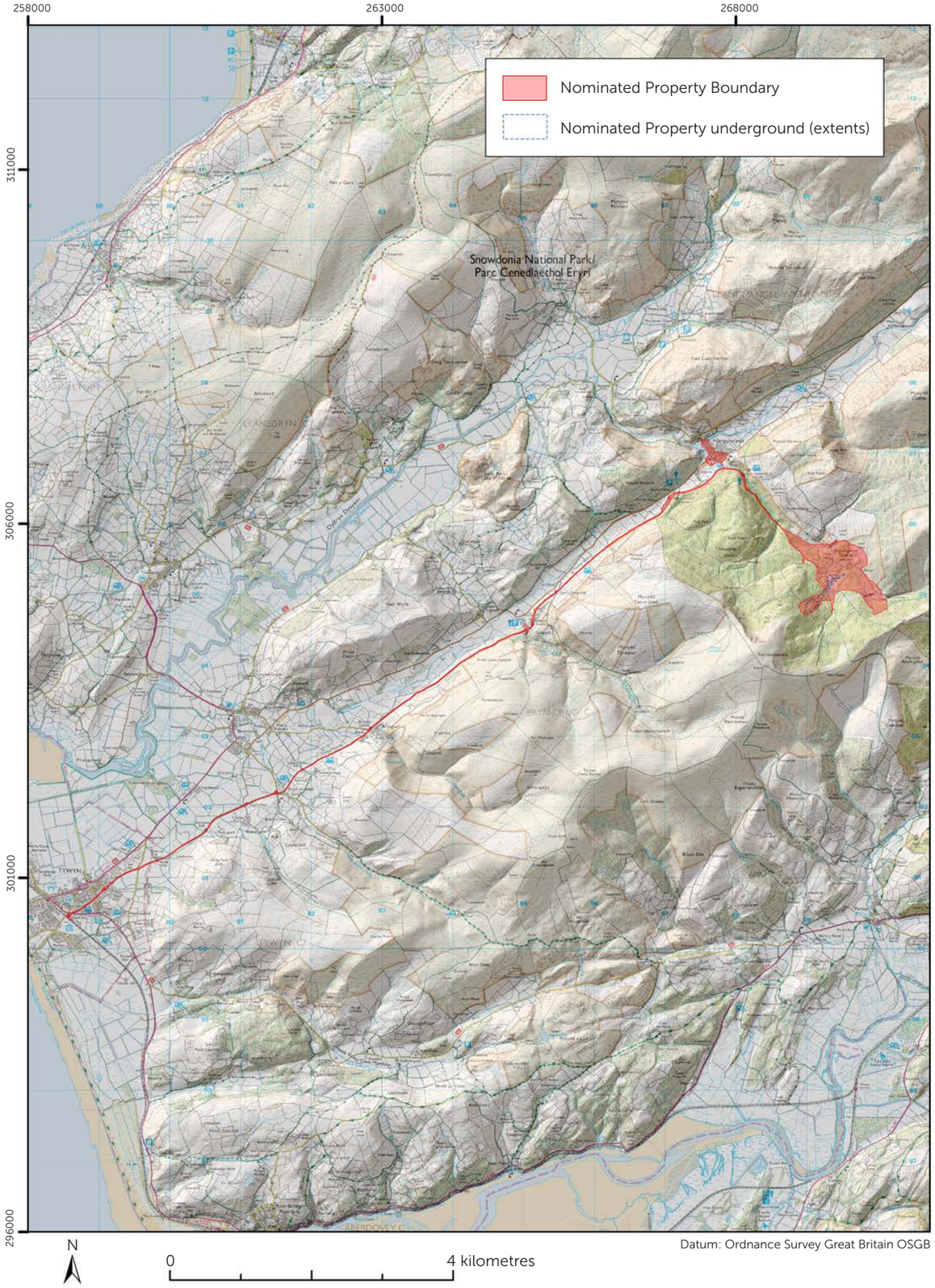
Map E5. Map showing the boundaries of Component Part 4: Gorseddau and Prince of Wales Slate Quarries, Railways and Mill (Scale 1:35,000).





Datum: Ordnance Survey Great Britain OSGB

Map E6. Map showing the boundaries of Component Part 5: Ffestiniog: its Slate Mines and Quarries, 'city of slates' and Railway to Porthmadog (Scale 1:50,000).



Map E7. Map showing the boundaries of Component Part 6: Bryneglwys Slate Quarry, Abergynolwyn Village and the Talyllyn Railway (Scale 1:70,000).

Criteria under which Property is Nominated

(ii) exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design.

(iv) be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history.

(v) be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change.

Draft Statement of Outstanding Universal Value

a) Brief Synthesis

The Slate Landscape of Northwest Wales is located in the United Kingdom, in the mountains of Snowdonia. Six areas together represent an exceptional example of an industrial landscape which was profoundly shaped by quarrying and mining slate, and transporting it for national and international markets. From 1780 to 1940 this industry dominated world production of roofing slates, transforming both the environment and the communities who lived and worked here.

The quarries and mines are monumental in scale, comprising stepped hillside workings, deep pits and cavernous underground chambers, massive cascading tips, ingenious water systems, and a range of industrial buildings. Outstanding technical equipment and major engineering features survive.

This mountainous landscape is close to the sea. Innovative transport systems linked quarries and processing sites with purpose-built coastal export harbours and with main-line railways.

Grand country houses and estates built by leading industrialists contrast with workers' vernacular settlements, with their characteristic chapels and churches, band-rooms, schools, libraries and meeting-places.

Slate from Northwest Wales is light, long-lasting and impermeable. By the late nineteenth century the region produced about a third of world output of roofing slates and architectural slabs. Its use in terraced houses, factories, warehouses and elite architecture contributed to rapid global urbanisation. It influenced building styles, encouraging the shallow-pitched roofs of the Georgian order.

Technologies that were innovated, adopted and adapted in *The Slate Landscape of Northwest Wales* include the ingenious application of waterpower, the development of bulk handling systems and the first known application of the circular saw for cutting stone. These were diffused by specialists and by emigration of skilled Welsh quarrymen to the developing slate industries of the USA, continental Europe and Ireland.

Snowdonia's narrow-gauge railway systems gained global influence as their suitability for challenging mountain environments, and for moving compact loads and minerals, meant that they were adopted from Asia and America to Africa and Australasia.

b) Justification for Criteria

Criterion (ii) – *The Slate Landscape of Northwest Wales* exhibits an important interchange of human values, particularly in the period from 1780 to 1940, on developments in architecture and technology.

Slate has been quarried in the mountains of Northwest Wales since Roman times, but sustained large-scale production from the late eighteenth to the early twentieth centuries dominated the global market as a roofing element. This led to major transcontinental developments in building and architecture.

Technology transfer from *The Slate Landscape of Northwest Wales* was fundamental to the development of the slate industry of continental Europe and the USA. Moreover, its narrow-gauge railways – which remain in operation under steam today – served as the model for successive systems which contributed substantially to the social and economic development of regions in many other parts of the world.

Criterion (iv) – *The Slate Landscape of Northwest Wales* is an outstanding example of a type of landscape which illustrates, in a dramatic way, the 'combined works of nature and of man' through the large-scale exploitation of natural resources.

Massive deposits of high-quality slate defined the principal geological resource of the challenging mountainous terrain of the Snowdonia massif. Their dispersed locations represent concentrated nodes of exploitation and settlement, of sustainable power generated by prolific volumes of water that was harnessed in ingenious ways, and brought into being several innovative and technically advanced railways that made their way to new coastal ports built to serve this transcontinental export trade.

The Property comprises the most exceptional discrete landscapes that, together, illustrate the diverse heritage of a much wider landscape that was created during the profound era of British industrialisation that changed the world.

Criterion (v) – *The Slate Landscape of Northwest Wales* is an outstanding example of the industrial transformation of a traditional human settlement and marginal agrarian land-use pattern; it also exemplifies how a remarkably homogeneous minority culture adapted to modernity in the industrial era yet retained many of its traditional attributes.

The monumentality of the quarry landscapes is compelling; huge stepped working benches carved from the mountainsides, deep pits and vast tips, and extensive cavernous underground workings. These also indicate the relentless persistence of generations of workers who used their hard-won skill and innovative technology to exploit slate for a global market. Their settlements, created by the industrialists, the workers and their families, retained multiple aspects of the traditional way of life and its strong minority language. They remain a palpable 'living' testimony, just like the diminished but proud slate-working tradition, and the railways that once hauled the slate.

c) Statement of Integrity

The Property contains all of the essential elements that convey attributes of Outstanding Universal Value. Its boundaries capture the principal slate-producing areas in Northwest Wales, together with their associated industrial heritage that includes the most significant processing facilities, settlements and transport routes.

Whilst some elements are at risk from decay and minor neglect, in each case the situation is under control from the point of view of effective legislation and management. There is no existing or anticipated pressure within the Property from any large-scale developments.

d) Statement of Authenticity

The Slate Landscape of Northwest Wales is an exceptionally well-preserved cultural landscape that retains an unusually high level of authenticity, and has experienced remarkably little intervention since the main period of industrial operation. Attributes of proposed Outstanding Universal Value are conveyed by physical property that is clearly identified and understood in terms of date, spatial distribution, use and function (including living communities and operational railways), form and design, materials and substance, and their interrelationships including connectivity and overall functional and compositional integrity of the series. The Nominated Property further embodies a vibrant cultural tradition, including slate-working skills and the continued widespread use of the Welsh language. Key attributes are reflected in landscape qualities and features of quarrying including the relict working areas, tips and transport routes, together with associated settlements and social infrastructure.

e) Protection and Management

The Welsh Government's approach to the protection and sustainable management of World Heritage sites is set out in *Managing Change in World Heritage Sites in Wales (2017)*. The Nominated Property and its setting will be afforded high levels of protection through the implementation of existing legislation: *The Ancient Monuments and Archaeological Areas Act 1979, The Town and Country Planning Act 1990, The Planning (Listed Buildings and Conservation Areas) Act* 1990, *The Historic Environment Act (Wales) 2016* and through implementation of policies within the Gwynedd & Anglesey Joint Local Development Plan and Snowdonia National Park Authority Local Development Plan.

Attributes of proposed Outstanding Universal Value have been defined and articulated in *The Slate Landscape of Northwest Wales Property Management Plan* which establishes the over-arching strategies and mechanisms by which the proposed World Heritage Site will be managed. This is complemented at local level by a series of Local Management Plans, developed in collaboration with landowners, which include site-specific information and practical recommendations. Responsibility for the implementation of *The Slate Landscape of Northwest Wales Property Management Plan* will sit with a multi-organisational Partnership Steering Group established by the lead organisation, to which an appointed Property Coordinator will report.

All of the Component Parts of the Nominated Property lie within areas of Wales that are already subject to strong levels of landscape protection through designation as a National Park and registration as Landscapes of Outstanding Historic Interest. These will serve the purpose of a Buffer Zone protecting the setting and key views into and out of the proposed World Heritage Site.

There is no active quarrying or mining within the Nominated Property (no active mineral permissions are included); mineral activity takes place in the wider protected area outside the boundary of the Nominated Property. The application of existing statutory management procedures will ensure this does not negatively impact upon the proposed Outstanding Universal Value of the Property.

Name and Contact Information of Official Local Institution / Agency

Organization: Gwynedd Council

Address: Pencadlys Cyngor Gwynedd,
Castle Street,
Caernarfon,
Gwynedd
LL55 1SE

Telephone: 01286 679947 (Economy and Community Department)
Fax: None
Email: llechi@gwynedd.llyw.cymru
Web address: **https://www.gwynedd.llyw.cymru/**

Figure E.2. The Prince of Wales Quarry in Cwm Pennant (Componet Part 4) clings to the mountain-side.

1 Identification of the Property

Component Part **1**

Penrhyn Slate Quarry and Bethesda, and the Ogwen valley to Port Penrhyn
Coordinates of central point: N 53°09'51" W 004°03'51"

Component Part **2**

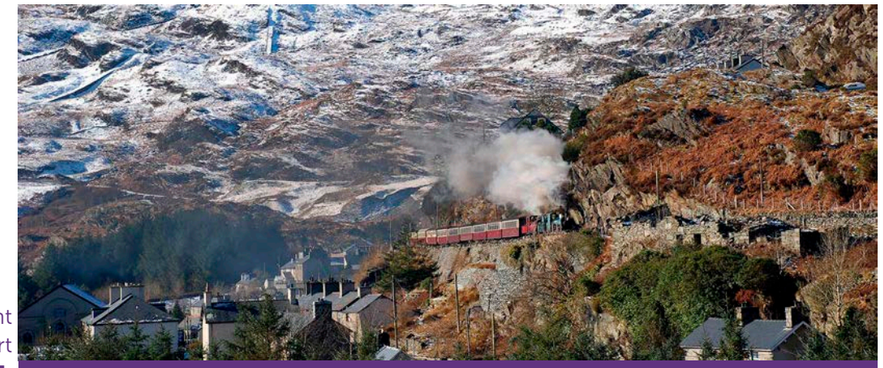
Dinorwig Slate Quarry Mountain Landscape
Coordinates of central point: N 53°07'26" W 004°06'13"

Component Part **3**

Nantlle Valley Slate Quarry Landscape
Coordinates of central point: N 53°03'17" W 004°14'28"

Component Part **4**

Gorseddau and Prince of Wales Slate Quarries, Railways and Mill
Coordinates of central point: N 52°58'25" W 004°09'26"



Component Part **5**

Ffestiniog: its Slate Mines and Quarries, 'city of slates' and Railway to Porthmadog
Coordinates of central point: N 53°00'12" W 003°56'35"

Component Part **6**

Bryneglwys Slate Quarry, Abergynolwyn Village and the Talyllyn Railway
Coordinates of central point: N 52°37'50" W 003°55'47"

1.a Country and State Party Wales, United Kingdom

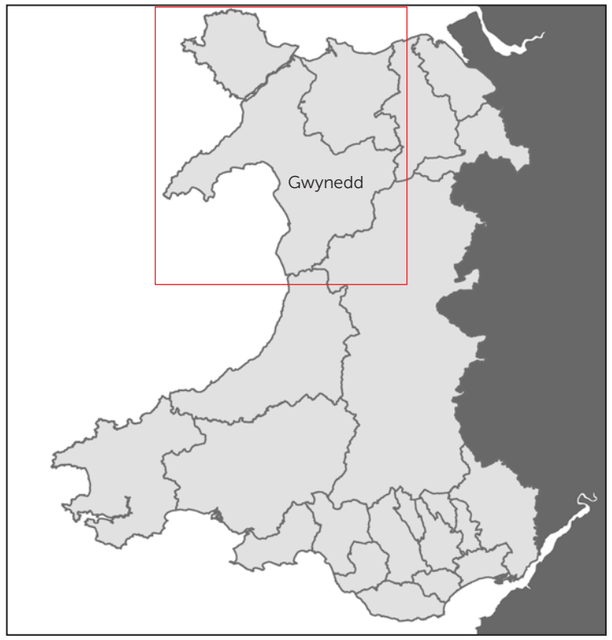
1.b State, Province or Region County of Gwynedd

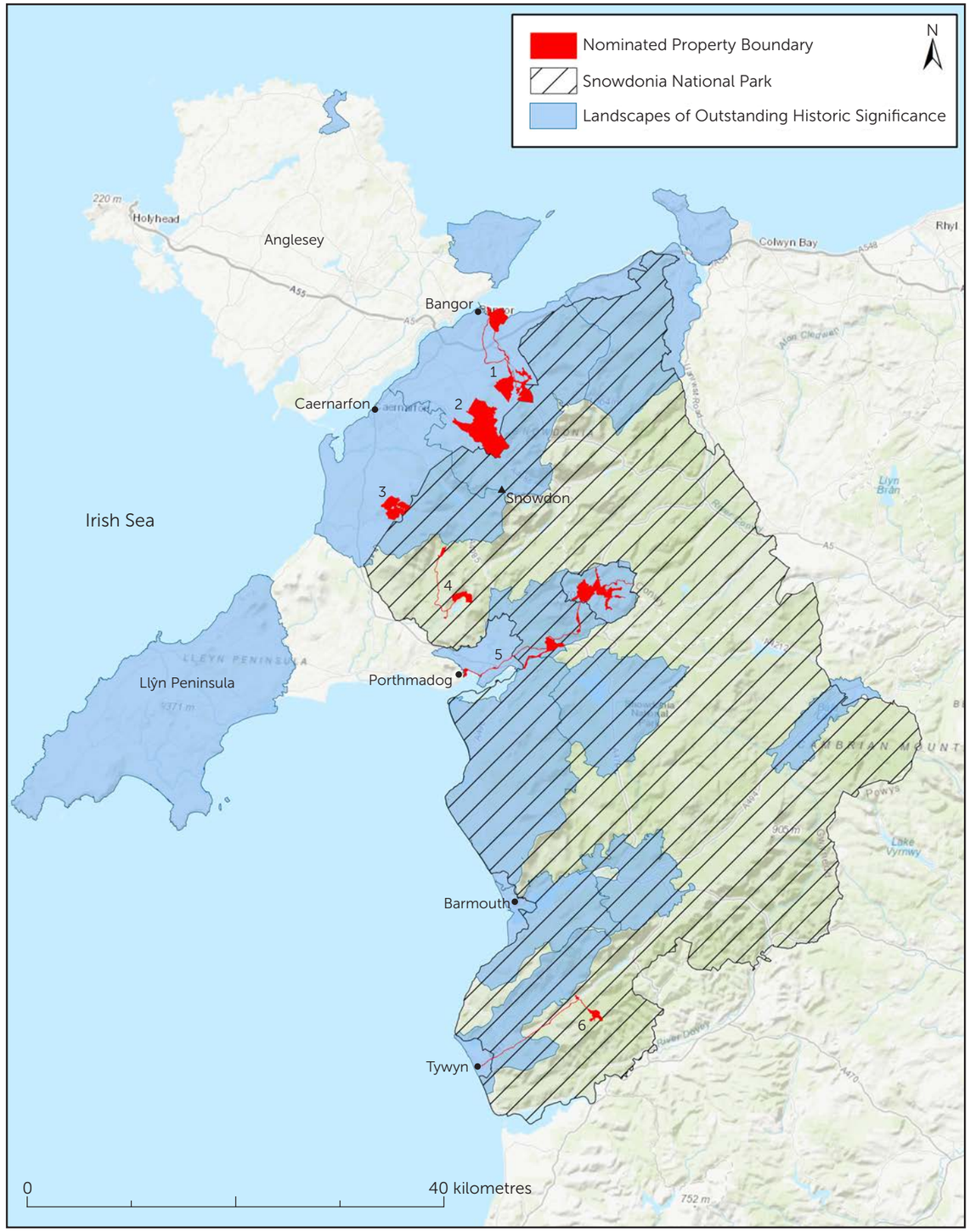
1.c Name of Property The Slate Landscape of Northwest Wales

1.d Geographical Coordinates to the Nearest Second

Id no	Name of the Component Part	Coordinates of the central point	Area of component part (ha)	Map no
1	Penrhyn Slate Quarry and Bethesda, and the Ogwen valley to Port Penrhyn	N 53°09'51" W 004°03'51"	?	**E2**
2	Dinorwig Slate Quarry Mountain Landscape	N 53°07'26" W 004°06'13"	?	**E3**
3	Nantlle Valley Slate Quarry Landscape	N 53°03'17" W 004°14'28"	?	**E4**
4	Gorseddau and Prince of Wales Slate Quarries, Railways and Mill	N 52°58'25" W 004°09'26"	?	**E5**
5	Ffestiniog: its Slate Mines and Quarries, 'city of slates' and Railway to Porthmadog	N 53°00'12" W 003°56'35"	?	**E6**
6	Bryneglwys Slate Quarry, Abergynolwyn Village and the Talyllyn Railway	N 52°37'50" W 003°55'47"	?	**E7**
			Total Area (ha) ?	

1.e Maps and plans, showing the boundaries of the Nominated Property and Buffer Zone





Map 1.1. Maps showing the Nominated Property and wider protected area, its location in the County of Gwynedd, Wales; the United Kingdom (State Party), Europe and wider World.

1.f Area of Nominated Property and proposed Buffer Zone

Area of nominated property: ? ha

Buffer zone: ? ha

Total: ? ha

A wider protected area serves the purpose of a Buffer Zone. It comprises the Snowdonia National Park and contiguous and immediately adjacent Landscapes of Outstanding Historic Significance in Wales.

1.g Glossary

Barracks: a word used within the slate industry of Northwest Wales for a dedicated building to accommodate workers, which might sometimes also house their families.

'Blondin' ropeway: a ropeway system used for internal handling in quarries and other industrial sites, originally devised in Scotland (UK), in which a traveller carriage is propelled along a catenary skyline and from which a haulage rope is separately controlled; named after the tightrope walker Charles Blondin.

Chain incline ropeway: ropeway system used for internal handling in quarries involving a steeply-angled skyline connecting the quarry floor to the processing area.

Chamber: an underground working area in a Ffestiniog slate mine (Component Part 5) or in the underground workings of Bryneglwys slate quarry (Component Part 6).

Company village: a settlement created to house the workforce by its operating company.

Cornish beam engine: a type of steam engine developed in Cornwall (UK) mainly for pumping water but which could also be applied to rotative motion and hence used to wind, and to power crushing machinery. It uses steam at a higher pressure than the earlier engines designed by James Watt.

Edge-railway: a form of railway in which the guidance is performed by flanges on the wheels, as distinct from a *tramroad*. Practically all railways now are 'edge-railways'.

Estate village: a settlement created to house the workforce by its operating company.

Field system: A group or complex of fields which appear to form a coherent whole.

Formation (of a railway): the civil engineering of a railway – its cuttings, tunnels, embankments and causeways.

Gallery: a benched (stepped) working face in an open quarry.

Inclined plane: a length of railway on a steep gradient in which vehicles are hauled by rope. Inclined planes may be counter-balance types in which the greater weight of descending wagons is sufficient to haul up the empties on an adjacent track, or they may be up-haulage, in which wagons are hauled against the gradient by a fixed prime-mover.

Landform: here used for the characteristic physical attributes of open quarrying.

Level: a tunnel which drains a working or provides access to chambers.

Mill: a structure within or associated with a quarry equipped with a prime mover to power mechanical processing of slate blocks. Most produced roofing slates and therefore retained an element of hand-processing. Some were *slate-slab mills*, producing architectural elements, gravestones etc., and might be completely mechanised.

Narrow-gauge railway: a railway system where the distance between the inside faces of the rail is less than 'standard' – 1,435mm in most of Europe and America. In practice most of the narrow gauge railways in the slate industry of Wales were to an approximate gauge of 0.6 metre.

National railway network: the system of public railways which enabled distribution of goods and the provision of services throughout the United Kingdom, and which reached the Gwynedd region between 1848 and 1881.

Pit (quarry): a quarry worked as an open pit.

Preserved railway: a railway operated as a heritage/visitor attraction and not primarily as a transport link.

Processing: here used for the transformation of a raw slate block into a commercial product, by sawing and splitting.

Public railway: a railway run by a public company, with some element of public obligation and responsibility, and with parliamentary sanction, as distinct from railways which formed part of an industrial undertaking and only served its purposes.

Pump-system: a technology used for keeping a quarry or mine free of water, including as well as the pumps themselves the means of powering them and of transmitting power from the prime-mover to the point of use.

Quarryman: this gender-specific word is used as all the evidence points to the quarries being exclusively masculine workplaces in the period 1780-1940. There is evidence for women working as slate haulage contractors but not as quarry-workers.

Railroad: here used following contemporary usage for an early form of *edge railway* in which the rails were formed of cast-iron rather than wrought-iron or steel.

Second-level tipping: an area within a quarry *landform* where pressure of space meant that *tips of waste rock* had to be created at a higher level than the main processing area.

Smallholding: A holding on a smaller-scale than an ordinary farm.

Squatter: one who constructs a dwelling and establishes a *smallholding* without the authority of the land-owner.

Tips of waste rock: areas where rock which had no commercial value was dumped. This rock might be from a formation than slate but which needed to be removed to gain access to slate; poorly grained slate; or waste produced by processing such as sawn ends and trimmed fragments.

Track-bed: the part of a railway *formation* which immediately underlies where the rails, sleepers and ballast are laid.

Tramroad: a form of railway, long defunct, in which the guidance is performed by flanges on the rails, as distinct from an *edge-railway*.

Wider protected area: an area surrounding the Nominated Property serving the purpose of a Buffer Zone.

2 Description

Figure 2.1. 'Moving mountains to roof the world': landform-scale quarries and tips dominate the fine Victorian 'city of slates', Blaenau Ffestiniog (Component Part 5).

2.a Description of Property

Introduction to the Nominated Property

The Slate Landscape of Northwest Wales is a serial property located in Gwynedd, Wales, comprising six Component Parts with a total area of **????** hectares. This is a coherent cultural landscape that represents the broader heritage of the Welsh slate industry but, more specifically, its pre-eminent centre in the mountains and valleys of the Snowdon massif. It was from here that the most profound global impact of Welsh slate came – as a world leader in the production of finely-grained roofing material in the heyday from around 1780 to 1940, of ingenious technical innovation in quarrying and stone processing, and moreover as a prototype for narrow gauge railway technology for mountainous environments. It is here, too, that sustained exploitation of slate transformed a sparsely populated marginal agricultural upland landscape into one dominated by industry, on a scale so exceptional, indeed so monumental, as to compete with the natural grandeur of Snowdonia.

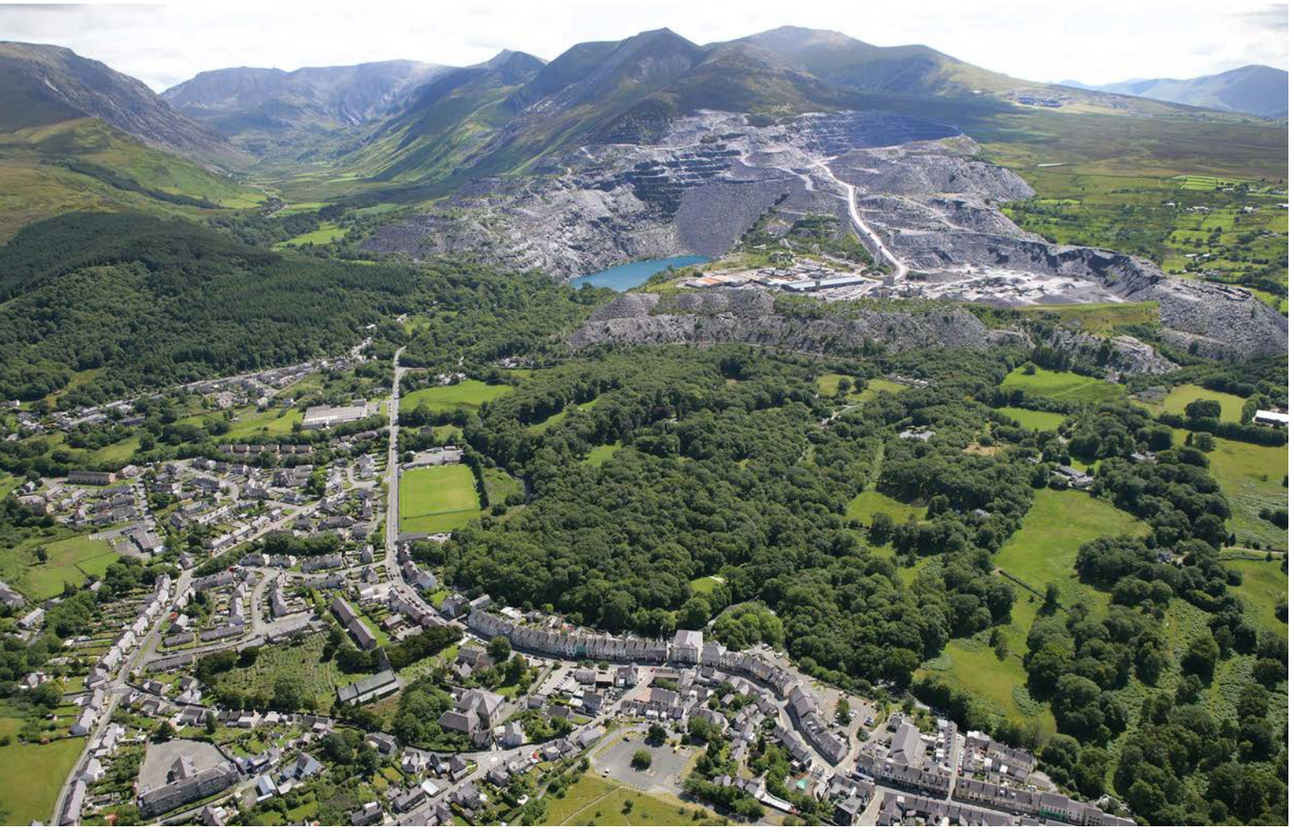


Figure 2.2. Bethesda, in the foreground, is overlooked by Penrhyn Slate Quarry (Component Part 1). Once the largest slate quarry in the world, Penhryn is still active in the wider protected area (top right, outside the Nominated Property) and is a wholly compatible activity supporting a vivid understanding of the industry and still producing slate for prestigious conservation contracts in some of the world's most historic buildings.

Physical testimony is characterised by exceptional survival; the vast majority of this evolved landscape remains intact and highly legible. The extraction of Gwynedd's mineral wealth shaped not only the landscape, but also the communities who lived and worked in these mountains. A rich and enduring social legacy is partly sustained by continued slate exploitation outside of the Nominated Property in the wider protected area, supporting a living tradition, its knowledge and know-how. This 'most Welsh of Welsh industries' remains an important employer, and continues to support modern-minded and outward-looking communities who take pride in their heritage, their distinctive culture and their everyday day use of a minority Celtic language.

The nomination comprises six Component Parts, which together capture the full geographical distribution of slate exploitation, its scale, diverse technical nature and the wider landscape impact, which includes settlement and transport.

Spatial relationship is governed by the location of several principal outcrop belts that belong to the largest regional deposit of high-grade slate in the world. Production centres range from the tops and sides of mountains to lower slopes and valley floors, depending on the orientation of the slate beds or 'veins' that are part of a complex folded geological structure. Each one makes a distinctive and substantial contribution to the proposed Outstanding Universal Value in the type of geological deposit and the way that the slate was won, handled and processed; where there are similarities, these provide important evidence for the transfer of skills and technology by internal migration.

Similarly, a range of settlement types is necessary to support overall functional integrity and to exemplify the variety of social forces at work as this region underwent industrialisation, the different contemporary assumptions about how an expanding workforce could be housed, and the ways in which its social, religious and cultural welfare could be ensured.

Figure 2.3. Bethesda High Street (Component Part 1).

Settlements, including Bethesda, Deiniolen and the town of Blaenau Ffestiniog, developed in close proximity to the quarries and mines, their location further dictated by topography. In some cases, their development was heavily influenced by the patronage of aristocratic landowners and wealthy investors, elsewhere by resistance to them.

This is a railway landscape, too, brought into being by, and an essential element of, the industrial exploitation of the slate resources of Snowdonia as vast tonnages were conveyed downhill in long trains of small wagons. Not only is the technical relationship of these railways to the topography through which they pass exceptional, but they also follow a strong and evident evolutionary pattern within the Nominated Property. Their design becomes increasingly sophisticated, beginning with methods adapted from canal engineering through horse-and-gravity operation to purpose-built locomotive-worked public railways. The concept of the mineral-carrying iron railway to an approximate gauge of 0.6 metres was evolved in the Nominated Property from 1801 onwards; in the 1860s the Ffestiniog Railway took this technology into the age of steam traction and passenger transport, providing a prototype that was emulated world-wide.

Slate production is captured by this network of physical linear linkages, from the quarry working faces to the processing mills where blocks were sawn, to the new, purpose-built slate harbours at Port Penrhyn and Porthmadog and to main-line railways.

Figure 2.4. The Ffestiniog Railway (Component Part 5) was built to transport slate and provided the precedent for the World Heritage Darjeeling Himalayan Railway, India. It remains operational as an internationally recognised visitor attraction.

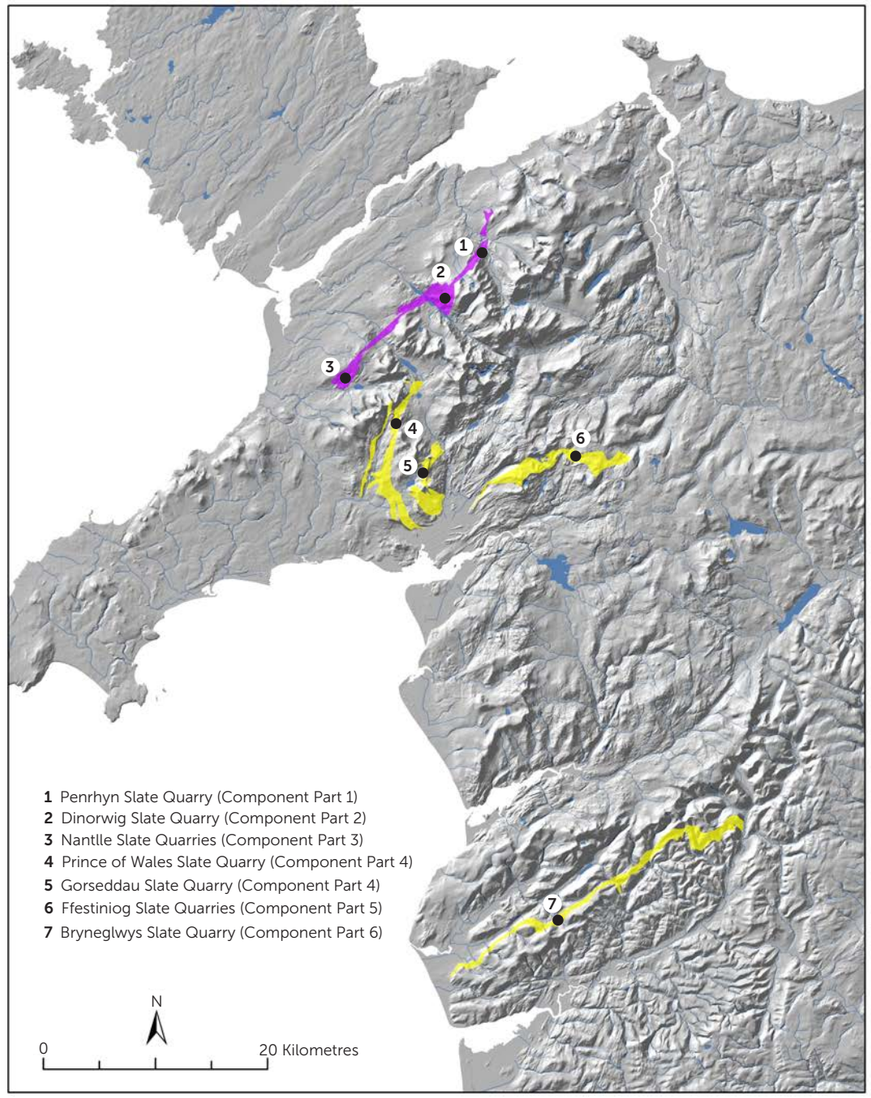
Figure 2.5. Port Penrhyn, with Penrhyn Castle and Park beyond (Component Part 1). Constructed between 1790 and 1855, the slate port marks the terminus of an intact linear cultural landscape – from quarry to wharf, connected by dedicated transport links – all originally under one ownership.

Links between Component Parts

Together, the six Component Parts represent a powerful and impressive relict landscape of slate exploitation with great unity and unparalleled compositional and functional integrity.

Geological linkages

Each Component Part contains a strict selection of the most significant and best examples of surface quarries and underground mines located within three principal Cambrian and Ordovician slate deposits that stretch for 60km in a northeasterly to southwesterly direction. The mountainous landscape, with its steep and rugged topography, heavy rainfall and frequent winter snow, includes what were, by the nineteenth century, the largest and most productive slate quarries and their underground counterparts (mines) in the world: Penrhyn, Dinorwig and Ffestiniog, each with their respective landform-scale waste tips.



Map 2.1. Northwest Wales, showing geological linkages between Component Parts, topography, rivers and lakes. The Cambrian Purple Slate Vein is shown in purple and the Ordovician Slate Vein in yellow.

Figure 2.6. Dinorwig Slate Quarry (Component Part 2), where the stepped galleries soar for over 500m above the waters of Peris Lake. In the eighteenth and early nineteenth centuries, Dinorwig slate was transported by small boats along the lake to carts at the further end.

Slate technology: innovation and transfer linkages

Each Component Part is associated with innovative technology and the ingenious use of water power for pumping and for extracting, hoisting and processing slate. The technology of extraction varied from mountain to valley; so too the way that the workings were dewatered and the slate was hauled out. Innovation can also be seen in the processing mills, often located on bleak mountainsides where men would often stay in purpose-built barracks to alleviate daily toil. Technology transfer is evidenced in the Nominated Property by inward means (e.g. Cornish pumping), between Component Parts (e.g. stepped galleries from Penrhyn Slate Quarry) and by outward means (e.g. Ffestiniog Railway to many parts of the world). All Component Parts include rare testimony in a range of surviving equipment and artefacts from specific periods and phases, both above and below ground.

Figure 2.7. The Dorothea Cornish beam engine (Component Part 3) is complete and in its original house. Built in 1904-1906, it is the penultimate example ever constructed and the only twentieth century survivor, marking the end of Cornwall's long pre-eminence in manufacturing these giants of steam.

Functional/process linkages

Inclined planes, level railways, shafts and aerial ropeways moved slate blocks hewn from cavernous underground workings or from deep pits and great mountainside galleries to the mills where they were sawn and split. From the mills, railways continued the negotiation of challenging mountainous terrain to transport the product to specially constructed slate ports in the shallow waters of broad estuaries and tidal straits. From here the product was exported to national and international markets. Component Parts each contribute different aspects to the Nominated Property as a whole.

Settlement patterns bear an intimate relationship with geology, topography and ownership, whilst specific social infrastructure reflects a unified and distinctive culture that once developed in relative isolation: scattered slate-workers' cottages and smallholdings, villages and the 'city of slates', Blaenau Ffestiniog – one of the United Kingdom's best-surviving Victorian industrial towns – and the great houses and estates that exemplify ownership, organisation and development under a British capitalist model of rural industrialisation.

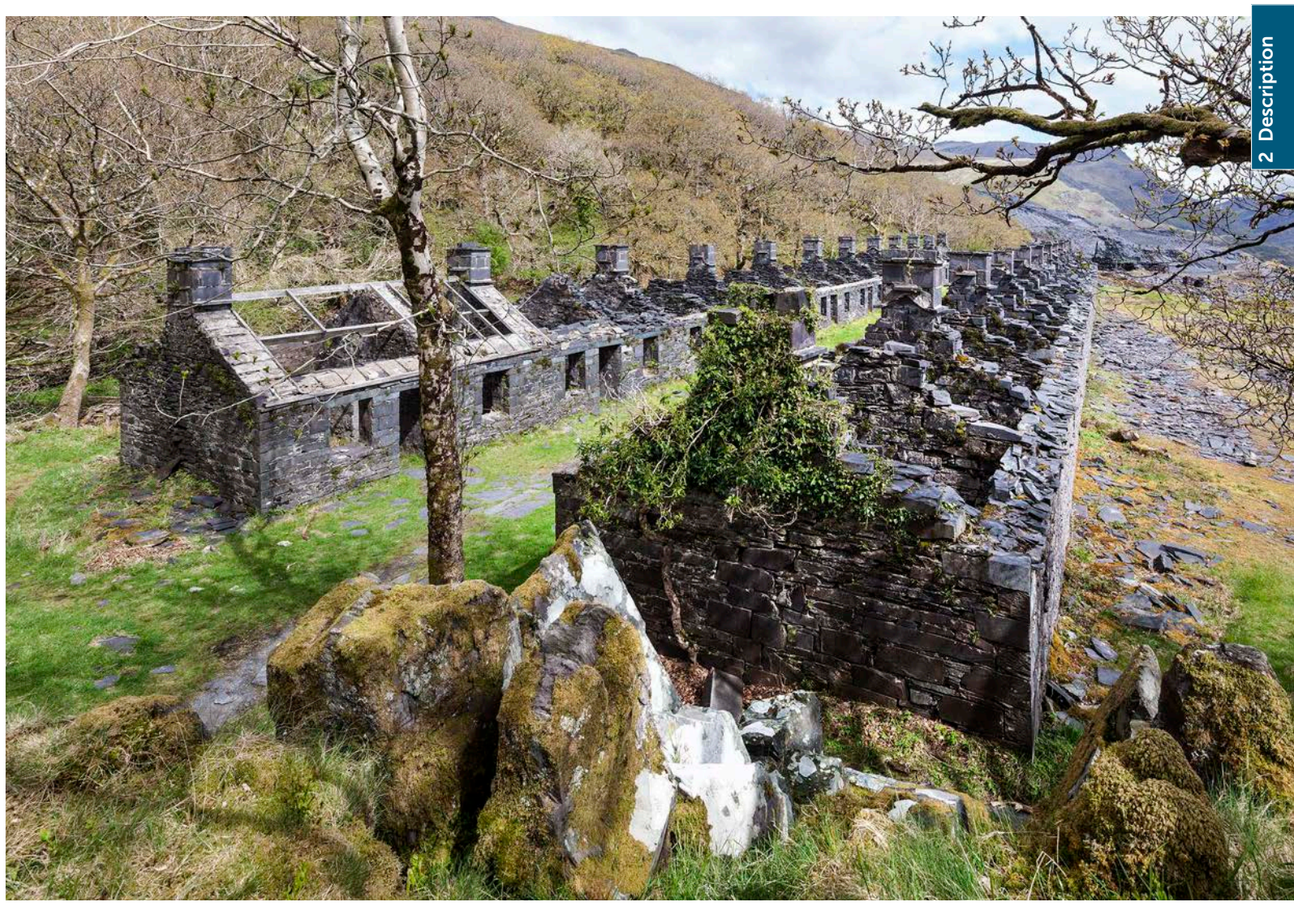


Figure 2.8. The Anglesey Barracks, or *y dre' newydd* – 'the new town' – (Component Part 2) were built in the 1870s at Dinorwig Slate Quarry to attract and accommodate workers from the more distant parts of Northwest Wales. The form of the settlement comprises traditional single-storey, two-room, rural cottages that have been adapted to create a pair of industrial rows that face each other across the 'main street'.

Architectural linkages

Industrial architecture comprises a mix of characteristic, industry-specific, features that occur throughout the Nominated Property: from the ubiquitous masonry inclined planes and their drum houses and the massive slate bastions of chain incline ropeways, to the long and low slate slab mills or the rudimentary slate-processing shelters known as *gwaliau* ('lairs'). Some features are singular, such as the majestic, abbey-like, water-powered Ynysypandy slate-slab mill that served the commercially unsuccessful Gorseddau Slate Quarry.

Much of the vernacular architecture is not only common throughout the Nominated Property but is also typical of much of Wales, and indeed elsewhere, particularly in nineteenth century regions of industrial Britain. However, it is an essential component of the exceptional cultural landscape, without which the winning of high-quality slate in such a remote part of Britain could not otherwise be fully understood.

Shared social linkages

The Nominated Property, as a whole, embraces a shared, distinctive and unique testimony of intangible values that represent the cultural tradition of Welsh slate. Whilst *The Slate Landscape of Northwest Wales* is predominantly a relict landscape, its railways have been the subject of early conservation movements that continue to provide world-famous journeys by steam, and its towns and villages remain vibrant living places. This living tradition also includes (outside the Nominated Property in a small part of the wider protected area) the continued extraction and processing of high-quality slate for prestige, and conservation, projects across the world. Present-day quarrying not only sustains traditional skills and provides slate for worldwide conservation, but also demonstrates continuity and change in an industry that remains vital to the region and its communities. In this way well-managed active quarrying within the wider protected area is functionally important as a support to the property and the protection of its values.

Figure 2.10. Underground workings at Bryneglwys Slate Quarry (Component Part 6). Selected examples of the superlative, and most technically diverse, underground workings are included in Component Parts 5 and 6. Historic artefacts survive well in these environments.

Figure 2.9. Ynysypandy Slate-slab Mill (Component Part 4)

Setting

The setting of the Nominated Property ranges from an extensive rural upland area, dominated by spectacular yet often bleak mountain ranges that include the highest peaks in Wales and England, to a more gentle, open yet narrow plateau (up to 7 kilometres wide from north to south) that ends in the coastline of the Irish Sea in the north and west. Dramatic vistas reveal close and contrasting visual relationships, and emphasise the strong connectivity between the elements in each Component Part, as well as with the wider landscape of mountain and sea-coast.

The Nominated Property, including its key views, lie within a wider protected area through designation as a National Park and registration as Landscapes of Outstanding Historic Interest that will serve the purpose of a Buffer Zone.

Language and intangible heritage; spirit and feeling

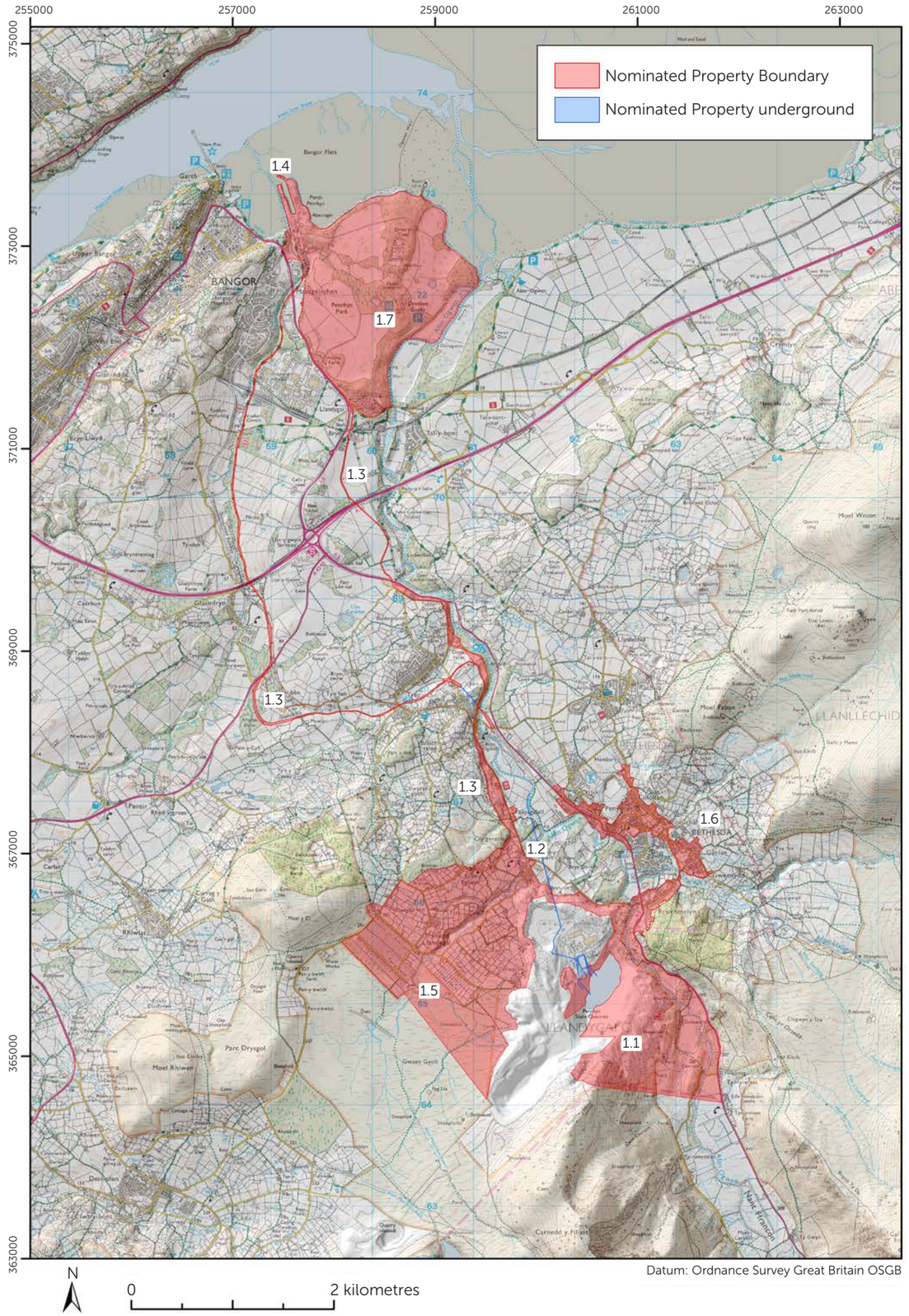
This is manifestly a cultural landscape where people had to earn a living in a harsh environment where, as a consequence, a minority language has remained strong. Place-names within the Nominated Property are almost entirely in Welsh – the only exceptions are the fanciful names which the quarrymen conferred on locations where they worked, such as 'Sebastopol' or 'Burma Road', reflecting their interest in current events, and the Biblical names they conferred on their places of worship, such as 'Carmel' and 'Bethesda'. The growing pains of industrialisation, and the conflict between those who profited from slate and those who worked it, are evident in the different types of housing and places of worship, and in the varied types of settlement within the Nominated Property.

Figure 2.11. The archaeologically rich, relict quarry landscape of the Nantlle Valley (Component Part 3), looking northwest. The deep flooded quarry pits illustrate the vertical nature of the slate veins in a valley setting, offering a landscape and technical contrast to the mountainous terrain of other Component Parts.

COMPONENT PART 1

Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn

Figure 2.12. The whole of Component Part 1 is visible in this aerial view of the Ogwen valley, from the quarry in the distance to the port in the foreground, and the course of the railways that connected them. Also evident are the quarry settlements and the Neo-Norman castle of the owning family.



Map 2.2. The boundaries and Elements of Component Part 1: Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn (Scale 1:50,000).

Location and setting

This is the most northerly of all the Component Parts, a 9km linear south-south-west to north-north-east trending industrial landscape in which all seven elements are intimately related in their direct development by aristocratic owners.

The course of the Component Part captures the entire process flow, beginning in the south at the great Penrhyn Slate Quarry, once the largest slate quarry in the world. This is located where the slate vein crosses the Component Part at the point where a steep-sided glacial formation to the south opens out onto the lower Arfon slopes. Geologically, this is part of the Arfon Slate District (Cambrian age) that also includes Component Parts 2 and 3. Penrhyn Slate Quarry is separated from Area 2 *Dinorwig Slate Quarry Mountain Landscape*, roughly 5km to the southwest, by the Elidir Fawr mountain (924m above sea level, the northernmost peak of the Glyderau range).

The village of Bethesda, which developed to serve the Quarry, is located 1km north, across the Ogwen valley which runs between the low ridge of the Glyderau mountains in the west and the Carneddau mountains in the east before flowing north-northwest for around 8km to within 200m of Penrhyn Castle before discharging into the sea. The earlier of two successive slate railways from the quarry mills creates a linear landscape feature that follows the contour of the Ogwen Valley as it cuts through a relatively open agricultural plateau until it reaches the elevated estate landscape of Penrhyn Castle and Park. Here the river flows to the east of the Castle whilst the railroad skirted the Park to the west before reaching Port Penrhyn that was developed as a slate port in the northwest of the Park, on the eastern fringe of the city of Bangor. The later railway, again a prominent linear landscape feature, crosscuts westwards away from the Ogwen Valley around a third of its way to the Port and picks up the Cegin valley instead. The Port extends its reach into the estuary-like character of the muddy Bangor Flats, midway between mean high and low water on the shores of the eastern end of the Menai Strait, which separates mainland Wales from the island of Anglesey.

Penrhyn Castle was the seat of the aristocratic dynasty that owned and developed most of this Component Part, and that placed the slate industry of Northwest Wales on a capitalised industrial footing from the late eighteenth century onwards. It dominates its surroundings, and is one of the most important large country houses in Wales (its 70 roofs cover 0.4 ha). Views from here extend northeast into where the Menai Straits open to Liverpool Bay, northwest across to Anglesey, and south to the mountains of Snowdonia and Penrhyn Slate Quarry – one of the sources, along with the owners' slave plantations in Jamaica, of the wealth that enabled this picturesque yet vast Neo-Norman fantasy castle to be built. Their ornamental dwellings, dairies, farms and imposing churches contrast with the sombre terraced houses and Nonconformist chapels of the quarrymen's freehold settlement at Bethesda.

Summary

The Component Part includes the relict part of the great galleried Penrhyn Slate Quarry, worked continuously since the late eighteenth century, a water-powered mill complex, associated transport systems to the private harbour at Port Penrhyn, and distinctive and contrasting workers' settlements at Bethesda and Mynydd Llandygai. Penrhyn Castle and Park was formerly the home of the major aristocratic quarry-owning family.

The Ogwen valley is distinctive in terms of the British Industrial Revolution as an integrated extraction landscape developed directly by its aristocratic owners, just as they also improved its agricultural economy. This reflects the strongly managerial approach they developed on their other major land-holdings, including the source of their founding wealth, sugar-growing slave-estates in Jamaica.

Elements

The seven Elements of this Component Part date from the 1780s to the early twentieth century within a landscape of estate improvement implemented by its aristocratic owner.

Table 2.1 Component Part 1 Elements

Element 1.1	Penrhyn Slate Quarry
Element 1.2	Felin Fawr Slate-Slab Mills
Element 1.3	The Penrhyn Slate Quarry Railroad and Penrhyn Slate Quarry Railway
Element 1.4	Port Penrhyn
Element 1.5	Mynydd Llandygai Settlement
Element 1.6	Bethesda Village
Element 1.7	Penrhyn Castle and Park

Figure 2.13. The scale of historic working at Penrhyn Quarry is remarkable, and retains the system of stepped galleries first introduced at the turn of the eighteenth and nineteenth centuries. These are evident both in the active workings in the wider protected area and in the relict landform of the quarry within the Nominated Property.

Element 1.1 consists of the relict landform of a quarry – once the largest of its type in the world – in which slate is still worked outside the Nominated Property in the wider protected area, most profitably for high-quality architectural products. The system of stepped galleries, first introduced here at the turn of the eighteenth and nineteenth centuries, is evident, with extensive areas of slate tipping to either side. Within the relict quarry, important features include a hospital (in ruins), and a rare technical combination of significant water-driven machinery, including two intact and preserved water-balance shafts still retaining their cages and mechanism, a hydraulic engine and its associated pumps, and a turbine. These complement the surviving waterwheels at the Felin Fawr slate-slab mills. The underground drainage levels and their railway systems remain intact and accessible.

Penrhyn Slate Quarry is the relict landform of what was by the early nineteenth century the largest slate quarry in the world, working over twenty stepped galleries. Waste rock was tipped to the north, south and east of the working faces. These tips were fed by railway lines from 1801 to 1965, leading to the formation of the distinctive 'finger-run' piles of rubble. Present tipping is carried out to the north of the Nominated Property, and carefully avoids the relict landform of the Quarry.

In the 1840s the system of inclined planes from the quarry pit was abandoned in favour of a system of water-balance shafts. Two of these shafts preserve their head-frames and other equipment, and connect with a network of tunnels.

Initially all the reduction of blocks and splitting was carried out by hand in shelters called *gwaliau* by the quarrymen. From the beginning of the twentieth century, these came to be superseded by electrically-powered mills housing saw tables in the main processing area, but examples survive within the Nominated Property.

Figure 2.14. Penrhyn Quarry made extensive use of water-balance systems from the mid-nineteenth century until 1965, when two surviving examples were retained for their heritage value. Sebastopol water-balance shaft was sunk during the Crimean war, and recalls the Allies' capture of the city in 1855. It connects with the accessible network of tunnels and drainage levels in the Quarry.

The introduction of the water-balance shafts from the 1840s and the deepening of the pit required the cutting of a drainage level 1.9 kilometres long to the Ogwen River by experienced miners from the coal and iron town of Merthyr Tydfil in South Wales. Underground machinery at Penrhyn Slate Quarry includes intact railway systems, and a hydraulic engine and pumps in a shaft now flooded to just below the floor level.

Figure 2.15. Hydraulic (or water-pressure) engines were never common in Britain, but Penrhyn Slate Quarry installed this triple-cylinder machine to pump the quarry pit in 1872, and preserved it *in situ* when it fell out of use in the 1930s.

Element 1.2 Felin Fawr Slate-Slab Mills

Element 1.2 consists of a conserved processing and engineering complex on the course of the Penrhyn railway systems of 1801 and the 1870s from the quarry to the sea, located where they first crossed a fall of water powerful enough to drive machinery. This was the site of the innovative slate-slab mill of 1802 – the earliest known location in the world to have used circular saws to cut stone. The two surviving waterwheels and most of the present buildings date from the mid-nineteenth century or later, and are in appropriate industrial re-use.

The industrial complex known as *y Felin Fawr* ['the big mill'] is situated to the north of Penrhyn Slate Quarry, at the first location where the railroad crossed a stream which could be dammed to turn water-wheels. This was where slate slabs were sawn and shaped, and where the quarry's engineering needs were met. It operated until 1965 and is now in re-use by local businesses.

A mill to saw raw blocks into architectural slabs had been established here by 1802, when it was equipped with circular saws. This is the earliest known location in the world to have used circular saws to cut stone; it narrowly predates their use to saw *lignum vitae* in the Royal Navy Dockyard at Portsmouth. Later mills were erected *c*. 1846 and in 1855, and the two present mills in 1865-6, to the design of William Francis (d.1887) and his son John Francis (1828-1879), the quarry managers. The mills were consolidated in 1999-2000 by Gwynedd Council for conversion to light industrial units.

The slate slab-built locomotive shed added against the southern gable wall of the western mill was built for the first locomotive on the Penrhyn Quarry Railway in December 1875, with a later siding for an internal combustion locomotive. The foundry dates from 1866, replacing an earlier structure erected in 1834. It is typical of its period, built out of sawn slate slabs with quoins of igneous rock. The blast was provided by a suspension water-wheel which survives in a building to the eastern perimeter of the site, by Henry Sugden and Son of Bramley, near Leeds.

The houses Tai'r Stablau [stable-houses] were built in 1875 on the site of facilities for the horses that formerly pulled the slate wagons to Port Penrhyn. Later structures include a two-bay locomotive repair shop, built out of sawn slate blocks. The more northerly range housed a range of machine tools; in the other, an inspection pit and an overhead gantry crane survive. At the southern perimeter of the site, where the railway passed into the quarry, is a fine slate-slab road over-bridge dating from 1900. The river which powered the complex follows its original course and is apparent both upstream and downstream. The culvert through which it passes under the site is accessible.

Figure 2.16. This aerial view of the Felin Fawr slab mill and engineering complex shows how the two slab-mills and their associated engineering complex were constructed above a culvert carrying the stream that powered the waterwheels. Also evident are a foundry, the course of the railway, locomotive sheds and workers' housing. The buildings are now operated by a local business, and have been conserved.

Figure 2.17. Two nineteenth century waterwheels survive at Felin Fawr; this one powered the foundry blower.

Element 1.3 The Penrhyn Slate Quarry Railroad and Penrhyn Slate Quarry Railway

The original 0.6 metre iron railroad of 1801 used both horse-traction along lightly-graded sections and counterbalanced inclined planes to connect the quarry with Port Penrhyn. It is the design ancestor of many narrow gauge railways built subsequently, and provides a contrast with its steam railway replacement built in the 1870s, operational until 1962. Their courses run parallel to each in places and include impressive retaining walls as well as an early railway viaduct and a remarkable intact inclined plane winding house.

Both these railway systems transported slate from Penrhyn Slate Quarry to Port Penrhyn. In places their formations run adjacent to each other; elsewhere they follow different routes. They illustrate not only the development of the distinctive technology of the narrow-gauge railway within the slate industry of North Wales but also how it evolved in a global context. This is evident in its links with both earlier and later technology; the original 0.6 metre iron railroad of 1801 used both horse-traction along lightly-graded sections and counterbalanced inclines, in the manner of a canal and its flights of locks. It used innovative cast-iron edge rails inspired by recent practice in Blaenavon (inscribed on the World Heritage List as an industrial landscape in 2000) and other South Wales ironworks. Charles Easton Spooner of the Ffestiniog Railway designed the 1870s steam-powered replacement for the horse railroad. It follows a sinuous and steep course – the maximum gradient is 1 in 33. By this time, small but powerful steam locomotives could haul significant loads up steep gradients, and the use of inclined planes, with their potential for delay, was no longer necessary. The Penrhyn Slate Quarry Railway operated until 1962.

Internal railways within Penrhyn Slate Quarry were built to the same gauge, and ran to over 80 km of track. They were replaced by off-road vehicles in 1965, but the course of many of the inclined planes is evident, as is the formation of the branches used to tip waste rock. Track survives in the underground part of the quarry.

Figure 2.18. The course of the Penrhyn Slate Quarry Railway is evident in this view. This section operated from 1879 to 1962.

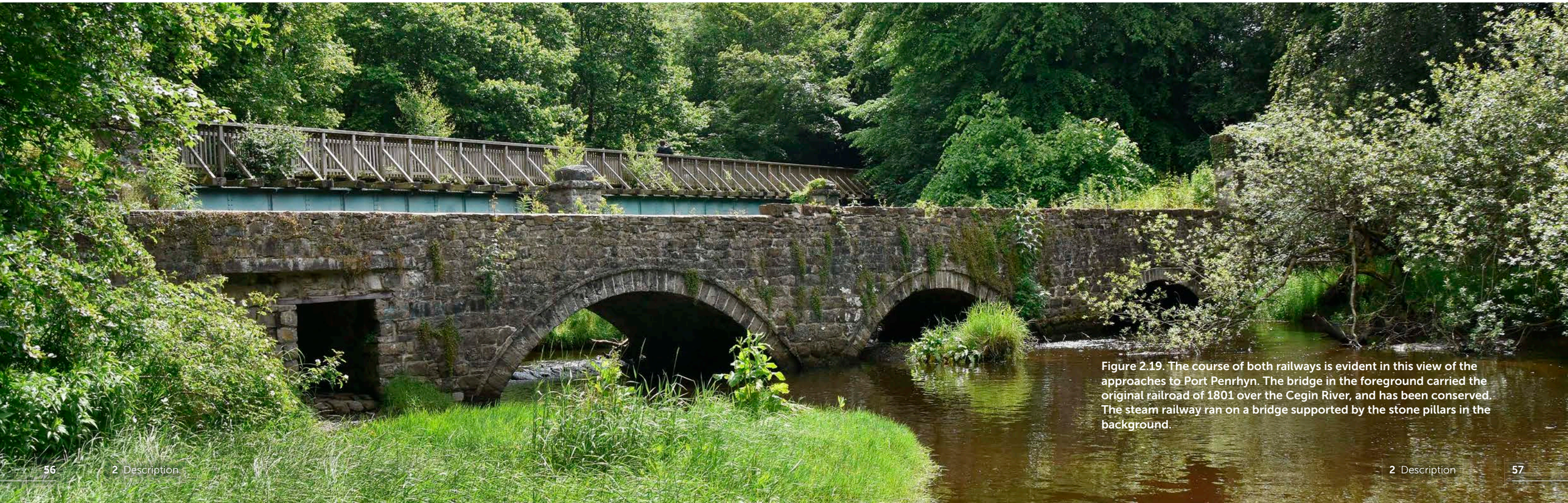


Figure 2.19. The course of both railways is evident in this view of the approaches to Port Penrhyn. The bridge in the foreground carried the original railroad of 1801 over the Cegin River, and has been conserved. The steam railway ran on a bridge supported by the stone pillars in the background.

Element 1.4 Port Penrhyn

Developed after 1790 as an engineered export harbour for Penrhyn slates, and extended in 1803, 1829-30 and 1855; in use as a commercial harbour, retaining its warehousing (1790s), and its Victorian office, circular privy, locomotive shed and carriage shed.

Port Penrhyn lies at the east end of the Menai Strait, which separates Anglesey from mainland Wales, adjacent to the town of Bangor and to Penrhyn Castle, and was the main shipping point for Penrhyn slate from the late eighteenth century to the mid-twentieth.

The River Cegin enters from the south. The earliest shipping point for slate was the pool upstream of the confluence, where a plan of 1768 shows a road approaching from the east with a possible quay alongside. In 1790 Benjamin Wyatt designed stone quays with a small stone pier and a warehouse at the mouth of the Cegin River; a further small quay was constructed by 1803, lengthened in 1828-1830. All of these survive. In 1855 further construction took place, resulting in the present harbour.

Port Penrhyn was initially served by the quarry road, then by the horse-drawn railroad of 1801, by a siding from the Chester & Holyhead Railway in 1852, which enabled slates to be distributed by the national rail network as well as by sea, then by the steam-worked narrow-gauge Penrhyn Slate Quarry Railway from the 1870s (Element 1.3).

Port Penrhyn remains in use as a commercial harbour and occasionally exports some crushed slate. Structures include: the warehouse, which contains eighteenth century fabric and is now offices and the head-quarters of Agoriad Cyf., an organisation assisting disabled and disadvantaged people; a bridge of 1820 built of dressed Penmon limestone crossing the Cegin river; the office (1840s); a circular privy (1862); the two-road locomotive shed (1878); and the shed for the quarrymen's train (1880).

Figure 2.20. The Neo-classical office at Port Penrhyn dates from the 1840s.

Figure 2.21. Port Penrhyn is a well-preserved industrial port built between 1790 and 1855.

Element 1.5 Mynydd Llandygai Settlement

An area set aside by the Penrhyn Estate for planned housing for quarrymen and their families, developed from the 1820s to the 1860s, with cottages set in long garden plots.

The Penrhyn Estate sponsored its own model settlement for quarrymen on the exposed slopes of Mynydd Llandygai, on the western sides of the Ogwen River. In 1796 the lower slopes were enclosed as a potato-patch to feed the quarrymen and their families; the upper slopes were initially exploited as a peat-digging to provide fuel for their homes. The first houses were built in 1798 alongside the slate road from the quarry, and have mostly been replaced with late-nineteenth century dwellings for quarry officials. On the mountain, quarrymen's dwellings on the lower road, Llwybr Main [back path], were laid out in 1843 and on the higher, Tan y Bwlch, in 1862. These are half-lofted dwellings of traditional design, each with a long garden on the hillside set out in regular order. Adapted former places of worship here include the Congregational (Independent) 'Hermon' chapel, built in 1845, rebuilt in 1856 and again in 1879, to a sub-classical design by the architect Owen Morris Roberts of Porthmadoc, and the Methodist 'Amana' chapel, built in 1868 in the simple round-headed gable entry type. The spire of St Anne's (Anglican) church, built in the early English style in 1865, is a prominent feature, to remind those who lived there of the important and enduring role of the established state church.

Figure 2.23. Tan y Bwlch road on Mynydd Llandygai, with the quarry in the background.

Figure 2.22. Mynydd Llandygai illustrates the dual economy of quarrying and agriculture, and the controlling hand of the Penrhyn estate in the way it housed its workforce in this designed landscape.

Element 1.6 Bethesda Village

Figure 2.24. Bethesda has seen little change since the beginning of the twentieth century, and is still mostly a long settlement on both sides of Telford's historic highway from Shrewsbury in England to Holyhead, a major port on the island of Anglesey.

A village initially created by quarrymen who preferred not to live on the Penrhyn Estate, established on a freehold where the Congregational (Independent) chapel from which it took its name was built in 1820. The earlier, core part is characterised by plain dwellings along Thomas Telford's highway, and a lack of any formal planning. Its subsequent expansion onto estate land includes larger dwellings and community infrastructure sponsored by the Penrhyn family once it recognised this independent community as an established fact.

The earliest part of the village of Bethesda was developed on one of the few parts of the Ogwen Valley that did not form part of the otherwise all-dominant Penrhyn Estate, and was constructed by slate-quarrymen to house themselves and their families. The community takes its name from 'Bethesda Chapel' (Congregational/ Independent) of 1820, built where Thomas Telford's newly-completed government-sponsored highway from Shrewsbury to Holyhead entered an area of freehold. Early settlement was confined to this small independent patch, first as a ribbon development along the road, then along winding field-paths as the population grew in the 1850s.

Fig 2.25. John Street In Bethesda is one of the parts of Bethesda built with 'great contempt for regularity' in the mid-nineteenth century.

Figure 2.26. 'Jerusalem' chapel was remodelled in 1872-5 by a local architect, Richard Davies of Caernarfon.

Bethesda in 1853 '.... its main street, a wide but winding thoroughfare, and the only street, properly so called, in the whole village. The rest of the houses were built all around, with great contempt for regularity: each house was built wherever a patch of tolerably level ground could be found facing any point of the compass which its builder might fancy. The houses looked as if they had rolled down the mountains with the other boulders, and had been suddenly stopped on their course before they reached the brawling Ogwen below. (Robert Roberts "Sgolor Mawr"' (Roberts 1991, 274)).

This pattern is still evident, but Bethesda also shows the influence of town planning in the more orderly layout of streets and housing following its Improvement Act of 1854 and where it later expanded onto the Penrhyn estate.

Distinctive chapels in the town include the substantial Calvinistic Methodist 'Jerusalem', built in 1842, remodelled in 1872-5, and the Welsh Congregational/ Independent 'Bethania' of 1885 and 'Bethesda' itself, a rebuild of 1872-5, contrasting with the Early Decorated design of the Anglican Christ Church/Glanogwen of 1855-6. Most of the houses, shops and public houses in Bethesda date from the second half of the nineteenth century.

Bethesda has seen little development since the prolonged and bitter strike (1900-1903) at Penrhyn Slate Quarry. This is still the longest running labour dispute in the history of the United Kingdom, pitching progressive and conservative forces against each other across the nation, and marking the beginning of the industry's long twentieth-century decline. Bethesda remains an excellent example of a Victorian industrial community.

Figure 2.27. Gordon Terrace (Rhes Gordon), built in 1885, is an example of later-nineteenth century housing for the better-off inhabitants of Bethesda.

Figure 2.28. The cottage row Cae'r Berllan, on the outskirts of Bethesda, probably dates from the 1830s.

Element 1.7 Penrhyn Castle and Park

The extravagant neo-Norman dwelling of the Penrhyn family, built by the architect Thomas Hopper from the early 1820s to 1837 on the site of much earlier dwellings, set within an enclosed nineteenth century landscape park with terraced garden, walled kitchen gardens and lawns.

Penrhyn Castle was the North Wales home of the family that owned both the quarry and most of the land in the Ogwen Valley, as well as extensive estates in England and in Jamaica. There has been a high-status dwelling here since at least the fourteenth century, successively re-built to culminate in the present Neo-Norman fantasy castle by Thomas Hopper, completed in 1837. It is one of the most lavish houses in Britain, rising out of the parkland woods to dominate a wide surrounding area, and

Penrhyn Castle – 'Continental travellers along the Holyhead road marvelled at the British and their political economy, which enabled a commoner to erect a palace for a king.' (Haslam, Orbach and Voelcker 403).

exemplifies the money that could be made from, and invested in, the slate industry of North Wales. Its opulence contrasts with the dwellings of the quarrymen and their families (Elements 1.5 and 1.6).

An area of 300 hectares around the Castle was transformed into a purely ornamental landscape, symbolically sealed off by a high boundary wall topped with broken Penrhyn slate, on which work commenced in 1819. The Penrhyn Slate Quarry Railroad to the west became the park boundary. The terraced garden, walled kitchen gardens and lawns retain their nineteenth century character, as well as their setting and their strong visual relationship with the Castle and the surrounding landscape.

Figure 2.29. The size and extent both of Penrhyn Castle and its park are apparent in this aerial view.

Summary of values and attributes

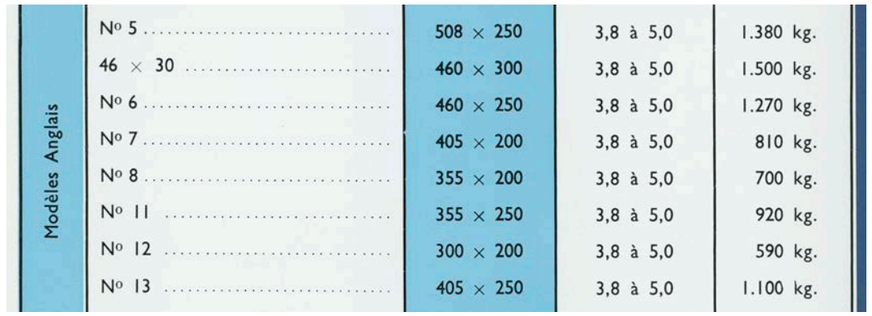
As the first area of the slate industry of North Wales to be extensively capitalised for global markets, the Ogwen Valley demonstrates how quarrying was re-organised by a single, immensely wealthy family, as a major part of a broader investment in their great landed estates. This transformative process reflects the reinvestment of profits from their sugar plantations in Jamaica, financial links to the maritime mercantile city of Liverpool, and the family's strong political connections in London. It illustrates the mixture of landed and banking capital in the British Industrial Revolution, as well as the role of British slavery as a source of funding for industrial development.

These changes began in the last decades of the eighteenth century and in the early years of the nineteenth, when Richard Pennant (Lord Penrhyn) cancelled the leases held by local partnerships which had previously conferred the right to work scattered and small-scale diggings, and instead initiated intense and systematised operations concentrated on the major slate vein in the valley. His engineers developed a system of regular stepped benches or 'galleries' to work the rock-face, and greatly improved transport links to the coast. He had created the world's largest single slate quarry by the early nineteenth century.

The wealth available to Lord Penrhyn and his successors is evident not only in the form and scale of the workings, but also in improved capacity. Innovative technologies include the first slate-slab mill in the industry (by 1802) and the iron railroad connecting the quarry to the sea (1801). The site is also remarkable for its rare variety of surviving water-driven machinery. Outside the Nominated Property, Penrhyn Quarry has continued to introduce new methods to the present day, and remains in active production. It is the one remaining quarry within the slate industry of North Wales where traditional techniques of extracting the rock and splitting blocks are still carried out on an industrial scale.

Other slate-producing areas in the region sought to emulate the technologies introduced at Penrhyn Slate Quarry and its novel transport systems.

Penrhyn slates were sold as 'Bangor blues', named after the town adjacent to the harbour at Port Penrhyn from which they were shipped. A set of standard sizes was established in the late eighteenth century by the architect and slate- and timber-merchant James Wyatt (1746-1813). It was subsequently adopted by the building industry. *Modèles Anglais* ('English [sic] sizes') were also offered by the slate quarrying industry of France.



Modèles Anglais

N° 5	508 × 250	3,8 à 5,0	1.380 kg.
46 × 30	460 × 300	3,8 à 5,0	1.500 kg.
N° 6	460 × 250	3,8 à 5,0	1.270 kg.
N° 7	405 × 200	3,8 à 5,0	810 kg.
N° 8	355 × 200	3,8 à 5,0	700 kg.
N° 11	355 × 250	3,8 à 5,0	920 kg.
N° 12	300 × 200	3,8 à 5,0	590 kg.
N° 13	405 × 250	3,8 à 5,0	1.100 kg.

Figure 2.30. French slate quarries have offered 'modèles Anglais' based on the Penrhyn Slate Quarry standard sizes since the mid-nineteenth century.

Table 2.2. The standard sizes established at Penrhyn Slate Quarry were adopted throughout the industry

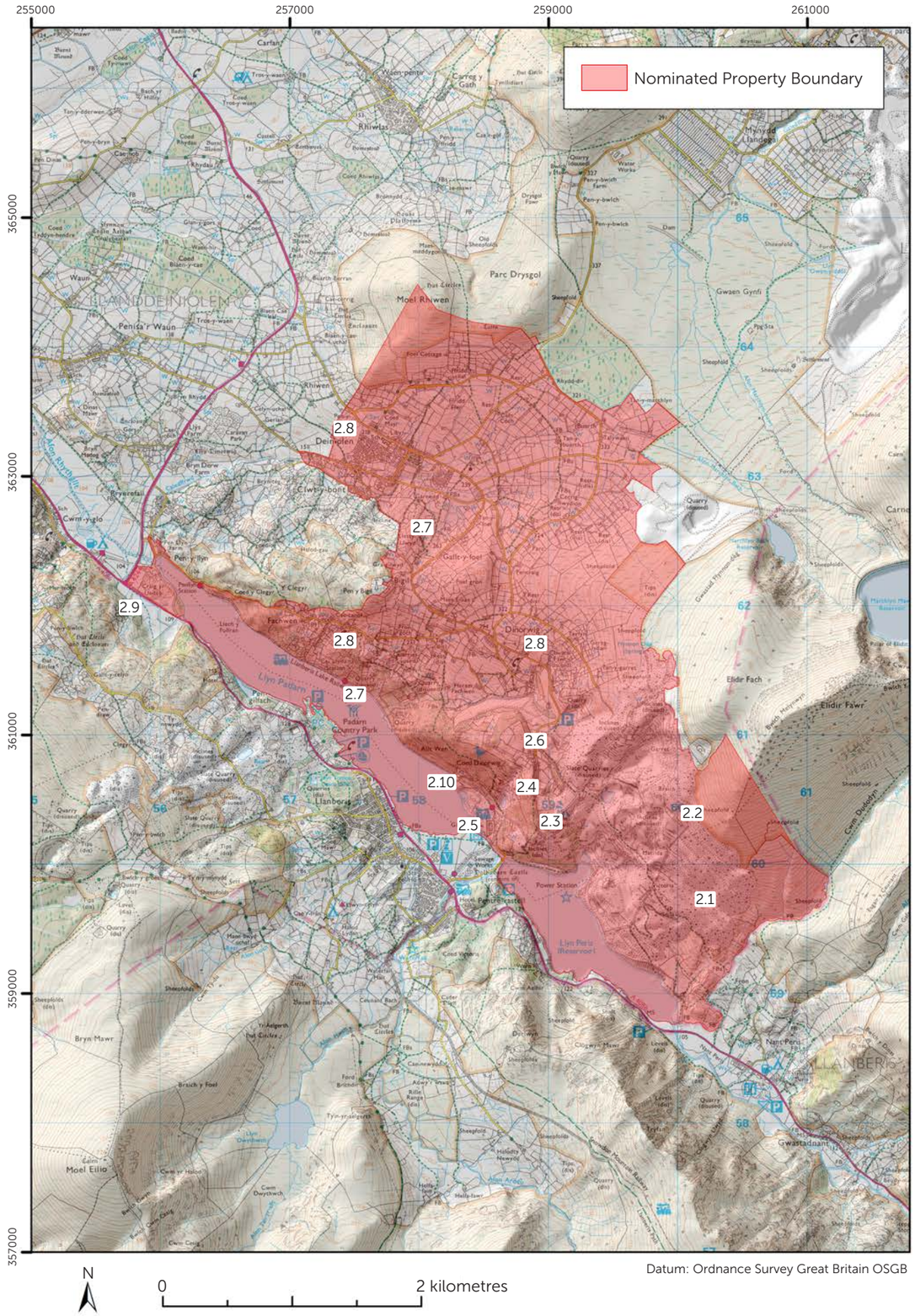
Empresses	660.4mm X 406.4mm (26" X 16")
Small Empresses	660.4mm X 381mm (26" X 15")
Queens	609.6mm, 660.4mm, 711.2mm, 762mm, 812.8mm, 863.6mm (24", 26", 28", 30", 32" and 34") long and various breadths
Princesses	609.6mm X 355.6mm (24" X 14")
Duchesses	609.6mm X 304.8mm (24" X 12")
Small Duchesses	558.8mm X 304.8mm (22" X 12")
Marchionesses	558.8mm X 279.4mm (22" X 11")
Countesses	508mm X 254mm (20" X 10")
Wide Countesses	457.2mm X 254mm (18" X 10")
Viscountesses	457.2mm X 228.6mm (18" X 9")
Wide Ladies	406.4mm X 254mm (16" X 10")
Broad Ladies	482.6mm X 228.6mm (19" X 9")
Long Ladies	419.1mm X 215.9mm (16½" X 8½")
Ladies	406.4mm X 203.2mm (16" X 8")
Wide Headers	355.6mm X 304.8mm (14" X 12")
Small Headers	330.2mm X 254mm (13" X 10")
Small Ladies	355.6mm X 203.2mm (14" X 8")
Narrow Ladies	355.6mm X 177.8mm (14" X 7")
Doubles	330.2mm X 177.8mm (13" X 7")
Wide Doubles	304.8mm X 203.2mm (12" X 8")
Small Doubles	304.8mm X 152.4mm (12" X 6")
Singles	254mm X 203.2mm (10" X 8")

Quarry settlements in the Ogwen Valley exemplify the social tensions caused by the controlling hand of the estate, itself a reflection of its use of coerced labour in the West Indies. The stylised cottages and houses built by the estate contrast with the plainer dwellings which independent-minded quarrymen created for themselves on freehold land. Anglican churches with tall spires vie with the 'preaching barn' architectural style of the Nonconformist chapels.

COMPONENT PART 2

Dinorwig Slate Quarry Mountain Landscape

Figure 2.31. The stepped galleries of the Dinorwig Slate Quarry are cut into the slopes of Elidir Fawr mountain. Between the two lakes at the foot of the quarry, the quadrangular yard of the National Slate Museum is evident. This was once the quarry's engineering complex.



Map 2.3. The boundary and Elements of Component Part 2: Dinorwig Slate Quarry Mountain Landscape (Scale 1:40,000).

Location and setting

The Dinorwig area is the second-most northerly of the Component Parts, a sub-rectangular southeast-northwest trending area that is around 5.5km at its longest, and typically around 3km wide; in the vicinity of the Quarry, the landscape takes in a dramatic rise in elevation of 600m. The orientation of the Component Part is aligned with the topography of the mountainside (in which the slate deposit is located) and the valley floor, which is largely occupied by two long and narrow lakes. The Quarry is located on the southern side of the Elidir Fawr mountain (924m above sea level), which separates it from Penrhyn Slate Quarry by around 5km; it also lies at the foot of Snowdon, the highest mountain in Wales and England (summit 1,085m above sea level, 4.5km to the south). All elements are intimately related in their direct development by aristocratic owners, and the strongly engineered approach to quarrying for slate that their resources made possible, as well as the social tensions between them and the workforce.

The Quarry was only slightly smaller in area and output than Penrhyn (Component Part 1) and covers more than 2.8km^2. From the smaller (Peris) of two lakes, stepped galleries (two principal sections with over 30 galleries in each) and their cascading tips of waste rock soar to an elevation of 500m up the side of the dissected mountain. 'Stairways' of some twelve massive, slate-built inclined planes connect galleries to produce, overall, a dramatic icon of Welsh slate.

The slate formation is Cambrian, part of the Arfon Slate District that also includes the quarries in Component Parts 1 and 3. Dinorwig lies within a geological fault that has produced a northwest-southeast trending pronounced upland valley (Nant Peris) with two narrow and contiguous lakes, Peris (1.6km long, below the Quarry) and Padarn (3km long), between which stands the thirteenth-century Dolbadarn Castle, built by the Welsh prince Llywelyn ab Iorwerth. The industrial landscape of Dinorwig Slate Quarry is particularly evident looking eastwards towards Elidir Mountain from the road which follows the Nant Peris valley (the A4086). To the immediate southeast is the narrow, straight and steep-sided Llanberis Pass, between the Snowdon massif and the Glyderau mountain range. The doorway and service buildings of the underground pumped-storage hydro-electric power station, constructed between 1975 and 1984, are visible on the lakeside level of the Quarry.

The highest elevations of quarried landscape in their rugged mountain setting give way to a sparsely settled rural upland in the north and northwest. Here, dispersed quarry workers' cottages and smallholdings, and small nucleated villages provide a settlement pattern that, together with barracks in the immediate vicinity of the Quarry itself, demonstrates the subtler impact the industry made on the pre-existing rural scene.

The Dinorwig landscape has appealed to travellers and artists searching for the Romantic and the Sublime, and has also attracted mountain climbers and botanists since the eighteenth century.

Summary

Includes the great Dinorwig Slate Quarry with its stepped galleries, tips of waste rock and processing areas rising 500m from the valley floor and its twin lakes, impressive quadrangular former Dinorwig Slate Quarry Engineering Complex (now the National Slate Museum), an innovative hospital to treat injured quarrymen, extensive worker settlements including barracks, dispersed cottages and the nucleated villages of Deiniolen and Clwt y Bont, and transport systems by lake, road and railway.

Elements

Elements of this Component Part date from the 1780s to the 1920s within a mountainous landscape of aristocratic improvement.

Table 2.3 Component Part 2 Elements

Element 2.1	Dinorwig Slate Quarry
Element 2.2	'Australia' Gallery
Element 2.3	Anglesey Barracks
Element 2.4	V2 Inclined Plane / Vivian Slate Quarry
Element 2.5	Dinorwig Slate Quarry Engineering Complex. The National Slate Museum
Element 2.6	Dinorwig Slate Quarry Road Systems
Element 2.7	Dinorwig Slate Quarry Railroad and Railway
Element 2.8	Deiniolen, Clwt y Bont, Dinorwig and Fachwen Settlements
Element 2.9	Craig yr Undeb ['Union Rock']
Element 2.10	Dinorwig Slate Quarry Hospital

Element 2.1 Dinorwig Slate Quarry

Figure 2.32. Dinorwig Slate Quarry is reflected in the waters of Peris Lake. The massive system of inclined planes shows how these transport systems made ingenious use of topography to ensure internal movement of slate rock. Locomotive-worked railway systems ran along each of the stepped galleries to the massive tips of waste rock.

An extensive relict slate quarry, once the second largest in the world, worked intensively from 1787 to 1969 and which retains substantial structures and machinery. Dinorwig adopted the same system introduced at Penrhyn Slate Quarry, of stepped galleries, along the west-facing slopes of Elidir Fawr Mountain, overlooking Peris Lake. These galleries lead to extensive areas of tipping to the north and south of the vein. Inclined planes, including massive four-track rubble-walled examples, represent striking features of this monolithic industrial system.

A slate quarry worked in over thirty stepped galleries, each with its tip of slate waste, connected by two major systems of inclined planes from the highest galleries to the lakeside floor. Slate mills, a transformer house, and slate-splitters' shelters survive, as well as substantial machinery on the upper galleries (see Element 2.2 'Australia' Gallery), and a row of barracks for quarrymen who lodged by the week, which has been conserved (see Element 2.3 Anglesey Barracks).

The intact 'A' series of inclined planes, built in 1869-1870 to connect the upper quarry to the railway, remained in use until the quarry's closure in 1969. Many have preserved their drum-houses, rails and other ironwork.

Figure 2.33. The 'A' series inclined planes are impressive features within the quarry landform. In many cases, machinery survives as well as well as the embankments on which they are built.

Figure 2.34. Some inclined planes were built on very steep gradients indeed, and used traveller carriages to transport the wagons.

Element 2.2 'Australia' Gallery

'Australia' Gallery, with its slate mill from the 1920s, is spectacularly situated towards the top of the south-eastern (Braich) side of the Quarry; at an elevation of 480m, this element is remote and difficult to access, hence the mill avoided having its machinery removed for scrap and thus survives remarkably intact.

The upper stepped galleries of Dinorwig Slate Quarry retain machinery that reflects technology dating from the mid-nineteenth century to the 1930s. The 'Australia' Gallery is situated at 702m AOD. Long known as 'Braich' ['arm (of the mountain)'], it acquired its present name with the declaration of the Commonwealth in 1901, reflecting quarrymen's interest in current affairs. The inclined plane to the higher gallery was built *c.* 1889.

The mill is built of slate rubble and on a very long rectangular plan (100m x 15m) with end-gables entered by railways. Regularly spaced open doorways gave access to a lean-to along a terrace (approximately 200m x 25m), which is retained by rubble walls on the down-slope front and sides. Construction dates from 1922-4, the period when the quarry extended its electricity supply. The adjacent compressors, water-tank and water-supply system and electric motor illustrate the adoption of pneumatic drilling, while the railway system, with its varieties of inclined plane and its locomotive shed, provide an excellent example of how this distinctive technology operated within the extractive and tipping areas of a galleried slate quarry. A *caban* survives here, the shelter where the men met to eat during their breaks from work and to engage in formal discussions.

Figure 2.36. The mill was built in the 1920s and preserves its rows of 36 saw-tables (right), as well as separate working spaces for hand-splitting, contrasting with the un-mechanised *gwaliau* [slate-splitters' shelters] in the Vivian Slate Quarry.

Figure 2.35. The upper galleries of Dinorwig Slate Quarry (above) were left untouched when it closed in 1969. The 'Australia' Gallery mill and other features are apparent in this aerial view.

Element 2.3 Anglesey Barracks

The Anglesey barracks, *y dre' newydd* ['the new town'], were built in the early 1870s adjacent to the former operational area of Dinorwig Slate Quarry, for workmen who lived too far away to commute daily.

Workmen from Anglesey or from elsewhere in the region lodged here on a weekly basis (a bedroom in each unit had space for four men) until 1937, when the Barracks were condemned as unfit for human habitation. The two rows of identical blocks of 11 two-roomed cottages, with windows only facing inwardly onto the 'street', differ little from vernacular cottage dwellings of the period, and are the last survivors of the seven or so barracks known to have functioned at the Quarry. Together with scattered cottages on the uplands to the northwest of the Quarry (Element 2.8), such barracks further illustrate how much-needed accommodation was provided for the workforce of up to 3,000 men, in a Component Part that exemplifies the hostile environment faced by the mountain slate-worker.

Figure 2.37. The Anglesey barracks are built on a 65x15m footprint, partly on a terrace made up of waste rock. The doorway through the wall at the eastern end is 8m from an inclined plane. Other, more ruinous, barracks are evident to their right. See also Figure 2.8.

Element 2.4 V2 Inclined Plane/Vivian Slate Quarry

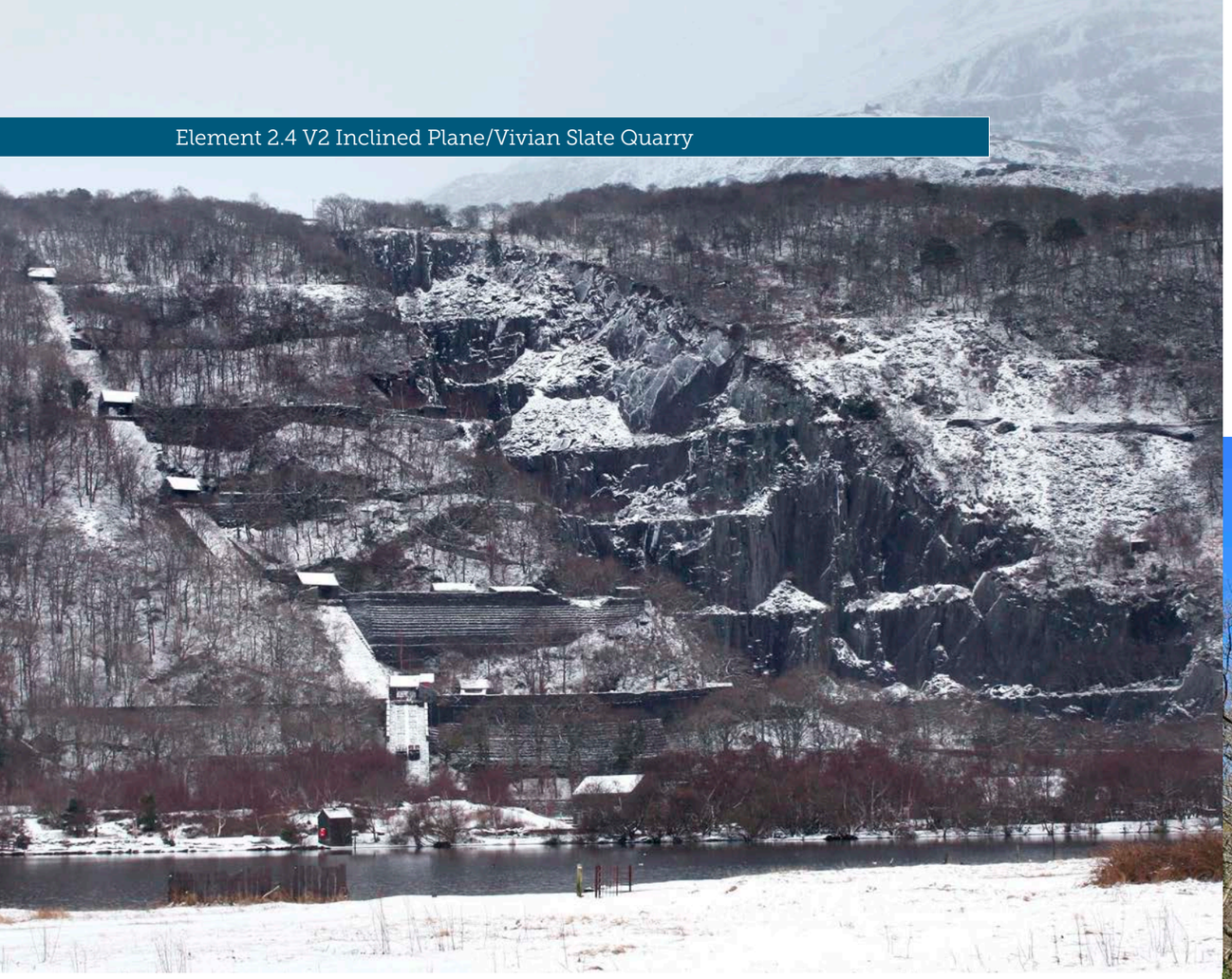


Figure 2.38. A fall of snow has brought out the galleries in the Vivian Slate Quarry and its system of inclined planes.

The Vivian Slate Quarry was a separate department of the Dinorwig complex, and preserves on a smaller scale many of the attributes of the Dinorwig Slate Quarry as a whole. There were eight different floors worked on the gallery system. A preserved and restored 'transporter' (also known as 'platform' or 'tank') inclined plane, powered today by an electric motor, is the last working example of a traditional inclined plane in Wales, one of over 500 counterbalanced inclines that once served the Welsh slate industry. An aerial ropeway has also been conserved. Adjacent to the head of the incline is a well-preserved row of *gwaliau*, the shelters where quarrymen processed and split the raw blocks of slate with hand-tools.

The Vivian Slate Quarry was opened out from the 1860s adjacent to what is now the National Slate Museum on the same principle of stepped galleries as the main Dinorwig complex, of which it formed a separate department. Rows of shelters on each gallery housed the slate-makers, representing the essential principles of this type of working. Several examples have been conserved. Inclined planes were built to the north of the wedge-shaped quarry to transport the finished slate to the railhead. One of these, the V(ivian)2, was conserved and returned to working order in 1998-9 by the National Museum of Wales, and is of a distinctive design in which the quarry trucks are carried on transporter carriages to facilitate operation. An aerial ropeway and its electric motor dating from the 1920s have also been conserved.

The site has public access along footpaths as part of the Padarn Country Park, which is managed by Gwynedd Council. The incline is operated by Museum staff for demonstration purposes.

Figure 2.39. The V2 inclined plane, conserved and returned to working order in 1998-9, demonstrates the operation of this typical slate quarry technology.

Element 2.5 Dinorwig Slate Quarry Engineering Complex.
The National Slate Museum

Figure 2.40. The Quarry supported a host of ancillary industries. Its former engineering complex includes a slate mill, locomotive sheds, repair facilities for machinery, and a foundry. This massive quadrangular range of workshops and other buildings was constructed in 1870 on bedrock and slate waste. The elaborate, yet functional, façade shows access for the narrower Quarry gauge railway, and the broader gauge Dinorwig Quarry Railway that transported slate to the sea. Traditional skills were taught to apprentices and were handed down over the generations. Functioning today as the National Slate Museum, the complex has been sensitively conserved.

The former Dinorwig Slate Quarry engineering complex at Gilfach Ddu (now the National Slate Museum) is a quadrangular range of ancillary workshops built around a central courtyard. Here much of the Quarry's machinery was built and maintained. It changed little from when it opened in 1870 until it closed nearly a hundred years later.

The architecture of the complex is ambitious, and is unusual in the context of the slate industry of North Wales. The quadrangle design recalls both the stable-courtyard of country houses and early industrial practice.

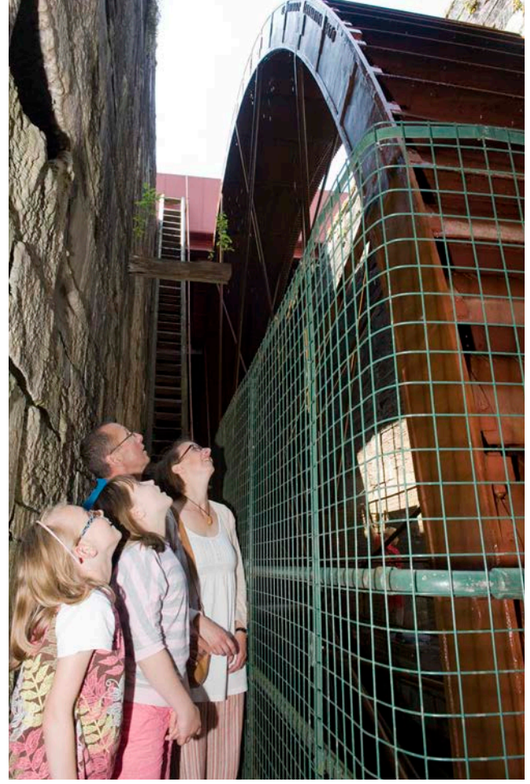


Figure 2.41. Public access to the iron waterwheel enables visitors to understand the skilful use the slate quarries of Northwest Wales made of their extensive water catchment areas.

Figure 2.42. The 1926 Pelton (bottom right) is directly coupled to the line-shafting in the Museum and provides a contrast with the earlier technology which it replaced.

The 15.4m-diameter iron suspension waterwheel, now the largest operational example in mainland Britain (located in a massive waterwheel housing at its southwest corner, near where the two lakes are divided) powered the Dinorwig Slate Quarry Engineering Complex, and was built by a local engineering firm. It was conserved and returned to working order in 1998-9, and is the largest surviving waterwheel in mainland Britain. A Pelton wheel from 1926 now operates the machinery. The historic machinery and the foundry survive, and the site as a whole is a time-capsule of mid-Victorian British engineering practice.

The National Slate Museum is housed in the former Dinorwig Slate Quarry engineering complex, once the main maintenance hub of the quarry. It is located in a piece of made-up ground on the shores of Padarn Lake, at the foot of the 'A' series of inclined planes from the quarry, and adjacent to the Vivian Slate Quarry, and the Dinorwig Slate Quarry Hospital.

One quadrant of the engineering complex houses the steam locomotives and repair facilities for the Llanberis Lake Railway, which has been operated on the trackbed of part of the Dinorwig Quarry Railway since 1971. Nearby is a relocated and reconstructed winding engine house from within the Quarry.

As the National Slate Museum, a part of Amgueddfa Cymru/National Museum Wales, the site interprets the history of the slate industry of Wales, offering talks, lectures and demonstrations of slate-splitting. Relocated quarry dwellings on the site depict the living conditions of quarry workers and their families during the boom period in 1861, during the time of the long-running labour dispute at Penrhyn Slate Quarry in 1900-1903, and after the sudden closure of Dinorwig Slate Quarry in 1969.

Element 2.6 Dinorwig Slate Quarry Road Systems

Figure 2.43. Penllyn bridge at the north-eastern end of Padarn Lake.

Early road systems developed at the Quarry include the 'drag' to the lake, the slate roads through Deiniolen village and to the 'Garret' (the higher galleries of the quarry), and the road from a small quarry on the Fachwen slopes to the north-eastern end of Padarn lake and a bridge.

Early routes built to transport the slate from Dinorwig Slate Quarry include the eighteenth-century 'drag' cart-road, now bisected by the workings of the Vivian Slate Quarry, to a landing point on the shore of Padarn Lake, buried but adjacent to the Dinorwig former engineering complex, and a more ambitious road which led to a tidal harbour on the Menai Straits. Its branch to the upper or 'Garret' part of the quarry was laid out in 1823 by the renowned engineer William Alexander Provis. Other features include the fine four-arched bridge of 1826 at the north-eastern end of Padarn Lake on the Fachwen road, built by the skilled local contractor John Hughes.

Figure 2.44. The uppermost road here led to the upper 'Garret' galleries in the quarry. It was designed and built by Thomas Telford's assistant William Alexander Provis in the 1820s, part of the pre-railway network that transported Dinorwig slates to the sea. It makes its way through the small plots of land leased to quarrymen to provide for themselves by building homes and growing food.

Element 2.7 Dinorwig Slate Quarry Railroad and Railway

The 0.6-metre-gauge Dinorwig Slate Quarry Railroad of 1825, based closely on the design of the Penrhyn Slate Quarry Railroad (Element 1.3) and the 1.2192-metre-gauge Dinorwig Slate Quarry Railway of 1842, two successive railed slate transport systems.

The original 0.6-metre-gauge iron railroad of 1825 used horse traction along lightly graded sections and counterbalanced inclines to connect the quarry with a tidal harbour on the Menai Straits to the north. It adopted the cast-iron rail technology of the Penrhyn Slate Quarry Railroad of 1801 (Element 1.3), even though this technology was on the point of being superseded. It was replaced in the 1840s by a more ambitious system, the upper section of which ran along the shore of Padarn Lake, designed by engineers who had worked with both Robert Stephenson and Isambard Kingdom Brunel. It was operational until 1961, and the part along the lake was rebuilt as a tourist railway in 1971.

Figure 2.45. Both the slate road through the village of Deiniolen and the 1825 Dinorwig Slate Quarry Railroad are evident in this aerial view. The Railroad can be traced as a tree-grown formation making its way down the slope on the right of the photograph.

Figure 2.46. Here the 1825 Dinorwig Slate Quarry Railroad is evident as a lane in the village of Clwt y Bont.

Figure 2.47. The Dinorwig Slate Quarry Railway closed in 1961, and a tourist railway using shunting locomotives from the quarry was laid on part of the formation.

Element 2.8 Deiniolen, Clwt y Bont, Dinorwig and Fachwen Settlements

These different types of settlement illustrate the variety of ways in which the demand for housing was met, and how transport needs and land-ownership patterns shaped them.

The Vaynol estate secured permission from Parliament to enclose the Dinorwig mountain common land in 1806. The estate leased plots of land here and on the Fachwen slopes for quarrymen and their families to build their own dwellings. Many are now abandoned. Even in ruins, they show how the influx of workers into the slate industry moved the margins of cultivation almost to the summits of the hill-slopes. By contrast, quarrymen who yearned for independence established the adjacent nucleated villages of Deiniolen and Clwt y Bont on small freeholds, with the help of speculative contractors and local building societies. Deiniolen was built along the slate road from the quarry to the sea, Clwt y Bont along the course of the 1825 quarry railroad.

The location of Anglican churches and nonconformist chapels, and their different architectural styles, also indicate the social forces competing for the allegiance of the quarrymen and their families. The Gothic-revival church and the Lombardic Methodist chapel on the moors immediately to the southeast of the village exemplify the rivalry between the Established (Anglican) church and the Dissenting denominations, vying for souls in an inhospitable landscape.

Figure 2.49. Rhes Fawr ['the big row'] is the work of an Anglesey builder, David Griffith, in the 1830s. He bankrupted himself building them. They originally only had two rooms.

Figure 2.48. This view shows estate-sponsored plots of land and cottages, the independent freehold villages of Deiniolen and Clwt y Bont and twentieth century social housing.

Element 2.9 Craig yr Undeb ['Union Rock']

This natural rock outcrop is where the North Wales Quarrymen's Union held its meetings. It represents a significant monument to the history of labour organisation and trade unionism in the Welsh slate industry.

Conflict between quarrymen and quarry-owners is evident at Craig yr Undeb ['Union Rock'], a natural outcrop at the north-western end of Llyn Padarn, where meetings of the North Wales Quarrymen's Union were held.

Figure 2.50. This view from Craig yr Undeb shows Padarn Lake, with Dinorwig Slate Quarry and Snowdon in the distance. It had been the traditional meeting place for local slate quarrymen long before the Union was proclaimed in 1874. Nonconformist quarrymen's Old Testament sense of themselves as the prophets of the new Israel led them seek out high places for their meetings and for their deunciations of the oppressor – more prosaically, Craig yr Undeb did not belong to the quarry-owner and so they could not be prevented from meeting there.

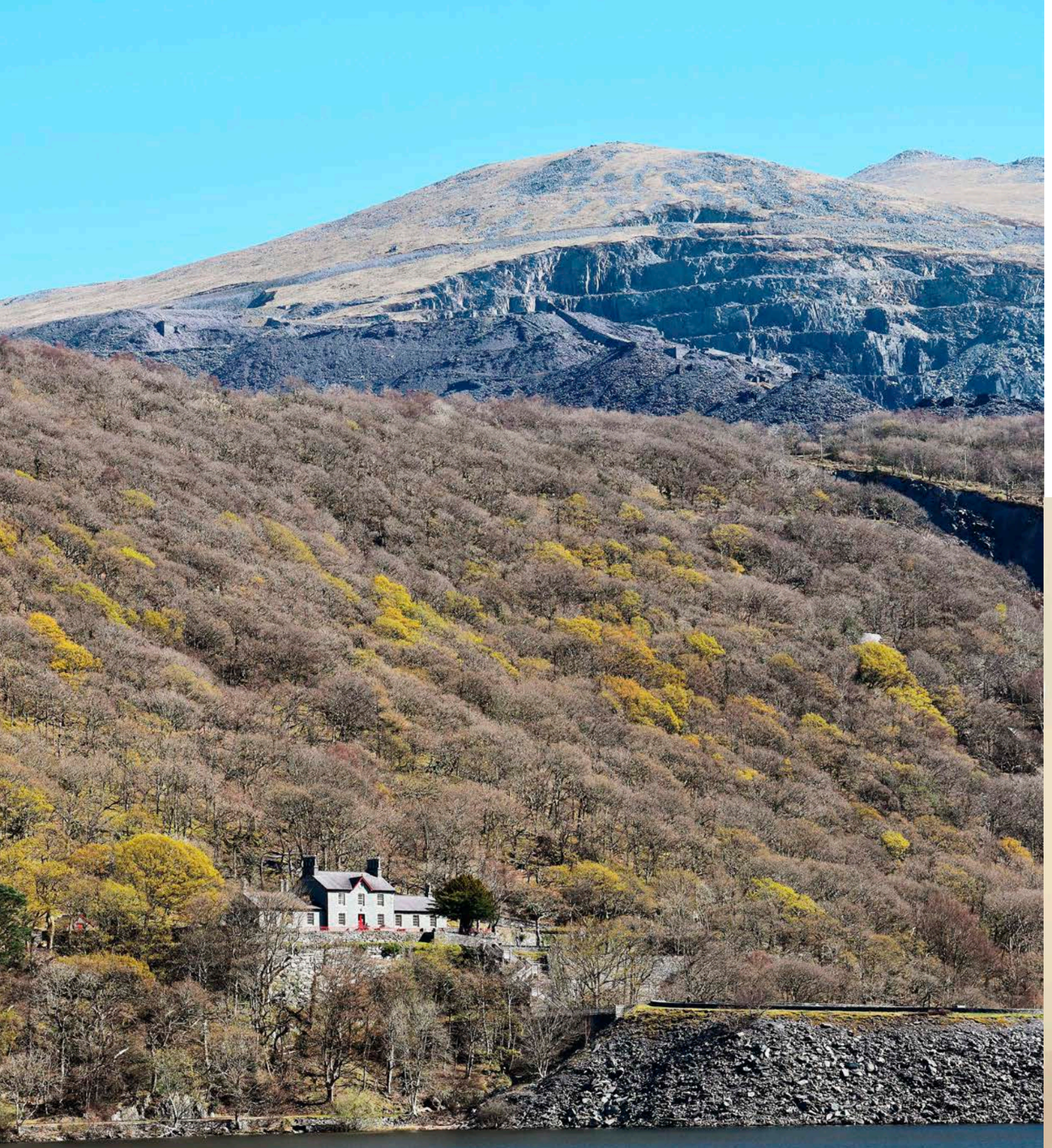


Figure 2.51. Like its counterparts at Penrhyn Slate Quarry (Component Part 1), and in the town of Blaenau Ffestiniog (Component Part 5), the Dinorwig Slate Quarry Hospital layout is based on a central reception block with wings radiating from the gable ends. Each of the three industrial hospitals was built by the principal landowner, and is included in the Nominated Property. The Penrhyn hospital is a ruin, and the Ffestiniog hospital is a private house. Dinorwig Hospital is prominently located so that no-one could miss the benign intent of the owning estate.

Element 2.10 Dinorwig Slate Quarry Hospital

Dinorwig Slate Quarry Hospital is one of the three hospitals established in the Welsh slate industry, all of which are included in the Nominated Property. Industrial hospitals are relatively rare in Britain and this particularly innovative example was built in the early 1860s.

Dinorwig Slate Quarry was the scene of horrific accidents in the early nineteenth century, but by the 1890s was hailed as a model of good practice. Dinorwig Slate Quarry Hospital is a rare surviving example of a nineteenth-century British industrial hospital which survives in its entirety, little changed from when it was opened. It is also known for its early use of Rontgen's X-ray technology, from 12 May 1897, when a quarryman thought to be suffering from a tubercular knee was examined. The Dinorwig Hospital is open to the public as a museum, run by Gwynedd Council.

Much of its early medical equipment is on display, and is interpreted.

Figure 2.52. Dinorwig Slate Quarry Hospital has been conserved, and opened to the public as a museum with much of its early medical equipment on display.

Summary of values and attributes

This Component Part is dominated by the spectacular relict galleried rock-faces, inclined planes and tips of the Dinorwig Slate Quarry, within the stunning landscape, at once rugged and picturesque, of the lower slopes of Snowdon and Elidir Fawr, and the two lakes, Peris and Padarn. Like Penrhyn Slate Quarry, Dinorwig was developed by an aristocratic dynasty (the Assheton Smiths, later the Duff family) who were also committed improvers of their estate. Dinorwig Slate Quarry rivalled Penrhyn in size and output and emulated it in many respects but developed a strongly engineered approach of its own, reflected in the first steam railway in the slate industry of North Wales, influenced by both Stephensonian practice and by Brunel, and in the remarkable quadrangular engineering complex of 1870, with its operational water-wheel. The Quarry Hospital, built in the 1860s, was at the forefront of medical care for injured workmen.

The sudden closure of the Quarry in 1969 meant that many buildings, structures and machines survived on some of the higher, more remote galleries. A tourist railway using quarry locomotives along the formation of the former Dinorwig Slate Quarry Railway in 1971, and the opening of the former engineering complex as the North Wales Quarrying Museum (now the National Slate Museum) in 1972, made Dinorwig a major visitor focus. The very visible nature of the workings when viewed from the slopes of Snowdon or across Peris Lake bring home the form and extent of the quarry, and the construction of a major pumped storage scheme in the lower part of the quarry from 1975 to 1984 added to the sense of the 'engineering sublime'.

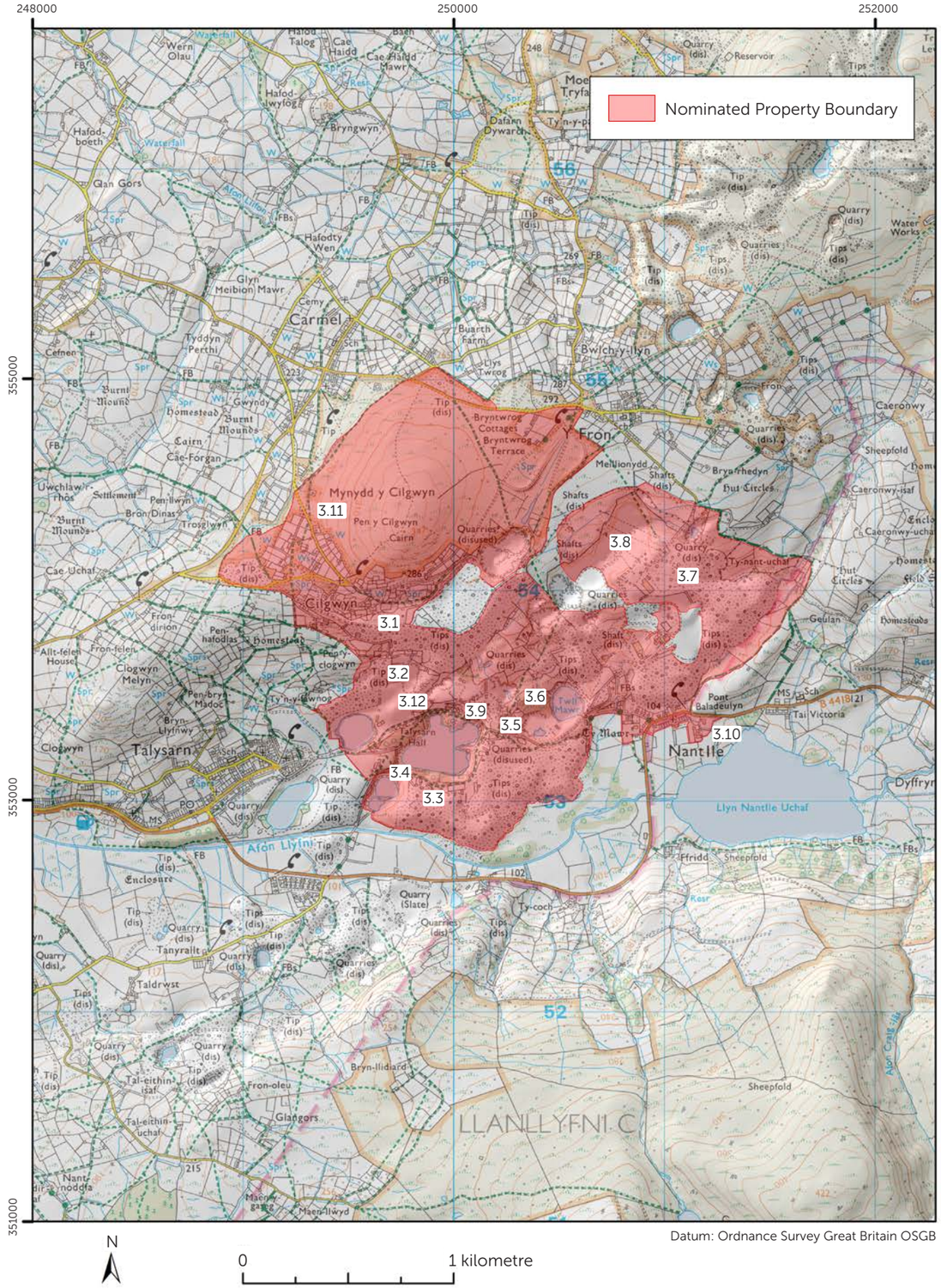
Dinorwig offers a text-book explanation of slate-quarrying practice from the late eighteenth century to the 1960s.

Figure 2.53. This aerial view, looking southeast up the narrow and steep-sided Llanberis Pass, shows the Dinowrig Slate Quarry in its mountain landscape, between the Snowdon massif on the right and the Glyderau mountain range on the left.

COMPONENT PART 3

Nantlle Valley Slate Quarry Landscape

Figure 2.54. This view looking northeast over the Nantlle Valley shows the distinctive pattern of pits on the valley sides and floor.



Map 2.4. The boundary and Elements of Component Part 3: Nantlle Valley Slate Quarry Landscape (Scale 1:25,000).

Location and setting

The Nantlle Valley Slate Quarry Landscape is located 10km southwest of Component Part 2 (Dinorwig) and 16km southwest of Component Part 1 (Penrhyn). All three exploited the same Cambrian formation of the Arfon Slate District, but the form and technical attributes of the Nantlle slate quarries are very different.

The valley runs east to west, framing a perspective of Snowdon, the highest mountain in Wales and England, to the east, and offering views over the Irish Sea as far as the Wicklow Mountains, south of Dublin, in Ireland to the west. The summit of Mynydd y Cilgwyn (347m) rises immediately to the north, whilst to the south a narrow belt of rising farmland gives way to the peak (635m) of Mynydd Tal y Mignedd, a peak on the Nantlle Ridge that leads towards Snowdon.

It is a stark landscape, but one of the world's most pristine, compact yet diverse, archaeological complexes of historic slate quarrying, as well as being rich in prehistoric and medieval archaeology. Geology and topography meant that slate had to be won from pits on the valley floor and on the northern slopes, leading to tips of waste rock in confined environments and the characteristic Nantlle aerial ropeway systems. These include the locally-evolved artisanal technology of the steeply-angled 'chain incline' connecting the quarry floor to the processing area, and the imported Scottish technology of the 'Blondin' catenary ropeway spanning the pit (see below).

Small but highly important structures are the slate-makers' shelters built by unemployed quarrymen to re-work the tips of waste rock in times of economic hardship. Landownership in multiple hands (as opposed to Penrhyn [Component Part 1], Dinorwig [Component Part 2], Bryneglwys [Component Part 6]) meant that the slate veins were leased and worked as many separate quarries – there is no 'great house' in, or associated with, this Component Part, though there are several substantial farms and the homes of minor landowners, as well as fields and wooded ridges, providing evidence for the pre-existing rural economy as well as for the way that the slate industry subsequently reshaped the landscape.

The quarries are now relict, and mostly flooded up to the water-table. Their low-lying location limited the use of waterwheels, with the result that steam-power was more important, including the iconic Cornish beam engine of 1904-06 at Dorothea Slate Quarry. The tide of settlement brought about by the expansion of the quarries is evident in the squatter-plots on the mountain common at Cilgwyn, and a more controlled form of housing is evident in the company village of Nantlle. To the southeast of Nantlle village, the Upper Nantlle Lake adds to the valley setting; there was originally a Lower Nantlle Lake (adjoining to the west) but this was drained to protect the deep slate pits from flooding.

Summary

Includes the open-pit slate quarries up to 150m deep, some of which are now flooded, extensive tips, relict processing buildings, a monumental Cornish beam engine for pumping, in its original roofed engine-house, associated worker settlements, including squatters' cottages and adapted agricultural buildings, and transport systems, including the Stephenson-engineered railway.

Elements

Elements of this Component Part date from the seventeenth century to the 1930s.

Table 2.4 Component Part 3 Elements	
Element 3.1	Cilgwyn Slate Quarry Tips
Element 3.2	Blaen y Cae Slate Quarry 'Blondin' Ropeway
Element 3.3	Dorothea Slate Quarry
Element 3.4	Dorothea Slate Quarry Cornish Beam Engine
Element 3.5	Pen y Bryn/Cloddfa'r Lôn Slate Quarry Dwellings, Slate-Mill and Chain Incline Ropeway Bastions
Element 3.6	Pen y Bryn / Cloddfa'r Lôn Slate Quarry Water-Driven Pump System
Element 3.7	Pen yr Orsedd Slate Quarry
Element 3.8	Pen yr Orsedd Slate Quarry 'Blondin' Ropeway
Element 3.9	The Nantlle Railway
Element 3.10	Nantlle Village
Element 3.11	Settlements on Cilgwyn Mountain
Element 3.12	Plas Tal y Sarn and Tal y Sarn Farmhouse

Element 3.1 Cilgwyn Slate Quarry Tips

These landform-scale slate tips are crowned by the unenclosed mountain, and dominate the Nantlle Valley.

Cilgwyn Quarry was the slate industry of Wales' market leader in the early eighteenth century and finally closed in 1956. It is located on the northern slopes of the valley, but its pits have been mainly in-filled. Its main tips of waste rock, however, lie immediately adjacent to the former quarry, an important landform in the Component Part indicative of the scale of the industry. To the northwest, rocky fields and ruined quarryman-cottager settlements spread over Cilgwyn mountain. The western tip follows the contour of the hillside in a bi-angular

Figure 2.55. The eastern tip at Cilgwyn illustrates the problems of removing waste rock in a confined area. A sinuous railway gave access to the tipping ground on the right of the photograph.

Figure 2.56. The western tip at Cilgwyn Slate Quarry looks out over the sea towards Ireland, once one of its principal markets. In the foreground is a slate-makers' shelter, one of many built during the Great Depression of the 1930s to rework slate blocks that had been dumped when times were good.

landform that stretches for over a kilometre. This dominates the valley floor (at a lower elevation by 75m) and provides a fine vantage point for an overview of the Component Part. It retains the tiny shelters where unemployed quarrymen reworked slate waste during the Depression of the 1930s and which convey the manner in which the landscape of the Nantlle slate industry was evolved by its independently minded local population. The tip to the north is reached by a sinuous railway formation.

Element 3.2 Blaen y Cae Slate Quarry 'Blondin' Ropeway

A classic steam-powered aerial ropeway system known as a 'Blondin', named after the famous tightrope walker Charles Blondin. This technology was originally introduced from Scotland and was deployed to raise slate trucks from a confined pit. The principle comprised a number of wire ropes (cables) strung across the working area between masts of timber or steel, with wagons raised or lowered by steam or electric power. The last working examples were at Pen yr Orsedd Slate Quarry in this Component Part (Element 3.8).

Blaen y Cae Quarry worked a distinctive rippled formation which may have been the source of Roman slates found nearby. It was in production again by the 1830s and worked for a further century. Its principal technical attribute is the steam 'Blondin' ropeway system for raising slate out of one of its pits. This was installed *c.* 1910 and survives with wooden masts, landing platforms on the lip of the quarry pit, a railway embankment, wire ropes and sheaves, together with a steam winding engine and drum by Henderson's of King's Works, Aberdeen, Scotland (makers of cranes, cable-ways and hoists). This is the best-preserved example of a characteristic Nantlle technology associated with a steam engine, and provides an instructive contrast with the (earlier) electrically powered installation at the nearby Pen yr Orsedd Slate Quarry (Element 3.8). It illustrates the challenges of raising material from a confined pit, and technology transfer from the Scottish freestone industry.

Figure 2.57. The steam engine that powered the 'Blondin' ropeway at Blaen y Cae Slate Quarry survives *in situ*.

Element 3.3 Dorothea Slate Quarry

Dorothea Slate Quarry is one of the most important and most widely recognised slate quarries within the Nominated Property; its fine Cornish beam engine is also of particular note, and is recognised as an element in its own right. Dorothea began in 1829 when shallow diggings were commenced on the valley floor, eventually amalgamating to form the giant excavation 150 metres deep that is visible today. The quarry ceased operating in 1970, and the pit flooded. It is now a popular venue for divers.

Surviving buildings and structures on site contribute to an extensive and archaeologically-rich industrial landscape. These include slate mills, a locomotive shed, winding houses, the Cornish pump-engine, and the huge slate bastions for the chain incline ropeways used for lifting slate blocks and rubble from the pit, railed inclined planes, the course of the Nantlle Railway, houses, stables and the many locations where, during the Great Depression of the 1930s, impoverished quarrymen reworked slate from waste-tips to sustain a meagre living.

Figure 2.58. Dorothea Slate Quarry is now a rich relict landscape of quarrying. This aerial view shows the main flooded pit (centre).

Element 3.4 Dorothea Slate Quarry Cornish Beam Engine

The Cornish beam engine, still in its original roofed engine house, is emblematic of the already old-fashioned but reliable de-watering technology imported from Cornwall to counteract rapid ingress of water into pits over 150 metres deep that were necessary to exploit the vertical slate vein in the valley floor.

This large (68-inch cylinder) steam pumping engine was manufactured in Camborne, Cornwall (UK) where the production and export of these distinctive machines form part of the Outstanding Universal Value of the *Cornwall and West Devon Mining Landscapes* World Heritage site. It was built by Holman Brothers, one of Cornwall's most famous mining engineering concerns and engine-builders, and was one of the last such engines ever manufactured. The Dorothea engine started work in 1906 and was preserved when it was replaced by an electric pump in 1951. It contrasts with the nearby Pen y Bryn/Cloddfa'r Lôn Slate Quarry water-driven pumping system, also an imported mining technology from Cornwall and West Devon.

Figure 2.59. The Cornish beam engine installed to pump Dorothea Slate Quarry is spectacularly located on a ridge between the main Dorothea pit (right) and a smaller pit to the west (left).

Figure 2.60. The Cornish beam engine is the icon of the Nantlle Valley slate quarry landscape.

Element 3.5 Pen y Bryn/Cloddfa'r Lôn Slate Quarry Dwellings, Slate-Mill and Chain Incline Ropeway Bastions

An industrial and domestic complex which both illustrates the system of working at one of the smaller workings within Component Part 3 and also how the pre-existing farming landscape was adapted for quarry purposes.

The seventeenth-century house at Pen y Bryn formed the centre of a small estate owned by the local Garnons family, who carried out some quarrying on nearby outcrops on their own account, before leasing them out to capitalised partnerships from 1793. They also came to work an early pit known as Cloddfa'r Lôn [the Roadside Digging]. The landscape around the house was transformed as the industry grew in the nineteenth century. Structures from this period include a centuries-old barn rebuilt as a dwelling to house the influx of new arrivals, a steam-powered mill to saw slate blocks, winding houses for chain incline ropeways, and an inclined plane installed to connect with the Nantlle Railway (Element 3.9).

Figure 2.61. The steam powered mill complex constructed in 1884 to process the slate blocks.

Figure 2.62. The traces of the seventeenth-century barn are evident in the gable of the barracks.

Figure 2.63. The barracks constructed in the 1860s to house the quarrymen and their families. Part of this terrace was adapted from a seventeenth-century barn.

Element 3.6 Pen y Bryn/Cloddfa'r Lôn Quarry Water-Driven Pump System

A waterwheel-powered flat-rod pumping system; this technology was originally devised in continental European mining-fields, but was widely adopted in Cornwall and Devon (UK), from where it was introduced to the Welsh slate industry.

The company operating Pen y Bryn and Cloddfa'r Lôn Slate Quarries from 1836 to 1844 introduced a double reciprocating pumping system operated by wrought-iron flat-rods driven by water-wheels, for which archaeological evidence survives, each running to a set of multi-stage pumps now evident as cast-iron rising mains in the *twll balast* [balance-engine pit] pit to the south as well as a branch to pumps located in a quarry pit to the east. Two wheel-pits, water channels, stone support-piers and cast-iron piping survive. It provides a contrast in technology with the nearby Cornish beam engine used to pump Dorothea Quarry.

Figure 2.65. Changes in direction for the flat-rods were accomplished by angle bobs mounted on stone support-piers.

Figure 2.64. Waterwheels powered the flat-rod pump system at Pen y Bryn, which was installed by mining engineers from the Cornwall and West Devon area around 1840. Two waterwheel pits are evident.

Element 3.7 Pen yr Orsedd Slate Quarry

Figure 2.66. The landform of Pen yr Orsedd Slate Quarry is evident in this view from the south, showing the pits, the processing areas with the mill buildings, and the tips of slate waste dominating the village of Nantlle.

Pen yr Orsedd is an extensive slate quarry which worked a series of pits on the valley slopes from the early nineteenth century to the late twentieth.

Pen yr Orsedd Slate Quarry reflects a mechanised and engineered approach to the quarrying of slate, with its well-ordered mill buildings arranged to take advantage of water-power, and its electrically powered 'Blondin' ropeways on the upper working floor (Element 3.8, the last to cease operation in the Welsh slate industry, in 1979). Its tips dominate the eastern end of the Nantlle Component Part, and the village of Nantlle.

Element 3.8 Pen yr Orsedd Slate Quarry 'Blondin' Ropeway

A set of electrically powered 'Blondin' aerial ropeway systems which served the upper pit at Pen yr Orsedd quarry, contrasting with the Blaen y Cae Slate Quarry steam 'Blondin' (Element 3.2).

'Blondin' ropeways at Pen yr Orsedd were built by Henderson's of Aberdeen (Scotland: UK) in 1906 and worked until 1978; electrically powered, they contrast with the later steam Blondin in Blaen y Cae Slate Quarry. The Bruce Peebles 50 horsepower, three-phase electric motors operated on the drum through reduction gearing, powered from a remote hydro-electric station.

Figure 2.67. This 'Blondin' ropeway at Pen yr Orsedd shows the traveller carriage drawn up to the mast. The travellers could be moved to any point on the catenary system over the pit, and a lifting rope lowered and raised.

Element 3.9 The Nantlle Railway

A long-lived narrow-gauge railway, which served the Nantlle Valley slate quarries from 1828 to 1963, and which reflects the transfer of technology devised by the Stephenson family to the Gwynedd region.

The Nantlle Railway, opened in 1828, was realigned several times as quarry pits were extended. It was built with Liverpool capital and engineered by Robert Stephenson the elder at a time when his brother George and nephew Robert had completed the Stockton & Darlington Railway and were designing the Liverpool & Manchester Railway, the two systems that defined the technology of the coming network of main-line railways worldwide. The Stephensons' innovative system of wrought-iron rails on stone block sleepers was used on the Nantlle Railway and was later adopted by the Ffestiniog Railway (element 5.9). With the coming of the national rail network to the region in the 1860s and 1870s, it was reduced to this short section at its upper end. This was horse-worked almost until it closed in 1963.

Figure 2.69. The course of the Nantlle Railway, making its way to Pen yr Orsedd Quarry.

Figure 2.68. The Nantlle Railway was re-aligned over the years as the quarry pits were extended. This is a section of the original route of 1828. The flying arches were added later to prevent the slate tips of Dorothea quarry from encroaching on the track bed.

Element 3.10 Nantlle Village

The small village of Nantlle is a linear settlement associated with Pen yr Orsedd Slate Quarry, built along the historic turnpike road through the valley, part of which now forms the B4418 secondary road. It is dominated by the quarry tips immediately to its north. A pre-industrial settlement is centred on the sixteenth-century Ty Mawr [the great house] and a corn mill.

The village of Nantlle was developed from the 1860s to the 1890s by the socially conscious but controlling manager of Pen yr Orsedd Slate Quarry. It is an example within the Nominated Property of a planned settlement created not by an aristocratic landowner but by an industrialist whose Christian Unitarian beliefs supported his philanthropic outlook. It reflects the sudden demand for labour during the boom of the 1860s and the need to provide for newly-arrived families and young unmarried quarrymen leaving the rural hinterland.

Older and plainer houses predominate to the west, while a 'company village' employing a Picturesque architectural vocabulary is located in the centre, and more substantial late-nineteenth century housing is located to the east. Other structures include a barracks complex, sensitively conserved as a community and business centre, the Neo-Romanesque vestry of Baladeulyn Methodist chapel with its remarkable quarrymen's war memorial, and a larger house built for the Pen yr Orsedd quarry manager, now a residential centre.

Figure 2.71. Some attempt at decoration is evident in these houses in Nantlle village.

Figure 2.70. The village of Nantlle grew up piece-meal from the 1850s, and housed the Pen yr Orsedd workforce and their families.

Element 3.11 Settlements on Cilgwyn Mountain

These squatters' cottages and irregular field-plots cover the mountain common to the north, leaving only the summit uncultivated. Some are inhabited, others are in ruin. They are bisected by the western Cilgwyn Slate Quarry Tip.

Workers' settlements within the Component Part include scattered cottages and field systems on the mountain common at Cilgwyn, enclosed without any legal authority on land belonging to the Crown by people attracted to the industry in the first three decades of the nineteenth century. Cottage names such as 'Samaria' (the Biblican name for the land despised by the Chosen) and 'Greenland' (a very cold place) indicate their marginal nature.

Figure 2.73. Some of the Cilgwyn cottages are still inhabited. They show how the slate-quarrying population of Nantlle evolved their own way of life, sometimes in defiance of authority.

Figure 2.72. Quarryman-cottager settlements were established on the southern (right-hand) slopes of Cilgwyn mountain in the first decades of the nineteenth century and were mostly abandoned by the 1930s.

Barns, farmhouses and field systems adjacent to the course of the Nantlle Railway, and at the foot of tips of slate waste, illustrate the transition from an agricultural economy to an industrial society, which nevertheless retained many of its earlier characteristics.

The earliest structures are vernacular farmhouses of seventeenth and eighteenth-century date, and a later *plas* [high-status house] for a minor landowner which shows some attempt at Georgian order, later the home of a socially ambitious quarry manager. As the quarries expanded, a stable, a terraced row and a small ironworks, 'Foundry Terrace', were added.

Figure 2.74. Tal y Sarn Uchaf cottages were built adjacent to an earlier farmhouse in the 1860s to house men working in the nearby Dorothea Quarry, and for men and women operating slate trains on the Nantlle Railway.

Figure 2.75. Amongst the buildings adjacent to Tal y Sarn farmhouse is this stable built in the 1860s for horses pulling wagons of Dorothea slates along the Nantlle railway.

Summary of values and attributes

The Nantlle valley belonged to many different landowners, and for this reason developed as many separate quarries. Much of the older, rural landscape remains evident because of the need to preserve boundaries between estates. Uniquely within *The Slate Landscape of Northwest Wales*, geology and topography meant that slate deposits could only be opened out as pits; as a result, ingenious methods were employed to raise blocks and rubble, as well as to pump water out of the deep and confined workings. Systems adapted from other industries are evident, in the form of catenary 'Blondin' ropeways spanning the pits (named after Charles Blondin who crossed the Niagara gorge on a tightrope in 1859), initially developed in the freestone quarries of Scotland, and water-driven and steam pumping systems from Cornwall. A long-standing tradition of local ingenuity is also apparent in this Component Part's own artisan technologies such as 'chain incline' ropeways, which ran from the pit-bottoms to massive slate bastions.

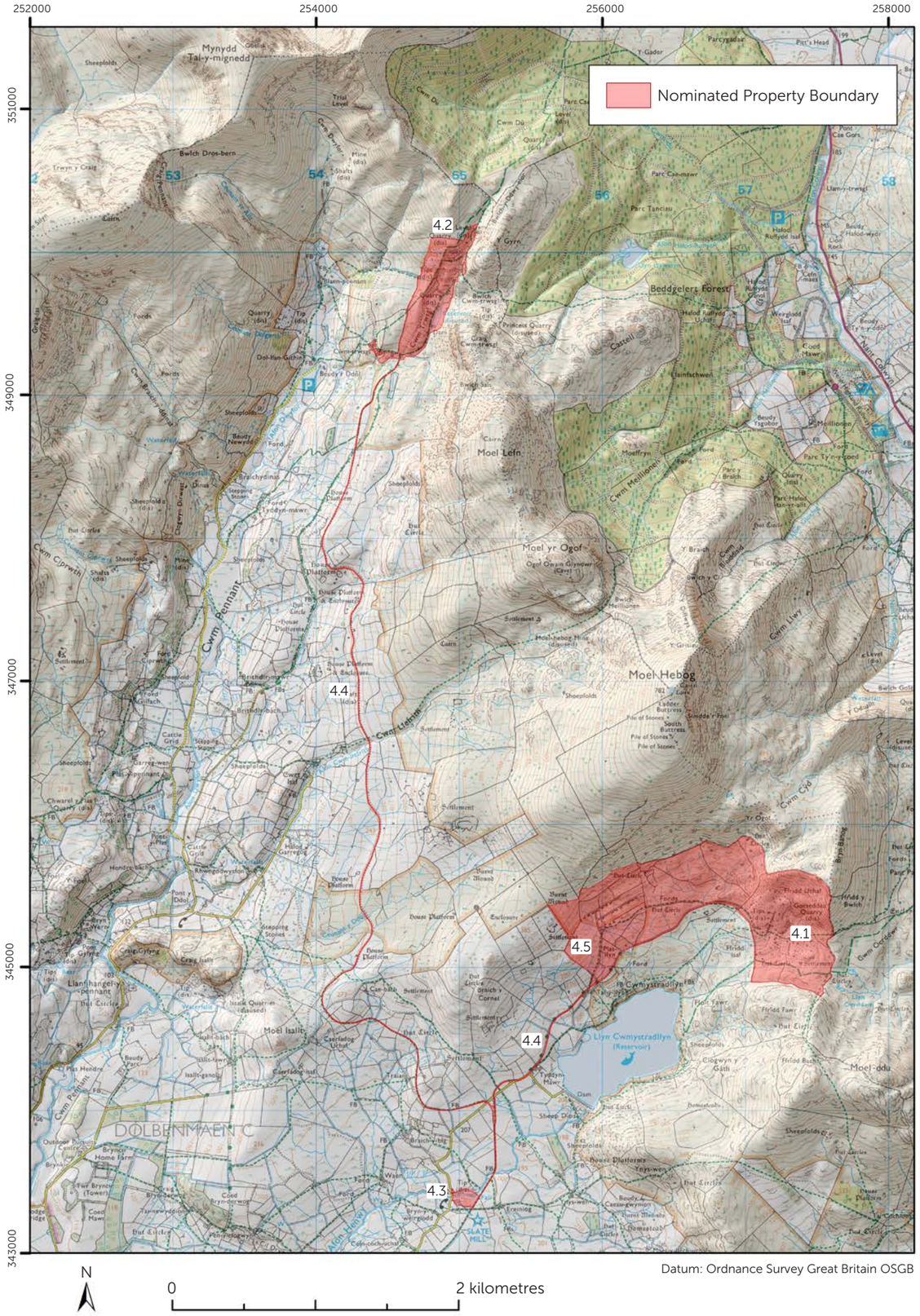
Settlement takes a variety of forms. Pre-industrial farmhouses survive within the quarries, embodying the transition from a traditional agricultural economy to an industrial society. Squatters' cottages and field-plots cover the mountain common to the north, leaving only the summit uncultivated. The village of Nantlle is a model settlement created by a socially conscious but controlling quarry manager. Barrack buildings for newly arrived families and young unmarried quarrymen leaving the rural hinterland illustrate the sudden social and economic changes in the fabric of regional society, and explain the survival of many pre-industrial practices and attitudes. The many tiny shelters built on the tips in the 1930s by impoverished quarrymen to re-work slate exemplify both the contraction of the industry and the determination of its people to wrest a living from it in difficult circumstances.

External capital and skill is evident in the course of the Nantlle Railway of 1828, the first public railway in the slate industry, built with Liverpool finance and with the advice of the Stephenson family, using the wrought-iron rail technology they had recently used to good effect on the Stockton & Darlington Railway and were currently applying to the Liverpool & Manchester Railway.

COMPONENT PART 4

Gorseddau and Prince of Wales Slate Quarries, Railway and Mill

Figure 2.76. Both quarries are visible in this aerial view, Gorseddau overlooking the lake and Prince of Wales just below the mountain ridge at the top left of the photograph.



Map 2.5. The boundary and Elements of Component Part 4: Gorseddau and Prince of Wales Slate Quarries, Railway and Mill (Scale 1:35,000).

Location and setting

Prince of Wales Slate Quarry is located 5km east-south-east of Nantlle village (Component Part 3), across the Nantlle Ridge and its central peak of Mynydd Tal y Mignedd (653m). Both quarries (Gorseddau is 5km south-south-east of Prince of Wales), are located within the same Ordovician slate-bearing area that runs for around 6km, trending roughly from northwest to southeast. Cwmstradllyn and Cwm Pennant form two little-visited and barely populated valleys which unite downstream. In each case, a vein of slate was quarried, with little commercial success, on high ground at the valley-head. Hills rise to between 550 and 650m above the valleys. The landscape is dominated by farmland in the valleys and open grazing on the ridges. The 700-hectare Beddgelert Forest is located 0.5km east of Prince of Wales Slate Quarry. Both quarries are connected by the extant courses of railways to the Ynysypandy slab mill. The longer railway from Prince of Wales Slate Quarry winds its way southwards down the eastern hillside contour of the Pennant Valley for some 8km before joining the shorter (2.5km) Gorseddau Quarry Railway in the final shared 0.75km stretch to Ynysypandy.

Summary

This short-lived quarrying area is notable for the survival of features often lost at more commercially successful operations. It includes the isolated Gorseddau Slate Quarry, abandoned soon after it began operating in the mid nineteenth century, its railway, a deserted worker settlement at Treforys, the dramatic Ynysypandy slate-slab mill preserved by the Snowdonia National Park, and the Prince of Wales Slate Quarry.

Elements

The five Elements of this Component Part date from the 1850s to the 1880s, within a remote upland landscape.

Table 2.5 Component Part 4 Elements

Element 4.1	Gorseddau Slate Quarry
Element 4.2	Prince of Wales Slate Quarry
Element 4.3	Ynysypandy Slate-Slab Mill
Element 4.4	Gorseddau Railway and Gorseddau Junction & Porthmadoc Railways
Element 4.5	Treforys Village

Element 4.1 Gorseddau Slate Quarry

A relict slate quarry which made use of the system of stepped galleries pioneered at Penrhyn Slate Quarry and a narrow-gauge railway that once provided a connection to the wharves at Porthmadog.

The Gorseddau Slate Quarry reflects the growing demand for slate in the expanding economy of the 1850s, and forms a distinctive gash in the hillside of Cwm Ystradllyn. Because of the poor quality of rock, the quarry failed here after only a few years, leaving evidence of working practice that has often been obliterated elsewhere. In its short working life it was opened up on the system introduced at Penrhyn Slate Quarry (Element 1.1) sixty years earlier as eight stepped galleries feeding an inclined plane, its tips of waste rock extending on either side. Other surviving assets include blast-shelters and slate-splitters' shelters, as well as a barracks, office and smithy, setting out mid-nineteenth century slate-quarrying practice, and exemplifying the sudden arrival of capital in this remote location.

Figure 2.78. This masonry retaining wall protects the Gorseddau Railway from the large tip of waste rock.

Figure 2.77. Gorseddau Slate Quarry from the southwest.

Figure 2.79. Prince of Wales Slate Quarry was opened on the same system of stepped galleries as Penrhyn, Dinorwig and Gorseddau. This view shows the higher incline, the tips, the working floors, slate-makers' shelters and the barracks.

Element 4.2 Prince of Wales Slate Quarry

A relict slate quarry, worked from the 1860s to 1881, which made use of stepped galleries. It illustrates working practices from the industry's height, and technologies imported by managers from Penrhyn Slate Quarry and its Felin Fawr slate-slab mill.

The Prince of Wales Slate Quarry reflects the building boom of the period from the 1860s to 1877. It was mainly worked in stepped galleries, of which there are seven, though there is also evidence of shafts being sunk on working floors and opened out laterally in an attempt to access the slate underground. Buildings include slate-splitters' shelters, blast-shelters, a stable, weighbridge houses, an office and barracks, essential in such a remote location. The two counterbalanced inclined planes form impressive features; these transported finished slates as well as raw blocks to the Quarry's own slate-slab mill.

The dam which powered this mill is a substantial feature, consisting of two large walls constructed from dressed rubble blocks. Downstream, the water-supply to the mill waterwheel pit is evident as a row of pillars which once supported a wooden trough.

The form and organisation of the mill itself anticipates that of the slightly later Felin Fawr slate-slab mill (Element 1.2), with transverse access through three arched doorways. From here, the course of the railway, which carried away the finished product, is evident.

Figure 2.80. The mill serving Prince of Wales Slate Quarry was designed by John Francis, the manager of Penrhyn Slate Quarry, and his son, when they were also begining to remodel the Felin Fawr slate-slab mill in Component Part 1. It was built in 1864. The waterwheel that powered it was located against the standing left-hand gable. In the distance, the formation of the railway makes its way down the valley. The mill illustrates the technology of transfer within the slate industry of Wales.

Element 4.3 Ynysypandy Slate-Slab Mill

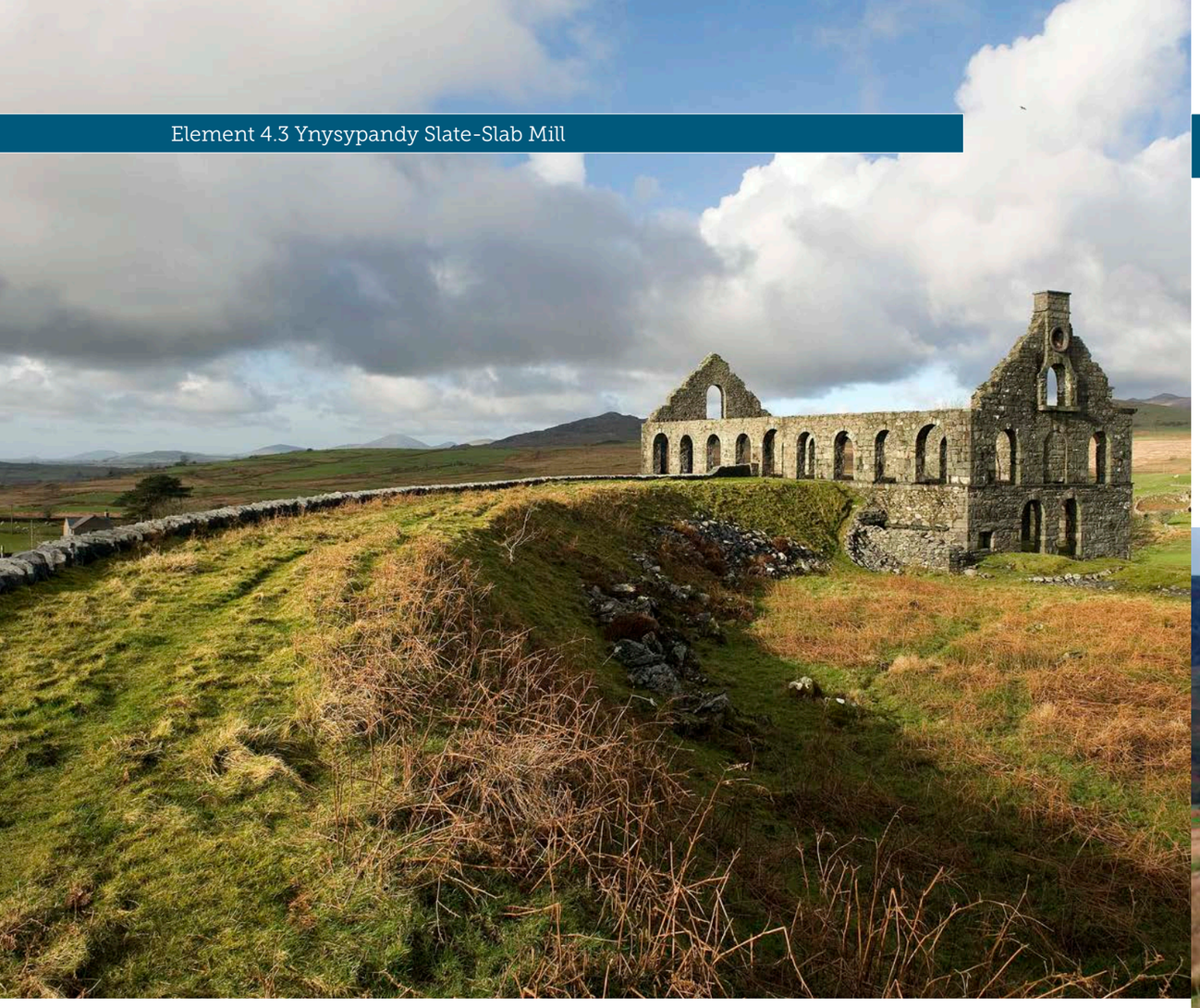


Figure 2.81. Ynysypandy slate-slab mill was powered by a water-wheel fed from the nearby stream. The heavier machinery was installed on the ground floor and lighter work was carried out on the higher levels. Raw blocks and finished products were transported in and out by the railway sidings on the formation in the foreground.

Ynysypandy is a disused and roofless water-powered mill, which processed slate slabs; a striking and architecturally ambitious structure, now conserved.

The unique multi-floor slate-slab mill that served Gorseddau Slate Quarry from 1857 to 1866 is architecturally ambitious and imposing in its rural setting. Its foundry design reflects the background of Gorseddau's shareholders and engineers in the growing national railway network.

Element 4.4 Gorseddau Railway and Gorseddau Junction & Portmadoc Railways

The soundly-constructed Gorseddau Railway was built in 1854-7 for horse and gravity operation. The Gorseddau Junction & Portmadoc Railways was a lightly-built line to the Prince of Wales Quarry intended for locomotive haulage.

The railway systems that served the two quarries exemplify different approaches to construction. The well-engineered line completed in 1857 to Gorseddau Slate Quarry was built by James Brunlees (1816–1892) and his colleague Daniel Makinson Fox (1830-1918), both of whom had distinguished international careers as railway-builders. By contrast, the Gorseddau Junction & Portmadoc Railways of 1875 to Prince of Wales Slate Quarry was constructed by a local contractor, Richard James Davids of Caernarfon, to a much poorer standard, despite its pretentious title.

Figure 2.82. Despite its grandiloquent title, The Gorseddau Junction and Portmadoc Railways consisted of a single line of track, built as inexpensively as possible to carry light traffic, typical of many industrial systems across the world. Well over a hundred years after it was scrapped, the impressions of wooden sleepers are still apparent.

Element 4.5 Treforys Village

An abandoned designed upland workers' settlement built in the 1850s to serve Gorseddau Slate Quarry.

The planned village of Treforys is a deserted and ruinous settlement located on a hillside 1km west of the quarry. It consists of 18 pairs of rubble-built semi-detached two-room cottages on three parallel streets with straight flanking walls, similar to, and possibly inspired by, Scottish and Irish planned estate villages as well as by Mynydd Llandygai (element 1.5).

Figure 2.83. Whoever drew up the plans for the village of Treforys failed to appreciate how uneven, boggy and infertile the slopes were. The manager's house was located in the trees to the right. Its name means 'Morris's Town', after Richard Morris Griffith, a local banker who helped find the capital, but to local people it was 'Johannesburg' – a synonym for a new and lawless industrial community.

Summary of Values and Attributes

The Gorseddau Slate Quarry and the Prince of Wales Slate Quarry form a relict landscape that illustrates both the commercial optimism of the boom years of the slate industry of Wales from the 1850s to the 1870s, and the working methods of the period. Both quarries follow the Penrhyn style of stepped galleries in the hillside. Both are served by water-powered slate-slab mills. Ynysypandy mill, which served Gorseddau Slate Quarry, is an adaptation of a foundry design, reflecting the investors' background in railway operation. The mill at Prince of Wales Slate Quarry shows the transfer of techniques evolved at Penrhyn Quarry. The two railways illustrate different approaches to building an industrial transport link – the Gorseddau was soundly built for traffic that barely materialised; the Gorseddau Junction & Portmadoc Railways was an attempt to embody the Ffestiniog Railway's approach but cheaply constructed and very lightly laid.

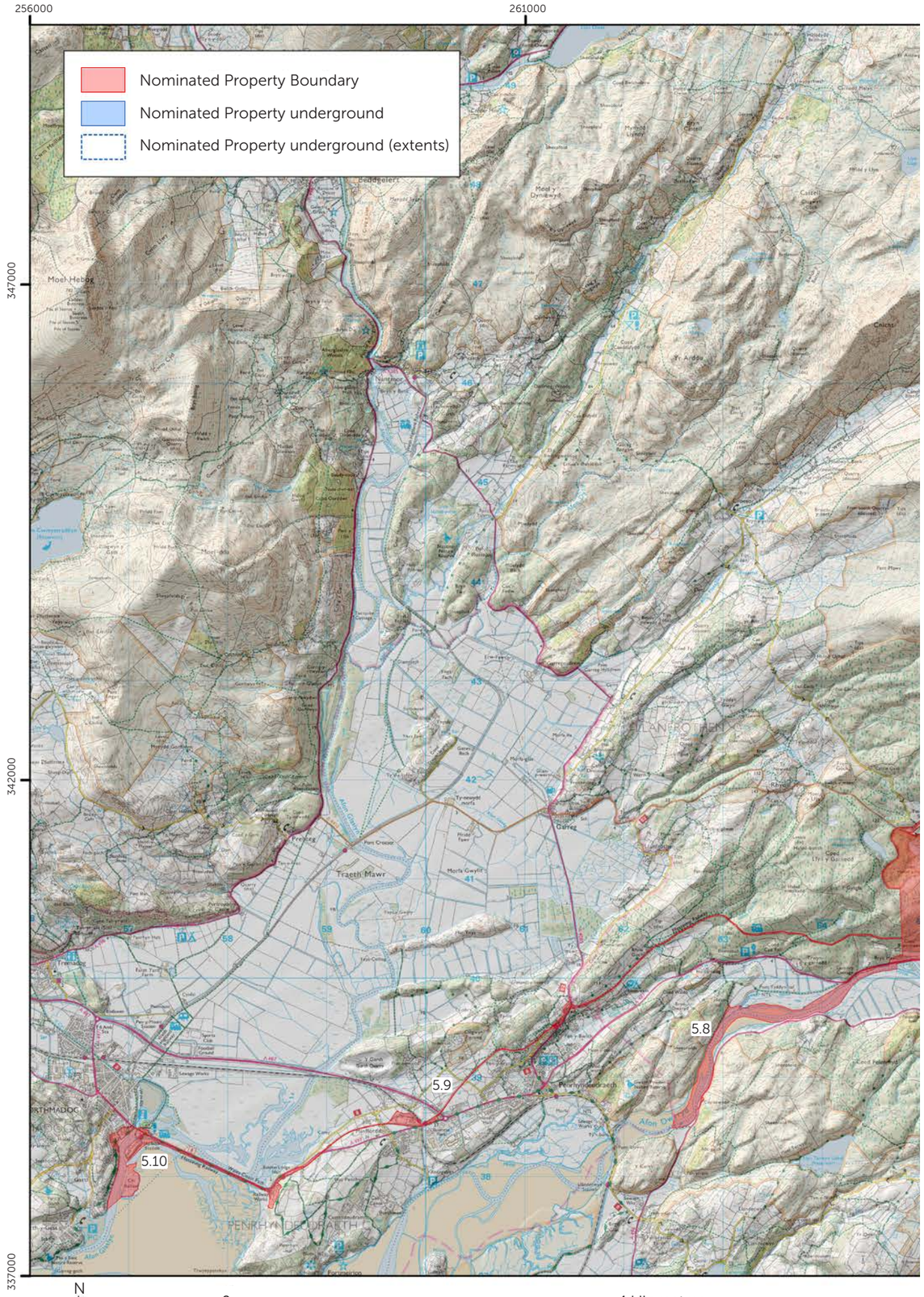
The remains of barracks are evident at both quarries, though the most remarkable settlement within this Component Part is the village of Treforys, under construction in 1857. The design reflects current ideas about re-housing rural populations familiar to Gorseddau's board of directors and to its engineer, James Brunlees, who also designed the railway to Porthmadog.

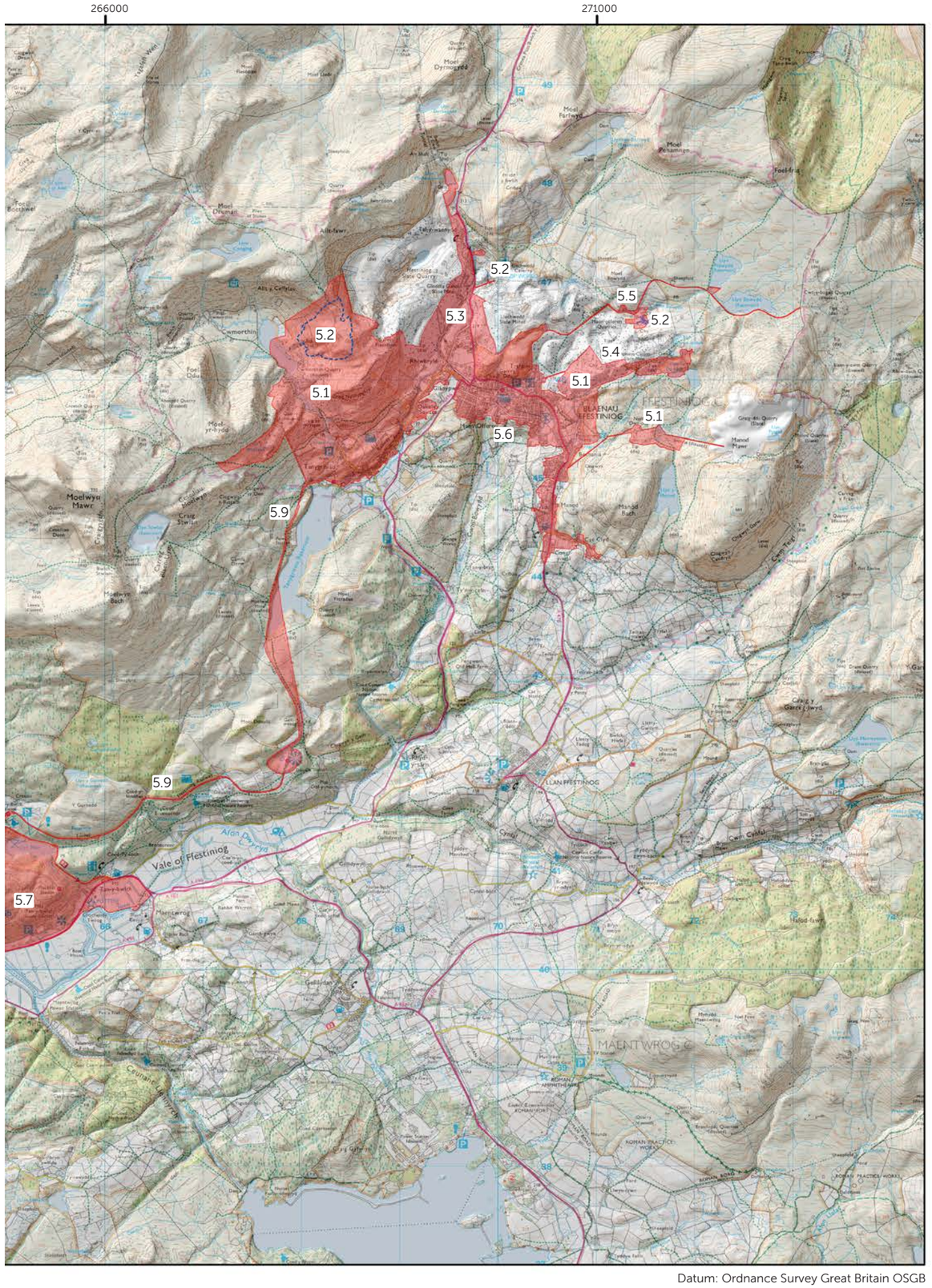
Figure 2.84. The challenges of living in the company village of Treforys are evident in this view of the middle street, showing three of its eighteen semi-detached cottage structures. It was visited by smallpox in the winter of 1859-60 and abandoned when Gorseddau Quarry closed a few years later.

COMPONENT PART 5

Ffestiniog: its Slate Mines and Quarries, ‘city of slates’ and railway to Porthmadog

Figure 2.85. The whole of the Ffestiniog landscape can be seen in this aerial view, from the quarry surface landform and the town of Blaenau Ffestiniog to the line of the Ffestiniog Railway to Porthmadog.





Datum: Ordnance Survey Great Britain OSGB

Map 2.6. The boundaries and Elements of Component Part 5: Ffestiniog: its Slate Mines and Quarries, 'city of slates' and Railway to Porthmadog (Scale 1:50,000).

Location and setting

Ffestiniog is an upland area on the southern limits of the Snowdon massif, between the Manod (661 m) and Moelwyn mountains (770 m); their peaks are collectively known as the Moelwynion range. The quarries and town are located around 16 km southeast of Dinorwig (Component Part 2) and 12 km east of the Gorseddau and Prince of Wales quarries (Component Part 4). Ffestiniog is situated in the second major slate belt (Meirionnydd Slate District, Ordovician) where the slate formations dip under the mountains. High-quality slate was mined extensively from underground.

Testimony to the huge output of systematic underground exploitation is a vast network of cavernous chambers, divided by pillars or walls that supported the roof, and which connected horizontally via a series of levels or floors, and vertically by underground inclined planes. Some of the mines were characteristically 'un-topped', whereby unproductive surface rock was removed to recover high-quality slate remaining in pillars, being subsequently turned into surface quarries. Together with voluminous tips of waste rock, their landform scale dominates the hillsides above the town.

'Blaenau Festiniog [sic] might well be termed the "city of slates"'
(anonymous journalist, 1873).

Once the inclined veins of grey Ordovician slate came to be quarried and mined here, a natural shelf on the lower slopes became the focus for settlements which evolved into the 'city of slates' – Blaenau Ffestiniog, the most distinctively urban of the slate quarry settlements. Today the town has a predominantly Welsh-speaking population of almost 5,000, but was home to nearly 12,000 people during the peak years of the industry. The town receives the highest rainfall of any town in Wales, and the area is drained by the Dwyryd River. This provided a natural gateway to the sea and to the harbour at Porthmadog, located in a northerly inlet of the wide sandy Glaslyn estuary around 15km southwest of Ffestiniog. The river itself was the initial export route for the large output of slate from great mines and quarries under different ownership, but from 1836 it was the Ffestiniog Railway that connected the quarries with ocean-going ships, following a spectacular sinuous contour formation along the valley slopes. Geographical setting has shaped the characteristics and technical achievements of the railway, determining its path and influencing its development over time.

Summary

This Component Part includes a representative group of underground mines, quarries, associated tips and mills and the largest slate town in Northwest Wales, Blaenau Ffestiniog, with its formal urban organisation; also Plas Tan y Bwlch, formerly the home of a major quarry-owning family and now the Snowdonia National Park residential study centre, quays on the Dwyryd river, the innovative slate-carrying Ffestiniog Railway, still operational, and Porthmadog Harbour.

Elements

Elements of this Component Part date from the 1820s to the 1930s.

Table 2.6 Component Part 5 Elements	
Element 5.1	Ffestiniog Slate Quarries – Surface Landform
Element 5.2	Ffestiniog Slate Quarries – Underground Workings
Element 5.3	Pant yr Afon Hydro-Power Station
Element 5.4	Diffwys Slate Quarry Mill
Element 5.5	Maenofferen Slate Quarry Main Complex
Element 5.6	Blaenau Ffestiniog Town
Element 5.7	Plas Tan y Bwlch
Element 5.8	Slate-quays on the Dwyryd River
Element 5.9	Ffestiniog Railway
Element 5.10	Porthmadog Harbour

Element 5.1 Ffestiniog Slate Quarries – Surface Landform

Figure 2.86. This view of the quarries brings out the scale of surface operations in the Ffestiniog slate landscape, but these were only a small part of the whole compared to the underground workings beneath them. The tips of waste rock dominate the town.

The vast landform of the Ffestiniog quarries was created from the late eighteenth century onwards. It includes early surface quarries which, as demand grew, had to be extended underground by following the inclined veins of Ordovician slate, as well as open workings which were created by removing top-rock in later times.

The surface landform of the Ffestiniog slate quarries is striking. Different vantage points offer views of the enormous tips of waste slate rubble that dominate the town, or of the huge open workings. There are five principal slate workings, from west to east: Cwmorthin, Oakeley, Llechwedd, Maenofferen and Diffwys.

Other features include mill buildings where slate was sawn and split.

Figure 2.87. Amidst landform tips of waste slate, the straight linear landscape feature of an inclined plane contrasts with a zig-zag pedestrian path for quarrymen that leads to Oakley Quarry.

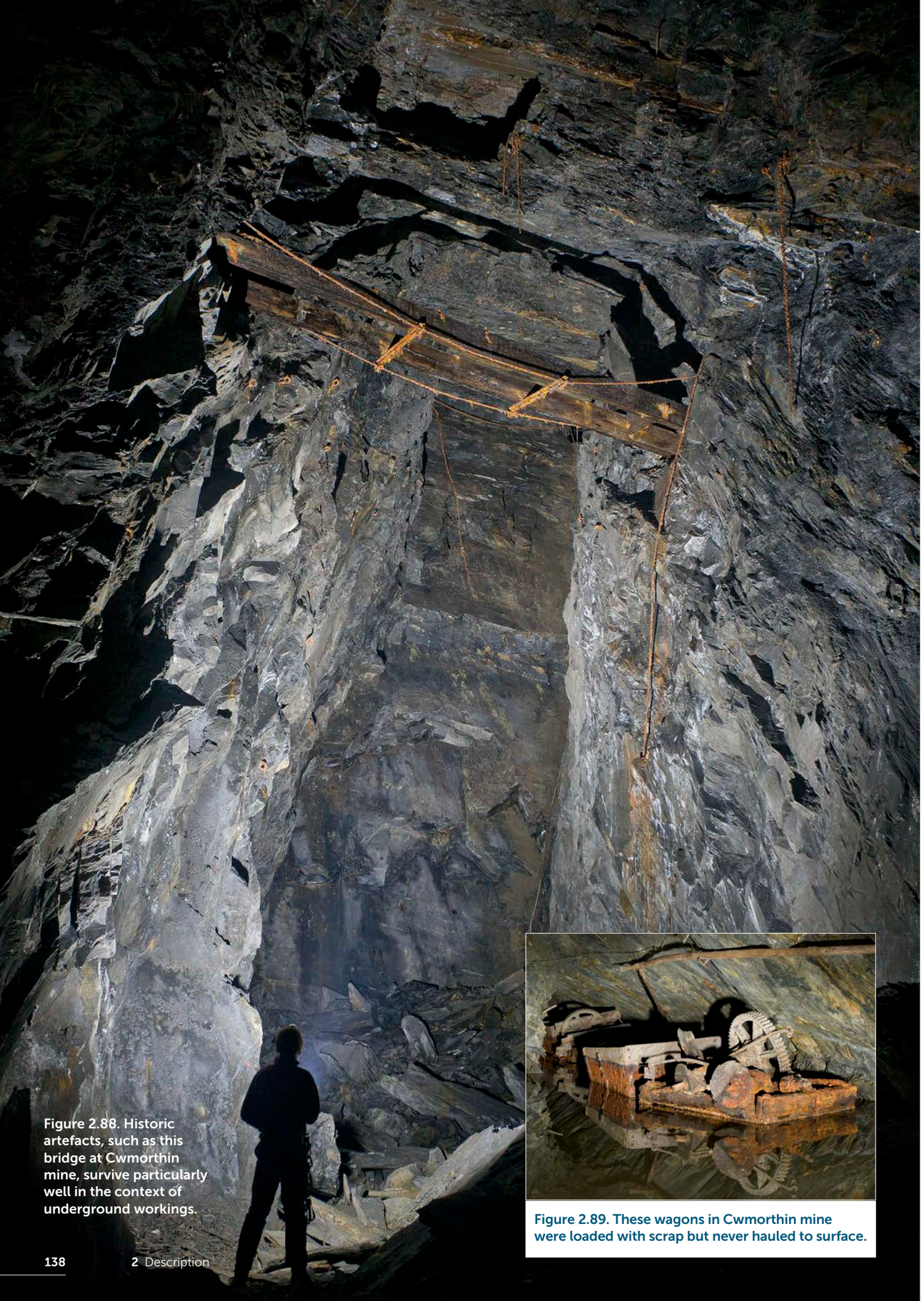


Figure 2.88. Historic artefacts, such as this bridge at Cwmorthin mine, survive particularly well in the context of underground workings.

Figure 2.89. These wagons in Cwmorthin mine were loaded with scrap but never hauled to surface.

The inclined veins of Ordovician slate dictated the form of the chambers which make up the underground workings at Ffestiniog, and the tunnels which gave access to them.

A technical selection of the extensive underground workings has been undertaken to ensure that all those which make the most substantial contribution to the proposed Outstanding Universal Value of the Nominated Property have been included. These are at Cwmorthin Slate Quarry and parts of Maenofferen Slate Quarry, and include spectacular honeycomb chambers under the mountains where in many cases, machinery, complete inclined planes and railway system survive intact; the underground workings also preserve smaller and more ephemeral artefacts such as boots, newspapers and cigarette packets.

Ffestiniog slate mines evolved around an inclined plane dropping from a processing and tipping floor into an open *sinc* (literally, a 'sinking'), then disappearing from sight through a cavernous opening in the rock face immediately under the 'hard' (chert deposits above the slate), following the dip of the vein. Once the miners had driven the shaft for the incline, they drove lateral tunnels known as 'levels' following the orientation of the vein at vertical intervals of about 12 m to give access to chambers where the rock was worked; further inclines underground as necessary gave access to deeper levels still. Some underground workings were accessed by a level tunnel from the open, of which examples are evident at Cwmorthin and Maenofferen.

Figure 2.90. Inclined planes frequently survive intact in the underground workings of Ffestiniog. This is the back vein inclined plane at Cwmorthin.

Element 5.3 Pant yr Afon Hydro-Power Station

The Pant yr Afon hydro-power station is a rare example of an early twentieth-century hydro-electric power station, with most of its original machinery, a complete example of the industrial use of water-power.

The Pant yr Afon hydro-power station of 1904 is a surviving and functioning example of an early industrial electricity generating station with water-powered turbines. This innovative way of exploiting the heavy rainfall of the area was exploited to operate and inclines in Llechwedd quarry. It is located at the wharf where Llechwedd Quarry's slate was transferred to the national railway network, and now supplies the national grid. The two preserved Gilkes pelton-wheels each drove a Johnson & Phillips 175 kilowatt generator.

Figure 2.92. The Pant yr Afon hydro-power station was established in 1904, and is one of the oldest operational water-driven electricity-generating stations known anywhere. The slate industry of Wales was cautious about investing in electrical plant but made considerable use of it once it had proved itself, especially when the price of coal increased.

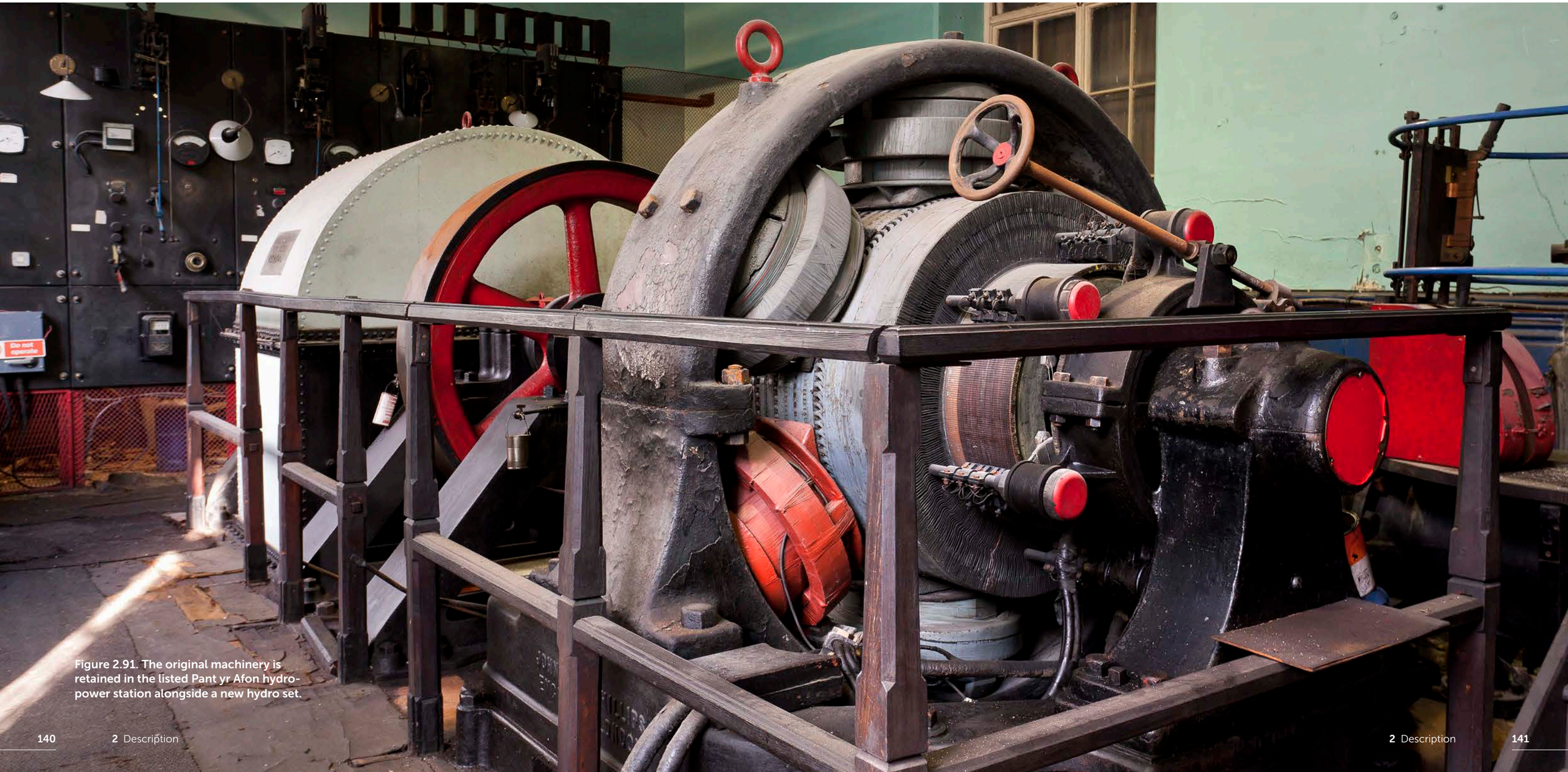


Figure 2.91. The original machinery is retained in the listed Pant yr Afon hydro-power station alongside a new hydro set.

Element 5.4 Diffwys Slate Quarry Mill

This steam-powered mill in Diffwys quarry was built in several stages and is one of the earliest 'integrated' mills, where all the processes for producing roofing slate are carried out in one place.

The prominent steam-powered mill at Diffwys Slate Quarry was the first major processing site in the Welsh slate industry where powered machinery was used to carry out the initial reduction of blocks to produce roofing slates, rather than architectural slabs. Its earliest phase dates from the late 1850s or early 1860s, and it was subsequently extended to the west and east. The ruins crown the skyline.

Figure 2.93. The steam mill at Diffwys Slate Quarry has been out of use since the 1920s but survives to show how the process of converting raw blocks of slate from the mine into roofing elements took place.

Element 5.5 Maenofferen Slate Quarry Main Complex

A group of buildings and structures constructed from the 1860s onwards, which show the typical surface technology of slate working in the Ffestiniog Component Part.

This exceptionally well-preserved quarry complex has features typical of the Ffestiniog Component Part, including a late nineteenth century slate mill, operational until the 1990s, with evidence for water, steam and electrical power, ancillary buildings and an up-haulage inclined plane from the extensive underground workings.

Figure 2.94. Maenofferen Mill is the best and most complete surviving example of a late nineteenth century slate processing site.

Figure 2.95. The up-haulage inclined plane at Maenofferen was initially powered by steam and later by electricity. It worked until the 1990s.

Element 5.6 Blaenau Ffestiniog Town

Figure 2.97. The construction of large and architecturally flamboyant chapels began in the 1860s – coincident with a boom in the slate industry. Examples include Rhiw Calvinistic Methodist Chapel, Rhiwbryfdir (1867-68) with the 'halo arch' front characteristic of many Welsh chapels.

The town of Blaenau Ffestiniog evolved from the 1820s to 1900 to house a new and expanding workforce, its shops, public houses, places of worship and reading rooms reflecting a new way of life.

Blaenau Ffestiniog is a remarkably well-defined industrial town founded by slate quarrymen and their families where before 1820 there had been only been fields and farmhouses. Rapid growth of this 'city of slates' was entirely sustained by the exploitation of slate, its character moulded in just a few decades. It is connected to the industrial landscape of mines, quarries and railways by a network of tracks and roads.

Figure 2.98. The Square and park at Blaenau Ffestiniog show how this raw industrial settlement evolved to house its growing middle class.

Blaenau Ffestiniog is located on a natural shelf below the *blaenau* [uplands] of the parish of Ffestiniog. It is the most distinctively urban and planned of the slate quarry settlements. It is also the largest, with its series of communities linked in a long linear settlement. In total, over 4km of urban ribbon is included, strung out along the A470 road (a route built piecemeal, but essentially completed by 1830, and now the main north-south Welsh road) in a horseshoe-shape centred on the head of the Bowydd Valley, extending from the western end of the town in a southerly direction to Tan y Grisiau, and from the eastern end of the town in a southerly direction through Bethania and Manod to Congl y Wal (see Figures 2.1 and 2.101). The roads provided an urban development framework, as did the Ffestiniog Railway, especially at Tan y Grisiau. Early houses were built along these transport axes. Topography exerted a constant constraint.

Formally planned squares and substantial dwellings were laid out for the town's service middle-class, as well as quarrymen's terraces. There are four Anglican churches in the town, and some forty chapels, providing an indication of the scale and range of the faith of the community.

Figure 2.96. The town of Blaenau Ffestiniog lies at the foot of the slate mines and quarries which brought it into being.

Element 5.7 Plas Tan y Bwlch

Plas Tan y Bwlch is a country house, now the Snowdonia National Park study centre, which illustrates the wealth generated by the slate industry.

Plas Tan y Bwlch is the former home of the Oakeley family, whose landed estate included three of the major Ffestiniog quarries, and is now the Snowdonia National Park residential study centre. Standing on the site of a much earlier dwelling, the house has an eighteenth-century frontage but mainly dates from 1868-86, when it was rebuilt and expanded and the extensive terraced gardens laid out. It overlooks the Dwyryd river, where slate was transferred from carts to boats. The Ffestiniog Railway (5.9) passes through its grounds.

Figure 2.99. Plas Tan y Bwlch was enlarged and altered in the second half of the nineteenth century on the profits of the Oakeley family's quarries in Ffestiniog.

Element 5.8 Slate-quays on the Dwyryd River

Ffestiniog slates were initially taken by cart to quays on the Dwyryd river, then boated to Porthmadog.

The earliest export of slate in this Component Part relied heavily on river traffic and this continued even after the introduction of the railway. Cart-roads laid out in the eighteenth and nineteenth centuries carried slate to purpose-built quays where it was transfered to small boats. Two of the river-quays built by the quarry companies are particularly well-preserved and are included in the Nominated Property.

Figure 2.100. Tyddyn Isa is one of the best-preserved of the quays where slate was transferred from road carts to river-boats crewed by boatmen known locally as 'Philistines' (for reasons unknown) before being loaded into sea-going ships. Tyddyn Isa served early slate workings near the present Maenofferen Quarry, and was built by Jack Griffith, a contractor from the nearby town of Dolgellau, in 1823-4.

Element 5.9 Ffestiniog Railway

This innovative and highly influential 0.6 metre gauge railway system carried slate from Ffestiniog to Porthmadog harbour from 1836 to 1946, and now operates as a visitor attraction with its historic steam locomotives and fleet of carriages and wagons.

The Ffestiniog Railway is a pioneering narrow-gauge system built to connect the quarries with the sea by means of a sinuous course to Porthmadog Harbour, which is still operational for pleasure craft.

This system adopted and improved the technology of the existing slate-carrying railways of northwest Wales. It adopted the 0.6 metre gauge of the Penrhyn Slate Quarry Railroad (element 1.3) and the Stephenson technology of stone blocks and wrought iron rails of the Nantlle (element 3.9) when it was completed in 1836 as a horse- and gravity-operated mineral line. It later took this design tradition into the era of steam traction and passenger carriage when it was modernised in the 1860s. The Ffestiniog Railway was immensely influential across the world following the visits of officials and engineers to North Wales in 1870. It was the inspiration for the Darjeeling Himalayan Railway, one of the World Heritage Mountain Railways of India, as well as for the Talyllyn Railway (element 6.4) and the Penrhyn Slate Quarry Railway (element 1.3). Following a period of closure, the railway was re-opened in stages from 1955 to 1982. It preserves much of its original formation, buildings, locomotives and rolling stock, including its historic fleet of Victorian slate wagons. Within the Nominated Property, the inclined planes connecting the quarries with the Ffestiniog Railway form spectacular landscape features.

Figure 2.102. The Ffestiniog Railway has undergone transition from a horse-and-gravity operated slate railway to a small but intensively worked public railway, and is now a major tourist attraction.

Figure 2.101. A characteristic of the railway is its use of stone-faced causeways to carry it over tributary streams.

Element 5.10 Porthmadog Harbour

Located in the broad and sheltered Glaslyn estuary, which opens to the Irish Sea, this was the shipping point for Ffestiniog slate from the early nineteenth century, initially served by river-boats and from 1836 by the railway.

The quays, built between 1824 and 1867, remain in use for pleasure craft, and a surviving slate shed is now the Maritime Museum. Other features include timber warehouses, a seamen's mission and 'Ellis' island', the ballast bank made up of stone brought from all the harbours across the world from which ships came to Porthmadog to pick up slate cargoes. Between 1824 and 1914, most Ffestiniog slate was exported from here.

Figure 2.103. The last stage of the journey from the quarries to the sea takes the Ffestiniog Railway over a sea-defence built in 1808-1811, shown here on the right. Diverting the Glaslyn River scoured out a harbour (left). The quays were built between 1824 and 1867 to facilitate the transfer of Ffestiniog slates, initially from small river-boats, later from the railway, to ocean-going sailing ships. The Ballast Bank (left foreground) is made up of stones discarded as ballast from slate-ships returning without a cargo. Porthmadog Harbour is widely used by pleasure craft.

Summary of values and attributes

This slate-quarrying area developed from the mid-eighteenth century with the arrival of skilled quarrymen from Cilgwyn Slate Quarry in Nantlle but only took off with major investment from England and Ireland in the early nineteenth century. Because the slate could only be won from underground once the initial quarries developed, this became the foremost area of slate mining; the multi-level tunnels and the hundreds of chambers, many of which are very well preserved, contain a wealth of artefacts. The town which grew up to house the workforce is the most urban of the slate quarry settlements, and incorporated well-planned public spaces. The innovative Ffestiniog Railway to the harbour at Porthmadog was the inspiration for narrow-gauge systems all over the world.

It is an area where no one landowner completely predominated, and where different quarries came to be worked. Lord Palmerston, the British statesman, invested heavily in one of the Ffestiniog slate concerns; others were bankers from the Huguenot community of Dublin, and from Liverpool and the English West Midlands. They provided the capital for the underground workings from the 1820s, developing a distinctive 'honeycomb' approach which led to well over 100km of levels and chambers. Those at the Oakeley Slate Quarry and Votty & Bowydd Quarry have collapsed and those at Wrysgan are dangerous, but others survive in a good state of preservation, however; they are accessible and preserve a wealth of historic artefacts. Diffwys Slate Quarry had only limited underground working.

The building of the 0.6 metre gauge Ffestiniog Railway between 1832 and 1836 gave the quarries a more cost-effective outlet to the harbour at Porthmadog than the previous pack-horses, carts and river boats. It began as a horse-and-gravity mineral railway, drawing on existing technologies employed in the Penrhyn Slate Quarry Railroad and the Nantlle Railway, but was transformed between 1863 and 1872 into a small but fully fledged and high-capacity public railway. This proved a model emulated over the world, following visits from officials and engineers to Ffestiniog in 1870 at the invitation of its engineer, Charles Easton Spooner. The railway remains active as a popular visitor attraction, and preserves its authenticity as a nineteenth-century railway to a remarkable degree.

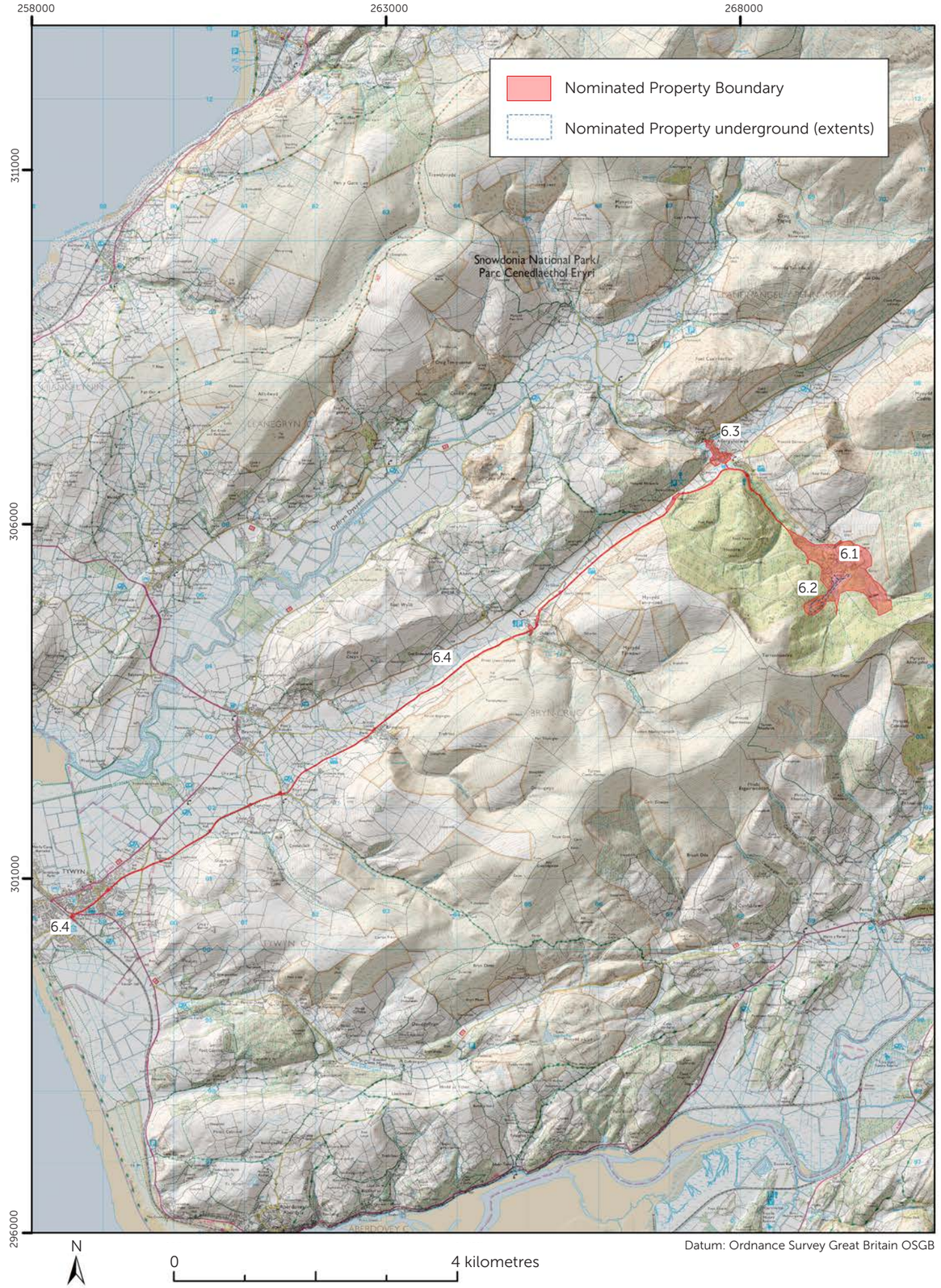
Blaenau Ffestiniog grew from a few scattered houses to a town of 11,274 by 1881. Its earlier unplanned ribbon developments are evident, and contrast with the confident architecture of the second half of the nineteenth century, with its impressive Nonconformist chapels and open public spaces.

The large-scale underground working of slate ceased in Wales in 1999 (at Maenofferen). Underground tours for both specialists and casual visitors interpret the industrial heritage of *The Slate Landscape of Northwest Wales*.

COMPONENT PART 6

Bryneglwys Slate Quarry, Abergynolwyn Village and the Talyllyn Railway

Figure 2.104. The village of Abergynolwyn is in the foreground, the Bryneglwys Quarry in the distance, and the railway follows the contours of the hill through the trees on the right.



Map 2.7. The boundaries and Elements of Component Part 6: Bryneglwys Slate Quarry, Abergynolwyn Village and the Talyllyn Railway with associated Elements (Scale 1:70,000).

Location and setting

Bryneglwys Slate Quarry, is located within the fourth major slate belt to be included within the series. Ordovician slate outcrops are aligned with a small northeast-southwest-trending range of hills in southern Gwynedd, 38km south-south-east of Ffestiniog (Component Part 5). This Component Part consists of a slate quarry, the settlement that supported it, and the railway which connected them with the main line at Tywyn, a distinctive linear landscape feature that was the first slate quarry railway built for steam traction. This was also the world's first preserved railway, still operating for visitors. The area is rural, with open agricultural fields in the valley giving way to a patchwork of fields, open grazing and forest on the hills.

Bryneglwys Slate Quarry is situated in a shallow valley 2km southeast of Abergynolwyn village, to which it was connected by a slate railway that passes between the steep hills of Foel Fawr (350m, in the south) and Foel Pandy (454m, in the north). It then joins the Talyllyn Railway which follows the contour on the south side of the Fathew Valley for 12km west-southwest to Tywyn, 0.5km from the coast of the Irish Sea. 3.5km southwest of Abergynolwyn the railway passes Dolgoch Falls, a series of three waterfalls in a wooded ravine which flow into the Fathew River, where there is an adjacent station. At 6km from Abergynolwyn, the valley opens out into extensive farmland with nucleated settlements, offering views west to the open sea.

Summary

The quarry shows the influence of extractive techniques from Nantlle (Component Part 3) and from Ffestiniog (Component part 5); this Component Part includes the Lancashire-pattern village, reflecting Manchester capital, and the first slate quarry railway built for steam traction and to connect with the national railway network rather than the sea – also a pioneering railway preservation project emulated worldwide.

As well as the surface features of the Bryneglwys Slate Quarry, underground workings remain accessible, within which wagons, rails and other artefacts survive. The quarry, the village and the railway all reflect investment and technology from the 1860s.

Elements

Elements of this Component Part date mainly from the 1860s.

Table 2.7 Component Part 6 Elements	
Element 6.1	Bryneglwys Slate Quarry Surface Landform and Chain Incline Ropeway Bastion
Element 6.2	Bryneglwys Slate Quarry – Underground Workings
Element 6.3	Abergynolwyn Village
Element 6.4	Talyllyn Railway

Figure 2.105. This aerial view looks southwest from the village of Abergynolwyn along the Fathew Valley to Tywyn. The line of the Talyllyn Railway can be traced at the top of the photograph through the line-side hedges at the base of the steep ground and left-hand edge of the valley pasture.

Element 6.1 Bryneglwys Slate Quarry – Surface Landform and Chain Incline Ropeway Bastion

An open quarry which worked two parallel veins of Ordovician slate from the 1840s, but which was only significantly developed during the boom of the 1860s, with capital from the Nantlle Component Part and from the Lancashire textile industry. The surviving stonework for its chain-incline ropeway of 1862-3 reflects a technology imported from the Nantlle slate quarries.

Bryneglwys Slate Quarry was opened in a narrow upland valley crossed by two veins of Ordovician slate. It made use of water-power, drawn from a reservoir on the Llaeron stream. The most prominent surviving feature is the bastion for a chain incline ropeway system site and the pits for the waterwheels which powered it. This device lifted blocks or slate and rubble from the open workings, and was based on a similar feature at Pen yr Orsedd Quarry (Element 3.7), long-since quarried away.

Figure 2.107. Bryneglwys Slate Quarry is the only remaining site where the technology of the water-driven chain incline ropeway for raising materials from open pits can be seen in situ. This distinctive system was brought to the area by Nantlle men in the early 1860s. A change of management shortly afterwards led to the start of a different method of working the rock – from underground chambers.

Figure 2.106. The surface landform of the Bryneglwys Slate Quarry, looking down the valley towards the village of Abergynolwyn. The two veins of slate ran across the valley.

Element 6.2 Bryneglwys Slate Quarry – Underground Workings

The steeply inclined Narrow Vein required underground working once it had reached to any depth.

Several of the seven floors in the Narrow Vein workings are accessible and contain rails, wagons and winches. These floors connect with the open pit from which a chain incline system raised blocks and slate rubble.

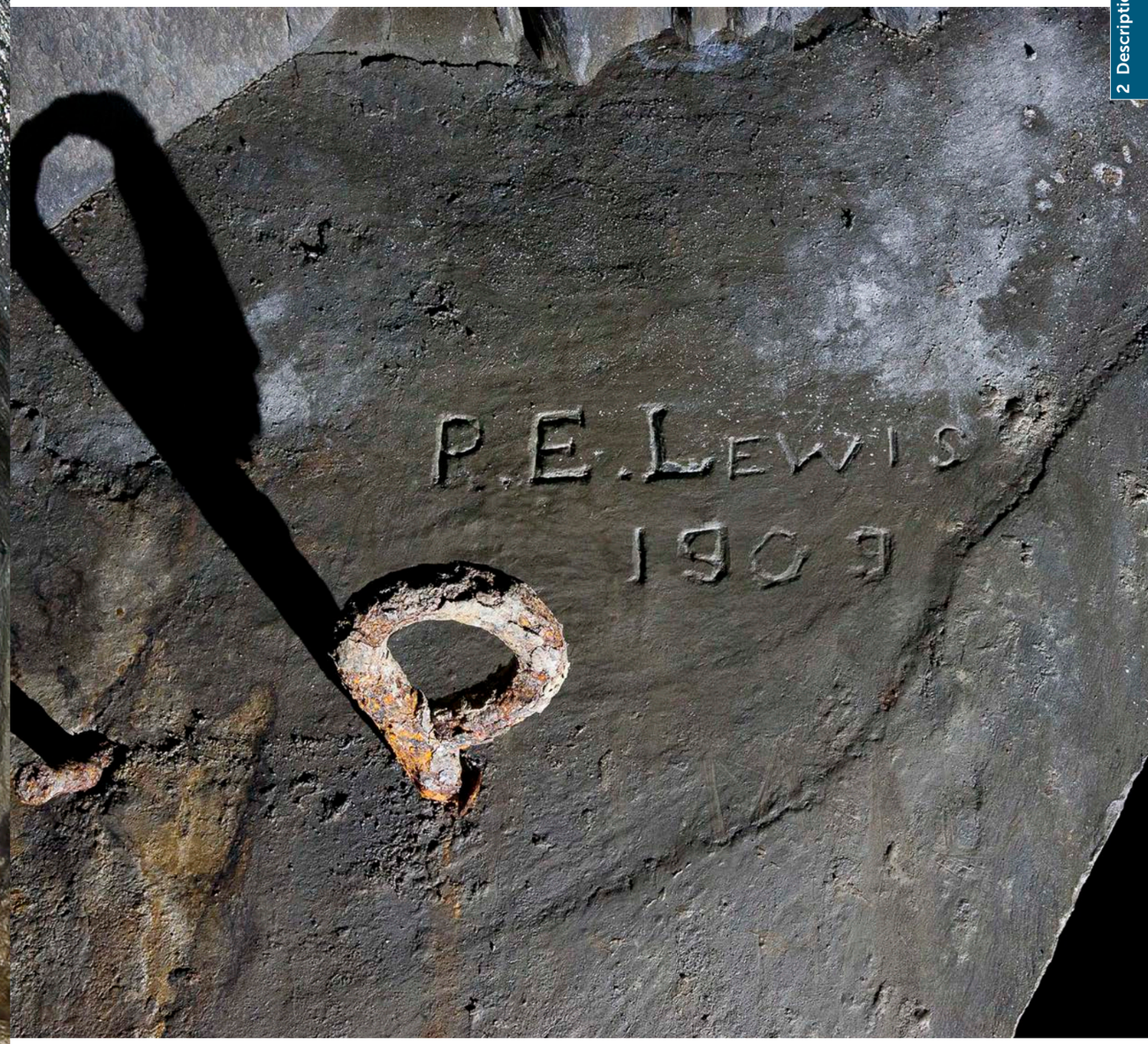


Figure 2.109. Graffiti recording the names and dates of quarry workers are often found underground in slate mines and quarries, and Bryneglwys is no exception.

Figure 2.108. Much of the underground workings at Bryneglwys is above the water table and accessible to specialists. They preserve equipment from various phases of the quarry's period of operation such as this flat wagon. See also Figure 2.11.

Element 6.3 Abergynolwyn Village

Abergynolwyn village was built to house quarrymen and their families, and reflects the sudden influx of capital from Lancashire in the 1860s.

The village of Abergynolwyn was developed following the lease of Bryneglwys Slate Quarry by the Lancashire cotton-producers, the McConnel brothers, in 1864. Many of the houses are built to a design by a Manchester architect, James Stevens, in a North of England industrial idiom. Abergynolwyn also acquired chapels, a church, school and shops. A distinctive feature of the village is the trace of the inclined plane connecting it to the Talyllyn Railway, which delivered goods to the village and removed night-soil. It was probably the means by which the slate blocks of which the village is largely built were delivered.

Figure 2.111. Tan y Bryn Road in Abergynolwyn was laid out around 1870.

Figure 2.110. The settlement at Abergynolwyn was created around a pre-industrial farm on the turnpike road.

Element 6.4 Talyllyn Railway

An early narrow-gauge public railway, built for locomotive operation and passenger carriage from the outset, the first in Northwest Wales to connect a slate quarry with the national railway network rather than with the sea. Its construction reflects the boom in the slate industry in the 1860s, as well as experience gained on the recent modernisation of the Ffestiniog Railway. It was completed in 1866.

The Talyllyn Railway connected the Bryneglwys Slate Quarry with the national railway network near the town of Tywyn and was purpose-built for steam traction, reflecting experience gained on the Ffestiniog Railway (Element 5.9). It is also internationally significant as the first railway to be successfully operated by a preservation movement. Line-side hedges through pastureland on the lower section give way to shallow contour embankments and cuttings along wooded slopes as it climbs towards the quarry. It retains its original locomotives and carriages and some of its slate wagons, as well as of many of its nineteenth century buildings and infrastructure. The Narrow Gauge Railway Museum at Tywyn Wharf station interprets this technology, and sets out the role of the slate industry of Wales in its evolution.

Figure 2.113. *Dolgoch*, built in 1866, hauls a passenger train over the viaduct which is the main engineering feature of the Talyllyn Railway.

Figure 2.112. The Talyllyn Railway operates its original locomotives and carriages through a landscape which retains its nineteenth century character.

Summary of values and attributes

As an area developed during the boom period of the 1860s, Bryneglwys Slate Quarry, the village and the railway illustrate the sudden arrival of capital to the industry from the leading sector of Lancashire cotton. Its attributes show how both technology and assumptions about housing the workforce had evolved by the period when the industry was at its height. In addition, both the railway and the quarry illustrate how technologies developed elsewhere in the slate industry could be applied. Economic downturn has preserved key elements of this Component Part as they were when first developed.

The quarry lease was acquired by the Aberdovey Slate Co. Ltd (the McConnel brothers of Manchester, wealthy textile merchants) in 1864. The village took shape between 1865 and 1870. An unusual feature of this settlement is the inclined plane from the Talyllyn Railway, which connected the quarry with the standard gauge railway at Tywyn. This narrow-gauge system, 11.7 km long, was built for the McConnels by James Swinton Spooner, of the Spooner family associated with the Ffestiniog Railway. It was innovative in applying Ffestiniog principles such as locomotive haulage and a passenger service, and was the first slate carrying railway in North Wales to be built to connect a quarry with a national railway network rather than with the sea. It was also the first in the world to be rescued from closure by voluntary effort; since 1951 it has been operated by the Talyllyn Railway Preservation Society as a visitor attraction.

Figure 2.114. The Dolgoch Viaduct.

2.b History and Development

2.b.i Introduction

The Slate Landscape of Northwest Wales is a serial property located in the Snowdon massif of Gwynedd, Wales. It has evolved through quarrying and mining for slate, a building stone that lends itself to the production of finely grained roofing elements and other architectural products. It was exploited on a monumental scale – world-leading, and with a global reach – particularly between 1780 and 1940. Welsh Slate was frequently specified from the most prestigious architectural projects, and was used to roof the huge volume of terraced housing that was built in the same period to house the growing populations of Britain's industiral towns and cities. Its landscape legacy is evident globally, is of unparalleled significance for its type, and represents all phases with high authenticity and exceptional integrity.

Figure 2.116. Penrhyn Slate Quarry provided roofing material for the World Heritage Royal Exhibition Building in Melbourne, Australia.

Figure 2.117. These terraces in the London Docklands show how slate roofs enabled the rapid construction of workers' houses during the Industrial Revolution.

Figure 2.115. Huw Llechid Williams, the Penrhyn quarry bugler, lets his workmates know that blasting is about to commence.

2.b.ii The natural environment

Geology

The Component Parts of the Nominated Property represent, and are located in, the most important slate outcrops of Northwest Wales (see Map 2.1). As one of the world's classic deposits, and historically its most significant, many generations of slate workers earned a living from this landscape and made Welsh slate internationally known. Three massive northeast-southwest-trending, sub-parallel linear deposits range over 60km from north to south. Each Component Part and its range of elements, together represent the entire range of process and technology in which slate rock was quarried and mined. The different methods of extraction – stepped galleries, pits or underground – depended on topography, the dip of the slate vein and the disposition of its lines of breakability. All aspects are easily interpreted in this highly legible landscape – above and below ground.

Figure 2.118. The vertical cleavage and bedding plane of the slate rock is evident in this view of Penrhyn Slate Quarry, where the other planes of fracture, the vertical pillaring line and the horizontal foot-joints, are also apparent.

Slate is a hard metamorphosed compacted mud with fissile properties that make it ideal for splitting to form thin, light and strong building products such as roofing elements, cladding, blocks, flooring and lintels, as well as for gravestones and memorials, school-slates, blackboards, urinals, switchboards, billiard tables, furniture and vats for breweries. The metamorphic cleavage (the fissile plane) is the most important plane of fracture but two others are significant: the 'grain' or pillaring line; and the 'foot-joint', across the plane of cleavage. The colour and composition of slate vary considerably, even within a small quarry, but the Cambrian veins of the Ogwen valley, Dinorwig, and Nantlle (Component Parts 1-3), tend to be purple in colour, the Ordovician veins of Gorseddau and Prince of Wales, Ffestiniog and Bryneglwys, grey, and softer (Component Parts 4-6). At Gorseddau and Prince of Wales, the cleavage is coarse, and fewer finely split slates could be made from one block. These quarries concentrated less on roofing elements and more on slab-production.

Understanding how to extract a suitable raw block of slate from the rock-face, whether by hand tools, blasting or wire saws, is part of the working quarryman's skill, and calls for a detailed understanding of geology. Processing a raw block into a commercial product is also skilled work, in particular hand-splitting with hammer and chisel, and is still required by the slate industry as some blocks cannot be processed mechanically even now.

A further characteristic of the industry is that in the diligent exploitation of the highest grade of slate enormous quantities of waste rock was also produced – at least 90% of all that was extracted. The resulting tips form distinctive and monumental elements of the surface landform of *The Slate Landscape of Northwest Wales.*

Topography

The Nominated Property lies in the mountainous areas of the Snowdon massif of Northwest Wales (see Map 2.1). Veins of slate are located in upland areas, at the heads of steep glaciated valleys along which extracted slate could be transported by water, road or rail, to a harbour or to the national railway network.

The Component Parts of the Nominated Property represent the different ways in which quarrymen and engineers responded to challenging topography, not only in the ways in which the rock was worked but also in finding cost-effective means of moving it to where it could be processed, of tipping unworkable rock where it would not compromise future working, and in devising ingenious transport systems utilising gravity to move the finished product. Topography (and hydrology) was also innovatively exploited to provide low-cost energy in the form of water-power.

Hydrology

The Component Parts of the Nominated Property exemplify the use made of the movement and distribution of water for industrial purposes in the mountainous and high rainfall/snowfall environment of Wales. Water was both an opportunity and a challenge. Many quarries had extensive catchment areas; they constructed large reservoirs and extensive channels, and used water to operate shaft- and inclined plane-balances, or to power waterwheels and turbines operating pumps and winding machinery, slate saws, foundry blowers, generators and compressors. Where water was unavailable, steam had to be used, and coal imported at considerable cost.

Hydrography

Although the quarries in *The Slate Landscape of Northwest Wales* are situated in a mountainous landscape, they also lie within a short distance of the sea, a factor which was crucial to commercial success. Component Parts 1, 2 and 3 exported from harbours on the Menai Straits, a narrow stretch of shallow tidal water about 25 kilometres long between the Welsh mainland and the Isle of Anglesey, and which gave access to both Liverpool Bay and the Irish Sea. Component Part 2 also used lake-transport to move its output part of the way to a sea-harbour at Caernarfon. Component Parts 4 and 5 constructed rail links to harbours on Cardigan Bay, the inlet of the Irish Sea which forms the largest bay in Wales, 5 also making use of river-transport to connect with sea-going ships. Component Part 6 is unique in never developing direct rail access to the sea, depending on the national railway network to distribute its output.

Figure 2.119. Padarn Lake enabled slate from Dinorwig (component part 2) to make part of the journey to harbour by rowing-boat.

2.b.iii Summary history

The history of *The Slate Landscape of Northwest Wales* divides into three broad periods: an era before the Industrial Revolution which extends from Roman times to the late eighteenth century; a period of dominance from 1780 to 1940, which is the one which makes the most significant contribution to proposed Outstanding Universal Value, and which sub-divides into an expansionist period until 1878, followed by a period of contracting markets culminating in the Great Depression from 1929 to 1940; and thereafter a period of continued decline until the stabilisation of the industry to match demand in the late twentieth century.

Before the Industrial Revolution

Slates from the Cambrian veins, within easy reach of the sea, were quarried for use within Northwest Wales in the Roman period, and were probably exported as far as London. There is little evidence for quarrying thereafter until the second millennium CE, when archaeological and documentary evidence confirms slate was finding favour in high-status dwellings and castles in western England and in Ireland, as well as in the World Heritage *Castles and Town Walls of King Edward in Gwynedd*, the great chain of fortified complexes and borough towns erected by the Anglo-Plantagenet monarch in the thirteenth century to ensure political subjugation to London and to mark the end of independent Welsh rule. Medieval slate-quarrying was probably a part-time occupation for farmers and labourers. Demand grew steadily from 1700 to 1780, but Gwynedd remained until the end of this period a marginal agrarian region, barely touched by the industrial developments which were transforming other parts of Britain and of Europe. Its people dressed in homespun clothes and burnt peat as a fuel. Urban life was restricted to a few small market towns. Wales' ancient Celtic language, one of the Britonnic group, remained the near-universal medium of communication. The translation of the Bible into Welsh in 1588 had enabled the Protestant Reformation to take deep root in Wales, but by the late eighteenth century the reformed Anglican church was itself under pressure from religious Nonconformists who believed that state-supported faith impinged on freedom of conscience, basing their opinions on scripture and reason rather than on tradition and authority. A network of circulating schools sponsored by evangelical churchmen ensured widespread levels of literacy in the Welsh language across the country, making possible the strong and sudden growth of Nonconformist congregations and their chapels in the nineteenth century.

1780 to 1940

The estimated output of British slate increased from 45,000 tons in 1793, of which 58% came from Wales, to 640,700 tons in 1898, of which 77% came from Wales (Gwynedd Archives Service: XM/4874/99). About 90% of Welsh output came from the great quarries in the Snowdonian massif of Northwest Wales, substantially represented by this Nomination.

Before the end of the eighteenth century, slate products from Northwest Wales were already being exported globally. War with France in 1793 and heavy taxes on building materials the following year badly affected slate production in Northwest Wales but in the longer term enabled it to compete with the long-established quarries of the Loire and the Ardennes, as revolutionary turmoil hampered the building trade and brought to a temporary end the demand for roofs for palaces and abbeys. Re-investment by Richard Pennant, Lord Penrhyn (1737-1808), of capital

'Cet ensemble constitue un monument, expression forte d'une civilisation, celle de la société galloise et de la revolution industrielle des îles britanniques, laquelle par sa technologie, ses capitaux et son marché mondial a permis de developper tout le potential productif du Pays de Galles' (This overall unity constitutes a monument which strongly expresses the culture of Welsh society and the industrial revolution of the British Isles, which by its technology, its capital and its access to world markets made it possible to develop the productive potential of Wales) (Professor Philippe Cayla, Président de l'Association de l'Ardoise, 2012).

derived from his West Indian sugar plantations enabled the consolidation of the older scattered diggings in the Ogwen Valley into Penrhyn quarry, an organised workplace based on a system of stepped galleries (Element 1.1), emulated at Dinorwig (Element 2.1), Gorseddau and Prince of Wales (Elements 4.1-2) quarries. An innovative water-powered mill to cut slate slabs with circular saws (Element 1.2) was opened to serve Penrhyn Slate Quarry in 1802 and a railway system was installed to handle raw blocks for splitting, to tip unproductive rock, and to transport output to the sea (Element 1.3) at a new purpose-built harbour (Element 1.4). William Oakeley (1750-1811) of Plas Tan y Bwlch (Element 5.7) was another improving landlord but preferred to lease out his Ffestiniog quarries. Capitalised partnerships took over Cilgwyn Slate Quarry in Nantlle (Element 3.1) and Diffwys Slate Quarry in Ffestiniog (Element 5.4) in 1800.

A short-lived boom in the 1820s led Thomas Assheton Smith II (1776-1858) to build a railway from his Dinorwig Slate Quarry to the sea (Elements 2.1 and 2.7) and Liverpool financiers to promote a railway (Element 3.9) connecting the Nantlle quarries with a quay at Caernarfon. Growth of the British canal and railway networks facilitated home sales. Repeal of the slate tax in 1831 encouraged bankers in Dublin to fund the 22 kilometre Ffestiniog Railway (Element 5.9), opened in 1836, the longest so far built to serve the industry. Overseas markets expanded considerably. Slates were exported to the West Indies and to the USA from the late eighteenth century. By the 1830s slates were also being sent to Australia. The Great Fire of Hamburg in 1842 gave the Ffestiniog quarries (Elements 5.1-2) their entrée into the German trade. Exports to Germany grew from 12,670 tons in 1867 to 68,490 tons in 1873. The early 1850s ushered in a long period of expansion, reflected in the development of Gorseddau (Element 4.1), Prince of Wales (Element 4.2) and Bryneglwys (Elements 6.1-2) quarries; by 1861 there was an 18-month waiting list for Penrhyn slates, such was the demand. The 504,000 tons of roofing slates produced by the British slate industry in 1877 represented a level never since exceeded. Global exports from Northwest Wales peaked in 1889. Roofing slates and slate-slabs were used on buildings all over the world. The availability of this durable, lightweight material profoundly influenced architectural and building styles, in particular the construction of the low-pitched roofs which became fashionable in the eighteenth century. As quarries opened in other parts of the world, or developed to serve export markets, quarrymen who had learnt their skills in *The Slate Landscape of Northwest Wales* were much in demand as managers and overseers.

Increased demand led to mechanisation. Major developments included the introduction of chain incline ropeways in Nantlle (Element 3.5), water-balance shafts and drainage systems at Penrhyn Slate Quarry (Element 1.1), the building of a water-driven engineering complex (Element 2.5) and an industrial hospital at Dinorwig (Element 2.10), and slate mills and inclined planes powered by steam or water, in all the Component Parts. Circular saw-tables, first introduced in 1802 at Felin Fawr (Element 1.2), were refined and developed, and new technologies adopted, including tunnelling machines. The characteristic 0.6 metre gauge railway which was evolved in the quarries and on the overland systems connecting them to the sea or to the growing mainline network proved a particularly influential technology following trials before an international audience of engineers and promoters on the Ffestiniog Railway (Element 5.9) in 1870.

The quarry settlements which initially took root in the 1820s expanded considerably with the arrival of newcomers drawn to the industry from the immediate rural hinterland. Bethesda (Element 1.6) and Blaenau Ffestiniog (Element 5.6) began to assume the character of towns, with their impressive public buildings and lavish Nonconformist chapels. Engineers and financiers who had been drawn to this very profitable industry constructed new company villages at Nantlle (Element 3.10), Treforys (Element 4.5) and Abergynolwyn (Element 6.3). Barracks were built in many quarries, some of which housed only men (Element 2.3), some entire families (Element 3.5). Quarrymen and their families remained close to the land, tending smallholdings and cottage plots; much of the traditional rural culture from pre-industrial times survived, and the Welsh language was strengthened by the creation of confident new urban and village communities. Quarrymen prided themselves on their rich cultural life, their love of poetry, of music, of prose writing and of debate on social, political, educational and theological matters, all of which were encouraged by their Nonconformist chapels and Anglican churches, libraries, schoolrooms and the *caban* ['cabin'] – their lunch-time meeting-places in the quarries themselves, where they gathered for discussions and recitals.

After 1878 the slate industry of Northwest Wales experienced decline through the stagnation of the United Kingdom building industry, though the export trade remained buoyant. Depression in the 1880s was followed by a brief period of renewed prosperity; by 1898, 16,510 men were employed in the slate industry of Wales, of whom 11,897 (72%) worked in the Nominated Property. New technologies, including electricity (Element 5.3) and catenary 'Blondin' ropeways (Elements 3.2 and 3.8), were introduced to make existing operations more cost-effective, but little new capital was attracted to the industry. The longevity of Welsh slate meant that it had little built-in obsolescence. Slate quarries in the USA and France captured much of the market, and a vogue for flat-roofed buildings lessened demand. The Great Depression (1929 onwards) spelt the end for some Welsh quarries, with others on restricted working. During the 1930s many quarrymen reworked slate tips on their own account to supply a limited market for damp-courses and small roofing elements (Elements 3.1 and 3.3).

Decline and stabilisation – 1940 to present

Depression and two world wars paralysed the building industry and reduced the demand for slate. From 1940 to 1970 *The Slate Landscape of Northwest Wales* continued to experience economic decline, as once-busy quarries became relict sites. Production and demand eventually stabilised, and ambitious modernisation programmes at an extension of the deposits long exploited at Penrhyn Slate Quarry have enabled it to compete with the new slate industries of Spain, China and Brazil.

2.b.iv Global influence – building and history

The Slate Landscape of Northwest Wales embodies an important interchange of ideas in building and architecture that impacted across the world.

Slate is unusual as a quarried stone in that its weight-to-cost ratio makes it worth exporting globally on a significant scale as a roofing element. Welsh slates have been used on buildings all over the world – the dwellings of the rich, the middle classes and the poor, civic buildings, places of worship, places of education, banks, offices, factories and warehouses. They are to be found in every continent and in most countries. They are particularly evident in the context of British imperial expansion and commercial advantage from the late eighteenth century onwards, and contributed to the increasing homogenisation of architecture in the western world in this period. Many excellent examples survive within the Nominated Property, showing the different sizes and qualities that were available, but also including poorer material not worth exporting, all of which together created a vibrant regional vernacular.

Figure 2.120. In *The Slate Landscape of Northwest Wales* itself, even the poorest quality slates, not worth exporting, could find a use, such as these on the roof of the lavatory at Pen yr Orsedd Slate Quarry (Element 3.7).

Though the slate industry of Wales emerged as the market leader in the Victorian period, it is not always possible to distinguish the origin of a slate roof, as there are considerable variations in colour and fissibility even within the same quarry. Slates were also rarely sold by the quarries themselves but by merchants, making it difficult to match source with supply. However, government and corporate archives make clear the enormous amounts produced in Northwest Wales, and the global reach of export.

Slate slabs from slate quarries in Northwest Wales were also exported widely as architectural products. Other exports of slab products are less well documented, though attempts were made to popularise slate furniture in hot climates where beetles and termites attack wood. School writing slates were exported largely across the United Kingdom.

Ships' captains often carried slate speculatively, though slate merchants set up in business in many large ports, and later along canals and railways. Some slate quarry companies in Northwest Wales competed in international exhibitions from 1851 onwards.

Figure 2.121. Slate furniture never proved popular but examples survive at Penrhyn Castle, where slate was used to make an ornamental bed for Queen Victoria's visit.

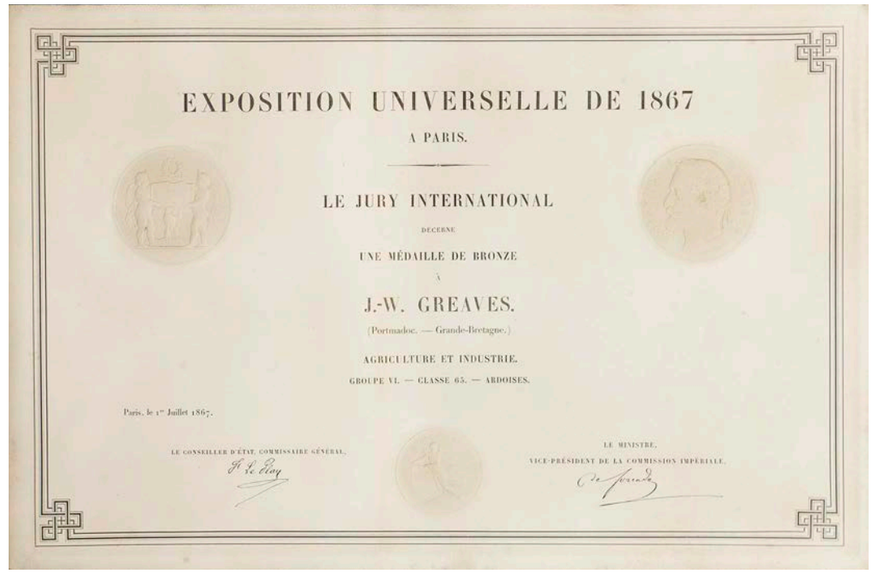


Figure 2.122. Taking part in international exhibitions was an effective way of promoting the qualities of slate from North Wales. J.W. Greaves of Llechwedd Quarry won a Bronze Medal at the Paris *Exposition Universelle* in 1867.

The home market – Britain and Ireland

'Spreading suburbs – Although multi-occupancy was common in London, there was a general acceptance that the family dwelling was the norm. Most houses were built in greyish brick with roofs of Welsh slate' (Trinder 2013, 546).

Slate fragments have been identified in Late Roman contexts in London. In Wales, slate was being used to roof high-status dwellings before the Anglo-Norman conquest of the late thirteenth century. The massive thirteenth-century building programme, *Castles and Town Walls of King Edward in Gwynedd*, now a World Heritage site, made considerable use of slate. Slates from Northwest Wales found markets in Cheshire, Shropshire and the hinterland of Bristol, as well as along the eastern coast of Ireland.

By 1738 Nantlle quarries were serving Dublin and London markets. The spread of slated roofs in Ireland down the social scale to the houses of the poorer farmers and labourers benefited the Welsh industry.

Sales of Welsh slates in England were hindered by war with France in 1793, and by a tax the following year. Peace, and the abolition of the tax, made Welsh slate roofs cheaper than ceramic-tiled roofs in London. Canals and the national railway network directly stimulated slate production, and the towns and villages which sprang up along these new lines of communications used slate. These ushered in a period of expansion for the slate industry which lasted until 1878.

Figure 2.123. Welsh slate has been used in Bristol since the Middle Ages. This 1921 photograph of Rupert Street and its environs illustrate the use of Welsh slate in a major city.

Continental Europe

'L'industrie ardoisière en Grande-Bretagne mérite une place toute particulière, en raison de son importance et de son rayonnement mondial'* (The slate industry of Great Britain deserves a special mention because of its importance and its global reach) *(F. Soulez Larivière 1979: 346-59).

The 1794 slate tax temporarily restricted home sales but encouraged trade with northern Europe. Slate was exported to Norway, Sweden, Denmark and Germany. After the great fire of Hamburg in 1842, the Ffestiniog quarries gained a strong foothold in continental Europe. The trade grew significantly from the 1860s, with the completion of the railway network, the end of Bismarck's wars and the lowering and abolition of tariffs.

Figure 2.124. The name of the slate-schooner *Frau Minna Petersen*, owned by Hugh Parry of Porthmadog, reflects the slate-trading links between Northwest Wales and Hamburg (Germany).

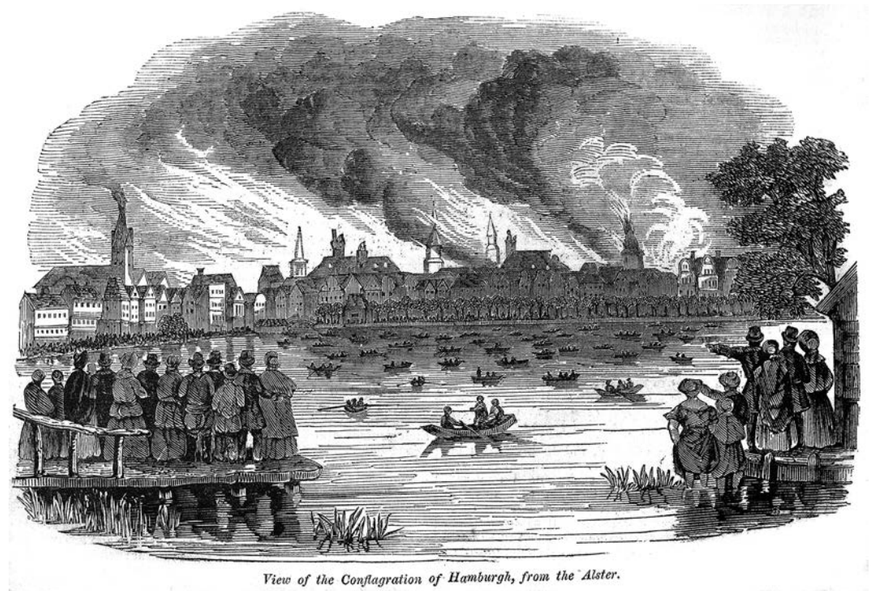


Figure 2.125. The great fire of Hamburg in 1842 destroyed public buildings and over 2,000 homes; rebuilding the city provided an important market for Ffestiniog slate (Lindsay 1974, 194).

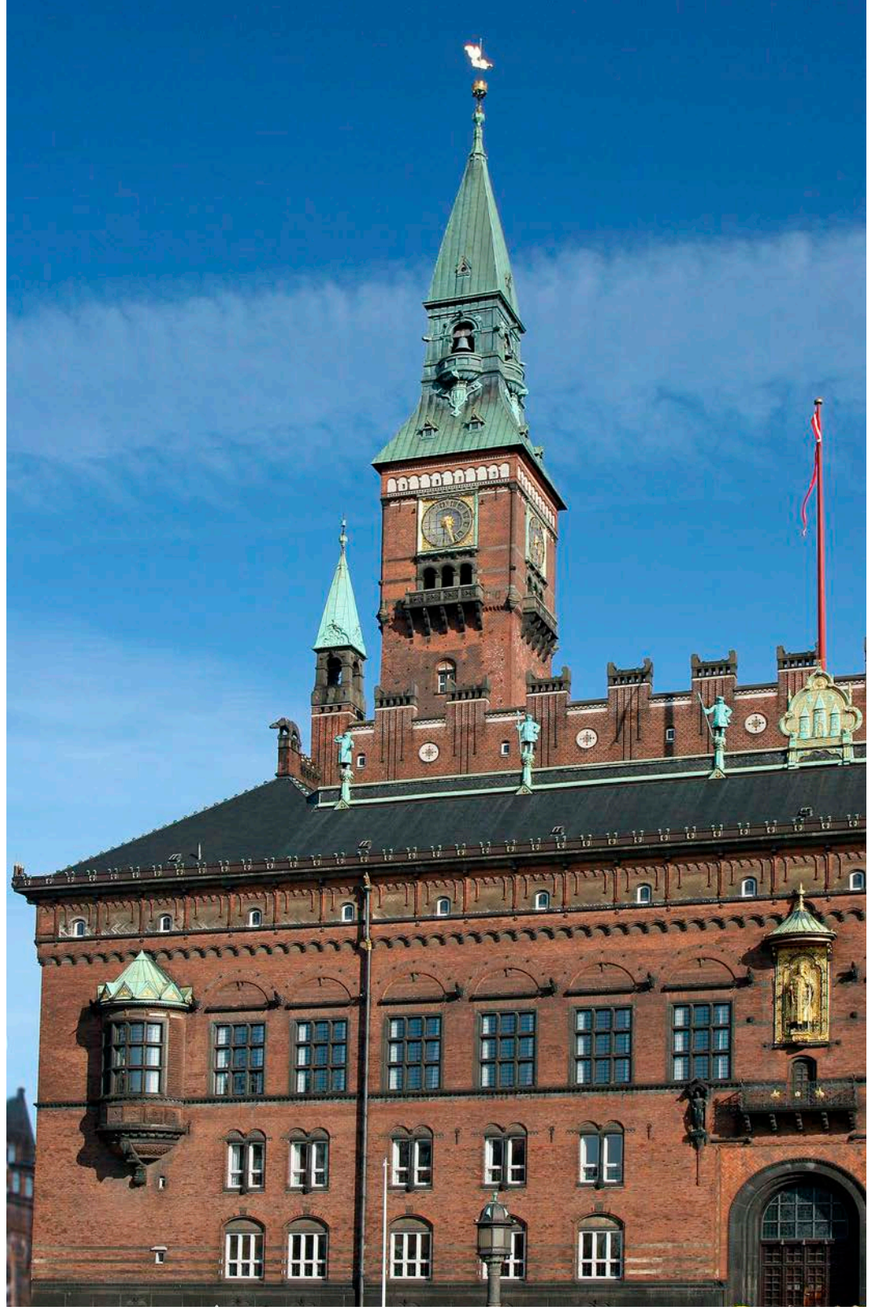


Figure 2.126. The architect Martin Nyrop (1849-1921) used slates from Maenofferen Quarry in Ffestiniog to roof Copenhagen City Hall, completed in 1905 in the Scandinavian National Romantic style.

German builders considered Welsh slate better and cheaper than continental European products. Commercial contacts through the port of Hamburg led to close business and family relationships between Ffestiniog and the slate quarry at Haute Martelange in Luxembourg. Szczecin was another major entrepôt for slate from Wales. Slate was sent inland by rail and water to new markets in Central and Southern Europe. Germany imposed an import duty in 1876, but the trade remained buoyant until 1914.

Figure 2.127. An article in the *Slate Trade Gazette* for 1910 records that Ffestiniog slate slabs were being used in the Alexander Nevsky Russian Orthodox cathedral in Warsaw.

West Indies

Slate from North Wales was used for high status buildings in the West Indies, reflecting the influence of the Penrhyn Estate.

'Around the ruined great houses of Jamaica, fragments of British roof slate can be found, some of which can be traced to particular quarries in North Wales ...' (Atkinson 2006, 132).

American colonies/United States of America

Roofing slates and writing slates have been identified in the context of the earliest phases of English colonisation in Virginia in the seventeenth century.

The United States Department of the Interior's *Preserving Historic Architecture: The Official Guidelines*: 'Evidence of roofing slates have been found also among the ruins of mid-17th century Jamestown. But because of the cost and the time required to obtain the material, which was mostly imported from Wales, the use of slate was initially limited. Even in Philadelphia (the second-largest city in the English-speaking world at the time of the Revolution) slates were so rare that "The Slate Roof House" distinctly referred to William Penn's home built in the late 1600s. Sources of native slate were known to exist along the eastern seaboard from Maine to Virginia, but difficulties in inland transportation limited its availability to the cities, and contributed to its expense. Welsh slate continued to be imported until the development of canals and railroads in the mid-19th-century made American slate more accessible and economical.'

The 1794 British slate tax provided an incentive for exports from North Wales to America, which remained a significant but highly speculative trade until the American Civil War (1861-1865). Welsh slate came increasingly to be used for ordinary structures in the USA. By 1830 half of New York was roofed with slate.

When the price of slates was high, in the 1870s, American quarries gained a foothold in the British and Irish markets, and the USA became a net exporter.

Figure 2.128. The 'Slate Roof House' in Philadelphia was built around 1687 – slate was clearly still an unusual material. It was here that William Penn (1644-1718) wrote the final Charter of Privileges (1701), which reiterated Pennsylvania's commitment to religious liberty. During the American Revolution, members of the First Continental Congress occupied the home, including John Adams and John Hancock. It was demolished in 1868.

Figure 2.129. Henry A. Papprill, after John William Hill. *New York from the Steeple of St Paul's Church, Looking East, South, and West* (1848), coloured aquatint and etching by Henry A. Papprill, after the original by John William Hill. The etching shows the slate roof of St Paul's, built in stages between 1764 and 1796, facing Broadway. Slates are used on St Paul's itself and the older buildings; other materials predominate on newer structures such as Barnum's Museum (left).

Australia

The first roofing slates exported to Australia, in the 1830s, were from the Cambrian veins, where Penrhyn and Dinorwig quarries were regarded as the best. In February 1840, 3,300 Welsh roofing slates reached Adelaide on the vessel *John*, to roof the Quaker meeting house. Penrhyn Slate Quarry exhibited at the Sydney and Melbourne exhibitions of 1879 and 1880. Ffestiniog began to supply Sydney and Melbourne in the 1880s. During the Victoria gold rush (from 1851), complete houses made of slate slab were sent to Australia, and slate roofs were laid on timber houses designed to be assembled in kit form.

Welsh roofing slates competed with native Australian slate, with green slates from Westmorland, Cumberland, and from Whitland Abbey in Pembrokeshire (UK), and with slate from Vermont (USA) and Italy, as well as with the ultimately all-conquering corrugated iron.

Figure 2.130. A Welsh slate roof covers the Friends' Meeting House, a 'Manning Portable Cottage', in Adelaide, built in 1840, shown here in 2002.

Table 2.8 Welsh slate export peaked in 1889		
Destination	*Number (tons)*	*Value £*
Germany	41,547	195,590
Australia	5,444	34,242
Denmark	3,516	34,336
Channel Islands	593	4,387
Austrian territories	516	1,176
Belgium	431	362
Argentine Republic	404	3,229
British South Africa	290	1,889
France	161	406
British West India islands and Guiana	114	817
United States	69	184
British East Indies	58	100
Holland	47	603
Uruguay	32	196
West Coast of Africa	12	82
Spain and Canaries	10	118
British North America	9	45
Bermudas	76	47
Gibraltar	6	60
China	6	51
Turkey	2	20

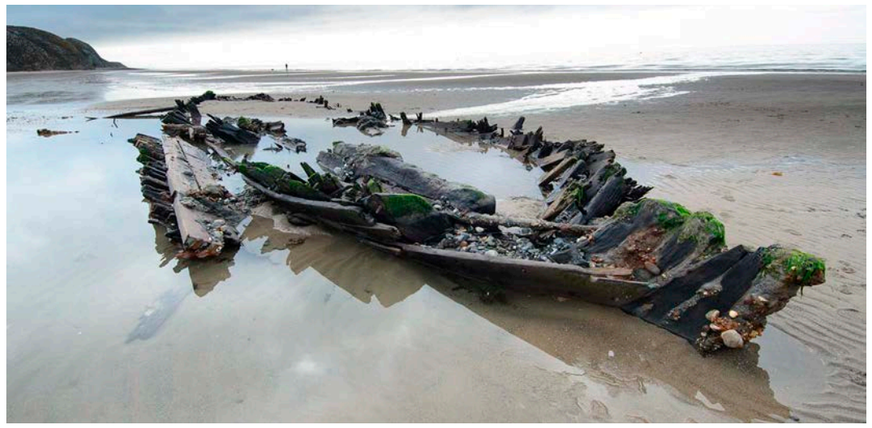


Figure 2.131. Archaeology has identified the remains of wrecks carrying Welsh slate around the coast of Britain and near the mouths of the Elbe and the Oder. These remains of a wooden vessel at Abersoch in Cardigan Bay are probably the *Fosil*, which ran aground in 1889. Broken slates survive in and amongst the timbers.

'Roofing materials changed dramatically as Lord Penrhyn and others began to exploit the slate resources of Gwynedd' (Trinder 2013, 18).

Roofing slates from Wales influenced building and architecture across the world during the Modern period, both for elite and ordinary dwellings.

Figure 2.132. London squares in the eighteenth century were constructed of stock bricks and Baltic pine, heated by Newcastle coal, and roofed with slates from Wales.

Their light weight facilitated Neo-classical low-pitched roofs behind a balustrade or pediment. The prolific English architect Samuel Wyatt (1737-1807) was himself a slate-merchant, profiting from an arrangement whereby he and his brother Benjamin (1744-1818), the agent of the Penrhyn Estate, were supplied from the Quarry (Element 1.1). Samuel Wyatt specialised in medium-sized country houses, but his spare Neo-Classical manner also lent itself to utilitarian buildings. He used slate for every conceivable architectural purpose of his own, as well as selling it to builders and urging its use on professional colleagues. His younger brother James Wyatt

(1746-1813) was a celebrated architect whose work includes Dodington Park in Gloucestershire (UK), the Bath-stone and slate-roofed Graeco-Roman house that served as the model for the Regency country house (Robinson 1973).

Figure 2.133. Purple Penrhyn slate still forms the roof of Dodington Park.

James' contribution was the 'patent slate', a lightweight covering with minimal laps designed to be laid on rafters of a low elevation.

The Federal style in the newly independent United States, as it evolved from colonial Georgian architecture, also encouraged the use of slate.

'The main building shall have a front of two hundred and eighty-two feet and a depth of eighty feet ... The height of three stories, resting on a sub-basement two feet and a basement to be eleven feet high ... The principal story [sic] to be sixteen feet; the whole of said building to be covered with a (Welsh) Slate Roof' – contract for the Federal mint at New Orleans, 1835, designed by William Strickland (Christovich, Toledano and Evans 1995, 13).

Figure 2.134. Samuel Wyatt's Great Barn on the Holkham Hall Estate in Norfolk shows the use of Penrhyn slate on a functional but architecturally ambitious agricultural building.

Terraced housing ('town houses', 'row-houses' or 'linked houses', rows of similar dwellings sharing side walls) lends itself to slate roofing. Its widespread adoption as a means of accommodating working people, in the United Kingdom, the USA, Canada, and Australia, as a consequence of emigration, urban growth and industrialisation, fuelled a demand for slate from North Wales.

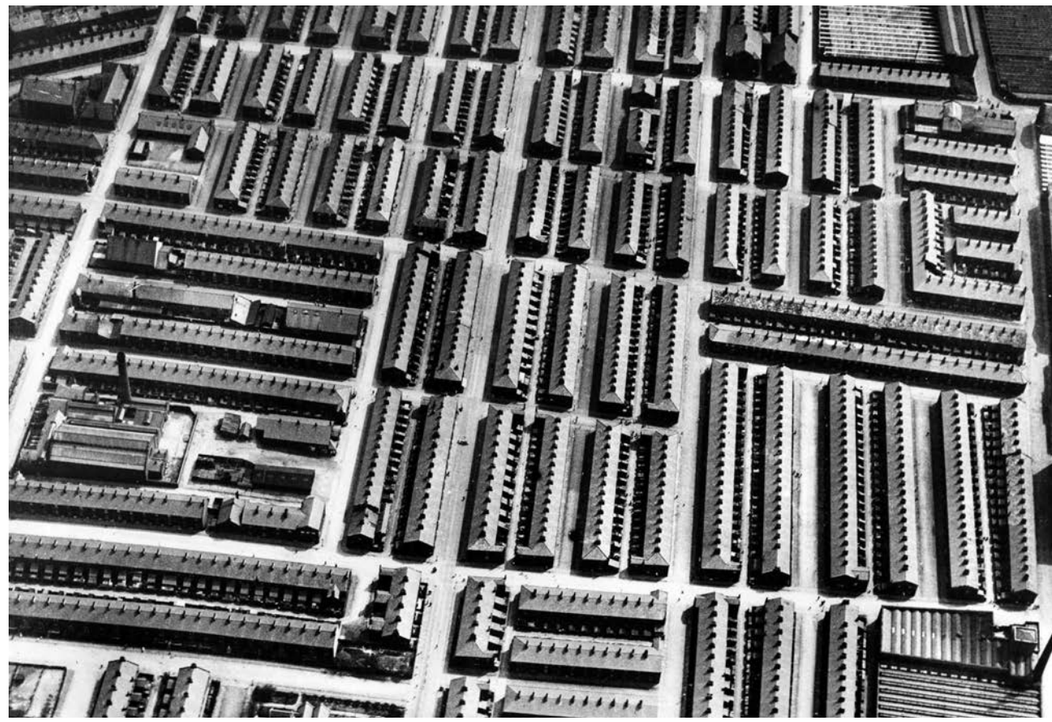


Figure 2.135. A small industrial terraced house might use 2.5 tons of Welsh slate on its roof. Wales' output in the nineteenth century would have covered well over 13,000,000 such homes. This 1925 aerial view is of Burnley in England.

Figure 2.136. A group of Dorothea quarrymen.

The slate quarryman of Northwest Wales

For many years, quarrying for slate in Northwest Wales was mostly part-time work for farmers and farm-labourers. Even after the industry came to be capitalised from 1780 onwards, many quarrymen retained their connection with the land by living on a small-holding. In the boom years from 1856 to 1877, when there was good money to be earned in the quarries, many young men made their way to the raw, burgeoning settlements (Elements 1.5, 1.6, 2.8, 3.10, 3.10, 4.5, 5.6, 6.3) or lodged by the week in barracks (Elements 2.3, 4.1, 4.2) as they found work. Practically all of them came from the immediate rural hinterland. For this reason, the quarryman's language has always been Welsh, and is so to this day.

The slate quarryman's work required agility and some physical strength, but above all it called for intellect. A quarryman had to learn how to study and judge the rock, and work out how best to extract and process it. An apparently mundane role such as piling slate and slabs on a quay (Elements 1.4, 5.8, 5.10) or in a railway yard (Elements 5.9, 6.4) called for a clear logical mind, capable of anticipating when a particular order might need to be accessed and loaded onto a ship or a railway wagon. These jobs went to the best mathematicians.

Not surprisingly, by the middle of the nineteenth century, the slate quarryman was likely to be literate, even literary. Itinerant booksellers always did a good trade when they came to the quarries. Libraries flourished in quarry settlements (Elements 2.8, 5.6). A talent for versifying, singing or debating was admired, and was nurtured in a remarkable institution known as the *caban* (Element 2.2), where the men met for their mid-day meal. The chapels within the quarry settlements promoted discussion groups and educational outreach.

2.b.v Skills-transfer

The Slate Landscape of Northwest Wales represents an important interchange of knowledge and ideas to, from and within this cultural landscape, in terms of the quarryman's craft-skills – his sophisticated knowledge of geology, of the planes of fracture, and of how to blast the rock to best advantage. This took place in two long-established ways – firstly by experienced workers passing on their understanding of complex geological formations to newcomers, often fathers teaching their sons, and secondly by the movement of labour. The ablest workers from Northwest Wales were much in demand to manage slate quarries in Canada, the USA, Ireland, Cornwall, Australia, Italy and Germany.

The 'family' scale of *The Slate Landscape of Northwest Wales* is apparent in confined working spaces, in the *gwaliau* (the separate shelters within which quarrymen split the blocks, then trimmed the split slates – Elements 1.2; 2.1; 3.1; 3.3; 4.1; 4.2), and the barrack buildings arranged as separate cottages (Elements 2.3, 3.5, 3.10, 4.2). Quarrymen retained a considerable degree of autonomy in the way they operated, and had not only to be skilled at working the rock and splitting the slates but also as businessmen. They negotiated the best rates they could with managers, working in groups which sometimes moved from quarry to quarry, as well as often combining slate work with running a shop, a public house or a smallholding.

For most of the nineteenth century and into the twentieth, quarrymen contracted to work a piecework 'bargain', a system with parallels in extractive industries throughout

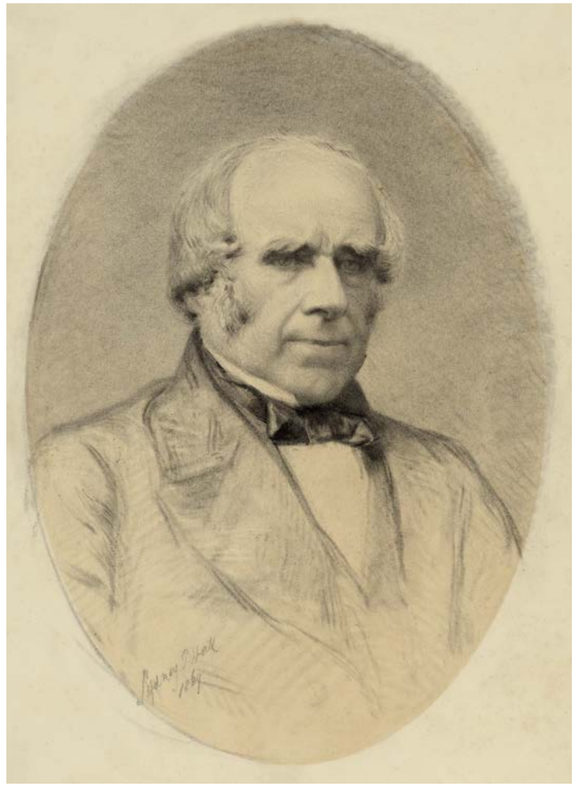


Figure 2.137. Calculating the money owed to each member of a bargain at the end of the month honed the mathematical skills of Griffith Davies (1788-1855), the only slate-quarryman to become a Fellow of the Royal Society. After leaving Cilgwyn Slate Quarry (Element 3.1) in Nantlle for London, with only a rudimentary grasp of English, he gained a reputation as an actuary, analysing statistics to calculate insurance risks and premiums, and as an auditor, entrused with the accounts of the Bombay, and Madras military funds. In 1827 he successfully opposed a parliamentary Bill to enclose common lands near his birthplace which had been settled by quarrymen (Element 3.11).

'... a slate-splitter is like a poet ... and contends with the poet on an equal footing at the National Eisteddfod where slate-splitting, music and poetry are stock subjects of rivalry.' (Jones 1981, 74, quoting *Pall Mall Gazette*, 1885)

the world, whereby a group of between four and eight men, often members of the same family, were paid for what they produced. Bargains were reset each month, and quarrymen were awarded 'poundage' if the rock proved poor or the weather made work difficult. The system was open to abuse. Some officials favoured

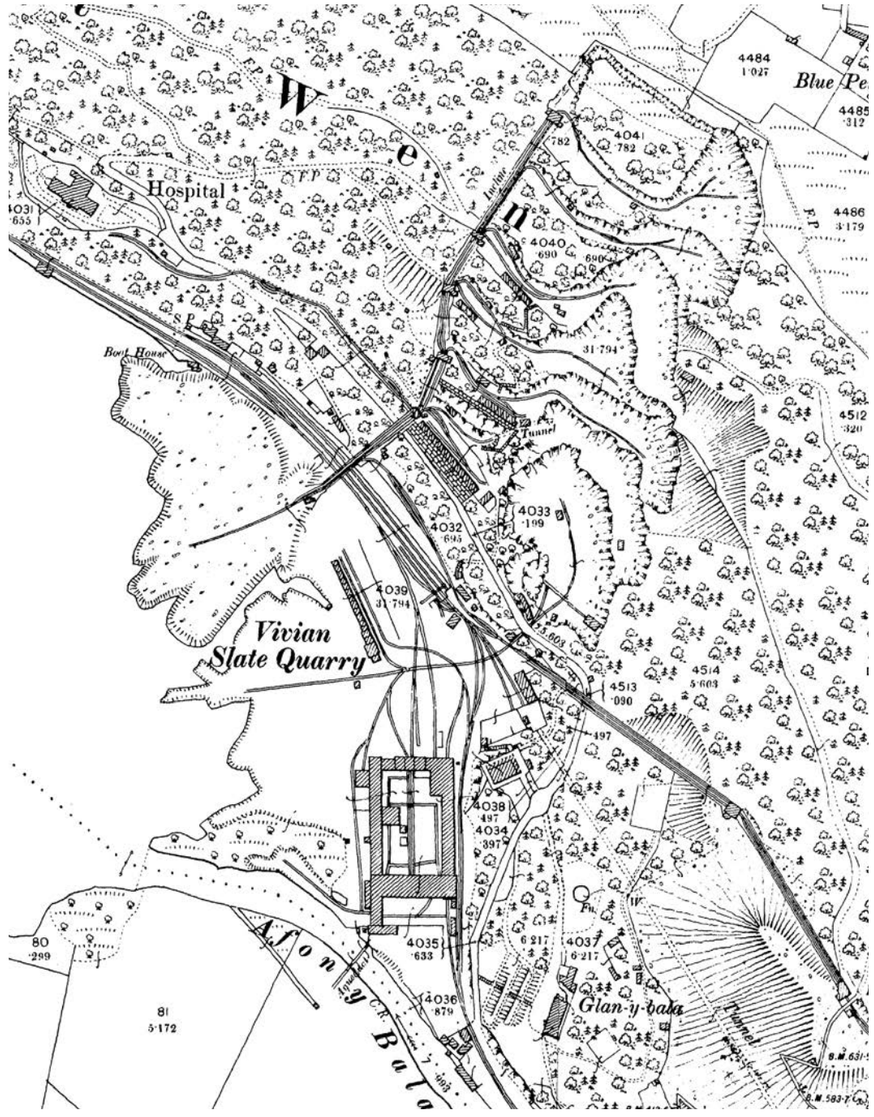
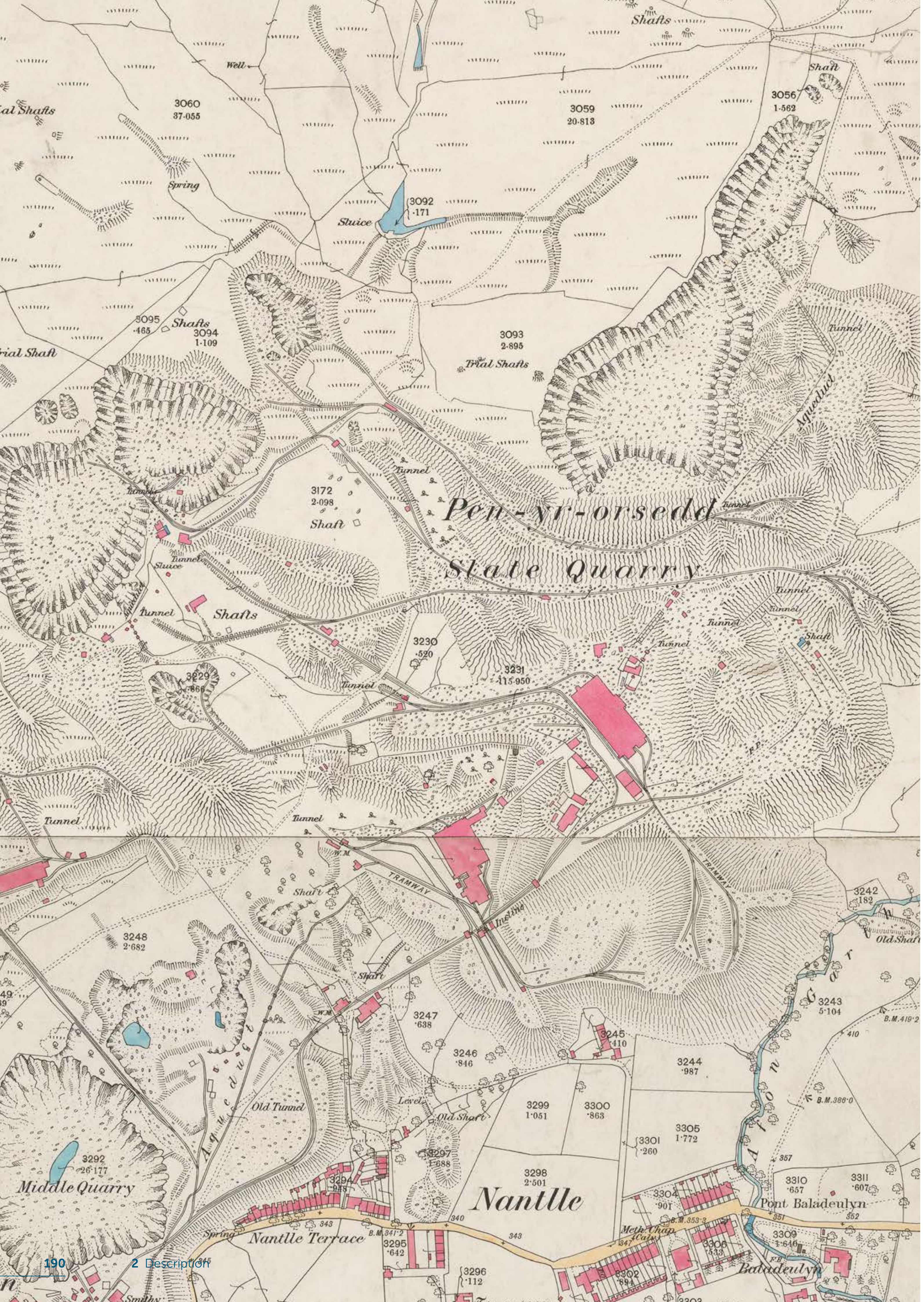


Figure 2.138. The 1900 25 inch to 1 mile ordnance survey map of the Vivian department (Element 2.4) of Dinorwig Slate Quarry illustrates the stepped bench or 'gallery' method of quarrying.



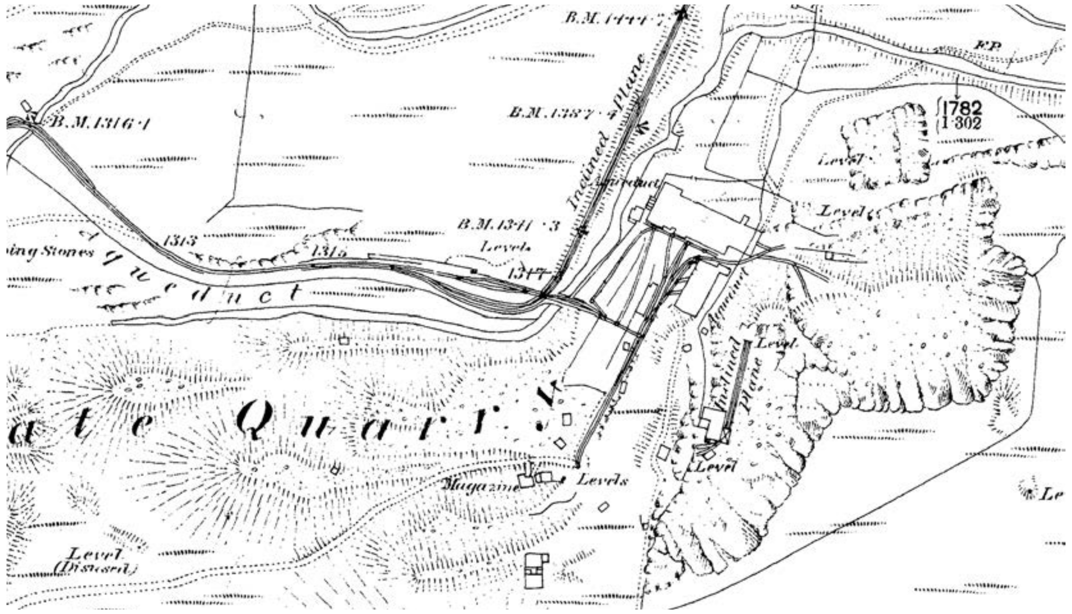


Figure 2.140. The 1889 25 inch to 1 mile ordnance survey map of the Maenofferen Slate Quarry main complex (Element 5.5) shows the typical Ffestiniog approach. Blocks and rubble are hauled out of the mine on an inclined plane. Blocks are sent to a water-powered slate-mill to be mechanically sawn and then split by hand. Rubble is being tipped to the west of the inclined plane to form an apron of waste rock, on which a more ambitious set of mills will shortly be constructed.

churchmen over Nonconformist chapel-goers, or members of one chapel over another. It was resented by men who could not join a bargain, who depended for their living on unskilled labouring and gifts of small blocks that they could split.

Fixed-rate wages and tonnage payments were paid removing unproductive rock, and labourers were paid a day rate. A minimum wage was brought in across the slate industry in 1918.

Quarried blocks were reduced in width and broken into shorter lengths, which at one time required both skill and brute force in wielding a *rhys*, an ash-handled hammer of African oak, at a point on the block where the quarryman considered it would separate. It was gradually superseded by mechanical saws from the 1850s.

A pillared and cross-cut block is split on the plane of cleavage with a hand-held chisel to produce roofing slates, a skill which takes several years to acquire. This process is only now being mechanised but some blocks still require traditional hand-splitting. The splitter sits on a low stool with ankles crossed, resting the block against his thigh, and uses a broad chisel tapped by an iron-bound wooden mallet, successively split it into slates about 1.5 millimetres thick.

The slate-maker then trims the jagged edges, either by a slate-trimming knife or by a machine.

These skills were common to all slate-quarrymen, but they also had to take account of the different quality of the rock they worked, and the different methods by which slate is extracted, according to geology and topography. These included open hillside quarrying, pit-working and mining.

Figure 2.139. The 1889 25 inch to 1 mile ordnance survey map of the Pen yr Orsedd Slate Quarry (Element 3.7) illustrates how the rock was worked in the Nantlle Valley. Rubble and blocks are raised by means of aerial ropeways spanning the pits, then moved by locomotive respectively to the tip-ends for dumping, and to mills to be mechanically sawn and then split by hand.

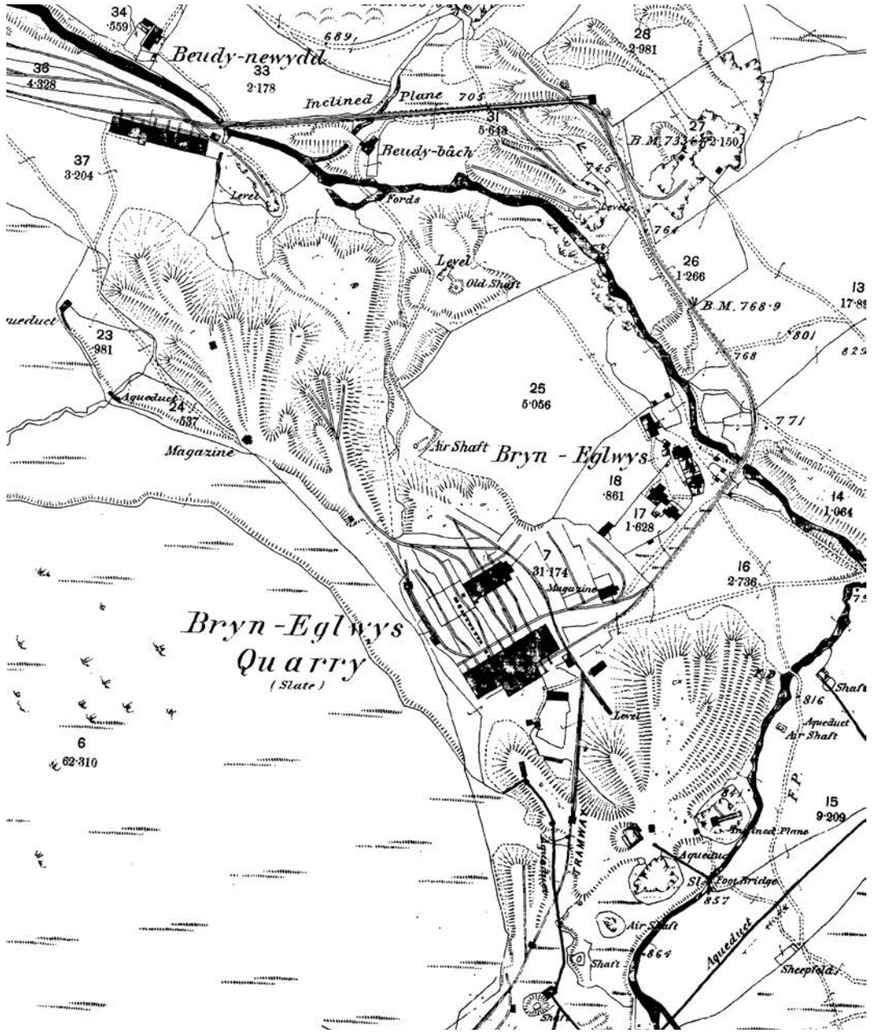


Figure 2.141. At Bryneglwys (Elements 6.1, 6.2), the 1889 22 inch to 1 mile ordnance survey map shows the initial open pits worked by quarrymen from Nantlle. Radiating from the pits to the south-west and the north-east, and below it, are tunnels and underground chambers worked by the next generation to arrive at the quarry – men from Ffestiniog.

From the late eighteenth century, the scattered workings of Penrhyn Slate Quarry (Element 1.1) were organised as a system of regular benches ('galleries') in the hillside, a system widely adopted in many extractive sites, and emulated at Dinorwig (Element 2.1), Gorseddau (Element 4.1) and Prince of Wales (Element 4.2) quarries.

The valley floor and valley-side slate quarries of Nantlle (Component Part 3) were worked as pits with few or no intermediate benches, and Bryneglwys Slate Quarry (Element 6.1) was first opened by skilled quarrymen from Nantlle in this way, before being developed as an underground operation (Element 6.2).

In Ffestiniog (Component Part 5), the vein dips. Slate could initially be worked in open quarries but by the 1820s underground working began, though locally Ffestiniog mines are still conventionally referred to as 'quarries'. The arrival of powerful earth-moving machinery in the mid-twentieth century made it possible to remove large amounts of overburden, with the result that the remaining Ffestiniog operations reverted to open quarrying, and the last underground operations ceased in the 1990s.

Bryneglwys Slate Quarry (Elements 6.1, 6.2) worked two veins of Ordovician slate which dip at between 50° and 60°, with near-vertical cleavage. It was initially worked by quarrymen from Nantlle as an open pit, then by Ffestiniog quarrymen in underground chambers, an instance of internal migration and technology transfer within the Nominated Property.

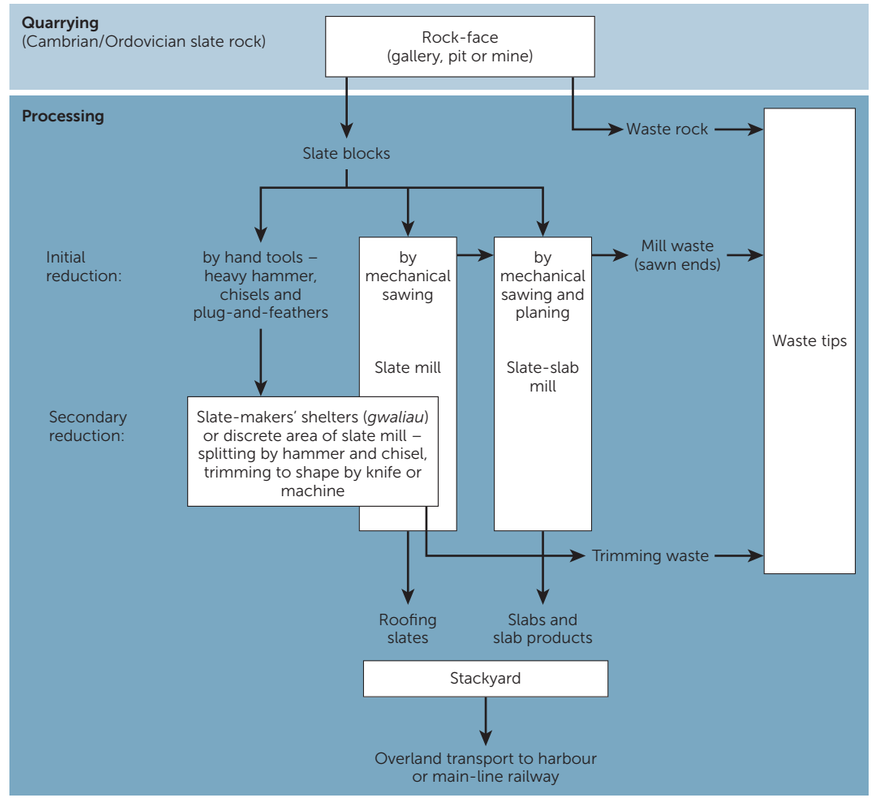


Figure 2.142. This flow-chart illustrates the typical working of a slate quarry and its associated transport system.

This series of photographs taken in 1911 shows the traditional craft-skills of the slate-quarryman.

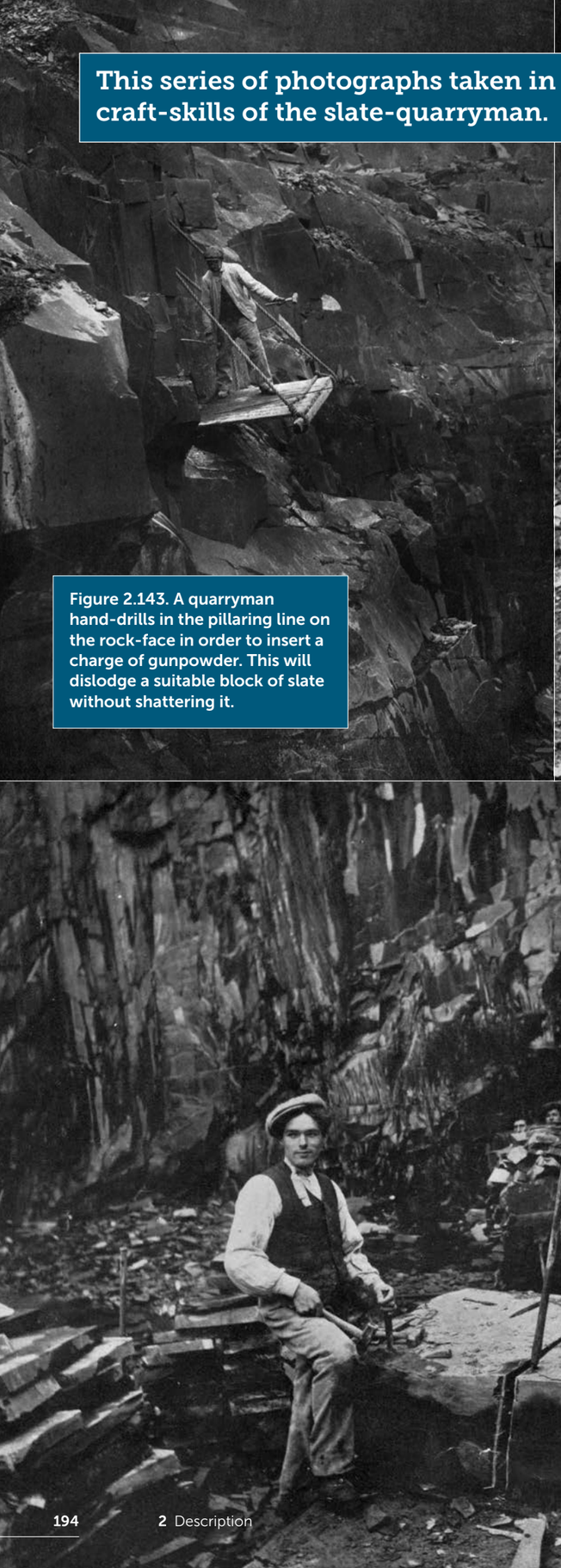


Figure 2.143. A quarryman hand-drills in the pillaring line on the rock-face in order to insert a charge of gunpowder. This will dislodge a suitable block of slate without shattering it.

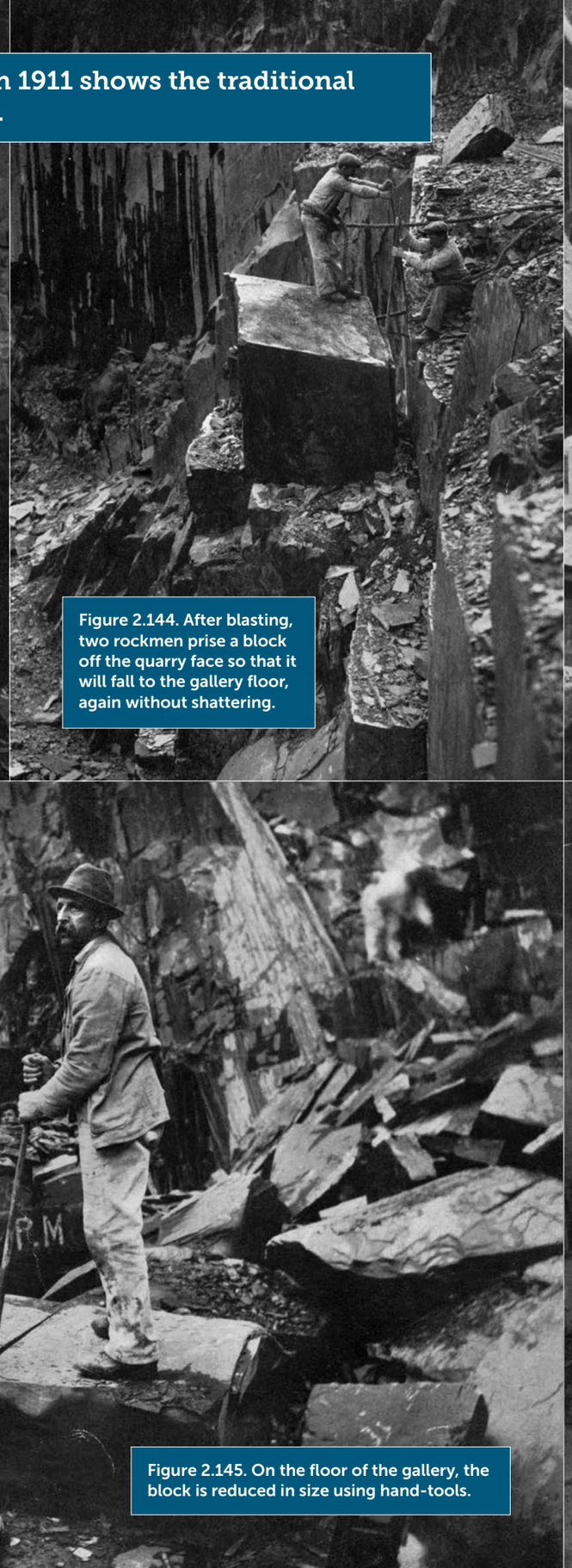


Figure 2.144. After blasting, two rockmen prise a block off the quarry face so that it will fall to the gallery floor, again without shattering.

Figure 2.145. On the floor of the gallery, the block is reduced in size using hand-tools.

Figure 2.146. In a slate mill, the reduced blocks are mechanically squared on a circular saw table powered by a belt drive.

Figure 2.147. These slate-makers are splitting the squared blocks along the plane of cleavage with hammers and chisels then trimming them with a knife. They are now ready for the market.

2.b.vi Global technology transfer – working a slate quarry

Engineering and management

The Component Parts of the Nominated Property also demonstrate the interchange of knowledge and ideas to, from and within this cultural landscape through technology transfer at the level of the professional engineer or manager. This reflects the movement of individuals and the building up of a knowledge-base, local emulation and the movement of capital, as well as paper-based sharing of technical knowledge, participation in international exhibitions and other forms of international visit. All of these are hallmarks of the world-wide Industrial Revolution. Engineers and managers from the Nominated Property sustained considerable influence on the development of slate exploitation elsewhere in the world, especially in England, the USA, Ireland, Germany and Luxembourg.

Organisation of workings

Organising quarries into stepped galleries, pits or mines required close co-operation between quarrymen, managers and engineers. Rock-faces throughout the Nominated Property show evidence of both hand-working and mechanised drilling. Underground working required additional skills, such as tunnelling and securing roofs, channelling water, and specific handling systems. The Welsh methods of working were carefully studied by engineers from the Loire slate industry and were published in the *Annales des Mines*. The use of stepped galleries, though attested in Roman stone-quarrying, came back into general use following its introduction at Penrhyn Slate Quarry (Element 1.1) in the late eighteenth century, and is now common in the industry.

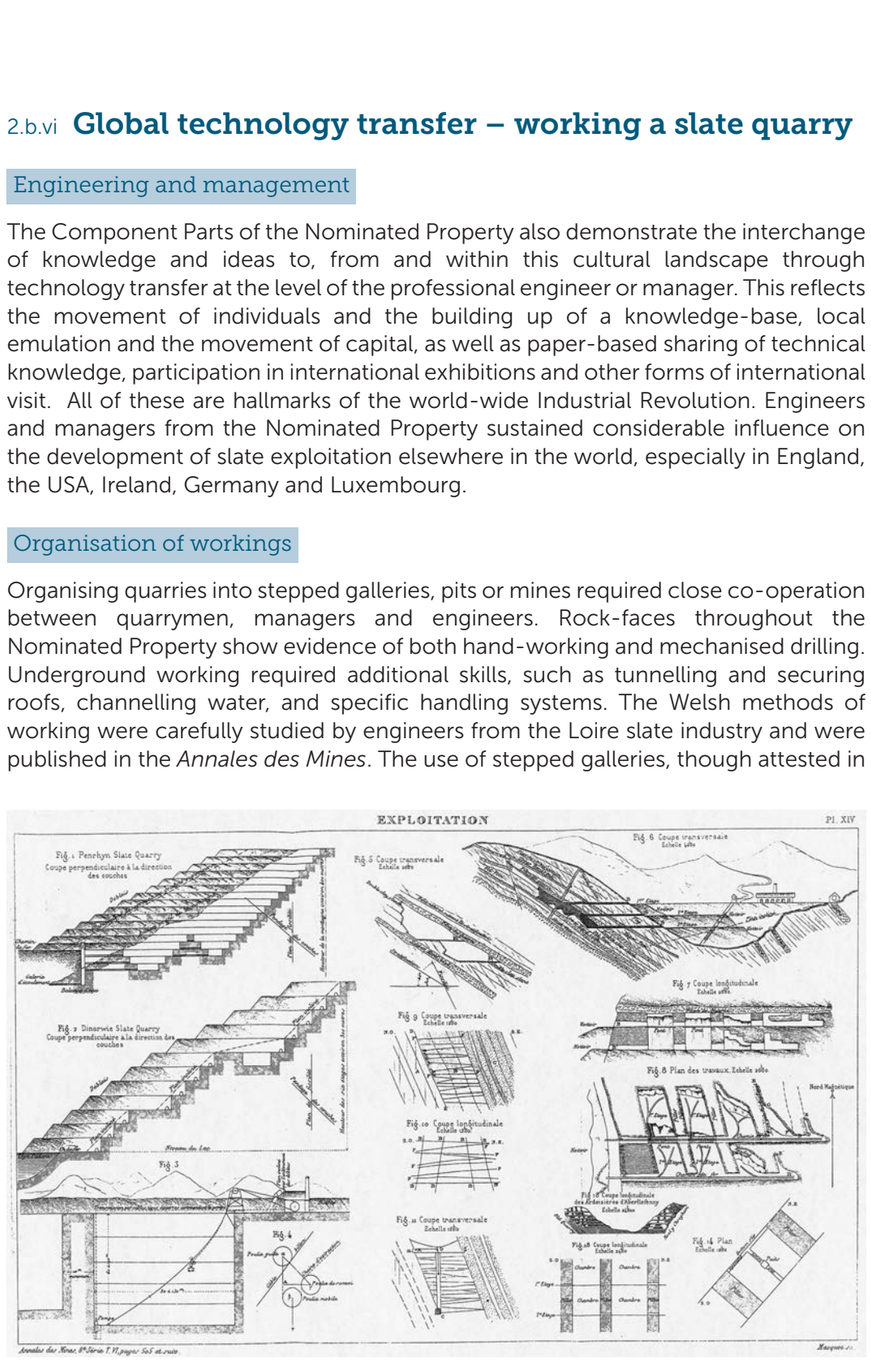


Figure 2.148. The *Annales des Mines* ran a series of articles on the Welsh slate industry in 1884, showing the principal variations in the methods of working. The stepped galleries, inclines and water-balance shafts of Penrhyn and Dinorwig quarries (Elements 1.1 and 2.1) show how quarrymen's skill in working the rock in uniform benches went hand-in-hand with engineering and managerial knowledge to create internal handling systems. Generic cross-sections show a Nantlle valley-floor quarry with a pump system and a chain incline ropeway (Component Part 3), and both surface and underground workings in the inclined beds of Ordovician slate at Ffestiniog (Component Part 5) (Larivière 1884).

Tunnelling

In conjunction with William Fothergill Cooke (1806-1879), inventor of the electric telegraph, the engineer George Hunter (1831-1887) devised a tunnelling machine which was tested underground at Maenofferen Slate Quarry in Ffestiniog in the 1860s, where it has left examples of the circular-section bore it created (Element 5.2). This was an early application of renewable-tip tooling, and left distinctive deep striations in the rock it cuts.

Figure 2.149. This circular-section bore in the underground workings of Maenofferen Slate Quarry (Element 5.2) was created by a Hunter tunnelling machine in the 1860s.

Mechanical processing

Slate quarries in Northwest Wales were innovative in using mechanical processing, initially to meet the growing demand for shaped slabs. By 1802, Penrhyn Slate Quarry's Felin Fawr slate-slab mill (Element 1.2) is known to have been using circular saws for cutting stone; the first place in the world to do so, as far as is known. This narrowly precedes the introduction of circular saws to saw lignum vitae at the Royal Navy's Portsmouth Block Mills in 1803 by the engineer Marc Brunel (1769-1849), the machine maker Henry Maudsley (1771-1831) and by the naval administrator Samuel Bentham (1757-1831, brother of the philosopher Jeremy Bentham), a significant stage in the development of mass production systems. Any link between the two sites, perhaps through Benjamin and Samuel Wyatt, is as yet unattested.

The growth and development of mechanical processing can be traced within the Nominated Property from the earliest surviving mills, at Ynysypandy (Element 4.3) and the coeval steam-powered Diffwys mill (Element 5.4), Felin Fawr (Element 1.2), Pen y Bryn / Cloddfa'r Lôn (Element 3.5) and Prince of Wales (Element 4.2). These show evolving practice from the 1850s into the 1870s. Large factory-type mills are evident at Dorothea (Element 3.3), Pen yr Orsedd (Element 3.7) and at the Maenofferen main complex (Element 5.5), where the successive use of water, steam and electric power is evident in the substantial two-bay mill. Australia Mill at Dinorwig Slate Quarry (Element 2.2) was built as late as the 1920s to take advantage of the arrival of electricity to the quarry.

Figure 2.150. The Prince of Wales Slate Quarry (Element 4.2) mill illustrates the transfer of technology within the slate industry of North Wales. It was designed by John Francis (1828-1879) and his father William, (d.1887), managers of Penrhyn Slate Quarry, and built in 1864, when they were also remodeling the Felin Fawr Slate-Slab Mills at Penrhyn (Element 1.2). They represent a development of the design shown here, which Francis tried out experimentally at the Prince of Wales Slate Quarry, even down to the segmental arch doorways (Element 4.2).

Handling of quarried material

Raw blocks and waste rock were moved within the quarries by internal railway systems, including inclined planes, and by chain incline and 'Blondin' ropeways or water-balance shaft. These ensured rapid and effective movement within complex industrial sites that might cover a very large area and involve a vertical distance of over 300 metres between topmost and lowest working floors.

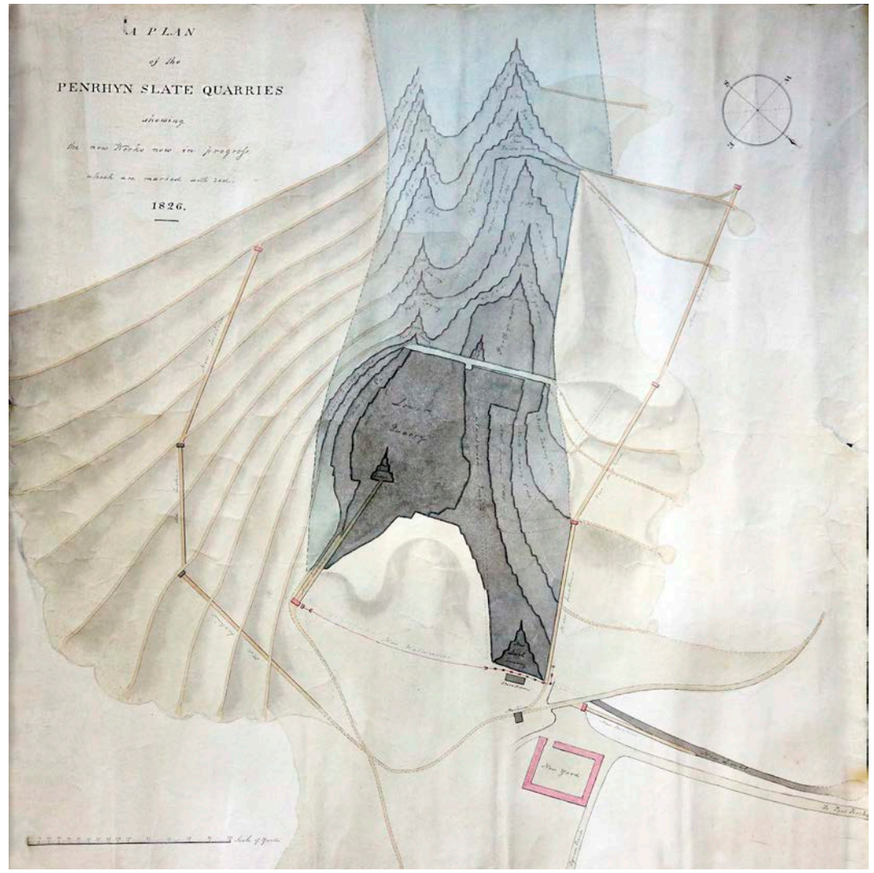


Figure 2.151. This map of 1826 shows how the use of internal railways had already become central to the operation of slate quarries. Counter-balanced inclined planes transport rock from the upper galleries of Penrhyn Slate Quarry, water-powered inclined planes haul rock and waste from the lower pits. The railroad (right) takes the wagons on to the harbour at Port Penrhyn.

The slate railways were some of the earliest developments of the early iron rail systems used to feed iron furnaces in Blaenavon and elsewhere in South Wales, and were nearly always constructed to an approximate gauge of 0.6 metres. They could easily be re-laid and extended as quarrying grew. The use of internal railway systems and inclined planes to handle the movement of blocks, waste rock and finished product begins at Penrhyn Slate Quarry (Element 1.1), where they were introduced in 1801. They subsequently became universal throughout the industry. They were in turn the direct inspiration for the lightly laid railway systems used across the world

on: agricultural estates, factories, prisons, hospitals, saw-mills, sewage farms, mines and collieries, as well as on short-term operations, such as serving trench warfare from 1914 to 1918, clearing wartime bomb sites, on tunnel and reservoir contracts and on large-scale archaeological excavations. The use of inclined planes was common on many early railways and industrial sites from the Industrial Revolution, such as at Ironbridge and in Cornwall but they were even more common features of *The Slate Landscape of Northwest Wales*. Well-preserved examples are evident in Dinorwig (Element 2.1), Dorothea (Element 3.3), Gorseddau (Element 4.1), Prince of Wales (Element 4.2) and Maenofferen (Element 5.5), including both counterbalance types for downwards movement of goods and up-haulage types powered by water-balance, steam and electricity. At Vivian Quarry (Element 2.4) one such incline has been restored to working order by the National Slate Museum. Nowhere else is such a predominance of such systems more evident in their complete historic context.

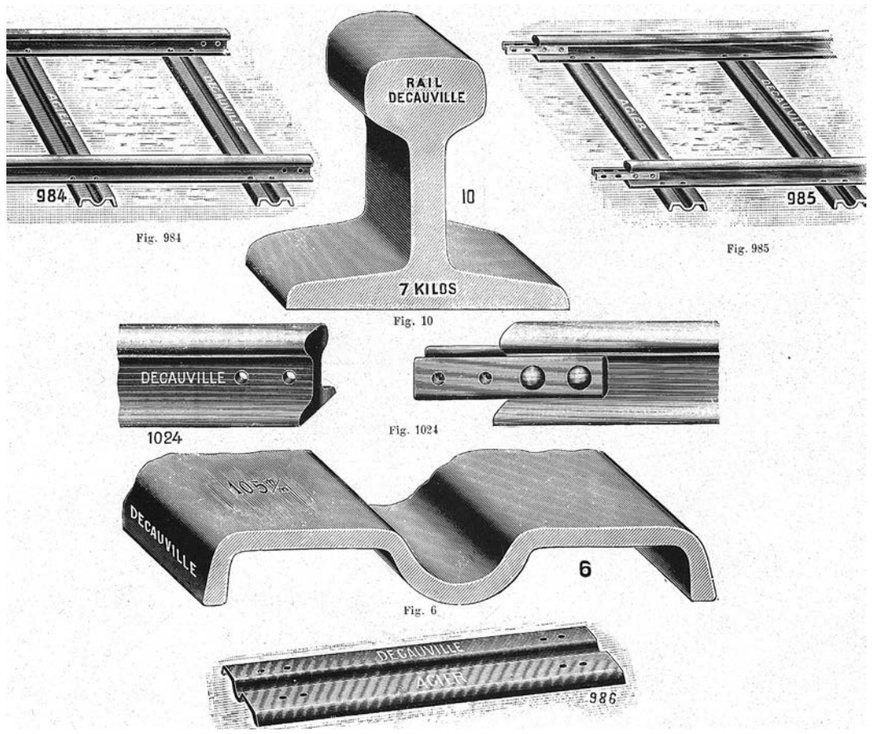


Figure 2.152. The French engineer and Senator Paul Decauville (1846-1922) stated that he had been inspired by the Ffestiniog Railway (Element 5.9) to develop his own brand of portable lightly laid railways for agricultural work (Decauville 1884). Similar systems by other manufacturers were found across the world: those built by Robert Hudson of Leeds, Johannesburg, Kidderpore and Durban dominated the British empire; those of Orenstein & Koppel of Berlin the German-speaking world.

Ropeway systems were in use before the end of the eighteenth century. A simple, early version, unique to the slate industry, was the chain incline, running from an anchorage at the pit bottom to a timber head-gear on a bastion built on the lip of the quarry pit, powered by a water wheel or a steam engine. This pioneering technology has left robust material evidence in Component Parts 3 and 6.

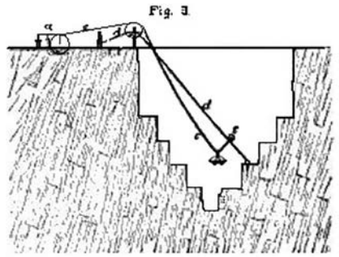


Figure 2.153. The pit-quarries of Nantlle (Component Part 3) reminded Rudolf Nasse, a Prussian visitor in 1869, of the Loire Valley slate quarries in France; he included a sketch of a chain incline (Nasse 1870, 97).

Figure 2.154. Bryneglwys Slate Quarry is the only site in *The Slate Landscape of Northwest Wales* where the technology of the water-driven chain incline can still be seen *in situ* (Element 6.1). This distinctive system was adopted at Pen yr Orsedd Slate Quarry in Component Part 3 and is shown on this map of 1862. It was exported to Bryneglwys by Nantlle men. Surviving archaeology and documentary sources such as this are important in establishing how particular technologies functioned and were dissmeninated. A change of management brought in Ffestiniog quarrymen shortly afterwards; they introduced their own characteristic way of working the rock – from underground chambers.

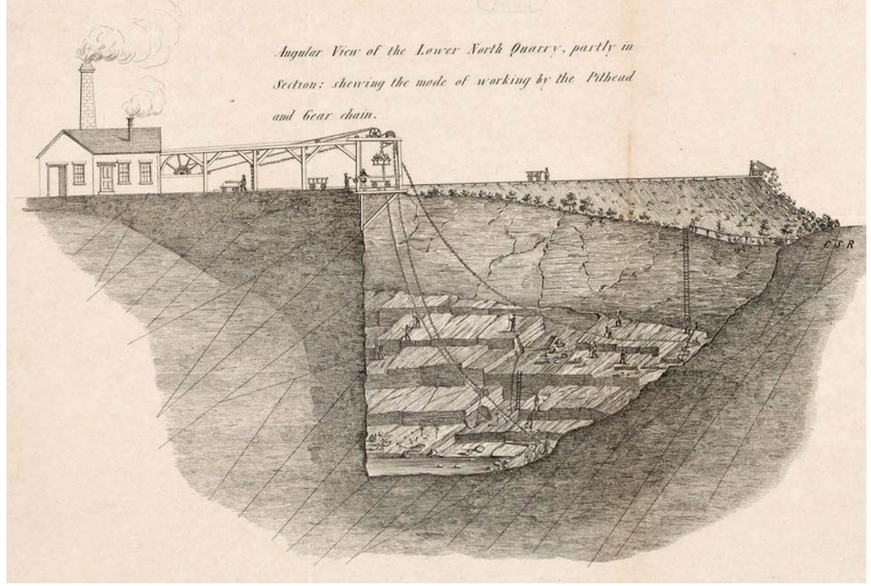


Figure 2.155. This 'angular view' of the Fairhaven Slate Quarry in Vermont (USA) in 1856 shows a steam-powered chain incline introduced by the Welshmen who had emigrated here some years before, and founded their first chapel in 1850.

The 'Blondin' catenary ropeway was introduced from the freestone quarries of Scotland in the late nineteenth century. Surviving examples include both steam and electrically-powered versions (Elements 3.2, 3.8).

Figure 2.156. 'Blondin' ropeways spanned the pit at Pen yr Orsedd Slate Quarry (Element 3.8). Similar systems were not only used in slate and other quarries but also on construction sites, and to load warships with coal. The masts and machinery for the 'Blondin' at Pen yr Orsedd were assembled in Aberdeen, and the electric motors constructed in Edinburgh.

Generating power

The Slate Landscape of Northwest Wales illustrates the successive means of power-generation in the classic industrial period, from water-wheels through steam engines to water-generated electricity in the early twentieth century.

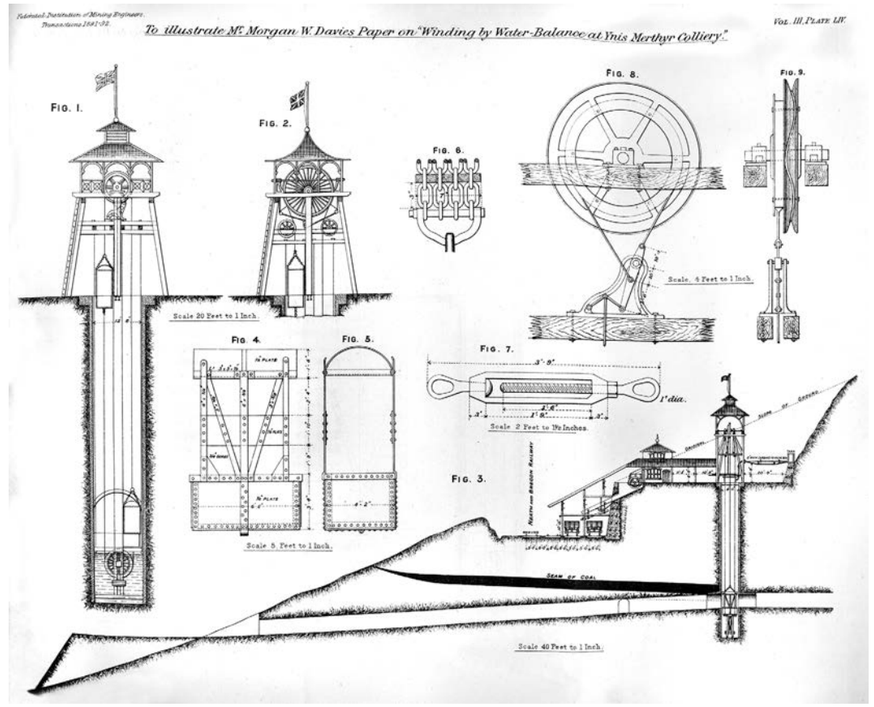


Figure 2.157. Water-balance shafts to raise wagons became common in the coal industry of South Wales in the 1830s, and were soon adopted in slate quarries on the advice of colliery engineers. This diagram of 1891-2 shows a water balance system at Ynys Merthyr Colliery in the Glamorgan coal-field. Penrhyn Slate Quarry (Element 1.1) made consistent use of them from the 1840s to 1965, when two were preserved. They connect with underground hydraulic features. Experienced miners came from the Staffordshire coal industry to sink the shafts at Penrhyn.

Water-power remained important in the slate industry of Wales from the 1780s to 1940 and subsequently. The Felin Fawr slate-slab mills at Penrhyn and their surviving suspension water-wheels are located over the channeled rivulet which led to the building of the first mill here by 1802 (Element 1.2). The locally constructed water-wheel of 1870 at the Donorwig Slate Quarry Engineering Complex (still operating as part of the National Slate Museum; Element 2.5) represents the ultimate development of an industrial tradition with roots in the third century BCE and the Musaeum of Alexandria; the replacement mechanically connected turbine of 1926 illustrates its successor technology. Other water-driven technology within the Nominated Property includes water-balance shafts and inclined planes (Element 1.1). Dams and water-courses make skilful use of the challenging environment of the area (Elements 1.1, 2.5, 3.6, 4.1, 4.2, 5.3, 6.1), and are an integral part of the industrial cultural landscape. Most still remain in use as part of water-management systems.

Pumping water from the workings

The Slate Landscape of North Wales made use of established pumping technology in ingenious ways. The valley-floor pits of Nantlle (Component Part 3) were particularly prone to water ingress. Two sites in this Component Part illustrate how the challenges were overcome by transfer of technology from the World Heritage *Cornwall and West Devon Mining Landscape*. The pillars and wheel-pits for the flat-rod system at Pen y Bryn (Element 3.6) and the Cornish beam engine by Holman's of Camborne at Dorothea (Element 3.4) provide a contrast in approach and in the way that pumping systems were powered. Both illustrate the influence of water-management technology from the acknowledged industry leaders. The Dorothea engine is the last surviving such machine to be installed from new anywhere in the world.

Figure 2.158. Water-driven rod-engines built to distribute power over a wide area evolved in the Central European mining areas in the sixteenth century, and were widely used in Cornwall and West Devon. They were never common in the slate industry of Wales. Surviving evidence from the most ambitious set-up, at Pen y Bryn Slate Quarry in Nantlle, suggests that it resembled this system at Wheal Martyn china clay works in Cornwall (UK) (shown here) in its use of wrought-iron links rather than timber rods.

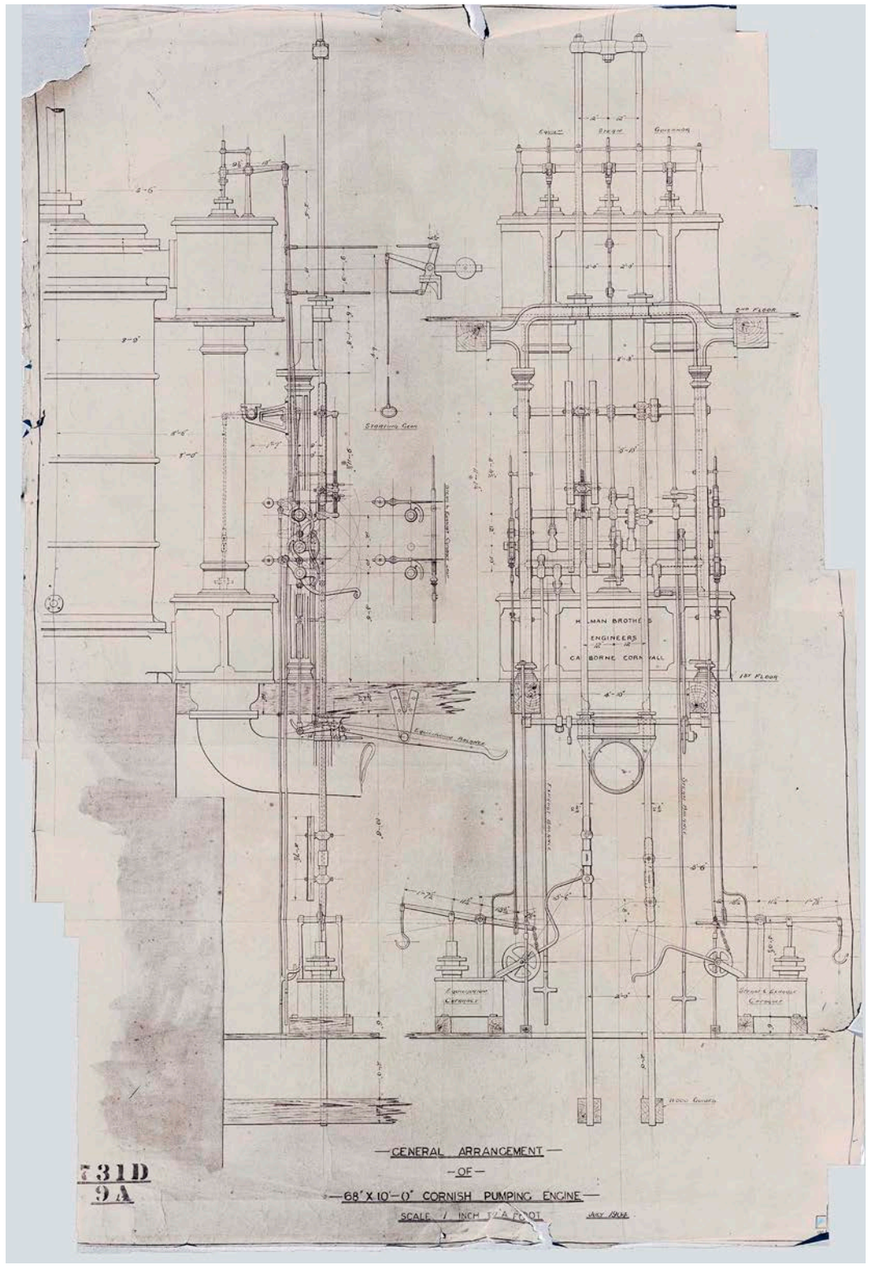
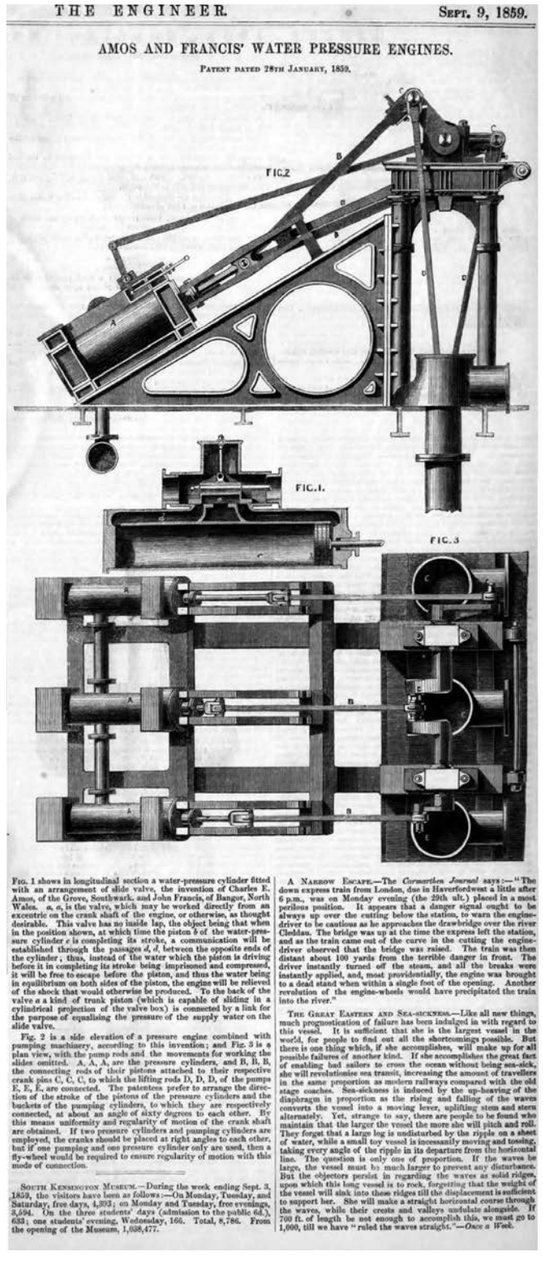


Figure 2.159. The Dorothea Slate Quarry Cornish beam engine represents the final evolution of the steam pumping technology evolved in the World Heritage *Cornwall and West Devon Mining Landscape*. The plans are preserved in the archive of its builders, Holman's of Camborne, in the Cornwall Record Office.

Penrhyn Slate Quarry's hydraulic engine represents a different technology, a positive displacement engine which relies on the incompressible quality of water (Element 1.1). These came into common use simultaneously in France, England and Hungary in the mid-eighteenth century, but saw little development from the mid-nineteenth onwards. It is a rare example in that it is *in situ*, in good condition, still attached to its water-feed system and coupled to its pumps, and is accessible by prior arrangement.



THE ENGINEER. SEPT. 9, 1859.

AMOS AND FRANCIS' WATER PRESSURE ENGINES.

PATENT DATED 28TH JANUARY, 1859.

FIG.2

FIG.1.

FIG.3

FIG. 1 shows in longitudinal section a water-pressure cylinder fitted with an arrangement of slide valve, the invention of Charles E. Amos, of the Grove, Southwark, and John Francis, of Bangor, North Wales. *a*, *a*, is the valve, which may be worked directly from an excentric on the crank shaft of the engine, or otherwise, as thought desirable. This valve has no inside lap, the object being that when in the position shown, at which time the piston *b* of the water-pressure cylinder *c* is completing its stroke, a communication will be established through the passages *d*, *d* between the opposite ends of the cylinder; thus, instead of the water which the piston is driving before it in completing its stroke being imprisoned and compressed, it will be free to escape before the piston, and thus the water being in equilibrium on both sides of the piston, the engine will be relieved of the shock that would otherwise be produced. To the back of the valve *a* a kind of trunk piston (which is capable of sliding in a cylindrical projection of the valve box) is connected by a link for the purpose of equalising the pressure of the supply water on the slide valve.

Fig. 2 is a side elevation of a pressure engine combined with pumping machinery, according to this invention; and Fig. 3 is a plan view, with the pump rods and the movements for working the slides omitted. A, A, A, are the pressure cylinders, and B, B, B, the connecting rods of their pistons attached to their respective crank pins C, C, C, to which the lifting rods D, D, D, of the pumps E, E, E, are connected. The patentees prefer to arrange the direction of the stroke of the pistons of the pressure cylinders and the buckets of the pumping cylinders, to which they are respectively connected, at about an angle of sixty degrees to each other. By this means uniformity and regularity of motion of the crank shaft are obtained. If two pressure cylinders and pumping cylinders are employed, the cranks should be placed at right angles to each other, but if one pumping and one pressure cylinder only are used, then a fly-wheel would be required to ensure regularity of motion with this mode of connection.

SOUTH KENSINGTON MUSEUM.—During the week ending Sept. 3, 1859, the visitors have been as follows:—On Monday, Tuesday, and Saturday, free days, 4,393; on Monday and Tuesday, free evenings, 3,594. On the three students' days (admission to the public 6d.), 633; one students' evening, Wednesday, 166. Total, 8,786. From the opening of the Museum, 1,688,477.

A NARROW ESCAPE.—The *Carmarthen Journal* says:—"The down express train from London, due in Haverfordwest a little after 6 p.m., was on Monday evening (the 29th ult.) placed in a most perilous position. It appears that a danger signal ought to be always up over the cutting below the station, to warn the engine-driver to be cautious as he approaches the three bridges over the river Cleddau. The bridge was up at the time the express left the station, and as the train came out of the curve in the cutting the engine-driver observed that the bridge was raised. The train was then distant about 100 yards from the terrible danger in front. The driver instantly turned off the steam, and all the breaks were instantly applied, and, most providentially, the engine was brought to a dead stand when within a single foot of the opening. Another revolution of the engine-wheels would have precipitated the train into the river."

THE GREAT EASTERN AND SEA-SICKNESS.—Like all new things, much prognostication of failure has been indulged in with regard to this vessel. It is sufficient that she is the largest vessel in the world, for people to find out all the shortcomings possible. But there is one thing which, if she accomplishes, will make up for all possible failures of another kind. If she accomplishes the great fact of enabling bad sailors to cross the ocean without being sea-sick, she will revolutionise sea transit, increasing the amount of travellers in the same proportion as modern railways compared with the old stage coaches. Sea-sickness is induced by the up-heaving of the diaphragm in proportion as the rising and falling of the waves converts the vessel into a moving lever, uplifting stem and stern alternately. Yet, strange to say, there are people to be found who maintain that the larger the vessel the more she will pitch and roll. They forget that a large log is undisturbed by the ripple on a sheet of water, while a small toy vessel is incessantly moving and tossing, taking every angle of the ripple in its departure from the horizontal line. The question is only one of proportion. If the waves be large, the vessel must be much larger to prevent any disturbance. But the objectors persist in regarding the waves as solid ridges, upon which this long vessel is to rock, forgetting that the weight of the vessel will sink into these ridges till the displacement is sufficient to support her. She will make a straight horizontal course through the waves, while their crests and valleys undulate alongside. If 700 ft. of length be not enough to accomplish this, we must go to 1,000, till we have "ruled the waves straight."—*Once a Week.*

Figure 2.160. Hydraulic (or water-pressure) engines operate in a similar way to a steam engine, by the action of an impellent force under pressure on a piston in a cylinder. The first one at Penrhyn Slate Quarry (Element 1.1, see Figure 2.15) featured in an article in *The Engineer*, the leading English-language professional journal of its time, on 9 September 1859. They were devised by John Francis (1828-1879), the quarry manager, in conjunction with Charles Amos (1806-1882) who began his working life on the fenland drainage in the east of England, and who had a long and distinguished career as an engineer, constructing the hydraulic jack which raised the tubes on Robert Stephenson's Britannia Bridge, connecting the mainland of Wales to Anglesey.

Maintenance and repair

Craftsmen, technicians and engineers in the slate industry of North Wales were ingenious and self-reliant. They could turn to local engineering firms, including the Ffestiniog Railway, for some machinery, but the larger quarries, including Penrhyn and Dinorwig, operated their own engineering complexes to maintain, repair and sometimes construct machinery. Penrhyn Slate Quarry was served by a foundry and workshops at Felin Fawr slate-slab mill (Element 1.2). The Dinorwig Slate Quarry engineering complex is now the National Slate Museum (Element 2.5). It was designed to impress; the quadrangular layout recalls not only earlier engineering practice but also the stable-courtyard of a great British landed estate.

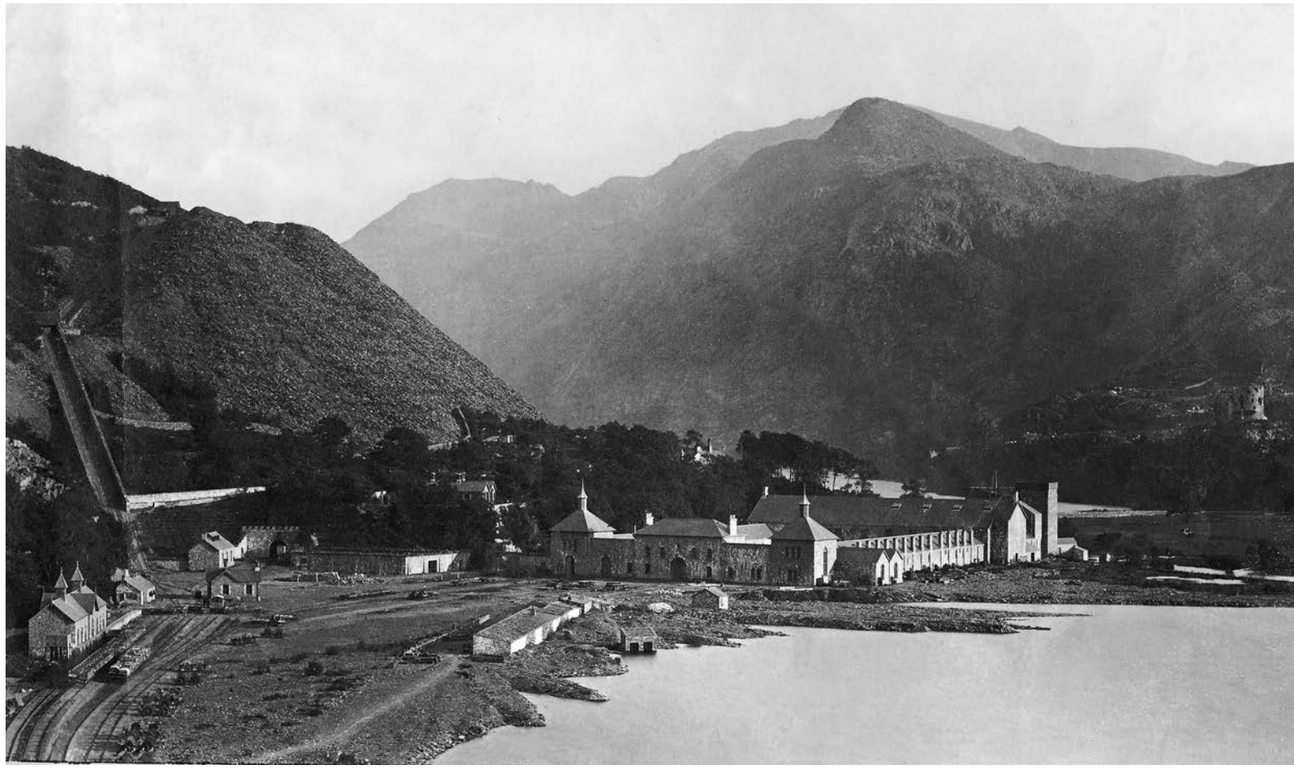


Figure 2.161. The Dinorwig Slate Quarry engineering complex (Element 2.5) has seen little change since opening in 1870. As the National Slate Museum, it has been sensitively conserved. Traditional skills of blacksmithing, carpentry, founding, pattern-making and mechanical engineering were taught to apprentices as they were on a great landed estate, and were handed down over the generations.

2.b.vii Global technology transfer – railway-building

The Slate Landscape of Northwest Wales represents an important interchange of ideas and knowledge in the transfer of railway technology.

The Ffestiniog Railway '...one of the most magnificent works in the Kingdom. Indeed while we admire the Liverpool railroad for the immensity of the undertaking, the Menai bridge for its symmetry of magnificence & the Aquaducts (sic) at Llangollen & Chirk for similar reasons, no person I am certain having viewed these & inspected the Quarry railway will for a moment hesitate to admit that its proportion of these desiderata to be less ..' (Thomas Letts, *Tour of North Wales, August-September 1834* [National Library of Wales manuscript 22341B (1834) fol 53v])

Slates were initially transported to ports and harbours (Elements 1.4, 5.8, 5.10) by pack-horse, by horse-and-cart or by lake- and river-boat, or by a combination of these methods. As output grew, the challenging mountainous landscape of Northwest Wales called for more innovative and cost-effective solutions. The answer lay in narrow-gauge railways (Elements 1.3, 2.7, 3.9, 4.4, 5.9, 6.4). The railways' ingenious use of topography to assist operations by means of inclined planes and continuous down-gradients, and their innovative adoption of mechanical traction and provision of passenger services, form a remarkable technical achievement which was imitated worldwide. Several of the distinctive quarry settlements grew up around them, such as Deiniolen/Clwt y Bont (Element 2.8) and Tan y Grisiau (Element 5.6). Two of the most significant railways, the Ffestiniog (Element 5.9) and the Talyllyn (Element 6.4), are now major heritage attractions with an international profile.

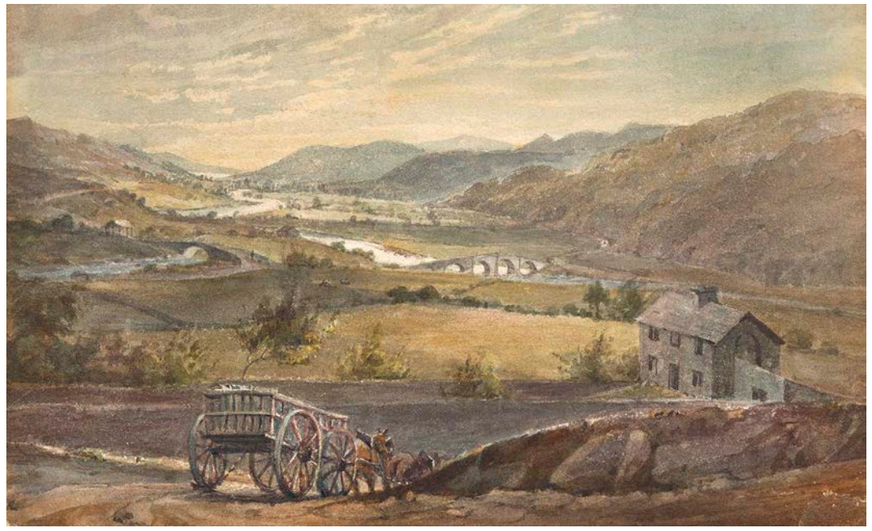


Figure 2.162. The modern road network in Component Part 5 follows the routes built to move slate. Here a cart laden with slate makes its way down to a wharf on the Dwyryd river in the distance (Element 5.8), where the load will be transferred to a small boat before being loaded on a sea-going ship.

The architect and slate-merchant Samuel Wyatt assisted his brother Benjamin to devise a 0.6 metre gauge cast-iron railroad to serve the slate quarries on the Penrhyn Estate for which Benjamin was responsible (Element 1.3). It recalls typical canal arrangements, such as the use of inclined planes on the same principle as a flight of locks. When it was completed in 1801, it was the longest iron edge-railway in the world, the first such railway built for the mass transport of quarried stone, and is the design-ancestor of all subsequent narrow-gauge railways.

The *Annales des Arts et Manufactures* described the Penrhyn Railroad in its edition of 30 Messidor year 12 (1804) '.. inventé par M. Benjamin Wyatt ... récemment employé dans le Carnarvonshire, depuis les carrières d'ardoises de Lord Penrhyn, jusqu'au Port Penrhyn où on les embarque; la longueur de ce chemin est de six milles un quart (mesure anglaise); la pente est d'un huitième de pouce par pied; il a été commencé en Octobre 1800 et achevé en juillet 1801' (89-90).

'... invented by Mr. Benjamin Wyatt ... recently employed in Caernarvonshire, from the slate quarries of Lord Penrhyn, to Port Penrhyn where they are shipped; the length of this road is six miles and a quarter (English measure); the slope is one-eighth of an inch per foot; it was started in October 1800 and completed in July 1801.'

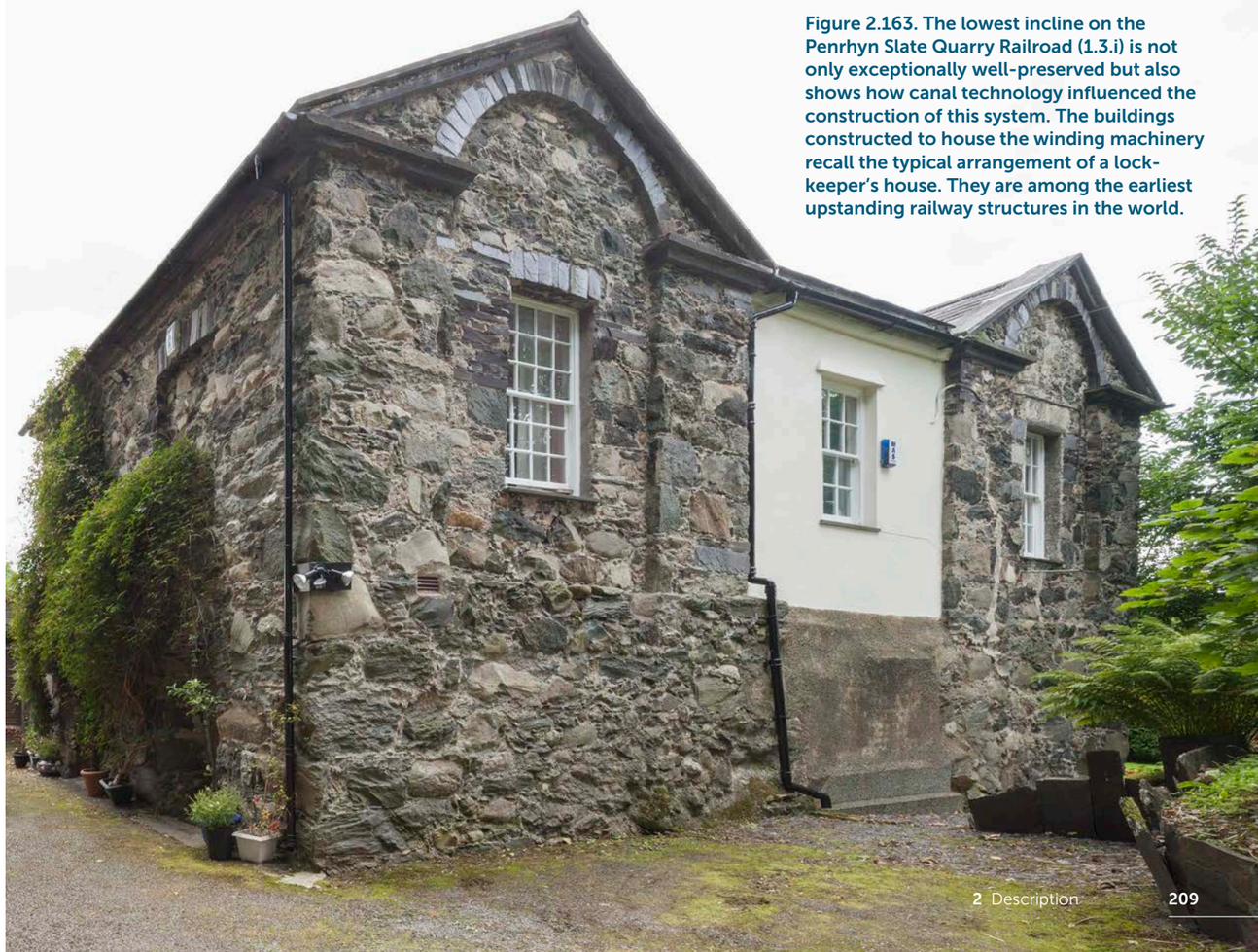


Figure 2.163. The lowest incline on the Penrhyn Slate Quarry Railroad (1.3.i) is not only exceptionally well-preserved but also shows how canal technology influenced the construction of this system. The buildings constructed to house the winding machinery recall the typical arrangement of a lock-keeper's house. They are among the earliest upstanding railway structures in the world.

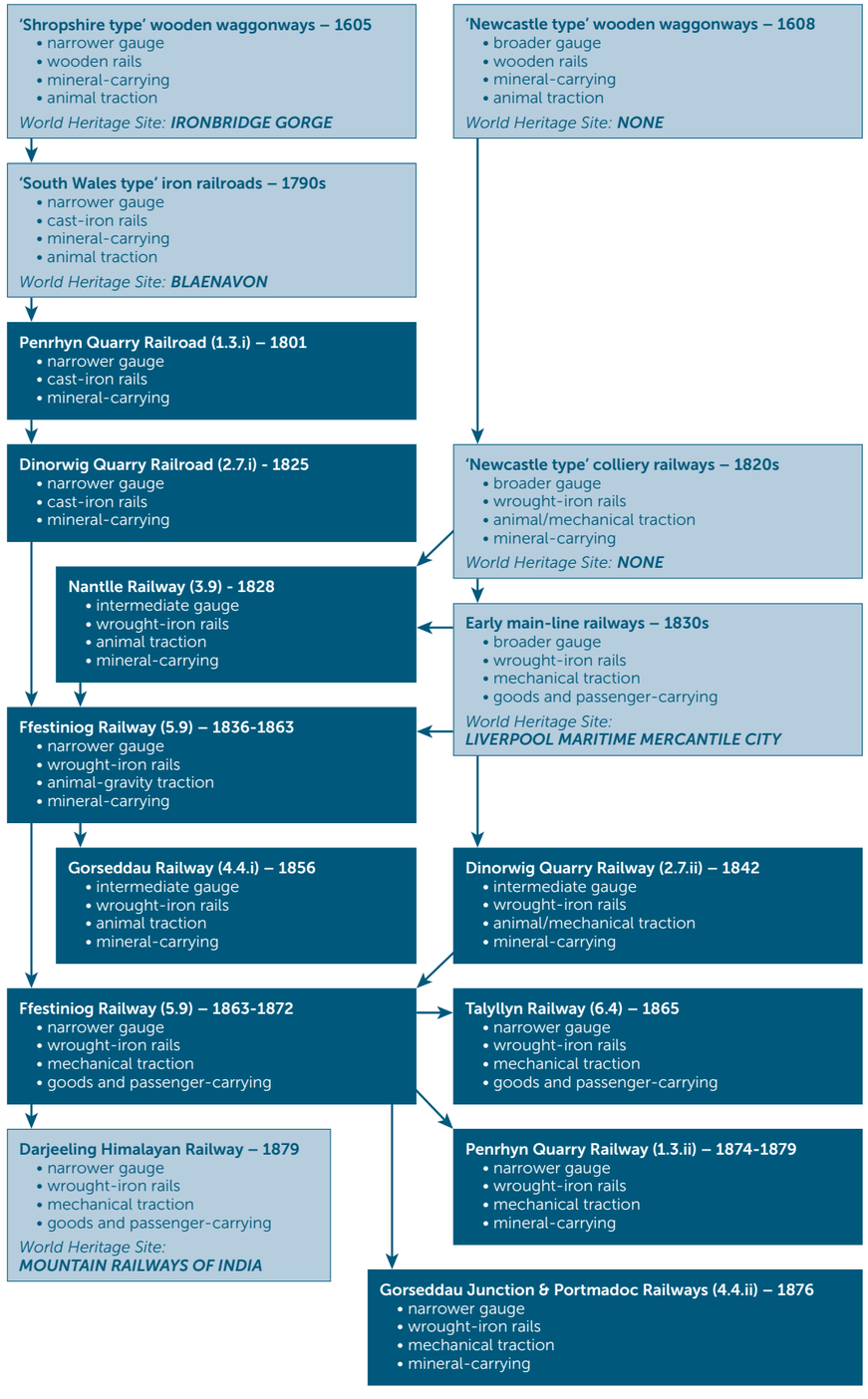


Figure 2.164 Railways in the slate landscape of northwest Wales – typological evolution and technology transfer.

Figure 2.165. A short length of the Nantlle Railway (Element 3.9) continued operating, with little change, until 1963. Here 'Prince' and 'Corwen' pull slate wagons from Pen yr Orsedd Slate Quarry (Element 3.8). Primitive though the system then appeared, when it opened in 1828 it represented the state of the art, reflecting advice from the Stephenson family of railway engineers.

This technology was used for the Dinorwig Slate Quarry Railroad (Element 2.7) of 1825, whereas the Nantlle Railway (Element 3.9), completed three years later, made use of the new technology of wrought-iron track on stone sleeper blocks on a broader gauge, on the advice of the famous Stephenson family, shortly before they designed the innovative *Rocket* locomotive for the Liverpool & Manchester Railway.

The most significant of the slate-carrying railways of North Wales is the Ffestiniog (Element 5.9), opened for horse-and-gravity operation in 1836. Robert Stephenson (1803-1859) advised on its construction. It combined the track technology of the Nantlle (Element 3.9) with the Penrhyn (Element 1.3) gauge of 0.6 metres in order to operate its slate trains by gravity along a sinuous course that responded to the challenging terrain of Snowdonia. Its technical success established a model that was adopted worldwide.

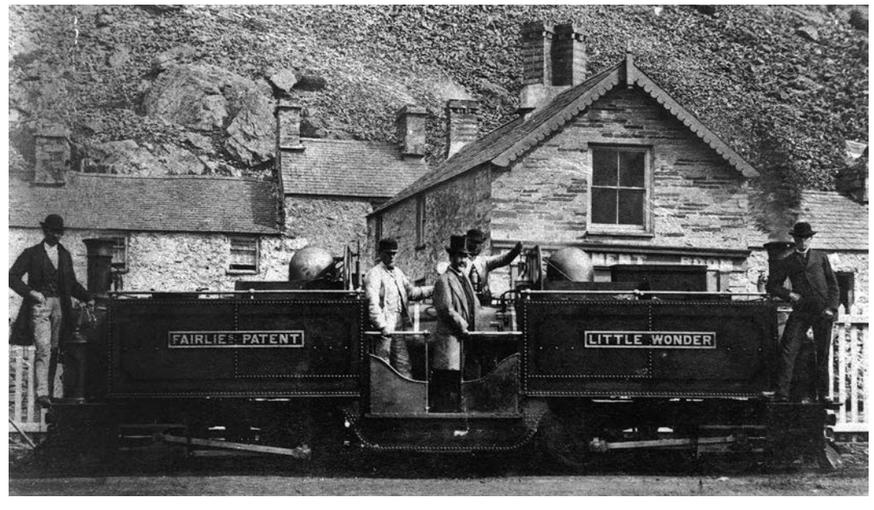


Figure 2.166. The construction and operation of railways to serve *The Slate Landscape of Northwest Wales* required new skills. Here Charles Easton Spooner (in top hat) stands on the footplate of the first of the Ffestiniog Railway's distinctive double Fairlie locomotives *Little Wonder* with crew-members. His son, George Percy, in bowler hat on the running-board to the right, became Assistant District Engineer and Locomotive Superintendent on the Indian State Railway.

***L'example le plus remarquable qui existe des chemins de fer à voie étroite est peut-être celui de Festiniog à Port-Madoc* (The most remarkable existing example of a narrow-gauge railway is perhaps the one from Ffestiniog to Porthmadog (*M. Sevène, Directeur de la Construction de la Compagnie d'Orléans*) *in Vignes 1878, 26*).**

During the slate boom the Ffestiniog Railway adopted locomotive traction and introduced passenger services to become a small but high-capacity public railway. In 1870, its engineer Charles Easton Spooner (1818-1889) hosted a visit from an Imperial Russian Commission accompanied by guests drawn from the political, technical and financial elites of Russia, Poland, Hungary, India, Mexico, Prussia and France. This focused attention on the possibilities Welsh slate railway technology offered governments and private investors anxious to exploit remote areas and colonial possessions, and armies needing logistical support for static battlefronts. The Ffestiniog Railway strongly influenced later developments.

Spooner's influence is clear in two other railways serving *The Slate Landscape of Northwest Wales*, the Talyllyn Railway (Element 6.4) and the Penrhyn Slate Quarry Railway (Element 1.3) in the use of narrow-gauge, steam traction and a tight formation.

The Talyllyn Railway, completed in 1866, was designed from the outset for locomotive haulage and to carry passengers and general goods as well as slate from Bryneglwys Slate Quarry (Element 6.1). It formed a significant part of the investment in the slate industry made by the Lancashire cotton-mill owners, the McConnel brothers, along with the Quarry itself and the workers' village of Abergynolwyn (Element 6.3). The engineer was James Swinton Spooner (1816-1884), brother of Charles Easton. The railway made history again in 1951, as the first to be taken over by enthusiasts as a heritage attraction. Like the Ffestiniog Railway, it operates its original locomotives and passenger carriages, as well as some of its historic slate wagons – additional associative attributes that help in the understanding of Outstanding Universal Value.

Figure 2.167. Though in no sense the first steam narrow gauge public railway, the Talyllyn (Element 6.4) was very early in combining from its conception the principle of a minimal gauge railway with passenger carriage and locomotive operation as developed on the Ffestiniog Railway.

Charles Easton Spooner influenced the design of the Penrhyn Quarry Railway (Element 1.3), completed in 1879, the steam-worked successor to the Railroad of 1801. This followed a steep and sinuous course avoiding the inclined planes required on the earlier route.

Other, relict, slate railways exemplify different ways of overcoming the challenging terrain of Northwest Wales and using it to advantage. Inclined planes from the quarries are spectacular features which make ingenious use of topography to move output at minimal cost. The Gorseddau Junction & Portmadoc Railways (Element 4.4), completed in 1875, includes a lightly engineered section with minimal earthworks to the Prince of Wales Slate Quarry, as well as making use of a well-built formation to Gorseddau Slate Quarry (Element 4.4) constructed twenty years earlier by James Brunlees (1816-1892), a distinguished engineer with an international profile.

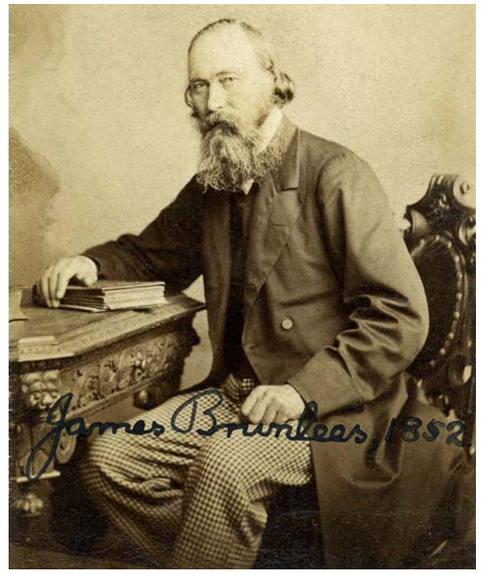


Figure 2.168. Sir James Brunlees (1816-1892) was one of a number of celebrated engineers who came to be involved in the slate industry of Wales. After building the Gorseddau Railway (Element 4.4), he became the Engineer of the São Paulo Railway in Brazil (see UNESCO tentative list, *Cultural Landscape of Paranapiacaba: Village and railway systems in the Serra do Mar Mountain Range, São Paulo, Brazil*) and of the Mersey Railway, and director of the Mt Cenis Pass Railway, as well being involved in other railway projects in England, Ireland and New Zealand and the Channel Tunnel scheme of 1872.

Ffestiniog Railway practice influenced other narrow-gauge railways across the globe. Spooner's more extravagant claims were soon disproved, but it emerged as an effective model for military, agricultural and industrial transport, as well as in desert or mountainous terrain in European colonies. An offshoot is the Darjeeling Himalayan Railway in West Bengal, part of the World Heritage *Mountain Railways of India* since 1999. The Darjeeling's assistant engineer was Thomas John Spooner (1862-1937), nephew of Charles Easton Spooner.

Longer 0.6 metre gauge systems, totalling between them many thousands of kilometres, ran in France, Hungary, Pomerania, the Union of South Africa and German South West Africa, Venezuela, New Guinea, the Belgian Congo and above all in Morocco. Temporary systems on the same principle performed a vital role for which they were ideally suited, and on a huge scale in the First World War, supplying the trenches with ammunition, shells and troops, and removing the wounded.

Figure 2.169. Although the Ffestiniog Railway (Element 5.9) closed in 1946 as the slate trade declined, it was re-opened in stages as a heritage railway from 1955 to 1982. It operates several of its first locomotives from the 1860s as well as many of its original mid-Victorian passenger carriages. It has recently restored to working order its fleet of slate wagons for demonstration purposes, a fascinating asset which adds to the interpretation and presentation of the Nominated Property.

Figure 2.170. The Ffestiniog-inspired Darjeeling Himalayan Railway has been a World Heritage site since 1999. Its distinctive B class locomotives are contemporary with the locomotives built for the Penrhyn Slate Quarry Railway. Small but powerful, they proved ideal for working sharp curves and steep gradients such as here at 'Agony Point'.

2.b.viii An Industrial Revolution

Transformation through capital investment

The Component Parts of the Nominated Property represent the diverse social groups which owned, or invested money and skill in, this classic landscape of the Industrial Revolution. These varied from hugely wealthy landowners with seats in Parliament, through bankers and entrepreneurs, locally based partnerships and 'penny capitalists', to quarrymen in the black economy who owned no more than their hand-tools. Between them they created *The Slate Landscape of Northwest Wales*.

The two biggest slate quarries, Penrhyn (Element 1.1) and Dinorwig (Element 2.1), were operated directly by their aristocratic owners as a part of their estates (Element 1.7). This was uncommon in the British industrial revolution, where patricians preferred to lease out their mineral rights to entrepreneurs.

In 1782, Richard Pennant, Lord Penrhyn, began to re-invest the extensive profits from his Jamaican sugar estates in the slate veins on the eastern slopes of the Bronllwyd Mountain in the Ogwen Valley, uniting the different workings into one quarry (Element 1.1). Pennant developed his quarry and farms as an 'improving landlord' on the same principles as he managed his West Indian properties, where he closely controlled the lives of his slaves and other dependants.

Figure 2.171. Richard Pennant, Lord Penrhyn, indicates on a map his new road system through the Ogwen valley. In May 1788, he was one of 'only two Members *(of Parliament)* who ventured to speak in extenuation if not in justification of the African *(slave)* trade. Henceforth he spoke frequently in defence of the slave trade "denying the facts advanced, appealing to the prudence and policy of the House *(of Commons)* against their compassion"'.

In 1820 Thomas Assheton Smith I (1752-1828), lord of the manor of Dinorwig, assumed the management of the slate workings on his estate. He owned lands in Cheshire and Hampshire, and sat in the House of Commons. He and his heirs ran Dinorwig Slate Quarry until it closed in 1969.

Previously these two quarries had been operated by local common-law partnerships, a system which survived as the 'bargain'. Such partnerships were initially composed of working men and their families; as profits grew, lawyers, bankers and entrepreneurs also became involved.

William Oakeley (1750-1811) of Plas Tan y Bwlch (Element 5.7) was the principal landowner in the Ffestiniog Component Part 5. An 'improver' like Lord Penrhyn, he left his mark on the landscape around his house and gardens at Plas Tan y Bwlch, but leased out his slate quarries. The political career of the British statesman Lord Palmerston (Prime Minister from 1855 to 1858 and from 1859 to 1865) was supported by the profits from his tenancy of one of these quarries. The Greaves banking family from the English West Midlands developed Llechwedd Slate Quarry in Ffestiniog, and their descendants retain ownership. In Nantlle, local Welshmen developed, and retained control of, Dorothea Slate Quarry (Element 3.3).

The Joint Stock Companies Act of 1856, by which any group of seven people or more could register a limited liability company for themselves, coincided with the start of the great slate boom. The Companies Act of 1862 allowed any seven or more associates to constitute themselves as a company with limited or unlimited liability, and was widely adopted in *The Slate Landscape of Northwest Wales*. In 1863, one British company in every nine registered with the Board of Trade in London

Figure 2.172. ' ... one of the earliest sculptured proletarians ... the peasant girl near him is, perhaps semi-allegorically, rather décolletée' (Hobsbawm 1999, 135). Richard Westmacott's 1820 memorial to Richard Pennant, first Lord Penrhyn, in Llandygái church depicts a quarryman wearing a classical tunic, holding a crow-bar and clutching a slate-trimming knife. The statues symbolise Lord Penrhyn's investment as an improving landlord in both quarrying and farming.

Figure 2.173. Richard Pennant invested in technology. In 1796 his agents installed a Boulton and Watt steam engine fired on sugar-cane on his sugar estate at Denbigh in Jamaica, but water-power operated machinery at Penrhyn Slate Quarry (Element 1.2).

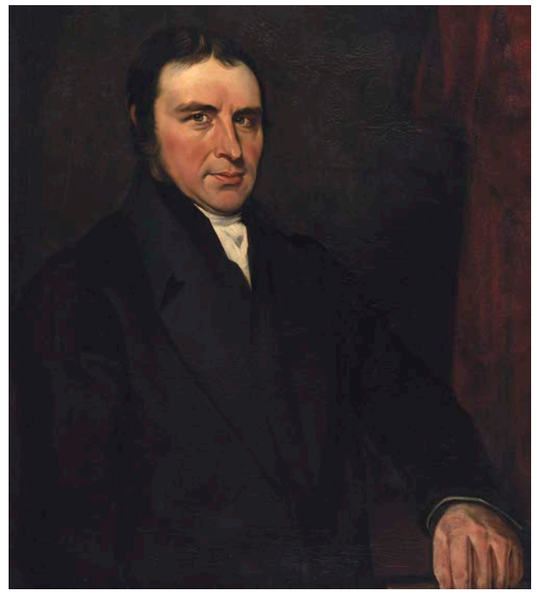


Figure 2.174. The Reverend John Jones Talysarn (1796-1857) represents the Welsh face of managers and investors in *The Slate Landscape of Northwest Wales*. A quarryman and a labourer with no formal education, he was ordained into the Methodist ministry, and became famous as an eloquent preacher. He was a reluctant manager of Dorothea Slate Quarry (Element 3.3) in Nantlle from 1850, as he disliked putting his neighbours and members of his congregation out of work when times were hard.

was concerned with the quarrying, processing or marketing of slate. William McConnel of Manchester formed the Aberdovey Slate Company Limited in 1864 to work Bryneglwys Slate Quarry (Element 6.1). Gorseddau and Prince of Wales slate quarries (Elements 4.1-2) also reflect this commercial optimism.

Quarrymen invested their accumulated knowledge of the rock in their work, as well as their health, in a dangerous industry. The shelters where they gathered for lunch and for discussion, or which they built on tips of waste rock to split slates when times were hard, have no architectural ambition, but exemplify their social identity and cultural confidence, as well as their skill and resourcefulness.

Transformation through mechanised solutions

The high levels of capital investment in *The Slate Landscape of Northwest Wales* made possible a partial transition from craft-skill to machine-based operation, a characteristic of the Industrial Revolution. Not only does the technology-transfer

already described demonstrate the interchange of knowledge and ideas, but the adoption of mechanised solutions also made possible the industrial transformation of this mountain landscape, on a monumental scale. The use of railways, inclined planes and water-power created the distinctive landforms of the quarries, with their level stepped galleries and working areas. The long, low slate mills indicate the scale of processing necessary to turn this natural resource into a commercial product. Throughout, the individual, human scale also remains evident, in the smaller buildings and spaces the quarrymen created for themselves, and in the scale of endeavour it took to create the rock-faces and the enormous waste tips.

Figure 2.175. Ancoats mill in Manchester (England) formed part of the largest cotton-spinning business in the United Kingdom. Its owner, William McConnel (1809-1902), reinvested his capital in *The Slate Landscape of Northwest Wales*, in Bryneglwys quarry (Elements 6.1-2), building the village of Abergynolwyn to house quarrymen and their families (Element 6.3) and the Talyllyn Railway to transport slate (Element 6.4). Courtesy: Centre for Applied Archaeology, University of Salford: 4428.

Transformation through exploitation of natural resources

A striking attribute of the quarries themselves is that, although they represent a dramatic level of intervention in the natural environment, their scale, form and organisation also clearly demonstrate how natural resources were ingeniously used to develop them. Quarrying had to follow the rock, and was dictated by the geology it exposed. The use of hillside slopes to construct counterbalance (self-acting) inclined planes is evident in every Component Part, as is the harnessing of the region's abundant rainfall as water-power to operate machinery. The Penrhyn (Element 1.3), Dinorwig (Element 2.7), Gorseddau (Element 4.4) and Ffestiniog (Element 5.9) railways all make skilful use of topography to provide appropriate gradients to assist the movement of the load, and to balance cuttings with causeways and embankments. The shape and form of ports, quays and harbours (Elements 1.4, 5.8, 5.10) exploit the shifting currents of the region's rivers, estuaries and sea-coast.

2.b.ix New forms of social organisation

Housing an expanding workforce

The expansion of quarrying created an urgent need to house the expanding workforce. New and varied forms of human settlement both introduced and reflected new forms of social organisation. The Component Parts of the Nominated Property have been chosen to include the entire range of settlement associated with the industry. All were created from new between the late eighteenth and mid nineteenth centuries, and were often carved out of inhospitable upland tracts.

Before 1780

Before the expansionist period from 1780, there was no need to build special accommodation for slate quarrymen. Specialist slate workers were few, and merged into the broader agricultural community.

Barracks

The sudden social dislocations generated by industrialisation frequently created a need for barrack accommodation, which became a distinguishing feature of the industry during the boom of the 1860s and 1870s and for many years thereafter. Examples at Dinorwig (Element 2.3) have been conserved and Nantlle (Element 3.10) have been brought back into use as a community centre. They are unlike barracks associated with other extractive industries elsewhere in the world, or the 'compounds' in African diamond mines, as they were typically built as long cottage rows, and some housed entire families.

'The barrack system is also found in Great Britain, especially in North Wales, but not on so large or so sumptuous a scale as in Germany. In Wales men often sleep two to a bed upon straw mattresses ....' (Foster and Cox 1910, 712).

Figure 2.176 The interior of a Ffestiniog barracks in 1901. Papers cut from the illustrated papers showing the war in South Africa are peeling off the walls in the humid conditions.

Smallholdings

Smallholdings on uplands previously considered unsuitable for cultivation were a characteristic form of settlement within the industry. Some were created by industrialists and landlords, others represent unregulated squatter occupation. Treforys (Element 4.5) is a relict settlement built by the entrepreneurs who leased

Figure 2.177. The slopes of Cilgwyn Mountain belonged to the Crown. Quarrymen began to build cottages and enclose plots of land here, without legal sanction, from 1800 onwards (Element 3.11).

Gorseddau Slate Quarry, who were perhaps inspired by contemporary theories about housing rural populations in Highland Scotland and Ireland. It is located on a bleak, boggy and windswept hillside around the 305 metre contour where even oats and potatoes will barely grow. Many Penrhyn quarrymen were settled in a similar way on Mynydd Llandygai (Element 1.7), where the estate built uniform houses for them and allotted long garden plots of uniform size. Dinorwig quarrymen were granted parcels of land once the quarry-owning family had secured an enclosure act over the mountain commons, and were entrusted to build their own homes. In Nantlle, the upper slopes of Cilgwyn Mountain were colonised by quarrymen and their families without any legal authority, who then proceeded to build simple vernacular dwellings on them (Element 3.11). Often the women would look after the smallholdings whilst the men worked in the quarries.

Company villages

Company villages in *The Slate Landscape of Northwest Wales* were small and ad-hoc, showing little evidence of the Utopian ambition and lavish philanthropic paternalism exemplified by World Heritage sites such as *New Lanark*, *Saltaire* or *Crespi d'Adda*, but still endeavouring to maintain some degree of control over the workforce. As such, they are more typical of the settlements established by capitalists and entrepreneurs for industrial workers throughout the world; Tan y Grisiau, an extension of the town of Blaenau Ffestiniog (Element 5.6) clings to a hillside and follows the course of the railway (Element 5.9), Abergynolwyn (Element 6.3) is set out in a Lancashire idiom on the floor of the Fathew Valley by its Manchester cotton-mill developers. In the village of Nantlle (Element 3.10), some aesthetic ambition is evident in the minimal ornamentation of the houses.

The pioneer industrial archaeologist, writer and conservationist Tom Rolt loved the Talyllyn Railway (Element 6.4), found the Bryneglwys Slate Quarry (Elements 6.1-2) eerie, and considered the houses in the quarry village of Abergynolwyn (Element 6.3) '... as dark, as dour and as incapable of concession to their surroundings as those which were terracing the valleys of the Rhondda and the Ebbw ... It looks as though a section has been arbitrarily chopped out of a mean street in an industrial city and transplanted in the abortive hope that it might take root and grow.' (Rolt 1971).

Figure 2.178. Pioneering conservationist Tom Rolt in his Alvis car in Bryneglwys Slate Quarry.

Nucleated villages and towns

The slate industry of Wales brought into being completely new industrial towns and villages which form classic Industrial-era settlements, interpreting a basic Georgian urban vernacular to house a burgeoning population. Bethesda (Element 1.6), in the Ogwen Valley, was constructed from the 1820s by quarrymen who chose not to live on the Penrhyn estate. The settlement follows Thomas Telford's post road, constructed between 1817 and 1825. The villages of Deiniolen and Clwt y Bont (Element 2.8) were similarly built on a freehold by quarrymen who chose not to accept the largesse of the owner of Dinorwig Slate Quarry. Blaenau Ffestiniog (Element 5.6) was established on a natural shelf where slate-quarry roads intersected; here, earlier ribbon development gave way to planned urban squares and ambitious chapels from the 1870s.

The architecture of chapels in the quarry communities reflects the growing confidence and wealth of their congregations in the nineteenth century. Constant rebuilding and enlargement has meant that few structures survive from before the 1860s, when the ornate gable front becomes common, and economic contraction has meant that very few were built in the twentieth century. The Anglican communion responded to the challenge of Nonconformity by making sure that it was also represented in the new quarry communities.

Figure 2.179. Blaenau Ffestiniog (Element 5.6) in the 1870s. A planned townscape is coming into being, complete with schools and chapels, within an earlier rural environment.

Figure 2.180. The contrast in architectural style between church and chapel, and the rivalry between them, is demonstrated by Henry Kennedy's Christ Church of 1857 and Richard Owen's Methodist Capel y Waun of 1868 near Deiniolen (Element 2.8).

Quarry owners' houses and parklands

The scale of the two quarry owners' houses and estates within the Nominated Property, Penrhyn Castle and Park (Element 1.7) and Plas Tan y Bwlch (Element 5.7), illustrate the level of profits that could be reinvested in, and made from, *The Slate Landscape of Northwest Wales* by wealthy aristocrats. On a smaller scale, Plas Tal y Sarn (Element 3.12) and its gardens illustrates the proximity of extractive sites to the dwelling of one of the industry's middle-class investors. These offer a marked contrast to the homes of those who worked in the industry.

Figure 2.181. The scale of the parklands associated with Penrhyn Castle is apparent in this aerial view.

A money economy

Growing prosperity in *The Slate Landscape of Northwest Wales* created a consumer society, evident in the shops and department stores of Bethesda (Element 1.6) and Blaenau Ffestiniog (Element 5.6), where the market hall was built between 1861 and 1864, subsequently extended in 1883.

Figure 2.182. Blaenau Ffestiniog's market hall (Element 5.6) not only exemplifies the arrival of consumer choice to working class communities in the 1860s but also demonstrates the growing cultural confidence of the quarrymen and their families, as it was used for theatrical performances and political meetings. It was here that David Lloyd George (1863-1945; British Prime Minster, war-leader and statesman) was told that he must stand for parliament. It was served by a siding from the Ffestiniog Railway (Element 5.9).

Healthcare and hospitals

Medical care for specialist workers in a hazardous working environment has been a feature of extractive industries since the medieval period. The three hospitals for quarrymen in *The Slate Landscape of Northwest Wales* were each established by the principal local landowner – each one prominently sited on the way to the quarry so the benign intent was clear to visitors. The Penrhyn estate, with its long experience of managing enslaved workers' health and fertility on its plantations in Jamaica, showed the way in 1840–42 (Element 1.1). The Ffestiniog Hospital followed in 1848 (Element 5.6), and Dinorwig Quarry Hospital (Element 2.10) in the 1860s. All follow the same pattern of a central reception block with projecting wings for the wards. The Dinorwig Slate Quarry Hospital (Element 2.10) is now a museum open to the public, displaying its innovative equipment, including amputation tools and an early X-ray machine. It exemplifies both patrician philanthropy and the increasing professionalization of medical treatment, since it was established to control health provision and to dispense with the services of traditional bone-setters, whose skills in the therapeutic movement of skeletal joints had been central to the distinctive medical history of Northwest Wales.

Figure 2.183. Company hospitals and clinics for workmen and their families were never common in Britain but were more often found in continental Europe. The San Rafael Mining Hospital (World Heritage Site: *Heritage of Mercury: Almadén and Idrija*) in Almadén (Spain) was built in 1755, and provided care for miners for over two hundred years.

Health and safety in *The Slate Landscape of Northwest Wales*

The slate quarryman's occupation was not a healthy one. Dedicated hospitals (Element 2.10) provided treatment for accidents but medical opinion was slow to recognise and address the respiratory impact of slate dust generated by powered drilling at the rock-face or by circular saws in the mills. Struggles for fair employment practices and just wages within the quarries led to the foundation of the North Wales Quarrymen's Union in 1874 – later absorbed into the Transport and General Workers' Union. It was these unions which led a long campaign from the 1940s through to the 1970s to secure state-funded compensation for quarrymen who suffered from lung-diseases arising from their employment. This culminated in the enactment of the Pneumoconiosis, etc (Workers' Compensation) Act 1979, which led to compensation being paid not only to ex-quarrymen and their widows, but also to workers in other industries who suffered from industrial lung diseases and who could not gain redress from employers who had gone out of business. In this, as in many other aspects, the slate-quarrymen of Northwest Wales led the fight for social justice, from which many other working people, in other areas and industries in the United Kingdom, eventually benefitted.

Figure 2.184. The Dinorwig Slate Quarry Hospital (Element 2.10). Dr Robert Herbert Mills Roberts (1862-1935) presided over the Hospital from 1890 to 1914. A pioneering and dedicated surgeon, he came from a famous local dynasty of bone-setters which provided a surgeon to the Royal Navy as well as doctors to all three quarry hospitals. He graduated from University College, Aberystwyth and St Thomas's Hospital, London. His experience of traumatic injury was invaluable during the Boer War, when he established the Welsh hospital in the Transvaal, and as a senior officer in the Royal Army Medical Corps in World War One. He considered quarrymen's health to be their own responsibility, and urged them to keep their houses and their clothes clean, to avoid drinking stewed tea and to eat a varied diet.

Figure 2.185. The Bethesda Women's Choir.

Women and the slate industry of Northwest Wales

Women took little active part in the industry itself. In the eighteenth century they sometimes ran small quarries and were often responsible for pack-horses and carts carrying the slates to navigable water, but in an increasingly masculine environment, their main option was to marry young and to produce a large family. Locations like the Pen y Bryn barracks (Element 3.5) exemplify the teeming, crowded conditions where young mothers had to clean, cook and look after small children and growing families as well as tend garden-plots, whilst the men worked nearby in the quarry. The novels and short stories of Kate Roberts (1891-1985) celebrate the hard-working, frugal life of women in these part-industrial, part-rural areas, and acknowledge the plight of those who could not live by its rules.

When times were good, quarrymen's wives were sometimes criticised for their showy outfits and lavish front parlours. Prosperity could rarely be taken for granted; family circumstances might change drastically with a husband's death in the quarry, or a woman's death in childbirth. Second and third marriages were common.

Women were actively involved in the religious life of the slate communities, and in their choral traditions. The Bethesda (Element 1.6) Women's Choir toured Wales and England to raise money for the Penrhyn Quarry (Element 1.1) strike of 1900 to 1903, and performed with male voice choirs to support Belgian refugees in 1914 (*The London Kelt*, 6 July 1901; *Yr Herald Cymraeg*, 1 December 1914).

2.b.x Adapting to modernity, retaining tradition

Transformation

Quarrying, processing and transporting slate in Northwest Wales not only changed architecture and building all over the world but also transformed a rural landscape and a marginal culture into a modern industrial society. This process was at times painful, as old ways of life collided with new, and as different social groups sought to impose their will on these new communities. Several bitter industrial disputes broke out. Each Component Part of *The Slate Landscape of Northwest Wales* illustrates in different ways the social trauma of industrialisation.

Industrialisation did not efface traditional ways of life or a minority language. These continued to shape the way *The Slate Landscape of Northwest Wales* evolved in the period 1780 to 1940, just as in many ways they remain strong to this day.

'The confident culture of Welsh-speaking Wales, with its vigorous community life, its traditions of poetry, music-making and the visual arts, and its respect for learning, reflects how a once slow-moving, traditional minority culture adapted in the classic "Industrial" period and could meet new challenges again. The past tells a story in which confidence and a willingness to learn, to contemplate change and to engage with a new world, emerge as the main themes, more so even than the undoubted realities of sickness, exploitation and fear which came with industrialisation. In the process, Wales transformed, radicalised and strengthened itself, its identity and its language. The slate industry was central to that change.' (Gwyn 2015).

Continuity within a changing landscape

Investment of skills, labour and minimal level of capital by local population

The Slate Landscape of Northwest Wales illustrates an important attribute of industrial society, namely the essential investment of skill, labour, and sometimes also minimal capitalisation, by the people who work in it. Quarrymen, practically all drawn from the immediate rural hinterland, soon developed the intellectual skills necessary to become effective workers, as well as demonstrating much-needed muscle-power. They made themselves responsible for their own tools and their own gunpowder, and firmly believed that the rock in their 'bargain' belonged to them, not to the quarry-owner or investors.

Persistence of low-technology and craft-based processes in quarries

Throughout the major industrial period of quarrying from 1780 to 1940, craft-skills remained crucially important to working slate quarries. Isolated slate-splitters' shelters erected on tips of slate rubble in Cilgwyn and Dorothea slate quarries (Elements 3.1, 3.3) exemplify the least prosperous class, unemployed quarrymen who had only their skills, labour and tools to invest, who earned a precarious living in times of hardship by reworking blocks which had previously been dumped, to produce small roofing slates and damp-courses.

Figure 2.186. Gorseddau Slate Quarry (Element 4.1) lies in the middle distance, at the head of a remote valley where Ordovician rock outcropped on the hillside and attracted the interest of the first speculators here. In the foreground is the Ynysypandy Slate-Slab Mill (Element 4.3), located where a fall of water could operate machinery. The course of the railway to the quarry leads past the abandoned quarrymen's village of Treforys, on the upper left side of the lake (Element 4.5); its branch to Prince of Wales Slate Quarry curves off to the left (Element 4.4). All of these lie within a farming landscape that has evolved since the Bronze Age.

Reinforcing traditional social identity, renewing cultural confidence

The new quarry villages and towns built their own libraries and reading rooms, and a barracks would have a shelf of books, but the quarrymen's rich cultural life was also sustained by an institution they created themselves known as the *caban* ['cabin'] or at Penrhyn Slate Quarry (Element 1.1) as the *cwt tân* ['fireplace hut'], a simple shelter where between 10 and 80 men gathered for their lunch and for a formal discussion, often on political matters, or for recitation, singing, poetry or quizzes. A quarryman who was ill, or who wanted to go on to university or to theological college, would be helped financially by his *caban*. The *caban* was rooted in earlier rural traditions of community life and mutual support, and of story-telling and entertainment.

Figure 2.187. Ifan ab Owen Edwards' film *Y Chwarelwr* ['The Quarryman'] of 1935, made with a largely amateur cast of quarrymen and their families, shows a caban meeting in Oakeley Slate Quarry in Ffestiniog (Component Part 5).

Figure 2.188. *Cabanau* survive in many quarries. This one is on Australia Gallery in Dinorwig Slate Quarry (Element 2.2) – even the men's boots remained for many years.

Renewed strength to Welsh language

A marginal culture that becomes incorporated into a global industrial system often loses its distinctive way of life and its minority language. The historic cultural vitality of *The Slate Landscape of Northwest Wales*, by contrast, ensured that it remained strongly Welsh in speech, and is so to this day. Its religious identity was also an important factor.

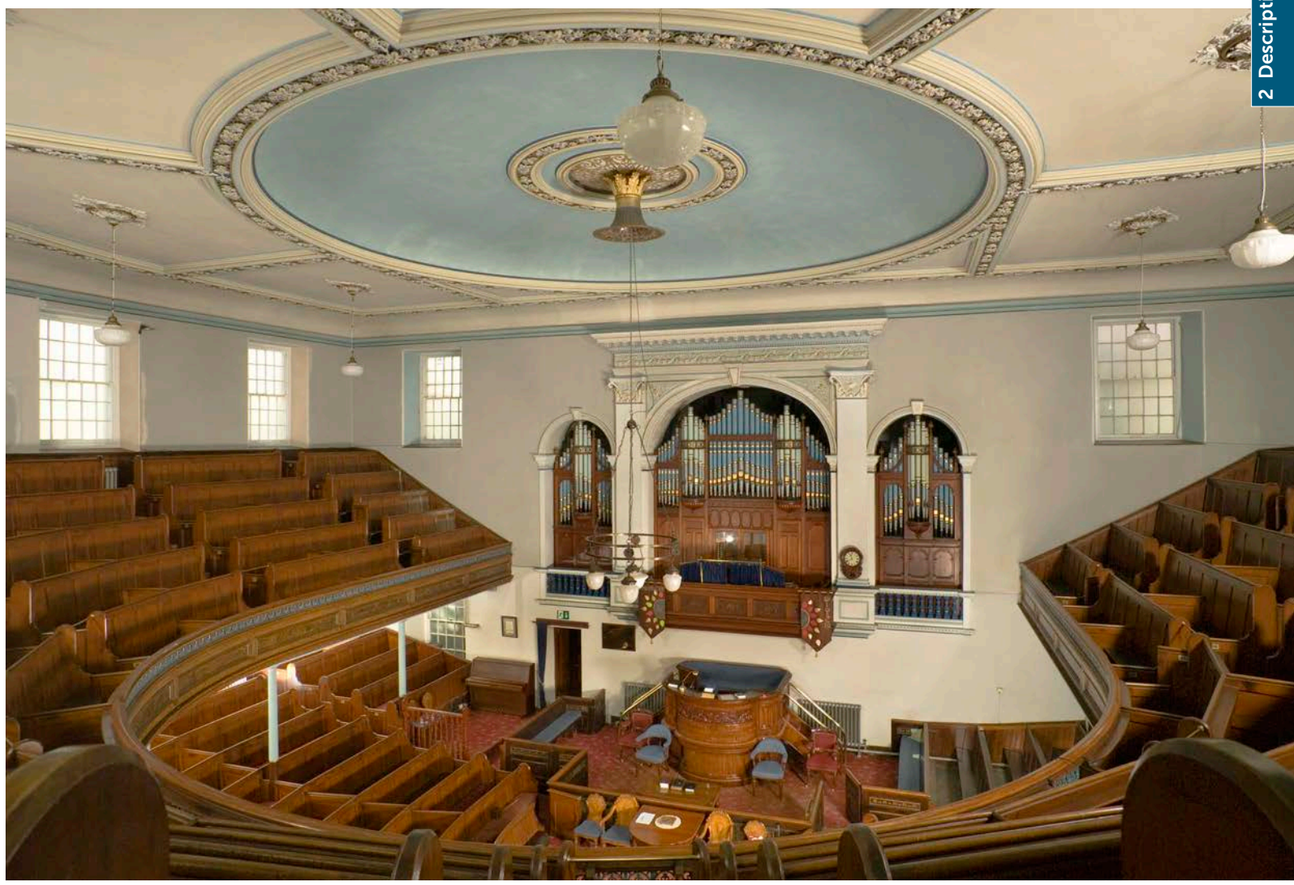


Figure 2.189. Methodism is a religion of the word. The scale and centrality of the pulpit in Jerusalem chapel in Bethesda (Element 1.6) illustrates the importance of the sermon in collective worship. Chapels had their own adjacent schoolrooms for Sunday schools and for community activities such as literary societies.

As quarry communities forsook the Anglican state church for the chapels of Methodism and other forms of Protestant Nonconformity, as Baptists or Independents, church and chapel came to have an uneasy relationship. The church drew its religious authority from tradition and its local influence from powerful land-owning patrons. Chapels offered visionary sermons, a ministry drawn from the people themselves, and the opportunity to organise and express the community's own values. The church identified with Conservatism, the chapels with the Liberal Party, and ultimately with the Labour movement.

Figure 2.190. Places of worship were strategically located in *The Slate Landscape of Northwest Wales*. Bethesda chapel, the nucleus of the future town, was built on the edge of a freehold where the London to Holyhead road ran through the Ogwen Valley (Element 1.6) to let the world know that here at least, the quarry-owner had no authority. The land immediately to the right of the chapel (circled) belonged to Lord Penrhyn. The chapel and all the land to its left did not.

The North Wales Quarrymen's Union was founded 1874, slightly later than the Knights of Labor in the USA (1869) but earlier than the Bourse du Travail in France (1887), and reflects the growth and public acceptance of trade unions in industrial countries. Yet the quarrymen also drew on far older traditions of public assembly, holding their Union meetings on a natural outcrop (Element 2.9) at the north-western extremity of Padarn Lake, a traditional gathering-place. Proceedings were opened with the hymn *Arglwydd Dduw Rhagluniaeth* ['Lord God of Providence'].

Most quarrymen were radicals and religious Nonconformists; all spoke Welsh. Their self-identity was reinforced by Welsh-language newspapers, by religious and secular publications, and by *eisteddfodau* – festivals of literature, music, performance and the arts. Wales' National Eisteddfod continues to be held over eight days every August.

The Slate Landscape of Northwest Wales was, and is, a stronghold of the Welsh language, and is home to many people for whom it is a mother-tongue. Slate quarrymen were great readers, and often keen poets and musicians as well.

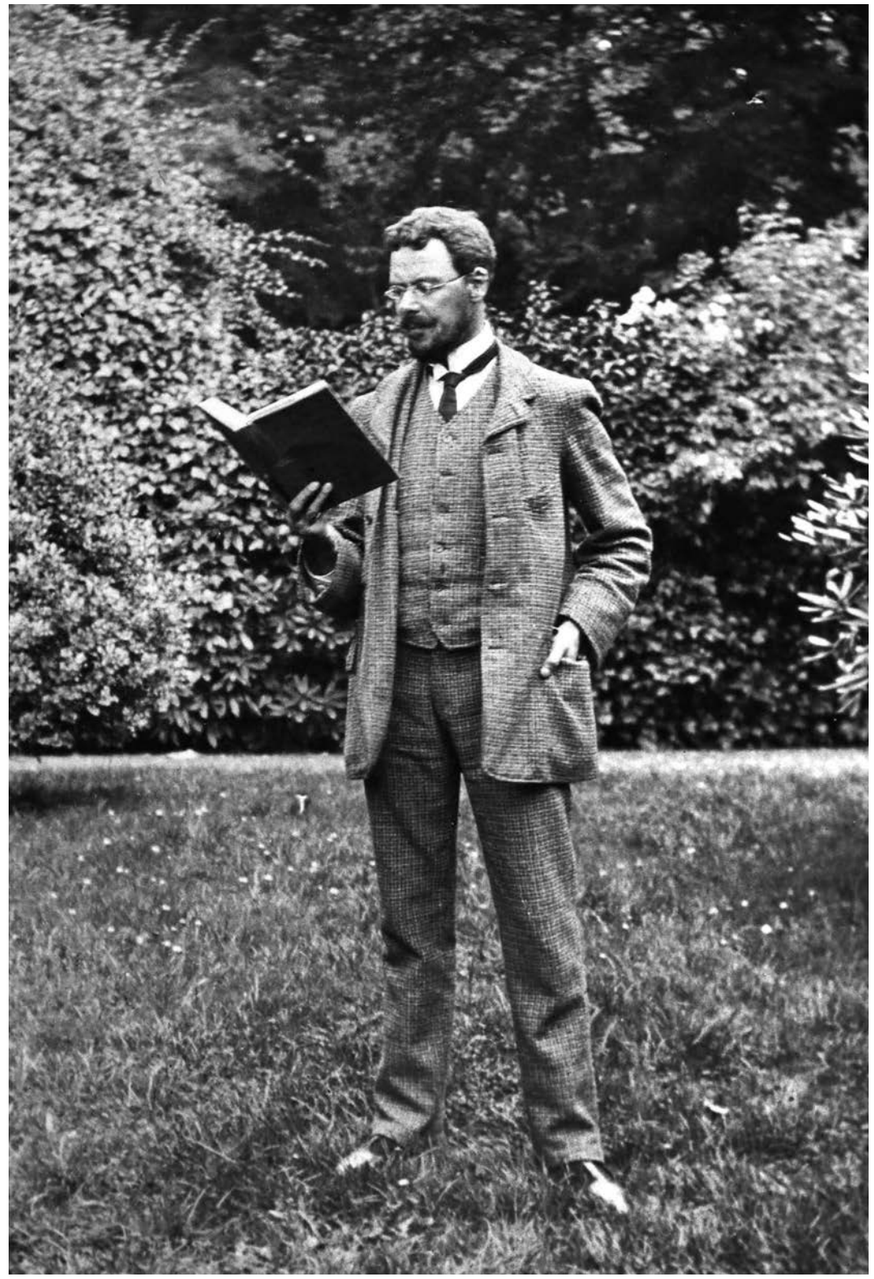


Figure 2.191. Edward Ffoulkes (1850-1917), steward of the Vivian Slate Quarry (Element 2.4), was an authority on the sonnet form in the Welsh language.

Figure 2.192. Bryn Awel (Element 5.6) was built by the tenants of Cwmorthin Slate Quarry in the 1840s as a reading room for their workforce.

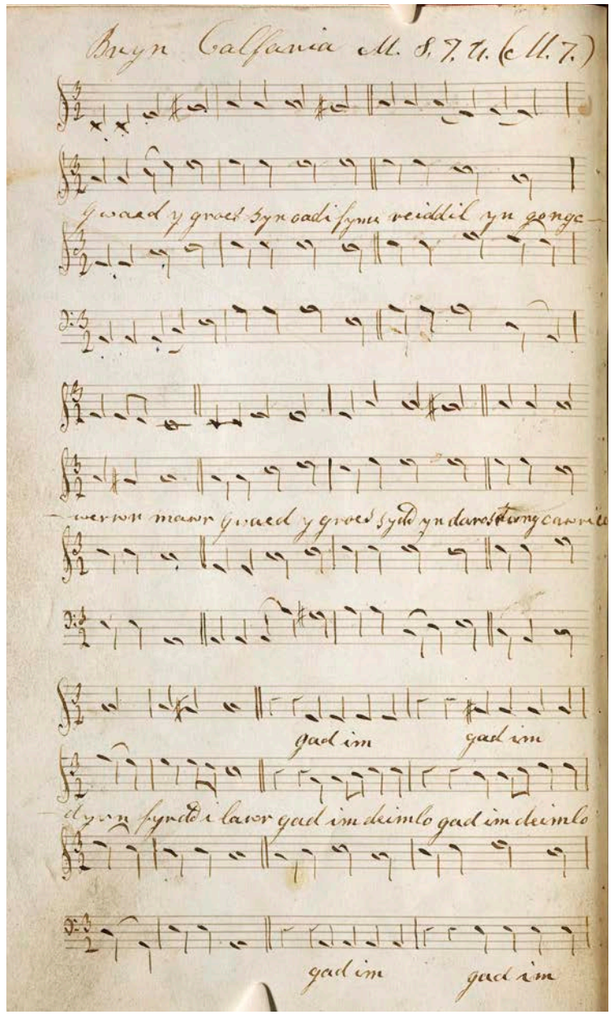


Figure 2.193. The quarryman and musician William Owen (1813-1893) is best known for the hymn-tune 'Bryn Calfaria' ['Calvary Hill'], one of the classics of high Calvinism, written in 8, 7, 8, 7, 4, 4, 4, 7, 7 meter, said to have been composed on a slate whilst on his way to work at Dorothea Quarry (Element 3.3) in Nantlle. His melody (shown here in the form of the holograph manuscript) was arranged by Daniel Protheroe of Cwmgiedd and Chicago (USA) as 'Laudamus', and was adapted as a prelude by the well-known English composer Ralph Vaughan Williams.

Social trauma

The Component Parts of the Nominated Property exemplify the social trauma that industrial development brought to a marginal culture, and the ways in which the people of the area responded to change.

The scale of the two quarry owners' houses and parklands within the Nominated Property, Penrhyn Castle and Park (Element 1.7) and Plas Tan y Bwlch (Element 5.7), illustrate the level of profits that could be reinvested in, and made from, *The Slate Landscape of Northwest Wales* by wealthy aristocrats. On a smaller scale, Plas Tal y Sarn (Element 3.12) in the Nantlle Component Part illustrates the proximity of extractive sites to the dwelling of one of the industry's middle-class investors. These contrast with the cottages and terraced rows the quarrymen inhabited (Elements 1.6 and 5.6). In addition, the contrast between rustic cottages on estate-planned settlements and the plainer houses quarrymen built for themselves and their families is particularly evident in the Ogwen Valley and Dinorwig Component Parts (Elements 1.5, 1.6, 2.8). Conflict between Anglicans and Nonconformists meant that churches and chapels were sited for maximum visual impact (Elements 1.5, 1.6, 2.8).

Figure 2.194. At the National Slate Museum (Element 2.5) a row of houses has been re-erected for interpretative purposes, illustrating the way of life of a slate-quarryman and his family in three crucial periods. One is the boom of the 1860s, another during the Penrhyn Slate Quarry strike (1900-1903) – one of the longest disputes in British industrial history – and the third when the Dinorwig Slate Quarry shut in 1969.

The suddenness of industrial change is apparent in the adaptation of earlier buildings as barracks at Pen y Bryn / Cloddfa'r Lôn (Element 3.5), and its often ephemeral nature in Gorseddau and Prince of Wales slate quarries (Elements 4.1-2) and Treforys village (Element 4.5), where the barracks and the cottages were soon abandoned. The contrast in size and social organisation between Blaenau Ffestiniog (Element 5.6) and Abergynolwyn (Element 6.3) illustrate the different forms it took.

At *Craig yr Undeb* 'Union Rock' (Element 2.9), the natural outcrop at the north-west end of Padarn Lake, social conflict found expression in meetings of the North Wales Quarrymen's Union, founded in 1874.

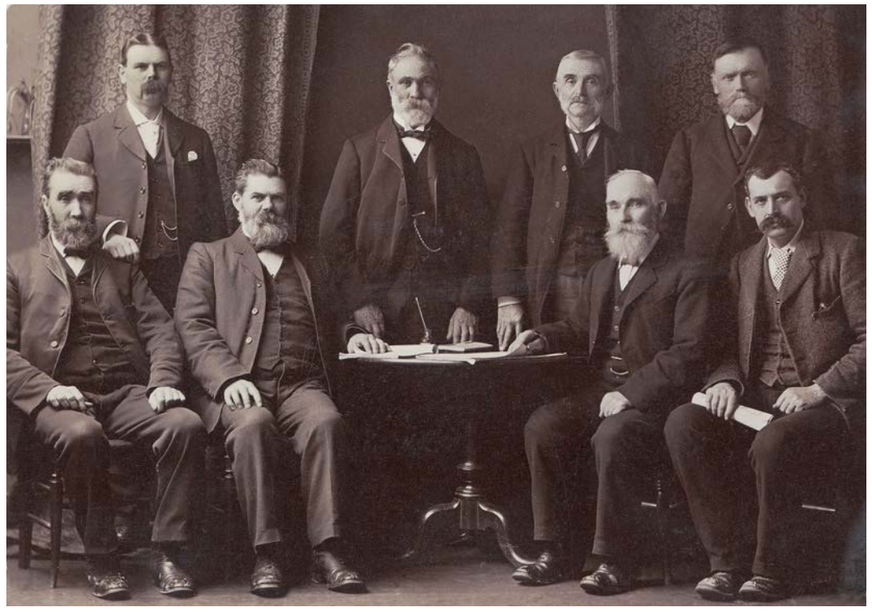


Figure 2.195. Social conflict erupted in a bitter industrial dispute at Penrhyn Slate Quarry (Element 1.1) which went on from 1900 to 1903. The non-revolutionary nature of the quarrymen's leadership is clear in this group photograph of the strike committee.

Pre-industrial landscape – traditional human settlement

Pre-industrial ways of life remain evident within each Component Part, evidence both of time-depth from before the late eighteenth century and also of the distinctive form in which industrial development took place in this marginal region with its strong cultural traditions.

Persistence of rural forms in dwellings and settlements

Northwest Wales forms part of the 'highland' zone of the British Isles. Until the late eighteenth century its economy depended on marginal agriculture – on pastoral farming and transhumance – and on a long tradition of resourcefulness which was inherited by the quarry communities. Few farmers' dwellings from this period survive. Cottages for quarrymen and their families, typically two-room buildings with gable hearths and a half-loft, derive instead from sub-medieval yeoman and gentry dwellings in the region. Variants on this design are found on planned smallholdings including Mynydd Llandygai (Element 1.5) and Treforys (Element 4.5), on squatter settlements at Dinorwig and Fachwen (Element 2.8) and Cilgwyn Mountain (Element 3.11), within quarries as barracks at Dinorwig (Element 2.3), at Pen y Bryn /Cloddfa'r Lôn (Element 3.5), in the village of Abergynolwyn (Element 6.3) and in an urban context in Bethesda (Element 1.6) and Blaenau Ffestiniog (Element 5.6). These illustrate the evolution of a regional style and its rural antecedents, and provide a contrast with the more specifically industrial type of housing which is also to be found in quarry settlements, the two-storey double-fronted dwellings typical of the British Industrial Revolution.

Persistence of rural forms – squatter settlements and field-scapes

'The farmer's calendar was, therefore, to some extent the quarryman's also, and a good number of hands skilled in gauging rock and wielding chisel and mallet could also perform with a long scythe in one of the bands that on July mornings would, standing in line, swathe their way through hilly hay fields. Many quarrymen had relatives who had farms or smallholdings and many lived with parents or other relatives on small plots of land'. (Jones 1982, 19).

Throughout the Nominated Property, pre-industrial and rural building forms are evident. The houses of prosperous tenant-farmers survive in Bethesda (Element 1.6), Nantlle (Element 3.10) and Abergynolwyn village (Element 6.3), where the farm-house became the Red Lion Inn and later the Railway Inn, and at Pen y Bryn / Cloddfa'r Lôn (Element 3.5) where barracks and other quarry buildings grew up in the field-scape associated with the seventeenth-century gentry house. In both the Nantlle and the Ffestiniog Component Parts, field walls and enclosures from before the main period of quarrying are evident, their pattern often broken by the expansion of quarry workings. The cottage-plots at Dinorwig and Fachwen (Element 2.8) and on Cilgwyn Mountain (Element 3.11) reflect a well-established Welsh tendency to dispersed settlement on poor land.

Figure 2.196. Most of the boys in this school-group of 1903 would have followed their fathers into the quarries and most of the girls would have married young. The tall girl in the middle of the second row from the back is Kate Roberts, daughter of a Cilgwyn (Element 3.1) quarryman, who went on to gain her degree from what is now Bangor University before becoming a teacher, a publisher, and an acclaimed Welsh-language novelist and short-story writer.

Growing up in *The Slate Landscape of Northwest Wales*

For many years, a quarryman's son would join him at work as soon as he was old enough. Girls would care for smaller children in order to be prepared for marriage and raising a family. Increased educational opportunities towards the end of the nineteenth century encouraged children to seek a better life. Passing the 'scholarship' to secondary education was an important step towards securing a place at university.

The first Welsh-language 'talkie', *Y Chwarelwr* ['The Quarryman' – 1935] filmed in Blaenau Ffestiniog (Element 5.6) dramatises the hard choices children often had to make. It shows how a promising boy leaves school for the quarry after his father's death to allow his more academically able younger sister to complete her education. Caradog Prichard's novel *Un Nos Ola Leuad* ['One Moonlit Night' – 1961] is more traumatic still; a narrator living in the quarry town of Bethesda (Element 1.6) who may be a child or a man remembering his childhood, faces his mother's descent into insanity.

2.b.xi *The Slate Landscape of Northwest Wales* today

The Slate Landscape of Northwest Wales has seen remarkably little change since the early twentieth century and survives with remarkable integrity. As a marginal area within the United Kingdom economy, Gwynedd has experienced few development pressures, and the region as a whole has adapted very well to an economy based on tourism rather than agriculture or mineral extraction.

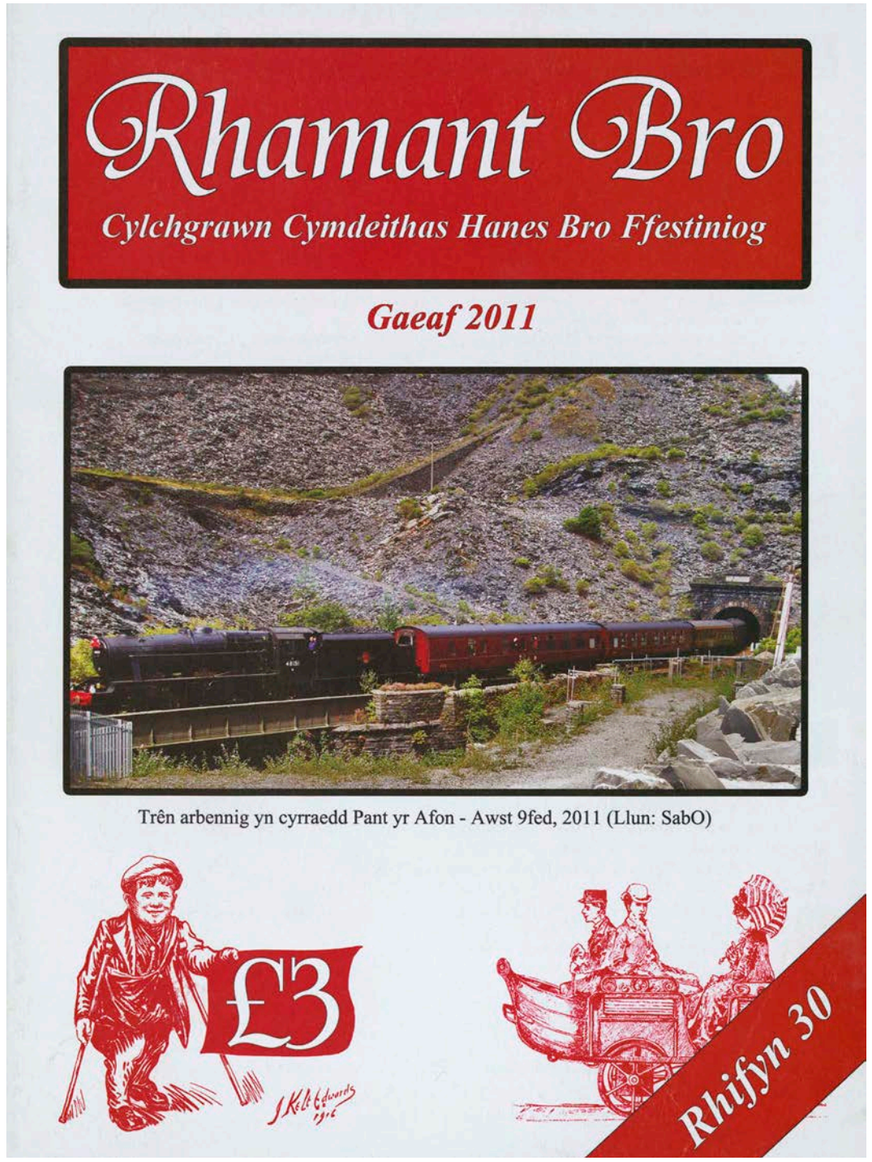


Figure 2.197. The town of Blaenau Ffestiniog (Element 5.6) publishes its own annual Welsh-language scholarly journal of local history. *Rhamant Bro* reflects a long tradition of historical writing within *The Slate Landscape of Northwest Wales* dating to the late eighteenth century.

Following in the footsteps of Prince Pückler-Muskau (see overleaf) and the aristocratic visitors of the late eighteenth and nineteenth centuries but on a more inclusive basis, tourism is now an important part of the slate economy. Elements within the Nominated Property have become major tourist attractions in their own right. These are set out in Section 4**,** but in summary, this begins with the Talyllyn Railway (Element 6.4), preserved by enthusiasts in 1951, after the export of slate from Bryneglwys Slate Quarry (Elements 6.1-2) came to an end. This was the first railway in the world to be taken over and successfully operated by a volunteer organisation. The Ffestiniog Railway (Element 5.9) was revived after a period of closure, and after many years' endeavour was re-opened to its original terminus in the slate town of Blaenau Ffestiniog (Element 5.6) in 1982. Both now enjoy an international reputation. Penrhyn Castle and Park (Element 1.7) are open to the public, and Plas Tan y Bwlch (Element 5.7) is a residential study centre managed by the Snowdonia National Park which offers courses on the history and archaeology of the quarries, settlements and transport systems. The National Slate Museum opened in the former Dinorwig Slate Quarry Engineering Complex (Element 2.5) in 1972.

Heritage-compatible adventure tourism is well-established in several locations. At Penrhyn (Element 1.1) and Llechwedd (Element 5.1) quarries, overhead zip-wires recall the ropeway handling systems which once spanned these workings and enable visitors to appreciate the quarry landform in new and exciting ways. Llechwedd and Cwmorthin (Element 5.2) both offer underground historical tours and adventure experiences.

Within the region, the modern-day slate economy is valued as a major contributor to prosperity and cultural identity. The slate industry continues to play a significant part in the present-day strength of the Welsh language in Gwynedd. Despite decline in the twentieth century, the number of Welsh speakers is now stable. In 2011, 19% (562,000) of residents of Wales aged three and over were able to speak Welsh, and 77% of these were able to read and write the language (15% of the total population). It is the only Celtic language not classified as 'endangered' by UNESCO. Its heartlands lie in Gwynedd, and within Gwynedd in *The Slate Landscape of Northwest Wales*. Bangor University, to which quarrymen and chapel congregations contributed generously from their meagre resources, remains at the heart of its traditional community, and schools have embraced their industrial heritage. New forms of music-making, literature, social media and publication reflect a confident, welcoming and outward-looking Welsh-speaking community which understands and values its roots in the slate industry. The landscape also provides a challenging and dramatic backdrop to outdoor events such as triathlons and marathons in addition to cultural and musical experiences.

Industrial tourism

A Saxon nobleman visits Penrhyn Quarry

Tourism has been a feature of The Slate Landscape of Northwest Wales *since the late eighteenth century and is now an important contributor to the slate economy.*

Early tourists were drawn from the ranks of the European wealthy, with the leisure and resources to travel. Many sought out the Picturesque landscapes of the region but also found themselves intrigued by the Sublime environments of the quarries themselves. One such was the Saxon Prince Hermann Ludwig Heinrich von Pückler-Muskau, creator of the Muskauer Park / Park Mużakowski *on the Neisse river, now a World Heritage site. He was one of many who left an account of their visits.*

'I followed a very romantic road, which led me through the park, and then along the bank of a beautifully wooded mountain stream, and in about an hour arrived at the slate quarry, which lies in the midst of the mountains, six miles from the castle. From what I have already told you, you may imagine what a vast work this is. Five or six high terraces of great extent rise one above another on the side of the mountain; along these swarm men, machines, trains of a hundred wagons attached together and rolling rapidly along the iron rail ways, cranes drawing up heavy loads, water courses, &c. ... I was obliged to lie down in one of the little iron wagons which serve for the conveyance of the slate, and are drawn by means of a windlass through a gallery hewn in the solid rock, only four feet in height, four hundred paces in length, and pitch dark. It is a most disagreeable sensation to be dragged through this narrow passage at full speed, and in Egyptian darkness, after having had ample opportunity of seeing at the entrance the thousand abrupt jagged projections by which one is surrounded.' (Pückler-Muskau 1832, 286-288. His *Briefe eines Verstorbenen* was translated as *Tour in Germany, Holland and England ... By a German Prince*).

An English Diarist visits Penrhyn Quarry

Penrhyn Quarry was also a tourist destination for visitors from the United Kingdom. The diarist Anne Lister of Shibden Hall in Yorkshire described it in 1822.

'.... we turned to our left this morning to Nant Frayon – we turned off to the slate quarries to the left as we returned from Ogwen Pool at the last turnpike before Llandegai – owing to some men standing by we took a round in going & were 20 minutes from the high road to the quarries – we returned another way in 10 minutes – the quarries very well worth seeing – shewn us by an overlooker John Hughes. A better sort of workman allowed 14/- a week – 8 hundred & 2 or 3 men employed in all the quarries (belonging now to Mr Pennant who succeeded to the estates of the late Lord Penryn, & who, Evan Jones the Snowdon guide told us had 28, 000 a year clearing 18, 000 by the quarries – we saw the largest quarries 450 men employed in it – they were pulling down huge masses of slate with ropes – or rather the ropes were fastened to or about the rock for the men to climb up by, & split or rend off the masses with large iron wedges – others were blasting the rock with gunpowder – this so lacerates the rock they only do it when other means fail – we went thro' a longish tunnel from one quarry to another 60 yards deep – slates different sizes – the largest £7 a thousand delivered at Port Penrhyn (close to Bangor) the smallest 4/6 a thousand – good workmen can earn £2 a month – each one pays 4/- a month towards clearing away the waste made in getting & dressing the slates – & what more is required is paid by Mr Pennant – the refuse is carted out along the side of the hill & has a striking effect (like so many pit-hills as we call them) at a distance.'

Figure 2.198. A sketch of Penrhyn Slate Quarry at the time of Anne Lister's visit in 1822. The artist, Francis Leggatt Chantrey (1781-1841), was the leading English portrait sculptor of the early nineteenth century.

2.b.xii Concise history and development of each Component Part, including conservation history

Component Part 1: Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn	
Sixteenth-century:	Slate quarrying on mountain slopes by local partnerships.
1782:	Richard Pennant, Lord Penrhyn, begins significant investment in Penrhyn Slate Quarry and in a slate-carrying road to the Menai Straits at Abercegin or 'Port Penrhyn'.
1801:	Railroad from the Quarry to Port Penrhyn completed.
1802:	Slate-slab mill opened.
1820s-1840s:	Neo-Norman Penrhyn Castle constructed, and Penrhyn Park reconfigured.
1840s:	Reconfiguration of Quarry, involving drainage levels and water-balance shafts.
1870s:	New steam railway replaces the original railroad.
1900-1903:	Prolonged strike at the Quarry.
1951:	Penrhyn Castle taken over by National Trust.
1960s:	Modernisation of the Quarry; new workings initiated, old workings abandoned, railway and slate-slab mill disused. Quarrying is henceforth concentrated on new workings to the southwest of the old Quarry which continue today. Port Penrhyn remains in use.
1990s:	Slate-slab mill conserved by Gwynedd Council as light industrial units.
2017:	Heritage-compatible tourist attractions open at relict Quarry.

Component Part 2: Dinorwig Slate Quarry mountain landscape	
Eighteenth-century:	Slate quarrying on mountain slopes by local partnerships.
1787:	A Caernarfon partnership develops the Quarry, building roads and using lake-transport.
1820:	Thomas Assheton Smith assumes full control of the Quarry.
1825:	Dinorwig Quarry Railroad completed to connect Quarry with a harbour on the Menai Strait.
1842:	Dinorwig Quarry Railway completed to connect Quarry with a harbour on the Menai Strait.
1860s:	Quarry Hospital opened.
1870:	Quarry Engineering Complex completed.
1961:	Dinorwig Quarry Railway ceases operation.
1969:	Quarry closed.
1971:	The first section of the Llanberis Lake Railway opens on part of the formation of the former Dinorwig Quarry Railway.
1972:	Quarry Engineering Complex re-opened as Welsh Slate Museum and the North Wales Quarrying Museum, now National Slate Museum.
1982:	Commissioning of Electric Mountain hydro generation scheme in Dinorwig Slate Quarry.
Early 1990s:	Gwynedd Council opens area adjacent to Quarry Engineering Complex as Padarn Country Park.
1998-9:	Inclined plane at Vivian department of Quarry conserved and returned to use by National Museum of Wales; iron suspension waterwheel of 1870 in National Slate Museum conserved and returned to use by National Museum of Wales; quarrymen's houses from Blaenau Ffestiniog (Element 5.6) re-erected on site to illustrate historic way of life in the slate communities.
2015:	Dinorwig Slate Quarry Hospital reopened as a museum following investment by Gwynedd County Council and European Union.

Component Part 3: Nantlle Valley Slate Quarry Landscape	
Roman to Medieval period:	Slate quarrying on mountain slopes by local partnerships.
1800:	Squatter-settlements begin on Cilgwyn Mountain.
1828:	Nantlle Railway to sea at Caernarfon opened.
1840s:	Work begins at Dorothea Slate Quarry.
1850s-1860s:	Influx of population to the Valley as quarries expand; existing farm-houses adapted as quarry dwellings
1904-06:	Dorothea Slate Quarry Cornish beam engine installed.
Early twentieth-century:	Electrification of Pen yr Orsedd Slate Quarry and installation of 'Blondin' ropeways.
1930s:	Contraction of industry; major social hardship.
1970:	Dorothea Slate Quarry closes.
1999:	Conservation of former barracks in Nantlle Village as business units and community centre.

Component Part 4: Gorseddau and Prince of Wales Slate Quarries, railways and mill	
Early nineteenth-century:	Limited slate quarrying on mountain slopes by local partnerships.
1856-7:	Major investment in Gorseddau Slate Quarry, railway, Ynysypandy Slate-Slab Mill and Treforys village.
1864:	Construction of slate-slab mill to serve Prince of Wales Slate Quarry.
1866:	Final abandonment of Gorseddau Slate Quarry, railway, Ynysypandy Slate-Slab Mill and Treforys village.
1875:	Construction of Gorseddau Junction & Portmadoc Railways to serve Prince of Wales Slate Quarry.
1890s:	Final abandonment of Prince of Wales Slate Quarry and Gorseddau Junction & Portmadoc Railways.
1981:	Purchase of Ynysypandy Slate-Slab Mill by Snowdonia National Park; conservation and consolidation.

Component Part 5: Ffestiniog: its slate mines and quarries, 'city of slates' and railway to Porthmadog	
1760s:	Quarrying of slate for export markets begins.
1800 onwards:	Capitalised partnerships lease slate quarries from the Oakeley estate and other landowners.
1807-1811:	Building of 'Cob' sea-defence leads to creation of a harbour at Porthmadog.
1820s:	Major capitalisation from English financial centres including *Liverpool – Maritime Mercantile City*; underground workings begin.
1836:	Opening of Ffestiniog Railway to Porthmadog Harbour.
1850s:	Steam power applied to large mills for processing slate.
1863-1872:	Transformation of Ffestiniog Railway by introduction of steam traction and passenger carriage.
1870:	International visit by engineers and government officials to Ffestiniog Railway.
Early twentieth-century:	Adoption of electrical power by quarries.
1930s:	Contraction of industry; major social hardship.
1946:	Closure of Ffestiniog Railway.
1955-1982:	Progressive re-opening of Ffestiniog Railway throughout its length.

1972:	'Quarry Tours' open in Llechwedd Slate Quarry.
1975:	Plas Tan y Bwlch reopens as the Snowdonia National Park's residential Study Centre.
2015:	A community initiative begins conservation of quarrymen's dwellings; heritage-compatible tourism ventures at Llechwedd Quarry.

Component Part 6: Bryneglwys Slate Quarry, Abergynolwyn village and the Talyllyn Railway	
1860s:	Investment by Nantlle entrepreneurs in Bryneglwys Slate Quarry,
1864:	Purchase of quarry lease by Lancashire industrialist William McConnel and formation of the Aberdovey Slate Company; construction of Abergynolwyn village begins.
1866:	Talyllyn Railway completed to connect the quarry with the main-line network and to carry passengers.
1946:	Last movement of slate from Bryneglwys Slate Quarry.
1951:	Operation of Talyllyn Railway taken over by Preservation Society.

3 Justification for Inscription

Figure 3.1. Penryn Quarry (Component Part 1), once the largest of its type in the world. Henry Hawkins' painting of rockmen at work in 1832.

3.1.a Brief Synthesis

The Slate Landscape of Northwest Wales is a serial nomination of six Component Parts, located in Northwest Wales, UK. It represents an exceptional example of an industrial cultural landscape that was profoundly shaped by large-scale slate quarrying and underground mining, and by the working and transport of slate for national and international markets. This industry, particularly in the period from 1780 to 1940, dominated the world production of roofing slates, opened up new slate quarries and mines across the world through the cultural transfer of technology and skills, and transformed both the environment and the way of life of those who lived and worked in the mountains of Snowdonia.

The enduring and highly legible landscape is set in majestic mountainous terrain that falls to Liverpool Bay in the north and to the Irish Sea to the west. The Nominated Property contains the best and most coherent landscapes that comprehensively represent a larger area of production that made the region the pre-eminent worldwide exporter of slate in the nineteenth century. It is first characterised by the monumental scale of the benched hillside workings, deep pits and cavernous underground chambers, landform cascading tips, ingenious water management systems, and a range of industrial buildings, together with some outstanding technical equipment and major features of engineering. These are complemented by dedicated and innovative transport systems that were constructed in highly challenging topography and that linked quarries with processing sites and purpose-built coastal harbours and main-line railways.

In addition to these elements, wealthy industrialists built grand country houses, set out parks and gardens, and improved their estates. These contrast with the diverse pattern of workers' vernacular settlements, where the working practices and social customs of the rural hinterland were preserved, including the region's confident prevailing culture of Welsh language, and its traditions of religious dissent and political radicalism. Their characteristic social infrastructure – chapels and churches, band-rooms, schools, libraries and meeting places – form a collective testimony to an outstanding process of adaptation from an agricultural to an industrial society, exemplifying how a traditional minority culture adapted to modernity in the Industrial period.

The Nominated Property developed in one of the world's largest high-quality slate deposits: four massive northeast-southwest trending, sub-parallel linear veins ranging over 60km from north to south. The industry that exploited them was the world's most significant during the era popularly known as the Industrial Revolution. Further, highly legible testimony survives on an unparalleled cultural landscape scale, distinguished by remarkable integrity and authenticity and with very little subsequent intrusion by modern development. This is partly due to its mountainous setting within a region that is also substantially protected by the Snowdonia National Park. Many generations of slate workers earned a living from this landscape and made Welsh slate internationally known. The special qualities of Welsh slate include its longevity and impermeable nature, its light weight and cleavable thinness, and comparatively low cost. This abundance of high-quality slate in deposits conveniently close to the sea for global export, together with an organisational structure and capacity that was able to meet the surge in demand, placed the slate industry of Northwest Wales as the major global supplier of roofing slates and of architectural slate slabs. By the late nineteenth century it represented about a third of world

Figure 3.2. Small schooners plied the deep-water oceanic slate trade. Here, loaders are shown sliding slates down a plank into a ship's hold at Porthmadog (Component Part 5). At the foot of the mast, a workman holds the heavy wooden hammer which will be used to pack them. Porthmadog was a busy slate-exporting harbour serving the Ffestiniog quarries from the 1820s to 1914, when war ended the German trade.

output, making possible the rapid urbanisation and architectural development of Africa, Australia, Eurasia, and North and South America. The sheer scale and exposure of the workings – on a regional landscape scale – together with discrete, functional, socio-technical ensembles enable the processes behind this extraordinary output to be easily understood.

Technology was diffused from Northwest Wales through exchange visits by specialists, and by the migration of quarrymen and managers. There is substantial evidence of these processes, both documentary and in terms of physical property in Wales and in receiving countries, and of the outcomes in terms of influence and impact. Technological expertise in the Welsh slate industry took the form of industrial organisation, innovative technical solutions and the skilled craft-based understanding of the nature of the rock to be extracted and processed. Such technology transfer was fundamental to the progress of the slate industry of continental Europe and particularly the USA, where Welsh technology and traditions remain evident in the physical industrial legacy of slate, including its wider social heritage, and so too in the names of streets and quarries and in prolific records that reveal the names and occupations of those who made these places their new home. Moreover, the locomotive railway is one of the most significant developments of the Industrial Revolution, and Snowdonia's narrow-gauge slate railways comprise a specific technological system that gained global influence as it was marketed and adopted in mountainous regions across continents from Asia and America to Africa and Australasia. By way of example, the gauge and sinuous formation as well as the locomotives and rolling stock of the Darjeeling Himalayan Railway explicitly derive from the Ffestiniog Railway in *The Slate Landscape of Northwest Wales*.

3.1.b Criteria under which Inscription is Proposed

Criterion (ii) – *The Slate Landscape of Northwest Wales* exhibits an important interchange of human values, particularly in the period from 1780 to 1940, on developments in architecture and technology.

Slate has been quarried in the mountains of Northwest Wales since Roman times, but it was the organisation of sustained large-scale production from the late eighteenth century to the early twentieth that came to dominate the global market as a roofing element, encouraging major transcontinental developments in building and architecture such as the low-pitched Regency roof, and terraced housing. Some of the buildings and structures worldwide which make use of slate from within the Nominated Property have been inscribed as World Heritage sites, including *Westminster Hall* and *Saltaire* (UK), and *The Royal Exhibition Building in Melbourne* (Australia). Over 90 per cent of Welsh output came from the quarries which are now relict landforms within the Nominated Property. Other elements within the Nominated Property demonstrate the various uses of slate, not only as roofing elements but also as building material, as fencing and as slab-work (for instance, as grave-stones).

Technologies evolved in *The Slate Landscape of Northwest Wales* were fundamental to the development of the slate industry of continental Europe and the USA, and to quarrying more generally. The system of stepped 'galleries' (working benches) developed at Penrhyn Quarry, evident in its relict landform, was widely adopted in other extractive industries. Other innovative solutions to problems encountered in Wales and applied elsewhere include the first known application of circular saws to cut stone, at Penrhyn Slate Quarry in 1802, adopted worldwide and the chain incline ropeways which men from the Nantlle Component Part took to the USA. Technological parallels are evident between the organisation of Ffestiniog slate mines and Martelange Quarry in Luxembourg, where there were family links with Wales. The skilled craft-based understanding of the nature of the rock to be extracted and processed was an attribute carried by every slate quarryman who left his native Wales; migration is a distinctive attribute of Welsh industrial culture. Slate quarries in other parts of the world also show how these skills were adopted elsewhere (see section 2.b).

An interchange of human values is also strongly evident in the skills and technologies which were disseminated within the Nominated Property. This is particularly clear in

Figure 3.3. Slate from Northwest Wales dominated the global market as a roofing element. Different coloured slates could be used for decorative purposes.

Figure 3.4. Slateville Cemetery in Pennsylvania, USA. These gravestones are inscribed in Welsh and commemorate the migrants who arrived in York County to work in the local slate industry. Many also record the deceased's parish of birth. Virtually all migrated from the slate quarrying communities of Northwest Wales and very many from within the Nominated Property.

the different methods of extracting the rock, whether by stepped galleries, pits or the varieties of underground working, and where slate processing shows the development of innovative mechanised mills from one Component Part to another.

Surviving machinery within the Nominated Property is also evidence for the way in which the slate industry of Northwest Wales evaluated technologies that had been devised in other contexts and adopted those that were fit for purpose; these include water-balance shafts, hydraulic engines, 'Blondin' ropeways, steam- and water-driven pumping systems, and electricity-generating plant.

Above all, the narrow-gauge slate railways of *The Slate Landscape of Northwest Wales* – two of which remain in operation under steam today (the Ffestiniog and the Talyllyn) – exhibit an important interchange of human values in that they: reflect the very earliest iron railway systems developed in South Wales; make evident how the technology was improved within the Nominated Property; and served as the model for successive developments that contributed substantially to the social and economic development of remoter regions in many other parts of the world. The World Heritage Darjeeling Himalayan Railway, with its zig-zag reverses and steep loops, is testament to several strands of railway engineering, but its civil and mechanical engineering clearly shows the direct influence of the Ffestiniog Railway.

Figure 3.5. A train rounds 'tank curve' on the Ffestiniog Railway (Component Part 5), where a water-supply was installed for the first four locomotives in 1863.

Figure 3.6. The stepped system of stepped galleries developed at Penrhyn Quarry (Component Part 1) was widely adopted in other extractive industries.

Criterion (iv) – *The Slate Landscape of Northwest Wales* is an outstanding example of a type of landscape which illustrates, in a dramatic way, the 'combined works of nature and of man' through the large-scale exploitation of natural resources.

The largest deposits of high-quality slate in the world lie in these mountainsides and valley floors. Within the Nominated Property, the lavish houses and parklands of quarry owners, even the occasional architectural flourishes in functional buildings, convey the levels of capital that were available to exploit and transport these natural resources successfully.

The monumentality of the quarry landforms in their isolated and challenging mountain settings is intense and compelling; the huge stepped 'galleries' (working benches) carved from the mountainsides (such as at Penrhyn and Dinorwig), the deep pits (such as Dorothea and Penyrorsedd), the vast tips of waste rock towering over the town of Blaenau Ffestiniog, and the many miles of underground workings with their cavernous openings at Ffestiniog, and in the Bryneglwys Quarry convey the sheer scale of the industry.

The impact of these quarries and mines on the natural environment, and their own landforms and organisation, are attributes of the generations of physical labour invested in them, as well as of the skill of quarrymen, managers and specialists in making the best possible use of topography and geology to exploit them. The quarry landforms make clear the relentless persistence of generations of workers who used their hard-won skill and innovative technology to exploit slate for a global market. The engineered solutions to extracting, processing and transporting slate, which are evident in elements throughout the Nominated Property, also indicate the challenges faced by an extractive industry working in a mountainous environment, and show how both gravity and water-power were ingeniously harnessed to operate machinery.

The combined works of nature and of humankind are also represented by the quarry settlements, which range from Ffestiniog as the living 'city of slates' to the villages of Deiniolen and Clwt Bont, and the archaeological imprint of the long-abandoned houses of Treforys. Though each has its distinct character, they have in common that they also represent a new land-use from the period of the Industrial Revolution, making best use of the natural environment to establish homes for a new workforce beyond the traditional margins of cultivation.

Figure 3.7. A road toll-house at Porthmadog (Component Part 5) shows the uses that can be made of slate – as roofing and as wall-cladding as well as for shaped interlocking roof-ridges.

Figure 3.8 The surface landform of slate-working in Ffestiniog (Component Part 5), its proximity to the 'city of slates' and their powerful mountain setting are all evident in the aerial view.

This is evident in the visual relationship between a quarry face and its tips of waste rock, a mill to saw slate slabs established adjacent to a water supply, and a settlement for quarrymen and their families growing up alongside the railway which carried output to the sea.

The technically innovative railways connecting Penrhyn Quarry and the Ffestiniog quarries with the sea make clever and contrasting use of topography, in their use both of rope-worked inclined planes and of graded contour formations. These made their way respectively to Port Penrhyn, where construction began in 1790, and Porthmadog, which exported its first slate around 1811 – new coastal ports taking advantage of convenient shorelines to serve this transcontinental export trade.

Figure 3.9 Underground at Maenofferen in Ffestinog (Component Part 5) – this former working chamber is one of the few surviving examples of the oldest method of supporting a roof in a slate mine, by leaving a column of slate in place.

Figure 3.10 The Marchogion winding house for the drums, rope and brake which operated the lowest inclined plane on the Penrhyn Quarry Railroad (Component Part 1) shows the influence of canal engineering on railway technology, as it resembles a lock-keeper's cottage. This is one of the world's oldest upstanding railway buildings.

Criterion (v) – *The Slate Landscape of Northwest Wales* is an outstanding example of the industrial transformation of a traditional human settlement and marginal agrarian land-use pattern; it also exemplifies how a remarkably homogeneous minority culture adapted to modernity in the industrial era yet retained many of its traditional attributes.

Elements within the Nominated Property demonstrate the investment of skills, labour and minimal level of capital by a traditional Welsh-speaking population, which is evident not only in the scale and organisation of relict quarry landforms and underground workings but also in the quarrymen's *cabanau* ['cabins', where they gathered for their mid-day meal and for discussion, debate and recitals] and in *gwaliau* [slate makers' shelters], and in the family scale of barracks.

The persistence of rural settlement patterns throughout the Nominated Property, alongside imported types of dwelling and the formal organisation of urban space, indicate the strong continuity with the pre-industrial past of farms and smallholdings as well as the needs of an industry with a global reach. These form elements within the Nominated Property. Some were created by industrialists, such as Mynydd Llandygai, Treforys and Abergynolwyn, others by quarrymen and their families, such as Bethesda, Deiniolen and Blaenau Ffestiniog. Contrasts between them and within them indicate the economic pressures and contestation between different social groups which is a feature of industrialisation. These settlements – close to the quarries yet associated with farms and smallholdings that predate industry – retain multiple aspects of the traditional way of life, particularly its strong minority language. They remain a palpable 'living' testimony; just like the diminished but proud slate-working tradition and the railways that once hauled the slate.

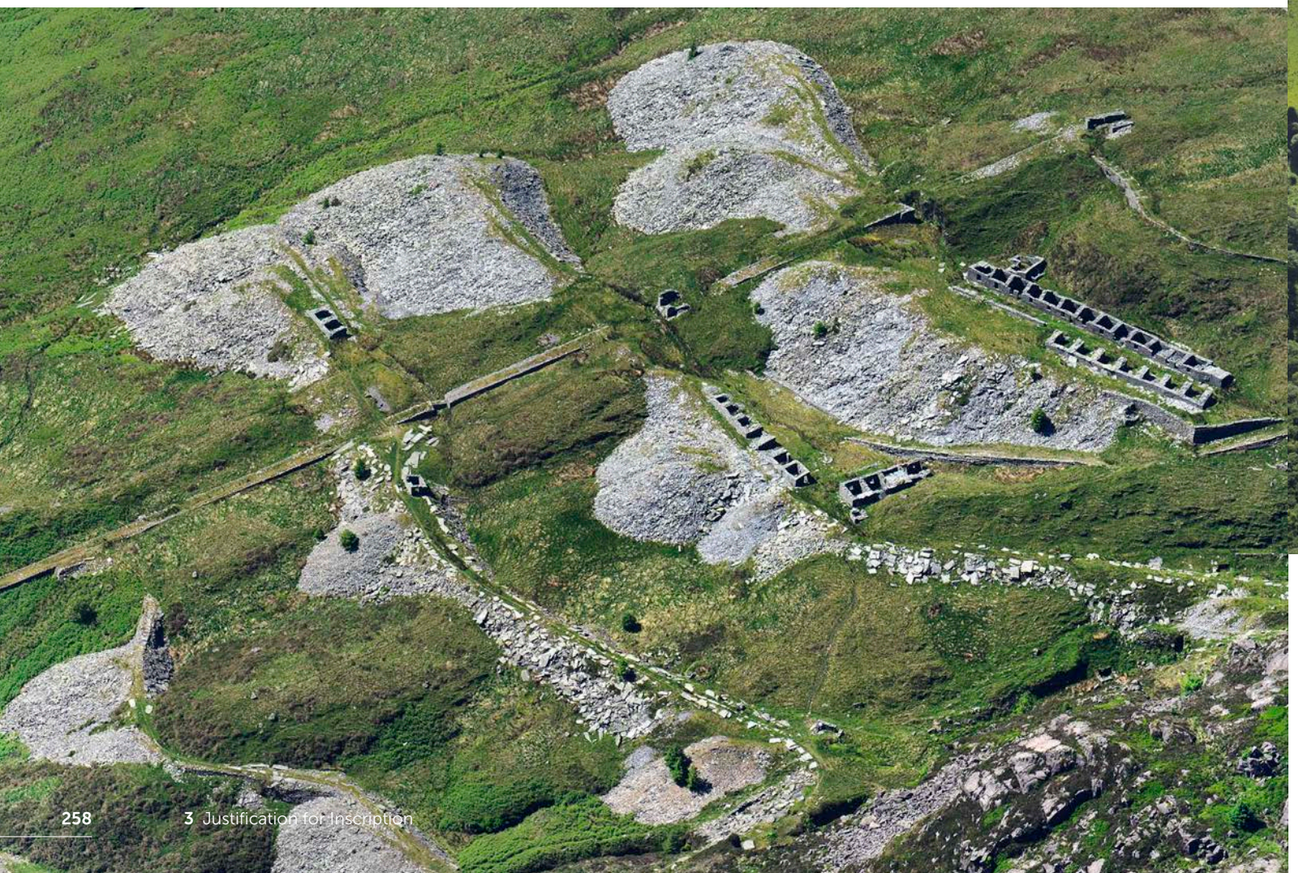


Figure 3.12 The inter-relatedness of different elements within the Nantlle Component Part is evident here – quarrymen's smallholdings occupy the marginal land to the left of, and above, the quarry pits.

Figure 3.13 The quarry village of Abergynolwyn (Component Part 6) reflects investment from the cotton industry of Lancashire, and was built around a pre-industrial farm-house on the turnpike road in the 1860s and 1870s.

Figure 3.11 This aerial view of Prince of Wales Quarry (Component Part 4) shows on the highest level (to the right of the photograph) barracks and slate-makers' shelters facing each other.

Figure 3.14 Ebenezer chapel, Deiniolen (Component Part 2) was founded alongside the course of the Dinorwig Quarry 'slate road' in 1823. The present building dates from a rebuilding of 1858, in the Classical style with a gable entry plan, by the minister-architect, the Revd Thomas Thomas.

Summary: three criteria, one cultural landscape

Humankind has always interacted with natural systems, and has needed not only to win new resources from the ground but also to process them, and to move them to markets. In addition, those who carry out this work, or who profit from it, must be housed and fed, which in turn evolves and sustains new ways of life and creates new social identities. The *Slate Landscape of Northwest Wales* reflects the profound social changes that distinguish the time-period 'The Industrial Revolution and the Advance of Science and Technology' and of 'European colonialism' in terms of its sudden transformational development, its technical innovations (including narrow-gauge railways), and its extensive reach.

This serial nomination therefore comprises the most exceptional examples that, together, illustrate the diverse heritage of a wider landscape created during the profound era of British industrialisation that changed the world. Component Parts include the largest slate operations in the world at the time, with examples of extraction, processing and transport that were the most technologically advanced, and employed the largest number of people. The strongly intervisible and interrelated elements confer a readily apparent meaning within an exceptional cultural landscape.

3.1.c Statement of Integrity

The Nominated Property contains all the essential interrelated and interdependent elements that convey attributes of proposed Outstanding Universal Value. Their visual integrity within intact entire landscapes, which include settlements and extensive transport systems, demonstrates the operation of a complete industry from original extraction to the export of products, and from workers' welfare and housing to the cultural, educational and spiritual life they created.

Economic slowdown in the twentieth century has substantially preserved the integrity of many of the key elements, as have active preservation and conservation initiatives. The lack of development pressure, together with protection afforded by the Snowdonia National Park and by the *Register of Landscapes of Outstanding Historic Interest in Wales* (a non-statutory designation that is a material consideration in the Welsh planning process), has meant that this cultural landscape survives to an exceptionally high degree, and in ways that can readily be understood.

Conditions of integrity also include social and cultural practices and values, economic processes and the intangible dimensions of heritage. For this reason, the quarry settlements are central to the cultural integrity of the Nominated Property; their distinctive character as vital human communities endures strongly. Continued mineral extraction and processing outside the Nominated Property in the wider protected area preserve traditional craft skills and contribute to the integrity of Nominated Property as an associative value by providing living evidence of the working methods which have created the evolved cultural landscape. Linkages between quarries and the sea are also particularly evident, and set *The Slate Landscape of Northwest Wales* apart from historically significant slate landscapes on the European continent and in North America.

Boundaries

The boundaries of the Nominated Property capture the principal slate-producing areas in Northwest Wales, together with their associated industrial heritage that includes the most significant processing facilities, settlements and transport routes, and define the cultural landscape which this industry created. Each Component Part has been selected for its particular contribution to the proposed Outstanding Universal Value of the overall property. Around each one, boundaries are drawn to include the most significant relict quarries and underground mines, processing facilities, settlement and transport routes. The six Component Parts of the Nominated Property ensure the complete representation of the features and processes which convey significance and, collectively, contain all the attributes and elements necessary to express its proposed Outstanding Universal Value.

Completeness

Overall, the survival and completeness of the range of attributes, elements and features that make the Nominated Property culturally significant is exceptional.

Attributes exemplify the industry's development through time, from outcrops which first drew the attention of Romano-British quarrymen (attested in recovered roofing slates of the period) through the growing mechanisation of the industry in the nineteenth century, to modern investment, and strongly articulate the major capitalised period from 1780 to 1940. Attributes show how different types of

topography and geology, as well as variations in social conditions, and levels of capital and landownership, meant that quarrying, processing, transport and settlement in the six Component Parts evolved in different ways.

Brief integrity statement for each Component Part

A full and holistic understanding of *The Slate Landscape of Northwest Wales* is made possible by the sum of the diverse cultural landscapes contributed by each Component Part. Each is distinguished by specific combinations of shared attributes and distinctive elements that demonstrate a high level of functional integrity and an integrated wholeness. Their selection was further guided by exceptional completeness (the landscapes having suffered virtually no adverse effects of development) and by defining them so that extant mineral permissions are located outside the Nominated Property in the wider protected area.

Component Part 1. Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn

This Component Part extends from the Quarry itself to the purpose-built Port Penrhyn from which slate was exported around the world. It is characterised by exceptionally strong visual and functional links from mountain to sea.

The relict quarry landform includes the stepped galleries and the tips, which survive in their mid-twentieth century state. Quarrying and processing continues outside the Nominated Property in the wider protected area, creating a landform that strengthens the cultural landscape values of this Component Part, and which retains many of the traditional characteristics of its relict counterpart.

The formations of the two contrasting historic railway systems, one horse-drawn, the other steam-operated, form strong linear landscape features that lead from the Felin Fawr Slate-Slab Mills (associated with, and immediately adjacent to, the Quarry) all the way to Port Penrhyn. Their course is almost entirely intact and survives in a landscape that has suffered remarkably low levels of subsequent development. The nineteenth century settlements for quarrymen and their families on Mynydd Llandygai and at Bethesda remain intact and inhabited, and contrast with the opulence of the owning family's Penrhyn Castle and Park; The Castle itself and its Park have suffered no adverse development or neglect and are now managed by the National Trust as a symbol of the immense wealth that was generated by, and reinvested in, the slate industry as well as in estate improvement.

This Component Part is set wholly within an historic landscape identified in the *Register of Landscapes of Outstanding Historic Interest in Wales*.

Component Part 2. Dinorwig Slate Quarry Mountain Landscape

This Component Part conveys the scale and extent of operations in the mountainous region at the foot of Snowdon (the highest mountain in Wales), as well as the highly engineered approach the environment required, and the paternalism the owning family adopted. Within the Quarry landform, the stepped galleries, tips and processing areas on the slopes of Elidir Fawr and overlooking Peris Lake are well preserved – including an unsurpassed system of inclined plane railways, together with mills and machinery that survive at the isolated 'Australia' Gallery and its Slate Mill. The Anglesey Barracks, where some Dinorwig quarrymen lodged by the week, have been consolidated as a substantially intact ruin that overlooks lakes that were once used for slate transport. The quadrangular workshops which formed the Dinorwig Slate Quarry Engineering Complex survive remarkably intact; this site has been adapted with minimal change to become the National Slate Museum, including its operational waterwheel of 1870. The innovative Dinorwig Slate Quarry Hospital to treat injured quarrymen is fully conserved and open to the public. Roads, bridges and the original railroad of 1825 remain in use or exist as relict features. Extensive worker settlements (Deiniolen, Clwt y Bont, Dinorwig and Fachwen) demonstrate a high level of survival and retain their distinctive patterns of laneways and roads in a setting little changed from the peak years of the industry. Dinorwig Power Station, a pumped-storage hydro-electric installation completed in 1984, was constructed in the lakeshore part of the quarry and – to preserve the natural beauty of the lower slopes of Snowdon – the power station itself is located 750m inside the Elidir Fawr mountain. The facility is open to public tours and represents not only a leading example of green energy production but a continuity in Snowdonia's traditional use of water combined with topography.

This Component Part is set wholly within an historic landscape identified in the *Register of Landscapes of Outstanding Historic Interest in Wales*.

Component Part 3. Nantlle Valley Slate Quarry Landscape

The Nantlle valley-floor is one of the world's most pristine, compact and yet diverse archaeological landscapes of slate quarrying, showing how extraction evolved within a pre-industrial environment, in multiple ownership. The relict landforms of the quarries are clearly evident and all survive in a robust condition together with the distinctive remains of the ropeway systems which these pit-workings required due to their topographical setting (a contrast with mountain landscapes). The relict course of the Nantlle Railway and its tributary inclined planes survive. Flooding of the valley-floor pits demonstrates the problems of water-management in this environment, exemplified by the different types of pumping system, including the intact Cornish beam engine at Dorothea Quarry and remains of a waterwheel-powered flatrod system nearby. Numerous tips of waste rock show how confined tipping proved problematic for individual quarries, whilst pre-industrial farmhouses and gentry dwellings show how they were adapted to quarry use. Characteristic nucleated and dispersed settlements for quarrymen and their families (Cilgwyn Mountain and Nantlle village) retain their historic form and have been subjected to very little subsequent development.

This Component Part is set wholly within an historic landscape identified in the *Register of Landscapes of Outstanding Historic Interest in Wales*.

Component Part 4. Gorseddau and Prince of Wales Quarries, Railways and Mill

This Component Part conveys the remoteness of operations in a remote and barely populated mountain landscape. The two relict slate quarries retain their Victorian pattern of stepped gallery workings, tips and inclined planes. The

complete course of the two railway systems unites them with the spectacular conserved Ynysypandy Slate-Slab Mill and the deserted quarrymen's village of Treforys.

This Component Part is set wholly within the Snowdonia National Park.

Component Part 5. Ffestiniog: its Slate Mines and Quarries, 'city of slates' and Railway to Porthmadog

The striking relict surface landscape of the Ffestiniog quarries, including their landform-scale waste tips, dominates the town of Blaenau Ffestiniog with little change from the early twentieth century. The town itself is one of the best-preserved industrial settlements in Wales. Some of the best examples of extensive relict underground workings in the Nominated Property survive at Cwmorthin and Maenofferen quarries. These are accessible, technically significant and include rare *in situ* historic machinery. Significant elements within the quarries remain in use (such as the early Pant yr Afon Hydro-Power Station) or are undergoing planned conservation. The home of one of the quarry-owning families, Plas Tan y Bwlch, is in use as the Snowdonia National Park Study Centre, set within an improved aristocratic landscape of the late eighteenth to mid-nineteenth century. The operational Ffestiniog Railway makes use of its distinctive nineteenth century civil engineering and, with nearly all its historic course in active use, strongly retains the general heritage ambience of a Victorian steam railway serving the slate industry. The soundly engineered slate-quays on the Dwyryd River and at Porthmadog Harbour survive well and are not under threat.

This Component Part is set wholly within an historic landscape identified in the *Register of Landscapes of Outstanding Historic Interest in Wales* or within the Snowdonia National Park.

Figure 3.15. The slate tips of Pen yr Orsedd Slate Quarry dominate the village of Nantlle in Component Part 3. The village housed the Pen yr Orsedd workforce and their families.

Component Part 6. Bryneglwys Slate Quarry, Abergynolwyn Village and the Talyllyn Railway

The strong functional and visual relationship between the surface workings and the underground chambers of Bryneglwys Slate Quarry is attested by the uniquely surviving archaeology of their water-powered chain-incline ropeway. The setting is a combination of forest and open pasture, with no subsequent development. The active Talyllyn (heritage) Railway has operated with little major change since the 1860s, connecting the quarry landscape with the operational main line system in the town of Tywyn. The Talyllyn Railway plans to conserve the relict inclined plane, which connected it to the quarry village at Abergynolwyn, and which retains its Victorian street plan and character.

This Component Part is set wholly within an historic landscape identified in the *Register of Landscapes of Outstanding Historic Interest in Wales* or within the Snowdonia National Park.

Adverse impacts

Whilst some elements are at risk from decay and minor neglect, in each case the situation is managed by effective legislation and by management, with action planned to improve the state of conservation and security. There is no existing or anticipated pressure within the Nominated Property from any visually intrusive large-scale developments. There is some local aspiration for renewable energy installations, which will be managed through the planning process.

Continued decay is a particular challenge when elements include small stone-built structures never intended for a long life, built on made-up ground. Some of the larger buildings in more near-complete condition – such as the Cornish beam engine at Dorothea Quarry in Component Part 3 and the slate mills at Dinorwig Quarry in Component Part 2 and Maenofferen Quarry in Component Part 5 – have been at risk from the theft of components and from dilapidation. Some machinery remains at risk from deterioration, such as the 'Blondin' ropeways at Pen yr Orsedd Quarry in Component Part 3. In each case, the situation is under control from the point of view of effective legislation and management, and action is being taken to improve security and state of conservation. This will also be addressed through the Local Management Plan.

3.1.d Statement of Authenticity

The Slate Landscape of Northwest Wales is an exceptionally well-preserved cultural landscape that retains an unusually high level of authenticity. Attributes of proposed Outstanding Universal Value are conveyed by physical property that is clearly identified and understood in terms of date, spatial distribution, use and function (including living communities and operational railways), form and design, materials and substance. This is equally true of their interrelationships and connectivity, and of the overall functional and compositional integrity of a series which includes historic industrial activity, transport and settlement. The Nominated Property further embodies a vibrant cultural tradition, including slate-working skills and the continued widespread use of the Welsh language.

Overall, *The Slate Landscape of Northwest Wales* has experienced remarkably little intervention since the main period of industrial operation. The primary cultural character is unchanged and the dominant presence of the quarries, associated settlements and transport routes, remains strong and highly visible. The archaeological potential of quarries, transport routes and deserted settlements remains high. There have been no conjectural reconstructions, and restoration projects have been based on sound conservation principles. Settlements are integral to the cultural authenticity of the bid; they retain their cultural character.

Key attributes are reflected in landscape qualities and features of quarrying including the relict working areas, tips and transport routes, together with associated settlements and social infrastructure.

Form and design

Relict quarries retain their landform essence. Rock-falls occasionally take place in hillside and pit workings, but tips assume a natural angle of repose and are stable. The formations of inclined planes and internal railway systems draw the eye to the relationship between working faces, tips and mills, and to the rational organisation of the workspace.

Inhabited settlements preserve the historic street patterns, public buildings, houses, garden-plots and boundaries which explain their location, ownership (whether landed estate, freehold or unauthorised occupation), and their relationship to pre-industrial patterns of landownership. A deserted settlement such as Treforys is ruinous but rich in archaeological potential; its plan illustrates its origins in contemporary thinking about rural settlement. Owners' houses and parks retain their nineteenth century form.

The transport routes preserve their eighteenth and nineteenth century engineering; the two active railways preserve the form and design of the routes, buildings and their mechanical engineering. The former Dinorwig Slate Quarry engineering complex is little changed from its condition in the 1870s and houses the National Slate Museum. At the adjacent Vivian workings, an inclined plane has been conserved and returned to operation.

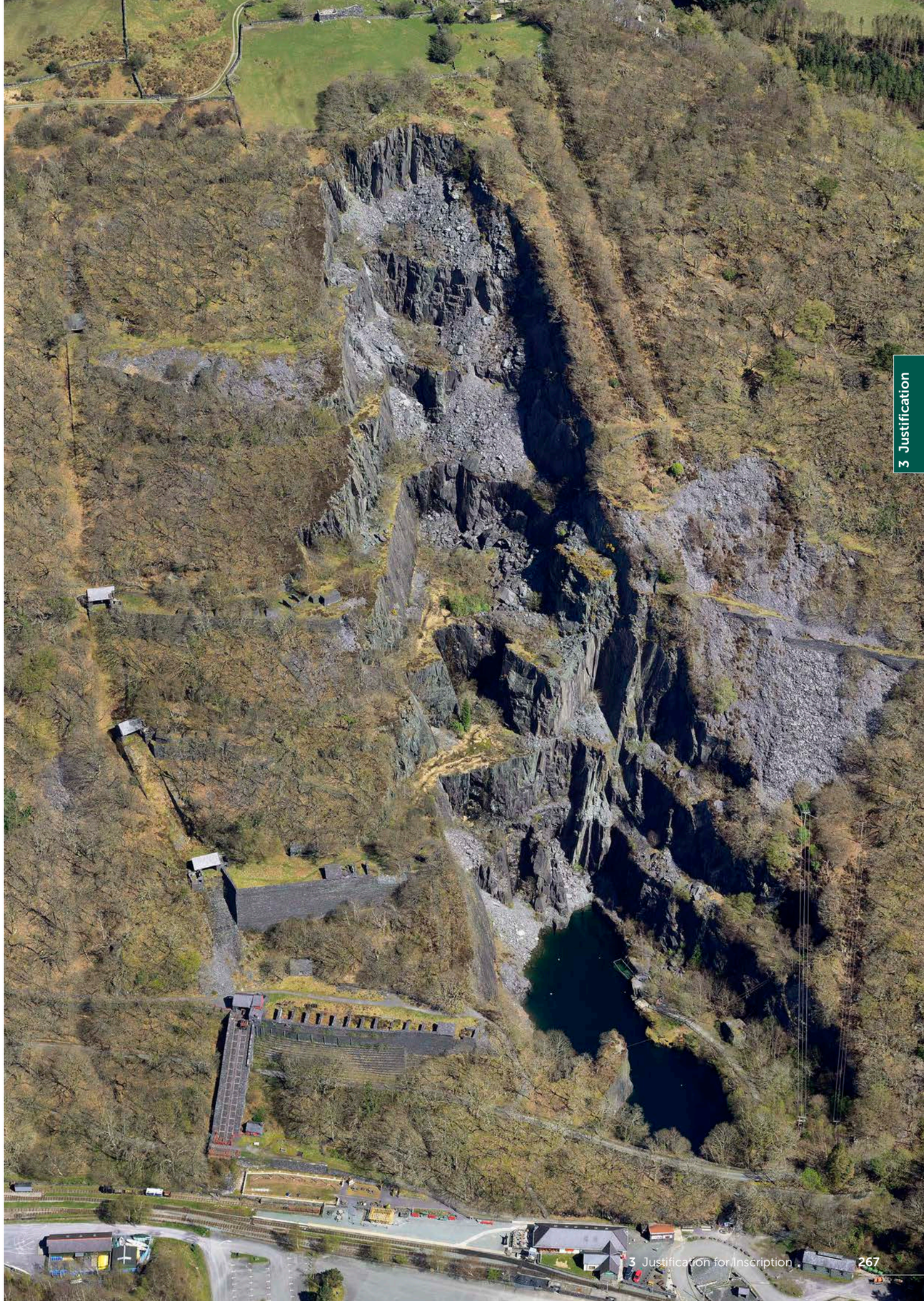


Figure 3.16. Vivian Slate Quarry in Dinorwig Component Part 2. The organisation of the quarry is clear to see from its stepped galleries, processing areas and inclined planes, including the restored and operating V2 incline (the lowest in the series). It lies within the Padarn Country Park and is accessible to visitors.

Materials and substance

The use of slate is widespread within all parts of the Nominated Property, both as roofing material and as architectural components, grave-stones, field boundaries and walling. Other building materials reflect related international and national trade patterns which depended on slate distribution networks, including slate-ships returning with Canadian timber, and bricks arriving by rail from Northeast Wales.

Use and function

All the quarries within the Nominated Property are either relict or in re-use for power-generation or for activity- and heritage-tourism. Active quarrying outside the Nominated Property in the wider protected area conveys the sense of human intervention in the natural environment, and of movement and activity from which the cultural landscape of the Nominated Property evolved.

Of the railways which formerly carried slate, the Ffestiniog and the Talyllyn are in active re-use as heritage systems, with a third, the Llanberis Lake Railway, operating on an historic formation. The population of the quarry settlements is less than at the industry's height in the late nineteenth century, but they remain viable communities.

Figure 3.18. Locomotives have taken water at this column on the Talyllyn Railway (Component Part 6) since the 1920s.

Traditions, techniques and management systems

Authenticity takes into account the traditional craft skills and techniques of the Welsh slate quarryman, some of which are still practised today as they were centuries ago. Slate blocks still have to be for the most part split by hand to create roofing elements, with a hammer and a chisel. The operational railways which once carried slate also keep alive skills and knowledge from the nineteenth century, including driving and stoking steam locomotives and guarding trains, as well as carpentry, metallurgy and decorative paint-work.

The cultural confidence of the slate communities is exemplified in the Welsh language itself (spoken fluently by seventy per cent of their inhabitants), a respect for learning, a love of literature and music, and a strong communal ethos. The strength of the language is further evidence of the cultural authenticity of the

Figure 3.17. The slate grave-stone, dated 1805, of Suwsanna Pierce in St Michael's churchyard, Ffestiniog (Component Part 5), is the earliest stone block sawn by a circular saw so far identified in the world.

Nominated Property that is strongly supported by community. Cultural confidence is also given material form by social infrastructure, from Nonconformist chapels to surviving examples of the *cabanau*, as well as by the vibrant modern community life of the region.

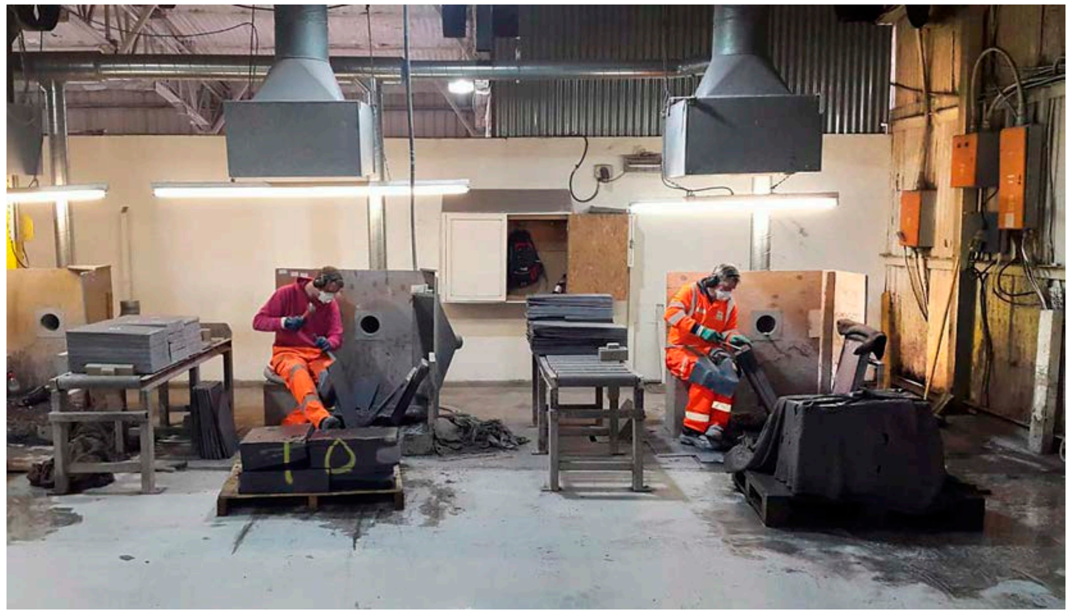


Figure 3.19. Welsh slate quarrymen still split slate by hand to create roofing elements in a modern mill at Penrhyn Quarry, outside the Nominated Property.

Location and setting

The location and setting of the Nominated Property is exceptionally authentic. The mountainous location of the quarries shows how geology determined extraction methods, how watercourses lead from upland reservoirs to wheel-pits and turbines, and how railways and inclined planes lead to a harbour or to a mainline railway. The quarries' visual relationship with the settlements is also clear; settlements illustrate the extension of the margins of cultivation as the need arose to house workers. Several settlements are defined by the former slate-carrying transport routes that run through them. Overall, their spatial organisation is relatively unaltered, with little modern development, within an historic agricultural environment.

Language and other forms of intangible heritage

Authenticity extends to language and other forms of intangible heritage. *The Slate Landscape of Northwest Wales* remains largely Welsh in speech, and many of the slight dialectical variations between the six Component Parts reflect patterns of migration to them from different parts of the region in the nineteenth century. The Welsh language is also evident in written form, in place-names, street-names, house-names and shop, public houses, chapel and business signage.

Figure 3.20. Slate as community pride, and as recognition of hard times in the past: this public scuplture on the streets of Blaenau Ffestiniog names every slate quarry in Wales and includes the saying *Llifa amser yn ei flaen a llifa dŵr; ni lifa bywyd creigiwr* ['Time flows forward and water flows; not the life of a slate rockman'].

Spirit and feeling

Authenticity also extends to spirit and feeling. This includes the sense of remoteness and the harsh living environment evident in the barracks in Component Parts 2 and 4, as well as the high levels of authenticity encountered in the abandoned workings underground, where not only does relict equipment survive, but so do graffiti recording quarrymen's names. The quarrymen's sense of ownership of the places where they worked, also remains strong in the modern communities of the six Component Parts. It is evident in their descendants' pride in their own village or town, and in the past generations who earned their living quarrying, processing and transporting slate in this beautiful but challenging environment.

Brief Authenticity Statement for each Component Part

Component Part 1. Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn

This Component Part is located within a setting that extends from the straits which separate the mainland of Wales from the island of Anglesey, and which includes both improved agriculture, mountain and moor. The relict element of Penrhyn Slate Quarry retains its landform dating from the principal period of operation. The former slab mills and workshops are in re-use as commercial outlets but retain their essential structure and built materials, and character. Part of the railway forms a walking trail/cycleway, and part has been laid as a demonstration railway. Port Penrhyn is in minor industrial use and for fishing and leisure. It occasionally exports slate. The quarry settlements are inhabited but retain an overall high level of authenticity in form, design and materials. Penrhyn Castle (National Trust) is a highly authentic Grade 1 listed structure and is run as a popular visitor attraction. The surrounding Park is managed by the Penrhyn Estate. Part of the quarry landform is home to a contemporary adventure tourism enterprise.

Component Part 2. Dinorwig Slate Quarry Mountain Landscape

The mountain setting of this Component Part has seen little change since the late nineteenth century. The quarry landform is relict, and retains its stepped working galleries leading to tips of waste rock, and the massive system of inclined planes. The National Slate Museum within the former Quarry Engineering Complex, is conserved to a high standard with little change from its operating condition, including its historic machinery. A country park includes the Quarry Hospital Museum, a small part of the main Dinorwig quarry and to the Vivian quarry, where the conserved V2 inclined plane operates and where there is a popular sub-aqua diving venue that offers commercial training. The track-bed of the Quarry Railway has been re-laid as a visitor attraction. Quarry settlements remain inhabited, and retain a high degree of authenticity in terms of form, structure, buildings, materials, and character.

The lower parts of the quarry landform, by the lakeside, have been adapted to generate hydro-electricity. The National Slate Museum attracts over 140,000 visitors annually.

Component Part 3. Nantlle Valley Slate Quarry Landscape

The setting of these valley-side and valley-floor quarries extends from the summit of Snowdon to the sea. The quarries are relict, their landform comprising pits, many now flooded, and the distinctive patterns of waste rock tipped in often confined spaces, within evident pre-Industrial field-patterns and their farm-houses. The Cornish beam engine at Dorothea is *in situ* and its main engine-house is roofed. The course of the Nantlle Railway and of its associated inclined planes is evident. Adjacent quarry settlements remain inhabited and retain a high degree of authenticity in terms of form, structure, buildings, materials, and character.

Long-standing but informal use of Dorothea Quarry for sub-aqua sport diving has been formalised and regulated on a short-term basis.

Component Part 4. Gorseddau and Prince of Wales Slate Quarries, Railways and Mill

This Component Part preserves the authentic spirit and feeling of remote workings and of abandoned communities. As a completely relict and isolated industrial landscape, it retains its pristine authenticity, including the Ynysypandy Slate-Slab Mill, which has been conserved to a high standard. The courses of the railway systems are evident.

Component Part 5. Ffestiniog: its Slate Mines and Quarries, 'city of slates' and Railway to Porthmadog

The setting of this Component Part extends from mountainous upland along a wooded valley to tidal rivers and an estuary. Quarries and mines in the Nominated Property are relict and remain authentic. Underground adventure and heritage tourism is offered at Cwmorthin Quarry. The Ffestiniog Railway is renowned for its impeccable authenticity and operates as a visitor attraction, carrying over 120,000 passengers annually. Blaenau Ffestiniog, the 'city of slates', is inhabited and retains a high degree of authenticity in terms of form, structure, buildings, materials and character. Plas Tan y Bwlch and its grounds remains authentic in materials and character, and today form the Snowdonia National Park study centre, offering courses on the history and archaeology of the Welsh slate industry. The quays at Porthmadog and on the Dwyryd River retain their nineteenth-century fabric.

Component Part 6. Bryneglwys Slate Quarry, Abergynolwyn Village and the Talyllyn Railway

This Component Part is located within a steep-sided valley which broadens out to a coastal plain. The relict quarry is located within an area of managed forestry and is wholly authentic, including underground workings. The Talyllyn Railway operates as a visitor attraction on its original formation, and carries over 45,000 passengers annually. The village is inhabited and retains a high degree of authenticity in terms of distinctive nineteenth-century layout, structures, buildings, materials and character.

3.1.e Protection and Management Requirements

Context

Responsibility for the United Kingdom's compliance with the UNESCO World Heritage Convention lies with the Department for Digital, Culture, Media and Sport (DCMS). DCMS liaises with the Welsh Government on the nomination, conservation and protection of World Heritage sites in Wales. The management of inscribed World Heritage sites in Wales is a devolved matter. Wales has three existing World Heritage sites and has developed mechanisms and guidance to ensure that these are appropriately protected and cared for, in line with UNESCO operating principles. The Welsh Government's approach to the protection and sustainable management of World Heritage sites is set out in *Managing Change in World Heritage Sites in Wales* (2017) and is based on three principles:

- the statutory designation of specific historic assets within World Heritage sites and associated mechanisms to manage and control works
- the collaborative creation and implementation of World Heritage Site management plans to ensure the effective and active involvement of all key stakeholders
- the use of the spatial planning system including policies in local development plans to guide appropriate development.

The Nominated Property and its setting will be afforded high levels of protection through the implementation of existing legislation: *The Ancient Monuments and Archaeological Areas Act 1979, The Town and Country Planning Act 1990, The Planning (Listed Buildings and Conservation Areas) Act 1990*, *The Historic Environment Act (Wales) 2016* and through the implementation of policies within the Gwynedd & Anglesey Joint Local Development Plan and Snowdonia National Park Authority Local Development Plan.

Specific historic assets within the Nominated Property which meet national criteria are protected by statutory designation as either Scheduled Monuments (*The Ancient Monuments and Archaeological Areas Act 1979)*, Listed Buildings and Conservation Areas *(The Planning Listed Buildings and Conservation Areas Act 1990)*, or Registered Parks and Gardens (*The Historic Environment (Wales) Act 2016)*. Works to designated assets are controlled by statutory consent procedures.

Protection of the Nominated Property is also assured through the spatial planning system, *The Planning (Wales) Act 2015* and *Planning Policy Wales* (edition 10, 2018) which provides guidance on inscribed World Heritage sites (paragraphs 61.6 and 61.22), specifying that the Outstanding Universal Value of World Heritage sites must be conserved. Local planning authorities (Gwynedd Council and the Snowdonia National Park Authority) are each required to prepare a local development plan for their area, which sets out appropriate policies to manage new development.

Gwynedd Council has prepared a joint local development plan (with the neighbouring Isle of Anglesey County Council) which was adopted in July 2017. Relevant policies include *PS17: Preserving and Enhancing Heritage Assets* and *AT1: Conservation Areas. World Heritage Sites and Registered Historic Landscape, Parks and Gardens*.

The *Eryri Local Development Plan 2016-2031* was formally adopted by the Snowdonia National Park Authority in February 2019. The local development plan includes *Strategic Policy Ff: Historic Environment*, which states that development will not be permitted that will adversely affect in any way heritage assets, including World Heritage Sites, and Candidate World Heritage Sites.

All of the Component Parts of the Nominated Property lie within areas of Wales that are subject to strong levels of landscape protection through designation as a National Park and registration as Historic Landscapes on the Cadw-CCW-ICOMOS-UK *Register of Landscapes of Outstanding Historic Interest in Wales.* These will be utilised through the application of existing policies within the Snowdonia National Park and Gwynedd Local Authority to afford the best level of protection for the proposed World Heritage Site and its setting.

National Parks are the highest level of landscape protection within the UK planning system. Component Parts 4 and 6 are located within the Snowdonia National Park. The transport element of Component Part 5 runs through the National Park, and Component Parts 1, 2 and 3 are located immediately adjacent to the National Park and thus benefit from protection through their proximity to the National Park boundary.

The *Register of Landscapes of Outstanding Historic Interest in Wales* is a non-statutory instrument but is a material consideration in the planning process and provides information to decision-makers and landscape managers to help ensure that the historic character of the landscape is sustained, and that, where change is considered, proposals are well-informed. Existing policies relating to these designations provide the necessary mechanisms to enable the setting, key views and any attributes that are functionally important as a support to the proposed World Heritage Site to be managed by Local Authorities through the statutory planning system. Detailed Landscape Character Studies have been undertaken within all areas to inform planning policy and decisions.

Also relevant to the nomination is the broader distinctive and forward-thinking legislative context within Wales. *The Well-being of Future Generations (Wales) Act 2015* sets seven well-being goals that together provide a shared vision for the future

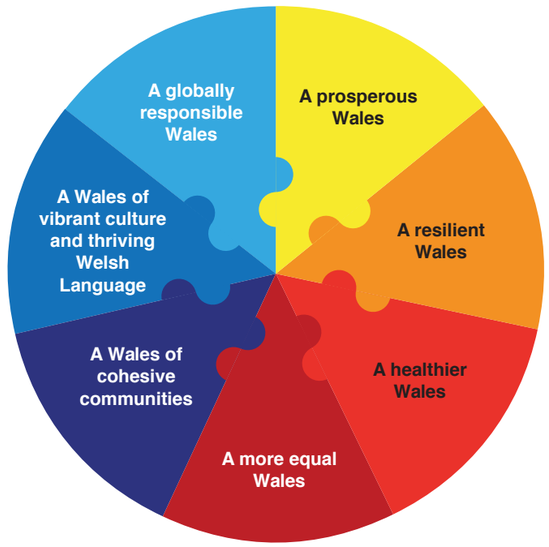


Fig 3.21. Goals of the Well-being of Future Generations (Wales) Act 2015.

of Wales. Policies developed to manage the Nominated Property will each contribute to one or more of these goals, which have the principle of sustainable development at their core. The 2015 Act requires public bodies in Wales to work towards the seven goals of: a prosperous Wales; a resilient Wales; a healthier Wales; a more equal Wales; a Wales of cohesive communities; a Wales of vibrant culture and thriving Welsh language; a globally responsible Wales. This nomination is a key driver to achieving the aims of the Act in the slate communities of Northwest Wales.

Intangible assets, particularly the Welsh language, will be protected and promoted within the Nominated Property by existing national and county-based policies, and by the strong support afforded by Gwynedd Council and Snowdonia National Park for cultural activities, including music-making, drama and active encouragement for all inhabitants to learn and use the Welsh language.

Management in Practice

Management of a complex multiple-site Nominated Property in multiple ownership requires close and effective partnership where national and local government work with the lead organisation and stakeholders, particularly the communities and businesses of *The Slate Landscape of Northwest Wales*, to protect and sustain the proposed Outstanding Universal Value of the Nominated Property through a clear understanding and valuing of its attributes. Attributes of proposed Outstanding Universal Value have been defined and articulated not only within this Nomination Document but also in *The Slate Landscape of Northwest Wales Property Management Plan* which establishes the over-arching strategies and mechanisms by which the proposed World Heritage Site will be managed.

Responsibility for the implementation of *The Slate Landscape of Northwest Wales Property Management Plan* will sit with a multi-organisational Partnership Steering Group established by the lead organisation, Gwynedd Council and chaired by Lord Dafydd Wigley. The Group comprises officials and Elected Members from Gwynedd Council and the Snowdonia National Park Authority, Cadw, the National Museum of Wales, Bangor University, the Royal Commission on the Ancient and Historical Monuments of Wales and the National Trust. The Elected Members provide community representation. Business interests are represented by quarry owners and specialist advice is taken from dedicated experts in conservation, regional history and in global heritage. The appointed Property Coordinator for *The Slate Landscape of Northwest Wales* will also report to this group.

Below *The Slate Landscape of Northwest Wales Property Management Plan* is a series of Local Conservation Management Plans which include site-specific practical recommendations designed to provide owners and land managers with the information they require to assist them manage their historic assets within the Plan area. Work is currently underway to prepare these plans, each being developed through a process of collaborative discussion between the Local Authorities, members of the World Heritage Site Partnership Steering Group and site owners. It is anticipated that all Local Conservation Management Plans will be in complete draft form by the middle of 2020.

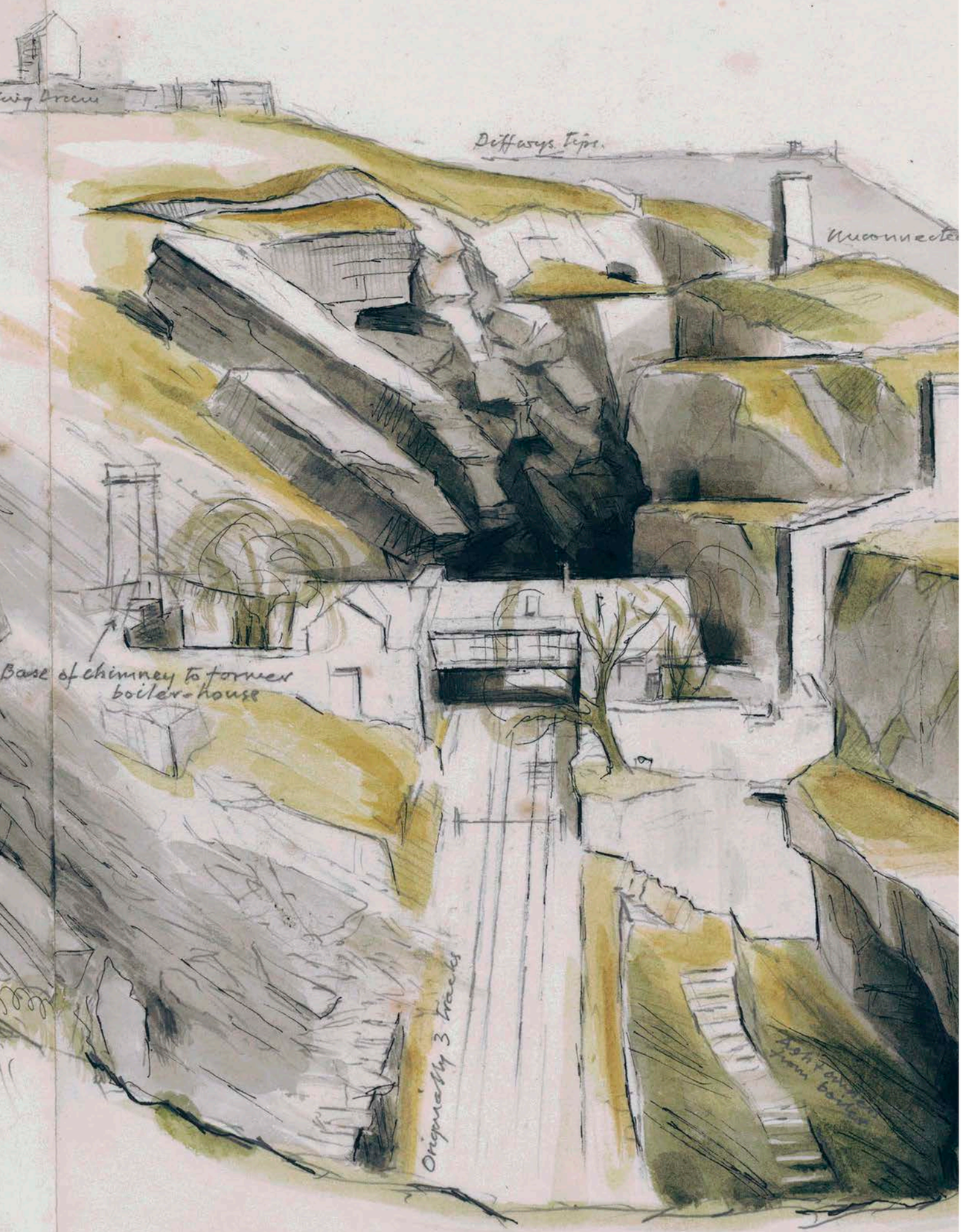
Long-term challenges

Climate change is a significant challenge to global eco-systems, and has the potential to impact negatively on the Nominated Property. Local Conservation Management Plans will have regard to the long-term effects of climate change as its implications become clearer. Otherwise, there are no currently known significant development or operational threats that would impact negatively on the proposed Outstanding Universal Value of the Nominated Property.

No primary mineral working takes place – or will take place – within the boundaries of the Nominated Property or within the boundary of the National Park. The Component Part boundaries have been drawn in agreement with mineral operators and the planning authority to include only historic workings where mineral operations no longer take place and exclude existing mineral permissions and areas where landowners foresee possible future mineral extraction. Some active mineral extraction, tipping, processing and secondary reworking will continue to take place in the wider protected area outside the boundary of the Nominated Property. However, this is on a small scale, accounting for less than 2% of the total area of the wider protected area which serves as a Buffer Zone for the Nominated Property. All operations are managed under the strict controls of existing mineral planning legislation and do not negatively impact on the attributes of proposed Outstanding Universal Value.

In relation to relict features within the Nominated property – such as quarry landforms, underground features, buildings, structures and transport routes – long-term challenges for their protection and management relate to ongoing natural deterioration, increasing natural re-vegetation, and vandalism and theft. In support of the Nomination, a programme of historic asset condition inspections has been carried out providing a base-line dataset that will monitored going forward. Where appropriate, recommendations for interventions to arrest change will be addressed within individual Local Conservation Management Plans. Recently abandoned historic buildings may lend themselves to adaptation and re-use as a good means to ensure their continued maintenance and economic benefit.

The long-term challenge to the historic settlements within the Nominated property relates to the loss of character and the failure to maintain properties in good condition leading to loss of characteristic features such as wrought-ironwork, porches, chimneys and fenestration; the visual impact of new housing on existing street patterns, and potential abandonment and dereliction of redundant historic buildings, in particular churches and chapels. Such challenges are well-managed utilising Conservation Areas and outside of these areas through Gwynedd Planning Policy AT2, which states that all development proposals will be required to conserve and seek opportunities to enhance buildings, structures and areas of locally or regionally significant non-designated heritage assets, which create a sense of local character, identity and variation across the Plan area. In support of the Nomination, and to provide a robust evidence base to guide the protection and management of the settlements within the Nominated Property a series of Urban Character studies have been commissioned.



3.2 Comparative Analysis

A rigorous and comprehensive comparative analysis has been undertaken in order to determine the significance of *The Slate Landscape of Northwest Wales* in both a national and international context.

A **Basis for Comparison (Section 3.2.i)** is set out here, in which the Values of the Nominated Property have been determined in order to test them against similar or potentially comparable properties. The **Results** are presented in the following sections:

3.2.ii Results 1: Properties already inscribed on the World Heritage List

3.2.iii Results 2: Properties on State Party Tentative Lists

3.2.iv Results 3: Quarrying and mining landscapes neither on the World Heritage List nor on State Party Tentative Lists

As *The Slate Landscape of Northwest Wales* is a serial nomination, these sections are followed by a **Justification for the selection of Component Parts (Section 3.2.v)**.

In addition, a comparative analysis has been undertaken of particularly significant elements across the Nominated Property where an international typology is relevant. The rationale for their inclusion is set out in the **Justification for the selection of Elements (Section 3.2.vii)**.

On this basis, an overall **Conclusion (Section 3.2.viii)** sets out the exceptionality of the Nominated Property.

Figure 3.22. The up-haulage inclined plane at Maenofferen Quarry (Element 5.5) sketched by Falcon Hildred. Since the late 1950s, Falcon has pursued a unique personal project to make a record of an industrial culture he calls 'worktown'. His drawings and water-colours of the Welsh slate industry capture the spirit and feeling of the quarries and their townscapes, particularly of Ffestiniog where he lives.

3.2.i Basis for comparison

The proposed Outstanding Universal Value of the Nominated Property and the key attributes which define it are described in section 3.1 and summarised in section 3.3. These same values are used in this comparative analysis, together with the measures of authenticity and integrity to assess the sites and landscapes. Protection and management is also a consideration.

The Nominated Property is a cultural landscape of the Industrial Revolution and of European domination of global markets. It is located in a mountainous environment and is on a considerable scale. Its attributes include the tangible evidence for quarrying, mining, processing, handling and transporting slate, for housing the workforce, and for the culture it created and sustained.

The category of cultural landscape is therefore appropriate for this nomination, together with the application of the second category: the organically evolved landscape. Considering the further two sub-categories, then *The Slate Landscape of Northwest Wales* is a substantially relict landscape, though settlements are inhabited and maintain their traditional way of life, and railways in some cases remain operational. The current active working of slate, which takes place only in the wider protected area and setting, is an associative attribute which contributes to greater understanding of proposed Outstanding Universal Value.

Type of Property

The cultural landscape category requires contextualisation, spatial continuity and a density of attributes that includes processes and close interrelationships. This means that Component Parts must be selected on the basis of a clear rationale and methodology whereby each one makes a clear and substantial contribution to each of the inscription criteria and to the series as a whole (its potential Outstanding Universal Value).

Size of Property

The property represents the key components of an industrial cultural landscape that is regional in scale and which has a powerful and readily recognisable landform dimension. *The Slate Landscape of Northwest Wales* represents the most significant parts of this regional landscape that ultimately produced around thirty per cent of world output, seventy-five per cent of British slate and ninety per cent of Welsh slate by the late nineteenth century. The Nominated Property includes what were the world's largest slate quarries (Penrhyn and Dinorwig) and slate mines (Ffestiniog). Nearly all these centres of extraction are located inland, yet comparatively near to the sea, and many at a considerable altitude. Much of the setting is covered by the Snowdonia National Park, substantially 'wild' in character and containing all fourteen Welsh mountains over 914 metres (3,000 ft), imparting a dramatic natural character to this quarrying landscape that has no other parallel on such a large scale.

What is a quarrying landscape?

In order to understand what constitutes a cultural landscape of quarrying or mining, and in order to identify comparators, Gwynedd Council commissioned three thematic studies, *Baseline Study and Technical Evaluation: Proposed World Heritage Site, Slate Industry of North Wales* (Gwyn 2012), *Stone Quarrying Landscapes as World Heritage Sites* (Uhlir and Gwyn, 2015), and *International Slate Quarrying Landscapes* (Cayla and Gwyn, 2015).

Uhlir and Gwyn offer the following definition:

> Stone quarrying landscapes are those formed by human intervention in the natural environment in order to extract stones, clays and useful earths … and at the least: extract stone (granite, limestone, marble, sandstone, slate and others) and clay from its geological formation for whatever purpose, in a quarry. These landscapes may, furthermore, provide evidence for: processing sites …transport of stone … social provision … and additionally … end-use of stone (*Stone Quarrying Landscapes as World Heritage Sites*, 2015, unpublished).

Cayla and Gwyn further suggest:

> Slate quarrying landscapes as defined are: those formed by human intervention in the natural environment in order to extract, process and transport slate, to dump waste material removed in the process of quarrying, to house the workforce thereby employed, and to house owners, managers and investors (*International Slate Quarrying Landscapes*, 2015, unpublished).

However, in the case of *The Slate Landscape of Northwest Wales*, the extraction of slate also commonly took place underground; in the United Kingdom this is legally defined as a 'mine'. A selection of representative mine-workings is included in the Nominated Property; these together convey all attributes of slate mining in Northwest Wales.

It is noted that environments where mineral ores, coal, salt and metallic elements were extracted and processed differ considerably from those of stone-working, including slate, just as there are considerable variations between sites which worked different types of stone.

Inscribed sites which worked mineral ores (silver, copper, gold, or lead) generally exploit narrow underground lodes or veins which require shafts, levels and narrow stopes, unlike working stone from underground where extraction chambers can be very large, reflecting the width of the bed of stone, particularly in the case of slate workings where the 'vein' can be very broad indeed. The landform of stone quarries worked in the open differs from locations where ores are extracted from pits according to the type of rock extracted. Handling and transport requirements are generally different, as stone has a low value-weight ratio, and ores have a high value-weight ratio. Processing mineral ores involves crushing, grinding, washing and smelting, whereas preparing stone for sale typically requires mechanical processing. Slate extraction is exceptional in the landform scale of tips of waste rock.

Inscribed coal-mining sites differ from the primary extraction landscape of slate and other forms of stone. While sharing some aspects of form and function (for example, tips) the principal differences arise from the fundamentally different structural geology of coal-deposits, the use of shaft-haulage, and of washing and grading plant.

Inscribed sites which worked salt deposits also differ from the primary extraction landscape of slate. Extraction is underground, and the processing takes a different form – primarily boiling.

Periodisation

Periodisation in this context refers to when the cultural landscape acquired its overall characteristic structure and organisation. Criteria selected for the assessment of Outstanding Universal Value are (ii), (iv) and (v). Criterion (ii) requires *a span of time*, which is determined as 1700 to the present day, but for which there is a particularly strong influence and worldwide reach between 1780 and 1940 (the Nominated Property achieved its approximate thirty per cent share of world slate production by 1897). Under criterion (iv), the *significant stage in human history* is the era of the Industrial Revolution (broadly 1750-1914).

Given the differences in temporal context, and economic and geo-political circumstance, comparisons have been excluded with properties inscribed on the World Heritage List formed in earlier periods, such as *Petra* (Jordan: 326), where quarrying is included incidentally, *Las Médulas* (Spain: 803), a site of Roman hydraulic mining, and *Kutná Hora* (Czech Republic: 732), which grew rich on the proceeds of mining in the medieval period. Comparisons have also been excluded with modern (post-1940) slate quarrying, such as in Spain, Portugal and Brazil.

Geo-cultural region

In accordance with the Operational Guidelines and the attributes of the Nominated Property, this comparative analysis has been undertaken on a global basis rather than only within the Europe-North America geo-cultural region.

Integrity, authenticity, protection and management

The Slate Landscape of Northwest Wales has exceptional integrity and authenticity, characteristics that have been consciously sustained by a decades-long programme of survey, protection and management. Within the Nominated Property there has been a longstanding commitment to the care, conservation and management of individual components and attributes. Specific measures for the conservation and management of landscapes continue to be implemented through existing regulation and conservation plans. Component Parts 4 (Gorseddau and Prince of Wales Slate Quarries, Railway and Mill), 5 (Ffestiniog Slate Mines and Quarries, 'city of slates' and railway to Porthmadog) and 6 (Bryneglwys Slate Quarry, Abergynolwyn Village and the Talyllyn Railway) lie either partly or completely within the Snowdonia National Park (Category 5 landscape). Component Parts 1 (Penrhyn Slate Quarry and Bethesda, and the Ogwen valley to Port Penrhyn), 2 (Dinorwig Slate Quarry mountain landscape), 3 (Nantlle Valley Slate Quarry Landscape), 5 (Ffestiniog Slate Mines and Quarries, 'city of slates' and railway to Porthmadog) and 6 Bryneglwys Slate Quarry, Abergynolwyn Village and the Talyllyn Railway) are included in the *Register of Historic Landscapes* (Wales) which provides a robust basis for national management.

Selection of comparable landscapes

There are currently (2019) 869 World Heritage sites inscribed for their cultural value. Of these, 169 are cultural landscapes, a category introduced in 1992, whereby human interaction with natural systems has evolved a distinctive environment, reflecting a basic need to manage and control the human habitat. Most of these cultural landscapes are sites where the harvesting of naturally renewing crops has led to intervention in the natural environment, such as terracing and water-management systems, and to complex forms of social organisation which guard traditional rights to these fundamental resources. These include the *Rice Terraces of the Philippine Cordilleras* [Philippines: 722], *Cultural Landscape of Honghe Hani Rice Terraces* in southern Yunnan [China: 1111] and *Cultural Landscape of Bali Province: the* Subak *System as a Manifestation of the* Tri Hita Karana *Philosophy* [Indonesia: 1194rev].

Others are cultural landscapes of wine-growing (*Jurisdiction of Saint-Emilion* [France: 932]; *Tokaj Wine Region Historic Cultural Landscape* [Hungary: 1063], *Vineyard Landscape of Piedmont: Langhe-Roero and Monferrato* [Italy: 1390rev]; *Alto Douro Wine Region* [Portugal: 1046]; *The Climats, terroirs of Burgundy* [France: 1425]; *Champagne Hillsides, Houses and Cellars* [France: 1465]; *Le Colline del Prosecco di Conegliano e Valdobbiadene* [Italy: 1571rev]), but also including sites associated with sugar (*Trinidad and the Valley de los Ingenios* [Cuba: 460]), fermented drink (*Agave Landscape and Ancient Industrial Facilities of Tequila* [Mexico: 1209]), coffee-production (*Archaeological Landscape of the First Coffee Plantations in the South-East of Cuba* [Cuba: 1008]; *Coffee Cultural Landscape of Colombia* [Colombia: 1121]).

None of these are considered to be relevant comparisons, as the harvesting of naturally renewing crops fundamentally differs from cultural landscapes shaped by quarrying and mining.

The Fray Bentos Industrial Landscape (Uruguay: 1464) by contrast, is a site-type that illustrates a modern, industrial and mechanised approach to the food industry of South America, which begins with the establishment in 1859 of a factory to process meat produced on the vast prairies nearby, and illustrates the whole process of sourcing, processing, packing and dispatching for export to the European market of meat extract, corned-beef and, later, frozen meat. This particular cultural landscape lacks the aesthetic appeal of traditional farming regions, and might have uncomfortable associations, but nevertheless reflects a profound and all-important change in global food-supply. This property is not considered to be a relevant comparison, as though it was constructed to process a natural resource, it does not include any productive landscapes, and meat-processing is wholly different in character to places where minerals or stone was processed.

Cultural landscapes which include mineral or stone extraction as a minor element are excluded. These include the collieries associated with the *Australian Convict Sites* (Australia: 1306) and stone quarrying in the *Upper Middle Rhine Valley* (Germany: 1066), and the *City of Bath* (UK: 428).

The Slate Landscape of Northwest Wales also requires comparison of its fundamental values and attributes with other similar and closely comparable cultural landscapes on state parties' tentative lists, as set out in **3.2.iii Properties on State Party Tentative Lists** below.

It is also necessary to analyse slate exploitation by means of like-with-like comparisons. However, given that there are, as yet, no World Heritage sites inscribed primarily for the extraction of any sort of stone, still less specifically of slate, thematic comparisons have also been undertaken of landscapes shaped by mining and quarrying, for stone in general and for slate in particular. These are set out in **3.2.iv Quarrying and mining landscapes neither on the World Heritage List nor on State Party Tentative Lists** below.

3.2.ii Results 1: Properties already inscribed on the World Heritage List

Context

Thematic comparisons have been undertaken with inscribed sites which have been shaped by mineral working, not only with cultural landscapes but with other cultural sites where they are on a significant scale.

***Hallstatt-Dachstein/Salzkammergut Cultural Landscape* (Austria: 806)**	
Year of inscription:	1997
Theme:	A cultural landscape of salt-mining
Criteria:	(iii), (iv)
Mineral:	Salt
Time period:	Ancient; fourteenth century to twentieth, continuing.
Key values and attributes:	Salt mining cultural landscape. The Alpine town of Hallstatt ('salt settlement') and an ancient underground salt mining industry that essentially continued to the mid-twentieth century, though still with some working today.
Similarities:	Use of criterion (iv); some time period overlap; mining; inclusion of social context
Differences:	Different material (salt mining as opposed to slate quarrying and mining); different industrial environment; different geological and landscape environment; different geo-political context

***Major Mining Sites of Wallonia* (Belgium: 1344rev)**	
Year of inscription:	2012
Theme:	A cultural site of coal-mining
Criteria:	(ii), (iv)
Mineral:	Coal
Time period:	Seventeenth century to twentieth
Key values and attributes:	The four sites of the property feature examples of the utopian architecture from the early periods of the industrial era in Europe within a highly integrated, industrial and urban ensemble, notably the Grand-Hornu colliery and workers' city designed by Bruno Renard in the first half of the nineteenth century. Bois-du-Luc includes numerous buildings erected from 1838 to 1909 and one of Europe's oldest collieries dating back to the late seventeenth century.
Similarities:	Use of criteria (ii), and (iv); time-period overlap; mining
Differences:	Different material (coal mining as opposed to slate quarrying and mining); different industrial environment; different geological and landscape environment; different geo-political context

***City of Potosí* (Bolivia: 420)**	
Year of inscription:	1987
Theme:	A cultural site as an urban-mining ensemble
Criteria:	(ii), (iv)
Mineral:	Silver
Time period:	Sixteenth century to nineteenth
Key values and attributes:	A mountain environment which in the sixteenth century formed one of the world's largest industrial complexes. The extraction of silver ore relied on water-power and a series of hydraulic mills. The site includes the colonial town with its mint, churches, and patrician and workers' dwellings.
Similarities:	Use of criteria (ii), (iv); some time overlap; inclusion of social infrastructure and varied forms of housing; use of water-power
Differences:	Different material (silver mining as opposed to slate quarrying and mining); different industrial environment; different geological and landscape environment; different geo-political context

***Sewell Mining Town* (Chile: 1214)**	
Year of inscription:	2006
Theme:	A cultural site built as a copper-miners' town
Criteria:	(ii)
Mineral:	Copper
Time period:	Twentieth century
Key values and attributes:	Built in 1905 to house workers at what became the world's largest copper mine, El Teniente, it is an outstanding example of the company towns that were born in many remote parts of the world from the fusion of local labour and resources from an industrialized nation, to mine and process high-value natural resources.
Similarities:	Use of criterion (ii); includes accommodation for mine-workers
Differences:	Different material (copper mining as opposed to slate quarrying and mining); different industrial environment; different geological and landscape environment; different geo-political context; a one-period (early twentieth-century) environment

Erzgebirge/Krušnohoří Mining Region (Czech Republic: 1478)	
Year of inscription:	2019
Theme:	A cultural landscape of mining
Criteria:	(ii), (iv), (vi)
Mineral:	Silver, tin, uranium and others.
Time period:	Twelfth century to twentieth
Key values and attributes:	Extensive trans-boundary cultural mining/extractives/ancillary industrial landscape of the Ore Mountains: Erzgebirge – Saxony, Germany; Krusne Hory, Bohemia, Czech Republic. The mines of Saxony are the sites of many important medieval advances in mining technology. It was a district where the miners were free miners as opposed to slaves. Silver production expanded rapidly in the Erzgebirge after 1470. The mines of St Annaberg and Marienberg achieved their maximum output around 1560 and declined rapidly after 1577 due to low prices created by the surge of silver imports from the New World (after 1551), together with rapidly increasing English competition. The Freiberg Mining Academy, established in 1765, is the world's oldest university of mining and metallurgy.
Similarities:	Use of criteria (ii), (iv); some time-period overlap; mining; time period overlap. Some technology is shared, and indeed some was originated in the Ore Mountains in the fifteenth and sixteenth centuries before being transferred to Britain – firstly to ore-mining and subsequently to slate quarrying, namely pumps driven by distant waterwheels to which they were connected by flat-rods.
Differences:	Different material (salt mining as opposed to slate quarrying and mining); different industrial environment; different geological and landscape environment; different geo-political context

From the Great Saltworks of Salins-les-Bains to the Royal Saltworks of Arc-et-Senans, the Production of Open-pan Salt (France: 203bis)	
Year of inscription:	2009
Theme:	A cultural site, as a rationally conceived salt-working enterprise
Criteria:	(i), (ii), (iv)
Mineral:	Salt
Time period:	Eighteenth century to twentieth
Key values and attributes:	Construction of the Royal Saltworks of Arc-et-Senans, near Besançon, was begun in 1775, the first major achievement of industrial architecture, reflecting the ideal of progress of the Enlightenment. The vast, semicircular complex was designed to permit a rational and hierarchical organization of work and was to have been followed by the building of an ideal city, never realized. The Great Saltworks of Salins-les-Bains was active until 1962. From 1780 to 1895, its salt water travelled through 21 km of wood pipes to the Royal Saltworks of Arc-et-Senans. It was built near the immense Chaux Forest to ensure its supply of wood for fuel. It includes an underground gallery from the thirteenth century with a functioning hydraulic pump from the nineteenth century.
Similarities:	Use of criteria (ii), (iv); time period
Differences:	Different material (salt mining as opposed to slate quarrying and mining); different industrial environment; different geological and landscape environment; different geo-political context

Nord-Pas de Calais Mining Basin (France: 1360)	
Year of inscription:	2012
Theme:	A cultural landscape of coal-mining
Criteria:	(iii), (iv), (v)
Mineral:	Coal
Time period:	Nineteenth century to twentieth
Key values and attributes:	Large (over 120,000 ha) cultural coal mining landscape that comprises pits and shaft head infrastructure, slag heaps, coal transport infrastructure, and social infrastructure including model workers' cities from the 1850s to the 1960s.
Similarities:	Use of criterion (iv); time-period overlap; mining and settlements
Differences:	Different material (coal mining surface features as opposed to slate quarrying and mining); different industrial environment; different geological and landscape environment; different geo-political context; no significant transport network (railways and harbours)

Mines of Rammelsberg, Historic Town of Goslar and Upper Harz Water Management System (Germany: 623ter)	
Year of inscription:	1992 (extension 2010)
Theme:	A cultural site of water-management in a mining environment
Criteria:	(i), (ii), (iii), (iv)
Mineral:	Copper, lead and tin
Time period:	Eleventh century to twentieth
Key values and attributes:	The Upper Harz mining water-management system, which lies south of the Rammelsberg mines and the town of Goslar, has been developed over a period of some 800 years to assist in the process of extracting ore for the production of non-ferrous metals. Its construction was first undertaken in the Middle Ages by Cistercian monks, and it was then developed on a vast scale from the end of the sixteenth century until the nineteenth. It is made up of an extremely complex but perfectly coherent system of artificial ponds, small channels, tunnels and underground drains. It enabled the development of water power for use in mining and metallurgical processes. It is a major site for mining innovation in the western world.
Similarities:	Use of criteria (ii), (iv); some time-period overlap; inclusion of settlement; water-power system in mining
Differences:	Different material (copper, tin and lead mining as opposed to slate quarrying and mining); different industrial environment; different geological and landscape environment; different geo-political context; emphasis on water-management in a mining context

Zollverein Coal Mine Industrial Complex in Essen (Germany: 975)	
Year of inscription:	2001
Theme:	A cultural site as an architecturally ambitious coal-mine complex
Criteria:	(ii), (iii)
Mineral:	Coal
Time period:	Nineteenth century to twentieth
Key values and attributes:	The Zollverein industrial complex consists of the complete infrastructure of a historical coal-mining site, with some twentieth-century buildings of outstanding architectural merit. It constitutes remarkable material evidence of the evolution and decline of an essential industry over the past 150 years.
Similarities:	Use of criterion (ii); time-period overlap; mining
Differences:	Different material (coal mining surface features as opposed to slate quarrying and mining); different industrial environment; different geological and landscape environment; different geo-political context; few transport elements or social infrastructure

Ombilin Coal Mining Heritage of Sawahlunto (Indonesia: 1610)	
Year of inscription:	2019
Theme:	A cultural site of coal-mining
Criteria:	(ii), (iv)
Mineral:	Coal
Time period:	Nineteenth century to twentieth
Key values and attributes:	Built for the extraction, processing and transport of high-quality coal in an inaccessible region of Sumatra, this industrial site was developed by the Netherlands' colonial government with a workforce recruited from the local population, supplemented by convict labour from Dutch-controlled areas. It comprises the mining site and company town, coal storage facilities at the port of Emmahaven and the railway network linking the mines to the coastal facilities. This integrated system enabled the efficient deep-bore extraction, processing, transport and shipment of coal.
Similarities:	Use of criteria (ii), (iv); time-period overlap; mining; includes extraction (including underground), processing, social infrastructure and transport systems including harbour.
Differences:	Different material (coal mining as opposed to slate quarrying and mining); different industrial environment; different geological and landscape environment; different geo-political context; the railway is not currently operational

Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining (Japan: 1484)	
Year of inscription:	2015
Theme:	A cultural site of industrialisation and social transformation
Criteria:	(ii), (iv)
Mineral:	Coal
Time period:	Nineteenth century to twentieth
Key values and attributes:	The site bears testimony to the rapid industrialization of Japan, through the development of the iron and steel industry, shipbuilding and coal mining, and illustrates the process by which feudal Japan ensured technology transfer from Europe and America, and how this technology was adapted to the country's needs and social traditions.
Similarities:	Use of criteria (ii), (iv); time-period overlap; social transformation
Differences:	Different material (coal mining fuelling ship-building and metallurgy as opposed to slate quarrying and mining); different industrial environment; different geological and landscape environment; vastly different geo-political context

Iwami Ginzan Silver Mine and its Cultural Landscape (Japan: 1246bis)	
Year of inscription:	2007
Theme:	A cultural landscape of silver-mining
Criteria:	(ii), (iii), (v)
Mineral:	Silver
Time period:	Sixteenth century to twentieth
Key values and attributes:	A cluster of mountains, rising to 600 m and interspersed by deep river valleys featuring the archaeological remains of large-scale mines, smelting and refining sites and mining settlements worked between the sixteenth and twentieth century, the undulating paths used to transport silver ore to the coast, and port towns from where it was shipped to Korea and China.
Similarities:	Use of criteria (ii), (v); some time-period overlap; transport corridors
Differences:	Different material (silver mining as opposed to slate quarrying and mining); different industrial environment; different geological and landscape environment; vastly different geo-political context; largely predates the major period of the Industrial Revolution

Historic Town of Guanajuato and Adjacent Mines (Mexico: 482)	
Year of inscription:	1988
Theme:	A cultural site as an urban centre with mining remains
Criteria:	(i), (ii), (iv), (vi)
Mineral:	Silver
Time period:	Sixteenth century to eighteenth
Key values and attributes:	Founded in the early sixteenth century, Guanajuato became the world's leading silver-extraction centre in the eighteenth. Mining remains include the 600m-deep 'Boca del Inferno', ore-dressing floors and administrative buildings, but the town is particularly distinguished by its Baroque and neoclassical buildings.
Similarities:	Use of criteria (ii), (iv); closeness of extractive and processing sites to settlement.
Differences:	Different material (silver mining as opposed to slate quarrying and mining); different industrial environment; different geological and landscape environment; vastly different geo-political context; little time overlap – largely predates the major period of the Industrial Revolution

Røros Mining Town and the Circumference (Norway: 55bis)	
Year of inscription:	1980
Theme:	A cultural site as an urban-mining ensemble
Criteria:	(iii), (iv), (v)
Mineral:	Copper
Time period:	Seventeenth century to twentieth
Key values and attributes:	Røros Mining Town (established 1646) and its cultural landscapes cover a large continuous area shaped substantially by copper mining. Its cultural landscape includes the area surrounding the mining town, the urban agricultural areas, and the most important mining landscapes where agricultural practices and copper work operations were carried out. Røros Mining Town is built entirely of wood, and interlinked with a cultural landscape that shows in an outstanding and almost complete manner how mining operations, transport, and the way of life had to be adapted to the natural environment. The town is the primary focus of the property, in which the smeltery of the copper-works was also located (this nineteenth-century complex closed in 1953 and was destroyed by fire in 1975). Nearby are many copper mines (mostly underground workings), from which the smeltery derived its ore. One of these (Olav's Mine) is a visitor attraction run by the Røros Museum.
Similarities:	Use of criteria (iv), (v); time-period overlap; settlement; human use of environmental factors
Differences:	Different material (copper mining as opposed to slate quarrying and mining); different industrial environment; different geological and landscape environment; different geo-political context

Historic Town of Banská Štiavnica and the Technical Monuments in its Vicinity (Slovakia: 618rev)	
Year of inscription:	1993
Theme:	A cultural site of mining and settlement
Criteria:	(iv), (v)
Mineral:	Gold and silver
Time period:	Thirteenth to eighteenth
Key values and attributes:	This town, established in the thirteenth century, reflects the symbiosis of the industrial landscape and the urban environment resulting from its minerals-based prosperity, reflected in its lavish Gothic and Baroque architecture. The first Mining and Forestry Academy in Europe was established here in 1762. Mining shafts, tunnels, towers, and a sophisticated water management system, built in the sixteenth century and developed in the eighteenth, served the needs of the mining industry and provided fresh drinking water for the town.
Similarities:	Use of criteria (iv), (v); proximity of settlement and mineral extraction
Differences:	Different material (gold and silver mining as opposed to slate quarrying and mining); different industrial environment; different geological and landscape environment; different geo-political context; focus on settlement; little time-overlap

Wieliczka and Bochnia Royal Salt Mines (Poland: 32ter)	
Year of inscription:	1978
Theme:	A cultural site of salt-mining
Criteria:	(iv)
Mineral:	Salt
Time period:	Thirteenth century to twentieth
Key values and attributes:	A serial property consisting of Wieliczka and Bochnia salt mines and Wieliczka Saltworks Castle. These illustrate the historic stages of the development of mining techniques in Europe from the thirteenth century to twentieth: both mines have hundreds of kilometers of galleries with works of art, underground chapels and statues sculpted in the salt.
Similarities:	Use of criterion (iv); some time-overlap
Differences:	Different material (salt mining as opposed to slate quarrying and mining); different industrial environment; different geological and landscape environment; different geo-political context; few surface features inscribed

Heritage of Mercury, Almaden and Idrija (Spain and Slovenia: 1313rev)	
Year of inscription:	2012
Theme:	A cultural site as an urban-mining ensemble
Criteria:	(ii), (iv)
Mineral:	Mercury
Time period:	Fifteenth century to twentieth
Key values and attributes:	The property includes the mining sites of Almadén (Spain), where mercury (quicksilver) has been extracted since antiquity, and Idrija (Slovenia), where mercury was first found in 1490 CE. The Spanish property includes buildings relating to its mining history, including Retamar Castle, religious buildings and traditional dwellings. The site in Idrija notably features mercury stores and infrastructure, as well as miners' living quarters, and a miners' theatre. The sites bear testimony to the intercontinental trade in mercury which generated important exchanges between Europe and America over the centuries. Together they represent the two largest mercury mines in the world, operational until recent times.
Similarities:	Use of criteria (ii), (iv); some time overlap
Differences:	Different material (mercury as opposed to slate quarrying and mining); different industrial environment; different geological and landscape environment; different geo-political context

Mining Area of the Great Copper Mountain in Falun (Sweden: 1027)	
Year of inscription:	2001
Theme:	A cultural site as an urban-mining ensemble
Criteria:	(ii), (iii), (v)
Mineral:	Copper
Time period:	At least the thirteenth century, ending in 1992.
Key values and attributes:	The Great Copper Mountain (Stora Kopparberget) is the oldest and most important mine working in Sweden and one of the world's most remarkable and classic mining monuments. The Great Pit initially resulted from a colossal cave-in in 1687. Underground workings form part of the mining-urban ensemble that includes the seventeenth-century planned town of Falun, together with industrial and domestic remains in the Dalarna region.
Similarities:	Use of criteria (ii), (v); some time period overlap; extraction from an open pit, akin to quarrying; settlement
Differences:	Different material (copper mining as opposed to slate quarrying and mining); different industrial environment; different geological and landscape environment; different geo-political context

Blaenavon Industrial Landscape (UK: 984)	
Year of inscription:	2000
Theme:	A cultural landscape of iron- and coal-mining
Criteria:	(iii), (iv)
Mineral:	Iron and coal
Time period:	Late eighteenth century to the twentieth
Key values and attributes:	Blaenavon is testimony to the pre-eminence of South Wales as the world's major producer of iron and coal in the late eighteenth and nineteenth centuries. The property includes the mines themselves (including Big Pit which closed in 1980 and where underground tours are available), quarries (limestone and iron ore), Blaenavon Ironworks (1789), early railways and inclined planes, and workers' housing and social infrastructure, including the town of Blaenavon itself.
Similarities:	Use of criterion (iv); time period overlap; some quarrying, and underground features; exposed mountainous landscape; innovative iron railway technology including inclined planes. Welsh cultural industrial prowess, with commonality in the approach to the definition of an industrial cultural landscape (including transport and settlements)
Differences:	Different material (coal and iron mining as opposed to slate quarrying and mining)

Ironbridge Gorge (UK: 371)	
Year of inscription:	1986
Theme:	A cultural site of the Industrial Revolution
Criteria:	(i), (ii), (iv), (vi)
Mineral:	Coal, clay
Time period:	Eighteenth century to nineteenth
Key values and attributes:	Ironbridge contains all the elements of progress that contributed to the rapid development of this industrial region in the eighteenth century, from the mines themselves to the railway lines. The blast furnace of Coalbrookdale, built in 1708, is a reminder of the discovery of coke. The bridge at Ironbridge had a considerable influence on developments in the fields of technology and architecture.
Similarities:	Use of criteria (ii), (v); an integrated landscape of the British Industrial Revolution, including mineral extraction, metallurgy, processing, transport and settlement; comparable industrial environment; similar geo-political context
Differences:	Different material (coal and clay mining as opposed to slate quarrying and mining); different geological and landscape environment

Cornwall and West Devon Mining Landscape (UK: 1215)	
Year of inscription:	2006.
Theme:	A cultural landscape of tin-, copper- and arsenic-mining
Criteria:	(ii), (iii), (iv)
Mineral:	Tin, copper, arsenic, and others
Time period:	1700 to 1914
Key values and attributes:	Much of the landscape of Cornwall and West Devon was transformed in the eighteenth and early nineteenth centuries as a result of the rapid growth of pioneering copper and tin mining. Its deep underground mines, engine houses, foundries, new towns, smallholdings, ports and harbours, and their ancillary industries together reflect prolific innovation which, in the early nineteenth century, enabled the region to produce two-thirds of the world's supply of copper. The substantial remains are a testimony to the contribution Cornwall and West Devon made to the Industrial Revolution in the rest of Britain and to the fundamental influence the area had on the mining world at large. Cornish technology embodied in engines, engine houses and mining equipment was exported around the world. Cornwall and West Devon were the heartland from which mining technology rapidly spread.
Similarities:	Use of criteria (ii), (iv); time period overlap; underground mining, although vein-hosted base metals as opposed to slate. Commonality in the approach to the definition of an industrial cultural landscape, including transport and social infrastructure; same geo-political context; some technology imported to Wales, including the Cornish beam engine.
Differences:	Different material (copper mining as opposed to slate quarrying and mining)

Analysis of Results 1

The World Heritage list includes cultural landscapes and cultural sites from the period of the Industrial Revolution which have inscribed for the extraction of mineral ores, coal, salt or chemical elements. No site has yet been inscribed for stone-extraction, though it is clear that this is a fundamental and ancient human activity and became one of the main sectors of the Industrial Revolution. The environments of ore, coal and salt working differ significantly from those formed by working for stone.

3.2.iii Results 2: Properties on State Party Tentative Lists

Context

Thematic comparisons have been undertaken with properties on state party tentative lists which have been shaped by mineral and stone working, not only those which are proposed as cultural landscapes but also those proposed as cultural sites where they are on a significant scale.

Hoge Kempen Rural-Industrial Transition Landscape **(Belgium)**	
Year of inscription:	Tentative List (2011)
Theme:	Nominated as a mixed site (cultural and natural) of sand and gravel extraction, and coal.
Criteria:	(iv), (vi), (viii)
Mineral:	Sand, gravel and coal
Time period:	Nineteenth and twentieth centuries
Key values and attributes:	A cultural landscape of sand and gravel exploitation sites and coal mines together with their garden city settlements.
Similarities:	Use of criterion (iv); quarrying landscape (construction material) and mining; a (shallow) quarrying landscape is included, together with coal mining (although using shafts); inclusion of industrial settlements
Differences:	Different material (different types of stone, coal mining as opposed to slate quarrying and mining different industrial environment (a shallow quarrying landscape that, together with the tips formed from coal mine shafts, is largely re-vegetated and returning to a more natural-looking landscape); different geological and landscape environment

The Marble Basin of Carrara **(Italy)**	
Year of inscription:	Tentative List (2006)
Theme:	Nominated as a mixed site (cultural and natural) of a mountain system and marble quarries
Criteria:	(ii), (vi), (vii), (viii), (ix), (x)
Mineral:	Marble
Time period:	Quarrying from the first century CE (Roman, including the largest quarry of the Roman world), Renaissance, and Modern/continuing.
Key values and attributes:	A large and spectacular 'alpine' region with an area of 400 km^2, containing extensive ancient and modern marble quarries that represent the most productive marble exploitation in the world. In antiquity these Roman marble quarries superseded the Greek quarries located on the islands of Paros and Naxos.
Similarities:	Use of criterion (ii); quarrying landscape (construction material), with large-scale preservation of components (quarries and tips, on a landform scale)
Differences:	Different material (marble quarrying as opposed to slate quarrying and mining); different industrial environment; different geological and landscape environment; different geo-political context; key values relate to Roman period and not the Industrial Revolution; quarries continue to be worked throughout the area, though key elements are effectively protected

Mining Historical Heritage **(Spain)**	
Year of inscription:	Tentative list (2007)
Theme:	Nominated as a cultural site of mining and quarrying
Criteria:	(i), (ii), (iv)
Mineral:	Wide range, from ores to stone and sand
Time period:	From the Bronze Age and Roman period to the twentieth century
Key values and attributes:	Mineral landscape
Similarities:	Use of criteria (ii), (iv); quarrying and mining. Some of the mining landscapes are on a major landscape scale and totally pervasive, such as Rio Tinto. Quarrying landscapes – as a whole – are much smaller than in Northwest Wales and, although the stone differs, their primary character share similarities nonetheless.
Differences:	Different products (a wide range of minerals and stone)

Analysis of Results 2

State Parties' tentative lists for World Heritage nomination include cultural sites and a mixed site, operational during the period of the Industrial Revolution, which have been nominated partly for stone extraction; however, other than *The Slate Landscapes of Northwest Wales*, none has been nominated primarily on this basis, despite its evident importance for human society. The inscription of a cultural landscape of stone quarrying and stone mining would fill a recognised gap on the World Heritage List.

3.2.iv Results 3: Stone quarrying and mining landscapes neither on the World Heritage List nor on State Party Tentative Lists

Context

This section discusses like-for-like properties for comparison which are neither on the World Heritage List nor on State Party Tentative Lists, and draws on the three thematic studies funded by Gwynedd Council referred to above.

Uhlir, Gwyn 2015 offers a definition of stone quarrying landscapes (see above) and a number of case studies. This study points out that quarried and processed stone has been used for a wide variety of purposes and is often the main heritage of past civilisations. European expansion into other continents from the fifteenth century onwards has also brought the use of quarried stone into parts of the world where it had previously been uncommon or unknown, such as North America, Siberia, West Africa and Oceania. The authors suggest that cultural landscape of stone-quarrying and -mining will include not only the point where the rock is extracted, and waste rock dumped, but also processing sites, transport systems, accommodation for workforce and perhaps also end-use. They draw attention to the various forms these took.

On this basis, this study concludes that whilst there are commonalities between landscapes shaped by quarrying and mining for different types of stone, there are also significant differences between them. The nature of the rock that is extracted will be reflected in the landform of the quarry or mine, in the ways in which it is processed, and in the way it is handled and transported. Social provision can take very varied forms, including towns and villages, or suburbs within them; scattered settlements, sometimes as part of a dual economy of industry and agriculture; barracks for free workers; and prison and camp accommodation for coerced workers. Evidence for end-use of the quarried material is also important; it is rare for quarried stone to be distributed globally unless it is highly prestigious, like marble, or unless it is particularly inexpensive to transport, like slate.

Uhlir and Gwyn (2015) concludes that there is a strong case for globally significant stone quarrying landscapes to be considered as potential World Heritage Sites. These need to be identified through expert knowledge and further peer discussion, acknowledging the cultural context to which a potential site might belong. However, as comparators to *The Slate Landscape of Northwest Wales*, they make it possible to assess the significance in global terms of individual elements which are typical of stone working generally with those of the slate industry in particular, and specifically with those of the Nominated Property. This appears in the section **Justification for the selection of Elements** below.

Gwyn (2012) evaluates slate quarrying and mining sites and landscapes within Gwynedd only. Sites within Gwynedd were selected for inclusion on the basis of their surviving archaeology, their integrity as a cultural landscape and their potential to contribute to Outstanding Universal Value. The Nominated Property includes all the largest and most significant quarrying landforms, as well as the best-surviving examples of the smaller areas. Other locations in Wales were considered in detail but not recommended for inclusion in the Nominated Property due to their small size and because significant elements lacked the authenticity and integrity of the major cultural landscape of slate-working within Gwynedd itself. These included sites in the Dee Valley, Llangynog (Northeast Wales), the Conwy Valley (on the borders of Gwynedd) and Pembrokeshire (Southwest Wales).

Cayla and Gwyn (2015) evaluates all the most important slate quarrying and mining sites and landscapes across the world, using a systematic methodology of site visits, assisted by local experts, combined with detailed desk-top research, as part of the process of preparing the comparative analysis.

On this basis, the following are considered to be the principal properties for comparison:

North Cornwall and Devon **(United Kingdom)**	
Theme:	Slate quarrying sites
Time period:	Medieval to twenty-first century, continuing
Key values and attributes:	Delabole Quarry, Tintagel, Cornwall is the largest slate quarry in England, created from five earlier workings in the mid-nineteenth century. The quarry has been operated almost continuously since the fifteenth century and is still operational. It possessed a narrow-gauge railway, and the village was named after the quarry. Nearby are the Prince of Wales' Quarry (with its surviving 1872 beam winding engine house) and some dramatic valley-side and cliff-side quarries with prolific waste heaps. Elsewhere in Cornwall (Glyn Valley, Bodmin) is a small slate mine – Carnglaze – with underground workings open to the public, whilst in Devon (Penrecca, Buckfastleigh) what is in local terms a relatively large underground slate mine retains shafts, adits and massive chambers, railway remains, and connection to an abandoned quarry with large tips.
Authenticity and Integrity:	Moderate
State of conservation:	Conservation has taken place on the Prince of Wales' Quarry engine-house
Protection and management:	Limited
Similarities:	There are close technical parallels between Delabole and quarries in the slate industry of Northwest Wales through the exchange of personnel; also there are cultural parallels in terms of religious identity through shared Protestant Christian dissenting traditions.
Differences:	The Delabole slate district is not on a regional scale, does not illustrate a wide range of technology (and there are no underground workings), and with the singular exception of Delabole quarry itself, the area did not have such wide-reaching consequences in terms of slate output and of the transfer of skills and technology. Settlements are also, correspondingly, on a much smaller scale.

Figure 3.23. The small scale of the Devon slate industry (UK) is brought out in this watercolour by John White (1763-1851) of the quarry at Widecombe in Devon.

***Cumbria (English Lake District)* (United Kingdom)**	
Theme:	Slate mining and quarrying sites
Time period:	Eighteenth century to twenty-first; continuing
Key values and attributes:	Slate was worked on a significant scale from the late eighteenth century. The largest open quarry is Burlington on Kirkby Moor owned by the aristocratic Cavendish family, and operational. Some quarries had good access to the sea; others such as Honister had to rely on pack-horse trails and later on motor roads.
Authenticity and Integrity:	Partially compromised
State of conservation:	Conservation work at Honister mine, including the main internal incline, designed by a Welsh slate-mine engineer
Protection and management:	Some sites fall within *The English Lake District* World Heritage site (UK: 422rev)
Similarities:	Technical continuities with Northwest Wales (inclined planes, narrow-gauge railways, water-balance shafts, slate mills) and evidence for the exchange of personnel
Differences:	Smaller scale and dispersed nature of the industry

***Slate industry of Scotland* (UK)**	
Theme:	Slate quarrying sites
Time period:	Seventeenth century to twentieth
Key values and attributes:	Slate quarries opened in a Pre-Cambrian slate belt stretching across Scotland; the principal workings were in Argyll (Easdale island and Ballachulish) and Aberfoyle (Stirling)
Authenticity and Integrity:	High
State of conservation	Good
Protection and management:	Scheduled Monuments, Listed Buildings at, and adjacent to, Easdale Quarry and settlement and at Ballachulish; also Conservation Areas at Easdale
Similarities:	Mountainous and coastal environments
Differences:	Smaller scale and dispersed nature of the industry

Slate industry of Ireland	
Theme:	Slate quarrying sites
Time period:	Nineteenth century to twenty-first, continuing
Key values and attributes:	Slate has been worked on a small scale in Ireland since the beginning of the nineteenth century. Workings on Valentia island were developed on a significant scale by its aristocratic owner, the Knight of Kerry, in the nineteenth century, who constructed an extensive steam-powered slate-slab mill in his model settlement of Knightstown. Pit quarries on the east banks of the Shannon preserve evidence of chain inclines. Other, smaller, quarries were opened in County Sligo, County Cork, County Wicklow and County Wexford.
Authenticity and Integrity:	Compromised and fragmented
State of conservation:	Poor; conservation work is anticipated the Knightstown steam-powered slate-slab mill
Protection and management:	Limited; part of the Knightstown steam-powered slate-slab mill has recently been protected
Similarities:	Technical parallels with Northwest Wales are evident, such as chain inclines and internal railways, through migration of skilled personnel from Northwest Wales
Differences:	Small scale and the dispersed nature of the industry

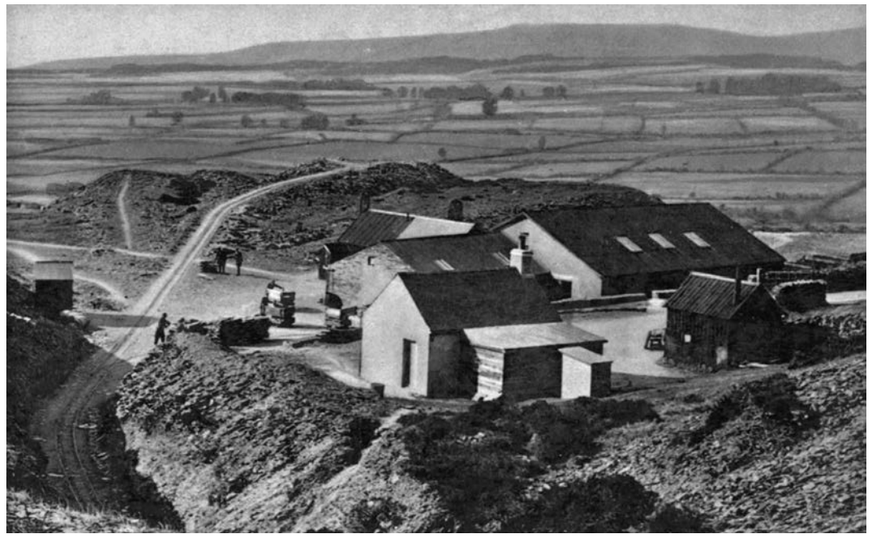


Figure 3.24. The small Kilcavan slate quarry in County Wicklow, Ireland. This quarry had a Welsh manager in the 1930s.

Maine-et-Loire (Anjou) (France)	
Theme:	Slate quarrying and mining landscape
Time period:	Medieval to twenty-first century
Key values and attributes:	The slate rocks of Maine-et-Loire (the former province of Anjou) form a series of tight and narrow folds on a north-south axis which meant that the early slate pits could not be extended laterally, and the beds ultimately had to be worked in mines. Their managers and engineers regularly visited Northwest Wales and found parallels in the working of the Nantlle Component Part. Its history is interpreted at the Musée de l'Ardoise in Trélazé.
Authenticity and Integrity:	Partly compromised; fragmented
State of conservation	Limited; some historic *chevalements* (shaft head-frames) have been conserved.
Protection and management:	Some of these sites are located in the Buffer Zone of World Heritage *The Loire Valley between Sully-sur-Loire and Chalonnes* but do not form part of the property. A trail in the Trélazé landscape offers views of flooded quarries.
Similarities:	Landscape scale of industry; global distribution of product; technological continuities including the use of chain inclines in pit workings; the use of a minority language by migrant Breton workers parallels the use of Welsh as the language of *The Slate Landscape of Northwest Wales*
Differences:	Though both Maine-et-Loire and North Wales at times dominated world markets, Welsh quarries were the market leaders in the main industrial period of the nineteenth century and were the more productive at their height. The use of substantial steam- or electrically powered *chevalements* is not paralleled in Northwest Wales, reflecting the mountainous environment of Wales and the use that could be made of water as a prime-mover. Slate-quarrying environments in Maine-et-Loire do not match the landform scale and impact of *The Slate Landscape of Northwest Wales* and there has been significant loss of surface features. There is as yet no evidence of technology / cultural exchange from Maine-et-Loire to Northwest Wales.

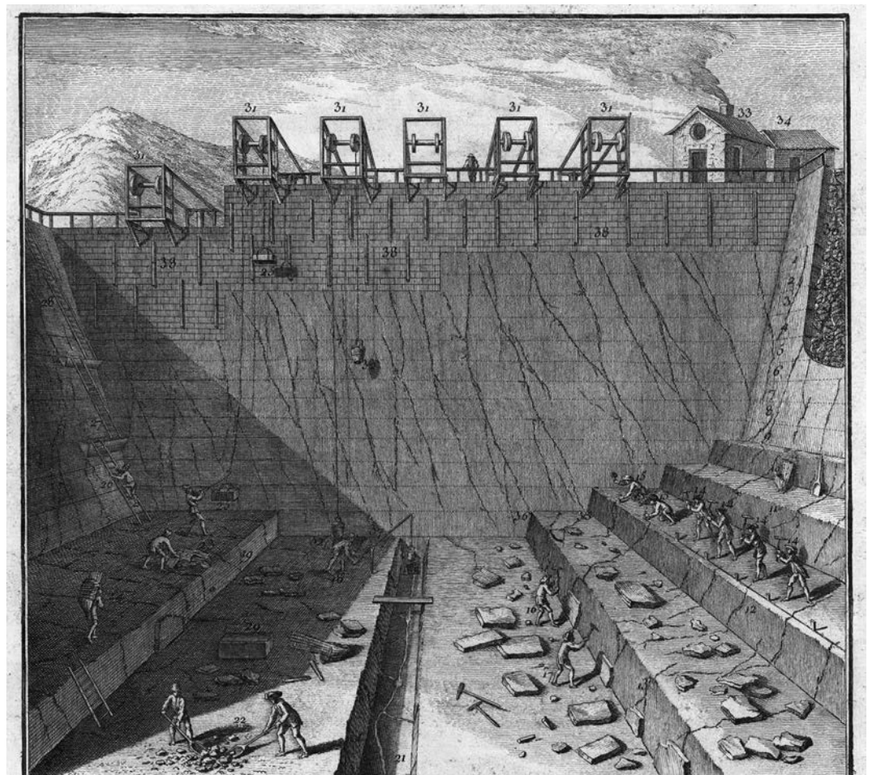


Figure 3.25. The slate quarries of Maine-et-Loire and of the Ardennes were technically more advanced than those of Wales until the late eighteenth century and the Revolution, but little is now evident of these early features. This engraving of the 1760s shows winding and pumping machinery that would come into use in Wales a few years later.

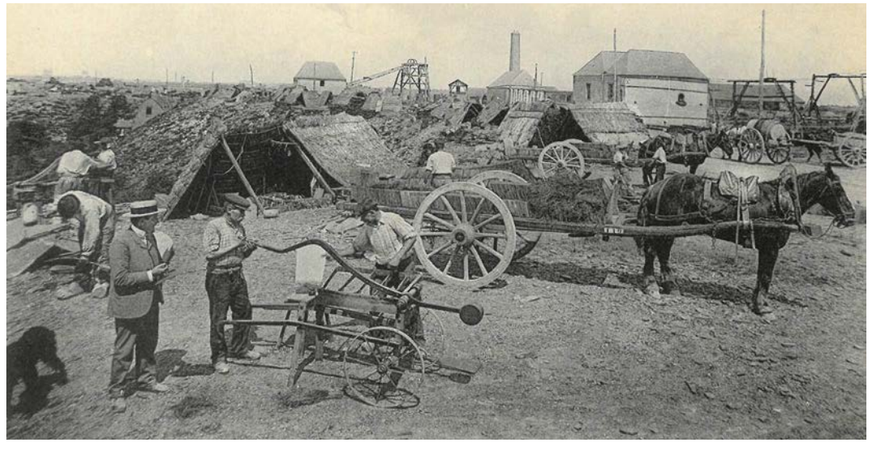


Figure 3.26. By the late nineteenth century, the slate industry of Maine-et-Loire had become slow to adopt new technologies such as mechanised mills and railways. Here splitters are still working in simple wind-break shelters and are being supplied by horse and cart.

Brittany **(France)**	
Theme:	Slate mining and quarrying sites
Time period:	Eighteenth century to twentieth
Key values and attributes:	Slate was worked in three *départments* of Brittany, at Morbihan (at Gourin); the Côtes du Nord (at Plévin and Maël-Carhaix); and Finistère (at Motreff and Saint-Goazec). Here, quarries were worked both in open pits and (from the eighteenth century) in underground chambers. Inclined planes and steam-powered shafts were used for up-haulage.
Authenticity and Integrity:	Believed to be compromised and fragmented
State of conservation:	The principal quarries are listed on the Inventaire Général du Patrimoine Culturel
Protection and management:	A *chevalement* (headframe) has been conserved at the Musée Des Ardoisières at Maël-Carhaix
Similarities:	Various forms of workings; use of the Breton language by quarrymen parallels the use of Welsh in *The Slate Landscapes of Northwest Wales*.
Differences:	Breton quarries were on a small scale, particularly in relation to the regional landscape scale of the slate industry of Northwest Wales.

The Ardennes **(Belgium and France)**	
Theme:	Slate mining and quarrying sites
Time period:	Roman to twenty-first century, continuing
Key values and attributes:	An industry with origins in the Roman period and which flourished in the eighteenth and nineteenth centuries, it made extensive use of river transport and of steam power to pump the workings and to operate slate-mills. After 1945, workers were recruited from many different countries. An impressive *chevalement* (headframe) is preserved at Rimogne, and a tipping incline system at Fumay. Some underground workings are accessible. (Haut-Martelange is noted separately.)
Authenticity and Integrity:	Compromised and fragmented
State of conservation:	Generally poor
Protection and management:	Limited
Similarities:	Some technical parallels, such as the use of narrow-gauge railways
Differences:	The slate industry of the Ardennes is dispersed and does not match the landform scale and impact of *The Slate Landscape of Northwest Wales*. It made greater use of steam power. The broad ethnic mix in the quarries contrasts with mono-cultural communities in Northwest Wales.

Haut-Martelange (Uewermaarteleng, Obermartelingen) (Luxembourg)	
Theme:	Slate mining landscape
Time period:	Nineteenth century to twentieth
Key values and attributes:	A slate mine opened in the slate formation of the Ardennes in the early nineteenth century, and later developed by the Rother family of Hamburg, who were related by marriage to the family of Charles Easton Spooner of Porthmadog, Secretary and Engineer of the Ffestiniog Railway and a slate-quarry consulting engineer. The site includes the former slate-mill, associated workshops and machinery, a powered incline plane for up-haulage, the traces of an up-haulage incline for second-level tipping of waste slate, the home of the paternalistic owners, with its English garden, workers' houses and an office building.
Authenticity and Integrity:	Very high
State of conservation:	Good
Protection and management:	Operated as a museum (Musée de l'Ardoise) under state auspices (Grand Duchy of Luxembourg); partly open to the public. Haut-Martelange is incomparably the best-preserved historic slate landscape of the Ardennes.
Similarities:	Personnel links between the managers of the quarry at Haut-Martelange (Uewermaarteleng, Obermartelingen) in the Grand Duchy of Luxembourg and Oakeley Quarry in the Ffestiniog Component Part led to the construction of a powered incline plane and a mill building which echo Ffestiniog practice.
Differences:	Haut-Martelange does not match the regional impact of *The Slate Landscape of Northwest Wales*.

Figure 3.27. The slate mill at Haute Martelange slate quarry, Luxembourg, follows a continental European architectural idiom but has parallels with similar buildings in the slate landscape of Ffestiniog, with which the owning family had close links.

Slate industry of Germany	
Theme:	Slate mining and quarrying sites
Time period:	Roman period to twenty-first century, continuing
Key values and attributes:	Slate quarrying took place around the Mayen area, to the west of Koblenz in the valley of the Moselle, in the Roman period, but otherwise the industry is first noted in the fifteenth century near Lehesten in Thuringia, where the site was developed in the 1860s. Other areas in production by the nineteenth century were between Wiesbaden and Koblenz on the Rhine, Mayen (in Fell, Kreuzberg, Sauerthal and Kaub) and in Westphalia (near Raumland and Berleburg), at Nuttlar (Ostwig) and Fredeburg. Some 5,000 men were employed by 1872, but productivity throughout Germany was low. One German quarry (it is not clear which one) employed a Welsh manager, Owen Williams from Penrhyn Quarry. Saw-tables from Porthmadog were exported to a German slate quarry.
Authenticity and Integrity:	Mostly compromised and fragmented
State of conservation:	Schiefer Park Lehesten has conserved a whim house built in 1862 converted to steam operation three years later, as well as other structures. Here pits and underground levels are accessible. Buildings and other features have been conserved in slate workings at Lotharhail in Bavaria, at Barbara und Hoffnung in Rheinland-Pfalz, at the Schieferbergbaumuseum Nuttlar and elsewhere.
Protection and management:	Some sites are actively managed for their heritage value.
Similarities:	Technical continuities including 0.6 m gauge railways
Differences:	Smaller scale and dispersed nature of industry

Figure 3.28. This winding house at a slate quarry at Lehesten in Thuringia (Germany) was built for a horse whim in 1862, and follows the long-established German mining tradition of building a tapering roof over the mechanism. The horses were replaced by a steam engine in 1865.

Figure 3.29. Mining for slate continues at Bad Fredeburg in the Rhineland Slate Range (North Rhine Westphalia), Germany.

Australia and Tasmania	
Theme:	Slate quarrying sites
Time period:	Nineteenth century to twentieth
Key values and attributes:	Slate has been worked in Australia since the 1840s with Welshmen and Cornishmen well represented amongst the workers. Tasmanian slate was worked from the 1850s. Here the main quarry was known as 'Bangor', and was connected to the coast by a wooden railway.
Authenticity and Integrity:	Compromised and fragmented
State of conservation	Limited
Protection and management:	Limited
Similarities:	Cultural continuities
Differences:	The slate landscapes of Australia and Tasmania are on a much smaller scale than those of Northwest Wales; although survival is good in some places, they never represented significant industrial landscapes, nor did their output have such wide-reaching consequences as the Nominated Property.

Himachal Pradesh **(India)**	
Theme:	Slate mining and quarrying landscape.
Time period:	Nineteenth to twenty-first century
Key values and attributes:	Slate in India is found in Rajasthan, Haryana, Andhra Pradesh and Madhya Pradesh; however the principal workings are in the state of Himachal Pradesh in northern India, first worked commercially in 1867 as the Kangra Valley Slate Co. Ltd. These are located in the Dhauladhar mountain range in the foothills of the Himalayas. Recent mining gave work to many hundreds of operatives working in uncontrolled conditions with minimal capital and with minimal mechanisation.
Authenticity and Integrity:	Potentially high, given the traditional and uncontrolled nature of operations
State of conservation:	Not conserved
Protection and management:	No protection; not managed as a heritage asset
Similarities:	The workings in Himachal Pradesh offer historical parallels to the earliest phases of the slate industry of Northwest Wales
Differences:	The slate industry of Himachal Pradesh did not undergo a major capitalised period of operations such as those of Northwest Wales which called new towns and dedicated transport systems into being.

Nova Scotia, Quebec, Newfoundland **(Canada)**	
Theme:	Slate quarrying sites
Time period:	Nineteenth-twentieth centuries
Key values and attributes:	A slate industry began to develop in British North America a few years before Confederation in 1867. French slate had been used in Montreal for many years previously. The main quarries were in Nova Scotia and two areas of Quebec. Welshmen were active in developing the industry but it was always on a small scale.
Authenticity and Integrity:	Believed to be compromised and fragmented
State of conservation:	Not known
Protection and management:	Not known
Similarities:	Evidence for Welsh emigration
Differences:	Small scale of industry

Maine slate belt (USA)	
Theme:	Slate quarrying sites
Time period:	Nineteenth century to twenty-first, continuing
Key values and attributes:	An industry which was developed by immigrant Welshmen but which went into decline after 1945. Slate was worked in many small pit-quarries, and 0.6m gauge railways transported the slate.
Authenticity and Integrity:	Significantly compromised and fragmented
State of conservation:	Poor
Protection and management:	Limited; the Italianate 'slate house' of *c.* 1860, built by the Brownville and Piscataquis Slate Company, is listed on the National Register of Historic Places. Its foundations and wall exteriors are fashioned entirely out of slate.
Similarities:	Technical and cultural continuities with Northwest Wales such as use of narrow gauge railways
Differences:	Smaller scale and dispersed nature of the industry

Figure 3.30. These cottages in Coulsontown, York County, Pennsylvania (USA), show how Welsh migrants from *The Slate Landscape of Northwest Wales* brought their own architectural forms over with them.

Pennsylvania slate belt (USA)	
Theme:	Slate quarrying landscape
Time period:	Nineteenth century, continuing
Key values and attributes:	Located 80 km northwest of Philadelphia, and one of the most important historical slate producers worldwide. Numerous quarries are located in a narrow belt covering an area of 56 km^2 in low-lying (elevation 165 m) and undulating terrain located between the Lehigh and Delaware rivers. The origins of large-scale quarrying are associated with Robert Jones who came from Northwest Wales. He named the principal settlement Bangor. This industry spread across the northern edges of both Lehigh and Northampton counties, where several hundred small open quarries have been identified. The town of Slatington on the Lehigh river became an important centre; many of the quarries and mills were operated by Welshmen. Principal primary remains comprise flooded quarries and hundreds of tips of waste rock. At Coulsontown in York County, four stone-built quarrymen's dwellings built in the mid-nineteenth century of distinctly Snowdonian appearance survive.
Authenticity and Integrity:	Many sites survive in an authentic and abandoned state
State of conservation:	Abandoned with no conservation, although a detailed record and documentation of selected sites is being undertaken by a local collaboration between academic institutions. This is planned to lead to priority conservation interventions.
Protection and management:	Limited; the Slatington Historic District is listed on the National Register of Historic Places. This includes the First School Slate Factory, in western Slatington. The Coulsontown Cottages contribute to a National Historic District. Otherwise there is no known formal protection, but some sites are managed as part of the 'Slate Trail'. There is a current (2019) intent to incorporate the 'Slate Belt' within the Delaware and Lehigh National Heritage Corridor.
Similarities:	These slate quarries, heavily driven/influenced in their early large-scale development by Wales, share some characteristics of open and water-filled pits and extensive tips of waste rock.
Differences:	Increasingly these sites are becoming less coherent as a landscape. Some railways survive and settlements also retain some important elements of their historic character. The primary remains increasingly lack integrity as they become more fragmented, due to reclamation and development pressure from light industry and alternative land use.

Figure 3.31. The borough of Bangor (Pennsylvania) was set up by Robert Morris Jones (1825-1886) from Bangor (Gwynedd), who developed the local slate industry. The quarries were extensive but are increasingly becoming re-vegetated.

***New York-Vermont slate belt* (USA)**	
Theme:	Slate quarrying landscape
Time period:	Nineteenth century to twenty-first, continuing
Key values and attributes:	An industry which developed from the mid-nineteenth century producing writing elements, roofing materials and slab products from small pit quarries. Immigrant Welshmen monopolised the skilled positions, and Irishmen, Hungarians, Ruthenians and Italians became the labourers. Twentieth century decline has been followed by a modest revival. The Slate Valley Museum in Granville, NY interprets the history of the industry.
Authenticity and Integrity:	Many sites survive in an authentic and abandoned state
State of conservation:	Not known
Protection and management:	Limited; Farmer's National Bank and W.H. Hughes Slate Company Office, also known as the Granville Town Hall, is listed on the National Register of Historic Places. (W.H. Hughes was the son of Hugh W. Hughes, the 'Granville Slate King', originally from Northwest Wales, who amassed a considerable fortune despite remaining illiterate all his life.)
Similarities:	Technical continuities with the slate industry of North-west Wales through immigration – chain incline ropeway technology from Wales replaced horse derricks and whims, and were themselves replaced by cable hoists from 1894; cultural continuities are evident
Differences:	Dispersed nature of the industry; broad ethnic mix contrasts with mono-cultural communities in Northwest Wales

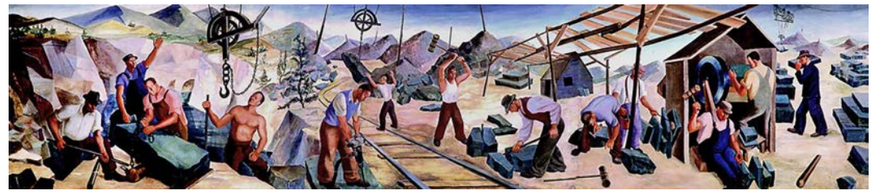


Figure 3.32. The distinctive environment of a quarry in the New York-Vermont slate belt is apparent in this mural of 1939, painted by Martha Levy for the Granville High School in New York State, now in the permanent collection of the Slate Valley Museum. It shows Welshmen working alongside immigrants from other European cultures. The National Slate Museum in Llanberis (Component Part 2) is twinned with the Slate Valley Museum.

Analysis of Results 3

The historic centres of slate quarrying across the world that developed to supply international markets from the eighteenth century onwards possess some important slate quarrying and mining landscapes, but are generally not on a comparable scale to Northwest Wales, nor do they illustrate such a diverse application of technology (quarrying, mining and processing), of transport infrastructure (especially narrow-gauge railways) and the high authenticity and integrity of associated settlements. They lack the elements that are well represented within Northwest Wales itself.

Historical sources confirm the influence of Welsh managers on many of these sites. The movement of labour from Northwest Wales to slate quarries elsewhere in the world, as well as the evident technical influence of engineers and managers from the industry, confirms criterion (ii) an important interchange of human values, particularly in the heyday period from 1780 to 1940, on developments in architecture and technology and (iv) an outstanding example of a landscape which illustrates in a dramatic way, a significant stage of human history – the Industrial Revolution – by exploiting natural resources of slate on a huge scale. (See *Conclusion of Analysis of Elements* below for criterion [v]).

3.2.v Conclusion of analysis of Results 1, 2 and 3

The Nominated Property ranks as exceptional when compared with similar cultural landscapes formed around quarrying for stone, and can fill a critical gap on the World Heritage List. *The Slate Landscape of Northwest Wales* exemplifies many of the most important characteristics of stone quarrying, some of which stretch back into antiquity, but which reached an industrial landscape scale particularly from the nineteenth century.

3.2.vi Justification of the selection of Component Parts

Results **1**, **2** and **3** above provide a context for the selection of the Component Parts that make up the serial nomination of *The Slate Landscape of Northwest Wales*. Comparison with other slate-producing areas in Wales and elsewhere confirms both the extent of technology transfer from Northwest Wales to other parts of the world, and the exceptionality of this slate landscape, with its varied geology and forms of natural environment, which called for ingenious, and exportable technologies.

A serial nomination is therefore necessary to capture the territorial scale, the uneven geological distribution, and the diversity of the wider industrial cultural landscape, including functional and social linkages that are essential to understanding the significance of the whole. In addition, comparison with inscribed cultural landscapes emphasises the significance not only of the extraction process itself but also of associated technical systems, such as processing, handling and transport, and of social systems, including housing and settlement, at different group levels. These reflect the variety of processing, handling and transport requirements within each Component Part of *The Slate Landscape of Northwest Wales*, and also the diffusion within the Nominated Property and beyond of innovative technologies to accomplish these ends, as well as the complex interaction of different social groups which led to the creation of varied settlement patterns, and to the distinctive intangible heritage of the region. It is for this reason that it is the series of Component Parts which demonstrates the proposed Outstanding Universal Value.

Selection of the six Component Parts has therefore been guided not only by detailed levels of historical research and archaeological enquiry into *The Slate Landscape of Northwest Wales* over many years, and by a concentrated review in the field, but also by consultation with experts familiar with comparable sites over the world, and particularly with the period of the Industrial Revolution. The Component Parts are large enough to reflect the cultural landscape dimension and to encompass functional, spatial and historical integrity of the significant surviving characteristics of extraction, processing, transport, settlement and end-use.

Component Part 1. Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn

This Component Part captures the entirety of the landscape from quarry to sea on a great landed estate, conveying the sheer size of what was once the largest slate quarry in the world, at the scale of which slate was extracted from stepped galleries on the hillside and in the pit, and the use of water-power to operate balance-shafts to raise material. The two contrasting and innovative railway systems which carried the slate to the harbour – a pioneering one built as early as 1801, the other in the 1870s – illustrate the developments in a distinctive and important technology, one particularly associated with the slate industry of Wales, and which became key in terms of international technology transfer.

Also evident is the difference between the estate-sponsored settlements and the quarrymen's village at Bethesda, as well as the even more powerful contrast between these cottages and terraces on the one hand, and the Quarry owner's Penrhyn Castle and Park on the other. The port itself, integral to the ensemble, is one of the two best-surviving examples developed for the export industry, both of which are included in the Nominated Property.

Component Part 2. Dinorwig Slate Quarry mountain landscape

Dinorwig Slate Quarry lies at the foot of Snowdon, the highest mountain in England and Wales, and overlooks Padarn Lake, in an environment that is both Picturesque and rugged. In its scale, it was barely second only to Penrhyn, and worked the same vein of Cambrian slate. The quarry landform is apparent in the view over Peris Lake, where each of the stepped galleries cut into the mountainside extends to form a tip of slate rubble. This is an exemplar of a mountain quarry that illustrates an unparalleled vertical section in a dramatic setting.

It is here that the distinctive quarry system of counter-balanced inclined planes, whereby loaded wagons descending would pull up the lighter empties on an adjacent track, can be seen to best effect, one of the best examples in any industrial context. It also includes a feature which is unique to it, the architecturally ambitious quadrangular engineering complex, with its historic machinery, now the National Slate Museum. The nearby quarry hospital was one of several in the slate industry of Northwest Wales but is now unique in having been fully conserved and opened as a museum. Settlements associated with Dinorwig Slate Quarry include not only nucleated villages and dispersed cottages but also surviving examples of purpose-built quarrymen's barracks.

Component Part 3. Nantlle Valley slate quarry landscape

Here, both topography and landownership resulted in a stark and distinctive environment where the fine Cambrian slates also exploited at Penrhyn and Dinorwig had to be worked in many sheer-sided pits on the valley floor and the lower slopes. This required the use of the aerial ropeway systems which are a 'signature' of this component part, and presented the challenge of tipping rubble in a confined environment where it would not compromise future extraction. Water ingress – a constant challenge – was resolved using pumping technology from Cornwall, one of the two principle types of which is represented by the exceptional survival of the original equipment *in situ*. The course of the railway and its feeder inclined planes is apparent. The unique social dynamic of the Nantlle Valley is evident in the varieties of settlement, including converted late-medieval dwellings and farm-buildings, cottages built on the mountain waste, and a planned company village.

Component Part 4. Gorseddau and Prince of Wales slate quarries, railways and mill

This remote upland environment exemplifies the commercial optimism generated by the slate industry in the mid-nineteenth century, and the ready availability of investment capital in the UK at the time, where even poor-quality slate rock was judged capable of being worked profitably for architectural slabs if state-of-the-art machinery was installed. The failure of both quarries has left intact a textbook example of mid-nineteenth century practice in extracting, processing and transporting slate and slate slabs, as well in housing the workforce in an inhospitable location. The magnificent multi-storey slate-slab mill is a unique survivor.

Component Part 5. Ffestiniog: its slate mines and quarries, 'city of slates' and railway to Porthmadog

The Ordovician slate veins of the Ffestiniog area lie at a shallow angle to the hoizontal, with the result that, though open workings here are still on an enormous scale, most of the slate was won from many hundreds of underground chambers, and transported to the surface along tunnels and by means of powered inclined planes. The energy needs of the Ffestiniog quarries were such that not only was water extensively used to operate machinery directly but it was also very early on put to generating electricity. The tips of slate rubble dominate the town of Blaenau Ffestiniog, the most characteristically urban of the quarry settlements. This Component Part additionally takes in the entire landscape not only of production and settlement but also of transport, in the form of the internationally influential Festiniog Railway, still fully operational, built to connect the quarries with navigable water at Porthmadog harbour. This active railway connection provides outstanding functional integrity to the ensemble, and an unsurpassed opportunity to understand how such natural resources were opened up in the era of the Industrial Revolution.

Component Part 6. Bryneglwys Slate Quarry, Abergynolwyn village and the Talyllyn Railway

Bryneglwys, which exploited the Ordovician slate of southern Gwynedd, shows different approaches to working this near-vertical vein, first in an open pit and then by mining, reflecting the successive arrival of workmen from Component Parts 3 and 5. The sudden influx of capital to this Component Part in the 1860s from the textile industry of Lancashire led to the creation of Abergynolwyn village and to the building of the first purpose-built steam railway in the slate industry, the Talyllyn. As the second of the two operational steam-powered railways in the Nominated Property, together with the primary industry it served, it differentiates this quarrying landscape at a global comparative level. It was the first railway in the world to be preserved by a group of railway enthusiasts.

Conclusion of analysis of the Component Parts

The proposed Outstanding Universal Value of *The Slate Landscape of Northwest Wales* under criteria (ii), (iv) and (v) is fully conveyed by the following Component Parts: Penrhyn Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn; the Dinorwig Slate Quarry mountain landscape; the Nantlle Valley quarry landscape; the Gorseddau and Prince of Wales slate quarries, railways and mill; Ffestiniog's slate mines and quarries, 'city of slates' and railway to Porthmadog; and Bryneglwys Slate Quarry, Abergynolwyn village and the Talyllyn Railway. Each of these Component Parts is essential to convey the full combination of attributes and values of the whole. Whilst additional landscapes survive, they do not add substantially to the series, which is deemed of adequate, indeed optimum, size for the purposes of the World Heritage List.

3.2.vii Justification for the selection of Elements

Cultural landscapes shaped by working, processing and transporting slate dating from the period of the Industrial Revolution form a sub-set of environments formed by the extraction of stone from its geological formation for human purposes, as set out above in **Basis for Comparison (Section 3.2.i)**. Elements within such cultural landscapes typically not only comprise the surface landforms thereby created, which include places where unusable rock was dumped, as well as in many cases underground environments, but also the means undertaken to keep the workings free of water, systems for processing and transporting output, and housing for those involved in the industry. This section has been informed by Uhlir and Gwyn (2015) as well as by Coulls (1999) and by Bergeron (2001) (see section 7.e Bibliography).

Quarries, tips and workings (surface landforms): Elements 1.1, 2.1, 2.2, 3.1, 3.3, 3.7, 4.1, 4.2, 5.1, 6.3

Slate quarries are opened on a hillside or as an open pit. In either case, the rock may be worked as one face or may be made up of stepped galleries in a hill-slope. This practice is known from Egyptian and Roman stone-quarrying, but was developed on a major scale at Penrhyn Slate Quarry (Element 1.1). It became common where geology permits, and favoured the use of railways for removing useful rock and for dumping waste. Pit-working is also common in stone-quarrying environments as well as in some instances of metalliferous ore extraction. The Nominated Property therefore includes the two major forms of open working. Tips of waste rock and debris form an important part of quarry landscapes, illustrating the human interaction with geology, and are often impressive landscape features in their own right.

Underground environments: Elements 1.1, 5.2, 6.2

Stone has often been worked underground, particularly where it is required for building purposes near a major city and slate has been worked underground in France, Belgium, Luxembourg, Germany and India as well as in Northwest Wales. Mining for slate in Component Part 5 of the Nominated Property reflects the considerable thickness of the 'vein' and its dip. It typically made use of the 'honeycomb' system of chambers stated to have been introduced in emulation of limestone mines in Dudley, in the English West Midlands, and which largely superseded the earlier system of free-standing pillars, of which one example remains. The narrower vein and steeper dip in Component Parts 6 is reflected in the different shape and organisation of the chambers.

The principal properties for comparison are other forms of stone mining where some of the rock itself was used as a support, such as at Dudley and Bath (UK); they contrast with properties such as the *Wieliczka and Bochnia Royal Salt Mines* (Poland: 32ter), where timber framing is used as a support.

Underground environments include drainage and access levels as well as evidence for mining. Although Penrhyn Slate Quarry (Element 1.1) was worked in the open, it required a drainage level not only to keep the workings dry but also to remove water used in the balance shafts and hydraulic engines. These were common in metalliferous (vein/lode) mining, and were found in stone-extraction sites where they were required.

Historic industrial buildings and machinery: Elements 1.1-2, 2.1-2, 2.4, 3.1-8, 4.1-3, 5.1, 5.3-5, 6.1

Slate-makers' shelters, slate mills and slate-slab mills

Buildings and machinery to convert raw quarried stone to a finished product stone were common throughout the quarrying industry worldwide, and varied from simple structures where hand tools were used to extensive mechanised and powered mills.

Slate-makers' shelters in Elements 1.1, 2.1, 2.4, 3.1, 3.3, 4.1, 4.2 and 5.1 reflect the earliest phase of processing, like the windbreaks erected by French slate *fendeurs* (splitters) or the 'quarr houses' in Purbeck limestone quarries.

So far as is known, the Felin Fawr Slate-Slab Mills (Element 1.2) is the first location in the world where stone was cut by a circular saw, in or by 1802. Circular saws to saw *lignum vitae* were set up in 1803 in the Royal Naval dockyard at Portsmouth (UK) by the engineer Marc Brunel, the machine maker Henry Maudsley, and by the naval administrator Samuel Bentham; these have been described as the world's first production line. Any connection between the two sites is as yet unattested. Circular saws for stone cutting became common in the United Kingdom in the 1820s and 1830s.

The Felin Fawr site is made up largely of a slab mill and other structures dating from 1866 to the twentieth century, and no trace of earlier buildings or machinery has been identified, but the culverted stream which operated the machinery here is accessible, and provides a topographical context for the harnessing of water power at this innovative location. The design of the two mills reflects the 1864 mill at the Prince of Wales Slate Quarry (Element 4.2), built by the same engineer.

Within the same Component Part as Prince of Wales Slate Quarry, the Ynysypandy Slate-Slab Mill (Element 4.3) is an unusual multi-storey structure which resembles foundry practice, in particular in its use of round-headed windows. It is believed to have been based on a design for a now-demolished workshop on the Lancashire & Yorkshire Railway at Miles Platting in Manchester (UK), reflecting the presence of railway directors on the board of management of Gorseddau Slate Quarry. The course of the two railways which served these highly significant mills and their two quarries in this Component Part demonstrates their high functional integrity in a landscape context.

The Diffwys Slate Quarry Mill (Element 5.4) illustrates the adoption of steam-power to process slate and the integration of mechanical and hand-processing within the one structure to produce roofing slate. The mills in Component Part 3 and the mill within the Maenofferen Slate Quarry Main Complex (Element 5.5) illustrates the scale these buildings had achieved at the industry's height in the late nineteenth century, and the successive use of water, steam and electricity as a prime mover. The electrically powered mill on 'Australia' Gallery (Element 2.2), with its surviving saw tables, illustrates the last phase of this development. Some saw tables also survive in their historic location coupled by line shafting to the 1870 waterwheel in the National Slate Museum (Element 2.5), where some slate was processed from the nearby Vivian Department (Element 2.4).

The successive use of water, steam and electricity to power stone-cutting machinery reflects a common evolution during the nineteenth century. Though the long, low-

roofed mills in *The Slate Landscape of Northwest Wales* are distinctive, they share with other environments of stone processing from this period the growing application of the factory principle, with a rationally conceived and ordered system built around a central power source.

Handling systems

Handling systems for internal movement within quarries and mines was carried out mainly by railways built to a nominal gauge of 0.6m, for which there is abundant evidence within the Nominated Property. These were the principal means of moving raw slate blocks to the mills and waste rock to tips, of transporting finished slate and slab to stack yards and bringing in coal for smithies and steam engines. The adoption in 1801 of internal iron railways by the slate industry of Northwest Wales was a particularly early reflection of emerging practice elsewhere in the United Kingdom, especially the iron industry. They differed from the long-established wooden systems which served continental metalliferous mines as well as with the use of basic technologies such as the horse and cart and the hand barrow which prevailed in many locations. The adoption of railways encouraged the integration of slate quarries and mines into rationally ordered workspaces, since they required uniform stepped galleries, properly engineered underground levels and spaces for tipping waste rock. The use of inclined planes is particularly marked in all the Component Parts of *The Slate Landscape of Northwest Wales* and illustrates a type of technology that was crucial to the successful working of other types of stone quarry, and to other types of industrial undertaking.

The widespread use of 0.6m-gauge railways as industrial handling systems throughout the world can be traced to the slate industry of Northwest Wales (see below).

Ropeway systems were also used. They had been a feature of open quarries from the late eighteenth century, reflecting earlier methods of transferring goods across a valley. The 'chain incline' ropeway, where the skyline is at an angle, is believed to have been devised in the slate industry of Northwest Wales and to have been adopted in slate quarries in Ireland and the USA by emigrant Welsh specialists. The substantial slate bastions these systems required are evident in Element 3.3. A smaller example in Element 6.1 preserves evidence for the waterwheels which powered it; here, documentation confirms technology transfer from Component Part 3.

The more sophisticated 'Blondin' ropeways are named after Charles Blondin who walked across Niagara falls on a tightrope in 1852, and were used in the Scottish stone industry from 1872. They involved a catenary skyline stretched across a pit between two masts, along which ran a traveller, from which in turn a vertical haulage rope depended. The lateral movement of the traveller was controlled by an endless rope running parallel to the skyline, operated by the same power source, on or near the bank, and which also operated the vertical movement of the haulage rope.

The 'Blondins' which form Elements 3.2 and 3.8 in the Nominated Property reflect a design of 1896 by Henderson's of Aberdeen (Scotland, UK) which used new inexpensive steel ropes, instead of iron ropes or chains. Such machines were soon adopted by the slate industries of the United Kingdom, the United States, in naval coaling stations and on large-scale engineering projects. A similar technology, known as the 'quarry stick', was also used in American slate quarries, and was adapted from technology used in Northwest Wales. The last operational 'stick' was

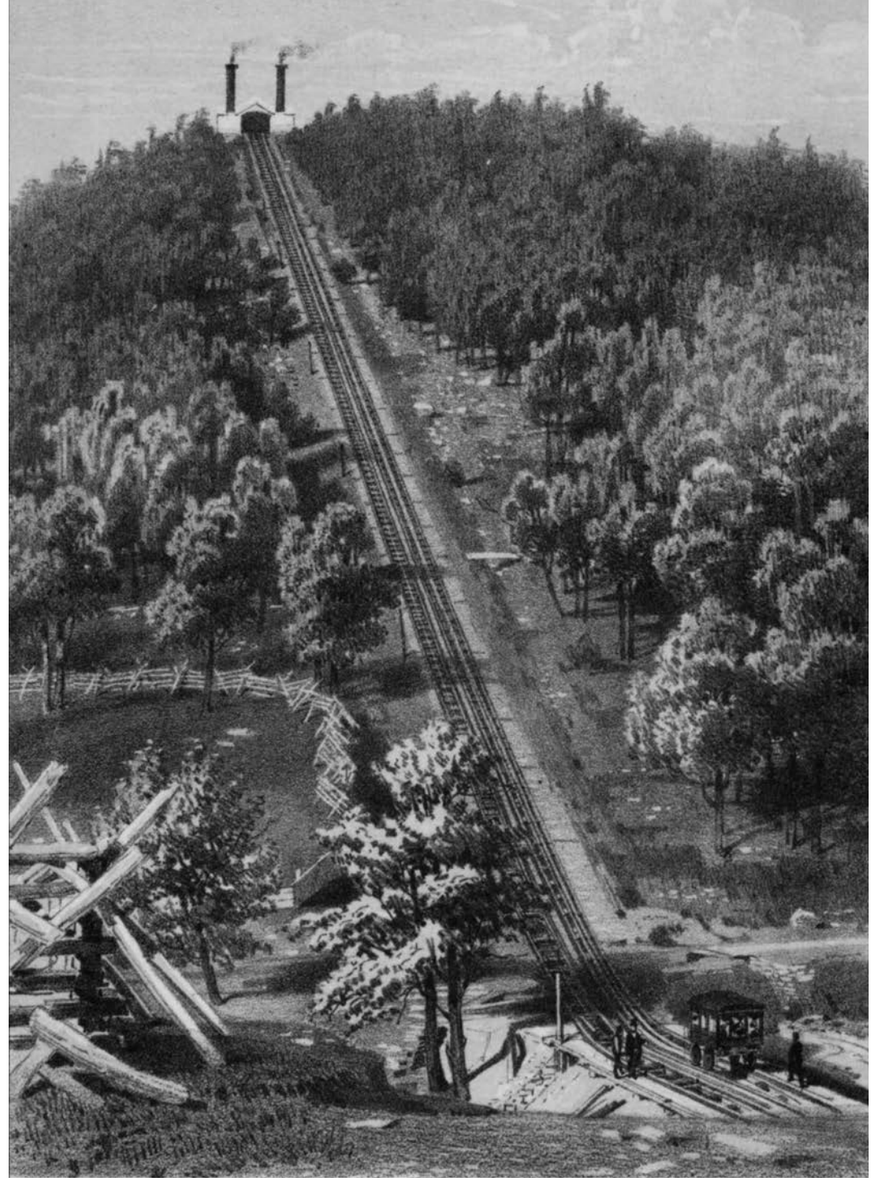


Figure 3.33. Inclined planes were commonly used on railways throughout the world from the eighteenth century until recent times, such as this one on the Mauch Chunk colliery railroad in Pennsylvania.

recorded by the Smithsonian Museum on videotape in October 1989 before it was replaced by a road system, ten years after the last 'Blondins' had stopped work in the Nominated Property.

The surviving examples of 'Blondin' ropeways (Elements 3.2 and 3.8) and a variant where the skyline is at an angle (Element 2.4), date from the first three decades of the twentieth century, and are believed to be unique survivors. Cableway cranes, in which some aspects of this technology are to be found, are in common use across the world. Aerial tramways or *téléphériques*, in which the cabins or receptacles are gripped by a propulsion rope, constitute a different technology in that they do not have the facility to raise or lower the load in a vertical plane, and are not considered comparators for this reason.

Few quarries or mines in the slate industry of Northwest Wales were self draining. The hydraulic engine in Element 1.1 which operated the pumps is a well-preserved and unusual late-nineteenth century example of a technology devised in continental Europe in the mid-eighteenth century but which saw comparatively little use in the United Kingdom, where steam pumping engines were more common. Element 3.6 is a more conventional waterwheel-driven pumping system, of a type devised in the sixteenth century in continental European mining fields. This technology was brought to this site by entrepreneurs from the English West Country, where they were common, and contrasts with the classic Cornish Beam Engine (Element 3.4) nearby at Dorothea Slate Quarry.

The development and global significance of these engines is well attested. They were used for crushing mineral ores, shaft-winding in mines or for pumping mines, quarries and waterworks. The four surviving examples *in situ* form attributes of the *Cornwall and West Devon Mining Landscape* World Heritage Site. The Dorothea Cornish beam-engine (Element 3.4) in Component Part 3 is one of only three such pumping engines outside Cornwall authentically preserved *in situ* in an extractive site (i.e. other than a waterworks) worldwide. It is also the only one to survive with its original boilers, as even in Cornwall these no longer exist. It is the only surviving example within the Nominated Property of this distinctive technology – one of only two believed to have been erected within it – and is the only surviving Cornish beam-engine in the context of stone quarrying.

Sixteen Cornish engines are known to survive worldwide, in the following twelve locations:

Table 3.1 Surviving Cornish beam engines worldwide

Location	*Province / region / municipality / county / state*	*Jurisdiction*	*Purpose*			*World Heritage site?*
			Crushing	*Winding*	*Pumping*	
East Pool Mine	Cornwall	UK		1	1	Yes
South Crofty Mine	Cornwall	UK			1	Yes
Levant Mine	Cornwall	UK		1		Yes
Kew Bridge	London	UK			2	No
Crofton Pumping Station, Kennet and Avon Canal	Wiltshire	UK			2	No
Fresnillo Mine	Zacatecas	Mexico	2			No
Cruquius Pumping Station	Haarlem	Netherlands			1	No
Llanishen, Cardiff Docks	Cardiff	UK			1	No
Sandfields Pumping Station, Lichfield	Staffordshire	UK			1	No
Prestongrange Colliery	East Lothian	UK			1	No
O'okiep Copper Mine	Northern Cape Province	South Africa			1	No
Dorothea Slate Quarry	**Gwynedd**	**UK**			**1**	**Nominated**

The *Nomination of the Cornwall and West Devon Mining Landscape for Inclusion on the World Heritage List* draws attention to the significance of these machines (section 2a) and notes that of the many built, only a small number have survived, and fewer still are on their original site (2b). Engine houses from which the machinery has been removed also constitute a highly distinctive industrial monument in Cornwall and West Devon (around 200) and elsewhere in the world (over 50).

The Dorothea Slate Quarry Cornish Beam Engine was built by Holman's of Camborne (UK) and was erected in 1904-1906. It is the penultimate such beam engine built from new, and it operated until the 1950s. The decision to install this machine was taken after plans for a hydro-electric pump system were rejected as not cost-effective. Its late date adds to its significance as an attribute of the pressing need within this Component Part to clear quarry pits of water, and as a still-viable technology within the great Cornish tradition of steam engineering.

Figure 3.34. The Cornish beam engine at O'okiep Copper Mine, Northern Cape Province, South Africa. This is the only such engine to survive *in situ* in the southern hemisphere. It was designed by John Hocking and built by Harvey's of Hale, Cornwall (UK).

Power-generation

Although many of the energy needs of the slate industry of Northwest Wales were met by using water power, the Nominated Property includes examples of fixed steam plant, and of the use of electricity. The large locally manufactured waterwheel of 1870 which powered the machinery in Element 2.5 the National Slate Museum is of the 'suspension' type whereby power is taken off rim gearing, as are the two waterwheels at Element 1.2; these represent the effective final phase in the evolution of the vertical industrial waterwheel from its origins in Antiquity.

Surviving steam plant in the Nominated Property is neither large-scale nor innovative but it does represent a considered application of a globally available technology to

the circumstances of Northwest Wales. The Pant yr Afon Hydro-Power Station (Element 5.3) is a well-preserved example of a technology that has been widespread since the late nineteenth century. Constructed in 1904-1906, it is an early, although not innovative, example, reflecting the continued evolution of waterpower that was crucial in the development of the Nominated Property. In the context of the slate industry it is on a smaller scale than the first known installations in the quarries of Maine-et-Loire (France), which do not survive. It reflects the transfer of technology to the slate industry of Northwest Wales, and the careful and cautious evaluation that quarry engineers made of this new form of power. It was designed and built by the local engineer, Charles Warren Roberts (1852-1897), who was educated at Eton and articled to Charles Easton Spooner of the Ffestiniog Railway. He was employed by the coal-hauling Dona Teresa Christina Railway in Brazil, before becoming manager of Llechwedd quarry in 1887.

Relict transport routes: railway systems: Elements 1.3, 2.7, 3.9, 4.4; 5.9, 6.4

Four relict railway systems forming elements within Component Parts 1 to 4 of the Nominated Property were built to transport slate (Elements 1.3, 2.7, 3.9, 4.4). In addition, the two active railways (see below) have relict sections (Elements 5.9, 6.4). All were connected to the internal quarry railways and to the other handling systems. Most were built to the same nominal gauge of 0.6 m as the internal systems. The earliest was constructed in 1801 (1.3), by the engineer Thomas Dadford and reflects his expertise in canal building; the last was completed in 1879 (1.3), a steeply graded line for locomotive operation. Their comparators are therefore early (1770-1830) mineral systems serving canals, and later industrial narrow-gauge (0.6-0.75 m) railways, from the period of 'The Industrial Revolution and the Advance of Science and Technology' and of 'European colonialism'.

The high survival of formations, bridges, causeways and buildings within these elements enables them to stand comparison in terms of significance, authenticity and integrity with important early mineral railway sites in England and elsewhere in the world identified in a report commissioned by Historic England (Gwyn and Cossons 2017), such as the Peak Forest Railway (Tramway) (1796) in Derbyshire (UK) and the Haytor granite railway (1820) in Devon (UK), as well as other early railways using inclined plane technology such as the Allegheny Portage Railroad (1834) (USA). Later industrial narrow-gauge (0.6-0.75 m) railways across the world appear to be to a great extent derived from the practice of the slate industry of Northwest Wales, and are considered in the context of operational heritage railways, below.

Operational heritage railways: Elements 5.9, 6.4

Two railways which form elements within Component Parts 5 and 6 – the Ffestiniog and the Talyllyn – remain operational as heritage attractions. Both are exceptional for the survival of historic features, including formations, station buildings, workshops and depots, and for the everyday operation of locomotives and rolling stock dating from the 1860s. The significance, authenticity and integrity of these two elements are of a very high order indeed.

Their principal comparators are operational public narrow-gauge (0.6-0.75m) railways from the period of 'The Industrial Revolution and the Advance of Science and Technology' and of 'European colonialism'. They can be distinguished from standard gauge (1.435 m) railways as well as 'medium' gauges (0.914-1.3716 m) which tend to be smaller versions of standard gauge practice.

The Ffestiniog Railway is particularly significant in the evolution of this technology. Visitors drawn from the political, technical and financial elites of Russia, Poland, Hungary, India, Mexico, Prussia and France came to see it in operation in 1870. It is identified in Coulls 1999 as the technological inspiration for the Darjeeling Himalayan Railway, a Component Part of the *Mountain Railways of India* World Heritage Site (India: 944ter), which clearly shows how its sinuous formation and steam locomotive technology could be adapted to the circumstances of India. The Ffestiniog, the Talyllyn and the Darjeeling represent this distinctive technology at its most complete and compelling in global terms.

The 0.6 m gauge offered a system robust enough to move a compact load or passengers over a distance but also light enough to be laid and operated in confined environments. The French engineer Paul Decauville (1846–1922) stated that the Ffestiniog Railway had inspired him to more imaginative development of his company's portable railway system of ready-made track fastened to steel sleepers. His work in turn influenced firms in Germany and the United Kingdom: between them they dominated the world market, building industrial 0.6m-gauge industrial railways for quarries and mines, agricultural estates, factories, prisons, hospitals, saw mills, sewage farms and mines. Others on this pattern, totalling many thousands of kilometres, were constructed as public railways in the USA, Wales, England, France, Hungary, Pomerania, the Union of South Africa and German South West Africa, Venezuela, New Guinea, the Belgian Congo, China and above all in Morocco. It was the favoured gauge for the vast networks of trench-supply railways built from 1914 to 1918 which defined a war of attrition. Their combined global length is beyond calculation, and practically all are now long disused and removed; however the Australian sugar cane industry still operates several thousand km of 0.6m track.

Figure 3.35. The applications of the Welsh slate quarry 0.6 m gauge were many and various. This locomotive was built for service on the United States Army's military railways during the First World War, then was bought by Penrhyn Slate Quarry and given the local name *Felin Hen* [Old Mill], which it retained when it was shipped to Brisbane, Australia and sold to Fairymead sugar mill near Bundeberg in 1940. It is shown here in 1964.

Figure 3.36. Diesel traction replaced steam on Queensland's 0.6 m gauge sugar cane railways by the 1970s. Here a train makes its way over a bridge at Mackay, parallel to the North Coast Railway which runs on 1.067 m gauge.

All these railways therefore represent an attribute of the interchange of human values to, within, and above all, from *The Slate Landscape of Northwest Wales*. Initially derived from existing practice elsewhere, they follow a strong and evident evolutionary pattern within the Nominated Property, and influenced technology across the world.

Harbours: Elements 1.4, 5.10

The two operational harbours, Port Penrhyn (Element 1.4) and Porthmadog (Element 5.10) and the two slate quays on the Dwyryd river (Element 5.8), reflect a long tradition of port and harbour engineering, and the expertise particularly of British engineers in the nineteenth century .

Historic planned landscapes, parks and gardens: Elements 1.7, 2.10, 3.12, 5.7

The landscape garden and park associated with Penrhyn Castle (Element 1.7) is an outstandingly well-preserved Georgian pleasure ground enriched by later nineteenth century planting and remodelling. The informal terraced gardens of Plas Tan y Bwlch (Element 5.7) are on a smaller and more intimate scale. Both reflect current thinking about elite landscapes that were common throughout Europe and North America; these elements form social linkages which contribute to the proposed Outstanding Universal Value of the Nominated Property.

Historic settlements: Elements 1.5-6, 2.3, 2.8, 3.10-12, 4.5, 5.6, 6.3

Settlements for quarrymen and their families within the Nominated Property exhibit a significant variety which reflects some of the different forms of accommodation for industrial workers constructed across the world since the eighteenth century. The range of potential comparators is therefore vast.

Each Component Part includes the dwellings of quarrymen and their families, as well as associated social and religious infrastructure. All the workers' dwellings are from the period 1780-1940 other than a few earlier rural buildings which have been significantly adapted. They have been chosen to represent the widest variety of settlement types, reflecting the different proprietorial, social, intellectual and commercial forces operating within the Nominated Property. These include nucleated, linear and dispersed settlements, some of them planned and philanthropic in intent, reflecting contemporary thinking about workers' housing, while others built with little or no formal sanction. They also range from the homes of the very wealthy to those of the very poor. The World Heritage list is currently dominated by planned or utopian industrial settlements. These include Le Grand Hornu in *Major Mining Sites of Wallonia* (Belgium; 1344rev); *City of Potosí* (Bolivia: 420); *Sewell Mining Town* (Chile: 1214); *From the Great Saltworks of Salins-les-Bains to the Royal Saltworks of Arc-et-Senans, the Production of Open-pan Salt* (France: 203bis); *Nord-Pas de Calais Mining Basin* (France: 1360); *Crespi d'Adda* (Italy: 730); *Mining Area of the Great Copper Mountain in Falun* (Sweden: 1027); *Blaenavon Industrial Landscape* (UK: 984); *Saltaire* (UK: 1028); *Derwent Valley Mills* (UK: 1030); *New Lanark* (UK: 429rev). As such, the Nominated Property includes a more representative variety of historic settlements from the period of the Industrial Revolution than inscribed World Heritage sites.

The architecture and internal fittings of representative chapels of the Welsh Methodist, Baptist and Independent (Congregational) connections within the Nominated Property reflect a distinct tradition of worship which originates in the European Reformation. These have the potential to contribute to a more balanced range of elements on the World Heritage list, within which places of Christian worship from episcopal traditions predominate.

Conclusion of analysis of Elements

Elements of the Nominated Property confirm its coherence and authenticity as a cultural landscape under criterion (ii) by exhibiting a powerful interchange of human values in developments in technology. A wide range of elements is necessary in order to capture this interchange, and to demonstrate integrity; these therefore include technologies evolved in an international context which were not necessarily cutting-edge, in some cases design-expired, but which reflect the options available to owners, managers, engineers and working quarrymen, and which illustrate the precedents they could follow as well as the technologies they could devise themselves and inspire others to emulate.

Elements of the Nominated Property confirm coherence and authenticity as a cultural landscape under criterion (iv) as an outstanding example of a landscape which illustrates, in a dramatic way, a significant stage of human history – the Industrial Revolution – by exploiting natural resources on a huge scale.

The types and patterns of settlement within the Nominated Property fulfil criterion (v) by capturing the industrial transformation of a traditional agrarian environment, within the broader evolution and variety of workers' housing during the global Industrial Revolution.

3.2.viii Conclusion to the comparative analysis

The Slate Landscape of Northwest Wales demonstrates the evolution of distinctive slate-quarrying environments (particularly those related to the era of the Industrial Revolution) that display strong technical heritage, both above and below ground, together with intact settlement and social infrastructure that clearly illustrates the organisation of a society based on slate exploitation and that has not suffered from development pressure.

The authenticity, integrity and diversity of the surviving elements is exceptional and highly significant in global terms. The important legacy of underground slate mining is well represented within the property. Moreover, due to the property's high elevation and mountainous terrain (as opposed to slate quarries and mines encountered in low-lying river valleys), this heritage is in a better state of conservation and is widely accessible to both public and specialists. The transport heritage – specifically narrow-gauge railways – is exceptional in any context.

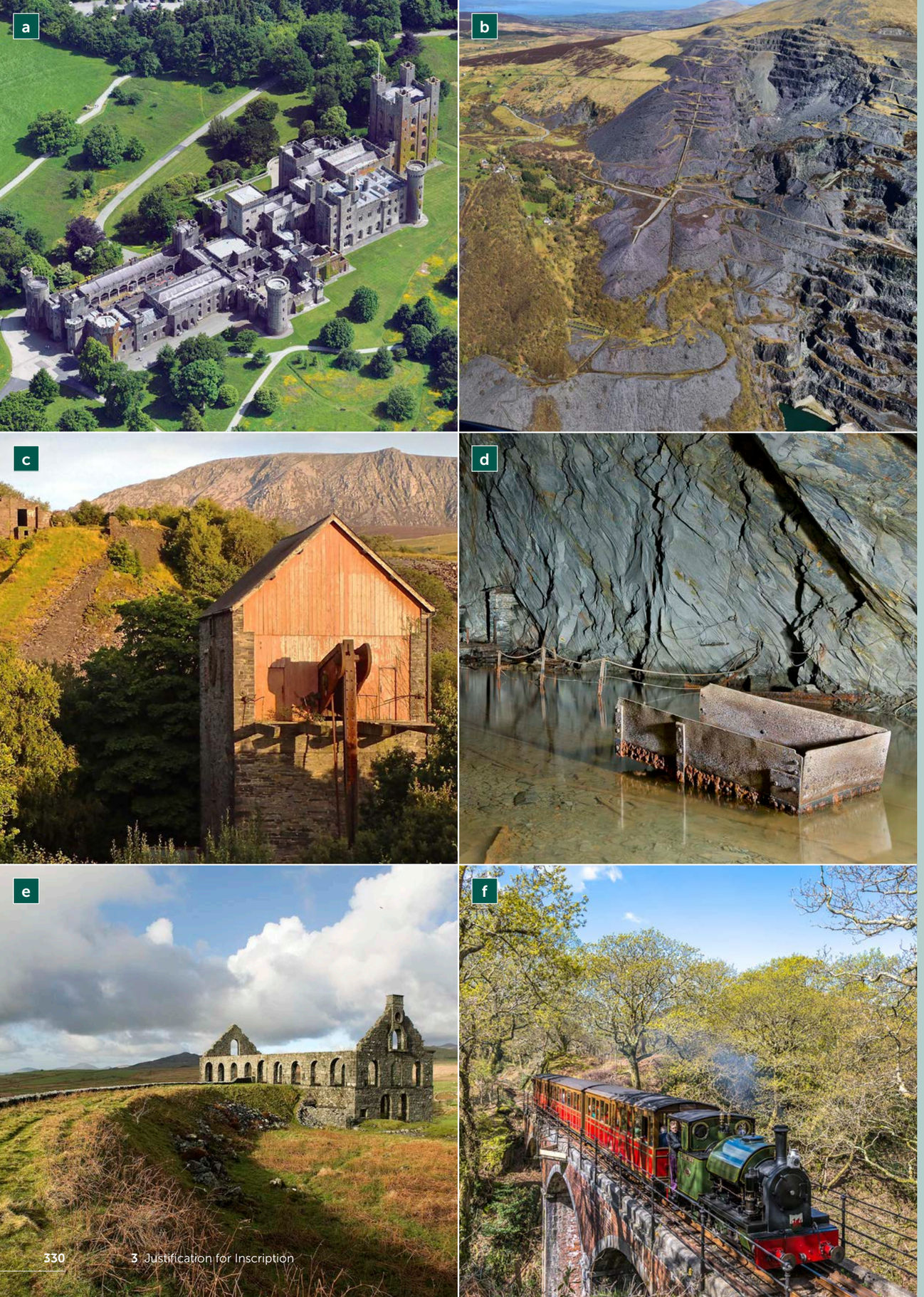
No site has yet been inscribed as a World Heritage Site specifically as a cultural landscape of stone quarrying or mining. Given the fundamental importance of this type of social and economic activity, and the fact that slate represents one of the world's key building stone resources, *The Slate Landscape of Northwest Wales* has the ability to fill a significant thematic gap in the World Heritage List.

Leading experts in the USA, France, Belgium, Luxembourg and the UK support the pre-eminence of the Nominated Property in the context of World Heritage comparative studies.

The Nominated Property is exceptional, and is unsurpassed by comparison with similar cultural landscapes of slate-quarrying. It would contribute to filling a recognised gap on the World Heritage List.

Table 3.2 World Heritage Sites linked to mineral extraction with comparisons to the Nominated Property

Site	*Ref:*	*Ores*	*Coal*	*Salt*	*Mercury*	*Stone / slate*
Hallstatt-Dachstein/Salzkammergut Cultural Landscape	(Austria: 806)			✔		
Major Mining Sites of Wallonia	(Belgium: 1344rev)		✔			
City of Potosí	(Bolivia: 420)	✔				
Sewell Mining Town	(Chile: 1214)	✔				
Erzgebirge/Krušnohoří Mining Region	(Czech Republic: 1478)	✔				
From the Great Saltworks of Salins-les-Bains to the Royal Saltworks of Arc-et-Senans, the Production of Open-pan Salt	(France: 203bis)			✔		
Nord-Pas de Calais Mining Basin	(France: 1360)		✔			
Mines of Rammelsberg, Historic Town of Goslar and Upper Harz Water Management System	(Germany: 623ter)	✔				
Zollverein Coal Mine Industrial Complex in Essen	(Germany: 975)		✔			
Ombilin Coal Mining Heritage of Sawahlunto	(Indonesia: 1610)		✔			
Sites of Japan's Meiji Industrial Revolution: Iron and Steel, Shipbuilding and Coal Mining	(Japan: 1484)	✔	✔			
Iwami Ginzan Silver Mine and its Cultural Landscape	(Japan: 1246bis)	✔				
Historic Town of Guanajuato and Adjacent Mines	(Mexico: 482)	✔				
Røros Mining Town and the Circumference	(Norway: 55bis)	✔				
Historic Town of Banská Štiavnica *and the Technical Monuments in its Vicinity*	(Slovakia: 618rev)	✔				
Wieliczka and Bochnia Royal Salt Mines	(Poland: 32ter)			✔		
Heritage of Mercury, Almaden and Idrija	(Spain and Slovenia: 1313rev)				✔	
Mining Area of the Great Copper Mountain in Falun	(Sweden: 1027)	✔				
Blaenavon Industrial Landscape	(UK: 984)	✔				
Cornwall and West Devon Mining Landscape	(UK: 1215)		✔			
Nominated Property – *The Slate Landscape of Northwest Wales*						✔



3.3 Proposed Statement of Outstanding Universal Value

The following is the proposed Statement of Outstanding Universal Value that will be adopted in the event of a successful inscription.

3.3.i Brief synthesis

The Slate Landscape of Northwest Wales is located in the United Kingdom, in the mountains of Snowdonia. Six areas together represent an exceptional example of an industrial landscape that was profoundly shaped by quarrying and mining slate, and transporting it for national and international markets. From 1780 to 1940 this industry dominated world production of roofing slates, transforming both the environment and the communities who lived and worked here.

The quarries and mines are monumental in scale, comprising stepped hillside workings, deep pits and cavernous underground chambers, massive cascading tips, ingenious water systems, and a range of industrial buildings. Outstanding technical equipment and major engineering features survive.

This mountainous landscape is close to the sea. Innovative transport systems linked quarries and processing sites with purpose-built coastal export harbours and with main-line railways.

Grand country houses and estates built by leading industrialists contrast with workers' vernacular settlements, with their characteristic chapels and churches, band-rooms, schools, libraries and meeting-places.

Slate from Northwest Wales is light, long-lasting and impermeable. By the late nineteenth century the region produced about a third of world output of roofing slates and architectural slabs. Its use in terraced houses, factories, warehouses and elite architecture contributed to rapid global urbanisation. It influenced building styles, encouraging the shallow-pitched roofs of the Georgian order.

Technologies that were innovated, adopted and adapted in *The Slate Landscape of Northwest Wales* include the ingenious application of waterpower, the development of bulk handling systems and the first known application of the circular saw for cutting stone. These were diffused by specialists and by emigration of skilled Welsh quarrymen to the developing slate industries of the USA, continental Europe and Ireland.

Snowdonia's narrow-gauge railway systems gained global influence as their suitability for challenging mountain environments, and for moving compact loads and minerals, meant that they were adopted from Asia and America to Africa and Australasia.

Figure 3.37. The Slate Landscape of Northwest Wales. (a) Penryn Castle (Component Part 1, Element 1.7); (b) Dinorwig Slate Quarry Mountain Landscape (Component Part 2); (c) Dorothea Slate Quarry Cornish Beam Engine (Component Part 3, Element 3.4); (d) Ynysypandy Slate-Slab Mill (Component Part 4, Element 4.3); (e) Cwmorthin Mine Incline Head (Component Part 5, Element 5.2); (f) Talyllyn Railway (Component Part 6, Element 6.4)

3.3.ii Justification for Criteria

Criterion (ii) – *The Slate Landscape of Northwest Wales* exhibits an important interchange of human values, particularly in the period from 1780 to 1940, on developments in architecture and technology

Slate has been quarried in the mountains of Northwest Wales since Roman times, but sustained large-scale production from the late eighteenth to the early twentieth centuries led to the dominant position of the material as a roofing element in global markets. This led to major transcontinental developments in building and architecture.

Technology transfer from *The Slate Landscape of Northwest Wales* was fundamental to the development of the slate industry of continental Europe and the USA. Moreover, its narrow-gauge railways – which remain in operation under steam today – served as the model for successive systems which contributed substantially to the social and economic development of regions in many other parts of the world.

Criterion (iv) – *The Slate Landscape of Northwest Wales* is an outstanding example of a type of landscape that illustrates, in a dramatic way, the 'combined works of nature and of man' through the large-scale exploitation of natural resources.

Massive deposits of high-quality slate defined the principal geological resource of the challenging mountainous terrain of the Snowdonia massif. Their dispersed locations represent concentrated nodes of exploitation and settlement, of sustainable power generated by prolific volumes of water that was harnessed in ingenious ways, and brought into being several innovative and technically advanced railways that made their way to new coastal ports built to serve this transcontinental export trade.

The Property comprises the most exceptional discrete landscapes that, together, illustrate the diverse heritage of a much wider landscape that was created during the profound era of British industrialisation that changed the world.

Criterion (v) – *The Slate Landscape of Northwest Wales* is an outstanding example of the industrial transformation of a traditional human settlement and marginal agrarian land-use pattern; it also exemplifies how a remarkably homogeneous minority culture adapted to modernity in the industrial era.

The monumentality of the quarry landscapes is compelling and consists of huge stepped working benches carved from the mountainsides, deep pits and vast tips, and extensive cavernous underground workings. These also indicate the relentless persistence of generations of workers who used their hard-won skill and innovative technology to exploit slate for a global market. Their settlements, created by the industrialists, the workers and their families, retained multiple aspects of the traditional way of life and its strong minority language. They remain a palpable 'living' testimony, just like the diminished but proud slate-working tradition, and the railways that once hauled the slate.

3.3.iii Statement of Integrity

The Property contains all of the essential elements that convey attributes of Outstanding Universal Value. Its boundaries capture the principal slate-producing areas in Northwest Wales, together with their associated industrial heritage that includes the most significant processing facilities, settlements and transport routes.

Whilst some elements are at risk from decay and minor neglect, in each case the situation is under control from the point of view of effective legislation and management. There is no existing or anticipated pressure within the Property from any large-scale developments.

3.3.iv Statement of Authenticity

The Slate Landscape of Northwest Wales is an exceptionally well-preserved cultural landscape that retains an unusually high level of authenticity, and has experienced remarkably little intervention since the main period of industrial operation. Attributes of proposed Outstanding Universal Value are conveyed by physical property that is clearly identified and understood in terms of date, spatial distribution, use and function (including living communities and operational railways), form and design, materials and substance, and their interrelationships including connectivity and overall functional and compositional integrity of the series. The Nominated Property further embodies a vibrant cultural tradition, including slate-working skills and the continued widespread use of the Welsh language. Key attributes are reflected in landscape qualities and features of quarrying including the relict working areas, tips and transport routes, together with associated settlements and social infrastructure.

3.3.v Requirements for Protection and Management

The Welsh Government's approach to the protection and sustainable management of World Heritage sites is set out in *Managing Change in World Heritage Sites in Wales (2017)*. The Nominated Property and its setting will be afforded high levels of protection through the implementation of existing legislation: *The Ancient Monuments and Archaeological Areas Act 1979, The Town and Country Planning Act 1990, The Planning (Listed Buildings and Conservation Areas) Act* 1990, *The Historic Environment Act (Wales) 2016* and through implementation of policies within the Gwynedd & Anglesey Joint Local Development Plan and Snowdonia National Park Authority Local Development Plan.

Attributes of proposed Outstanding Universal Value have been defined and articulated in *The Slate Landscape of Northwest Wales Property Management Plan* which establishes the over-arching strategies and mechanisms by which the proposed World Heritage Site will be managed. This is complemented at local level by a series of Local Conservation Management Plans, developed in collaboration with landowners, which include site-specific information and practical recommendations. Responsibility for the implementation of *The Slate Landscape of Northwest Wales Property Management Plan* will sit with a multi-organisational Partnership Steering Group established by the lead organisation, to which an appointed Property Coordinator will report.

All of the Component Parts of the Nominated Property lie within areas of Wales that are already subject to strong levels of landscape protection through designation as a National Park and registration as Landscapes of Outstanding Historic Interest. These will serve the purpose of a Buffer Zone protecting the setting and key views into and out of the Nominated Property.

There is no active quarrying or mining within the Nominated Property (no active mineral permissions are included); mineral activity takes place in the wider protected area outside the boundary of the Nominated Property. The application of existing statutory management procedures will ensure this does not negatively impact upon the proposed Outstanding Universal Value of the Property.

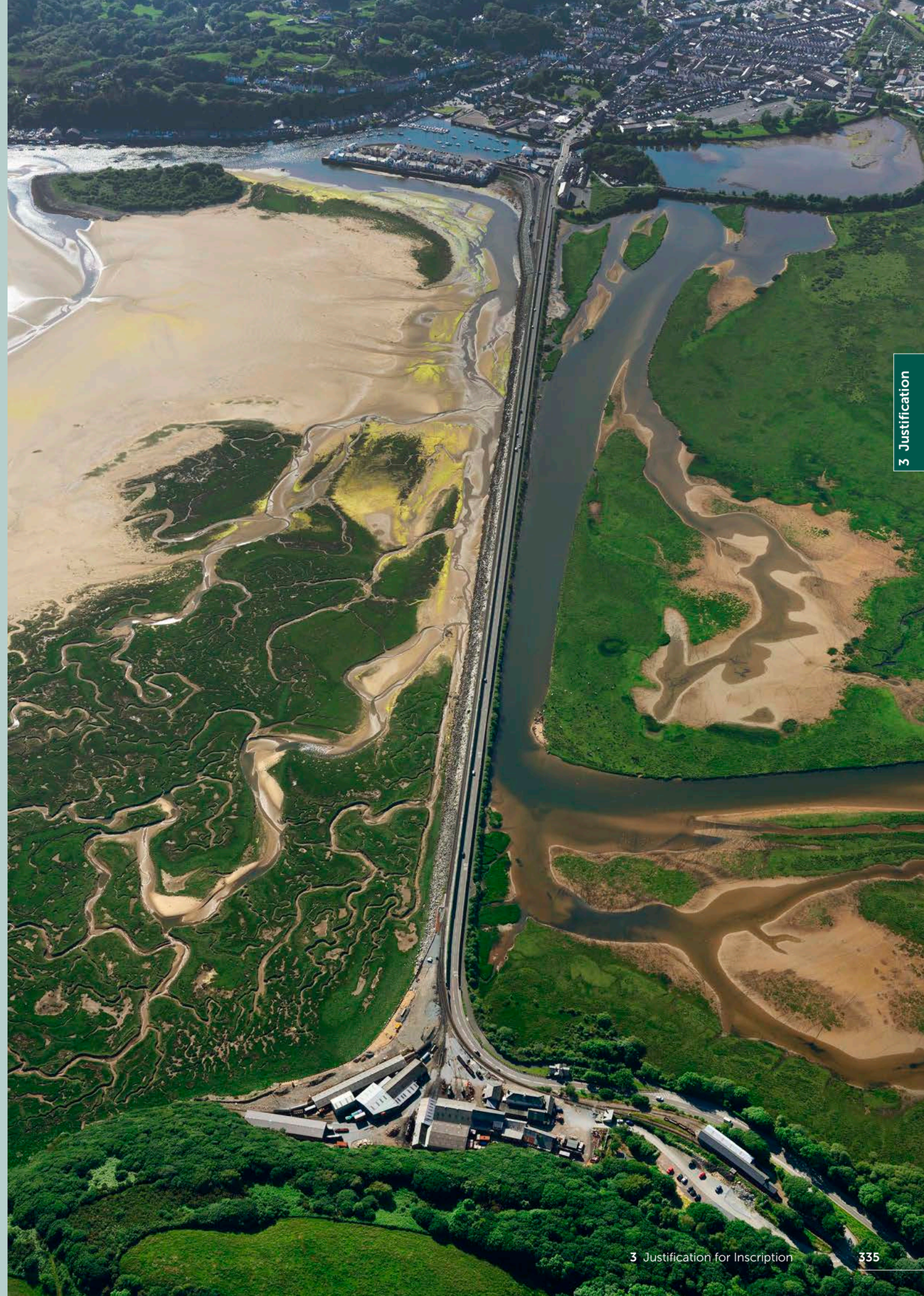


Figure 3.38. The last stage of the journey from the quarries to the sea in Component Part 5 takes the Ffestiniog Railway over a sea-defence built in 1808-1811. Diverting the Glaslyn River scoured out Porthmadog Harbour where quays were built to facilitate the transfer of Ffestiniog slates to ocean-going ships.

4 State of Conservation and Factors Affecting the Property

Figure 4.1. This aerial view of Penrhyn Slate Quarry, the village of Bethesda, and the Ogwen Valley to Port Penrhyn from the south conveys how little change has occurred within Component Part 1 of the Nominated Property and the wider surrounding area since its principal period of significance. The active quarry, outside the Nominated Property, continues the method of extraction from benched galleries first introduced here at the end of the eighteenth century. The sea is near at hand, the means by which the slate reached global markets.

4.a Present State of Conservation

Definitions

Throughout this section, the following definitions are used to describe the state of conservation:

'Very good' is defined as in exceptional condition, showcasing historic integrity and values and generally being actively managed or conserved.

'Good' is defined as in favourable condition, retaining historic integrity and values, and appropriately maintained; no significant conservation issues.

'Fair' is defined as demonstrating localised or slow deterioration but where historic integrity and values are not immediately under threat.

'Poor' is defined as in an unfavourable and / or deteriorating condition where historic integrity and values could be compromised or lost; requiring intervention.

Conservation status of the overall property

The present state of conservation of *The Slate Landscape of Northwest Wales* is good.

Overall, the landscape has experienced little change since the principal period of significance from 1780 to 1940. The inter-relationships between quarries, transport and settlements remain clear and apparent. Successor industries, such as hydro-electric power generation, have not been visually intrusive. The authenticity and integrity of the proposed property has not been harmed to any significant extent, nor has any compromising urban development taken place.

All the slate quarrying, mining and processing elements are relict or are in re-use which is sympathetic to the proposed Outstanding Universal Value. Transport elements are in some cases relict, in other cases active. Some settlements are inhabited, some partially deserted and others are relict archaeological sites.

Quarries and mines

In every case, these impressive landform features are generally robust and in good condition, and fully display their values and attributes. Pit quarries are now generally flooded. Former working-faces can be liable to infrequent and localised rock-falls. Tips are stable, though in some cases vegetation growth can obscure their form. Underground features are accessible (though some to specialists only) and are generally in a stable condition and retain a considerable amount of *in situ* machinery and equipment.

Surviving structures and features

These structures and buildings are in varying states of transition from recently abandoned to fully relict. Prince of Wales and Gorseddau (Elements 4.1-2) represent an end-point of archaeological stability, whereas at Ffestiniog the Diffwys slate quarry mill (Element 5.4) and structures at Dorothea (Element 3.3) demonstrate active change.

Figure 4.2. The robust survival of quarry landforms is evident in this view showing the main 'A' inclined planes and other structures and features in Dinorwig Quarry, Component Part 2.

The former Dinorwig Slate Quarry Engineering Complex (Element 2.5) has been fully conserved and is now in active re-use as the National Slate Museum. Here, historic fixed machinery is maintained in excellent, fully-operable, condition. The Dinorwig Slate Quarry Hospital (Element 2.10) has also been restored by the Local Authority and is in very good condition and is now in active re-use as a museum. At Felin Fawr (Element 1.2), the mills, the foundry and locomotive sheds are all in sympathetic re-use. Work is underway to arrest deterioration of Maenofferen mill and the inclined-plane winding engine house (Element 5.5) while long term sustainable re-use options for structures within this element are being explored.

Other industrial and domestic structures and features within the quarry landforms are mostly now relict. Selected key structures including the Ynysypandy Slate-Slab Mill (Element 4.3) have been conserved and are managed for visitor access and interpretation.

Transport systems

The relict historic railway formations in Component Parts 1 to 4 survive for the greater part of their lengths but are in multiple ownership, and as a consequence have in places suffered localised small-scale attrition. In Component Part 1, the Cegin railroad viaduct (Element 1.3) has benefited from recent conservation, and community initiatives are underway to tackle vegetation encroachment to support the re-opening of further stretches of the formation for public access.

Figure 4.3. The formation of the Gorseddau Junction & Portmadog Railways which served the Prince of Wales Slate Quarry was lightly engineered. As a permissive footpath, it provides access to the upper reaches of Component Part 4; a short detour at this point makes it possible for walkers to see the bridge at Cwm Llefrith which was its most substantial feature.

Two historic railways, the Ffestiniog (Element 5.9) and the Talyllyn (Element 6.4), are fully operational. These retain, and make use of, their historic infrastructure on a daily basis. The main formations and significant buildings of both railways are original and intact. Track, sleepers and ballast are replaced as necessary, and redundant examples are retained for historical examination. Both railways also maintain in everyday use historic steam locomotives, passenger carriages, and wagons built to carry slate. These are managed and operated as part of the unique mechanical signature of the two systems. Demonstration slate trains are operated on both railways.

The original formation of the Dinorwig Slate Quarry Railway (Element 2.7), dating to 1842, is now used by the Llanberis Lake Railway, which was opened in the 1970s.

Quays and harbours

The two quays on the river Dwyryd (Element 5.8) are relict and in a good state of conservation. The two harbours within the Nominated Property, Port Penrhyn (Element 1.4) and Porthmadog (Element 5.10) are in active use. Port Penrhyn is a busy industrial and fishing harbour, handling general cargo and supporting mussel-dredging vessels. Porthmadog is a popular yachting harbour.

Historic settlements

The main settlements associated with the industry are inhabited and retain a full range of key historic buildings including houses, chapels, churches, public houses, shops and schools. These are Mynydd Llandygai (Element 1.5), Bethesda (Element 1.6), Deiniolen, Clwt y Bont, Dinorwig and Fachwen (Element 2.8), Nantlle (Element 3.10) Blaenau Ffestiniog (Element 5.6) and Abergynolwyn (Element 6.3). The settlements retain their historic plan forms and street patterns as evidence for their historical evolution.

Conservation areas have been designated at nine different locations in *The Slate Landscape of Northwest Wales*: within Component Part 1 (four in Bethesda, others at Llandygai, Tanysgafell, St Anne's church and Mynydd Llandygai) and Component Part 5 (Porthmadog Harbour). Consideration is being given for new ones at Blaenau Ffestiniog (Component Part 5) and Abergynolwyn (Component Part 6). Characterisation studies commissioned by Cadw, Gwynedd Council and Snowdonia National Park Authority on the main settlements in the Nominated Property have also been completed.

One historic settlement, Treforys (Element 4.5), is completely relict. Another, Cilgwyn Mountain (Element 3.11), is partially deserted.

Information sources

Information on the current state of conservation of the individual attributes, elements and Component Parts of the Nominated Property is derived from the following sources:

Scheduled Monuments

Monuments at Risk surveys are carried out by Cadw on a 10-year rolling programme. Monuments are evaluated against set criteria in terms of condition, threats and level

of risk and reports produced accompanied by photographs and management recommendations. A new survey round has commenced in 2019.

Listed Buildings

Buildings at Risk surveys are carried out cyclically by Cadw. The most recent surveys were carried out in 2013 (Snowdonia National Park) and 2014 (Gwynedd). Cadw are currently commissioning a new survey. Both planning authorities have Conservation Officers and maintain a register of listed buildings at risk within the nominated property. The *Buildings at Risk Register* hosts the data collected during the survey and is used to identify and monitor listed buildings within the planning area that are assessed at risk.

Non-designated historic assets

To inform the nomination, a series of archaeological surveys grant-aided by Cadw was undertaken between 2015 and 2019 to prepare a full gazetteer of all relict archaeological features within the Nominated Property. Information collected includes descriptions and photographs of all historic features to create a comprehensive inventory. Mapped zones, based on original function, historic feature survival and condition, have been defined and will serve as the basis for future conservation, management and protection, and as a baseline for monitoring purposes.

Other sources

In-house condition surveys are also undertaken by the National Trust, the National Museum, by the owners of Dorothea and Maenofferen slate quarries, the Ffestiniog Railway and the Talyllyn Railway.

Present state of conservation of Component Parts and their Elements

Component Part 1. Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn

The present state of conservation of this Component Part is for the most part good to fair, and key assets such as Penrhyn Castle and Garden (Element 1.7), managed by the National Trust, are in very good condition.

This Component Part is dominated by the Penrhyn Slate Quarry (Element 1.1), which retains its monumental and visual dominance within the Valley. The landform of the Penrhyn Slate Quarry is generally stable including the stepped galleries. Although some rock-movement is intrinsic to this site, this does not threaten its historic character. Individual structures within the landform are relict archaeological sites and mostly stable, although some, including the long abandoned relict hospital, are overgrown with vegetation and would benefit from active clearance and masonry stabilisation. Outside the Nominated Property, within the wider protected area, active quarrying of slate takes place, and the adventure tourism facility is located; this includes a café with terrace providing panoramic vistas overlooking the relict quarry landform. Associated zip wires extend primarily outside the Nominated Property with only a short section extending above it. Historically, Penrhyn Quarry used shallow-angled aerial ropeways to lift slate blocks from the lower workings in the pit to the processing areas. While the zip wires are recent structures, overhead lines set at this alignment and angle are therefore not alien to the historic character of this quarry. They provide visitors with opportunities to enjoy aerial views of this spectacular landform and do not adversely affect its heritage values.

The underground features are in active management but inaccessible to visitors as they remain in use for drainage purposes.

Felin Fawr slate-slab mills (Element 1.2) are currently used as commercial outlets. While most of the listed buildings here are in good condition, there are concerns affecting two buildings and the relict *gwaliau* [slate makers' shelters] due to historic unsympathetic alterations and poor maintenance. These have resulted in some loss of historic character, for which action is required. The two relict waterwheels are intact but are not currently accessible for public display.

Figure 4.4. The Felin Fawr slate-slab mills in Component Part 1, are in re-use for retail purposes and as light industrial units.

The 9-kilometre long Penrhyn Slate Quarry Railroad (Element 1.3) survives as an earthwork formation apart from one 50-metre section that was removed in 1983 to build the Bangor bypass. Most sections are clearly visible, and some below-ground archaeology also survives. Overall its condition is generally good but it suffers in discrete places from excess vegetation. Community-led clearance and stabilisation are in progress. Two of its most important structures are in very good condition; these are the Cegin viaduct, which was conserved in 2013, and the Marchogion inclined plane winding house, which is an inhabited listed property.

The 10.5-kilometre long Penrhyn Slate Quarry Railway (Element 1.3) survives as an earthwork formation apart from the one 50-metre section that was removed to build the Bangor bypass. In places, the Railroad and Railway are very near each other, and in one location the Railway runs on top of the Railroad formation. One section 0.5 kilometres long has been re-laid as a demonstration railway, currently disused. Other parts are in active use as public footpaths, including the Snowdonia Slate Trail, and as the Lôn Las Ogwen cycle route. Some sections run across private land. Overall, it is largely intact and in good condition.

Port Penrhyn (Element 1.4) is in active industrial use for commercial fishing and associated uses, boat repairs and as a storage yard, and both imports and exports goods, including crushed slate. Key buildings, such as the office, and the locomotive and carriage sheds, are listed, in good condition, occupied and in use.

Mynydd Llandygai (Element 1.5) retains its mid-nineteenth century planned layout as a model settlement on an exposed hillside, as well as key features such as *crawia*, the distinctive slate-pillar fences. In a number of instances, adaptation to dwellings in order to bring them up to modern living standards (internal bathrooms, kitchen extensions) has led to some attrition of historic character. The best examples have been listed and fully retain historic character. Three Conservation Areas have been designated within this element, at Tanysgafell, Bryneglwys and Mynydd Llandygai.

Bethesda (Element 1.6) retains its nineteenth century layout unaffected by later growth. The contrast between earlier unplanned settlement along the main road and the more orderly late nineteenth-century street-pattern and larger dwellings is evident. It retains its character as an urban settlement with varied housing, religious, civic and commercial buildings, development pressures will be managed through the existing planning process. Key buildings which are listed and which are in good condition include the major churches and chapels, as well as some of the public houses, dwellings and shops. The historic streetscapes survive intact. There are four conservation areas in Bethesda; these are Lon y Graig, Rhes Elfed, Rhes Gordon and Braich Melyn.

Penrhyn Castle (Element 1.7) is a Grade I listed structure. With its registered Park, it is maintained by the National Trust and is in very good condition. It is operated as a heritage visitor attraction.

Component Part 2.
Dinorwig Slate Quarry Mountain Landscape

The present state of conservation of this Component Part is generally good to very good. It is dominated by the Dinorwig Slate Quarry, which retains its massive waste-tips and stepped galleries overlooking Peris Lake at the foot of Snowdon.

The spectacular landform of Dinorwig Slate Quarry (Element 2.1) is generally stable including the stepped galleries, the massive waste-tips and the prominent inclined planes. The range and level of preservation of structures and associated machinery is exceptional although some individual buildings require conservation.

The 'Australia' Gallery (Element 2.2) is situated in an extremely exposed location which is not generally accessible due to its dangerous location. The mill has lost most of its slates, exposing the mechanical saw-tables to weathering. The compressor, inclined planes and the railways are in stable condition.

The Anglesey barracks (Element 2.3) have been partly consolidated / conserved and are in good condition.

Vivian Slate Quarry (Element 2.4), a small and separate sub-section of the main Dinorwig Slate Quarry, is owned by Gwynedd Council and is managed as part of the National Slate Museum. Within the quarry, the V2 inclined plane was fully conserved and restored to working order in 1998-9. The stepped galleries of the quarry are largely in good condition and retain their definition and visibility but recent inspection has identified a need to reduce vegetation cover to improve presentation.

The former Dinorwig Slate Quarry engineering complex (Element 2.5) built in 1870, and which survived in use until 1969 with its historic machinery, is in very good condition. It has been conserved and opened to the public with very little change as the National Slate Museum, attracting over 140,000 visitors annually. Traditional skills are fostered here, including hand-splitting of slates. Associated fixed machinery including the waterwheel has been restored to working order; movable equipment is conserved and all are regularly maintained as part of the visitor experience. The historic Slate Quarrymen's houses re-erected on this site in 1998-9 from Component Part 5 are in very good condition, though the relocation of structures in this way is no longer endorsed as an appropriate conservation measure. The circular shop in the courtyard, the café and the lift to the waterwheel were added by the locally-based Ap Thomas Partnership in 1998 to improve the visitor experience and provide

Figure 4.5. A characteristic of several Component Parts is the use of *crawiau* – robust slate-slab fences, as shown here in Mynydd Llandygai (Component Part 1).

disabled access. These structures were carefully designed with respect to heritage values and do not have an adverse impact on the proposed Outstanding Universal Value of the Nominated Property.

Figure 4.6. The former Dinorwig Slate Quarry engineering complex in Component part 2, has been conserved and is now the National Slate Museum, a popular visitor attraction. A well-designed lift permits disabled access to the waterwheel, on the right of this aerial view.

The Dinorwig Slate Quarry road systems (Element 2.6) and the listed Penllyn Bridge are in good condition and everyday use, maintained by the Highways Department of Gwynedd Council. The 'drag' roadway is visible as an earthwork formation except where it is cut by Vivian Slate Quarry.

The Dinorwig Slate Quarry Railroad (Element 2.7) is partly intact and partly in re-use as minor roads. Relict sections, including the inclined planes, survive mainly as shallow cuttings and stone causeways, in stable condition with some vegetation cover.

The formation of the Dinorwig Slate Quarry Railway (Element 2.7) has been re-used as the route of a tourist railway. It is evident as a stone causeway and rubble embankment along the shore of Padarn Lake, with modern quarry-gauge (0.6 m) track laid on it.

The settlements at Deiniolen, Clwt y Bont, Dinorwig and Fachwen (Element 2.8) are inhabited. All retain their early nineteenth-century layout, including the course of historic roads and the formation of the Dinorwig Slate Quarry Railroad. The contrast between the hastily-built nucleated communities on the historic freeholds and the dispersed settlements promoted by the Vaynol estate remains very clear, and the isolated location of the church and Methodist chapel is unchanged. Options to update and manage social housing within the boundary will be carefully managed through planning policy to retain key character. A particularly important building is the listed writing slate mill in Clwt y Bont, which retains its historic waterwheel.

Craig yr Undeb ('Union Rock') (Element 2.9) is a geological feature in stable condition.

Component Part 3.
Nantlle Valley Slate Quarry Landscape

The Nantlle Slate Quarry landform is highly visible and dominates its setting. As a valley landscape it contrasts with other Component Parts – it is a lowland environment with its own distinct ecology. Historically it was in multiple ownerships where boundaries between the quarries were often tree-grown ridges, and where workers' houses and gardens were located immediately adjacent to quarry pits and railway systems. Woodland and horticulture is historically an important part of its character. On a landscape scale it is in a good state of conservation.

The tips at Cilgwyn (Element 3.1) and Pen yr Orsedd (Element 3.7) are significant monumental features largely devoid of vegetation and visually dominate this Component Part. Many of the quarry pits are flooded, including Dorothea Slate Quarry (Element 3.3). Here, recreational and training diving is permitted by agreement, and has the potential to ensure monitoring of the site.

The most prominent structures in Dorothea Slate Quarry are the two bastions constructed to operate chain incline ropeways – locally known as 'the pyramids', or in Welsh as *pengialiau*. A structural assessment commissioned by the site-owners in October 2017 concluded that the southern bastion is structurally sound and generally performing well, albeit demonstrating evidence of historic movement. Some repairs were considered advisable. This assessment indicated that the eastern Bastion is in very poor condition as a consequence of inherent flaws associated with its historic method of construction. The bastion comprises an outer skin of small, random slate blocks supporting interior material which was tipped into place rather than being stacked, resulting in an inherently unstable structure. While it is apparent that the structure has stood in this condition for some decades, the structural assessment concludes that subsequent settling and movement has resulted in unavoidable section loss, fractures and visible depressions at the surface of the structure, which indicate that structural deterioration is underway. Despite this, the survey confirmed that the condition of the tunnel passing through this structure which historically accommodated the railway linking the quarry to the Nantlle Railway is sound and stable.

A detailed three-dimensional survey will be produced to form a permanent record and inform the development of an engineering solution to retain its heritage values.

The Dorothea Slate Quarry Cornish Beam Engine (Element 3.4) is notable for the survival of its original machinery. The building itself is a robust structure in fair condition with only minor conservation requirements. It originally had a free-standing steel chimney but this collapsed and was removed in the 1960s. The

substantial slate-built coal-hopper used to store fuel is in good condition. The engine within the building is in surprisingly good condition, although the sheer-legs have collapsed and the pump rod has been severed to protect the integrity of the cylinder. The boilers, located outside the building, are exposed to the elements and are in poor condition but retain their overall integrity. Recent work has included improvements to access, removal of vegetation, and improved security to protect against vandalism as a preliminary to more extensive conservation measures.

There are four 'Blondin' ropeways within this Component Part, three electrically-powered examples at Pen yr Orsedd (Element 3.8) and one steam-driven at Blaen y Cae (Element 3.2). These were moveable structures, regularly re-located as quarrying required. It is remarkable that one iconic mast remains standing at Pen yr Orsedd in the location in which it was last used together with its cable and traveller-carriage spanning the pit. The others masts are no longer upright but remain substantially intact, along with their associated ropeways, sheaves and motor houses.

Pen y Bryn/Cloddfa'r Lôn Slate Quarry, aerial ropeway systems, slate mill, barracks and dwellings (Element 3.5) have been identified as a priority for consolidation and conservation, particularly the seventeenth century farmhouse. A survey of the complex took place in 2012, and excavations commenced in summer 2019 to investigate the complicated history of these buildings in order to inform conservation plans.

The Pen y Bryn/Cloddfa'r Lôn Slate Quarry water-driven pumping system (Element 3.6) consists of two waterwheel pits, water-courses and towers for the flat-rod systems. These survive in robust fair condition. Fragments of the wheels, rising mains and rod-system remain on site.

The landform of Pen yr Orsedd Slate Quarry (Element 3.7) survives in good condition. Many of the associated buildings are listed but suffer from deterioration. The preferred course of action is to retain these buildings in use and the site owners are reviewing options. Work is also underway to develop a Local Management Plan.

The Nantlle Railway (Element 3.9) survives as a formation mostly in good condition, including cuttings, embankments and a tunnel. Vegetation encroachment has been identified as an issue affecting some cuttings.

Nantlle village (Element 3.10) retains its historic character as a linear development along a pre-existing turnpike road. Much of the settlement was built by the Pen yr Orsedd quarry company in a Picturesque style, which is still clearly evident, and contrasts with earlier dwellings. There has been some attrition of historic character in individual dwellings. The listed former Barracks have been conserved and brought back into use as a community centre and retail outlets. Other listed buildings are quarrymen's houses.

The settlements on Cilgwyn Mountain (Element 3.11) retain their historic layout including their associated pattern of small individual fields defined by drystone walls. These cottages were built in the nineteenth century and occupied as smallholdings by slate quarrymen and their families. Some were abandoned after quarrying ceased, and some have remained inhabited.

Figure 4.7. Though one of the bastions which supported a chain-incline ropeway at Dorothea Slate Quarry in Component Part 3 has exhibited some structural instability, the tunnel associated with it, which provided siding access to the Nantlle Railway, is sound and has recently been cleared of vegetation.

Figure 4.8. The former barracks in Nantlle village, Component Part 3, have been conserved and returned to use as retail outlets and a community centre

Plas Tal y Sarn, Tal y Sarn farmhouse (Element 3.12), their associated outbuildings, an adjacent barracks and a stable are all semi-relict buildings, out of occupation for sixty years. Current strategy anticipates their continued management as ruined, unoccupied structures; the possibility of their reconstruction would be considered if consistent with retention of their heritage values. Recent condition assessments note active deterioration caused by vegetation growth and the elements. A programme of proportional conservation is under discussion between Gwynedd Council and the site-owners.

Component Part 4.
Gorseddau and Prince of Wales Slate Quarries, Railways and Mill

The Gorseddau and Prince of Wales quarries, railways and mill form a completely relict landscape returned to managed grazing. The present state of conservation of this Component Part is generally good. The Ynysypandy Slate-Slab Mill (Element 4.3) has been conserved and is cared for by the Snowdonia National Park Authority. Gorseddau Slate Quarry (Element 4.1) is in good condition. Treforys village (Element 4.5), a deserted settlement is largely in good condition although minor repairs are required following damage by livestock. The Gorseddau Railway and Gorseddau Junction & Porthmadoc Railways (Element 4.4) railway formation is mostly in good condition. Part is in use as a footpath. Prince of Wales Slate Quarry (Element 4.2) is largely in good condition. Minor conservation of the mill and associated structures is required.

Figure 4.9. Ynysypandy slate-slab mill in Component Part 4 was conserved by the Snowdonia National Park Authority in the 1990s, and public access made possible.

Component Part 5.
Ffestiniog: its Slate mines and Quarries, 'city of slates' and railway to Porthmadog

The surface landform of the (relict) Ffestiniog Slate Quarries (Element 5.1) survives in robust good condition, and dominates its setting. Underground workings retain historic machinery and evidence of working practice as well less evident historic assets such as graffiti (Element 5.2). They can be prone to rock falls and water-ingress, and are subject to regular inspection. The Pant yr Afon Hydro-Power Station (Element 5.3) is in everyday use and is listed. The Diffwys Slate Quarry Mill (Element 5.4) is a ruined building; the future management objective is to maintain it in this state, minimising the rate of deterioration as best can be achieved, given its exposed location. It has been the subject of archaeological recording to provide a permanent record.

The Maenofferen main complex (Element 5.5), consisting of a large relict slate mill, railway system, winding house and powered up-haulage inclined plane, has suffered deterioration since ceasing to be in operation. The site owners, Gwynedd Council and Cadw have initiated work to stabilise the winding house, and discussions are under way to establish sustainable re-use of the mill building.

Figure 4.10. An imaginative and unusual transformation of a listed building is evident at the Ffestiniog Railway's former upper passenger terminus at Duffws in Blaenau Ffestiniog in Component Part 5. This has been a public convenience since the 1930s but has recently been adapted to include an interpretation space as part of a wider public realm project, inspired by the slate industry. The form of the building has been retained, with its decorative slate roof, slate gable plaques with Prince of Wales feathers, and booking window.

Llechwedd Quarry, Antur Stiniog and Zip World operates adjacent to the Nominated Property, within the wider protected area, providing a combination of adventure tourism, including zip-wires and down-hill biking, visitor accommodation and heritage tours. These include opportunities for visitors to view historic assets within the Nominated Property. Some active quarrying continues in the wider protected area but not within the boundary of the Nominated Property.

The slate quarry town of Blaenau Ffestiniog (the 'city of slates', Element 5.6) is inhabited, and retains its nineteenth-century pattern of roads and urban layout, as well as the housing and social and religious buildings of the period. Options to meet the future need to update and manage social housing within the town will be managed in line with the existing planning policy to ensure that historic character is retained. Community heritage initiatives are in place to develop design guides for historic urban character of this element. Local initiatives have already successfully stabilised an important relict row of slate quarrymen's dwellings at Cwmorthin in this Component Part. Significant buildings have been listed. The Grade II listed station building of *c.* 1875 which formed the upper passenger terminus of the Ffestiniog Railway until 1931, and was subsequently converted into a council-operated public convenience, benefits from a new slate history interpretation space.

Plas Tan y Bwlch (Element 5.7) and its grounds are in very good condition and are actively managed by the Snowdonia National Park Authority as its residential study centre, offering courses on the history and archaeology of the slate industry as well as other topics. During 2004/05 major renovations, grant-aided by the Heritage Lottery Fund and by Cadw, were undertaken to make the historic house and grounds more accessible to the public, including provision of a lecture room, a library, and an

Figure 4.11. Built in the 1870s, Plas Tal y Weunydd in Component Part 5, is the former home of one of the owning families in Llechwedd Slate Quarry. It has been converted into a hotel by the locally-based operating company, retaining its historic character.

archaeological archive of the slate industry, located in the former stables. Locals, visitors and children can enjoy the house and gardens as well as attend courses on art, history and culture, craft, folklore or industrial archaeology. Professional training courses are also offered for Local Authority officers, Field-wardens, university and college lecturers and students.

The two slate-quays on the Dwyryd river (Element 5.8) are in good condition.

The historic character of the operational 22-kilometre long Ffestiniog Railway (Element 5.9) is carefully preserved. Historic buildings remain in use, and are listed, and the historic formation is carefully conserved to retain its nineteenth-century character. Short sections of the original formation of 1836 and a re-alignment of 1842 which have subsequently been by-passed are now relict and within agricultural land. They remain visible as earthworks. A number of active conservation initiatives are regularly sponsored by the Railway's governing body.

Porthmadog Harbour (Element 5.10) is robustly built and remains in daily use. A surviving slate-storage shed is in re-use as the Porthmadog Maritime Museum.

Figure 4.12. In this view of Component Part 5, a train makes its way along the new section of the Ffestiniog Railway to the right of the photograph, built by voluntary labour between 1965 and 1978. This was needed after a pumped storage scheme drowned the earlier formation, seen here in the foreground. This operated between 1842 and 1946, and was the second of the three routes the railway has taken through this mountain ridge – the first was a series of inclined planes.

Component Part 6.
Bryneglwys Slate Quarry, Abergynolwyn Village and the Talyllyn Railway

The present state of conservation of this Component Part is generally good. The surface landform of Bryneglwys Slate Quarry and chain incline ropeway (Element 6.1) is in the ownership of Natural Resources Wales, a Welsh Government Sponsored Body, which is addressing the problems caused by historic afforestation and re-vegetation in this element. The quarry dam retains its physical form but has been breached for health and safety reasons in order to protect the village of Abergynolwyn. The underground workings are stable, in good condition and contain many historic artefacts such as rails, wagons and winches (Element 6.2).

The village of Abergynolwyn (Element 6.3) fully retains its mid-nineteenth century character and layout. Houses in Tan y Bryn Street are listed.

The operational 12-kilometre long Talyllyn Railway (Element 6.4) is in very good condition and fully retains its historic character. Historic buildings remain in use, and are listed, and the formation is carefully conserved to retain its nineteenth-century character. Informed conservation projects are currently under discussion to reconstruct historic features, interpret the history of slate transport, and to recreate the historic rural ambience of the Railway. The Narrow Gauge Railway Museum at Tywyn Wharf Station tells the story of how such railways transformed slate quarrying and were used in other industries world-wide and in warfare. As well as locomotives and rolling stock, exhibits include the recreated study of the children's author, the Rev. Wilbert Awdry, famous for the *Thomas the Tank Engine* stories, whose 'Sarloey Railway' was based on the Talyllyn.

Figure 4.13. The Narrow Gauge Railway Museum is located at the Tywyn Wharf terminus of the Talyllyn Railway (Component part 6). It provides a unique and comprehensive record of the history of narrow gauge railways through video, sound and over 800 items on display including the wagon in the foreground, which was used to move slate blocks in a Ffestiniog quarry.

Figure 4.14. This sketch of Penrhyn Quarry (Component Part 1) by the artist Mary Elizabeth Thompson (1896-1981) shows how *The Slate Landscape of Northwest Wales* was evolved by hard physical labour as well as by skill. Each wagon-load of slate rubble means that the rock-face has been cut further into the mountain-slope and the tips of waste rock extended over the valley-sides. Mary Elizabeth Thompson was influenced by both Rodin and Meštrović in her depiction of the dignity of labour but she was careful also to produce portraits of the individual quarrymen, whom she had grown to know and admire.

Intangible heritage

The key elements of intangible heritage are: the Welsh language; the cultural life it sustains; and traditional skills.

Welsh language

The region remains the principal area of Wales where the Welsh language is the everyday medium of speech. Currently 64.5% of the population of Gwynedd are Welsh speakers; a further 9% possess some Welsh language skills. Within the Nominated Property, the percentage of Welsh speakers is above the county average, at 70%, with the highest concentration in Component Part 1 (81.2%) and the lowest in Component Part 6 (52.1%). The use of Welsh is an intangible attribute of the proposed Outstanding Universal Value of the Nominated Property, and is actively supported by Gwynedd Council, by the Snowdonia National Park Authority and by Welsh Government.

Many community projects have been undertaken to recognise the important role of the Welsh Language within the Nominated Property including a project run by the National Slate Museum to identify the traditional Welsh names of the Dinorwig Quarry galleries, and a public arts project in Blaenau Ffestiniog where local sayings and slang words are carved into the pavement. There are also countless cultural events and groups located throughout the Nominated Property who function wholly through Welsh including community newspapers, debating societies, drama clubs, bands, lectures and social events such as a *talwrn*, *eisteddfodau* [cultural festivals] and gigs.

The tangible evidence for use of the Welsh language within the Nominated Property is also extremely strong, including place-names, street- and house-names, shop-fronts, chapel names and dates inscribed on their facades, gravestones and all official documentation, alongside everyday use of Welsh in newspapers, advertising and correspondence. All of these link strongly to the culture of the community and its religious life.

Cultural life

The slate communities have made a major contribution to the distinctive cultural traditions of Wales. These include *eisteddfodau*, a long-standing tradition of local history writing, poetry and fiction, and music-making in the form of brass bands and choirs. Contemporary popular music in the region draws on much older traditions and much of its inspiration is taken from the industrial and natural landscape and its folklore. Many of the most popular bands within Wales and further afield have come from *The Slate Landscape of Northwest Wales* including 9Bach (BBC Radio 2 Folk Awards Best Album winner 2015), the Super Furry Animals (9 top 25 UK Album charts) and bands such as Anweledig, Gai Toms, Sobin ar Smaeliaid, and Yws Gwynedd. A regional arts scene has been profoundly influenced by the slate landscape, including artists such as Mary Elizabeth Thompson, Falcon Hildred, David Nash and Gwynedd-born Wales International goalkeeper Owain Fôn Williams. The region is one of the principal areas of Wales where the country's distinctive cultural traditions survive strongest.

The Snowdonia National Park Authority's residential study centre at Plas Tan y Bwlch plays an active role in promoting understanding of the culture, history and industrial archaeology of the region and the characteristics of the National Park. Thriving cultural venues both within the Nominated Property and the region as a whole sustain a living and popular cultural tradition with diverse cultural and engagement programmes. These include Neuadd Ogwen, Storiel and Pontio, Galeri and the National Slate Museum, Cell B and other community-based venues.

Cultural events and festivals are also numerous within the nominated property and the region such as Zip World Rocs at Penrhyn Quarry, Pesda Rock in Bethesda and Carnifal Deiniolen, Gwyl Fai Dyffryn Nantlle [Nantlle Vale May Festival] and Drum House Ffest and Gwyl Car Gwyllt in Blaenau Ffestiniog.

A range of activities are also promoted to develop cultural and heritage understanding amongst young people and businesses in the Nominated Property through the National Lottery Heritage Fund Great Places project, LleCHI. A series of programmes to foster Ambassadors from within these communities has resulted in a greater understanding of the cultural landscape and has opened the door for many cultural experiences. The project alsos upports various cultural events such as community drama's, lectures, carnivals and fetes, LleCHI has also supported artists to work with primary school children to create artwork for public display that depicts what the slate landscape means to them, along with supporting projects to develop apps, walks, information panels and leaflets.

Traditional skills

The traditional skills of working a slate rock-face and splitting slates are sustained by the working slate quarries outside the Nominated Property, within the wider protected area; manual splitting techniques are also demonstrated at the National Museum. Mechanical engineering, blacksmithing, historic engineering, drystone-walling and carpentry/joinery skills are supported by the Ffestiniog Railway's Heritage Skills scheme, where the National Lottery Heritage Fund has enabled training for twenty trainees, who will be instructed by the members of the Railway's sixty-strong

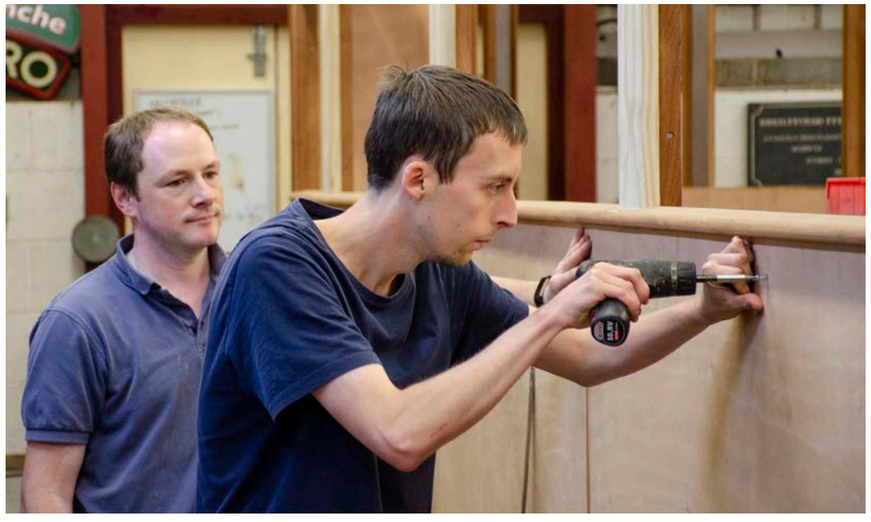


Figure 4.15. A National Lottery Heritage Fund trainee learns new skills on the Ffestiniog Railway in Component Part 5.

permanent staff, in addition to its experienced volunteers. Traditional land management skills are actively facilitated by Natural Resources Wales and by Snowdonia National Park Authority. Gwynedd Council is developing a Traditional Skills project in conjunction with further education colleges, the Construction Industry Training Board, Department of Work and Pensions, social enterprises and the private sector, in order to meet a gap in market-provision identified by the construction industry and the market in the conservation of pre-1919 buildings. The Breedon Group/Welsh Slate has created four slate-processing apprenticeships, including the teaching of traditional hand-splitting skills, in the operational part of Penrhyn Slate Quarry. All these activities support an appreciation and understanding of the property as a whole and are of great importance in transmitting the proposed Outstanding Universal Value of the Nominated Property to future generations.

Context: history of active conservation within the Nominated Property

The active conservation of historic sites within the nominated property started in 1951, when negotiations began between the owning family and the National Trust as to the future of Penrhyn Castle and Park. Transfer of the property to the National Trust subsequently enabled them to be opened to the public. At the same time, the pioneering preservationist and author Lionel Thomas ('Tom') Caswall Rolt (1910-1974) rescued the Talyllyn Railway from closure following the abandonment of Bryneglwys Slate Quarry and the death of its owner, by establishing the Preservation Society which continues to operate it to this day. This was the first successful attempt by an enthusiast group to operate a railway anywhere in the world. From its start, its focus has been to preserve the railway's distinctive character and it is currently examining options for the informed reconstruction of early features along its alignment. An important development was the opening of the Narrow Gauge Railway Museum at its lower terminus; the present facilities date from 2005. Heritage railways are now an important part of the tourist industry in every continent of the world.

The Talyllyn's example was followed by the Ffestiniog Railway, which was re-opened from 1955 onwards. Significant features on the Ffestiniog Railway have been conserved to a very high standard. The historic locomotive shed of the 1860s was conserved between 2009 and 2012, winning a National Railway Heritage award. A line-side house built in 1863 for the Railway's superintendent was restored and conserved between 2014 and 2017 by the Landmark Trust. The Minffordd yard goods shed of 1874 was conserved with private funding in 2018. Funds have been secured to conserve the blacksmiths' shop at the Railway's Boston Lodge works. An ambitious voluntary programme has also restored to running order over fifty of the historic slate wagon fleet for demonstration purposes, and the railway has conserved in working order its historic locomotives and passenger carriages.

The historic water-balance shafts and other features in Penrhyn Slate Quarry were retained when they fell out of use in 1965. In 1972 the National Slate Museum was opened in the former workshops of Dinorwig Slate Quarry and Llechwedd Slate Quarry opened an historical tour into parts of its underground workings. Consolidation work was carried out on Ynysypandy slate-slab mill by the Snowdonia National Park following purchase in 1981 and subsequent conservation.

The house and grounds of Plas Tan y Bwlch were bought by Merioneth County Council in 1969, transferring to Gwynedd County Council as part of the 1974 local government reorganisation. It opened as Snowdonia National Park Study Centre in 1975. Ownership was transferred to Snowdonia National Park Authority during the 1996 reorganisation. During 2004/05 major renovations, grant aided by the Heritage Lottery Fund and Cadw, were undertaken to make the historic house and grounds more accessible to the public.

In 1998-9 the National Museum restored to working order the V2 inclined plane and the waterwheel at the former Dinorwig Slate Quarry engineering complex.

Initiatives continue to conserve and maintain sites throughout the nominated property. In 2009-2013 a £1.7m project to promote Heritage Tourism in the area realised investment to safeguard and conserve the Cegin railroad viaduct, a feature of the Penrhyn Slate Quarry Railroad, in addition to the renovation and re-interpretation of the Dinorwig Slate Quarry Hospital. Consolidation and safeguarding works also took place on the 'Cob' embankment (see Figure 3.39) in Porthmadog in the early 2000s and again in 2012.

Relict houses and chapels in Cwmorthin were stabilised by a community project from 2010 to 2015; some work continues.

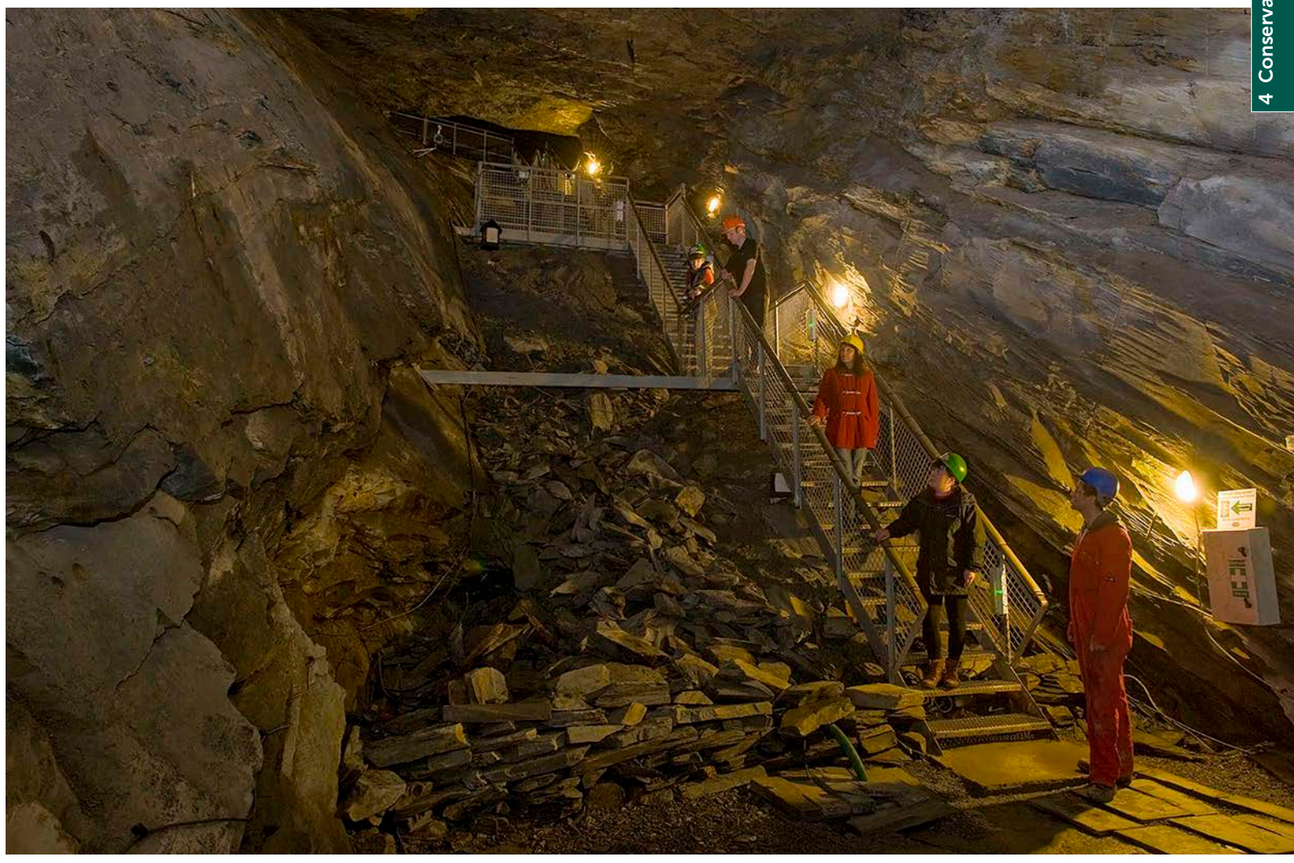


Figure 4.16. Visitors discovering the story of slate on the Llechwedd Deep Mine Tour in Component Part 5.

4.b Factors affecting the Property

The upland environment, peripheral economy and strong levels of protection afforded to the Nominated Property limit the pressures that affect it. The wider protected area surrounding all Component Parts is further protected and sustained by existing landscape protection through designation as a National Park and registration as Landscapes of Outstanding Historic Interest.

4.b.i Development pressures

Extractive industries (quarrying and mining)

Extractive industries do not constitute a development pressure and do not take place within the Nominated Property. The Nominated Property boundaries have been drawn in agreement with landowners and the planning authority to include only historic workings where mineral operations no longer take place, and to exclude existing mineral permissions and areas where landowners foresee possible future mineral extraction.

Active mineral extraction, tipping, processing and secondary reworking continues outside the Nominated Property in the wider protected area of three Component Parts (1, 3 and 5), though not within the Snowdonia National Park, and amounts to under 2% of the wider protected area. All operations are managed under existing mineral planning legislation and do not impact on the attributes of proposed Outstanding Universal Value. They contribute positively to the local economy, and support proposed World Heritage values in several different ways:

- They sustain the intangible heritage of craft skill in quarrying and processing slate, and thereby inform interpretation and demonstrations.
- They ensure the continued supply of slate for future conservation requirements within the Nominated Property, and across the world.
- They address the economic and social needs of the region by providing continued employment to local people, therefore ensuring that the settlements within and adjacent to the Nominated Property are inhabited and vibrant places in which to live, both now and in the future and where the Welsh language and culture continue to thrive.
- They contribute to understanding of the proposed Outstanding Universal Value of the Nominated Property in that these evolving quarry landforms create and sustain a dramatic environment which strengthens the character of the relict industrial archaeological elements in the Nominated Property itself, and thereby form an important associative attribute.
- They sustain an existing industry that meets the priority of *Planning Policy Wales Edition 10* and *Mineral Technical Advice Note 1 (MTAN1)* of the importance of the secondary aggregates sector as a source of materials for the construction industry.

All such operations are managed through Gwynedd Council's current mineral permission process. Decisions are made in accordance with the Local Development

Figure 4.17. The Mynydd Gwefru / Electric Mountain hydro-power station. The historic use of water-power within the Nominated Property is continued in the pumped storage scheme in Dinorwig Slate Quarry (Component Part 2), one of the largest in the world when it was commissioned in 1982.

Plans unless material planning considerations indicate otherwise. *Policy MWYN 3: Mineral developments in the Anglesey and Gwynedd Local Planning Authority* includes a criterion which avoids significant adverse impact to sites of international, national, regional or local environmental, nature conservation, landscape and / or heritage importance. *Policy PS 20: Preserving and where appropriate enhancing heritage assets* and *Policy AT 1: Conservation areas, World Heritage Sites and Registered Landscapes, Parks and Gardens* are also relevant in the assessment of proposals within the Nominated Property.

Figure 4.18. The active Penrhyn Slate Quarry, within the wider protected area outside Component Part 1.

Figure 4.19. Slate from the active Penrhyn Slate Quarry has been used to re-roof the World Heritage Buda Castle in Budapest, Hungary (*Budapest, including the Banks of the Danube, the Buda Castle Quarter and Andrássy Avenue* [Hungary: 400bis]).

Power-generation and distribution

UNESCO'S *Transforming our World: the 2030 Agenda for Sustainable Development*, agreed at the General Assembly of the State Parties to the World Heritage Convention in 2015, sets out UNESCO's policy for how World Heritage sites can contribute towards sustainable development. This document establishes seventeen goals of which *Goal 7, Affordable Clean Energy* is to 'ensure access to affordable, reliable, sustainable and modern energy for all.'

The Welsh Government expects local planning authorities to support the generation and use of energy from renewable and low carbon energy sources at all scales to contribute to securing zero or low carbon developments and to tackle the causes of climate change.

All renewable energy proposals require infrastructure and access that can potentially have more impact than the proposed development itself. These will be assessed against relevant local planning policies.

Hydro power

The long history of water-power in the Nominated Property continues to this day. The successful installation of hydro-electricity schemes within disused quarries recalls this historic dependence on water-power. The Mynydd Gwefru / Electric Mountain hydro-power station in Dinorwig Slate Quarry, commissioned in 1982, shows how an adverse effect on a relict quarry site was offset by sensitive mitigation. When built, concealed within the mountain, it was one of the world's most imaginative engineering and environmental projects. It continues to provide green energy essential to the region. A second scheme within the wider protected area adjacent to Component Part 2 has recently received planning permission.

There is potential for further schemes, which will provide opportunities for the region to contribute to generating energy through renewable resources. These will be assessed against relevant local planning policies

Wind and solar power

Gwynedd Council and Snowdonia National Park Authority have commissioned studies into the capacity of their areas to accommodate on-shore wind turbines and solar farms (*Landscape and Sensitivity Capacity Study – 2014).* An outcome is a clear policy presumption against large-scale and very large-scale solar and wind farms / wind turbines, and therefore the threat from this scale of development is negligible and developments are unlikely to be supported due to existing landscape designations and existing planning policies within both Local Development Plans.

The Nominated Property could experience pressure for micro-scale, small-scale and domestic-scale wind turbines and solar installations. Proposals that make use of natural resources and which demonstrate that they would not have a significant detrimental effect on the proposed Outstanding Universal Value of the Nominated Property will be supported subject to the requirements and criteria (including the need to consider the impact on locally, nationally and internationally important designations and their setting) set out in the *Eryri Local Development Plan: Development Policy 3 (July 2017)* and the *Anglesey and Gwynedd Joint Local Development Plan*.

Urban development

The *Anglesey and Gwynedd Joint Local Development Plan* aims to create sustainable mixed communities for current and future residents by ensuring that appropriate types of housing is provided. The Plan's foreseen level of growth is based on the level of anticipated housing need, balanced against deliverability, environmental and landscape constraint, economic and demographic prospects and the potential demographic profile. The level of growth is distributed in accordance with *Strategic Policy PS 17* and Policies *TAI 1* to *TAI 6*. Proposed housing developments would have to comply with all of the policies contained within the *Anglesey and Gwynedd Joint Local Development Plan*, including those relating to design, landscaping and historical assets (where applicable).

There are no strategic housing allocations within those areas of the Nominated Property located within the Snowdonia National Park (Component Parts 4, 5 and 6). *The Anglesey and Gwynedd Joint Local Development Plan* has identified a housing allocation within Component Part 1 in Bangor and within Component Part 2 in Deiniolen, and in Blaenau Ffestiniog adjacent to Component Part 5. Local Development Plan policy *TAI 6: Housing in Clusters* requires proposals for new housing units to conform to criteria, several of which are relevant to the Nominated Property.

Settlements within the Nominated Property may be vulnerable to unsympathetic development if left unmanaged. Streetscapes, landmark buildings and spaces create uniquely visible characteristics. Inappropriate housing design and location and incremental alterations to individual buildings can result in a loss of historic character and would have a negative impact on the demonstrable Outstanding Universal Value. Historic character is protected across the Nominated Property through designation in the form of nine Conservation Areas and through listing of key buildings. In addition, all main historic settlements have been subject to detailed Urban Character Studies which have identified overall street-patterns, architectural style and ambition, and small-scale but characteristic detailing. These assessments have made recommendations for appropriate conservation and will be used as guidance for best practice to protect the historic character of the settlements in the Nominated Property.

Figure 4.20. Small-scale but characteristic detailing within settlements includes these slate-built porches in Bethesda (Component Part 1) and contributes to the distinctiveness of this historic settlement.

The increasing likelihood of places of worship, public houses and other community facilities falling out of use also endangers historic character. Appropriate adaptive reuse of redundant historic buildings is actively encouraged in a way that will not compromise the historic and archaeological integrity of these assets.

A high level of second homes and the use of open market dwellings as short term holiday lets is also an identified risk to the sustainability of local communities. Gwynedd Council has introduced a Council Tax Premium on Second Homes and long-term empty homes, stating that a 50 per cent premium will be raised on properties that have been empty and substantially unfurnished for 12 months or more. This has been operational since 1 April 2018.

The Council is also researching how it can manage the conversion of homes to holiday letting accommodation and the policies and structures required to prevent the loss of local housing stock. The policies and structures developed following this research will be relevant to managing sustainable communities within the nominated property in the future.

Industry and commercial development

The general pattern of business within the region is on a small scale, which in general encourages sympathetic re-use of historic buildings. There are no foreseen significant pressures for major commercial or industrial development within the Nominated Property.

Industrial and business operation within the Nominated Property supports goal 9 of UNESCO's *Transforming our World*, to 'build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation' and will be managed to sustain demonstrable Outstanding Universal Value.

Adaptive re-use

The quarry landforms and underground features included in the Nominated Property are relict, but some have been adaptively re-used for purposes compatible with their demonstrable Outstanding Universal Value. This includes electricity generation by hydro-power, which has a long history of development and use within Gwynedd (see above). This can result in the introduction of new infrastructure, requiring sensitive design.

An ambition of the Nomination is to ensure the sensitive conversion and reconstruction of historic buildings for suitable economic uses such as bunkhouses, hotels, restaurants, and business units in addition to uses such as educational or community facilities, thereby securing their long-term future and enabling elements to more clearly express their values.

Several Component Parts offer examples of buildings that have been imaginatively re-used, such as the public conveniences in the former Duffws railway station in Blaenau Ffestiniog which now also houses historical interpretation (see Figure 4.10).

All adaptive re-use of the built environment will be guided by the Welsh Government's *Conservation Principles for the sustainable management of the historic environment in Wales*, by Welsh Government (Cadw) guidance documents and existing planning policy.

Agriculture and forestry

Outside the inhabited settlements in the Nominated Property, much of the land is currently used for agriculture and forestry, which are the main land-uses within the region. Some relict quarry landforms are now open moorland predominantly used for grazing, while other parts are enclosed farmland. Farms are mostly small and family-run, though the decline in the number of people employed on the land has led to an amalgamation of holdings and paradoxically to agriculture becoming a part-time activity in some cases. Diversification has already led to farmhouses and outbuildings being used for bed-and-breakfast or converted into self-catering accommodation, and farmers increasingly embrace tourism-related and other commercial activities.

Some farming requirements can have a negative impact on elements demonstrating proposed Outstanding Universal Value. These include reduction in stocking rates in areas of grazing, which could lead to scrub-growth obscuring and damaging historic features. Agriculture in Wales may be affected by the withdrawal of European subsidies, though the Welsh Government has introduced several schemes designed to encourage farming communities to co-operate in caring for their land in an environmentally sustainable way. Well-considered schemes can provide benefits to both farming practice and historic environment conservation. Field boundary restoration, gate repairs and footpath maintenance can both assist good land management and also confer visitor and conservation benefits.

Commercial forestry is well established within the region, particularly in Component Parts 5 and 6, where it is critical to the long-term protection and enhancement of the proposed Outstanding Universal Value. Natural Resources Wales employs a felling regime that respects historic elements and a maintenance programme which manages new growth within scheduled areas in their landholdings. Good forestry management can help to strengthen historic landscape character. Component Parts 1–4 retain little forestry and as such the introduction of new plantations could erode historic landscape character. Applications for new planting schemes are subject to a licensing regime managed by Natural Resources Wales, with advice on the impact on the historic environment provided by the regional Welsh Archaeological Trusts. Reference to Historic Landscape Characterisation and to the *Register of Historic Landscapes* inform all future planting proposals to ensure any such conflicts are minimised.

Demographic change

Many communities within the region face the challenges of low income, high economic inactivity and unemployment, compounded by the outward migration of young people and in-migration, often of retired people of whom few speak Welsh.

Whilst the slate communities welcome newcomers, there is a danger that local traditions, events and the welsh language may be lost or weakened if community structures change considerably. This would result in the gradual erosion of elements that make the Nominated Property distinctive, such as a decline in the number of Welsh speakers. The fundamental ambition of Gwynedd Council and its partners is the development of sustainable and viable communities that provide housing and employment as foundations to safeguard a thriving and living Welsh language and culture. This is a core principle of the Welsh Government's *Well-being of Future Generations Act (2015)* – and recognised as the means for achieving the *well-being goals* (see Figure 3.21) that will ensure the future of living and sustainable communities in Wales.

4.b.ii Environmental pressures

Climate change

Climate change projections for the United Kingdom were updated in 2018 (*UK Climate Projections 18*). The headline findings show for the twenty-first century an increased chance of milder, wetter-winters, and hotter, drier-summers along with an increase in frequency and intensity of climate extremes including localised heavy rainfall, storm-event or heat-wave. Sea-level around the UK will continue to rise, and increases to extreme coastal water levels such as through storm surges are expected.

Climate change could therefore amplify and accelerate existing management problems and threats affecting the integrity of particular elements and assets, through changed precipitation patterns, and the frequency, intensity and seasonality of extreme events such as droughts, fires, heavy precipitations, and floods. Increases in storminess and wind gusts can lead to structural damage.

Sea level change and changes in coastal processes (including tidal patterns, wave height, wave direction and the movement of beach and seabed materials) may result in coastal erosion and increased flooding. Areas of Component Parts 1 and 5 are located within flood zones, however, they do not have very high natural sensitivity and have a higher capacity to cope with these social and environmental impacts.

The *West Wales Shoreline Management Plan 2* is a large-scale assessment of the risks associated with coastal processes. It identifies potentially significant flood risk to much of Port Penrhyn (Component Part 1) and to low lying areas of Porthmadog (Component Part 5) if no intervention/management is undertaken in the future. Therefore the policy approach advocated in the Shoreline Management Plan for Porthmadog and the Cob is 'hold the line', defined by Natural Resources Wales as 'existing defence' – an aspiration to build or maintain artificial defences which are maintained and upgraded or replaced in their current position where funding permits so that the position of the shoreline remains. Sometimes, the method of defence may change to achieve this result.

Vegetation and invasive species

Rhododendron encroachment into upland habitats has had a drastic impact on the ecosystem at some Component Parts. Rhododendron's ability to withstand wide

climatic variation and a tolerance to a range of substrates means it can grow almost anywhere where there is sufficient moisture, and it is a particular problem in Component Part 5. Opportunities to manage and control invasive species within projects developed from the World Heritage nomination will be set out in local conservation management plans. Such a scheme is already in place in Component Part 5 under the auspices of *Y Dref Werdd* [The Green Town], a social enterprise whereby volunteers are trained in environmental management.

Figure 4.21. Rhododendron growth on slate tips in Blaenau Ffestiniog (Component Part 5).

Figure 4.22. Management of Rhododendron by *Y Dref Werdd* [The Green Town] volunteers in Blaenau Ffestiniog (Component Part 5).

Cotoneaster is also present, particularly within Component Part 3. There are historical records of Japanese Knotweed at Gorseddau Slate Quarry in Component Part 4, and there are likely to be further records of this species in other Component Parts.

Natural decay

Decay is a long-term natural process across the Nominated Property. The integrity of landscape-scale features is not generally adversely affected by this process, however it can pose a challenge to the structural integrity of some smaller-scale elements. Though quarries are robust environments, incremental deterioration of exposed quarried rock-faces is inevitable. Most quarry galleries demonstrate long-term stability and will retain their form and values for centuries to come. There are instances of localised collapse on a small scale which do not impact on their values. Tips of slate rubble achieve a natural angle of repose as they are created, and remain stable long after the quarry has ceased to be used unless actively disturbed.

Historic industrial buildings and structures such as inclined planes, particularly those within quarries that are roughly built out of waste rock, are prone to dilapidation and collapse. Where heritage assets are already in an advanced state of decay, the optimal conservation approach is to record and allow continued decay as opposed to excessive intervention. This will allow the asset eventually to reach a state of stability which retains its heritage values.

The principal threat to fixed historic machines is the impact of harsh environmental conditions, though brass and copper components are also vulnerable to theft. Fixed historic machines located underground are largely engineered for their environment and are not subject to significant decay. Machines housed within intact buildings are largely protected from decay. Machines in exposed locations or within roofless buildings are particularly vulnerable to the elements. Recording and targeted conservation is undertaken on a case-by-case basis.

Risks for relict transport routes include the potential for unused formations becoming overgrown, and unmanaged features such as cuttings, embankments, causeways and bridges becoming destabilised. It is possible that future increased numbers of visitors using historic transport links that have been converted into public cycleways and footpaths could lead to erosion of these elements.

4.b.iii Natural disasters and risk preparedness

North Wales is not prone to major earthquakes or volcanic activity, devastating forest fires, massive flooding or tidal waves, although extreme weather conditions such as localised flooding, and related events are increasing as a consequence of climate change. After the very hot dry summer of 2018 forest and upland peat fires took place across Wales including a few within the Nominated Property. Most unusually, an earthquake measuring 5.4 on the Richter scale occurred in Northwest Wales in 1984 with its epicentre 10 km from the Nominated Property. No reports of structural damage arising from this event were identified.

Subsidence and collapse

It is unlikely that subsidence as a consequence of former underground working will lead to significant loss of surface features within the Nominated Property. The underground features are self-draining or are systematically pumped, and are located in areas with no known history of geological instability. Very few make use of finite-life timber for support. Regular inspection of accessible underground features and appropriate structural remediation are the most appropriate forms of mitigation for the possibility of subsidence or collapse.

Unlike colliery waste-heaps, tips of slate rubble are stable structures, which achieve a natural angle of repose. Their safe management is subject to *The Mines and Quarries (Tips) Regulations 1971*, which obliges owners to engage a competent person to inspect tips no longer in use at intervals not exceeding twelve months.

One of the monumental revetted slate bastions in Dorothea Slate Quarry in Component Part 3 is subject to deterioration and movement which could ultimately result in collapse. The bastion has been subject to a structural assessment; measures are being undertaken by the site-owners to avoid harm to the general public and a strategy for recording and remedial actions is being developed.

Floods

The Nominated Property includes areas identified by Welsh Government and Natural Resources Wales as being at risk from flooding.

Many of the lower underground features in Component Parts 5 and 6 are flooded; water provides lateral stability for the walls of underground chambers. Regular inspection of surface dams minimises health and safety concerns arising from flooding.

Fire

Most surviving structures within *The Slate Landscape of Northwest Wales* are constructed of stone, but a small number of particularly important sites incorporate timber elements such as the National Slate Museum, or incorporate historically important timber roof elements, such as Penrhyn Castle and Plas Tan y Bwlch. All are vulnerable to fire and have individual fire and security protection measures.

Key occupied dwellings have appropriate strategies in place. Occupied dwellings and buildings in use also have the usual fire risks. Derelict buildings and structures are most vulnerable.

Wildfire

There is an increased likelihood of wildfires during prolonged dry periods as a consequence of climate change, as seen across Wales during 2018. As a result the Fire and Rescue Authorities are actively working with partners to reduce the number and impact of wildfires. The two active railways using coal-fired, potentially spark-emitting steam locomotives have a defined policy as to when to substitute diesel traction in dry weather, and crews are trained to minimise sparks.

Theft, disposal or damage to archives and artefacts

The principal archives maintaining archaeological records (both digital and hard copy information) relating to the Nominated Property are the regional Historic Environment Record curated by the Gwynedd Archaeological Trust, and the National Monuments Record curated by the Royal Commission on the Ancient and Historical Monuments of Wales which has been awarded Archive Service Accreditation and is the recognised Digital Archaeological Repository for Wales.

Under the provisions of the Historic Environment (Wales) Act 2016 (the Act), the Welsh Ministers must compile and keep up to date a historic environment record for each local authority area in Wales. In order to be fit for purpose the statutory Historic Environment Record must meet certain benchmarks and standards, developed for use in Wales by the Historic Environment Data Standards Working Group for Wales. These include the requirement to maintain robust data storage, security and risk management procedures to protect against cyberattack and other disasters. These procedures are monitored by the Royal Commission on the Ancient and Historical Monuments of Wales.

A number of important art-works, artefacts and collections of archive material which document and illustrate *The Slate Landscape of Northwest Wales* are held in collections within the Nominated Property at Penrhyn Castle, the National Slate Museum, Plas Tan y Bwlch, the Ffestiniog Railway, and at the Narrow Gauge Railway Museum on the Talyllyn Railway. These are subject to individual fire and security protection measures. Other collections and artefacts are held at locations within the region, at the Gwynedd Record Offices at Caernarfon and Dolgellau, in the Bangor University Archives and Special Collections, and at Storiel Museum and Gallery in Bangor, and are protected by their own security systems.

There is a market for portable items relating to *The Slate Landscape of Northwest Wales*, which may therefore be vulnerable to sale, disposal into collections without public access, or theft. Private archives and collections are inherently more vulnerable to accidental damage than those in appropriately housed, conserved and protected public collections.

Some larger industrial artefacts are also at risk of damage or theft. Former industrial buildings and underground features are susceptible to the theft of timber, lead, metal, copper or the slates themselves for re-sale and other isolated artefacts or component are open to the risk of vandalism.

4.b.iv Responsible visitation at World Heritage sites

The Slate Landscape of Northwest Wales has attracted visitors since the late eighteenth century, and numbers have grown very considerably since 1945. Gwynedd Council is currently reviewing its tourism and destination management strategy with a view to publishing a new *Tourism and Destination Management Plan* during 2020. The new plan will take account of the United Nations World Tourism Organisation's aim of seeing tourism as a driver for economic growth, inclusive development and environmental sustainability.

The region is served by a network of trunk and other A roads adjacent to, or within, each of the Component Parts. These provide direct access to a number of elements within the Nominated Property which function as visitor attractions or are otherwise open to the public, and further improvements to the existing road infrastructure are expected. However, the mountainous environment of the region does not make it suitable for more intensive use of road transport; existing Gwynedd Council and Snowdonia National Park policy is to reduce the need for travel by private car.

Across the Nominated Property

An interpretation plan has been undertaken in an effort to unify the sites and attractions across the Nominated Property with an identifiable brand and story; this will ensure that visitors gain a high quality, accurate and informative insight into *The Slate Landscape of Northwest Wales*. The interpretation plan identifies themes under which individual stories can be told.

The interpretation plan has been developed around a model of Hubs and Spokes, with larger sites acting as hubs to draw visitors to the area and to encourage visitors to visit the smaller sites and attractions – spokes. In between the Hubs and Spokes are medium sized places which have been called Sprockets as they are intermediate in size and have a good sized heritage offer already. This model will support understanding, integration and transmission of the proposed Outstanding Universal Value to visitors, and will also work to disperse visitors across the region and the Nominated Property. Visitors will be encouraged to 'follow the story' of slate across the different hubs, sprockets and spokes in order to gain a full understanding of all the identified themes. Off line and on line information will form part of the offer, and central tools will be available to support partners and stakeholders to transmit information to visitors through the availability of standard text and an image library in order to ensure historical accuracy and quality standards.

Component Part 1.
Penrhyn Slate Quarry and Bethesda, and the Ogwen valley to Port Penrhyn

Penrhyn Castle and Park are managed by the National Trust as a heritage attraction, including a museum with interpretation, activities and events programme, café and visitor facilities. They received 118,762 visitors over the 2018-2019 season, and are open from March until October. They have good road access and parking. There is good disabled access to the site.

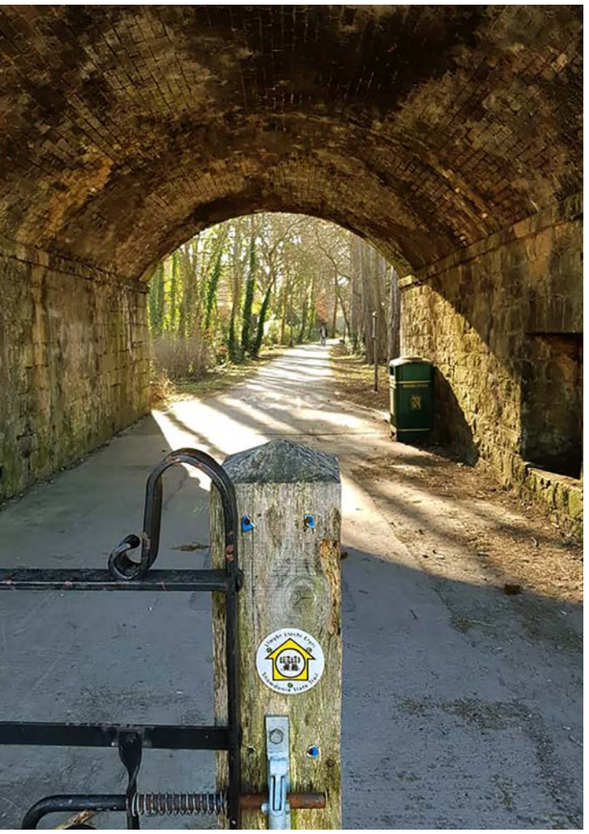


Figure 4.23. The 133 kilometre-long Snowdonia Slate Trail enables visitors on foot or bike to explore the slate heritage of the Nominated Property.

Lôn Las Ogwen, a cycle route which forms part of Wales' National Cycle Network, takes in Port Penrhyn, the course of the quarry railways, Felin Fawr slate-slab mill, Penrhyn Slate Quarry itself and the improved landscape of the late eighteenth and early nineteenth centuries. The Snowdonia Slate Trail, a popular 133 kilometre long path, begins at Port Penrhyn and follows part of the route of the Penrhyn Quarry Railway, encompassing Felin Fawr Slate-Slab Mill, Mynydd Llandygai and Bethesda.

The installation of zip-lines as part of adventure tourism at Penrhyn Slate Quarry is a new (2017) development. Infrastructure including visitor reception and café is located outside of the Nominated Property within the wider protected area. A short section of the zip-line passes over the Nominated Property. This development has attracted large numbers of visitors and provides interpretation and views across the flooded pit towards the best-preserved section of gallery workings.

The Storiel Museum and Gallery in Bangor also provides interpretation on the cultural traditions of Gwynedd. It exhibits slate folk art from across the Nominated Property and displays artefacts associated with quarries and their communities.

The level of visitor numbers to this Component Part is not currently considered an issue.

Component Part 2.
Dinorwig Slate Quarry Mountain Landscape

The National Slate Museum, part of the National Museum of Wales, attracted 126,169 visitors in 2018 and is open all the year round. It is located in what has been a major tourism destination since the eighteenth century, at the foot of Snowdon, Wales and England's highest mountain, in spectacular scenery, and adjacent both to the lower terminus of the Snowdon Mountain Railway and to the Medieval Dolbadarn castle. The museum operates the restored V2 inclined plane, which shows how this typical slate quarry technology functioned. Plans are being developed to enhance the Museum's interpretation and visitor facilities in the near future. The Dinorwig Slate Quarry Hospital Museum drew 16,299 visitors in 2018. The Llanberis Lake Railway offers a visitor experience on trains hauled by slate-quarry steam locomotives; 76,700 passengers were carried in 2018.

Figure 4.24. The Llanberis Lake Railway in Component Part 2.

324 hectares of this Component Part is managed as Padarn Country Park by Gwynedd Council. The Snowdonia Slate Trail passes through, or immediately adjacent to, Elements 2.4, 2.5, 2.8 and 2.10.

Mynydd Gwefru / Electric Mountain operates a visitor centre adjacent to the Nominated Property providing interpretation of the hydro-electric power plant as well as visitor facilities and café. New interpretation schemes will be introduced in 2020.

The part of Dinorwig Slate Quarry landform which is owned by Gwynedd Council includes paths and a viewpoint. These are unlikely to suffer significant deterioration from visitor pressure. The remaining part is owned by First Hydro-Engie, where visitor access is restricted to existing public rights of way due to the dangerous nature of the steep and exposed rockface of the industrial landform.

This Component Part and the wider protected landscape adjacent to it are substantially visited by tourists, particularly during the spring and summer months – the majority of whom climb Snowdon (500,000 per year). The Visitor Strategy to be developed for the Nominated Property will ensure that visitors are encouraged to visit less frequented areas of the Component Part and the whole property, throughout the year. There is sufficient car-parking to cater for current and projected visitor numbers and discussions are under way regarding the development of a shuttle bus service.

Component Part 3.
Nantlle Valley Slate Quarry Landscape

The Nantlle Component Part has not traditionally been a visitor destination; however recent developments are responding to this gap in provision. A vineyard has been opened adjacent to this Component Part and includes a café and terrace to view the landscape. The vineyard also makes use of slate waste to keep the roots of the vines at a consistently warm temperature. Two cafés with some interpretation have recently opened, again within the wider protected area – one of which is located in the old Nantlle Railway station at Penygroes – Yr Orsaf [The Station]. There are currently no dedicated slate-related visitor attractions in this Component Part. At Dorothea Slate Quarry regulated diving has recently been introduced in the quarry pit on a short-term agreement. It is a popular venue for local walkers, and the Snowdonia Slate Trail passes through the Quarry, as well as Pen y Bryn/Cloddfa'r Lôn Slate Quarry, aerial ropeway systems, slate mill, barracks and dwellings and the Nantlle Village settlement. Access to some areas are also restricted to existing public rights of ways due to the dangerous nature of some of the industrial landforms which include deep pits and shafts.

There is considerable potential for adaptive re-use of quarry buildings and historic dwellings in this Component Part to ensure that it will respond to the opportunities afforded by the nomination to enable it to manage, accommodate and service, as well as benefit from, any increase in visitors.

The level of visitor numbers to this Component Part is not currently considered an issue.

Component Part 4.
Gorseddau and Prince of Wales Slate Quarries, railways and mill

The Gorseddau and Prince of Wales Slate Quarries are relict properties in open landscape accessible along marked footpaths, and are not suitable for mass tourism which would adversely affect its sense of remoteness and seclusion.

Ynysypandy slate-slab mill is a monument which formerly had some interpretation panels but is not suited for any significant number of visitors. Its remote location, near a minor road and access by a steep path up a slate tip, precludes further on-site development. It is managed by the Snowdonia National Park Authority.

A draft visitor-management plan has been produced for this Component Part which emphasises improved interpretation but which recommends a limited increase in physical visitors. The level of visitor numbers to this Component Part is not currently considered an issue.

Component Part 5.
Ffestiniog: its slate mines and quarries, 'city of slates' and railway to Porthmadog

The Ffestiniog Railway carried 113,000 passengers on its public services in 2018, and also offers additional special interest experiences including access to properties not open to the general public for about 1,000 visitors. The Railway has a maximum capacity of 140,000, and for the other experiences 3,000. Its 60 paid employees are assisted by over 300 volunteers who come from all over the world.

Llechwedd Quarry, Antur Stiniog and Zip World offer a variety of experiences for visitors including an hotel and underground and over-ground heritage tours within the Nominated Property, as well as adventure activities and facilities, down-hill biking, catering and glamping adjacent to it within the wider protected area. In 2018 45,000 visitors went on the heritage tours, 180,000 the adventure activities and 8,490 people came for downhill biking. It has sufficient parking, and is accessible from a main trunk road.

Figure 4.25. 'Quarry Explorer' tours to the relict Ffestiniog slate quarries in Component Part 5.

Figure 4.26. 'Go Below' underground tour at Cwmorthin Quarry in Component Part 5. Briefing for participants includes a history of the site and instructions to avoid damage to heritage.

The Snowdonia National Park's study centre at Plas Tan y Bwlch hosted 9,000 day and residential visitors in 2018, as well as approximately 10,000 additional visitors to the historic gardens, many from overseas. It offers courses on the history of the slate industry, including practical archaeological survey and recording, or walking tours specifically based on *The Slate Landscape of Northwest Wales*. In the event of a successful inscription, the study centre will seek to develop visitor numbers through the provision of conservation-based courses.

Other facilities include the Maritime Museum in Porthmadog Harbour and Go Below, a guided underground tour at Cwmorthin Quarry.

The Blaenau Ffestiniog town trail interprets the history of this historic industrial community. There is currently minimal tourist accommodation in the town of Blaenau Ffestiniog, though the town of Porthmadog is better served. Blaenau Ffestiniog can expect to face an increased visitor foot-fall, given that it lies on the 'Cambrian Way' (the main north-south trunk road which forms part of the Welsh Government's new visitor strategy – the Wales Way), the national railway network branch-line from Llandudno Junction, the Ffestiniog Railway, and the Snowdonia Slate Trail.

The level of visitor numbers to this Component Part is not currently considered an issue.

Component Part 6.
Bryneglwys Slate Quarry, Abergynolwyn Village, Talyllyn Railway

The number of visitors to this Component Part is dominated by passengers on the Talyllyn Railway, which attracted 49,000 passengers in 2018 and has a potential carrying capacity of 55,000. Its 33 permanent staff members are assisted by over 480 regular volunteers drawn from over the United Kingdom and beyond, with a regular contingent coming from the Netherlands. It is developing plans to expand facilities at Abergynolwyn, where the station lies at some distance from the village, in order to encourage passengers to join the train at this location to take pressure off the road system, and has invested in additional volunteer accommodation. The annual 'Race the train' event along the railway attracted 2,000 participants and 5,000 attendees in 2018.

Tourism facilities at Tywyn, a Medieval town which was developed as a seaside resort in the nineteenth century, are currently under-used.

Bryneglwys Quarry is managed by Natural Resources Wales and has visitor access by paths. There is some on-site signage and interpretation.

The level of visitor numbers to this Component Part is not currently considered an issue.

Impact on local population

A key ambition in developing the Nomination is to promote economic and community development across the region, and every effort has been made to involve local communities and businesses in the process. Local people have been involved in developing the nomination throughout, from presentations being held in local communities to business sessions, from attending local events such as farmers markets and carnivals to working with local school pupils. Local businesses have been heavily involved in the drafting of the Interpretation Plan, which has focussed on the stories that the area has to tell about the slate industry; these are the 'real' stories that local people want to tell each other, and the rest of the world.

The Interpretation Plan analyses visitor management, and identifies methods to encourage visitors away from traditional 'honey-pot' tourist sites, and towards less-visited sites, therefore spreading the impact of tourism on the region, and also ensuring that the economic benefit of the sector is spread across the Nominated Property.

The Welsh language is an important attribute of the Nominated Property, which is its heartland. Welsh is identified as an indigenous language by UNESCO and forms part of the UNESCO Year of Indigenous Languages celebrations 2019. UNESCO promotes indigenous languages through the following five key areas:

1. Increasing understanding, reconciliation and international cooperation.
2. Creation of favorable conditions for knowledge-sharing and dissemination of good practices with regards to indigenous languages.
3. Integration of indigenous languages into standard setting.
4. Empowerment through capacity building.
5. Growth and development through elaboration of new knowledge

The interpretation of the Nominated Property will take these key areas into consideration in order to give the Welsh language priority within all activities, and to ensure that visitors to the area understand the significant role of the language in the everyday life of our communities and the important role that the slate industry has had in its survival.

4.b.v Number of inhabitants within the property

Population within the area of nominated property: 13,722

Year: 2011 (census data)

Figure 5.1. The ‘city of slates’, Blaenau Ffestiniog in Component Part 5.

5 Protection and Management of the Property

5.a Ownership

The Nominated Property comprises six Component Parts; the different Elements within each one are under various ownerships, and are subject to different management regimes. In the event of a successful inscription, management will be co-ordinated through the adoption of an overarching strategic document, *The Slate Landscape of Northwest Wales Property Management Plan*.

Table 5.1 Ownership and Management within the Nominated Property

1 Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn			
ID	*Component Parts and Elements*	*Owners/Managers Public*	*Private / Third Sector*
1.1	Penrhyn Slate Quarry		Breedon Group plc
1.2	Felin Fawr Slate-Slab Mills		Private Ownership
1.3	Penrhyn Slate Quarry Railroad		Various
1.3	Penrhyn Slate Quarry Railway		Various
1.4	Port Penrhyn		Penrhyn Estate
1.5	Mynydd Llandygai – Settlement		Private Ownership / Social Housing
1.6	Bethesda – Village		Private Ownership / Social Housing
1.7	Penrhyn Castle and Park	National Trust (not-for-profit organisation)	Penrhyn Estate
2 Dinorwig Slate Quarry Mountain Landscape			
ID	*Component Parts and Elements*	*Owners/Managers Public*	*Private / Third Sector*
2.1	Dinorwig Slate Quarry		First Hydro-Engie
2.2	'Australia' Gallery		First Hydro-Engie
2.3	Anglesey Barracks	Gwynedd Council	
2.4	V2 Inclined Plane / Vivian Slate Quarry	Gwynedd Council –leased to the Welsh Government, operated by a charity, the National Museum Wales	
2.5	Dinorwig Slate Quarry Engineering Complex. The National Slate Museum		
2.6.	Dinorwig Slate Quarry Road Systems – the drag	Gwynedd Council	
2.6	Dinorwig Slate Quarry Road Systems – Dinorwig quarry road	Gwynedd Council Highways Authority	
2.6	Dinorwig Slate Quarry Road Systems – Fachwen quarry road	Gwynedd Council Highways Authority	
2.7	Dinorwig Slate Quarry Railway	Gwynedd Council	Llanberis Lake Railway
2.8	Deiniolen, Clwt y Bont, Dinorwig and Fachwen – Settlements		Private Ownership / Social Housing
2.9	Craig yr Undeb		Private Ownership
2.10	Dinorwig Slate Quarry Hospital	Gwynedd Council	
3 Nantlle Valley Slate Quarry Landscape			
ID	*Component Parts and Elements*	*Owners/Managers Public*	*Private / Third Sector*
3.1	Cilgwyn Slate Quarry Tips	Gwynedd Council	Private Ownership
3.2	Blaen y Cae Slate Quarry 'Blondin' Aerial Ropeway System		Dorothea Pumped Hydro Limited
3.3	Dorothea Slate Quarry		Dorothea Pumped Hydro Limited
3.4	Dorothea Slate Quarry Cornish Beam Engine		Dorothea Pumped Hydro Limited
3.5	Pen y Bryn / Cloddfa'r Lôn Slate Quarry, Aerial Ropeway Systems, Slate Mill, Barracks and Dwellings		Dorothea Pumped Hydro Limited
3.6	Pen y Bryn / Cloddfa'r Lôn Water-driven Pumping system		Dorothea Pumped Hydro Limited
3.7	Pen yr Orsedd Slate Quarry		Breedon Group plc
3.8	Pen yr Orsedd Slate Quarry 'Blondin' Ropeway		Breedon Group plc
3.9	The Nantlle Railway		Dorothea Pumped Hydro Limited
3.10	Nantlle Village		Private Ownership / Social Housing
3.11	Settlements on Cilgwyn Mountain		Private Ownership
3.12	Plas Tal y Sarn and Tal y Sarn Farmhouse		Dorothea Pumped Hydro Limited

4 Gorseddau and Prince of Wales Slate Quarries, Railways and Mill			
ID	*Component Parts and Elements*	*Owners/Managers Public*	*Private / Third Sector*
4.1	Gorseddau Slate Quarry		Dŵr Cymru-Welsh Water
4.2	Prince of Wales Slate Quarry		Private Ownership
4.3	Ynysypandy Slate-Slab Mill	Snowdonia National Park Authority	
4.4	Gorseddau Railway and Gorsedda Junction and Portmadoc Railways		Various
4.5	Treforys Village		Private Ownership

5 Ffestiniog: its Slate Mines and Quarries, 'city of slates' and Railway to Porthmadog			
ID	*Component Parts and Elements*	*Owners/Managers Public*	*Private / Third Sector*
5.1	Ffestiniog Slate Quarries – Surface Landform		Breedon Group plc; JW Greaves & Sons Ltd
5.2	Ffestiniog Slate Quarries – Underground Workings		Breedon Group plc; JW Greaves & Sons Ltd
5.3	Pant yr Afon Hydro-Power Station		JW Greaves & Sons Ltd
5.4	Diffwys Slate Quarry Mill		JW Greaves & Sons Ltd
5.5	Maenofferen Slate Quarry Main Levels Complex		JW Greaves & Sons Ltd
5.6	Blaenau Ffestiniog – Town		Private Ownership / Social Housing
5.7	Plas Tan y Bwlch	Snowdonia National Park Authority	
5.8	Slate-quays on the Dwyryd River		Private Ownership
5.9	The Ffestiniog Railway		Festiniog Railway Trust (not for profit organisation)
5.10	Porthmadog Harbour	Municipal Harbour Authority (Gwynedd Council)	

6 Bryneglwys Slate Quarry, Abergynolwyn Village and the Talyllyn Railway			
ID	*Component Parts and Elements*	*Owners/Managers Public*	*Private / Third Sector*
6.1	Bryneglwys Slate Quarry Surface Working and Chain Incline Ropeway	Natural Resources Wales	
6.2	Bryneglwys Slate Quarry Underground Workings	Natural Resources Wales	
6.3	Abergynolwyn Village		Private Ownership / Social Housing
6.4	Talyllyn Railway		Talyllyn Railway Company

5.b Protective designation

Robust systems of designation within Wales ensure high-level protection for the Nominated Property as a cultural landscape.

5.b.i Heritage legislation

Cadw (the Welsh Government's historic environment service) sets out general principles for understanding and managing World Heritage sites in Wales, and how they are protected through the planning system in its document *Managing Change in World Heritage Sites in Wales* (2017), which supplements *Planning Policy Wales* and *Technical Advice Note 24*.

Cadw's approach is based on three principles:

- the statutory designation of specific historic assets within World Heritage Sites and associated mechanisms to manage and control works
- the use of the spatial planning system including policies in local development plans to guide appropriate development
- the collaborative creation and implementation of World Heritage Site Management Plans to ensure the effective and active involvement of all key stakeholders

This section deals with the first of these. The use of the spatial planning system is described in **5.c** and the approach to Management Plans is set out in **5.e**.

The Nominated Property and its setting will be afforded appropriate levels of protection through:

Statutory Designation of Historic Assets

Maps 5.1 to 5.6 (annexed to the Nomination Document) show the statutory designated historic assets within each Component Part.

Scheduling

The Ancient Monuments and Archaeological Areas Act 1979 as amended by *The Historic Environment Act (Wales) 2016* provides the legislative framework for the protection of historic monuments of national importance through Scheduling. The Welsh Ministers have a duty to compile and maintain a schedule of monuments of national importance; monuments on the schedule have statutory protection and are referred to as scheduled monuments.

The methods and techniques required for managing relict and archaeological sites differ from those for occupied buildings, and the different legislation reflects this. Scheduling is the most appropriate protection to apply to structures in the form of earthworks, ruinous or semi-ruinous buildings and archaeological remains. Scheduled monuments possess a high level of archaeological interest, and derive their importance (in whole or in part) from their evidential and historical values. Scheduled sites are not generally suited to adaptive re-use.

Co-ordinated programmes of archaeological assessment undertaken across Gwynedd and the neighbouring county of Conwy grant-aided by Cadw from 1992 to 1997 and from 2015 to 2017, have provided the baseline for a programme of scheduling which is underway and due to be completed by the end of 2020. The currently designated and proposed historic assets are listed in Table 5.2.

Information including descriptions of all scheduled monuments are available to the public and can be accessed online from Cadw using *Cof Cymru* **https://cadw.gov.wales/advice-support/cof-cymru/search-cadw-records**.

Table 5.2 Scheduled Monuments within the Nominated Property and those which meet the criteria for scheduling.

1 Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn			
	Component Parts and Elements	*Scheduled Monuments Designated*	*Proposed*
1.1	Penrhyn Slate Quarry		Quarry Galleries East Slate Tips Twlldyndwr and Agor Boni Inclines Quarry Hospital Princess May Water Balance Sebastopol Water Balance
1.2	Felin Fawr Slate-Slab Mills	CN297 Slate Gwaliau	
1.3	Penrhyn Slate Quarry Railroad	CN380 Cegin Viaduct	Relict Railroad Sections
1.3	Penrhyn Slate Quarry Railway		Relict Railway Sections

2 Dinorwig Slate Quarry Mountain Landscape			
	Component Parts and elements	*Scheduled Monuments Designated*	*Proposed*
2.1	Dinorwig Slate Quarry	CN337 Dinorwic Slate Quarry	Dinorwig East Slate Tips
2.2	'Australia' Gallery		Dinorwig West Slate Tips
2.3	Anglesey Barracks	CN177 Dinorwig Quarry Barracks / A Incline	
2.4	V2 Inclined Plane/Vivian Slate Quarry	CN198 Vivian Slate Quarry, Inclines, *gwaliau* and associated Structures	
2.5	Dinorwig Slate Quarry Engineering Complex. The National Slate Museum	CN163 Hafod Owen Winding Engine, Locomotive Shed, Main Water Wheel and Housing	

3 Nantlle Valley Slate Quarry Landscape			
	Component Parts and elements	*Scheduled Monuments Designated*	*Proposed*
3.2	Blaen y Cae Slate Quarry 'Blondin' Aerial Ropeway System	CN301 Blaen Y Cae Slate Quarry	
3.3	Dorothea Slate Quarry	CN199 Dorothea Slate Quarry, Pyramids, Inclines, Mill and Winding Houses	Revision to include tips and the Nantlle Railway
3.4	Dorothea Slate Quarry Cornish Beam Engine	CN165 Dorothea Quarry beam Engine	
3.5	Pen y Bryn/Cloddfa'r Lôn Slate Quarry, Aerial Ropeway Systems, Slate Mill, Barracks and Dwellings	CN302 Cloddfa'r Lôn Slate Quarry	Pen Y Bryn Slate Quarry and tips
3.7	Pen yr Orsedd Slate Quarry		Pen yr Orsedd Slate Quarry structures, incline and tips
3.8	Pen yr Orsedd Slate Quarry 'Blondin' Ropeway	CN208 Pen yr Orsedd Quarry, 'Blondins' and associated structures	
3.9	The Nantlle Railway		The Nantlle Railway
3.12	Plas Tal y Sarn and Tal y Sarn Farmhouse		Plas Tal y Sarn

4 Gorseddau and Prince of Wales Slate Quarries, Railways and Mill			
	Component Parts and elements	*Scheduled Monuments Designated*	*Proposed*
4.1	Gorseddau Slate Quarry	CN303 Gorseddau Slate Quarry	
4.2	Prince of Wales Slate Quarry		Prince of Wales Slate Quarry
4.3	Ynysypandy Slate-Slab Mill	CN160 Ynyspandy Slate-Slab Mill	
4.4	Gorseddau Railway and Gorseddau Junction and Portmadoc Railways		Relict sections of Gorseddau Railway and the Gorseddau Junction & Portmadoc Railways
4.5	Treforys Village	CN321 Treforys Deserted Quarry Settlement	

5 Ffestiniog: its Slate Mines and Quarries, 'city of slates' and Railway to Porthmadog			
	Component Parts and elements	*Scheduled Monuments Designated*	*Proposed*
5.1	Ffestiniog Slate Quarries – Surface Landform		Rhiwbach Quarry Railway and Inclined Planes Llechwedd Slate Tips West Oakley Quarry Tip Oakley Quarry West Cwmorthin North Wrysgan Slate Mine
5.4	Diffwys Slate Quarry Mill		Diffwys Slate Quarry West complex
5.8	Slate-quays on the Dwyryd River	ME108 Tyddyn Isa quay	
5.9	The Ffestiniog Railway		Pant yr Afon sidings and Ffestiniog Railway formation

6 Bryneglwys Slate Quarry, Abergynolwyn Village and the Talyllyn Railway			
	Component Parts and elements	*Scheduled Monuments Designated*	*Proposed*
6.1	Bryneglwys Slate Quarry – Surface Landform and Chain Incline Ropeway Bastion	ME186 Water Powered Chain Incline at Bryneglwys Slate Quarry ME205 Alltwyllt Quarry Inclined Plane	Revision to include tips and railway
6.2	Bryneglwys Slate Quarry Underground Workings		Revision to ME186 to include underground workings
6.4	Talyllyn Railway		Talyllyn Railway formation

Listing

The Planning (Listed Buildings and Conservation Areas) Act 1990 as amended by *The Historic Environment Act (Wales) 2016* provides the legislative framework for the protection of buildings of special architectural or historic interest through listing. Elements of the components part of the Nominated Property have been listed for their architectural and historical importance since 1949. Listing began with patrician and aristocratic elements within the Component Parts of the Nominated Property, and has been extended to include workers' dwellings, vernacular buildings, places of worship and other social infrastructure, and industrial and transport elements, as

knowledge and understanding of the built heritage of Wales has grown. Listed buildings are generally best maintained by being kept in active use.

The national listing resurvey of Wales completed in 2005 included comprehensive designations within each of the Component Parts. Buildings that met the criteria of special architectural or historic interest were listed. This process confirmed that very many buildings that contribute to historic character did not meet the criteria for listing.

Information including descriptions of all listed building can be accessed online using Cof Cymru **https://cadw.gov.wales/advice-support/cof-cymru/search-cadw-records**.

Conservation Areas

Conservation Areas are designated by Local Planning Authorities in accordance with *Section 69* of *The Planning (Listed Buildings and Conservation Areas) Act 1990*. Local Authorities have a duty to identify areas of special architectural and historic interest the character or appearance of which it is desirable to preserve or enhance. Conservation areas are defined as areas 'the character and appearance of which it is desirable to preserve or enhance'; quality of place therefore is one of the prime considerations in their identification.

Conservation Areas have been designated at nine different locations in *The Slate Landscape of Northwest Wales*: within Component Part 1 (four in Bethesda, others at Llandygai, Tanysgafell, St Anne's church and Mynydd Llandygai) and Component Part 5 (Porthmadog Harbour). Consideration is being given for additional conservation areas at Blaenau Ffestiniog (Component Part 5) and Abergynolwyn (Component Part 6).

Statutory Register of Historic Parks and Gardens in Wales

Wales has a rich inheritance of historic parks and gardens. They form an integral part of the historic and cultural fabric of the country. Their importance is recognized in *The Historic Environment (Wales) Act 2016*, which requires the Welsh Ministers to compile and maintain a statutory register of historic parks and gardens in Wales. This statutory register will come into force in 2020**.** It incorporates the existing non-statutory Register of Parks and Gardens of Special Historic Interest in Wales.

Registered parks and gardens are afforded protection through the planning system as set out in *Planning Policy Wales*. Local planning authorities are required to protect and conserve parks and gardens and their settings if they are included in the register of historic parks and gardens in Wales. Whilst inclusion in the register does not introduce any new consent regimes, registered parks and gardens and their settings, may be protected through the planning system. The local planning authority consults Cadw on applications affecting registered parks and gardens and/or their settings. The local planning authority may also consult the Welsh Historic Gardens Trust, a conservation and heritage charity established to protect and conserve historic parks and gardens. The effect of a proposed development on a registered park or garden or its setting is be a material consideration in the determination of a planning application.

In preparation for the introduction of the statutory register, Cadw undertook a thorough review of the boundaries of all registered historic parks and gardens including the two parks and gardens within the Nominated Property at Penrhyn Castle (Grade II*) and Plas Tan y Bwlch (Grade II*).

Information on each of these assets including descriptions can be accessed online using Cof Cymru **https://cadw.gov.wales/advice-support/cof-cymru/search-cadw-records**.

5.b.ii Landscape Protection

National Park

The National Parks and Access to the Countryside Act (1949) established procedures for the creation of National Parks and Areas of Outstanding Natural Beauty leading to the establishment of the Snowdonia National Park/*Parc Cenedlaethol Eryri* in 1951.

National Parks are the highest level of landscape protection within the UK planning system. Component Parts 4 and 6 are located within the Snowdonia National Park. The transport element of Component Part 5 runs through the National Park, and Component Parts 1, 2 and 3 are located immediately adjacent to the National Park and thus benefit from protection through their proximity to the National Park boundary.

The Snowdonia National Park Authority is a key stakeholder and partner in the management of the Nominated Property. Its purposes are to conserve and enhance the natural beauty, wildlife and cultural heritage of the area and to promote opportunities for the understanding and enjoyment of the special qualities of the Park by the public. These purposes, together with the activities and planning powers through which the National Park Authority implements them, create a favourable context for the protection and conservation of cultural heritage, including that of the slate landscapes.

Register of Landscapes of Outstanding Historic Interest in Wales

The *Register of Landscapes of Outstanding Historic Interest in Wales*, compiled by Cadw, the former Countryside Council for Wales (now part of Natural Resources Wales) and ICOMOS-UK, identifies the most important and best-surviving historic landscapes in Wales. The *Register* is a non-statutory instrument but is a material consideration in the planning process. The *Register* provides information to decision makers and landscape managers, to help ensure that the historic character of the landscape is sustained, and that where change is considered, it is well-informed. A published *Guide to Good Practice on Using the Register of Landscapes of Historic Interest In Wales* explains how the *Register* is used in the planning process.

Five of the Component Parts of the Nominated Property lie within six registered historic landscapes.

Information on these landscapes, including descriptions can be accessed online using Cof Cymru **https://cadw.gov.wales/advice-support/cof-cymru/search-cadw-records**.

Table 5.3 Registered Historic Landscapes within the Nominated Property		
	Component Part	**Registered Historic Landscape**
1	Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn	HLW (Gw) 10 – Ogwen Valley
2	Dinorwig Slate Quarry Mountain Landscape	HLW (Gw) 6 – Dinorwig
3	Nantlle Valley Slate Quarry Landscape	HLW (Gw) 9 – Nantlle Valley
5	Ffestiniog: its Slate Mines and Quarries, 'city of slates' and Railway to Porthmadog	HLW (Gw) 3 – Blaenau Ffestiniog HLW (Gw) 7 – Aberglaslyn
6	Bryneglwys Slate Quarry, Abergynolwyn Village and the Talyllyn Railway	HLW (Gw) 17 – Dysynni Valley

The landscapes presented in the *Register* have been subject to detailed landscape characterization to define discrete geographical areas of broadly consistent historic character suitable to inform conservation and management.

Best-practice guidance has been developed to assist local planning authorities and the Planning Inspectorate in their consideration of planning proposals affecting areas on the Register of Historic Landscapes. Proposed developments within a registered historic landscape that require an Environmental Impact Assessment are likely to also require assessment of their impact on the historic environment as part of the Environmental Statement. This is undertaken using the ASIDOHL formula (Assessment of the Significance of Development on Historic Landscape), which objectively evaluates probable effect on the wider landscape.

Registration as Landscapes of Outstanding Historic Interest and designation as a National Park serve the purpose of a Buffer Zone, protecting the setting and key views into and out of the Nominated Property. Map E1 shows the National Park and Registered Historic Landscape Character Areas.

5.b.iii Environmental designations

Maps 5.7 to 5.12 (annexed to the Nomination Document) show the environmental designations within each Component Part.

Parts of the Nominated Property are located within or close to various environmental designations which include:

- Statutory sites designated under international conventions or European legislation including Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).
- Statutory sites designated under national legislation including Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs)
- Local sites including Local Wildlife Sites, Local Nature Reserves and Ancient woodlands

These environmental measures can be harnessed to protect the proposed Outstanding Universal Value of the Nominated property by managing change through existing legislation and policy; existing protection is the statutory responsibility of public and private sector organisations including Gwynedd Council, Natural Resources Wales and Dŵr Cymru – Welsh Water.

Table 5.4 Ecological Designations within and adjacent to the Nominated Property	
1 Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn	
Ecological designations within and adjacent the Nominated Property	**European sites where otters live within 25 km and lesser horseshoe bats live within 30 km of the Nominated property**
Caeau Tyddyn Dicwm SSSI at Halfway bridge. Eryri Snowdonia SAC and SSSI at Penrhyn Slate Quarry. Ancient woodland at Penrhyn Castle and adjacent to Penrhyn Slate Quarry.	**Bats SAC:** Meirionydd Oakwoods and Bat Sites, Glynllifon and Gwydyr Forest Mines **Otter SAC:** Afon Gwyrfai a Llyn Cwellyn Pen Llyn a'r Sarnau Afon Eden – Cors Goch Trawsfynydd
2 Dinorwig Slate Quarry Mountain Landscape	
Ecological designations within the Nominated Property	**European sites where otters live within 25 km and lesser horseshoe bats live within 30 km of the Nominated property**
Eryri Snowdonia SAC and SSSI Llyn Padarn SSSI Coed Dinorwig Local Nature Reserve	**Bat SAC:** Glynllifon; Gwydyr Forest Mines; Meirionnydd Oakwoods and Bat Sites **Otter SAC:** Pen Llyn a'r Sarnau; Afon Gwyrfai a Llyn Cwellyn; Afon Eden – Cors Goch Trawsfynydd
3 Nantlle Valley Slate Quarry Landscape	
Ecological designations within the Nominated Property	**European sites where otters live within 25 km and lesser horseshoe bats live within 30 km of the Nominated property**
Glynllifon SAC and SSSI lie within 2 kilometres	**Bat SAC:** Meirionnydd Oakwoods and Bat Sites; Glynllifon, Gwydyr Forest Mines **Otter SAC:** Afon Gwyrfai a Llyn Cwellyn; Pen Llyn a'r Sarnau; Afon Eden – Cors Goch Trawsfynydd

4 Gorseddau and Prince of Wales Slate Quarries, Railways and Mill	
Ecological designations within the Nominated Property	**European sites where otters live within 25 km and lesser horseshoe bats live within 30 km of the Nominated property**
Moel Hebog SSSI Meirionydd Oakwoods and Bat Sites lie within 2 kilometres	**Bat SAC:** Meirionydd Oakwoods and Bat Sites; Glynllifon; Gwydyr Forest Mines **Otter SAC:** Pen Llyn a'r Sarnau; Afon Gwyrfai a Llyn Cwellyn; Afon Eden – Cors Goch Trawsfynydd

5 Ffestiniog: its Slate Mines and Quarries, 'city of slates' and railway to Porthmadog	
Ecological designations within the Nominated Property	**European sites where otters live within 25 km and lesser horseshoe bats live within 30 km of the Nominated property**
Coedydd Dyffryn Ffestiniog SSSI Several components of the Meirionydd Oakwoods and Bat Sites SAC Pen Llyn a'r Sarnau SAC Parcels of ancient woodland lie within the WHS boundary at Plas Tan y Bwlch and Ddualllt station Coed Maentwrog NNR, Coedydd Dyffryn SSSI and Glaslyn SSSI surround the Component Part Migneint- Arenig- Ddualllt SSSI/SAC/ SPA lies within 2 kilometres	**Bat SAC:** Glynllifon, Gwydyr Forest Mines and many components of the Meirionydd Oakwoods and Bat Sites lie within 30 km of the Nominated Property boundary **Otter SAC:** River Dee and Bala Lake; Pen Llyn a'r Sarnau; Afon Eden – Cors Goch Trawsfynydd; Afon Gwyrfai a Llyn Cwellyn

6 Bryneglwys Slate Quarry, Abergynolwyn Village and the Talyllyn Railway	
Ecological designations within the Nominated Property.	**European sites where otters live within 25 km and lesser horseshoe bats live within 30 km of the Nominated property**
Pen Llyn a'r Sarnau SAC lies within 2 kilomtres. Bird rock/ Craig yr Aderyn SPA and SSSI lie within 1.2 kilometres. Dyfi Biosphere lies within 1 kilometre. Ancient woodland is located directly adjacent.	**Bat SAC:** Meirionydd Oakwoods and Bat Sites **Otter SAC:** Pen Llyn a'r Sarnau; Afon Eden – Cors Goch Trawsfynydd

Slate quarries and underground features are important hibernation sites for many species of bat, in particular the lesser horseshoe bat *Rhinolophus hipposideros* which has its stronghold in North Wales. Lesser horseshoe bats are a European Protected Species (EPS) under the EU Habitats Directive and Conservation of Habitats and Species Regulations 2010. Given the many underground features within the Nominated Property, there is potential for bat-roosts within some of the Component Parts, particularly Component Part 5, which is adjacent to the Meirionydd Oakwoods and Bat SAC, a site designated for lesser horseshoe bats. Additionally, Component Part 3 lies within 2km of the Glynllifon SAC, a maternity and hibernation site for a large population of lesser horseshoe bats, comprising about 6% of the UK population.

Some iconic birds species are associated with quarries and surrounding areas including chough *Pyrrhocorax pyrrhocorax*, a Schedule 1 species protected under the Wildlife and Countryside Act 1981, whose numbers are in serious decline. These birds often nest in quarries, mine shafts and even abandoned quarry buildings. Other species associated with quarry landscapes and which sometimes breed in quarries include peregrine falcon *Falco peregrinus*, raven *Corvus corax* and ring ouzel *Turdus torquatus*.

Component Part 6 lies less than 1km away from the UNESCO designated Dyfi Biosphere, an area that has been recognised for its unique mix of plants and animals, valued environment and sustainable way of life of the people who live and work within it. The Dyfi Biosphere is representative of salt marshes and estuarine systems and is one of the most important wildfowl and shorebird centres in Wales. This site has national protection as a NNR and as a SSSI.

Component Parts 5 and 6 are adjacent to Pen Llyn a'r Sarnau SAC, and all six are located within 25km of Pen Llyn a'r Sarnau SAC, where otters are common. Component Parts 1 and 2 lie within the Eryri Snowdonia SAC. All Component Parts contain various SSSI designations, each selected for special flora, fauna, geological, geomorphological or physiographical features. Each SSSI is protected by law from damage through development or unsuitable management.

All Component Parts contain a mosaic of local wildlife sites selected for their local nature conservation value. They vary in shape and size and can contain important, distinctive and threatened habitats and species. Their designation is non-statutory, and their protection comes through the planning system.

5.c Means of implementing protective measures

5.c.i Heritage Designations

Any works that would disturb, damage or alter a Scheduled Monument require Scheduled Monument Consent – a statutory procedure administered by Cadw. There is a presumption against granting consent for proposals which would cause damage or adversely impact on the historic values of the monument. Consent is also required for conservation and repairs.

Any works that would alter the character of a Listed Building or structures within its curtilage require the prior consent of the local authority. It is a criminal offence to undertake works that would impact on the character of a building without consent. Applications are subject to public scrutiny and statutory consultation with appropriate bodies. There are provisions for local authorities to require improvement where a building is at risk.

The demolition of an unlisted building in a conservation area may only be undertaken with the consent of the local planning authority. The demolition of a gate, fence, wall or railing more than 1m high next to a highway (including a public footpath or bridleway) or public open space; or more than two metres high elsewhere in a conservation area may only be undertaken with the consent of the local planning authority

Cadw can assist with the protection of historic parks and gardens through advice to planning authorities on planning applications affecting registered sites.

5.c.ii The Spatial Planning System

Planning Policy Wales

The protection of the Nominated Property is embedded in the *Town and Country Planning Act 1990* and delivered through *The Planning (Wales) Act 2015* which establishes delivery structures, processes and procedures to enable the planning system to support the delivery of national, local and community aspirations by creating sustainable places where citizens have improved access to quality homes, jobs and built and natural environments, and to support use of the Welsh language. The Act requires local planning authorities to have regard to Local Well-being Plans published by Public Service Boards, and ensure engagement with proposed development at the pre-application stage to ensure local communities are able to engage early on in the planning process to influence development proposals. The Act also makes provision for the preparation of Strategic Development Plans for areas where there are matters of greater than local significance to direct strategic development.

Planning guidance on inscribed World Heritage sites is provided in paragraphs 6.1.6 and 6.1.22 of the Welsh Government's *Planning Policy Wales 10 (2018)* (national policy guidance) which specifies that the Outstanding Universal Value of World Heritage sites must be conserved, and in *Technical Advice Note 24: The Historic Environment* (May 2017), which states that it must be preserved by managing development within and adjacent to them, based on the statutory designation of specific historic assets within each site, on collaborative creation and implementation of World Heritage Site management plans and the use of the planning system to guide appropriate development.

Local Development Plans

The *Anglesey and Gwynedd Joint Local Development Plan (2011-2026)* and Snowdonia National Park Authority *Eryri Local Development Plan (2016-2031)* are recently adopted plans, which include specific policies relating to World Heritage sites.

The Nominated Property is therefore covered by robust and up-to-date planning policies that will be used to manage the proposed Outstanding Universal Value, setting, key views and sense of arrival to the World Heritage site.

Gwynedd Council Local Development Plan

Gwynedd Council's joint Local Development Plan (with Isle of Anglesey County Council), the *Anglesey and Gwynedd Joint Local Development Plan (2011-2026)*, was adopted on 31 July 2017. Relevant policies are:

POLICY PS 20
Preserving and where appropriate enhancing heritage assets

In seeking to support the wider economic and social needs of the Plan area, the Local Planning Authorities will preserve and where appropriate, enhance its unique heritage assets.

Proposals that will preserve and where appropriate enhance the following heritage assets, their setting and significant views into and out of the building/area will be granted:

1. Scheduled Monuments and other areas of archaeological importance (in line with Policy AT 4).
2. Listed Buildings and their curtilages.
3. Conservation Areas (in line with Policy AT 1).
4. Beaumaris Castle and Caernarfon Castle and Town Walls World Heritage Sites (in line with Policy AT 1).
5. Candidate World Heritage sites.
6. Registered Historic Landscapes, Parks and Gardens (in line with Policy AT 1).
7. Buildings of architectural/historic/cultural merit that are not designated or protected (in line with Policy AT 3).

POLICY AT 1
Conservation Areas, World Heritage Sites and Registered Historic Landscapes, Parks and Gardens

Proposals within or affecting the setting and/ or significant views into and out of Conservation Areas, World Heritage Sites and Registered Historic Landscapes, Parks and Gardens shown on the Constraints Map must, where appropriate, have regard to:

1. Adopted Conservation Area Character Appraisals, Conservation Area Plans and Delivery Strategies.
2. World Heritage Site Management Plans.
3. The Register of Landscape, Parks and Gardens of Special Historic Interest in Wales.

Proposals should be supported by a Heritage Impact Assessment, where appropriate.

Snowdonia National Park Authority Eryri Local Development Plan

The Snowdonia National Park Authority *Eryri Local Development Plan (2016-2031)* was adopted in 2019. Relevant policies are:

POLICY FF
Historic Environment

The historic landscape, heritage assets and cultural heritage of Snowdonia National Park will be conserved and enhanced, due to their contribution to the character and 'Special Qualities' of the National Park. Particular protection will be given to the following archaeological, architectural, historic or cultural assets and where appropriate, their settings.

Development will not be permitted that will adversely affect in any way the following Heritage Assets, or where appropriate their settings and significant views:

i Conservation Areas
ii World Heritage Sites
iii Candidate World Heritage Sites
iv Scheduled Monuments and other sites of archaeological importance
v Historic landscapes, parks and gardens
vi Listed Buildings
vii Traditional Buildings

Slate Landscape of Northwest Wales Supplementary Planning Guidance

The *Slate Landscape of Northwest Wales* Joint Supplementary Planning Guidance will provide more detailed guidance on the relevant planning policies in Gwynedd and Snowdonia National Park Authority for development within and outside the Nominated Property.

In the event of a successful inscription, the overall Property Management Plan, Local Management Plans and Joint Supplementary Planning Guidance will become immediately effective.

5.c.iii Use of the Spatial Planning System

Change is inevitable and will be managed carefully so that it does not threaten the proposed Outstanding Universal Value of the Nominated Property whilst enabling the sustainable evolution of this cultural landscape.

The nature, scale and location of development will determine the range and depth of information that is required to accompany planning applications. Where appropriate this will include preparation of Heritage Impact Assessments and/or Design and Access Statements.

Heritage Impact Assessments

Applications to the local planning authority for listed building and conservation area consent must be accompanied by heritage impact statements, according to the *Planning (Listed Building and Conservation Areas) (Wales) Regulations 2012* as amended by *Planning (Listed Building and Conservation Areas) (Wales) (Amendment No. 2) regulations 2017*. Applications to Cadw for scheduled monument consent will also require a heritage impact statement for cases where the changes have potential to impact on the Outstanding Universal Value of a World Heritage Site.

Heritage Impact Assessment is a structured process to make sure that the significance of a historic asset is taken into account when preparing proposals for change. The assessment is a core part of the design process and is used to test whether the proposals are appropriate by assessing their impact on the significance of the historic asset. The results of this assessment are summarised in a heritage impact statement.

Individual designated assets contribute to the Outstanding Universal Value of World Heritage sites. Applicants seeking consent to make changes will need to take the potential impact on demonstrable Outstanding Universal Value into account when developing their proposals.

The Welsh Government's Guidance *Managing Change in World Heritage Sites in Wales* states that 'a heritage impact statement accompanying an application for consent will need to consider the contribution that the designated asset makes to the Outstanding Universal Value of the World Heritage Site and the impact that the works may have upon that contribution', and advises the application to take account of the ICOMOS guidance as a model for undertaking such an assessment.

Design and Access Statements

Certain applications for developments within World Heritage Sites require a design and access statement. These include the provision of one or more dwelling houses, or the creation of floor-space of 100 square metres or more. The requirements of a design and access statement are set out in *Design and Access Statements in Wales* guidance.

Environmental Impact Assessments

World Heritage sites are classed as 'sensitive areas' under the Environmental Impact Assessment (EIA) regulations. This means all projects listed under schedule 2 which are located in, or partly in, a sensitive area need to be screened, even if they are below the thresholds that would normally require such an assessment. When an EIA is required, Welsh Government guidance requires that it should include an assessment of impact on the Outstanding Universal Value and attributes of the World Heritage Site through the provision of a heritage impact assessment.

5.c.iv Environmental Designations

Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC) and Special Protection Areas (SPA)

SSSIs include a wide range of habitats from small fens, bogs and riverside meadows to sand dunes, woodlands and vast tracks of uplands. Most are in private ownership, although some are owned and managed by local wildlife trusts, or other voluntary conservation bodies. Notification of an SSSI under the Wildlife and Countryside Act 1981 has since been amended by the Countryside and Rights of Way Act 2001, which brought about numerous changes in the way SSSI are notified, managed and protected. In order to ensure consistent, favourable long-term management of these sites, Natural Resources Wales with landowners have prepared management plans for all SSSI in Wales.

Local planning authorities are required to consult Natural Resources Wales before allowing any development to proceed that may affect an SSSI. Water, gas and electricity companies must also do the same.

Each SSSI has a list of activities that are considered to be likely to damage the site's special interest. Consent is required from Natural Resources Wales to carry out activities on that list.

All Terrestrial SACs and SPAs are underpinned by SSSIs and are managed accordingly.

5.d Existing plans related to municipality and region in which the proposed Property is located

Gwynedd Council Plan 2018-2023

The *Gwynedd Council Plan 2018-2023* was adopted on 8 March 2018. Its vision is:

to support all the people of Gwynedd to thrive and live full lives in our community, in a county which is one of the best counties to live in.

The Anglesey and Gwynedd Joint Local Development Plan (2011-2026) and Snowdonia National Park Authority Eryri Local Development Plan (2016-2031)

The *Anglesey and Gwynedd Joint Local Development Plan (2011-2026)* and Snowdonia National Park Authority *Eryri Local Development Plan (2016-2031)* are statutory development plans providing strategic and detailed policies to manage issues such as landscape change and visual impact, deterioration or loss of habitats, addressing housing and employment needs, and (in association with national planning policy and legislation) protection of important historic sites and buildings. The principle of avoiding adverse impacts on World Heritage sites and their settings and on the National Park and its settings is therefore firmly established in both plans.

Policies in both plans enable the two local planning authorities to make consistent and transparent decisions regarding planning applications. They cannot provide all the detailed advice applicants and stakeholders need to prepare and comment on planning applications. In order to provide this detailed advice, local planning authorities prepare Supplementary Planning Guidance to support policies in their Local Development Plans. Each local planning authority has a suite of Supplementary Planning Guidance that cover a range of policies and proposals. In the event of a successful inscription, a Joint Supplementary Planning Guidance to support *The Slate Landscape of Northwest Wales Property Management Plan* will include detailed background and guidance for developers regarding the required assessment of the impact of development on the World Heritage Site and its setting. This Supplementary Planning Guidance will ensure that development reflects and interprets the particular quality of its surroundings, responds to and reinforces distinctive patterns of development, townscape, views, landscape, scale, materials and quality of the World Heritage Site.

Gwynedd Destination Management Plan 2013-2020

Gwynedd Council adopted its *Destination Management Plan 2013-2020* in May 2013. This prioritises themes to ensure that the tourist industry in Gwynedd continues to thrive in the future. Its vision is:

Gwynedd as a top class integrated quality visitor destination valued for its internationally renowned special landscapes, its spectacular built environment and its unique Welsh Culture.

Its main aims are to:

- Extend the tourism season
- Increase visitor spend
- Improve the quality of the visitor experience

- Improve integration of tourism with other aspects of life
- Enhance the natural, built and cultural environment
- Build and maintain quality public infrastructure and amenities
- Provide well-paid, year-round quality jobs and skills development

The *Destination Management Plan 2013-2020* prioritises the following themes:

- Environment
- Key Products (outdoor adventures, culture and heritage, food and events)
- Public Realm, accommodation and customer services
- Marketing

Gwynedd Council is currently reviewing its tourism and destination management strategy with a view to publishing a new Tourism and Destination Management Plan during 2020. Initial consultations are focused on developing a set of principles for the tourism sector, and the requirements of the Nominated Property will be integrated within the new Plan. The new Plan will take account of the United Nations World Tourism Organisation's aim of seeing tourism as a driver for economic growth, inclusive development and environmental sustainability. Emerging principles in Gwynedd currently include:

- Celebrating uniqueness and the Welsh Language
- Living and Sustainable Communities
- Improved value from the sector to communities and people
- Quality
- Partnership working, well-being
- Sustainability

Slate Landscape of Northwest Wales Economic Plan

The Economic Task Force sub-group was established by *The Slate Landscape of Northwest Wales* Partnership Steering Group to identify the economic priorities of the Nominated Property. The work of the subgroup is underpinned by the report commissioned in 2015 *An assessment of the current and potential economic impact of heritage* (prepared by TBR's Economic Research Team and Rebanks Consulting). On the basis of this document, the sub-group drew up the *Slate Landscape of Northwest Wales Economic Plan (2016)*, of which the following is the mission statement:

to ensure that the potential economic and social benefits of developing the Wales Slate World Heritage Site nomination are realised and maximised across all communities and businesses in Gwynedd.

In order to fulfil this mission, the plan focuses on:

- Contributing to the skills and education of our young people and lifelong learning
- Creation of sustainable and high-value employment opportunities
- Improving destinations
- Ensuring a unified story and narrative
- Improving our communities and sense of pride in our communities
- Promoting and safeguarding our unique industrial heritage, culture, language and local landscapes for all

The Economic Task Force subgroup includes various business stakeholders including quarry-owners, tourism operators and landowners, officers from Gwynedd Council Economy and Community Service, Destination Management representation, and Visit Wales officers. This group will be responsible for the creation and monitoring of a *Strategic Funding Strategy* as a supplementary document to the Economic Plan, a document that will be used to co-ordinate applications from within the Nominated Property to public funding bodies such as the National Lottery and Welsh Government. This group will also be responsible for identifying, developing, supporting and implementing economic projects relating to the Nominated Property in the event of a successful inscription, and monitoring the relevant actions in *The Slate Landscape of Northwest Wales Property Management Plan.*

The Economic Task Force subgroup has already been successful in securing grant funding of over £500,000 from various sources including the National Lottery Heritage Fund, Europe / Welsh Government via the Regional Development Programme and the Rural Community Development Fund, and Snowdonia National Park Authority to carry out various community and business engagement projects and activities for key destinations within the Nominated Property. A £500,000 interest-free loan scheme through the Welsh Government Town Centre Loans programme has also been secured to support the regeneration and development of settlements within and adjacent to the Nominated Property. Bethesda, Component Part 1 and Penygroes, adjacent to Component Part 3, are currently benefitting from this grant, and it is hoped that there will be an opportunity to expand to other settlements in the future.

5.e Property Management Plan or other management system

The Slate Landscape of Northwest Wales Property Management Plan (2020-2030) which accompanies this Nomination sets out the guiding principles by which the proposed Outstanding Universal Value of the Nominated Property will be protected, conserved and managed. The Plan reflects and responds to the main pressures and opportunities within in the Nominated Property and will be supported by a series of Local Management Plans for Elements within each Component Part.

The process of developing the Plan has been led by Gwynedd Council but has involved all members of the Partnership Steering Group and, wider stakeholders, and has drawn on a public consultation.

The Plan expresses a vision for the management of the World Heritage Site:

To protect, conserve, enhance and transmit the proposed Outstanding Universal Value of *The Slate Landscape of Northwest Wales* to reinforce cultural distinctiveness and strengthen the Welsh language, and become a significant driver for economic regeneration and social inclusion.

The Plan sets out a prioritised list of agreed actions, and identifies leads for each. This Action Plan is subject to measurement and monitoring, and will be kept under regular review by the Partnership Steering Group. Resources for implementation of the Plan are identified in Sections **5.f**, **5.g** and **5.j**.

In the event of a successful inscription, the Management Plan and Local Management Plans will become immediately effective in their entirety. The plan covers the period 2020-2030 and will be reviewed in 2025.

Management Structure

The nomination process has been led by a multi-organisational Partnership headed by the lead organisation, Gwynedd Council, and chaired by Lord Dafydd Wigley, a well-respected former Member of Parliament for a Gwynedd, and a member of the Privy Council of the United Kingdom. The Partnership Steering Group comprises officials and elected members from Gwynedd Council and the Snowdonia National Park Authority, representatives from Cadw, the National Museum Wales, Bangor University, the Royal Commission on the Ancient and Historical Monuments of Wales, the National Trust, ICOMOS – UK, and representatives from the private sector. Elected members provide community representation. Quarry owners and managers of key sites represent business interests.

Partnership Steering Group

The Partnership Steering Group is the strategic lead for a series of working groups, through which it receives specialist advice from dedicated experts in heritage conservation, global heritage, economic regeneration, and cultural tourism.

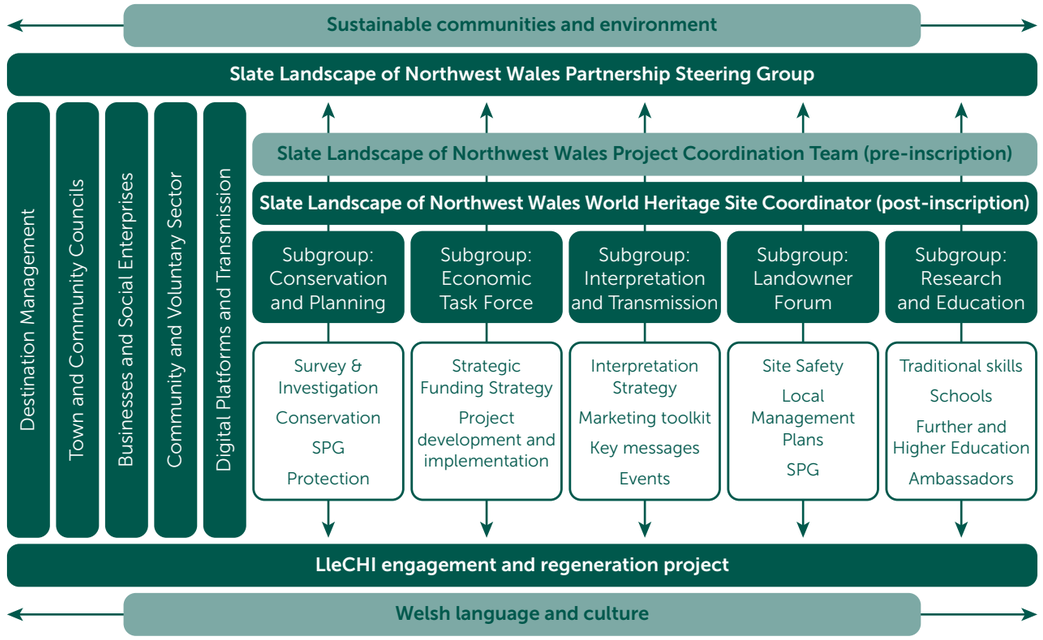


Figure 5.2. Nominated Property management structure organogram.

The Partnership Steering Group began meeting in 2009, and operates according to principles agreed in a Memorandum of Understanding (MOU) which was signed by all parties in 2016. The principles include:

- Work to promote good working relations for the mutual benefit of all parties and other stakeholders who will assist in the development of a full World Heritage Site nomination.
- Proactively collaborate to agree the strategic and operational direction of the Nomination.
- Work in an open and transparent partnership to share expertise and to undertake the key tasks.
- Commit to working in partnership on the identification, development, implementation and closure of collaborative projects relating to the Nomination.
- Share relevant information and intelligence relating to the Nomination which might impact on the partner organisations and on the Nomination itself; including lessons to be learnt and best practise.

As well as having overall responsibility for implementing *The Slate Landscape of Northwest Wales Property Management Plan*, the Partnership Steering Group will monitor progress against the actions set out in the plan, and ensure all necessary documentation is submitted to UNESCO. All members of the Partnership Steering Group have invested resources in developing the nomination, and each remains committed to providing support for the implementation of the Plan in the event of a successful inscription.

Figure 5.3. Members of the Partnership Steering Group meeting in Penrhyn Quarry.

Coordination Team

The Partnership Steering Group oversees a Coordination Team that reports on a quarterly basis. The Coordination Team comprises officers from bodies in the Partnership Steering Group, including Gwynedd Council, Cadw and the Royal Commission on the Ancient and Historical Monuments of Wales, along with specialist consultants and external advisors. The Coordination Team has been responsible for the preparation and delivery of the nomination dossier and management plan, landowner liaison, public engagement and other measures. It is envisaged that much of this work will become the responsibility of an appointed World Heritage Site Coordinator in the event of a successful inscription.

Subgroups

A series of themed subgroups have been established, comprising representatives from relevant Partner and stakeholder organisations, and specialist individuals, to take forward the delivery of specific actions set out in the management plan. All subgroups make use of expert advice from consultants and/or critical friends as required. The subgroups will continue to function in the event of a successful inscription, with the option to revise their purpose or create additional subgroups as required.

The Slate Landscape of Northwest Wales Property Management Plan

The Management Plan is a living stand-alone document. It covers the period 2020-2030 and will be reviewed in 2025. Five Themes lie at its heart, setting out how the World Heritage Site will be managed, cared for, developed and enjoyed, and its meaning conveyed.

The Plan is divided into eight sections:

- Section 1 is an introduction to World Heritage Sites, the Nominated Property and the role of the Plan.
- Section 2 provides the Justification for Inscription including the proposed Statement of Outstanding Universal Value, Justification for Criteria, Statements of Integrity and Authenticity and Requirements for Protection and Management. It also describes the attributes of the Nominated Property.
- Section 3 sets out the Partnership's vision for the Nominated property.
- Section 4 relates to Theme 1: Governance and Management, and explains how the Plan will be effectively, openly and transparently delivered.
- Section 5 relates to Theme 2: Caring for *The Slate Landscape of Northwest Wales*, and sets out how the proposed Outstanding Universal Value of the World Heritage Site will be effectively protected, conserved and managed.
- Section 6 relates to Theme 3: Sustainable Development of *The Slate Landscape of Northwest Wales* to ensure that the World heritage Site will help to sustain a living, thriving landscape.
- Section 7 relates to Theme 4: Enjoying *The Slate Landscape of Northwest Wales*, and shows how the World Heritage Site can be enjoyed, experienced and understood by both local residents and visitors.
- Section 8 relates to Theme 5: Learning about *The Slate Landscape of Northwest Wales*, and sets out options to ensure that the World Heritage Site becomes a focus for shared learning and research at all levels.

The Plan includes an Action Plan. Each Theme sets out a series of Objectives and Principles under which the actions sit. Each action has an appointed lead and timescale. There are 16 Objectives across the whole Plan:

Local Management Plans

The Management Plan establishes the over-arching strategies and mechanisms by which the Nominated Property will be managed. At a local level, this will be implemented through Local Management Plans, which will set out the significance of each Element, its contribution to the proposed Outstanding Universal Value, an assessment of its current condition and how its cultural meaning will be preserved in any future use, management, alteration or repair.

These plans are currently in preparation, through a process of collaborative discussion between the Local Authorities, members of the Partnership Steering Group and site owners. They underpin the Management Plan and set out how relevant actions will be delivered in each area. They will be completed and operational within the timeline for completion of the inscription process.

Slate Landscape of Northwest Wales Supplementary Planning Guidance

The *Slate Landscape of Northwest Wales* Joint Supplementary Planning Guidance will provide more detailed guidance on the relevant planning policies in Gwynedd and Snowdonia National Park Authority for development within and outside the Nominated Property.

Figure 5.4. Plans and guidance relating to the Nominated Property.

Community Engagement and the Consultation Process

Community engagement has been central to the development of the Nomination.

The Consultation Process for the Nomination

The process of developing the Nomination has included stakeholder and partner engagement, along with a seven-week public consultation on the Management Plan. This consultation was an opportunity for residents, businesses, organisations, individuals and interested parties to have their say on the nomination and the draft Management Plan. Every town and community council within the Nominated Property received a copy of the draft *Slate Landscape of Northwest Wales Property Management Plan* along with an accompanying questionnaire; hard copies were made available in every library in Gwynedd and Gwynedd Council area offices and it was available on the Gwynedd Council website (**www.gwynedd.llyw.cymru/managementplan**) from 14 August to 30 September. All documents were available in Welsh and English, and the consultation was widely promoted on the Gwynedd Council and Nomination website, in local and regional newspapers, by social media and a short promotional video created by the Wales Slate Youth Ambassadors. Eight community drop-in afternoons and presentation evenings were held across the Nominated Property.

63 full questionnaire responses were received (in which the respondents answered every question), of which 93.6% stated they were supportive or very supportive of developing the World Heritage Site nomination and 95.5% understood or fully understood what is important about the slate landscape. 157 questionnaires were partially completed, with 88.7% noting that they were supportive or very supportive of developing the World Heritage Site nomination, 93.9% noting that they understood the importance of the slate landscape, and 78.7% understood how the slate landscape would be managed in the future. Individual responses were also received from landowners, businesses, national bodies and individuals.

The final version of the Management Plan has drawn on this consultation.

Other Community Events

Community events have taken place throughout the development of the nomination, offering an opportunity to share information about the nomination, the significance of the slate landscape, and to gain input and opinions from attendees.

Examples of community events include:

- An original drama production by the young people of the Nantlle Valley (Component Part 3) based on the past, present and future of the valley (November 2019).
- A week long Slate Festival in Blaenau Ffestiniog (Component Part 5) where various activities were organised by local organisations and individuals to celebrate their slate culture and the development of the Nomination. The Festival included gigs, lectures, film screenings, children's actives, a parade, guided walks and access to sites usually closed to the public (July 2018).
- Business breakfast events across the Nominated Property where individuals and businesses are invited to key locations within the region for breakfast, presentations, networking and tours. To date. events have taken place at Pant Du vineyard, the National Slate Museum, Zip World and the Talyllyn Railway (ongoing).
- Merched Chwarel [Slate Women] holding underground singing sessions in various locations across the Nominated Property (Spring 2019)

Figure 5.5. *Merched Chwarel* [Slate Women] *Canu Chwarel* [singing slate] at Llechwedd (Component Part 5).

The LleCHI project

Further work in the Nominated Property and surrounding areas is taking place under Gwynedd Council and partners' LleCHI regeneration banner ([YOUR place] which also translates in Welsh as [Slate]). LleCHI is a National Lottery Heritage Fund project and involves cultural events, destination improvements, work with young people, conservation projects, community engagement and interpretation.

Current projects include a small grant fund to facilitate cultural projects and events within and adjacent to the Nominated Property. Projects supported to date include the installation of lamppost banners depicting local culture and language in Penygroes (adjacent to Component Part 3) and an event in Deiniolen (Component Part 2) commemorating 50 years since the closure of the Dinorwig Quarry. Applications are being considered for a mural in Blaenau Ffestiniog (Component Part 5), the creation of a tapestry in Llanberis (adjacent to Component Part 2) and a school film project in Bethesda (Component Part 1).

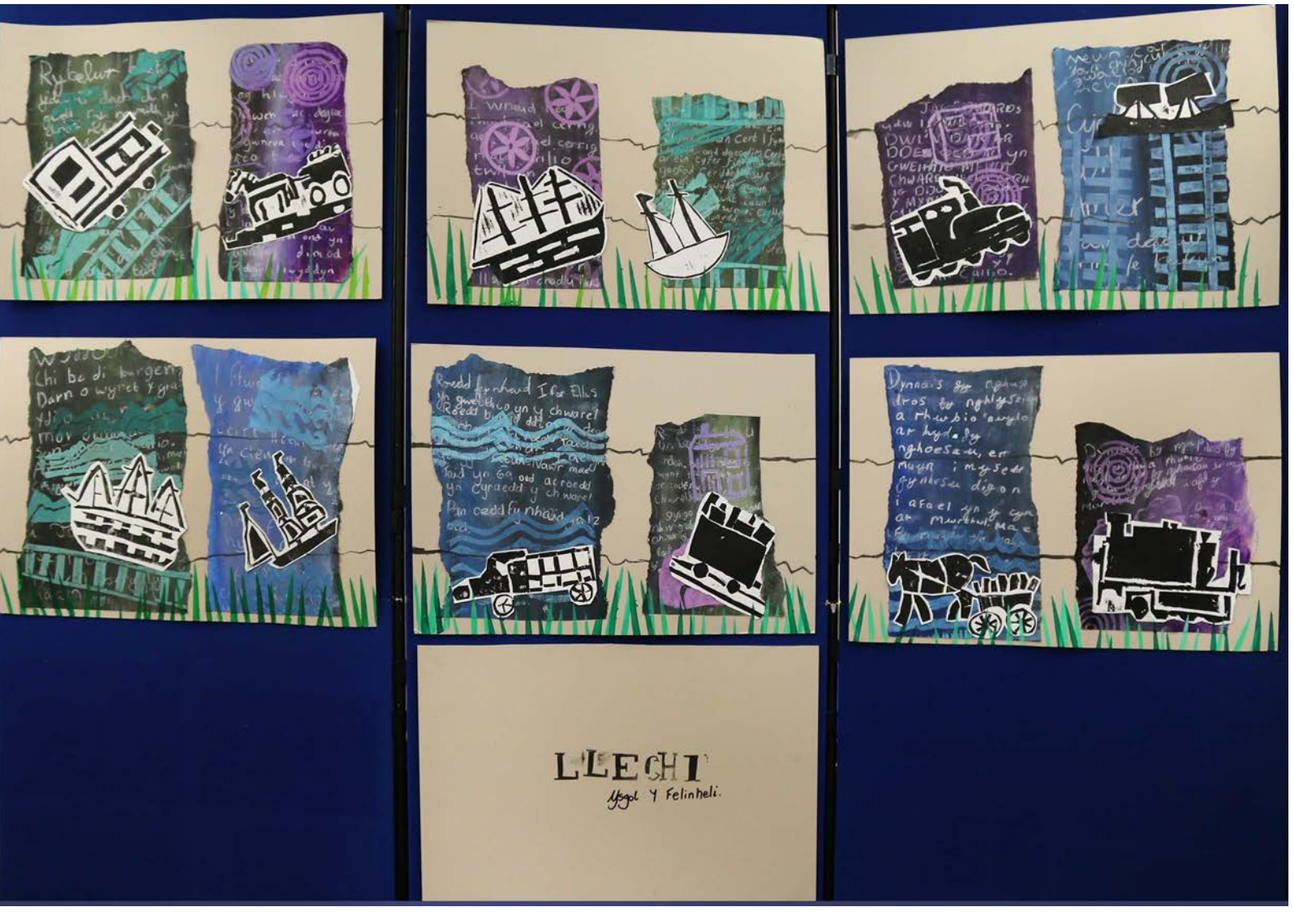


Figure 5.6. This artwork has been produced by primary school ambassadors from Ysgol y Felinheli primary as part of the National Lottery Heritage Funded Great Place Scheme LleCHI in conjunction with local artist Eleri Jones and the Gwynedd Archive Service.

Figure 5.7. Youth Ambassadors have come forward to tell the slate story to a new generation.

An Ambassadors Programme has also been rolled out across Gwynedd. Primary school ambassadors undertake arts workshops with local artists underpinned by information sessions hosted by the Project Coordination Team and the Archives service, the artwork is then on display in the local communities. Six primary schools have been part of the programme to date, totalling approximately 180 children, with plans to roll out the project to more schools before the end of 2021. Youth Ambassadors are secondary school children, with over 700 young people given the opportunity to apply to the scheme; 14 were selected from across the Nominated Property and have been offered various opportunities including visits to sites across the Nominated property and volunteering with partners such as the National Slate Museum. The Ambassadors has also had the opportunity to contribute to the development of key documents such as the *Interpretation Strategy* and *The Slate Landscape of Northwest Wales Property Management Plan*. The Youth Ambassador scheme is a rolling programme running for a period of 12 months at a time.

5.f Sources and levels of finance

Management of the Nominated Property will build on the existing governance and structures, as outlined in **5.e** to ensure the delivery of *The Slate Landscape of Northwest Wales Property Management Plan*.

The development of a World Heritage nomination has been a priority for Gwynedd Council for the past 10 years and a strategic priority since 2013. This strategic priority has brought with it core local authority funding sufficient to develop the Nomination. In addition, a two-year funding commitment by Welsh Government through Cadw, along with contributions from partners and stakeholders has ensured that a comprehensive and robust Nomination has been developed.

The Economic Task Force subgroup has also been successful in securing grant funding of over £500,000 from various sources including the National Lottery Heritage Fund, Europe / Welsh Government via the Regional Development Programme and the Rural Community Development Fund, and Snowdonia National Park Authority, to carry out various community and business engagement projects and activities for key destinations within the Nominated Property. A £500,000 interest-free loan scheme through the Welsh Government Town Centre Loans programme has also been secured to support the regeneration and development of key settlements within and adjacent to the Nominated Property, including Bethesda in Component Part 1 and Penygroes, adjacent to Component Part 3.

Gwynedd Council intends to commission a study to identify future income for the Nominated Property.

In terms of balancing resources and needs, Gwynedd Council considers the World Heritage site coordinator model best suited for the long-term management of the Nominated Property. In the event of a successful inscription, the coordinator will initially sit within the Economy and Community Department of Gwynedd Council.

Gwynedd Council is considering the establishment of an independent heritage trust for the region which could include responsibility for the World Heritage Site as part of its objectives. Gwynedd Council is also examining potential sources of income from tourism in the region; options include visitor giving and visitor levies to support the Nominated Property.

Table 5.5 Annual Funding (pound sterling) of the Nominated property.
Figures in red are estimates and subject to inscription.

	2017	2018	2019	2020	2021	2022	2023
Gwynedd Council	90,000	90,000	90,000	105,000	30,000	30,000	30,000
Cadw			35,000	25,000	20,000	20,000	20,000
External Grants		30,000	123,750	253,750	87,000		
External Loans			500,000				

5.g Sources of expertise and training in conservation and management techniques

The required sources of expertise and training in conservation and management techniques exist within Gwynedd to ensure the long-term protection of the proposed Outstanding Universal Value of the Nominated Property, with support from national authorities and organisations. This has been confirmed throughout the nomination process, and will become stronger in the event of a successful inscription. The following organisations host a number of specialist roles:

Gwynedd Council has officers with expertise contributing to the conservation and management of the Nominated Property. These roles cover responsibility for project management, planning, mineral planning, conservation, biodiversity, and archives. Gwynedd Council also have expertise in regeneration and economic development, which will be key to the sustainable development of the nominated area. The Council has vast experience in developing, funding, implementing and managing both revenue and capital projects from small-scale local projects to very large-scale regional programmes. Recent projects include the successful renovation of the Dinorwig Quarry Hospital (Element 2.10) which included both building improvements and interpretation work, the town centre regeneration of Blaenau Ffestiniog (Element 5.6) including significant capital infrastructure works and interpretation, and successful marketing campaigns as part of implementing Visit Wales' strategic priorities. Gwynedd Council also has administrative and financial departments on hand to assist as necessary.

Snowdonia National Park Authority has a wide range of roles which supports its work across the National Park. This includes an archaeologist, planning, conservation and biodiversity advisors, and expertise in heritage management, tourism and culture. The Authority also owns Plas Tan y Bwlch (Element 5.7), its residential study centre, offering courses on the history and archaeology of the region's slate industry, its quarries, settlements and transport routes. The knowledge and expertise derived from these courses has been instrumental to developing the Nomination process, and to informing conservation of the historic assets of the Nominated Property.

Cadw is the Welsh Government's historic environment service. Cadw's mission statement is to work for an accessible and well-protected historic environment for Wales. Cadw employs specialist archaeologists, historians, conservation surveyors and heritage managers with a wealth of professional experience and skills in the conservation and management of historic assets of all types, and who provide formal advice and guidance on managing the historic environment at both a strategic and historic asset level. Cadw manages 130 historic properties across Wales including the properties comprising the *Castles and Town Walls of King Edward in Gwynedd* World Heritage Site (UK 374) and provides guidance for Local Authorities on the management of World Heritage Sites in Wales. Cadw is responsible for designating historic assets of national importance and provides financial support to owners and site managers for conservation projects through its Historic Buildings and Ancient Monuments grants programmes. Cadw also supports provision of broader historic environment advisory services through its funding of four regional Archaeological Trusts and other third sector advisory bodies.

The Royal Commission on the Ancient and Historical Monuments of Wales is the investigation body and National Archive for the historic environment in Wales.

It has a survey and investigation section responsible for recording and interpreting sites and monuments in Wales and provides training and advice on the management and conservation of the historic environment. The Royal Commission also curates the National Monuments Record of Wales, a National Archive with Archive Service Accreditation that defines good practice and agreed standards for archive services in the UK, and is national home for digital archaeological archives. The archive holds a unique collection of photographs, maps, images, publications and reports on Wales's historic environment.

The Gwynedd Archaeological Trust is a team of professional archaeologists who provide expert curatorial advice on the management and conservation of Gwynedd's cultural and historic environment. The Trust curates the regional Historic Environment Record, one of the principal collections of archaeological records (both digital and hard copy information) relating to the Nominated Property.

The National Slate Museum (Element 2.5) is part of National Museum Wales, which has its own in-house historic machinery conservation team. As well as undertaking work on the historic slate-quarry machinery, including the operational V2 inclined plane, the turbine, water-wheel, shafting and mechanical saw-tables, they are also responsible for work at the Big Pit National Coal Museum in the World Heritage *Blaenavon Industrial Landscape* as well as the National Woollen Museum at Drefach Felindre.

The National Trust as the owner of Penrhyn Castle (Element 1.7) employs curators advise on authenticity and conservers who are responsible for the care of items. Management and conservation of the park is advised by a dedicated gardens department. Cleaning, oiling and greasing of the items in the Industrial Railway Museum is carried out by volunteers under Trust supervision.

The **Ffestiniog Railway** (Element 5.9) and the **Talyllyn Railway** (Element 6.4) both have long-standing experience in the conservation and management of historic machinery, buildings and other structures. The Ffestiniog Railway has carried out conservation projects for National Museum Wales, the National Trust, the East Anglian Transport Museum and London Transport Museum, and provides training and apprenticeships in historic conservation and traditional engineering skills.

Further work in the Nominated Property and surrounding areas is taking place under Gwynedd Council and partners' LleCHI regeneration banner, and includes cultural events, destination improvements, work with young people, conservation projects, community engagement and interpretation. Current projects relevant to conservation and management include:

Traditional Skills Development: a partnership approach to identify opportunities to upskill the existing skilled workforce in the region to work sensitively on traditional buildings (Gwynedd has the highest percentage of pre-1919 buildings in the UK). This project also involves raising awareness amongst communities on the importance of appropriate and sensitive maintenance and conservation of traditional buildings. Breedon Group plc, owners of Penrhyn Slate Quarry (Element 1.1) have established an apprenticeship scheme to encourage new workers into the quarrying industry, and the Ffestiniog Railway (Element 5.9) have a successful apprenticeship scheme working on traditional engineering skills. A community-run skills fair will be held in Blaenau Ffestiniog in 2020, supported by the Tywi Centre (Traditional Building Centre based in West Wales) and other partners such as housing associations, Cadw, further education colleges and local businesses.

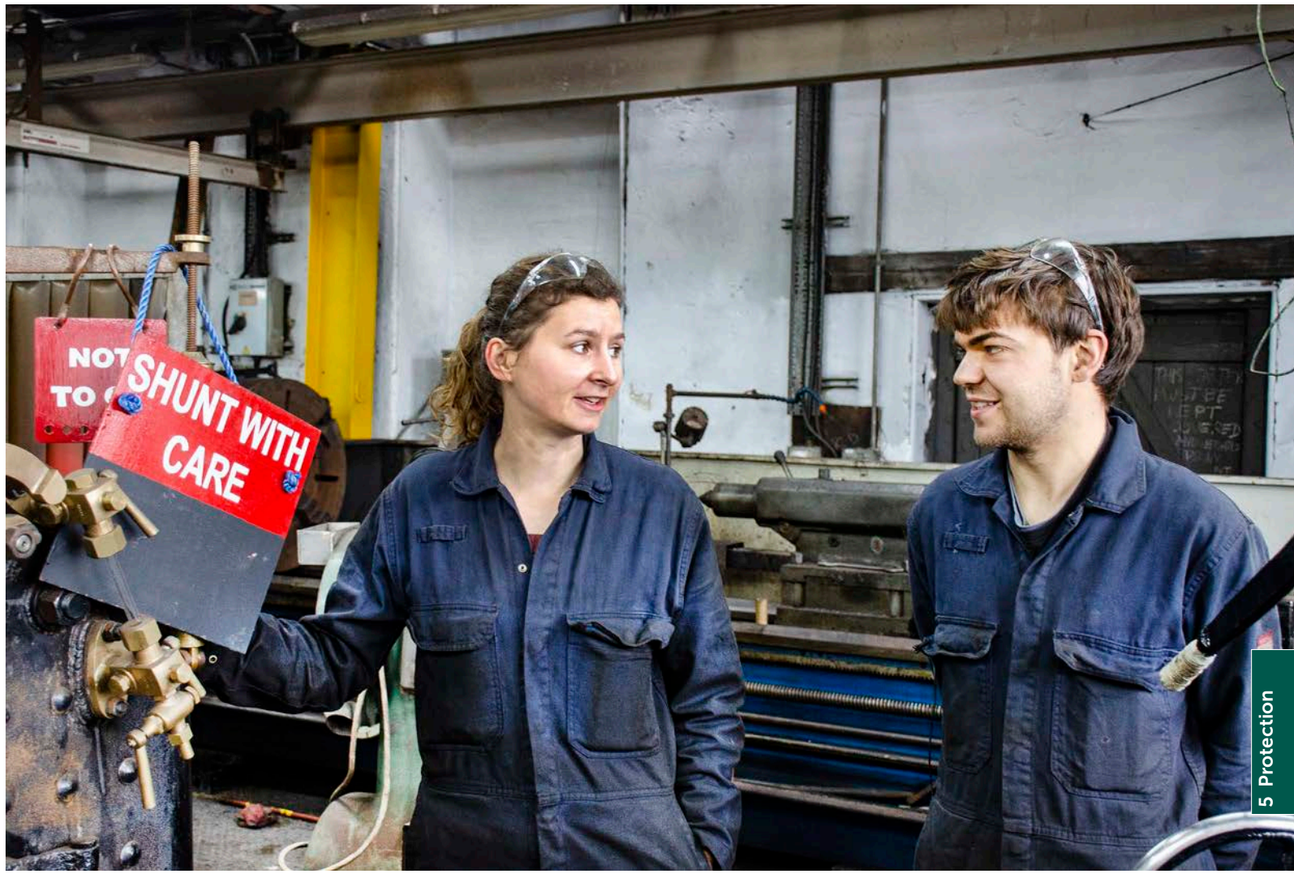


Figure 5.8. National Lottery Heritage Fund trainees at the Ffestiniog Railway.

Community Regeneration: inhabitants in each of the settlements within the Nominated Property have been involved in the creation of *Community Destination Plans*, where the strategic, conservation, tourism and community aspirations of the settlement are identified and prioritised within a community strategy. Plans were completed in late 2019, and Community Boards led by Gwynedd Council, with key stakeholders, have subsequently been established in the settlements. The Community Boards are given the responsibility of prioritising and implementing regeneration ideas identified within the plans. Work is underway in Blaenau Ffestiniog (Element 5.6) and Bethesda (Element 1.6) to implement priorities, with other communities following early in 2020. Agreed priority projects will be implemented by 2021.

5.h Visitor facilities and infrastructure

The Nominated Property is served by a well-established visitor infrastructure. There is currently no overall guidebook for the Nominated Property; however, the Nomination website **www.llechi.cymru** introduces visitors to this cultural landscape, including downloadable maps and other resources. It is also showcased on Visit Snowdonia, the destination website for the area **https://www.visitsnowdonia.info/heritage-and-culture**. Opportunities have been identified to further develop these and other virtual access platforms.

The Nominated Property will be presented and promoted through a *Visitor Management and Interpretation Plan.* This, along with a marketing toolkit and set of key messages, will improve the visitor experience by providing high-quality visits across the Nominated Property, and by encouraging visitors to 'follow the slate story' across the region, moving them away from the established honey-pot locations to less-discovered areas. Close co-operation between Gwynedd Council and site owners will ensure a high-quality visitor experience worthy of a World Heritage Site.

The *Visitor Management and Interpretation Plan* also considers the provision of safe and appropriate access across the property. Relict quarries can be extremely dangerous places and could cause significant injury or death if they are not respected and understood. Key messages will communicate the importance of safety when visiting some of the more remote and inhospitable areas of the landscape, and highlight those parts of the Nominated Property on private land, and not openly accessible to the public without prior consent of the landowner. There are however a large number of sites and places within the Nominated Property which offer a visitor experience, and safe and managed access to the slate landscape.

Section **5.i** provides further detail on the *Visitor Management and Interpretation Plan*.

A bed-stock survey undertaken by Gwynedd Council during 2018-19 found that 3,957 properties offer accommodation in Gwynedd. A breakdown of this accommodation within the key destinations of the Nominated Property indicates that 8.7% of properties (346) were serviced accommodation, and 91.3% were un-serviced accommodation (3,611). Of the un-serviced, 67.1% (2,424) are Self Catering, 10.1% (366) Caravans and Camping and 1.4% (52) are Hostels / Bunkhouses / Campus Accommodation and 0.7% (24) are other types of accommodation. A further 745 properties were also advertised on Airbnb.

Existing visitor infrastructure across the Nominated Property includes:

Component Part 1. Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn

Penrhyn Castle and Park (Element 1.7) are managed by the National Trust as a heritage attraction. The Castle is home to the Trust's Industrial Railway Museum which includes items from the region's slate industry. There is an activity and events programme, and café and visitor facilities. The attraction is open from March until October, has good road access and parking, along with disabled access to the site.

The village of Bethesda (Element 1.6) is situated along a major transport route, the A5 road, and is accessible by public transport. The Lôn Las Ogwen, a cycle route which forms part of Wales' National Cycle Network, also links Bethesda with other elements of this Component Part, including Port Penrhyn (Element 1.4), the course of the quarry railroad and railway (Element 1.3), Felin Fawr slate-slab mill (Element 1.2) and Penrhyn Slate Quarry (Element 1.1). This cycle route also forms part of the Snowdonia Slate Trail **https://www.snowdoniaslatetrail.org/home.html**, a popular 133-kilometre-long path that begins at Port Penrhyn and alongside the elements listed above also climbs out of the Ogwen Valley to Mynydd Llandygai (Element 1.7).

Zip World is a visitor attraction at Penrhyn Slate Quarry. Nearly all of its facilities lie adjacent to the Nominated Property, aside from a section of zip-line, which offers an aerial prospect of the relict quarry landscape. Facilities include a newly constructed café and restaurant that provides views across the main pit towards the best-preserved section of the historic quarry galleries. Quarry lorry tours and Quarry Carts provide an opportunity for visitors to experience and learn more about the slate landscape. Events such as music festivals are also held here.

The city of Bangor, in the wider protected area immediately adjacent to this Component Part, is provided with hotels, meeting spaces, a Museum and an Arts Centre, a well as all the resources of the University, including its Pontio Arts and Innovation Centre.

Component Part 2. Dinorwig Slate Quarry Mountain Landscape

Visitor facilities for this Component Part, including parking, toilets and cafes, are extensive. Most are located in Llanberis, a major tourism destination since the eighteenth century, which is set in spectacular scenery at the foot of Snowdon, Wales and England's highest mountain.

The National Slate Museum (Element 2.5), part of National Museum Wales, is open all year round and has good disabled access. The museum operates the restored V2 inclined plane (Element 2.4), which shows how this typical slate quarry technology functioned and offers popular demonstrations of slate-splitting. Plans are being developed to enhance the Museum's interpretation and visitor facilities.

The Dinorwig Slate Quarry Hospital museum (Element 2.10) interprets the history of health-care in the industry, and the Llanberis Lake Railway offers a visitor experience on trains hauled by slate-quarry steam locomotives along the former Dinorwig Slate Quarry Railway (Element 2.7)

324 hectares of this Component Part is managed as Padarn Country Park by Gwynedd Council. The Snowdonia Slate Trail passes through, or immediately adjacent to, Elements 2.4, 2.5, 2.8 and 2.10. The greater part of the quarry landform (Element 2.1) is in private land and has no visitor access, though a public footpath into the quarry does provide key viewpoints and enables visitors to appreciate its scale and form.

First Hydro-Engie operate Mynydd Gwerfu / Electric Mountain, a visitor centre in the Nominated Property. This provides interpretation of the hydro-electric power plant within Dinorwig Slate Quarry. Refurbishment is currently being undertaken to create an up-to-date visitor facility with new interpretation. It is due to reopen in 2020.

This Component Part and the wider protected landscape adjacent to it are substantially visited by tourists, particularly during the spring and summer months – the majority of whom climb Snowdon (over 500,000 per year). There is sufficient car-parking to cater for current and projected visitor numbers, and discussions are under way regarding the development and increase in shuttle bus services into and across the area.

Figure 5.9. Demonstrations of slate-splitting at the National Slate Museum are popular with visitors.

Component Part 3. Nantlle Valley Slate Quarry Landscape

The Nantlle Component Part has not traditionally been a visitor destination; however recent developments are responding to this gap in provision. A vineyard has been opened adjacent to the Component Part and includes a café and terrace to view the landscape. The vineyard also makes use of slate waste to keep the roots of the vines at a consistently warm temperature. Two cafés with some interpretation have recently opened, again within the wider protected area – one of which is located in the old Nantlle Railway station at Penygroes – Yr Orsaf [The Station]. At Dorothea slate quarry (Element 3.3), regulated diving takes place in the quarry pit on a short-term agreement.

The whole of this quarry landscape is a popular venue for walkers, and the Snowdonia Slate Trail passes through Dorothea (Elements 3.3-4), as well as Pen y Bryn / Cloddfa'r Lôn Slate Quarry (Elements 3.5-6), along the Nantlle railway (Element 3.9) and through Nantlle village (Element 3.10), where a quarrymen's barracks has been conserved as a shop and community centre.

Existing facilities are currently inadequate for any significant escalation in visitor numbers. The considerable potential for adaptive re-use of quarry buildings and historic dwellings in this Component Part will enable it to manage, accommodate and service, and benefit from, an increase in visitor-numbers.

Component Part 4. Gorseddau and Prince of Wales Slate Quarries, Railways and Mill

The Gorseddau and Prince of Wales slate quarries (Elements 4.1-2), their associated railways (Element 4.4) and the Treforys village (Element 4.5) are relict properties partly in open land and fully accessible along marked footpaths. This landscape is not suitable for mass tourism which would adversely affect its sense of remoteness and seclusion within the Snowdonia National Park.

Ynysypandy slate-slab mill (Element 4.3) has some minimal interpretation and the Snowdonia National Park Authority has recently commissioned a study to examine improving visitor and interpretation facilities on site.

Component Part 5. Ffestiniog: its Slate Mines and Quarries, 'city of slates' and Railway to Porthmadog

There is currently minimal tourist accommodation in the town of Blaenau Ffestiniog (Element 5.6), though Porthmadog and other settlements immediately adjacent to the Nominated Property are better served. Blaenau Ffestiniog can expect to face an increased visitor foot-fall, given that it lies on the 'Cambrian Way' (the main north-south trunk road which forms part of the new Welsh Government Transport Strategy *One Wales: Connecting the Nation*), the branch-line railway from Llandudno Junction, the Ffestiniog Railway (Element 5.9), and the Snowdonia Slate Trail. An 'Urban Walk' has been instituted which takes in some of the notable sites of the town and there is further interpretation of the town's heritage in the former railway station and public convenience.

Llechwedd Quarry, Antur Stiniog, Zip World and Go Below offer a variety of experiences for visitors, including an hotel and underground and over-ground heritage tours (Elements 5.1-2) within the Nominated Property, and adventure activities, catering and glamping adjacent to it. For all activities there is sufficient

parking, and Llechwedd Quarry, Antur Stiniog and Zip World are accessible from a main trunk road.

Plas Tan y Bwlch (Element 5.7), the Snowdonia National Park's residential study centre has parking and accommodation, is fully equipped with conference and lecture rooms, and audio-visual facilities.

The Ffestiniog Railway (Element 5.9) operates visitor facilities with disabled access on trains and at its main stations, and interprets its history through signage and publications. The Maritime Museum in Porthmadog Harbour (Element 5.10) provides interpretation on the maritime history of the town and area with a clear focus on the export of slate. A public footpath leads to Tyddyn Isa quay (Element 5.8).

Figure 5.10. Interpretation panel on the 'Urban Walk' through Blaenau Ffestiniog (Component Part 5).

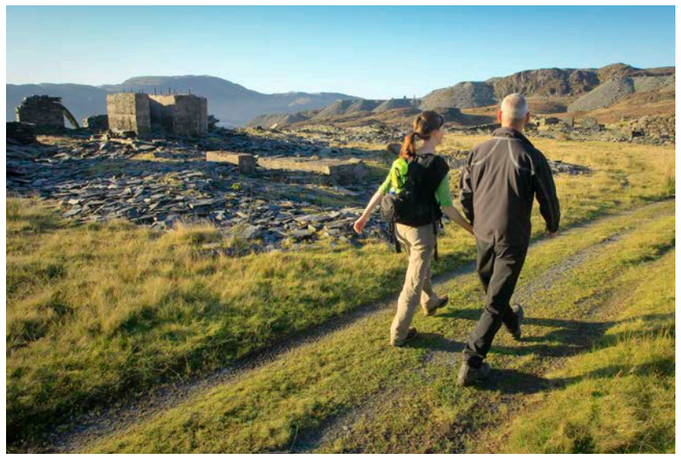


Figure 5.11. Walking the Snowdonia Slate Trail in the mountain landscape of Snowdonia, The trail passes through four Component Parts of the Nominated Property.

Component Part 6. Bryneglwys Slate Quarry, Abergynolwyn Village and the Talyllyn Railway

The Talyllyn Railway (Element 6.4) operates visitor facilities with disabled access on trains and at its main stations. It is developing plans to expand facilities at Abergynolwyn (Element 6.3), where the station lies at some distance from the village and its facilities which includes a café, toilets and parking. This would offer passengers an alternative venue for joining the train. The Talyllyn's Tywyn terminus, a seaside resort with tourism facilities, is home to the Narrow Gauge Railway Museum, which interprets this distinctive technology in the context of Wales and the world.

Bryneglwys Quarry (Element 6.1) is accessible to visitors through a marked footpath, and also has interpretation panels providing information on the quarry.

5.i Policies and programmes related to the presentation and promotion of the Property

The Nominated Property will be presented and promoted through the following plans and strategies:

- A *Visitor Management and Interpretation Plan* which along with a marketing toolkit and set of key messages is targeted towards visitors to the Nominated property.
- Gwynedd's *Destination Management Plan 2013-2020* which ensures tourism-providers respond to the needs and expectations of the visitor and local communities alike.
- A *Community Engagement Strategy* aimed at Gwynedd residents.
- A *Research Strategy* which engages with the academic community.

Interpretation Plan, Marketing Toolkit and Key Messages

Gwynedd Council's *Visitor Management and Interpretation Plan* is informed by *The ICOMOS Charter for the Interpretation and Presentation of Cultural Heritage Sites*, and has seven key objectives:

1. Facilitate understanding and appreciation of cultural heritage sites and foster public awareness and engagement in the need for their protection and conservation.
2. Communicate the meaning of cultural heritage sites to a range of audiences through careful, documented recognition of significance, through accepted scientific and scholarly methods as well as from living cultural traditions.
3. Safeguard the tangible and intangible values of cultural heritage sites in their natural and cultural settings and social contexts.
4. Respect the authenticity of cultural heritage sites, by communicating the significance of their historic fabric and cultural values and protecting them from the adverse impact of intrusive interpretive infrastructure, visitor pressure, inaccurate or inappropriate interpretation.
5. Contribute to the sustainable conservation of cultural heritage sites, through promoting public understanding of, and participation in, ongoing conservation efforts, ensuring long-term maintenance of the interpretive infrastructure and regular review of its interpretive contents.
6. Encourage inclusiveness in the interpretation of cultural heritage sites, by facilitating the involvement of stakeholders and associated communities in the development and implementation of interpretive programmes.
7. Develop technical and professional guidelines for heritage interpretation and presentation, including technologies, research, and training.

The implementation of the this Plan, along with a marketing toolkit and key messages, will improve the visitor experience and provide high-quality visits across the Nominated Property. It will encourage visitors to 'follow the slate story' across the

region and aims to move visitors away from the traditional honey-pot areas to less discovered areas. This will be achieved with the full support and guidance of site owners and managers.

Enjoyment of the Nominated Property will be achieved through both physical and virtual access. Interpretation of the 'slate story' has been developed around a model of 'Hubs', 'Sprockets' and 'Spokes', whereby the larger 'Hub' sites act as conduits to draw visitors to the area and encourage them to visit the medium-sized 'Sprocket' and smaller 'Spoke' sites. This model will support understanding, integration and transmission of the proposed Outstanding Universal Value, and will work to disperse visitors across the region and Nominated Property. By 'following the slate story' across the different 'hubs', 'sprockets' and 'spokes', visitors will gain a full understanding of the identified themes. On and off-line information will form part of the offer, and central products will be available to support partners and stakeholders to transmit information to visitors, including standardised text and an image library, thus ensuring historical accuracy and quality standards.

In the event of a successful inscription, each 'Hub', 'Sprocket' and 'Spoke' will reference the World Heritage inscription and will adopt a shared interpretation strategy and approach to marketing. Each will outline their contribution and importance to the World Heritage Site. This will ensure a consistent approach to the 'slate story' and will communicate how each Component Part and individual Element contribute to the proposed Outstanding Universal Value.

Figure 5.12. The Nominated Property visitor experience model.

It is also recognised that some sites (mainly 'Spokes') are not physically accessible due to safety concerns and private ownership. These still form an important part of the 'slate story' and will be showcased through alternative methods such digital platforms offering virtual access, and using accessible sites to tell their story.

Destination Management Plan

Gwynedd's *Destination Management Plan 2013-2020* prioritises themes to ensure that the tourist industry in Gwynedd continues to thrive in a sustainable manner into the future. Focus for the Nominated Property is the regeneration of the settlements through their heritage and culture, and will concentrate on the visitor experience, public places, accommodation, customer service and marketing.

Progress is being made under the LleCHI regeneration banner, whereby a series of *Community Destination Plans* are being developed across the settlements within and adjacent to the Nominated property. In consultation with the residents and businessess, the plans identify key priorities for regeneration and could include the renovation of key buildings, amenities, public art, creating links between sites or attractions and settlements, and interpretation. An important element of this work is the up-skilling of businesses and communities in the heritage of their locality to become ambassadors to improve customer service and authentic information provision.

Community Engagement

A key ambition in developing the Nomination is to promote economic and social regeneration across the region, and every effort has been made by the Partnership Steering Group through its *Community Engagement Strategy* to inform and involve local communities and businesses in the nomination process. Presentations have been given across local communities and at events, and 'business breakfasts' have been held for regional business leaders to meet and discuss the commercial potential of the Nominated Property. These local businesses have been heavily involved in the drafting of the *Visitor Management and Interpretation Plan.*

The Partnership Steering Group has also supported community-led events and activities to raise awareness, understanding and pride in the Nominated Property, one example being the week- long Slate Festival in Blaenau Ffestiniog in July 2018.

Figure 5.13. A 'business breakfast' where regional business leaders meet to discuss the commercial potential of the Nominated Property.

Research

Historical research and archaeological investigation have been central to understanding of *The Slate Landscape of Northwest Wales* long before the Partnership began the nomination process. Archaeological investigation has been carried out by numerous organisations and groups including participants on practical courses in industrial archaeology that have been held since 1972 at the Snowdonia National Park Authorities residential study centre at Plas Tan y Bwlch (Element 5.8). Authoritative studies of the industry have also been published, including *Welsh Slate. Archaeology and History of an Industry*, by the Royal Commission on the Ancient and Historical Monuments of Wales in 2015.

The Partnership Steering Group will establish and promote a *Research Strategy* based on existing best practice with community groups, stakeholders and education providers in order to develop and refine technical and professional guidelines for heritage interpretation and presentation, and to identify and fill gaps in academic understanding.

A programme of formal research and learning will contribute to the 'virtuous circle' of management by furthering historical and archaeological understanding in order both to inform conservation and management projects and to complement interpretation of the Nominated Property. It will also contribute to understanding the global dimension of the Nominated Property through evolving links with the Slate Valley Museum, Granville, New York State (USA), le Musée de l'Ardoise à Haut-Martelange/Schiefermusée Uerwermaartel (Luxembourg), and the European Quarry Landscapes Network. Wider themes include World Heritage Site and industrial landscape management, climate change, tourism impact.

Figure 5.14. The Snowdonia National Park Authorities residential study centre at Plas Tan y Bwlch (Element 5.8) offers regular weekend and week-long courses on aspects of *The Slate Landscape of Northwest Wales*, including community archaeology digs under professional supervision.

5.j Staffing levels and expertise

The majority of staff resources required to manage the Nominated Site will come from Gwynedd Council, with support from the wide variety of expertise available within the Partnership Steering Group and stakeholders, as outline below:

Gwynedd Council is the lead partner in developing the nomination, with expertise in planning, mineral planning, conservation, biodiversity, regeneration, archives, heritage, tourism and culture. It has been responsible for providing the core funding for developing the nomination, and has also secured external funding via grants and loans to implement and achieve various projects across the Nominated Property. There are currently 3.5 (full-time equivalent) staff working on the nomination within the Economy and Community Department, with officers from various other departments providing time and expertise as required. In the event of a successful inscription the World Heritage site co-ordinator will initially sit under the Economy and Community Department of Gwynedd Council.

The **Snowdonia National Park Authority** has its headquarters in Penrhyndeudraeth, and employs around 145 staff whose wide range of roles supports its work across the National Park. This includes an archaeologist, planning, conservation and biodiversity advisors, and expertise in heritage management, tourism and culture. The Authority have provided grant support through the Snowdonia Partnership Fund for community activities in and around Component Part 6, and have also part funded the Urban Character Studies for Component Part 3 and 6.

Cadw is the Welsh Government's historic environment service, employing around 250 people. The relevant staff for the Nominated Property are based in Nantgarw near Cardiff and Caernarfon in Gwynedd. Relevant staff include archaeologists, historians, conservation surveyors and heritage managers with a wealth of professional experience and skills in the conservation and management of historic assets of all types, and who provide formal advice and guidance on managing the historic environment at both a strategic and historic asset level. Cadw has provided core funding for the development of the Nomination and provides financial support to owners and site managers for conservation projects through its Historic Buildings and Ancient Monuments grants programmes. Cadw also supports provision of broader historic environment advisory services through its funding of four regional Archaeological Trusts and other third sector advisory bodies.

The **Royal Commission on the Ancient and Historical Monuments of Wales** have 36 staff based in Aberystwyth that includes specialists in recording, analysis and interpretation of the historic environment in Wales and through curation of the National Archive. The Royal Commission has provided staff support in the development of the nomination.

The **National Slate Museum**, an Element of Component Part 2, is based in Llanberis and employs 27 staff. It is part of National Museum Wales and has long-standing experience of community engagement, in particular oral history, archives and working with young people. The Museum also has expertise in the field of securing external funding for projects, and in managing large numbers of domestic and international visitors. It will be the main 'Hub' for the interpretation of the Nominated Property.

The **National Trust** owns Penrhyn Castle, located in Component Part 1. It has a core staff of 10 and over 100 volunteers. The wider organisation employs

approximately 600 staff and 5,000 volunteers accross the UK. The National Trust has expertise in the field of securing external funding for projects, and also in managing large numbers of domestic and international visitors. Penrhyn Castle will be a 'hub' for the interpretation of the Nominated Property.

Bangor University employs around 2000 staff and has approximately 11,000 students with a wide range of expertise. The University provides academic research skills for the Nomination and will play a key role in the developing Research Strategy for the Nominated Property.

Many **Stakeholders** have also contributed to the nomination via the various established subgroups. The skills and expertise of the subgroups are noted in the Table below and will continue in the event of a successful inscription. In addition to the recognised subgroups, there is further expertise available amongst the community and business sectors across the Nominated Property and wider protected area that contribute positively to the management and development of the Nominated Property. Local expertise will deliver an authentic experience for visitors demonstrating intangible heritage such as language and traditions.

Figure 5.15. Meeting of the Partnership Steering Group.

Table 5.6 Membership and expertise across the Partnership subgroups

Subgroup	Members	Expertise
Conservation and Planning subgroup	Local Planning Authorities, Cadw, Gwynedd Archaeological Trust, the Royal Commission on the Ancient and Historical Monuments of Wales, Gwynedd Council Biodiversity Officer, Snowdonia National Park archaeologist and conservation officers, the National Slate Museum, and Mineral Planning Service.	Historic environment expertise Planning and conservation Mineral planning Funding Designation Policy and legislation
Economic Task Force	Business stakeholders including quarry owners, tourism operators and landowners. Officers from Gwynedd Council Economy and Community Service, destination management representation, and Visit Wales officers	Business advice Funding Regeneration Sector engagement Destination management Strategic direction
Interpretation and Transmission subgroup	Marketing and communication officers from Gwynedd Council, Snowdonia National Park Authority, Cadw, the National Trust, attraction landowners and associated businesses who lie outside the Nomination Area	Marketing Communication Funding Events Visitor Management Destination Management Interpretation
Landowner Forum	Landowners within and outside of the Nominated Property	Development Regeneration Job creation Sector engagement Conservation and protection
Research and Education subgroup	Education providers, Gwynedd Council, Cadw, National Slate Museum, businesses and social enterprises	Education Sector engagement Funding Job creation International links Traditional skills School projects Training

The identified protection and management for the Nominated Property as outlined in sections **5.a** to **5.i** of this document, requires different resources for their implementation, as outlined in the table below:

Table 5.7
Resources for the Protection and Management of the Nominated Property

Protection / Management Method	*Responsibility*	*Resourcing*
Statutory and non-statutory designated assets and areas		
Scheduling	Cadw	In place
Listing	Cadw	In place
Conservation Areas	Local Planning Authorities	In place
Statutory Register of historic parks and gardens in Wales	Cadw	In place
Register of Landscapes of Historic Interest in Wales	Cadw	In place
National Park	Snowdonia National Park Authority	In place
Ecological Designations	Various (National resources Wales, Gwynedd Council, Snowdonia National Park Authority)	In place
Means of implementing protective measures		
Statutory assets	Cadw, Local Planning Authorities	In place
The Town and Country planning system	Welsh Government	In place
Gwynedd Local Development Plan	Gwynedd Council	In place
Snowdonia National Park Authority Local Development Plan	Snowdonia National Park Authority	In place
Heritage Impact Assessments	Developers	In place – Heritage architects, landscape architects, planning Officers, Cadw
Design and Access Statements	Developers	In place – Heritage architects, landscape architects, planning Officers
Environmental Impact Assessments	Developers	In place – Heritage architects, landscape architects, planning Officers, Natural Resources Wales
Existing Plans		
Gwynedd Council Plan 2018-2023	Gwynedd Council	In place – Elected members, Officers
Slate Landscape of Northwest Wales Economic Plan	Economic Task Force	In place – Businesses, landowners, social enterprises, partners, communities
Joint Local Development Plan and Eryri Local Development Plan	Local Planning Authorities	In place – Local Planning Authorities
Gwynedd Destination Management Plan 2013-2020	Destination Management Partnership	In place – Gwynedd Council, businesses, communities
Management		
Slate Landscape of Northwest Wales Management Plan	Partnership Steering Group	In place – Partners, businesses, communities
Local Conservation Management Plans	Landowners	In progress – Partners, landowners
Slate Landscape of Northwest Wales Supplementary Planning Guidance	Conservation and Planning Sub-group	In place – Partners, landowners

6 Monitoring

Figure 6.1. Cwmorthin Quarry is part of the Ffestiniog group in Component Part 5. Exotic trees and shrubs surround the quarry manager's residence, located at an elevation of 340 metres on the eastern edge of Cwmorthin Lake, backed by the tips of waste rock.

Implementation of a structured process for monitoring is critical to successful long-term management of the Nominated Property. Monitoring serves a number of purposes. It is a management tool for responsible individuals and organisations, providing feedback on the effectiveness of their work in conserving and protecting the proposed Outstanding Universal Value. Over time, it will measure:

- Changes, for better or worse, in each element, and in the Nominated Property as a whole.
- The effectiveness of the management system and governance of the Nominated Property, including the implementation of *The Slate Landscape of Northwest Wales Property Management Plan*.
- The sustainable use of the Nominated Property.
- The information needed for the monitoring activities of the World Heritage Committee, both for periodic reporting, carried out on a regular cycle, and for State of Conservation reports if problems arise.

Monitoring of the Nominated Property will be achieved through existing programmes undertaken at National and Local Government level and through newly established programmes that will be introduced in the event of Inscription.

At Element level, a range of monitoring practices are currently employed, which enable individual landowners and site-managers to operate and care for Elements within the Nominated Property within a range of different statutory, health-and-safety and administrative contexts. The nature and frequency of condition monitoring at Element level varies, depending on current use. Examples include daily inspections of track and associated railway infrastructure carried out by the operators of the Ffestiniog and Talyllyn railways, and periodic site-inspections carried out by the National Trust, the National Museum Wales, Gwynedd Council and quarry owners.

Element-level monitoring is supplemented by a series of structured condition monitoring surveys of designated assets carried out by Cadw across the whole Nominated Property. Listed buildings are examined on a five-year cycle and scheduled monuments on a ten-year cycle. Assessing the condition of Conservation Areas is the responsibility of the Local Planning Authorities.

The *Anglesey and Gwynedd Joint Local Development Plan (2011-2026)* and Snowdonia National Park Authority *Eryri Local Development Plan (2016-2031)* are subject to annual monitoring to track the effectiveness of their policies. Annual monitoring reports are prepared by each local authority and are approved by a Scrutiny Committee and Executive Committee at a local level before reporting to the Welsh Ministers. If trigger points are reached, matters are investigated in order to understand why policies and proposals are not being implemented as proposed and to determine what action is required.

The impact of community, cultural and regeneration activities within the Nominated Property that are externally funded, for example through grants from Welsh Government and the National Heritage Lottery Fund under the LleCHI banner are also monitored and evaluated against criteria set out by the individual grant bodies and funding application. An evaluation will be commissioned for LleCHI and will report at the end of the project in 2021.

6.a Key Indicators for Measuring State of Conservation

Key indicators have been selected to align with the requirements of the UNESCO periodic reporting regime in order to ensure accurate reporting. They will also support identification of conservation priorities and management decisions. Indicators have been categorised into two themes: Table 6.1 State of Conservation and Table 6.2 Sustainable Use.

Table 6.1 Key Indicators for Measuring State of Conservation

Indicator	*Ideal Status*	*Periodicity*	*Location of Records*
Number of Listed Buildings and Scheduled Monuments in the Nominated Property.	Stable	Baseline 2019, reviewed every 3 years.	Cadw
Number of Conservation Areas in the Nominated Property.	Stable	Baseline 2019, reviewed every 3 years.	Gwynedd Council, Snowdonia National Park Authority
Number of Listed Buildings recorded to be At Risk in the Nominated Property.	Decreasing	Baseline 2019, reviewed on a 5-year cycle.	Cadw, Gwynedd Council, Snowdonia National Park Authority
Condition of Scheduled Monuments in the Nominated Property.	All graded Very Good	Baseline 2019, reviewed on a 10-year cycle.	Cadw
Number of Scheduled Monuments recorded to be At Risk in the Nominated Property.	Stable	Baseline 2019, reviewed on a 10-year cycle.	Cadw
Condition of Historic Parks and Gardens in the Nominated Property.	Stable	Baseline year of inscription, reviewed every 6 years.	Snowdonia National Park Authority, National Trust, Cadw
Condition of Historic Landscapes in the Nominated Property and the wider protected area.	Stable	Baseline to be established in 2020, reviewed on a 10-year cycle.	Cadw
Integrity of Historic Settlement Character in the Nominated Property.	Stable	Baseline condition assessment 2011 and 2017 from Urban Character Reports, reviewed every 5 years.	Gwynedd Council, Snowdonia National Park Authority

Integrity of the Setting, Sense of Arrival and Significant Views from and into the Nominated Property.	Stable	Baseline 2019 through Setting descriptions in Property Management plan, reviewed annually in accordance with planning policy.	Gwynedd Council and Snowdonia National Park Authority
Number of Signed Local Management Plans for the Nominated Property.	Increasing / Stable	Baseline 2019, reviewed annually.	Cadw, Gwynedd Council, Landowners
Number of planning applications within the Nominated Property and wider protected area in which consideration of the World Heritage Site has been identified as a material consideration.	Stable	Baseline to commence from inscription	Gwynedd Council, Snowdonia National Park Authority

Table 6.2 Key Indicators for Measuring Sustainable Use

Indicator	*Ideal Status*	*Periodicity*	*Location of Records*
Tourism engagement strategy			
Number of visits to each of the 'hub' World Heritage Site locations per annum.	Stable	Baseline 2018, reviewed annually.	Gwynedd Council
Visitor satisfaction rating of Hubs.	Stable / Increasing	Baseline year of inscription, reviewed annually.	Gwynedd Council
Number and type of community events held relating to the Nominated Property.	Stable	Baseline year of inscription, reviewed annually.	Gwynedd Council
Expenditure on conservation and refurbishment projects in the Nominated Property.	Stable / Increasing	Baseline year of inscription, reviewed annually.	Gwynedd Council
Community engagement strategy			
Number of community representatives engaged with initiatives to support Outstanding Universal Value of the Nominated Property.	Increasing / Stable	Baseline year of inscription, reviewed annually.	Gwynedd Council
Number of volunteers within Hubs, Spokes and Sprockets and participating in ambassador schemes.	Increasing / Stable	Baseline year of inscription, reviewed annually.	Gwynedd Council
Research framework strategy			
Links established / strengthened with international bodies, including European Quarry Landscapes, TICCIH, museums, universities and other education providers; formation of research partnerships.	Increasing / Stable	Baseline year of inscription, reviewed annually.	Gwynedd Council
Number and type of educational events relating to the Nominated Property.	Stable	Baseline year of inscription, reviewed annually.	Gwynedd Council
Number of educational / school visits relating to the Nominated Property.	Stable	Baseline year of inscription, reviewed annually.	Gwynedd Council
Number of publications / published articles produced relating to the Nominated Property.	Stable	Baseline year of inscription, reviewed annually.	Gwynedd Council
Economic regeneration			
Additional investment secured to increase public access and appreciation of the Nominated Property.	Stable / Increasing	Baseline year of inscription, reviewed annually.	Gwynedd Council
Additional investment secured to increase sustainable socio-economic activity within the Nominated Property that supports its Outstanding Universal Value.	Stable / Increasing	Baseline year of inscription, reviewed annually.	Gwynedd Council

6.b Administrative Arrangements for Monitoring the Nominated Property

Governance

The Partnership Steering Group will scrutinise the information provided through monitoring, and the implementation of the Property Management Plan to ensure consistency in the standards of planned works and improvements. Specific areas of collaborative work will be overseen by subgroups as outlined in the organogram in section **5.e**.

The Partnership Steering Group will produce an annual report drawing together information from all sources and the activities of member organisations and individuals and reported to UNESCO every six years through the Periodic Review process.

Contact:
Wales Slate World Heritage Site Partnership Steering Group: secretariat
Economy and Community Department, Gwynedd Council, Caernarfon LL55 1SE, United Kingdom

llechi@gwynedd.llyw.cymru

Monitoring Arrangements

State of Conservation indicators

The State of Conservation indicators have been chosen to provide information on the present state of protection, management and condition trend. This information will be gathered and reviewed through the Conservation and Planning Subgroup and reported to the Partnership Steering Group on an annual basis.

Number of Listed Buildings and Scheduled Monuments in the Nominated Property

Designation of Listed Buildings and Scheduled Monuments is the responsibility of Cadw, the Welsh Government's Historic Environment Service. Buildings meeting the criteria for designation have been listed. A programme of work is underway to schedule additional historic monuments identified for protection during the development of the nomination. This will be completed before the end of 2020.

Contact:
Cadw Designations
Cadw, Plas Carew, Unit 5/7 Cefn Coed, Parc Nantgarw, Cardiff CF15 7QQ, United Kingdom

Cadwmailbox@gov.wales

Number of Conservation Areas in the Nominated Property

Designation of Conservation Areas is the responsibility of the local planning authorities and is undertaken in accordance with *Section 69* of *The Planning (Listed Buildings and Conservation Areas) Act 1990*, if a settlement or part of a settlement meets the criteria for Conservation Area status, consideration will be given to designation. Following the recommendations made in the Urban Character Studies, there is support to creating Conservation Areas within Component Part 5 (the town of Blaenau Ffestiniog) and Component Part 6 (the village of Abergynolwyn). Assessment of the proposed areas will take place in 2020, with designation as Conservation Areas to follow if the settlements reach the necessary criteria.

Contact:
Historic Buildings Conservation Officer
Gwynedd Council, Caernarfon LL55 1SH, United Kingdom

Contact:
Historic Buildings Conservation Officer
Snowdonia National Park Authority, Penrhyndeudraeth LL48 6LF, United Kingdom

Number of Listed Buildings recorded to be At Risk in the Nominated Property

The condition of listed buildings is assessed by Cadw on a five-year cycle. The information is retained on the *Buildings at Risk Register*. The most recent surveys were carried out in 2013 (Snowdonia National Park) and 2014 (Gwynedd). A new survey commenced in 2019. Both planning authorities have Conservation Officers responsible for monitoring the condition of listed buildings at risk within the nominated property.

Contact:
Cadw Designations
Cadw, Plas Carew, Unit 5/7 Cefn Coed, Parc Nantgarw, Cardiff CF15 7QQ, United Kingdom

Cadwmailbox@gov.wales

Contact:
Historic Buildings Conservation Officer
Gwynedd Council, Caernarfon LL55 1SH, United Kingdom

Contact:
Historic Buildings Conservation Officer
Snowdonia National Park Authority, Penrhyndeudraeth LL48 6LF, United Kingdom

Condition of Scheduled Monuments in the Nominated Property and Number of Scheduled Monuments recorded to be At Risk in the Nominated property

Field Monument Wardens employed by Cadw visit all scheduled monuments in Wales on a ten-year cycle. Wardens record their condition using a standardised methodology combining a series of set questions with descriptive text supported by photography. The report results in a Monument at Risk (MAR) rating – ranging from low risk to high risk – immediate.

Contacts:
North Wales Archaeological Inspectorate Team,
Cadw, Plas Carew, Unit 5/7 Cefn Coed, Parc Nantgarw, Cardiff CF15 7QQ, United Kingdom

Cadwmailbox@gov.wales

Condition of Historic Parks and Gardens in the Nominated Property

Review of the two registered Parks and Gardens within the Nominated Property is carried out during the year by the owners – the National Trust and Snowdonia National Park Authority. These indicate that they are both in good condition. In the event of a successful inscription a baseline / management assessment will be undertaken by the owners, with support and assistance from Cadw.

Contact:
Penrhyn Castle, Park and Garden
National Trust, Bangor LL57 4HT, United Kingdom

Contact:
Plas Tan y Bwlch Garden
Snowdonia National Park Authority, Penrhyndeudraeth LL48 6LF, United Kingdom

Condition of Historic Landscapes in the Nominated Property and the wider protected area

Landscape Characterisation descriptions were produced for all the Historic Landscapes within the Nominated Property and its wider protected area by the Gwynedd Archaeological Trust between 2000 and 2009. These will serve as the basis for ongoing monitoring on a six year cycle.

Contact:
Cadw, Plas Carew, Unit 5/7 Cefn Coed, Parc Nantgarw, Cardiff CF15 7QQ,
United Kingdom
Cadwmailbox@gov.wales

Integrity of Historic Settlement Character in the Nominated Property

An *Urban Character Report* for Blaenau Ffestiniog waste tips was published by Cadw in 2011 and in 2017 Cadw, Gwynedd Council and Snowdonia National Park Authority commissioned reports on Bethesda, Nantlle Village and Cilgwyn settlements, Deiniolen and Clwt-y-Bont, and Abergynolwyn. Information in these reports form the baseline of information for future monitoring.

Good practice guidance will be produced from information within the Urban Character Reports for communities within each settlement to inform appropriate development, improvement and decisions as a result of a better understanding of historic character. Supplementary Planning Guidance will also assist in ensuring the integrity of historic settlement character which will be monitored through the planning process.

Contact:
Historic Buildings Conservation Officer
Gwynedd Council, Caernarfon LL55 1SH, United Kingdom

Contact:
Historic Buildings Conservation Officer
Snowdonia National Park Authority, Penrhyndeudraeth LL48 6LF, United Kingdom

Integrity of The Setting, Sense of Arrival and Significant Views from and into the Nominated Property

Chapter 2 of *The Slate Landscapes of North West Wales Property Management Plan* describes how setting is understood and how the setting of the proposed World Heritage Site is to be managed. Within this chapter the Essential Setting, Significant Views and Sense of Arrival is described for each Component Part of the Nominated Property.

The setting of the Nominated Property will be subject to ongoing monitoring through the implementation of relevant planning policies. The effectiveness of these policies is subject to annual review in accordance with statutory planning procedures.

Contact:
Wales Slate World Heritage Site Partnership Steering Group: secretariat
Gwynedd Council, Caernarfon LL55 1SE, United Kingdom

Number of Signed Local Management Plans for the Nominated Property

Local Management Plans will be in place for each of the key elements of *The Slate Landscape of Northwest Wales* World Heritage Site prior to inscription. These will be developed in partnership between site / land owners and the Partnership Steering Group, and will outline management actions for the short, medium and long term for the site. Plans are reviewed on an annual cycle or depending on need.

Contact:
Wales Slate World Heritage Site Partnership Steering Group: secretariat
Gwynedd Council, Caernarfon LL55 1SE, United Kingdom

Number of planning applications within the Nominated Property and wider protected area in which consideration of the World Heritage Site has been identified as a material consideration.

This data is collected on an annual basis as part of the implementation of statutory planning processes.

Contact:
Planning, Gwynedd Council, Caernarfon LL55 1SH, United Kingdom

Contact:
Planning, Snowdonia National Park Authority, Penrhyndeudraeth LL48 6LF,
United Kingdom

Sustainable Use Indicators

The sustainable use indicators have been chosen to provide information on the broad range of uses applying across the Component Parts and Elements within the Nominated Property. The information will be gathered and reviewed through the Planning and Conservation and Economic Regeneration subgroup, and reported to Partnership Steering Group on an annual basis.

The indicators link to the Action Plan of *The Slate Landscape of Northwest Wales Property Management Plan.*

Contact:
Wales Slate World Heritage Site Partnership Steering Group: secretariat
Gwynedd Council, Caernarfon LL55 1SE, United Kingdom

Figure 6.2 Cadw officials carrying out a monitoring and assessment visit in Component Part 4.

6.c Results of Previous Reporting Exercises

Number of Listed Buildings and Scheduled Monuments in the Nominated Property

Indicator	*Ideal Status*	*Latest Results*
Number of Listed Buildings and Scheduled Monuments in the Nominated Property.	Stable	**2019:** **328** listed buildings **17** scheduled monuments

Designation of Listed Buildings and Scheduled Monuments is the responsibility of Cadw.

Information including descriptions of all scheduled monuments are available to the public and can be accessed online from Cadw using *Cof Cymru* **https://cadw.gov.wales/advice-support/cof-cymru/search-cadw-records**.

Number of Conservation Areas in the Nominated Property

Indicator	*Ideal Status*	*Latest Results*
Number of Conservation Areas within the Nominated Property.	Stable	**2019:** **9** Component Part 1: Llandygai; Mynydd Llandygai; St Anne's Church; Tanysgafell; Bethesda High Street; Bethesda – Gordon Terrace; Bethesda – John Street; Bethesda – Braichmelyn. Component Part 5: Porthmadog

Designation of Conservation Areas is the responsibility of the local planning authorities and is undertaken in accordance with *Section 69* of *The Planning (Listed Buildings and Conservation Areas) Act 1990*.

A map of the Conservation Areas is available online from Gwynedd Council **https://www.gwynedd.llyw.cymru/map/**.

Condition of Listed Buildings recorded to be At Risk in the Nominated Property

Indicator	*Ideal Status*	*Latest Results*
Number of Listed Buildings recorded to be At Risk in the Nominated Property.	Decreasing	**2019** Gwynedd: **274** Listed Buildings **51** Buildings At Risk Snowdonia National Park: **54** Listed Buildings **4** Buildings At Risk **Total:** **328** Listed Buildings **55** Buildings At Risk

Gwynedd Council and Snowdonia National Park planning authorities have Conservation Officers responsible for monitoring the condition of listed buildings at risk within the nominated property. Results are kept by the respective departments.

Condition of Scheduled Monuments in the Nominated Property

Indicator	*Ideal Status*	*Latest Results*
Condition of Scheduled Monuments in the Nominated Property.	All graded Very Good	**2019** **2** Very Good **8** Good **5** Fair **2** Poor Total: **17**

Cadw holds all information relating to the Condition of Scheduled Monuments in the Nominated Property.

Number of Signed Local Management Plans for the Nominated Property

Indicator	*Ideal Status*	*Latest Results*
Number of signed Local Management Plans.	Increasing	**2019** None to date although one almost complete and others to be completed by autumn 2020.

These will be held by the Slate World Heritage Site Partnership Steering Group.

Number of visits to each of the 'hub' World Heritage Site locations per annum

Indicator	*Ideal Status*	*Latest Results*
Number of visits to each of the 'hub' World Heritage Site locations per annum.	Stable	**Penrhyn Castle:** 118,762 **National Slate Museum:** 126,169 **Ffestiniog Railway:** 113,000 **Llechwedd:** 225,000 **Total:** 582,931

Information held by the Slate World Heritage Site Partnership Steering Group, from information provided by 'hub' managers.

Additional investment secured to increase sustainable socio-economic activity within the Nominated Property that supports its Outstanding Universal Value

Indicator	*Ideal Status*	*Latest Results*
Additional investment secured to increase sustainable socio-economic activity within the Nominated Property that supports its Outstanding Universal Value.	Stable	**Heritage Fund:** £362,000 **Snowdonia National Park:** £7,500 **RDP:** £50,000 **RCDF:** £44,672 **Welsh Government:** £500,000 **Cadw:** £60,000 **Total:** £1,024,172

Information held by the Economy and Community Department of Gwynedd Council and the Slate World Heritage Site Partnership Steering Group.

Figure 7.1. Lord and Lady water-balance shafts at Penrhyn Quarry (Component Part 1) in the late nineteenth century.

7 Documentation

7.a Photographs and audiovisual image inventory and authorization form

Thirty-five images of the Nominated Property are attached with this nomination.

It is not possible to assign copyright or reproduction fees of photographs that are under Copyright to a third party. However, UNESCO is granted the right to reproduce, and allow to be reproduced, items 1-35 free of charge for the purpose of this nomination. Any such reproduction should be accompanied with the acknowledgment of copyright owner and photographer e.g. Crown Copyright. RCAHMW.

All of the images in the nomination document are deposited with the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW).

Contact details:
Penglais Road
Aberystwyth
SY23 3BU
United Kingdom

Tel. 01970 621200
E-mail: nmr.wales@rcahmw.gov.uk.

Acknowledgments for all the images in the nomination document can be found at the end of this document.

Id No	*Format*	*Caption*	*Date*	*Photographer & Reference*	*Copyright Owner*	*Contact*	*Non exclusive cession of rights*
1	Digital	Bethesda and Penrhyn Slate Quarry (Component Part 1)	07/2011	RCAHMW AP_2011_2859	Crown Copyright	RCAHMW	N
2	Digital	Port Penrhyn, Penrhyn Castle and the Ogwen Valley (Component Part 1)	6/2018	RCAHMW AP_2018_0748	Crown Copyright	RCAHMW	N
3	Digital	Penrhyn Slate Quarry (Component Part 1)	06/2018	RCAHMW AP_2018_0492	Crown Copyright	RCAHMW	N
4	Digital	Hydraulic engine, Penrhyn Slate Quarry (Component Part 1)	07/2017	Jon Knowles JDK_8735	Gwynedd Council	RCAHMW	N
5	Digital	Mynydd Llandegai settlement (Component Part 1)	04/2018	RCAHMW AP_2018_0646	Crown Copyright	RCAHMW	N
6	Digital	Gordon Terrace, Bethesda (Component Part 1)	02/2017	Richard Hayman BUCP_499	Gwynedd Council	RCAHMW	N
7	Digital	Jerusalem Chapel, Bethesda (Component Part 1)	03/2017	Richard Hayman BUCP_111	Gwynedd Council	RCAHMW	N
8	Digital	Cae'r Berllan, Bethesda (Component Part 1)	02/2017	Richard Hayman BUCP_158	Gwynedd Council	RCAHMW	N
9	Digital	Penrhyn Castle (Component Part 1)	06/2018	RCAHMW AP_2018_0729	Crown Copyright	RCAHMW	N
10	Digital	Dinorwig Slate Quarry (Component Part 2)	10/2015	RCAHMW AP_2015_3391	Crown Copyright	RCAHMW	N
11	Digital	Dinorwig Quarry (Component Part 2)	06/2005	RCAHMW AP_2005_2945	Crown Copyright	RCAHMW	N
12	Digital	Anglesey Barracks (Component Part 2)	05/2013	RCAHMW DS2013_204_011	Crown Copyright	RCAHMW	N
13	Digital	'Australia' Level, Dinorwig Slate Quarry (Component Part 2)	06/2018	RCAHMW AP_2018_0835	Crown Copyright	RCAHMW	N
14	Digital	'Australia' Level mill saw-tables, Dinorwig Slate Quarry (Component Part 2)	06/2017	Dave Hopewell G2398/567	Gwynedd Archaeological Trust	RCAHMW	N
15	Digital	V2 inclined plane, Dinorwig Slate Quarry (Component Part 2)	03/2019	RCAHMW DSC_3294	Crown Copyright	RCAHMW	N
16	Digital	National Slate Museum (Component Part 2)	10/2007	RCAHMW DS2007_417_004	Crown Copyright	RCAHMW	N
17	Digital	Deiniolen and Clwt y Bont settlements (Component Part 2)	06/2018	RCAHMW AP_2018_905	Crown Copyright	RCAHMW	N
18	Digital	Dinorwig Slate Quarry Hospital (Component Part 2)	03/2018	RCAHMW DSC_3274	Crown Copyright	RCAHMW	N
19	Digital	Dorothea Cornish Beam Engine (Component Part 3)	02/2017	Dave Hopewell G2398/442	Gwynedd Archaeological Trust	RCAHMW	N

Id No	*Format*	*Caption*	*Date*	*Photographer & Reference*	*Copyright Owner*	*Contact*	*Non exclusive cession of rights*
20	Digital	Nantlle Valley Quarry Landscape (Component Part 3)	6/2018	RCAHMW AP_2018_0846	Crown Copyright	RCAHMW	N
21	Digital	'Blondin' ropeway, Pen yr Orsedd Slate Quarry (Component Part 3)	12/2016	Dave Hopewell G2398/302	Gwynedd Archaeological Trust	RCAHMW	N
22	Digital	Nantlle Village (Component Part 3)	06/2018	RCAHMW AP_2018_0972	Crown Copyright	RCAHMW	N
23	Digital	Settlements on Cilgwyn Mountain (Component Part 3)	02/2017	RCAHMW AP_2018_0892	Crown Copyright	RCAHMW	N
24	Digital	Gorseddau Slate Quarry (Component Part 4)	10/2015	RCAHMW AP_2015_3466	Crown Copyright	RCAHMW	N
25	Digital	Prince of Wales Slate Quarry (Component Part 4)	10/2015	RCAHMW AP_2015_3427	Crown Copyright	RCAHMW	N
26	Digital	Gorseddau Slate Quarry and Treforys Village (Component Part 4)	01/2007	RCAHMW	Crown Copyright	RCAHMW	N
27	Digital	Ynysypandy Slate-Slab Mill (Component Part 4)	08/2007	RCAHMW DS2007_280_001	Crown Copyright	RCAHMW	N
28	Digital	Blaenau Ffestiniog Landscape (Component Part 5)	07/2011	RCHAMW AP_2011_3093	Crown Copyright	RCAHMW	N
29	Digital	Ffestiniog Railway (Component Part 5)	–	Roger Dimmick	Ffestiniog & Welsh Highland Railways	RCAHMW	N
30	Digital	Cwmorthin Slate Mine (Component Part 5)	12/2013	Jon Knowles JDK_2497	Jon Knowles	RCAHMW	N
31	Digital	Ffestiniog Railway and Porthmadig Harbour (Component Part 5)	06/2018	RCAHMW AP_2018_1075	Crown Copyright	RCAHMW	N
32	Digital	Abergynolwn Village with Bryneglwys Slate Quarry in the distance (Component Part 6)	06/2018	RCAHMW AP_2018_1142	Crown Copyright	RCAHMW	N
33	Digital	Bryneglwys Slate Quarry (Component Part 6)	06/2018	RCAHMW AP_2018_1120	Crown Copyright	RCAHMW	N
34	Digital	Underground workings at Bryneglwys Slate Quarry (Component Part 6)	11/2012	Jon Knowles JDK_19378	Jon Knowles	RCAHMW	N
35	Digital	Talyllyn Railway crossing Dolgoch Viaduct (Component Part 6)	–	DAZ3458	Rheilffordd Talyllyn Railway	RCAHMW	N

7.b Texts relating to protective designation, copies of Property management plans or documented management systems and extracts of other plans relevant to the Property

The property Management Plan *The Slate Landscape of Northwest Wales Property Management Plan*, the five Urban Character Studies undertaken on Bethesda (Element 1.6), Deiniolen and Clwt y Bont (Element 2.8), Nantlle Village and Cilgwyn (Elements 3.10-11), Blaenau Ffestiniog (Element 5.6), and Abergynolwyn (Element 6.3) and Historic Landscape Characterisation reports are attached with this nomination.

Links to all legislation relating to the protection of the Nominated Property are listed below, and attached with this nomination.

International Legislation and Guidance

Transforming our World: the 2030 Agenda for Sustainable Development **https://sustainabledevelopment.un.org/post2015/transformingourworld/publication**

The ICOMOS Charter for the Interpretation and Presentation of Cultural Heritage Sites **http://icip.icomos.org/downloads/ICOMOS_Interpretation_Charter_ENG_04_10_08.pdf**

National Legislation and Guidance

The National Parks and Access to the Countryside Act (1949) **http://www.legislation.gov.uk/ukpga/Geo6/12-13-14/97**

The Mines and Quarries (Tips) Regulations 1971 **http://www.legislation.gov.uk/uksi/1971/1377/made**

The Ancient Monuments and Archaeological Areas Act 1979 **http://www.legislation.gov.uk/ukpga/1979/46**

The Planning (Listed Buildings and Conservation Areas) Act 1990 **http://www.legislation.gov.uk/ukpga/1990/9/contents**

Town and Country Planning Act 1990 **http://www.legislation.gov.uk/ukpga/1990/8/contents**

The Well-being of Future Generations (Wales) Act 2015 **http://www.legislation.gov.uk/anaw/2015/2/contents/enacted**

The Planning (Wales) Act 2015 **http://www.legislation.gov.uk/anaw/2015/4/contents/enacted**

The Historic Environment (Wales) Act 2016 **http://www.legislation.gov.uk/anaw/2016/4/contents**

UK Climate Change Projections 2018 **https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index**

Conservation Principles for the sustainable management of the historic environment in Wales **https://cadw.gov.wales/sites/default/files/2019-05/Conservation_Principles%20for%20the%20sustainable%20managment%20fo%20the%20historic%20environment%20of%20Wales.pdf**

Mineral Technical Advice Note (MTAN1) **https://gov.wales/sites/default/files/publications/2018-09/mtan1-aggregates.pdf**

The Wildlife and Countryside Act 1981 **http://www.legislation.gov.uk/ukpga/1981/69**

EU Habitats Directive and Conservation of Habitats and Species Regulations 2010 **http://www.legislation.gov.uk/uksi/2010/490/contents/made**

Countryside and Rights of Way Act 2000 **http://www.legislation.gov.uk/ukpga/2000/37/contents**

Environmental Impact Assessment (EIA) regulations 2017 **http://www.legislation.gov.uk/uksi/2017/571/pdfs/uksi_20170571_en.pdf**

Welsh Government Policy and Guidance

Planning Policy Wales Edition 10 (2018) **https://gov.wales/sites/default/files/publications/2018-12/planning-policy-wales-edition-10.pdf**

Technical Advice Note 24: The Historic Environment (May 2017) **https://gov.wales/sites/default/files/publications/2018-09/tan24-historic-environment.pdf**

Managing Change in World Heritage Sites in Wales (May 2017) **https://cadw.gov.wales/sites/default/files/2019-05/20170531Managing%20Change%20in%20World%20Heritage%20Sites%20in%20Wales%2031146%20EN_0.pdf**

Design and Access Statements in Wales **https://gov.wales/sites/default/files/publications/2018-09/design-and-access-statements.pdf**

Planning (Listed Building and Conservation Areas) (Wales) (Amendment No. 2) regulations 2017 **http://www.legislation.gov.uk/wsi/2017/638/made**

Planning (Listed Building and Conservation Areas) (Wales) Regulations 2012 **http://www.legislation.gov.uk/wsi/2012/793/contents/made**

Welsh Government Transport Strategy One Wales: Connecting the Nation **https://gov.wales/sites/default/files/publications/2017-09/wales-transport-strategy.pdf**

Local Plans and Guidance

The Eryri Local Development Plan 2016 **https://www.snowdonia.gov.wales/__data/assets/pdf_file/0011/1689041/Cynllun-Datblygu-Lleol-V4.pdf**

Gwynedd and Anglesey Joint Local Development Plan 2017 **https://www.gwynedd.llyw.cymru/en/Council/Documents---Council/Strategies-and-policies/Environment-and-planning/Planning-policy/Anglesey-and-Gwynedd-Joint-Local-Development-Plan-Written-Statement.pdf**

Gwynedd Council Plan 2018-2023 **https://www.gwynedd.llyw.cymru/en/Council/Documents---Council/Strategies-and-policies/Gwynedd-Plan-17-18/Gwynedd-Council-Plan-2018-2023.pdf**

Gwynedd Destination Management Plan 2013-2020 **https://businesswales.gov.wales/dmwales/sites/dmwales/files/documents/gwynedd-dm-plan.pdf**

West Wales Shoreline Management Plan 2 **http://www.westofwalessmp.org/content.asp?nav=23&parent_directory_id=10**

Register of Landscapes of Outstanding Historic Interest in Wales (Cadw, ICOMOS, Countryside Council for Wales, 2000) **https://lle.gov.wales/catalogue/item/RegisteredLandscapesOfOutstandingHistoricInterestInWales/?lang=en**

Guide to Good Practice on Using the Register of Landscapes of Historic Interest In Wales **https://cadw.gov.wales/sites/default/files/2019-05/LandscapesRegisterGoodPractice_EN_0.pdf**

Landscape and Sensitivity Capacity Study 2018 **https://www.snowdonia.gov.wales/planning/planning-policy/Supp-Planning-Guidance/adopted-supplementary-planning-guidance-documents** section 13

Urban Character Studies

Blaenau Ffestiniog Urban Character Report **https://cadw.gov.wales/advice-support/placemaking/historic-character/urban-character-reports#section-blaenau-ffestiniog**

Bethesda Urban Character Report **http://orapweb.rcahms.gov.uk/coflein/6/634146.PDF**

Deiniolen / Clwt y bont Urban *Character Report* **http://orapweb.rcahms.gov.uk/coflein/6/634147.PDF**

Nantlle Village and Cilgwyn Urban Character Report **http://orapweb.rcahms.gov.uk/coflein/6/634149.PDF**

Abergynolwyn Urban Character Report **http://orapweb.rcahms.gov.uk/coflein/6/634145.PDF**

7.c Form and date of most recent records or inventory of Property

Attached with this nomination is an *Inventory of the Nominated Property* comprising a full gazetteer of archaeological features and designated assets, compiled from the information sources detailed below.

To inform the nomination, a series of archaeological assessments were undertaken between 2015 and 2019 to prepare a full gazetteer of all relict archaeological features within the Nominated Property. Information collected includes descriptions and photographs of all historic features to create a comprehensive inventory. This inventory is held in the regional Historical Environment Record curated by the Gwynedd Archaeological Trust. This is available to the public and can be accessed online using *archwilio* **https://www.archwilio.org.uk/her/chi1/arch.html?county=Gwynedd&lang=eng**

Information including descriptions of designated assets within the Nominated Property (Scheduled Monuments, Listed Buildings and Historic Parks and Gardens), and Registered Historic Landscapes are held by Cadw and are available to the public. They can be accessed online using *Cof Cymru* **https://cadw.gov.wales/advice-support/cof-cymru/search-cadw-records**.

Information on the Historic Landscape Character Areas of the Registered Historic Landscapes are held with Gwynedd Archaeological Trust and are available to the public and can be accessed online **http://www.heneb.co.uk/hlc/hlc.html**

Information on the Conservation Areas within the Nominated Property are held by Gwynedd Council. Their locations, together with the border of Snowdonia National Park, can be accessed online using MapGwynedd **https://www.gwynedd.llyw.cymru/map/**

Information on environmental designations – Special Areas of Conservation, Special Protection Areas, Sites of Special Scientific Interest and National Nature Reserves are held by Natural Resources Wales. Information is available from the Lle Geo-Portal **https://lle.gov.wales/home?lang=en**

7.d Addresses where inventory, records and archives are held

Cadw

Welsh Government through Cadw maintains detailed records on designated historic assets in Wales.

Address:
Cadw, Plas Carew, Unit 5/7 Cefn Coed, Parc Nantgarw, Cardiff CF15 7QQ,
United Kingdom

Historic Environment Record

The Historic Environment Record (HER) curated by the Gwynedd Archaeological Trust includes information on both designated and non-designated assets associated with the slate industry. The HER maintains copies of all archaeological studies relevant to the nominated property.

Address:
Gwynedd Archaeological Trust Ltd, Craig Beuno, Garth Rd, Bangor LL57 2RT,
United Kingdom

National Monument Record

The National Monument Record (NMR) is National Archive for the historic environment in Wales.

Address:
National Monuments Record of Wales, Ffordd Penglais, Aberystwyth SY23 3BU,
United Kingdom

Archive holdings

The Gwynedd Archives curates the archive of the Penrhyn (Element 1.1), Dinorwig (Element 2.1), Dorothea (Element 3.3), Pen yr Orsedd (Element 3.7), Oakeley (Element 5.1) and Llechwedd (Element 5.2-6) quarries, and of the Nantlle (Element 3.9), Ffestiniog (Element 5.10) and Talyllyn (Element 6.4) railways.

Address:
Caernarfon Record Office, Caernarfon LL55 1SH, United Kingdom

The National Library of Wales curates the archive of D.C. Davies of Diffwys slate quarry (Element 5.4) and of Sir Henry Haydn Jones MP, owner of Bryneglwys (Elements 6.1-2) and of the Talyllyn Railway (Element 6.4).

Address:
Ffordd Penglais, Aberystwyth SY23 3BU, United Kingdom

The Snowdonia National Park study centre curates the archives of the successive archaeological campaigns undertaken in the slate industry of Wales since 1972, including Penrhyn (Element 1.1), Dorothea (Elements 3.3-4), Pen y Bryn (Elements 3.5-6) and Pen yr Orsedd (Elements 3.7-8) quarries, the Nantlle Railway (Element 3.9), Gorseddau (Element 4.1) and Prince of Wales (Element 4.2) quarries, Ynysypandy slate-slab mill (Element 4.3) and their associated railways (Element 4.4), Llechwedd, Maenofferen and Diffwys quarries (Elements 5.3-6) and Bryneglwys quarry (Elements 6.1-2)

Address:
Plas Tan y Bwlch, Maentwrog, Blaenau Ffestiniog LL41 3YU, United Kingdom

Bangor University curates major research collections associated with the slate industry of Wales, including the archive of the Penrhyn estate (Elemts 1.1-5), and the Porth yr Aur legal partnership which was responsible for early developments in Dinorwic quarry (Elemts 2.1, 2.6.i) and in Nantlle (Component Part 3).

Address:
Bangor University: Archives and Special Collections, The Main Library,
Bangor University, College Road, Bangor, Gwynedd LL57 2DG, United Kingdom

7e Bibliography

Bibliography relevant to Criterion (ii)

The Slate Landscape of Northwest Wales exhibits an important interchange of human values, particularly in the period from 1780 to 1940, on developments in architecture and technology.

Publications

Andrieux, J-Y. 'Les élèves ingénieurs de l'École des Mines et les exploitations minières et ardoisières des bords de la Loire au XIXe siècle' in *Annales de Bretagne et des pays de l'Ouest*. Tome 104, numéro 3, 1997.

Anon. Description des deux nouvelles espèces de chemins de fer pour les grosses voitures, et pour les voitures de voyages, *Annnales des Arts et Manufactures*. 30 Messidor an. 12 (1804), 89-96.

Anon. 'Amos and Francis' Water-Pressure Engines' in *The Engineer*, 9 September 1859.

Anon. 'Electricity in French Slate Quarries', in *American Manufacturer and Iron World* 73 (1), 2 July 1903, 8-10.

Atkinson, L-G. *The Earliest Inhabitants: the Dynamics of the Jamaican Taino Kingston*. University of the West Indies Press, 2006.

Bayles, R. 'The Dorothea Cornish Engine', in *Bulletin of the International Stationary Steam Engine Society* 14 (3), 1992, 40-49.

Blavier, A. 'Essai sur l'Industrie Ardoisiere d'Angers', in *Bulletin de la Societe d'Encouragement pour l'Industrie Nationale* 2ieme serie tome XL, 1864, 416-44.

Carson, C., Lounsbury, C.R. *The Chesapeake House: Architectural Investigation by Colonial Williamsburg*. University of North Carolina, 2013.

Christovich, M.L., Toledano, R. and Evans, S.K. *New Orleans Architecture V: The Esplanade Ridge*. Louisiana: Pelican 1977.

Cooke, W.F. 'On New Machinery for Cutting, Tunnelling and Facing Slate, Stone and Marbles', in *Journal of the Society of Arts* 15, 1867, 418-25.

Cooper, C.C. 'The Production Line at Portsmouth Block Mill', in *Industrial Archaeology Review* 6 (1), 1981-82, 27-44.

Coulls, A. *Railways as World Heritage Sites*. Paris: ICOMOS, 1999.

Davies, A.C. 'Roofing Belfast and Dublin, 1896-98: American Penetration of the Irish Market for Welsh Slate', in *Irish Economic and Social History* 4, 1977, 26-35.

Davies, E. *The North Wales Quarry Hospitals and the Health and Welfare of the Quarrymen*. Caernarfon: Gwynedd Archives Service, 2003.

Decauville, P. 'Portable Railways', in *Scientific American Supplement*, 446, 19 July 1884.

Everton, C. *The History of Snooker and Billiards*. Haywards Heath: Partridge Press 1986.

Fischer, J. and Schroder, E. *Schieferbau Aktiengesellschaft 'Nuttlar' 1857-1957*. Soest, 1957.

Foster, C. LeNeve and Cox, S.H. *Ore and Stone Mining* London: Griffrin, 1910.

Geddes, R.S. *Burlington Blue-Grey A History of the Slate Quarries, Kirkby-in-Furness*. Privately published, 1975.

Gwyn, D. 'Valentia Slate Slab Quarry', in *Cuman Seandaloichta is Staire Chiarrai/Journal of the Kerry Archaeological and Historical Society* 24, 1995, 40-57.

Gwyn, D. 'Transitional Technology – the Nantlle Railway', in *Early Railways*. London: Newcomen Society, 2001, 46-62.

Gwyn, D. *Anjou and Gwynedd: Slate Landscapes*. Maentwrog: Snowdonia National Park, 2013.

Gwyn, D. *Welsh Slate – Archaeology and History of an Industry.* Royal Commission on the Ancient and Historic Monuments of Wales, 2015.

Haslam, R., Orbach, J. and Voelker, A. *The Buildings of Wales: Gwynedd*. Yale University Press, 2009.

Hilton, G.W. *American Narrow Gauge Railroads*. Stanford: Stanford University Press, 1990.

Hobsbawn, E. *Uncommon People. Resistance, Rebellion and Jazz*. London: Abacus, 1999.

Hughes, J.P. *Foundries amidst the Slate Industry of North West Wales*. Eade, 2015.

Jones, G.P. 'Nantlle Slate Quarries, Stationary Power', in *The Journal of the Stationary Engine Research Group* 2, 1985, 13-41.

Jones, L.P. *The history of the slate industry in Buckingham County, Virginia*. Master of Arts thesis, University of Richmond, 1948.

Isherwood G. 'The Hunter Machines in Mining Technology: Technical Innovation in the Extractive Industries', in *Proceedings of the NAMHO Conference 2014*. Llanaber: The Welsh Mines Society, 2015, 123-146.

Jones, G.P. and Dafis, D.W. 'Water Power in the Slate Mines of East Ffestiniog', in *Water Power in Mining*. Special edition of *Mining History: The Bulletin of the Peak District Mines Historical Society* 15 (4/5), 2003, 11-15.

Jones, R.M. *The North wales Quarrymen 1874-1922*. Cardiff: University of Wales Press, 1981.

Kerouanton, J-L. 'Blavier (1827-96), ingenieur des Mines et president de la Commission des Ardoisieres d'Angers', in *Annales de Bretagne et des pays de l'Ouest* 104 (3), 1997, 149-56.

Lariviere, C. 'Notes d'un Voyage aux Ardoisieres du Pays de Galles', in *Annales des Mine 8ième Serie – Memoires Tomes VI*, Paris, 1884, 505-64.

Lewis, M.J.T. *How Ffestiniog Got its Railway*. Caterham: Railway and Canal Historical Society, 1968.

Lewis, M.J.T. 'New Light on Tŷ Mawr Ynys y Pandy', in *Industrial Gwynedd* 3, 1998, 34-49.

Lindsay, J. *A History of the North Wales Slate Industry*. Newton Abbot: David and Charles, 1974.

Martin, T. *Halfway to Heaven: Darjeeling and its Remarkable Railway 1879-2000*. Chester: Railromances, 2000.

Morris, W. 'The Influence of Building Materials on Architecture', *Century Guild Hobby Horse* 7, January 1892, 1-14.

Nasse, R. 'Über die Dachschiefergewinnung in Nord-Wales', in *Zeitschrift für das Berg-, Hütten- und Salinenwesen in dem Preussischen Staate* 18 (1870), 92-111.

Neve, R. *The city and country purchaser*. London: for J. Sprint, 1703.

Nicholson, P. *The New and Improved Practical Builder*. London: T. Kelly, 1823.

Nicholson, P. *The New and Improved Practical Builder, vol 2*. London: T. Kelly, 1837.

Phillips-Schrock, P. *The White House: An Illustrated Architectural History*. McFarland, Jefferson, 2013.

Pierpont, R.N. 'Slate Roofing', in *APT Bulletin* 19 (2), 1967, 13-14.

Pilling, J. 'From Bethesda to the Bangor Slate Quarry, Tasmania', in *Transactions of the Caernarvonshire Historical Society* 70, 2009, 38-54.

Pritchard, D.D. *The Slate Industry of North Wales: A Study of the Changes in Economic Organisation from 1780 to the Present Day*. MA University College of North Wales, 1935.

Roberts, G.R. *New Lives in the Valley: Slate Quarries and Quarry Villages in North Wales, New York and Vermont, 1850-1912*. Somersworth: New Hampshire printers, 1998.

Robinson J.M. *Samuel Wyatt, Architect*. Oxford D.Phil. thesis, 1975.

Robinson, J.M. *The Wyatts, an Architectural Dynasty.* London: Oxford University Press, 1978.

Rolt, L.T.C, *Railway Adventure*. London: Constable, 1953.

Rynne, C. *Industrial Ireland 1750-1930 An Archaeology*. Cork: Collins Press, 2006.

Smyers, L. *Essai sur l'état actuel de l'industrie ardoisière en France et en Angleterre, suivi de quelques observations pratiques sur la formation du schiste ardoisier*. Paris, 1858.

Soulez Lariviere, F. *Les Ardoisieres d'Angers*. Angers: Prestograph, 1979.

Spooner, C.E. *The Narrow Gauge*: London, 1871.

Summerson, J. *Georgian London*. New York and Washington: Praeger, 1970.

Trinder, B. *The Making of the Industrial Landscape*. London, Melbourne, Toronto: Dent, 1982.

Trinder, B. *Britain's Industrial Revolution: The Making of a Manufacturing People*. Lancaster: Carnegie, 2013.

United States of America. *Preserving Historic Architecture: The Official Guidelines*. Department of the Interior.

Vignes, M. E. Étude technique sur le *Chemin de fer de Festiniog et quelques autres chemins de fer à voie* étroite *de l'Angleterre*. Paris: Dunod, 1878.

Voisin, L. *Les Ardoisieres de l'Ardenne*. Charleville-Mezieres: Editions Terres Ardennais, 1986.

Wiliam, E. *The Welsh Cottage*. Aberystwyth: RCAHMW, 2010.

Williams, J.Ll. and Jenkins, D. 'Dwr a Llechi ym Mhlwyf Llanllechid, Bethesda – Agweddau ar Ddatblygiad Diwydiant yn Nyffryn Ogwen', in *Transactions of the Caernarvonshire Historical Society* 54, 1993, 29-62.

Williams, J.Ll. and Jenkins, D. 'Tair Chwarel ym Mhlwyf Llanllechid, Bethesda Rhan I', in *Transactions of the Caernarvonshire Historical Society* 56, 1995, 47-70.

Williams, J.Ll. and Jenkins, D 'Tair Chwarel ym Mhlwyf Llanllechid, Bethesda Rhan II', in *Transactions of the Caernarvonshire Historical Society* 57, 1996, 65-84.

Woodward, G. 'Hydro Electricity in North Wales, 1880-1948', in *Transactions of the Newcomen Society* 69 (2), 1997-98, 205-35.

Unpublished literature

Cayla, P. and Gwyn, D. *International Slate Quarrying Landscapes*, 2015.

Gwyn, D., Rees, S. and Cossons, N. *Baseline Study and Technical Evaluation Proposed World Heritage Site: Slate Industry of North Wales*, 2012.

Jones, G.P. *The Economic and Technological Development of the Slate Quarrying Industry in the Nantlle Valley, Gwynedd*. Ph.D thesis, University of Wales, 1996.

Letts, T. *Tour of North Wales*. National Library of wales manuscript 22341B, 1834.

Uhlir, C. and Gwyn, D. *Stone Quarrying Landscapes as World Heritage Sites*, 2015.

Online publications

Dictionary of Welsh Biograrphy **https://biography.wales/**

'To Thomas Jefferson from Benjamin Henry Latrobe, 1 December 1804', Founders Online, National Archives (USA), last modified March 30, 2017, **http://founders.archives.gov/documents/Jefferson/99-01-02-0754** (use of slate on the White House, Washington).

Lill, B. *Richard Pennant, Samuel Worthington, and the Mill at Penlan: A History of the Penrhynh Mills on the Lower Ogwen*. PhD thesis, Bangor University, 2019. **https://archdenk.blogspot.co.uk**

Australian Building: A Cultural Investigation **http://mileslewis.net/australian-building/**

Bibliography relevant to Criterion (iv)

The Slate Landscape of Northwest Wales is an outstanding example of a type of landscape which illustrates, in a dramatic way, the 'combined works of nature and of man' through the large-scale exploitation of natural resources.

Publications

Anon. 'Amos and Francis' Water-Pressure Engines' in *The Engineer*, 9 September 1859.

Boyd, J.I.C. *Festiniog Railway 1 History and Route*. Blandford: Oakwood Press, 1975.

Boyd, J.I.C. *Festiniog Railway 2 Locomotives and Rolling Stock Quarries and Branches: rebirth 1954-74*. Blandford: Oakwood Press, 1975.

Boyd, J.I.C. *Narrow Gauge Railways in North Caernarvonshire Volume 1*. Trowbridge: Oakwood Press, 1981.

Boyd, J.I.C. *Narrow Gauge Railways in North Caernarvonshire Volume 2*. Oxford: Oakwood Press, 1985.

Boyd, J.I.C. *Narrow Gauge Railways in North Caernarvonshire Volume 3*. Oxford: Oakwood Press, 1986.

Boyd, J.I.C. *The Talyllyn Railway*. Oxford: Wild Swan, 1988.

Cadw, ICOMOS UK and the Countryside Council for Wales. *Register of Landscapes of Outstanding Historic Significance in Wales*. Cardiff, 1998.

Cadw, ICOMOS UK and the Countryside Council for Wales. *Register of Landscapes of Special Historic Interest in Wales*. Cardiff, 2001.

Cayla, P. Du Pays de Galles à l'Anjou et à la Galice, l'ardoise atlantique patrimoine mondial.

Davies, D.C. *A Treatise on Slate and Slate Quarrying*. London: Crosby Lockwood and Co., 1878.

Dodd, A.H. *The Industrial Revolution in North Wales*. Wrexham: Bridge Books, 1990.

Gwyn, D. 'Power Systems in Four Gwynedd Slate Quarries', in *Industrial Archaeology Review* 22 (2), 1999, 83-100.

Gwyn, D. *Anjou and Gwynedd: Slate Landscapes*. Maentwrog: Snowdonia National Park, 2013.

Gwyn, D. *Welsh Slate - Archaeology and History of an Industry.* Royal Commission on the Ancient and Historic Monuments of Wales, 2015.

Holmes, A. *Slates from Abergynolwyn*. Caernarfon: Gwynedd Archives Service, 1986.

Holmes, A. and Eade, S. *Bryneglwys Slate Quarry*, Abergynolwyn, Meirionethshire. Privately published, 2013.

Isherwood, G. *Cwmorthin Slate Quarry*. Mold: Adit Publications, 1995.

Isherwood, J.G. *Slate from Blaenau Ffestiniog*. Leicester: ABP publishing, 1988.

Jones, G.P. *The Economic and Technological Development of the Slate Quarrying Industry in the Nantlle Valley, Gwynedd*. Ph.D thesis, University of Wales, 1996.

Jones, G.P. and Dafis, D.W. 'Water Power in the Slate Mines of East Ffestiniog', in *Water Power in Mining*. Special edition of *Mining History: The Bulletin of the Peak District Mines Historical Society* 15 (4/5), 2003, 11-15.

Jones, R.C. *The Llanberis Slate Quarry 1780-1969*. Wrexham: Bridge Books, 2006.

Lewis, M.J.T. (ed.). *The Slate Quarries of North Wales in 1873*. Maentwrog: Snowdonia National Park, 1987.

Lewis, M.J.T. *Sails on the Dwyryd*. Plas Tan y Bwlch: Snowdonia National Park, 1989.

Lewis, M.J.T. *Gorseddau: a portrait of a slate quarry and its railway* (forthcoming).

Lindsay, J. *A History of the North Wales Slate Industry*. Newton Abbot: David and Charles, 1974.

Puckler-Muskau, F.H., Fürst von. *Tour in England, Ireland, and France, in the years 1828 & 1829* (London, 1832) (translation of *Briefe eines Verstorbenen: Ein fragmentarisches Tagebuch aus Deutschland, Holland, England, Wales, Irland und Frankreich, geschrieben in den Jahren 1826 bis 1829*. Munich: F.C. Franck, 1830-31.

Richards, A.J. *A Gazetteer of the Welsh Slate Industry*. Capel Garmon: Gwasg Carreg Gwalch, 1991.

Richards, A.J. *Slate Quarrying in Corris*. Llanrwst: Gwasg Carreg Gwalch, 1994.

Richards, A.J. *Slate Quarrying in Wales*. Llanrwst: Gwasg Carreg Gwalch, 1995.

'Sylwedydd'. *Chwarelau Dyffryn Nantlle a Chymdogaeth Moel Tryfan*. Conwy: R.E. Jones, no date.

Trinder, B. *The Making of the Industrial Landscape*. London, Melbourne, Toronto: Dent, 1982.

Trinder, B. *Britain's Industrial Revolution: The Making of a Manufacturing People*. Lancaster: Carnegie, 2013.

Unpublished literature

Gwynedd Archaeological Trust. *Gwynedd Slate Quarrying Landscapes*. Report 129, 1994.

Gwynedd Archaeological Trust. *Gwynedd Slate Quarries*. Report 154, 1995.

Gwynedd Archaeological Trust. *Gwynedd Slate Quarries: mills, power systems, haulage technology, barracks*. Report 252, 1997.

Govannon Consultancy, Royal Commission on the Ancient and Historical Monuments of Wales. *Gwynedd Slate Industry Transport Routes*, 2017.

Govannon Consultancy. *Slate Industry of North Wales: Archaeological Assessment of Underground Features, their Condition and Protection*. Report GC405, 2017.

Bibliography Publications relevant to Criterion (v)

The Slate Landscape of Northwest Wales is an outstanding example of the industrial transformation of a traditional human settlement and marginal agrarian land-use pattern; it also exemplifies how a remarkably homogeneous minority culture adapted to modernity in the industrial era.

Publications

Anon. *Damweiniau yn Chwarel Dinorwig, Arfon o 1822 hyd 1878*. Caernarfon: John Evans, 1879.

Burnett J. and Williams H.G. *A wandering scholar: the life and opinions of Robert Roberts* ('Sgolor Mawr'). Cardiff: University of Wales Press, 1991.

Caffell, G. *Llechi Cerfiedig Dyffryn Ogwen/The Carved Slate of Dyffryn Ogwen*. Cardiff: National Museum of Wales, 1983.

Davies, E. *The North Wales Quarry Hospitals and the Health and Welfare of the Quarrymen*. Caernarfon: Gwynedd Archives Service, 2003.

Dodd, A.H. *The Industrial Revolution in North Wales*. Wrexham: Bridge Books, 1990.

Gwyn, D. 'From Blacksmith to Engineer: Artisan Technology in North Wales in the Early Nineteenth Century', in *Llafur* 7, 1999, 51-65.

Gwyn, D. 'Ignorant of all science': Technology transfer and peripheral culture, the case of Gwynedd, 1750-1850' in *From Industrial Revolution to Consumer revolution: international perspectives on the archaeology of industrialisation*. London: The International Committee for the Conservation of the Industrial Heritage, 2001, 39-45.

Gwyn, D. 'Quarries As "Memorials to the Unknown Labourer": the Slate Quarrying Landscapes of Gwynedd, Wales', in Douet, J. (ed.). *European Quarry Landscapes: Collected essays from the first meeting of the European Quarry Landscapes Network*. Ayuntamiento de Teruel, 2015.

Gwyn, D. *Welsh Slate - Archaeology and History of an Industry*. Royal Commission on the Ancient and Historical Monuments of Wales, 2015.

Hughes, H.D. *Hynafiaethau Llandegai a Llanllechid*. Cyhoeddiadau Mei, y Groeslon, 1979.

Hyde-Hall, E. *A Description of Caernarvonshire*. Caernarfon: Caernarvonshire Historical Society, 1952.

Jones, D.G. *Un o Wŷr y Medra: Bywyd a Gwaith William Williams Llandygai. 1738-1817*. Denbigh: Gwasg Gee, 1999.

Jones, E. *Canrif y Chwarelwr*. Denbigh: Gwasg Gee, 1963.

Jones, E. *Bargen Dinorwic*. Porthmadog: Tŷ ar y Graig, 1980.

Jones, E. *Stiniog*. Caernarfon: Gwasg Gwynedd, 1988.

Jones, G.P. *The Economic and Technological Development of the Slate Quarrying Industry in the Nantlle Valley, Gwynedd*. Ph.D thesis, University of Wales, 1996.

Jones, R.C. *The Llanberis Slate Quarry 1780-1969*. Wrexham: Bridge Books, 2006.

Jones, R.M. *The North Wales Quarrymen 1874-1922*. Cardiff: University of Wales Press, 1981.

Jones, R.M. and Lovecy, J. 'Slate Workers in Wales, France and the United States: A Comparative Study, 1870-1920', in *Llafur* 4 4, 1987, 9-19.

Jones, W. 'Ffestinfab'. *Hanes Plwyf Ffestiniog a'r Amgylchoedd*. Blaenau Ffestiniog: Jones a Roberts, 1879.

Lewis, M.J.T. *The Archaeology of Gwynedd Slate: Flesh on the Bone*. Maentwrog: Snowdonia National Park, 2011.

Lewis, M.J.T. and Williams, M.C. *Pioneers of Ffestiniog Slate*. Maentwrog: Snowdonia National Park, 1987.

Lindsay, J. *The Great Strike*. Newton Abbot: David and Charles, 1987.

Pedr. *Traethawd yn Rhoddi Hanes Manwl o Waen Gynfi &c*. Ebenezer: W.R. Hughes, 1869.

Roose Williams, J. *Quarryman's Champion: The Life and Activities of William John Parry of Coedmor*. Denbigh: Gwasg Gee, 1978.

Smith, P. *Houses of the Welsh Countryside*. Aberystwyth: Royal Commission on the Ancient and Historical Monuments of Wales, 1988.

'Sylwedydd'. *Chwarelau Dyffryn Nantlle a Chymdogaeth Moel Tryfan*. Conwy: R.E. Jones no date.

Williams, D. 'Hanesydd'. *Hanes Gwaen Gynfi er Dechreuad y Ganrif Bresenol*. Ebenezer: Undeb Llenyddol Deiniolen, 1869.

Williams, G.J. *Hanes Plwyf Ffestiniog*. Wrexham: Hughes and Son, 1882.

Bibliography relevant to Comparative study

Publications

Chaumeil, L. *L'Industrie Ardoisiere de Basse-Bretagne*. Lorient: Nouvelliste de Morbihan, 1938.

Benjamin, S.G.W. 'The Granite Quarries of the New England Coast' in *Harper's Weekly*, 35 1777, 1891, 29-31.

Burford, A. 'Heavy Transport in Classical Antiquity' in *Economic History Review* 2nd series 13, 1960, 1-18.

Cossons, N. (ed.). *Rees's Manufacturing Industry 1819-1820*. Newton Abbot: David and Charles, 1972.

Dale, T.N. *Slate Deposits and Slate Industry of the United States*. Washington: Government Printing Office, 1906.

Dale, T.N. *The Commercial Marbles of Western Vermont*. Washington: Government Printing Office, 1912.

David, R. 'The Slate Quarrying Industry in Westmorland: Part One: The valleys of Troutbeck, Kentmere and Longsleddale', in *Transactions of the Cumberland and Westmorland Antiquarian and Archaeological Society* 87, 1987, 215-35.

Fairweather, B. *The 300-Year Story of Ballachulish Slate*. Glencoe: Glencoe and North Lorn Folk Museum, no date.

Foster, C. Le N. and Cox, S.H. *Ore and Stone Mining*. London: Charles Griffin and Co., 1910.

Fowler, P. *Landscapes for the World*. Windgather, 2004.

Greenwell, A. and Elsden, J.V. *Practical Stone Quarrying*. London: Crosby Lockwood, 1913.

Gwyn, D. 'Valentia Slate Slab Quarry', in *Cuman Seandaloichta is Staire Chiarrai/Journal of the Kerry Archaeological and Historical Society* 24, 1995, 40-57.

Gwyn, D. *Anjou and Gwynedd: Slate Landscapes*. Maentwrog: Snowdonia National Park, 2013.

Hayter, H. 'Holyhead New Harbour', in *Minutes of the Proceedings of the Institution of Civil Engineers* 44, 1875-76, 98-105.

Kopalek, T. *Die Deutsche Erd- und Steinwerke GmbH am Mauthausen-Gusen 1938-1945*. University of Vienna, Mag. Phil. Thesis, 2103.

Lorigan, C. *Delabole The History of the Slate Quarry and the Making of its Village Community*. Caversham: Pengelly Press, 2007.

O'Reilly, D. 'The Slate Quarrying Industry on Sherkin Isand, Co. Cork', in *The Journal of the Mining Heritage Trust of Ireland* 12, December 2012, 53-56.

Phillips, J. 'Quarry Houses on the Isle of Purbeck, Dorset', in *Bulletin of the Peak District Mining History Society* 13 2, 1996, 155-162.

Plűmpe, T. *Die westfalische Schiefer-industrie*. Leipzig: Verlag von Veit & Comp., 1917.

Ramsey, D. 'New light on early slate and granite extraction in North West Leicestershire', in *Leicestershire Industrial History Society Bulletin* 18, 2007, 3-79.

Redvers-Higgins, N., Willies, L. and Wain, I. 'Finished Labour of a Thousand Hands': The Archaeology of the Combe Down Stone Mines, Bath, Somerset. Oxford: Oxford Archaeology Monograph, 2011.

Roberts, G.R. *New Lives in the Valley: Slate Quarries and Quarry Villages in North Wales, New York and Vermont, 1850-1912*. Somersworth: New Hampshire printers, 1998.

Rynne, C. *Industrial Ireland 1750-1930 An Archaeology*. Cork: Collins Press, 2006.

Scheibner, C.P. 'The Carrara-Marble District Railway', in *Minutes of the Proceedings of the Institution of Civil Engineers* 103, 1891, 342-351.

Scientific American. 'The Carrara Marble Industry', in *Scientific American* 54 1376, 17 May 1902.

Sharpe, A. *Coastal Slate Quarries: Tintagel to Trebarwith*. Truro: Cornwall Archaeological Unit, 1990.

Soulez Lariviere, F. *Les Ardoisieres d'Angers*. Angers: Prestograph, 1979.

Stanier, P. *Quarries of England and Wales; an historic photographic record*. Truro: Twelveheads, 1995.

Thomas, I. *Quarrying Industry in Wales/Y Diwydiant Chwareli yng Nghymru*. National Stone Centre, 2014.

Tomlinson, C . *Cyclopaedia of Useful Arts*. London and New York: Virtue, 1854.

Trinder, B. *The Making of the Industrial Landscape*. London, Melbourne, Toronto: Dent, 1982.

Trinder, B. *Britain's Industrial Revolution: The Making of a Manufacturing People*. Lancaster: Carnegie, 2013.

Tucker, D.G. 'The Slate Quarries of Easdale, Argyllshire, Scotland', in *Post-Medieval Archaeology* 10, 1976, 118-30.

Tucker, G. and Tucker, M. 'The Slate Industry of Pembrokeshire and its Borders', in *Industrial Archaeology Review* 3 (3), 1979, 203-27.

Tyler, I. *Honister Slate: The History of a Lakeland Slate Mine*. Caldbeck: Blue Rock Publications, 1994.

Tyson, B. 'Transportation and the Supply of Construction Materials: An Aspect of Traditional Building Management' in *Vernacular Architecture* 29, 1998, 69-73.

Voisin, L. *Les Ardoisieres de l'Ardenne*. Charleville-Mezieres: Editions Terres Ardennais, 1986.

Walsh, J.A. *Scottish Slate Quarries*. Edinburgh (Historic Scotland Technical Advice Note 21), 2000.

Ward, O. *French Millstones: Notes on the Millstone Industry at La Ferté-sous-Jouarre*. International Molinological Society, 1993.

Wood, P. 'Tools and Machinery of the Granite Industry' in *The Chronicle of the Early American Industries Association* 59 2, 2006, 37-52 to 60 1, 2006, 10-32.

Online publications

Uhlir, C. and Gwyn, D. *Stone Quarrying Landscapes as World Heritage Sites*, 2015. **http://ticcih.org/wp-content/uploads/2015/02/stonequarryinglandscapes.pdf**

Bergeron, L. *Les villages ouvriers comme* éléments *du patrimoine de l'industrie,* 2011 **https://www.icomos.org/en/116-english-categories/resources/publications/229-les-villages-ouvriers-comme-elements-du-patrimoine-de-lindustrie**

Archival material held in depositories outside the United Kingdom

Library of Congress: G3754.F3H5 1856 .R5., map of Fairhaven Slate Quarry.

Archives départmentales du Maine-Loire: FR AD 49, 15 J 414, *Notes d'un voyage aux ardoisières du Pays de Galles*.

8 Contact Information of Responsible Authorities

8.a Preparer

Leader

Roland Evans, Assistant Head, Economy and Community,
Cyngor Gwynedd Council

Address:
Stryd y Jêl
Caernarfon
Gwynedd
LL55 1SH
United Kingdom

Telephone: 01286 679 450
Email: rolandevans@gwynedd.llyw.cymru

Team

A Coordination team has been responsible for the preparation and delivery of the nomination dossier comprising representatives from Gwynedd Council, Cadw, the Royal Commission on the Ancient and Historical Monuments of Wales, and specialist consultants/external advisors Dr David Gwyn and Barry Gamble. Input and advice has also been provided by all members of the Partnership Steering Group, subgroups, stakeholders and other external advisors.

8.b Official Local Institution / Agency

Cyngor Gwynedd Council

Address:
Stryd y Jêl
Caernarfon
Gwynedd
LL55 1SH
United Kingdom

Telephone: 01766 771000
Email: rolandevans@gwynedd.llyw.cymru

Figure 8.1. The slate-slab stairway connecting Floor C and Floor 1 in the underground workings at Cwmorthin Quarry in Component Part 5 is a good example of a once-common feature.

8.c Other Local Institutions

Snowdonia National Park Authority

Address:
National Park Office, Penrhyndeudraeth, Gwynedd LL48 6LF, United Kingdom
Telephone: 01766 770274
Email: park@snowdonia.gov.wales

Cadw

Address:
5/7 Plas Carew, Cefn Coed, Nantgarw, Cardiff CF15 7QQ, United Kingdom
Telephone: 0300 025 6000
Email: cadw@gov.wales

Visit Wales

Address:
Trefforest Industrial Estate, QED Centre, Main Avenue, Pontypridd CF37 5YR, United Kingdom
Telephone: 0333 006 3001
Email: info@visitwales.com

National Museum Wales

Address:
National Slate Museum, Llanberis, Caernarfon LL55 4TY, United Kingdom
Telephone: 029 2057 3700
Email: slate@museumwales.ac.uk

Bangor University

Address:
Bangor LL57 2DG, United Kingdom
Telephone: 01248 351151
Email: marketing@bangor.ac.uk

Royal Commission on the Ancient and Historical Monuments of Wales

Address:
National Library of Wales, Penglais Road, Aberystwyth SY23 3BU, United Kingdom
Telephone: 01970 621200
Email: nmr.wales@rcahmw.gov.uk

National Trust

Address:
Penrhyn Castle and Garden, Bangor, Gwynedd LL57 4HT, United Kingdom
Telephone: 01248 353084
Email: penrhyncastle@nationaltrust.org.uk

Ffestiniog & Welsh Highland Railway

Address:
Harbour Station, Porthmadog, Gwynedd LL49 9NF, United Kingdom
Telephone: 01766 516000
Email: enquiries@ffwhr.com

Talyllyn Railway

Address:
Wharf Station, Tywyn, Gwynedd LL36 9EY, United Kingdom
Telephone: 01654 710472
Email: enquiries@talyllyn.co.uk

Porthmadog Maritime Museum

Address:
The Harbour, Porthmadog, Gwynedd LL49 9LU, United Kingdom
Telephone: 01766 514581

Gwynedd Archaeological Trust

Address:
Craig Beuno, Garth Road, Bangor, Gwynedd LL57 2RT, United Kingdon
Telephone: 01248 352535
Email: gat@heneb.co.uk

8.d Official Website

http://www.llechi.cymru/en/Home.aspx
Contact name: Roland Evans
Email: rolandevans@gwynedd.llyw.cymru

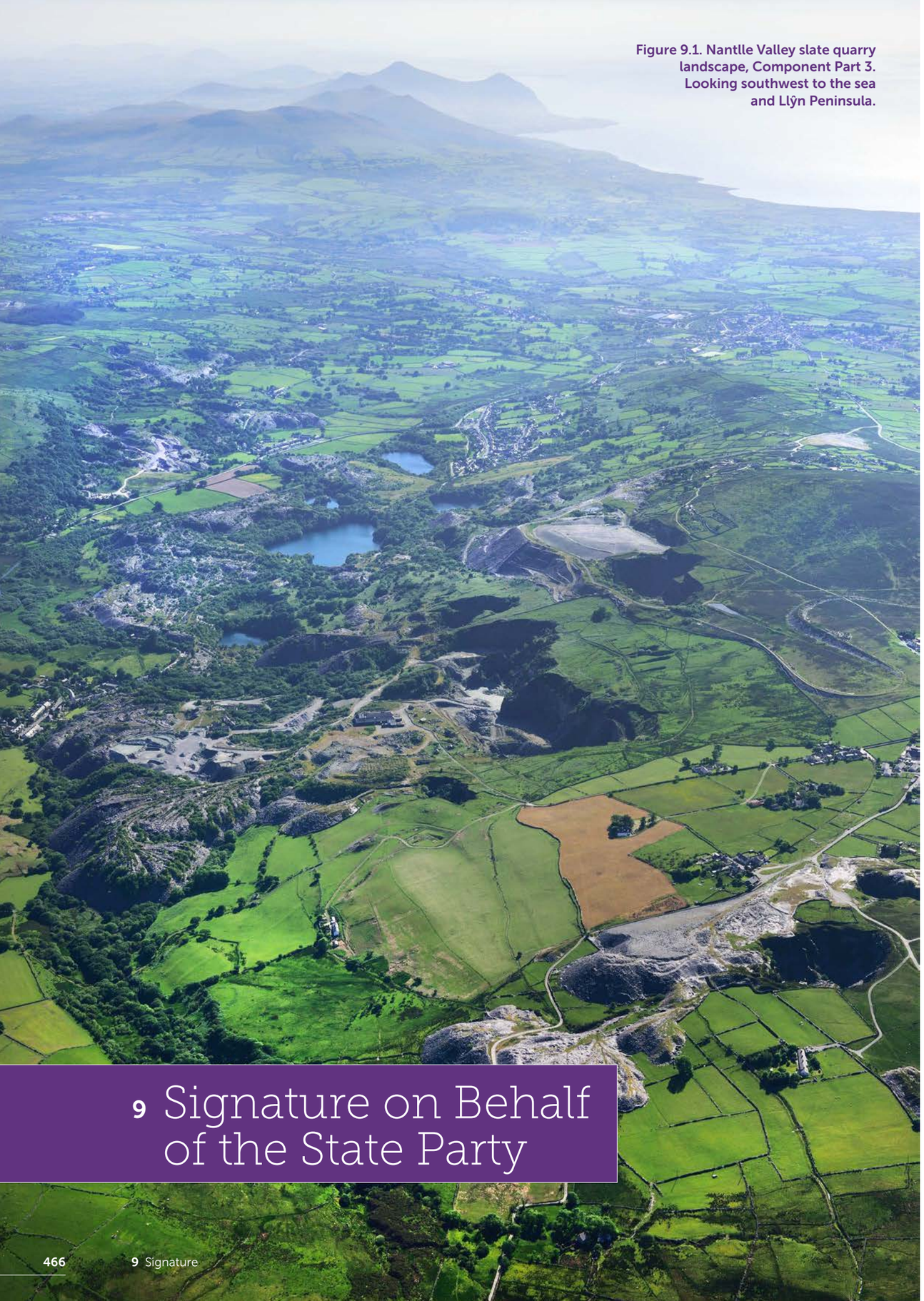


Figure 9.1. Nantlle Valley slate quarry landscape, Component Part 3. Looking southwest to the sea and Llŷn Peninsula.

9 Signature on Behalf of the State Party

Llechi Cymru
Wales Slate

Signed on behalf of the Government of the United Kingdom

Giles Smith
Deputy Director for Heritage Tourism and Cultural Diplomacy

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Partneriaeth Ogwen
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Antur Nantlle
Nantlle 2020
Zip World
First Hydro / Engie
Natural Resources Wales
Welsh Water
Farmers Union of Wales
National Farmers Union
Corris Railway
Llanberis Lake Railway
King Arthur's Labyrinth
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Inigo Jones
Transport for Wales
Unloved Heritage?
Llyfrgell Genedlaethol Cymru – National Library of Wales

The Project Coordination Team:
Roland Evans, Cyngor Gwynedd Council
Hannah Joyce, Cyngor Gwynedd Council
Gareth Jones, Cyngor Gwynedd Council
Louise Barker, Royal Commission on the Ancient and Historical Monuments of Wales
Dr Kathryn Roberts, Welsh Government, Cadw
Ashley Batten, Welsh Government, Cadw
Dr David Gwyn, Govannon Consultancy
Barry Gamble

The LleCHI and Community Engagement Team:
Gwenan Pritchard
Iwan Terschowetz
Elin Evans
Bethan Jones-Parry
Catrin Siriol

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Blaenavon Industrial Landscape
Castles and Town Walls of Kind Edward in Gwynedd
The English Lake District
Pontcysyllte Aqueduct and Canal

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Neuadd Ogwen
Llandygai Community Council
Bethesda Community Council
Llanllechid Community Council
Ysgol Dyffryn Ogwen

Component Part 2: Dyfodol Deiniolen
Deiniolen Rural Futures
Pwyllgor Pentra
Grwp Datblygu Deiniolen
Llanberis Community Council
Llanddeiniolen Community Council
Menter Fachwen
Ysgol Y Felinheli
Hwb Eryri
Ysgol Brynrefail
Deiniolen Band
International Earth Resource Centre
Llanberis Community Centre
Tidy Towns
Y Festri
St Padarn Church Appeal
Padarn Peris Energy
Framed Bicycle Company
Llanberis Community Development Group

Component Part 3: Ysgol Dyffryn Nantlle
Unloved Heritage
Nantlle 2020
Antur Nantlle
Llanllyfni Community Council
Grŵp Cynefin
Siop Griffiths
Llanllyfni Community Council
Canolfan y Fron

Trigonos
Nick Ashby
David Ingham
Bragdy Lleu Brewery

Component Part 4: Dolbenmaen Community Council

Component Part 5: Cymdeithas Hanes Bro Ffestiniog History Society
Ysgol y Moelwyn
Cwmni Bro Ffestiniog
Y Dref Werdd
Antur Stiniog
Ysgol Maenofferen
Porthmadog Town Council
Penrhyndeudraeth Community Council
Maentwrog Community Council
Blaenau Ffestiniog Town Council
Ysgol Eifion Wyn
CellB

Component Part 6: Tywyn History Society
Tywyn Chamber of Trade and Commerce
Y Ganolfan Abergynolwyn
Ysgol Penybryn
Ysgol Craig y Deryn
Ysgol Dyffryn Dulas
Bryncrug Community Council
Llanfihangel y Pennant Commmunity Council
Tywyn Town Council
Race the Train
Greener Tywyn
Dysynni Paddling Club
Love Tywyn
Tywyn Baptist Church
Lounge Holidays
Clocktower Books

Our Slate Youth Ambassadors:

Swyn Huws, Huw Jarman, Osian Thomas, Esyllt Roberts, Cian Rhys, Elan Williams, Beca Nia, Elin Lane, Llion Davies, Hanna Evans, Elis Jones, Chelsea Jones, Meilir Griffiths, Cai Thomas

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We apologise if we have missed naming you as a contributor.

Design and layout: Owain Hammonds

Figure 9.2 The steam mill at Diffwys Slate Quarry which overlooks Blaenau Ffestiniog in Component Part 5.

Front Cover:
Dinowig Slate Quarry (Component Part 2)

Back Cover:
Penrhyn Slate Quarry and Bethesda (Component Part 1)
Nantlle Valley slate Quarry Landscape (Component Part 3)
Gorseddau Slate Quarry (Component Part 4)
The Ffestiniog Railway (Component Part 5)
Underground Workings at Bryneglwys Slate Quarry (Component Part 6)

Title page and contents:
Pen yr Orsedd war memorial (Component Part 3)


THE ROCKS IN THE EMPTY
R·NI LIFA BYWYD CREIGIWR
CWM EIGIAU
CWM MAENGWYNEDD
CROESOR BACH
CRAIG RHIWARTH
CORNGAFR
CRYMLYN
CROES Y DDWY AFON
CRAIG WYNNSTAY
CRAIG RHOSAN
CONGLOG
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CWM ERA
CWM GWENLAIS
CWM MERCHON
CWM TYWYLL
CYMERAU
CHWAREL FAWR
CHWAREL OWEN PARRY
DARREN
DINAS DDU
DANDDERWEN
DEESIDE
DINORWIG
DOLGOCH
DOROTHEA
EGRYN
FOTY
FRONFRAITH
FFOREST
GALLT Y FEDW
GALLT Y MAWN
GARTHEINIOG
GLANDYFI
GLOGUE
FRIOG
FFRIDD