PENDERYN QUARRY

Twyn y Glog Ridge Reserves Swap

Environmental Statement Volume 1

April 2019

ENVIRONMENTAL STATEMENT

VOLUME 1

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Twyn-y-Glog Ridge Reserves Swap

Client: Hanson
Job no. 407.00027.00475
Document title: Environmental Statement Volume 1
Status: Final v6
Date: 17 04 19

Ref: ES

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1.0 INTRODUCTION

1.1 Background

This Environmental Statement (ES) sets out the results of an Environmental Impact Assessment (EIA) which has been undertaken to accompany a planning application submitted by Hanson UK Ltd to the Brecon Beacons National Park Authority (BBNP).

The application seeks permission for a new area of working at the south eastern corner of Penderyn Quarry, but with the scheme proposing the relinquishment of the rights to quarry permitted reserves in the south western area of the quarry along the Twyn-y-Glog ridgeline. In effect, the application represents a 'reserve swap'. There would be no net increase in the available reserve as a consequence of the reserve swap: indeed, in practical terms, the consequence of quarrying within the Application Site compared to the currently permitted area proposed to be relinquished would be a net reduction in the available planned reserve at the overall quarry of some 7.4 million tonnes.

A plan showing the location of the Application Site in relation to the existing Penderyn Quarry is produced as **Figure 1.1.** This shows the '**Application Site** 'edged in red, and the proposed area where existing planning permission is to be relinquished (the '**Preserved Area**') shown hatched green.

The objective of the scheme is to deliver a substantial landscape benefit via the retention of the prominent western half of the Twyn-y-Glog ridgeline which would otherwise be quarried and removed as part of the currently permitted quarry development scheme. The Application Site is also in a location which is more remote from residential properties and the village of Penderyn.

The scheme has been further guided by the findings of the landscape and Visual Impact Assessment (LVIA) undertaken as part of the EIA and produced in full as Appendix 1 to the ES. This notes the 'LANDMAP' recommendation to "*ensure that no significant features of geomorphological significance are lost to development"*, and the objectives of the BBNP Management Plan (2015 - 2020) "*to reduce damage done to the Park by mineral working*". These issues are discussed further in Section 5 of the ES, and in the planning policy section of the accompanying Planning Application Statement.

The Application Site lies within the boundary of a planning permission for quarrying granted in 1972 (reference 1/8523). However, a planning condition imposed on that permission prevents quarrying taking place within the confines of the current Application Site. Thus, whilst the current planning application intends to create a new area of working, that new area is within the boundary of an existing mineral planning permission area. Whilst quarrying has not taken place within the defined area, there have been ancillary operations associated with the construction of haulage roads for overburden placement etc within the defined area. A plan showing the boundaries of the existing planning permissions at the quarry is produced as **Figure 1.2**.

In March 2011 an application was submitted to update the planning conditions imposed on the respective mineral planning permissions at Penderyn Quarry (reference Environment Act 1995 Review of Old Mining Permissions, commonly referred to as a 'ROMP Review'). This application provided an opportunity to review the approved development scheme and to propose modernised planning conditions to cater for a proposed updated development scheme. Through this mechanism, Hanson proposed an almost identical 'reserve swap' involving the quarrying of reserves within the area currently excluded from quarrying within the 1972 permission and the relinquishment of permission to extract reserves along the western part of the Twyn-y-Glog ridgeline (covered by a 1958 Planning Permission – reference 1/ 2427). However, the ROMP application has not been determined at the time of submitting this current application as a result of regulatory issues surrounding the dewatering of the quarry workings at depth and the potential hydrogeological/ecological effects arising from such activities.

The consequence of the delay in determining the ROMP application has resulted in a position whereby there are now limited accessible reserves available at the quarry without either (a) deepening the quarry (as approved) or (b) quarrying the Twyn-y-Glog ridgeline (also as approved). Hanson has

concluded that it would be prudent to submit a freestanding application to "extend" the quarry workings into the 'excluded' 1972 planning permission area and promote the 'reserve swap' associated with the preservation of the Twyn-y-Glog ridgeline. In effect, this would deliver the same objective of a 'reserve swop' as proposed as part of the ROMP Review application, but via a different mechanism and application. It would also result in a reduction in the surface area of the quarry operational area, with an application site area of 1.77 hectares, and a proposed 'Preserved Area' of 2.35 hectares.

Importantly in the context of the current planning Application Site, the quarrying of reserves within the discreet Application Site area would be confined to levels above the water table (on a precautionary basis, taken to be levels above 265m AOD). The consequence would be that the potential hydrogeological/ecological effects associated with the wider quarry development (and consideration of the outstanding ROMP Review application) would not apply to the specific development within the 'extension' Application Site.

1.2 The Application Site

The Application Site is some 1.77 hectares in extent, and comprises a narrow rectangular area averaging 340 metres long by 60 metres wide at the south eastern extremity of Penderyn Quarry. Penderyn Quarry itself is some 44.6 hectares occupying land to the north, north west and west of the Application Site.

The Application Site comprises an area of upland acid grassland with bracken over areas of previous disturbance comprising piles of loose rock and small areas of rock outcrop. Towards the western end of the area there is an exposure of bare ground where vehicles accessed a historic quarry tipping area to the south and south east of the Application Site. That historic tip, referred to as 'the sinkhole tip' is dominated by ephemeral short perennial grassland.

The area of Twyn-y-Glog ridge to the west (outside the Application Site but permitted for quarrying) is distinctive in being dominated by south facing rock exposures. The Millstone Grit (Twrch Sandstone) slabs are extensive, with more diverse grassland and moss species around the edges of the outcrops within the overall heathland/acid grassland vegetation. These areas are generally unmanaged other than by grazing by rabbits and itinerant sheep, and as a consequence the area has a different character to the pasture in the wider locality where, to the south east, the vegetation changes to largely open moorland dominated by acid grass, heathland and bracken.

The Application Site is at the furthest extremity of Penderyn Quarry in terms of the village of Penderyn, which lies at a distance of some 1.1 km to the west. The western most edge of the Twyn-y-Glog ridgeline is at a distance of some 700m from the edge of Penderyn village.

1.3 The Proposed Development

The scheme would involve a straightforward development of the upper faces and benches along the existing south eastern edge of the quarry into the defined Application Site. With the confined area of the Application Site, this would restrict the development of the benches to those above 268m AOD. With the lowest elevation at approximately 268m AOD within the Application Site, the development would be confined above the water table, and there would thus be no groundwater effects arising from the development within the Application Site.

The faces and benches within the Application Site would be subject to restoration treatment, principally through natural regeneration, but supplemented by the seeding or planting of locally native trees and shrubs where necessary. This is discussed further in Section 3.0 below with the restoration of the Application Site area integrated into a comprehensive restoration scheme for the overall Penderyn Quarry area.

1.4 Environmental Impact Assessment

1.4.1 Context

An Environmental Impact Assessment (EIA) has been undertaken to consider the environmental effects of the proposed development, and the results are presented in this Environmental Statement (ES). The ES has been prepared in accordance with the requirements of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations

2017. The Regulations update earlier similar Regulations issued in 1999 and implement EC Directive No 85/337 on the assessment of the effects of certain public and private projects on environment. The Directive's main aim is to ensure that the decision-making authority determines the application in the knowledge of any likely significant effects on the environment.

The Regulations set out a procedure that must be followed for certain types of projects before permission can be granted. This procedure known as 'Environmental Impact Assessment' is a means of drawing together in a systematic way an assessment of the likely significant environmental effects of a particular development. This helps to ensure that predicted effects are identified, and the scope for minimising those effects are considered and properly understood at the time the decision is made.

The 2017 EIA Regulations define the circumstances and establish the procedures for carrying out Environmental Impact Assessments for projects that require planning permission. There is no up to date guidance in Wales on the interpretation and implementation of the 2017 Regulations, other than a brief reference in the Welsh Government 'Development Management Manual; May 2017'.

However, whilst not applicable in Wales, there is guidance on the English version of the EIA Regulations (Town and Country Planning) Environmental Impact Assessment (Regulations 2017) set out in the 'Planning Practice Guidance' which accompanies the English National Planning Policy Framework (NPPF). Given that the Regulations are essentially identical, this guidance has been drawn upon where appropriate.

The EIA Regulations categorise a range of developments as either 'Schedule 1' where EIA will always be required, and 'Schedule 2' where EIA may be required if the development "*is likely to have significant effects on the environment by virtue of factors such as its nature, size or location*". National Parks are separately defined in the Regulations as 'sensitive areas' where, notwithstanding the thresholds and criteria in Schedule 2, all development should be screened to consider whether EIA is required.

Schedule 1 confirms that EIA will be required for quarry developments involving a surface area of more than 25 hectares. Schedule 2 indicates that other quarry developments should be considered for EIA, with the Planning Practice Guidance setting out an indictive criterion and threshold that EIA will be required for quarry development "*covering more than 15 hectares or involving the extraction of more than 30,000 tonnes per year*". The development within the Application Site in conjunction with the quarrying operations in the remaining Penderyn Quarry area would exceed the output criteria. This, together with the location of the site within a 'sensitive area (National Park) has led the Applicants to conclude that an EIA should be undertaken, and that the application should be supported by an Environmental Statement.

In undertaking an EIA, it is important to stress that an EIA should focus on the main significant environmental issues with a targeted assessment: it is not the role of EIA to identify each and every impact.

Planning Practice Guidance (England) provides further advice on the information to be included within an ES. It notes that whilst every ES should provide a full factual description of the development, the emphasis of Schedule 4 is on the "main" or "**significant**" effects to which a development is likely to give rise. It confirms that an ES "should be proportionate and not be any longer than is necessary to assess properly those effects. **Where, for example**, **only one environmental factor is likely to be significantly affected the assessment should focus on that issue only. Impacts which have little or no significance for the particular development in question will need only very brief treatment to indicate that their possible relevance has been considered"** (ref Planning Practice Guidance ID4-033).

In the context of these requirements and guidance, the EIA has taken a proportional approach which focuses on issues perceived to have the potential to give rise to "significant" environmental effects.

1.4.2 Scope of the EIA

The EIA Regulations 2017 set out a procedure whereby applicants can seek advice from the Planning Authority as to the issues which should be covered

as part of an EIA. This is referred to in the regulations as a 'scoping opinion'. This exercise is not mandatory, and applicants can determine the scope of an EIA either independently, informally with the Planning Authority, or formally via a 'scoping opinion'.

In this instance, given the very straightforward nature of the proposed development, the Applicants have not deemed it necessary to seek a formal 'scoping opinion'. They have however held informal discussions with Mineral Planning Officers representing BBNP, and in the context of the above advice and the need for EIAs to be proportionate and to focus on key issues, it has been agreed that the topics to be addressed as part of the EIA can be confined to:

(i) The landscape and visual effects of operations within the Application Site, and the benefits of relinquishing the rights to quarry within the Twyn-y-Glog ridgeline area;
(ii) The hydrological (surface water) effects of the development in terms of surface water flows and effects on the catchment areas (noting that there would be no hydrogeological (groundwater) effects associated with the development); and
(iii) The ecological effects of the development within the Application Site and the ecological benefits of relinquishing the rights to quarry within the more ecologically valuable Twyn-y-Glog ridgeline area.

It has also been agreed that other topics conventionally addressed as part of a minerals development EIA will be briefly assessed but in the context of the planning and other regulatory controls which are already in place at the quarry relating to noise and blast vibration limits, and air quality / dust mitigation and monitoring (including controls imposed by the plant environmental permit).

1.4.3 Technical studies

In order to ensure that the agreed key topics are suitably addressed the Applicants have commissioned specialist consultants to deal with:

- Landscape and Visual Impact Assessment – WYG
- Hydrology – ESI/Stantec; and
- Ecology – Sylvan Ecology

The EIA has also drawn upon the technical studies undertaken as part of the 2011 ROMP Environmental Statement, which, whilst prepared for a separate application, remain relevant in terms of the other environmental effects associated with the development within the Application Site and the inter-related operations within the existing quarry.

The EIA Regulations 2017 introduced specific requirements that "(a) an Environmental Statement must be prepared by persons who in the opinion of the relevant planning authority have sufficient expertise to ensure the completeness and quality of the Statement; and (b) contain a Statement by or on behalf of the Applicant outlining the relevant expertise and experience or qualifications of such exerts (reference Regulation 18 (5) (a) and (b)). There is also a parallel requirement for the Planning Authority to ensure that they have or have access as necessary to sufficient expertise to examine the Environmental Statement (Reference Regulation 4 (5)).

The EIA project team comprises experienced individuals from well-established organisations who themselves have extensive experience of environmental impact assessments. There is thus no question that the project team have sufficient expertise to ensure the completeness and quality of the statement,

The EIA and preparation of the ES has been coordinated by SLR Consulting which has a specialist capability in mineral planning. SLR is a member of the Institute of Environmental Assessment and Management (IEAM) with an awarded EIA 'Quality Mark'.

The EIA Quality Mark is a voluntary scheme, operated by IEAM through which EIA activity is independently reviewed, on an annual basis, to ensure it delivers excellence in the following areas:

- EIA Management
- EIA Team Capabilities
- EIA Regulatory Compliance
- EIA Context & Influence
- EIA Content

- EIA Presentation
- Improving EIA practice

1.5 The Environmental Statement

The ES has been prepared to fulfil the requirements set out in the EIA Regulations 2017 regarding the content of Environmental Statements (reference Regulation 17 (3)), and such additional information specified in Schedule 4 relevant to the specific characteristics of the particular development and to the environmental features likely to significantly affected. It includes the minimum requirements of:

(a) a description of the proposed development comprising information on the site, design, size and other relevant features of the development;

(b) a description of the likely significant effects of the proposed development on the environment;

(c) a description of any features of the proposed development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;

(d) a description of the reasonable alternatives studied by the applicant or appellant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the significant effects of the development on the environment;

(e) a non-technical summary of the information referred to in sub-paragraphs (a) to (d); and

(f) any additional information specified in Schedule 4 relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected.

The required Non-Technical Summary of the Environment Statement is produced as a separate document.

The ES has been prepared with a clear structure and reads as a concise single document. It is subdivided into a number of chapters, as follows:

1.0 Introduction, which sets out the background to the development and the EIA

2.0 The Application Site, which describes the application and features of the Application Site and the adjoining Twyn-y-Glog ridgeline.

3.0 The proposed development, which describes the quarry development and restoration scheme within the discreet Application Site, and the relationship of the working and restoration scheme to the existing permitted area.

4.0- 8.0 Environmental effects and mitigation measures comprising an introductory chapter 4.0, landscape and visual impact assessment (5.0); hydrological impact assessment (5.0); ecological assessment (6.0); and other environmental effects (7.0)

8.0 Summary and conclusions, which provide a general overview of the EIA and the key conclusions which are reached.

1.6 Submitted Documents

The ES draws together the inputs from the specialist technical consultants who have undertaken the EIA. It highlights the key findings of the Landscape and Visual Impact Assessment (LVIA), Hydrological Impact

Assessment (HIA) and ecological surveys, which are produced in full as Appendices to the ES (within ES Volume 2).

A separate flood consequences assessment is also included within the Appendices Volume 2. A selection of key figures from the LVIA and HIA are reproduced for ease of reference at the end of chapters 5.0 and 6.0.

A non-technical summary of the ES has been prepared as a separate document (Volume 3) as a means of enabling the findings and conclusions of the ES to be more readily understood.

The planning application which is supported by this ES is formalised by a separate Planning Application Statement which includes the planning application forms and formal application plans. The Planning Application Statement also provides a more detailed description of the planning context of the development scheme, the planning policy against which the application will be judged, and a description of the pre-application community consultation which has been undertaken.

Figure 1-1Site Location

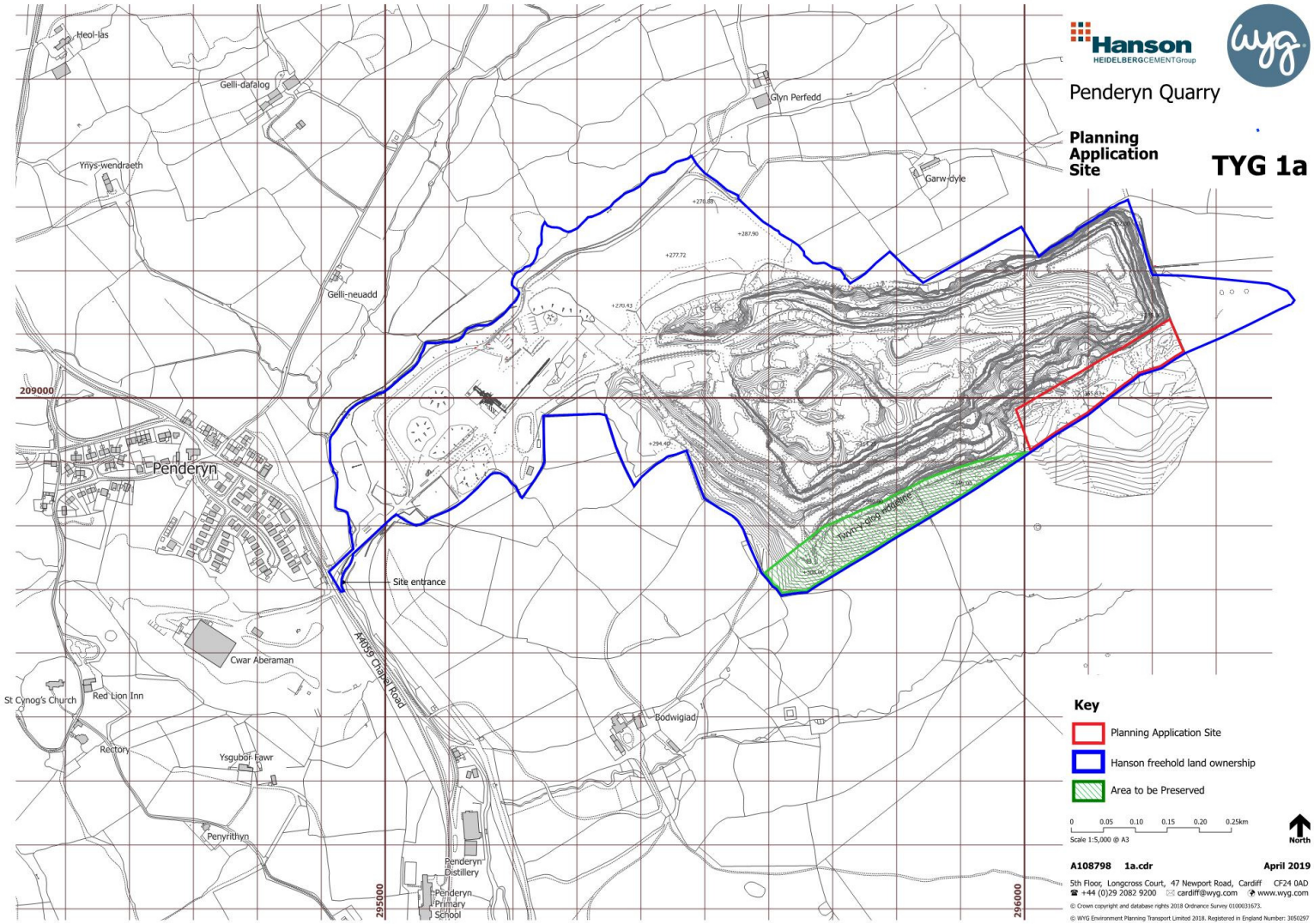
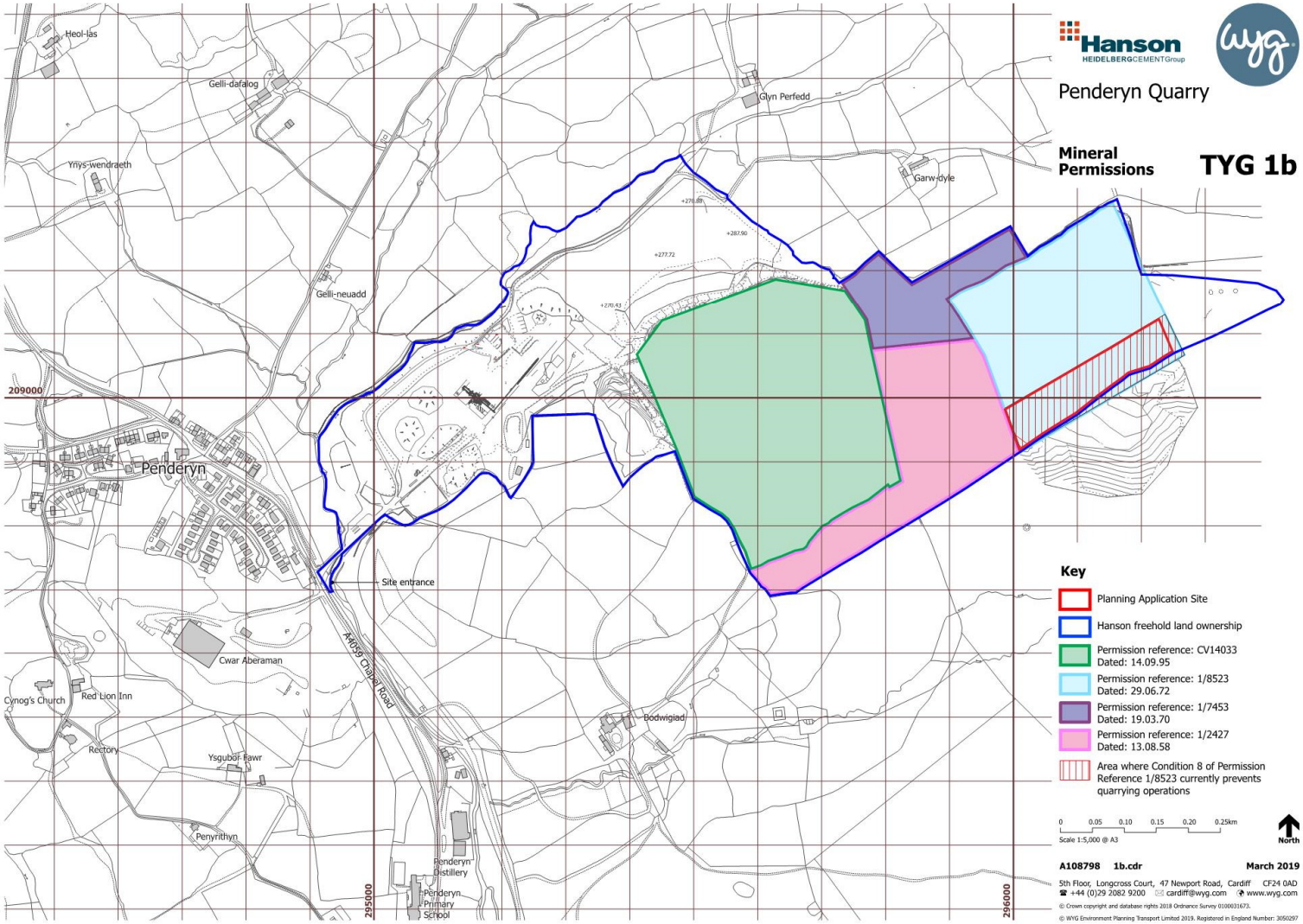


Figure 1-2 Mineral Permissions



2.0 THE APPLICATION SITE

2.1 Site Location

The Application Site is located approximately 1.1 km east of Penderyn village and 2.8 km north of Hirwaun. The Application Site covers approximately 1.77 ha.

The Application Site lies within Penderyn Quarry which covers an area of 44.6 ha. Penderyn Quarry is accessed from the A4059 which lies immediately west of the quarry and 1 km west of the Site.

Other than Penderyn Quarry, land use in the area around the Application Site is predominantly rural, comprising various small settlements, agricultural land, woodland and moorland. Land immediately around the site to the north and west forms part of Penderyn Quarry, and to the south and east is moorland forming the western slopes of the hill Mynydd-y-Glog.

A number of small industrial developments are located in the surrounding area, the closest of which is a concrete block works located immediately west of the quarry and 1.3 km south-west of the Application Site. The Cwm Cadlan Special Area of Conservation (SAC) is located 440 m north of the Site. The Application Site covers approximately 1.77 ha

Settlements surrounding the Application Site include Penderyn village (1.1 km west of the site), Pontbren Llwyd (1.3 km south-west) and Hirwaun (2.8 km south). A number of isolated dwellings and farms are located in the area around the site, including Bodwigiad (725 m south-west), Garw-Dyle (400 m north) and Glyn-perfedd (650 m north).

Ground levels at the Application Site itself, range from 350 – 362 m AOD. The site forms part of the Twyn-y-Glog ridge, and topography slopes away from the site to the north and south. There is a much steeper drop to the north due to the presence of the Penderyn Quarry void and the quarry has currently been worked down to an elevation of 250 m AOD. To the south, topography falls towards the westward flowing Bodwigiad Stream which is at an elevation of approximately 320 m AOD at its closest approach. East of the site, ground levels rise gradually to the summit of Mynydd-y-Glog (at 390 m AOD).

Regionally, topography is dominated by elevated moorland areas including Mynydd-y-Glog, Moel Penderyn (up to 360 m AOD) and Cadair Fawr (485 m AOD). North of the Site are the Brecon Beacons and land is generally topographically much higher. River valleys cut through this high land including Cwm Cadlan, the valleys of the River Cynon and River Hepste.

2.2 Landscape Context

The Application Site covers the south eastern part of the quarry land and is located within the freehold land ownership boundary and within the boundary fence of Penderyn Quarry. There is a restored quarry waste tips to the south of the Application Site and the existing extraction area is located to the north.

Mature trees and screen planting extend along the northern boundary of Penderyn Quarry from the plant site towards Glyn Perfedd. This vegetation links into the strong field pattern of hedgerows extending towards Garw-dyle and the northern boundary of the quarry. Land beyond the southern boundary of the quarry and Application Site is open land, extending towards the higher ground of Mynydd-y-Glog further to the east. In contrast, land to the south-west of the quarry around the farmstead of Bodwigiad has a strong field pattern of dry stone walls, overgrown hedgerows and small areas of woodland.

The Application Site consists of a narrow strip of upland grassland between the restored tip to the south-east and the existing quarry void to the north-west. A post and wire fence separate the site from the open moorland and the restored tip. The site slopes gently in a general south-westerly direction.

The Application Site comprises the undisturbed eastern end of the Twyn-y-Glog ridgeline where it forms a broad shoulder of land to the south of the existing extraction area. To the west of the Application Site the central and western section of the Twyn-y-Glog ridgeline for a prominent ridge with naturally exposed rock outcrops.

2.3 Soils and Agricultural Land Quality

The site is shown on the 1/63,360 scale Provisional Agricultural Land Classification Map (Sheet 154) as either 'land primarily in non-agricultural use' (i.e. the quarry footprint at the time) or Grade 5 agricultural land. Grade 5 land is described in the accompanying explanatory note as "land with severe limitations due to adverse soil, relief or climate, or a combination of these. The main limitations include very steep slopes, excessive rainfall and exposure, poor to very poor drainage, shallow depth of soil, excessive stoniness, low water holding capacity and severe plant nutrient deficiencies or toxicities. Land over 305m (1000 ft) which has more than 1525mm (60") annual rainfall or land with a high proportion of very steep slopes (greater than 1:3) will generally not be graded above 5."

These circumstances apply fully to the circumstances at the Application Site and adjoining undisturbed area along the remainder of the Twyn y Glog ridge, notably the exposed nature of the site, the shallow depth of soil, stoniness (notably the rock outcrops along the western area of the Twyn y Glog ridge), and elevation (with the land averaging some 350m AoD along the Twyn y Glog ridge).

2.4 Geology

The bedrock geology of the area around the site consists of Carboniferous strata. The Carboniferous Oxwich Head Limestone Formation of the Pembroke Limestone Group and younger Twrch Sandstone Formation of the Marros Group crop out at the site. The Oxwich Head Limestone Formation is comprised of fine to coarse grained packstone limestone and includes the Penderyn Oolite (cropping out 60 m north of the site towards the base of the Oxwich Head Limestone) and Honeycombed Sandstone members. These members are comprised of ooidal limestone and calcareous sandstones respectively. The Twrch Sandstone Formation unconformably overlies the Oxwich Head Formation and is formed of quartz arenites and conglomerates.

The older Carboniferous Dowlais Limestone Formation crops out within the Penderyn Quarry void, 125 m to the north of the site. This unit is comprised of various grainstone, packstone and wackestone limestones with some interbedded shale strata. The age of the bedrock strata gets progressively younger moving southwards from the site. The Bishopston Mudstone Formation crops out 2 km south of the Site and the younger still South Wales Lower Coal Measures crops out 1.9 km south-west of the site. The older Devonian Grey Grits Formation and Carboniferous Cwmyniscoy Mudstone (also part of the Pembroke Limestone Group) formations crop out 700 m north-east and 950 m north-east of the site respectively.

A plan showing the bedrock geology within and in the vicinity of the site is produced as **Figure 2.1** (taken from the Hydrogeological Impact Assessment, ES Appendix 2)

The geological structure around the Site is complex. Bedrock strata in the southern part of Penderyn Quarry (including the Application Site) dip gently at 10 - 25º to the south-east and form part of the southern limb of a regional east-west trending antiformal anticline. The site lies on the southern limb of this anticline strata become progressively younger southwards of the anticlinal axis. The Dinas Fault is a regionally significant steeply northerly dipping normal fault, and this runs north-east to south-west 400 m north of the site. The Coed Hir Fault lies 1.5 km north of the site and is a southerly dipping fault with a normal displacement running along a similar orientation to the Dinas Fault. These major faults are cross-cut by a series of north-west to south-east orientated faults.

2.5 Hydrology

The closest surface water feature to the site is the Bodwigiad Stream. This is sourced from an area of moorland south and east of the site and the site itself is included in its catchment. The Bodwigiad Stream flows south-westwards to its confluence with the River Cynon approximately 1 km to the south-west of the site. Another un-named stream is located 550 m north-west of the Application Site and immediately north of Penderyn Quarry and flows south-westwards to its confluence with the River Cynon.

Nant Cadlan is located 700 m to the north; this is sourced 2.8 km north-east of the site on the southern flank of Cadair Fawr and flows west along Cwm Cadlan. Nant Cadlan becomes the River Cynon south-west of the site. OS mapping shows a series of springs and tributaries which contribute to flow in the Nant Cadlan at various points along its course.

The River Cynon flows south-east towards the River Taff which it joins at Abercynon 22.5 km from the site. Nant y Bwllfa is located approximately 1.4 km south of the site. A tributary of the Nant y Bwllfa, the Nant y Deri, is located 1.2 km south of the Application Site. The Nant y Bwllfa is a tributary of the River Cynon and joins this watercourse north of Hirwaun around 2.4 km south of the site.

Nant Melyn is another tributary of the River Cynon. This is sourced 1.7 km west of the site and flows southwards through Nant-moel Reservoir to its confluence approximately 4.5 km south-east of the site.

Further from the site is the River Hepste, which lies 2 km north-west of the site and is sourced from high up in the Brecon Beacons 10 km north of the site. The River Hepste flows south-west and then westwards to its confluence with the River Mellte 3.7 km west of the site. The River Mellte flows southwards and becomes the River Neath 5 km west of the site.

There are a number of other small streams and farm drains that drain to these larger rivers in the area around the site. Areas of limestone outcrop at and around the site have a lower density of watercourses compared to areas underlain by Marros Group and Coal Measures strata. This is particularly apparent around Nant Cadlan, where almost all tributaries are sourced from Marros Group strata rather than limestone strata. The density of streams is greater west of the quarry with most flowing broadly southwards in line with the regional topographic slope.

The closest major waterbodies to the site are as follows:

- Waterbodies associated with water management at Penderyn Quarry;
- Penderyn Reservoir 2.5 km south-west of the site; and
- Nant-Moel Reservoir 2.5 km south-east of the site.

Penderyn Reservoir is an artificial reservoir and does not have an outlet but is used as a water supply abstraction. Nant-Moel Reservoir is fed by inflows from watercourses further up the catchments with outflows from a dam.

The closest other waterbodies are a pond in woodland near Pontbren Llwyd, approximately 1.4 km south-west of the site and a series of small ponds on the moorland of Mynydd-y-Glog, the closest of which is 700 m east. These small ponds may occupy dolines and sinkholes.

Runoff from the northern part of the site discharges towards Penderyn Quarry where it is managed by the existing quarry water management arrangements. Runoff in the southern part of the site discharges to the south. Some of this southward flowing runoff recharges the underlying limestone aquifer, whilst the remainder discharges to the Bodwigiad Stream.

In summary, water management within the quarry is associated with a quarry sump which collects surface water runoff from the quarry void catchment (including the northern part of the site) and some groundwater ingress. The portion of groundwater is considered to be a minor component of dewatering relative to surface water runoff. Water abstracted from the quarry sump is transferred to the Nant Cadlan and is discharged under consent AN0272091. A manually adjustable stopcock allows this flow to be diverted to a series of storage tanks from which water is used for dust suppression and wheel washing purposes.

Post restoration, runoff from the Application Site will attenuate in the large open water feature which constitutes part of the proposed ROMP Review restoration scheme for the wider Penderyn Quarry

2.6 Hydrogeology

The baseline hydrogeology of the site and locality is described in detail in sections 2.5 and 2.6 of the Hydrogeological Impact Assessment (HIA) referred to in Chapter 6.0 and produced as **Appendix 2** to the ES.

The hydrogeological conceptual model set out in section 2.8 of the HIA indicates that the bedrock geological sequence at the site features Twrch Sandstone comprised of cemented sandstone and conglomerate overlying a sequence of Carboniferous Limestone of the Pembroke Limestone Group.

The Bodwigiad Stream is the closest watercourse to the Application Site being situated 300 m south at its closest approach. Due to the lower

permeability of the unit, surface watercourses tend to be mostly sited over areas of Twrch Sandstone (compared to limestone) or where the limestone is overlain by superficial deposits such as glacial till. The Bodwigiad Stream joins the Nant Cadlan west of the site and this becomes the River Cynon south-west of the Application Site.

The Twrch Sandstone is not thought to be saturated at the quarry. Owing to the cemented nature of the constituent sandstone and conglomerate units, this stratum is less permeable than the limestone and the degree of hydraulic connectivity between the two is thought to be limited.

The limestone aquifer has a negligible primary porosity and groundwater flow within the aquifer will be largely dependent upon secondary features such as joints, faults and karstic fissures and conduits. Bedding planes may often act as inception horizons for development of karst features and where lower permeability mudstone units are present, perched groundwater layers may form. Groundwater flow in these perched layers will likely be southwards in line with the stratigraphic dip.

There could be some discharge from the limestone aquifer to surface water features including the, Bodwigiad Stream and Nant Cadlan, where the watercourse directly overlies the limestone aquifer. Such connectivity will be reduced and may even be absent where the limestone is overlain by Twrch Sandstone or glacial till. Dependent on location, the watercourses could be gaining or losing to groundwater. Epikarst features may locally enhance connectivity with the underlying aquifer, such as along the Bodwigiad Stream.

Based on groundwater levels, groundwater flow within the limestone aquifer appears to be flowing south and westwards. However, groundwater flow will vary spatially dependent on the density of fractures and karst formation. Flow in perched layers will likely flow down stratigraphic dip. There is some drawdown due to quarry dewatering evident in monitoring boreholes at Penderyn Quarry, but this appears to have largely stabilised since 2014 and groundwater is thought to comprise only a minor component of quarry dewatering.

Recharge to the limestone is from direct rainfall and runoff through solutional features. Particularly on the southern face of the Penderyn Quarry void, karst has developed though limestone dissolution by acidic runoff from areas of Twrch Sandstone outcrop. Solution features are most prominent at the contact between the Twrch Sandstone and the limestone and represent preferential recharge pathways to the limestone outcrop.

A series of sinkholes are present on the limestone outcrop around Penderyn Quarry. Dolinas have formed on the Twrch Sandstone. These represent preferential recharge pathways to the limestone aquifer and act to limit surface water runoff.

Cwm Cadlan SSSI (also designated as a National Nature Reserve and Special Area of Conservation [SAC]) is the closest designated site to the site. This site is designated for its grassland habitats and is thought to be primarily dependent on surface water. Licenced and private abstractions sourced from groundwater are understood to be abstracting groundwater from the limestone aquifer.

2.7 Access and Traffic

Penderyn Quarry gains access onto the A4059 at the south eastern extremity of the village of Penderyn.

The A4059 runs in a northeast direction from the A470 at Abercynon through Mountain Ash, Aberdare and Penywaun to the A465 Heads of the Valleys Road to the south east of Hirwaun. The route is truncated for approximately 1.3km, where its natural continuation is coincident with the route of the A465, before it heads northwards from a roundabout at the west side of Hirwaun towards and through Penderyn. Beyond Penderyn the A4059 heads generally north then northeast before continuing in a northerly direction across the Brecon Beacons to re-join the A470 just south of ‘Beacons Reservoir, approximately 15.5km southwest of Brecon.

The length of the A4059 between the A465 roundabout to the south and A470 T junction to the north is approximately 15.5km. The access to Penderyn Quarry is approximately 3.3km to the north of the A465 roundabout. Between the roundabout and site access the A4059 is a good standard route with several straight sections linked by gradual bends. The majority of the route is devoid of significant vertical gradient although it does

climb briefly to clear the railway line which runs under the highway along the north side of Hirwaun.

The site access is a simple priority T junction on the east side of the A4059 with kerbed radii forming a bellmouth which extends approximately 33m along the near edge of the priority route. The minor arm access to Penderyn Quarry is controlled by a STOP line along the near edge of the A4059 which extends 15.1m to the north of the southern kerb radius.

The ongoing operation of Penderyn Quarry is anticipated to reflect the current and historic activities in terms of the annual output remaining at around 500,000 tonnes with limestone, roadstone and ready mixed concrete products being distributed by HGV via the existing access on the A4059.

In terms of traffic and highway implications, it is not envisaged that the proposed future activities will vary from the existing operations beyond the normal day to day fluctuations currently accommodated on the road network.

The proposed development at the Application Site will thus provide an alternative source of reserves for a continuation of this pattern of output, and it will not, in itself, result in any change to the pattern of output or HGV flows.

2.8 Cultural Heritage

A baseline cultural heritage study was undertaken as part of the ROMP Review EIA cultural heritage assessment.

This was based upon a 500m radius study area centred on the existing Penderyn Quarry. Figures 2.05 – 2.08 from the ROMP Review ES are reproduced at the end of this chapter, as **Figures 2.2 – 2.5**. (Figures 2.2 to 2.5 depict a red line site area which comprised a cultural heritage study area associated with the ROMP Review application. The red line shown on those figures includes an area adjacent to the southern edge of the Application Site which comprises a former quarry waste tip. This area has been fully restored and integrated into the adjacent moorland and is not part of the current application site).

The study confirmed that there are seven Scheduled Monuments recorded within the study area, including: a round cairn (Fig. 2.06, **8**; SAM GM523A) and ring cairn (Fig. 2.06, **7**; SAM GM523B) to the south-east of the site; Wernlas hut circle to the north-east (Fig. 2.06, **4**; SAM GM562); Wernlas ring cairn (Fig. 2.06, **3**; SAM GM558A) and cairnfield (Fig. 2.06, **10**; SAM GM558B); Wernlas medieval settlement (Fig. 2.06, 20; SAM GM558C); and Pont Sychbant Medieval hamlet (Fig. 2.06, **21**; SAM GM520).

There are no Grade I or Grade II* Listed buildings or Registered Parks and Gardens (Grade II* or Grade I) within the study area. However, there are seven Grade II Listed structures recorded within the study area (Fig. 2.06, **22, 23, 31-35**).

The East Forest Fawr and Myndd-y-Glog Landscape of Special Historic Interest covers a large part of the study area (Cadw 2001, 45), and partially extends into the northern part of the site (see Fig. 2.05). Within this Landscape of Special Historic Interest the Cwm Cadlan character area extends into the central northern part of the Application Site, while the Cefn Cadlan – Cefn Sychbant – Mynydd-y-Glog character area borders the site immediately to the south.

2.8.1 Prehistoric (pre AD 43) and Roman (AD 43 – c. AD 410)

The higher ground to the south and east of the site, broadly part of Mynydd-y-Glog, is a rich prehistoric landscape, with a number of barrows and cairns recorded within the study area. The prehistoric use of this upland landscape predominately dates to the Bronze Age, with a seemingly abrupt abandonment at the end of this period, most likely the result of increasingly inhospitable conditions caused by a deterioration in the climate and over-exploitation. Some of the cairns and barrows identified relate to ritual practices, often the burial of the dead, while others seem to relate to land clearance, in preparation for agricultural use.

Barrows/cairns are the defining features of the Bronze Age in the Welsh uplands, and several Scheduled examples are recorded within the study area. These include a cairn of unsorted rubble with possible internal walling (Fig. 2.06, 8) 250m south-east of the site, and a ring cairn 10m in diameter

(Fig. 2.06, 7) 100m south of the site. Both of these are situated on the south-east facing side of Twyn-y-Glog. These two cairns form part of a wider surviving ritual landscape of prehistoric monuments. The ring cairn 100m south of the site occupies a hill-slope position, below Twyn-y-Glog ridge.

Further probable Bronze Age monuments are recorded at a greater distance from the site, including a ring cairn (Fig. 2.06, 3) and surrounding cairnfield of at least 12 smaller cairns (Fig. 2.06, 10) at Wernlas, 920m north-east of the site. These features lie in enclosed rough pasture at the moorland edge, and at least some of the surrounding cairns appear to be field clearance cairns, as they are associated with lengths of stone-built bank. A possible hut circle has also been identified within this Scheduled area (Fig. 2.06, 10). Just outside the Scheduled area surface finds include a lozenge-shaped arrowhead and a large flint scraper (Fig. 2.06, 6), both suggestive of Bronze Age activity in the vicinity.

There is evidence of late Bronze Age/Iron Age settlement, in the form of a Scheduled hut circle, situated within woodland (Fig. 2.06, 4), 530m north-east of the Application Site. This oval/sub-rectangular enclosure is bounded by banks of stone and terraced into the hill slope. Further enclosures of unknown date, but potentially of prehistoric origin, are recorded 920m north-east of the Application Site (Fig. 2.06, 2, 39) within the Werrnlas Scheduled area.

Probable Bronze Age burial cairns occur within the wider study area, many of these on the higher ground of Mynydd-y-Glog. The examples closest to the site include two small cairns of rounded limestone blocks (Fig. 2.06, 14, 15) recorded on Twyn-y-Glog 120m east of the Application Site. These two cairns are located on the edge of a depression to the north-west of Mynydd-y-Glog summit plateau.

Clearance cairns of probable prehistoric date have been recorded 580m (Fig. 2.06, 5) and 300m (Fig. 2.06, 11) to the east of the Application Site, and on Mynydd-y-Glog 400m (Fig. 2.06, 16) and 550m (Fig. 2.06, 17) south of the Application Site. These probable clearance cairns relate to early land improvement and arable agriculture, rather than burial cairns.

In the Iron Age, settlement seems to have favoured sheltered lower ground, especially river valleys. The uplands within the study area do not have any confirmed enclosures of Iron Age date. The transition to the Roman period resulted in little obvious change in rural settlement construction or patterns in Wales and many late prehistoric settlements seem to continue in use throughout and beyond the Roman Conquest. There are no recorded Roman features within the study area.

2.8.2 Early medieval (AD 410 - 1066) and medieval (1066 – 1539)

There are no recorded features within the study area relating to the early medieval period. The earthwork remains of a possible deserted medieval settlement site (Fig. 2.06, 20) are recorded amongst the Bronze Age ritual monuments at Wernlas. These remains include several stretches of earth and stone field banks, narrow ridge and furrow earthworks, and a large sub-rectangular earthwork enclosure containing a house platform. To the south of these remains, 600m east of the site, there are further potentially medieval settlement remains, relating to the medieval hamlet of Pant Sychbant (Fig. 2.06, 21), also a Scheduled Monument. Pant Sychbant hamlet consists of a complex of banks, enclosures and building-platforms on the lower northern slopes of Mynydd-y-Glog. The earthwork remains of a third possible medieval settlement (Fig. 2.06, 19) are recorded close to the Church of St Cynog's, 400m west of the site.

St Cynog's church (Fig. 2.06, 22) may have pre-Norman origins, and is Grade II Listed. The Churchyard wall, pound and lynchgate may also have medieval origins and are also Grade II Listed (Fig. 2.06, 23).

To the east of the site, on the higher ground of Mynydd-y-Glog, a possible medieval hollow way is recorded (Fig. 2.02, 24), while further to the south stands a ruinous building of possible medieval origins (Fig. 2.06, 25). This rectangular building lies amongst rock outcropping in rough enclosed pasture on the south-west slope of Mynydd-y-Glog. Such medieval farmsteads reflect the exploitation of a range of environments, including streams, enclosed land and moorland (RCAHMW 2003, 32).

2.8.3 Post-medieval (1540 – 1800) and modern (1801 – present)

The wider study area

Post-medieval features recorded within the study area are predominantly found in the lower valley to the west of the site. Here the settlement of Penderyn was first established as an industrial settlement in the 19th century to the east of St Cynog's church. The Zoar Independent Chapel (Fig. 2.06, 26) built in 1859 and a Jerusalem Welsh Calvinistic Methodist Chapel (Fig. 2.06, 27) built in 1857 served the expanding community. Two historic public houses are also recorded within Penderyn (Fig. 2.06, 30, 36), both close to the church on the hill to the west of Penderyn. One of these (Fig. 2.06, 30) was reportedly depicted on a map dating to 1776, and was recorded on the 1840 Tithe Map.

The Rectory, and its associated coach house and stables (Fig. 2.06, 33), are also located close to the church, and are Grade II Listed. A signpost (Fig. 2.06, 34) just to the east of St Cynog's Church is Grade II Listed, as is a milestone (Fig. 2.06, 35) outside the Lamb Hotel on the northern periphery of Penderyn. Just to the south of Penderyn, Railway Crossing Cottage (Fig. 2.06, 28) served as workers housing in the early 19th century.

On the slopes below Twyn-y-Glog, 450m south of the Application Site, a rubble bank sheepfold is recorded (Fig. 2.06, 29), associated with Bodwigiad House. The current Grade II Listed Bodwigiad House (Fig. 2.02, 31) dates to 1815, and is located 750m to the south west of the Application Site. The garden and associated features at Bodwigiad are also Grade II Listed (Fig. 2.02, 32), and include an agricultural range, an aviary, a carriage drive and a lodge set within a small area of woodland.

The Penderyn Quarry site

The 1840 Penderyn Tithe Map is the first map to depict the quarry site in detail (Fig. 2.07). Neither the quarry nor the main area of settlement at Penderyn existed at this date and the majority of the western area of the site comprised small fields, in use as meadow or arable. The higher ground of Twyn-y-Glog, in the southern area of the quarry, was partially enclosed (by a drystone wall still extant within the site, Fig. 2.07, C) and was in pastoral use. A large portion of the eastern area of the quarry was unenclosed, forming the open moorland of Mynydd-y-Glog.

Two small farmsteads were recorded within the quarry. The first was recorded to the centre-north of the quarry, named 'Llewynon' (Fig. 2.07, A), and comprised at least four buildings. The second farmstead was smaller, comprising a single building, named 'The Glogue' (Fig. 2.07, B), and was situated on the southern border of the quarry. Neither of these farms survives, having been destroyed during the expansion of the quarry. The prominent limestone ridges of Twyn-y-Glog were depicted on the Tithe Map in the eastern area of the site, and these acted as the focus of subsequent industrial activity.

The field names within the quarry area are fairly generic, frequently referring to 'cae' (field/enclosure) and 'coed' (tree/timber). The majority of these fields have now been removed by quarrying. At this date (1840) the now permitted Twyn-y-Glog expansion to the south was unenclosed to the east and within a field named 'Coed Cae' to the west, translating as 'tree field/enclosure'.

The extensive limestone quarry at Penderyn was established in the latter half of the 19th century (Fig. 2.06, 37 and 38), and its expansion was prompted by an increased demand for lime from the construction industry and agriculture. The 1891 First Edition Ordnance Survey map recorded a small quarry within the site (Fig. 2.08). The quarry face was situated just to the west of 'Llwyn-on Cwar'. The element 'Llwyn' refers to a grove or bush, while the addition of 'Cwar' (translated as 'Quarry') indicates that the quarry site was established between 1840 and 1891.

In the southern area of the quarry small-scale quarrying activity and a limekiln were recorded (Fig. 2.08, E). Due to the establishment of the quarry the field boundaries in the western area of the site had been removed or substantially altered by this date. A tramway (Fig. 2.04, D) was depicted running through the western part of the quarry towards the quarry face, and this line connected the quarry to the iron works at Hirwaun over 3km to the south. In the eastern area of the site two small enclosures were recorded adjoined to field boundaries (Fig. 2.08, F), and a single 'Old Limekiln' (Fig. 2.08, G) was recorded further east within the site.

The 1952 Revision of the Ordnance Survey map (not illustrated) recorded the further expansion of the quarry face to the east, and the construction of several large buildings at the terminal of the tramway. The majority of the eastern area of the site was undisturbed at this date and had not altered to any great extent from its late 19th-century depiction. Two possible small sheep pens are observable on post 1940s aerial photographs in the vicinity of the enclosures depicted on the 1891 Ordnance Survey map (Fig. 2.08, F). These features were identified within the area subsequently quarried in the later 20th century.

The quarry expanded greatly during the second half of the 20th century, and by the 1980s had reached its current boundaries, along Twyn-y-Glog to the south and running across the open moorland of Mynydd-y-Glog to the east.

2.9 ES Baseline

The above summary of baseline conditions represents a brief overview of the with a much more detailed consideration of current circumstances set out in the LVIA (section 4.3) and HIA (Section 2.0) and summarised further in chapters 5.0 and 6.0 below.

However, this Chapter 2.0 provides a brief outline of current circumstances as a context for the description of the proposed development at the Application Site which is described in the following chapter 3.0.

Figure 2-1 Bedrock Geology

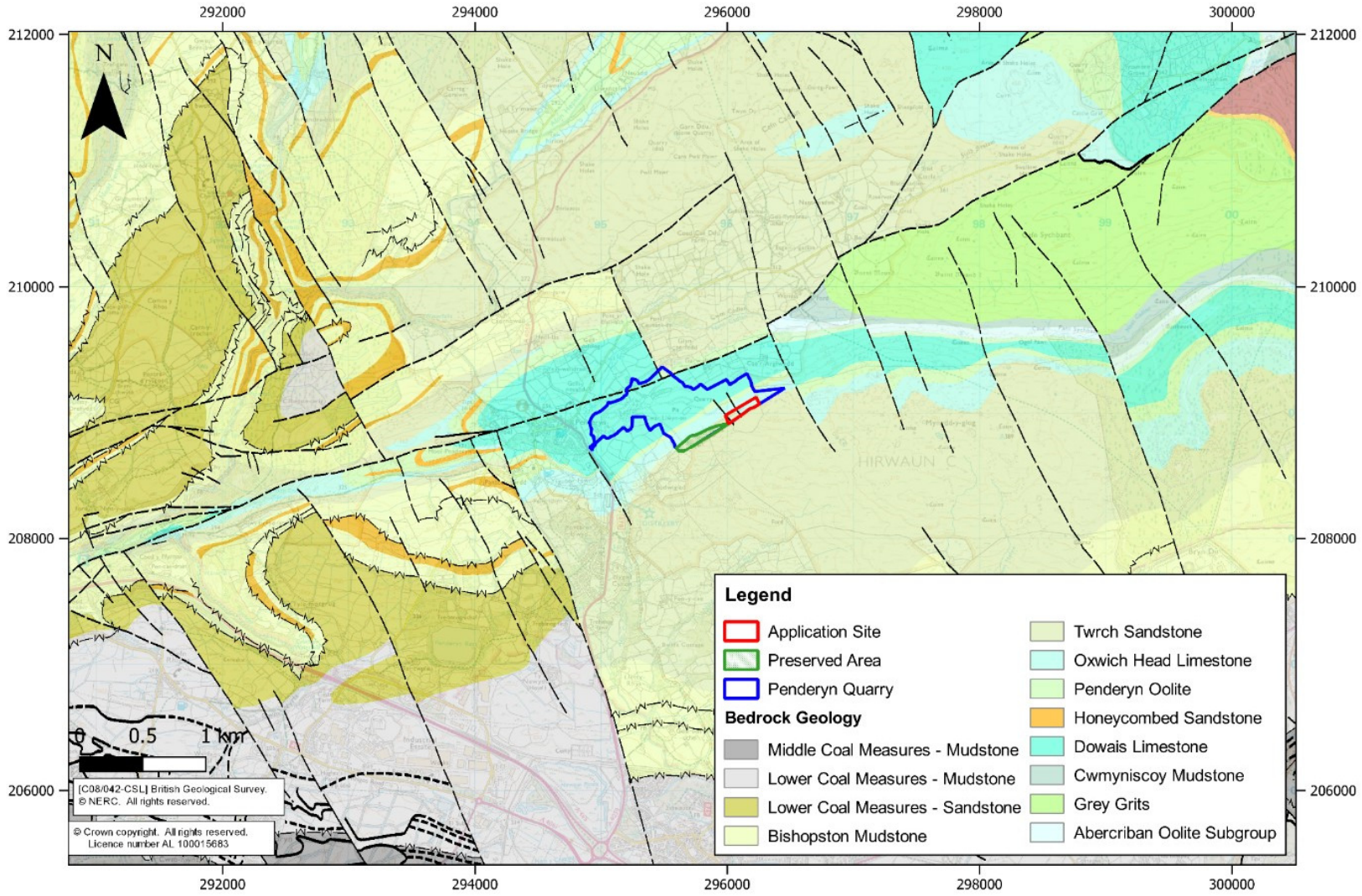


Figure 2-2 Cultural Heritage Designations (Figure 2.05 from 2011 ES)

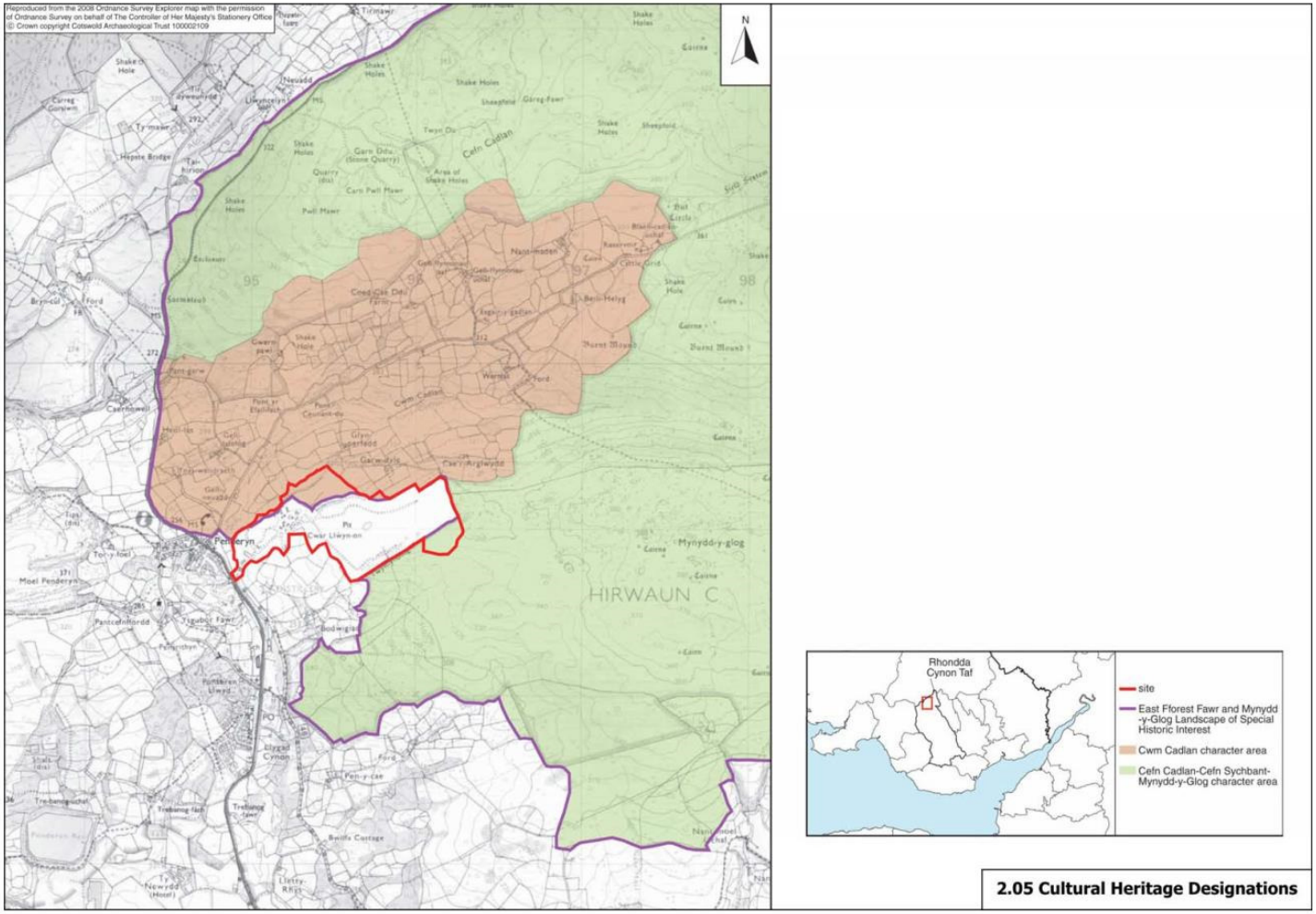


Figure 2.3 Recorded Cultural Heritage (Figure 2.06 from 2011 ES)

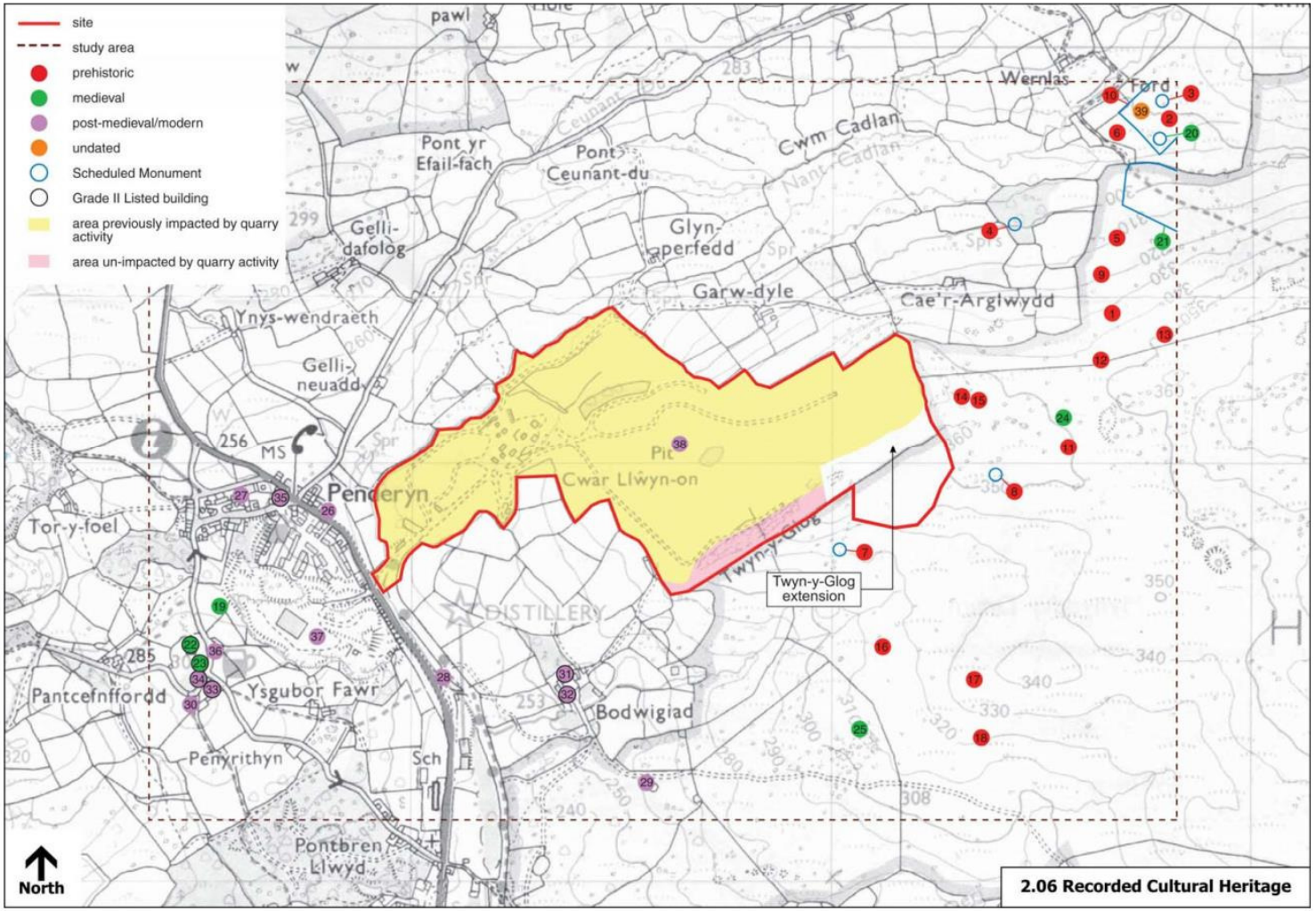


Figure 2.4 Extract from 1840 Tithe Map (Figure 2.07 from 2011 ES)

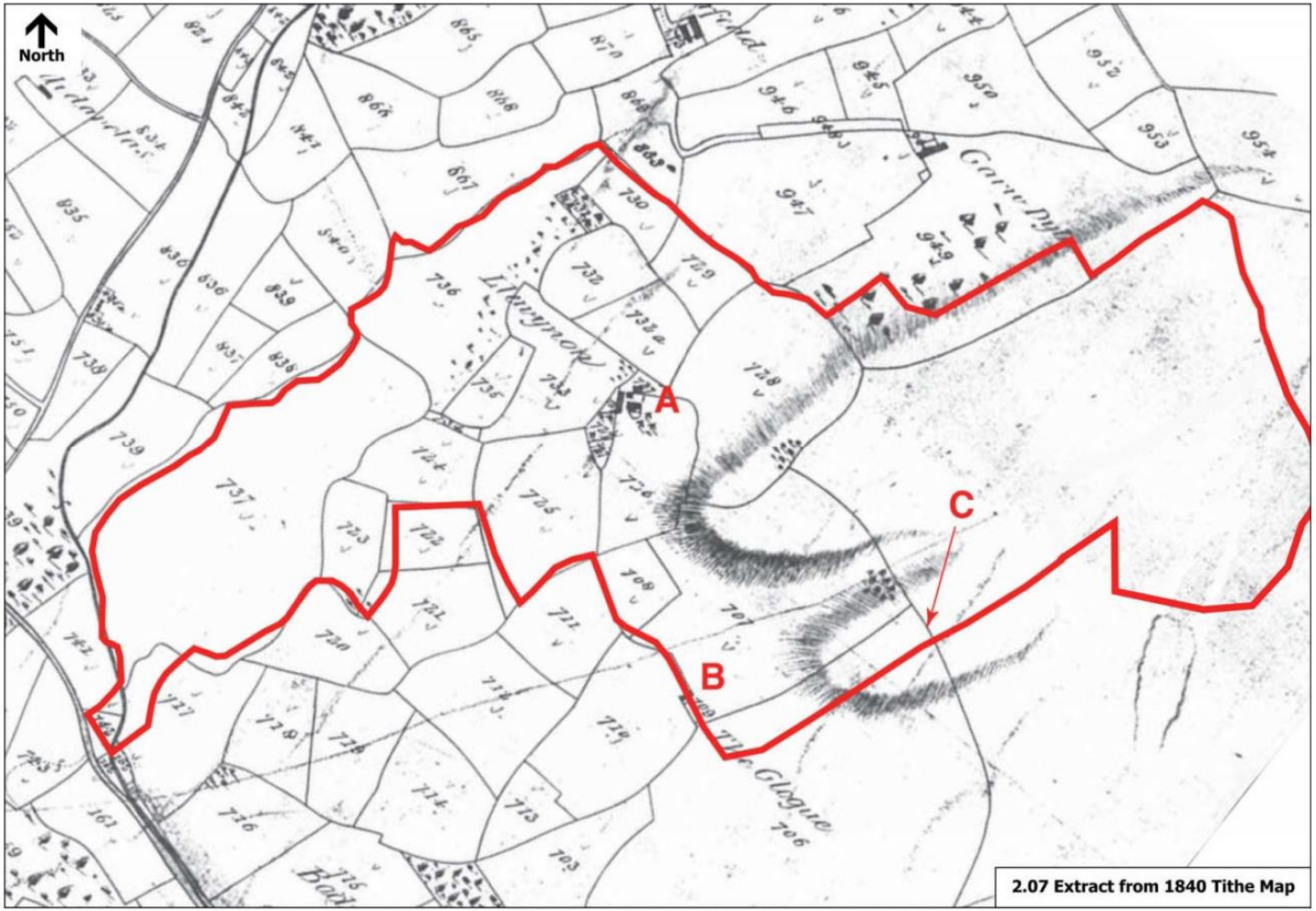
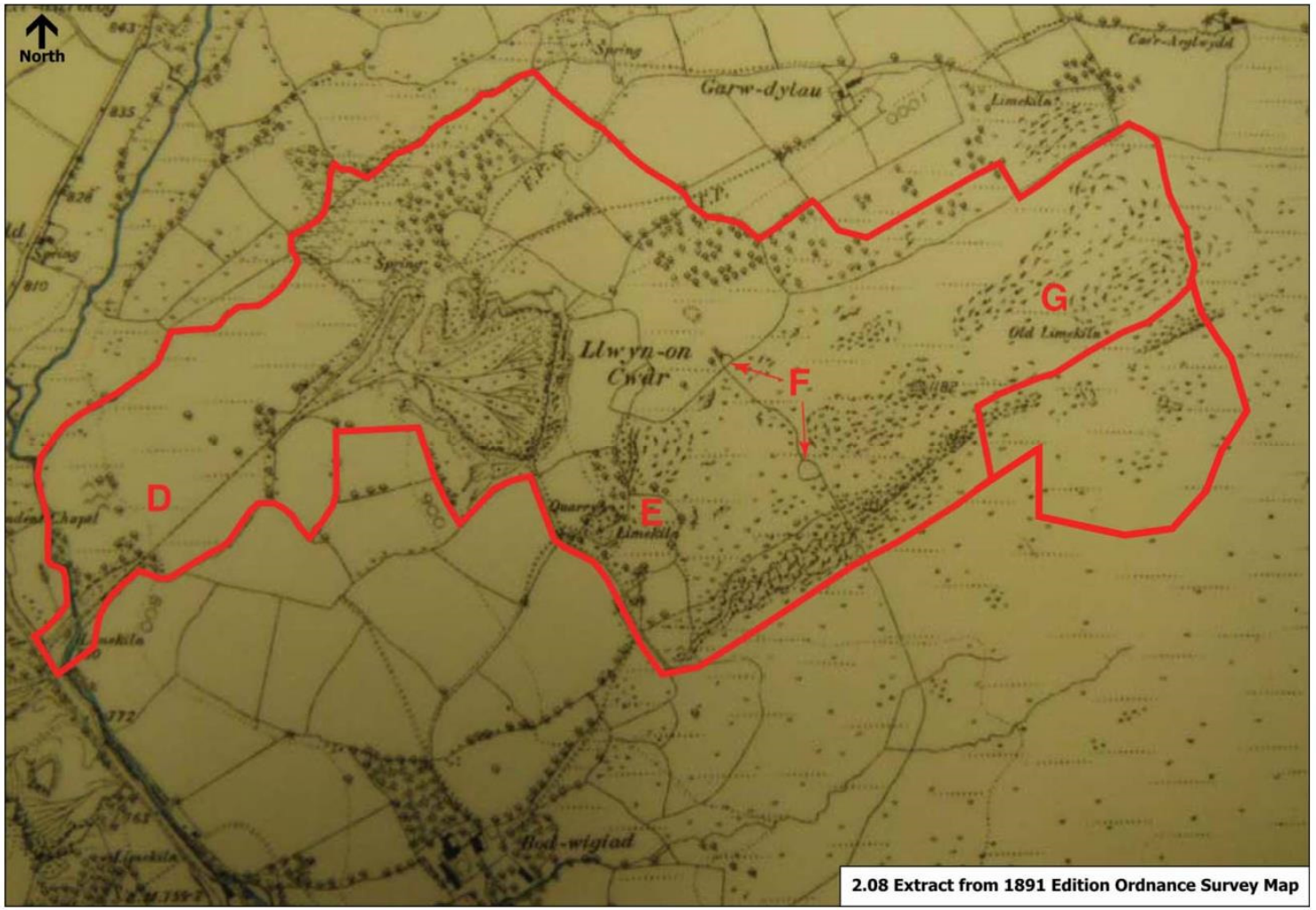


Figure 2.5 Extract from 1891 OS Map (Figure 2.08 from 2011 ES)



THE APPLICATION SITE 2

3.0 THE PROPOSED DEVELOPMENT

3.1 Introduction

The application seeks permission for a new area of mineral working at the south eastern corner of the existing Penderyn Quarry but with the scheme proposing the relinquishment of the rights to quarry permitted reserves in the south western area of the quarry along the Twyn-y-Glog ridgeline, with the application in effect representing a 'reserve swap'.

The consequence of quarrying within the Application Site compared to the currently permitted area proposed to be relinquished would be that there would be a net reduction in the available planned reserve at the overall quarry of some 7.4 m tonnes.

The objective of the scheme is to deliver a substantial landscape benefit via the retention of the prominent Twyn-y-Glog ridgeline which would otherwise be quarried and removed as part of the currently permitted quarry development scheme.

The scheme would involve a straightforward development of the upper faces and benches along the existing south eastern edge of the quarry into the Application Site. With the confined area of the Application Site, this would restrict the development of the benches to levels above 265m AOD.

With the lowest level of working being at 268m AOD within the Application Site, the development would not extend below the water table, and there would thus be no groundwater effects arising from the development within the Application Site. As a result, and as discussed in Chapter 7.0 below, there would be no indirect hydrological or hydrogeological effects on any ecological designations in the locality (notably the Cwm Cadlan SAC).

3.2 Quarry Development Scheme

The phased quarry development scheme is illustrated on plan ref numbers TYG 3 – TYG5 based upon the current situation which is shown on plan ref TYG2. A cross section through the Application Site illustrating the proposed development is are shown on plan ref TYG6.

The scheme would involve the development of the faces and benches in a generally easterly direction from the existing quarry into the defined Application Site. The anticipated configuration at the end of Year 5 is shown on plan ref TYG3 which shows benches at the 328, 316 and 300m AOD levels, with a haul road running from the south western side of the Application Site into the existing quarry area and on to the processing plant site. Plan TYG3 is reproduced at a smaller scale for ease of reference as **Figure 3.1** at the end of his chapter.

Plan ref TYG4 (reproduced as **Figure 3.2** at the end of this chapter) shows the anticipated progress of the development at the end of year 15, with all faces and benches worked back to the final positions, and a bench at the 268m AOD level which would be integrated with the wider quarry development scheme for the remainder of the quarry.

Plan TYG5 shows the final quarry layout based upon the scheme submitted as part of the ROMP application (ref **Figure 3.3** at the end of this chapter). The wider quarry development scheme does not form part of the current planning application, but plan TYG5 has been prepared to illustrate the way in which the development at the Application Site would relate to the future development scheme for the existing quarry.

The quarry development scheme within the discrete boundaries of the Application Site would provide access to limestone reserves in substitution for those within the Preserved Area. However, overall, the scheme would not alter the general pattern of working within the quarry, the aggregate products supplied, or the rate of output. The scheme would simply provide an alternative source of limestone for extraction, having a significantly reduced landscape and visual impact.

3.3 Processing Plant

It follows from the above that the development at the Application Site would not be associated with any change to the existing processing arrangements at the quarry, or to the ancillary plant utilised at the existing plant site

(asphalt plant and ready mixed concrete plant). These would continue to operate as at present, based upon existing planning and permitting controls.

3.4 Hours of Operation

Similarly, quarrying operations within the Application Site would be undertaken in accordance with the existing hours of working limitations and eventually, subject to the determination of the ROMP application, in accordance with updated and probably more restrictive hours of working which have been proposed for the existing quarry area as part of that application.

The 1995 planning permission (ref CV14033) imposes the following hours of working restrictions:

> *"Unless otherwise approved in writing by the National Park Committee, except in the case of emergency (*), quarrying operations shall take place only between the hours of 06:00 am and 8:00 pm Monday to Friday and 06:00 am to 6:00 pm on Saturdays and Sundays. No quarry operations shall take place on statutory public/ bank holidays, with the exception of Good Friday when quarrying operations will be permitted."*
>
> *NB For the purposes of this Condition quarrying operations shall be defined as the winning and working of stone from the quarry face, the haulage of stone from the face and the operation of primary crusher or any replacement thereof.*
>
> *(*) "emergency" means any circumstances in which the Operator has a reasonable cause for apprehending injury to persons or serious damage to property". (Condition 6).*

There are additional restrictions relating to blasting operations, which are limited to 10.00 to 18.00 Mondays to Fridays, and 10.00 to 12:00 noon on Saturdays. No blasting is to take place on Sundays or statutory Bank Holidays (ref condition 17 a).

Whilst not directly relevant to the current application, there are no hours of working restrictions on:

- The operation of secondary or tertiary items of the crushing plant;
- Sales and vehicle movements into and out of the site;
- The operation of the roadstone plant; and
- The operation of the ready-mixed concrete plant.

In practice, the Quarry operations, as defined, are generally undertaken within the hours of 07:00-19:00 Mondays to Fridays, and occasionally on Saturdays (07:00-17:00). The extended periods permitted by Condition 6 of 06:00-7:00 and 19:00-20:00 are only utilised very occasionally during particular surges in demand.

As part of the ROMP application, Hanson has proposed an updated hour of working condition which reflects existing practice, namely:

- Quarrying operations (as defined) Mondays to Fridays 07.00 – 19.00 (currently permitted 06.00 – 20.00);
- Quarrying operations Saturdays 07.00 – 13.00 (currently permitted 06.00 – 18.00);
- No quarrying operations on Sundays, apart from the removal of 'muck pockets' from the quarry faces, using a mechanical excavator, to be restricted to 08.00 – 13.00 (currently quarrying operations permitted between 06.00 – 18.00);
- No quarrying operations on Statutory / Bank Holidays (currently Good Friday working permitted);
- Operation of the crushing and screening plant (primary, secondary and tertiary crushers and screens) Mondays to Fridays 07.00 – 19.00; Saturdays 07.00 – 19.00, no operations on Statutory / Bank Holidays (currently unrestricted);
- Operations outside the normal 'daytime' hours of 07.00 – 19.00 to be restricted to the roadstone plant and ready mixed concrete plant only, together with pumping, plant maintenance, servicing and testing (which reflects the current permissions).

In the event that planning permission is granted for the development within the Application Site, then it is suggested that the operating hours for quarrying within the Application Site and for the processing of minerals worked from it should be the same as those imposed by conditions to the 1995 planning permission until such time as those conditions are updated by the determination of the ROMP application. A Section 106 agreement

would then provide for the updated conditions to also apply to development within the Application Site.

3.5 Output and Traffic Movements

Recent and historic output at Penderyn Quarry has averaged some 500,000 tonnes per annum. The payloads of lorries leaving the site varies but averaging not less than 18 tonnes. On this basis, and using a notional 275 day working year, this equates to an average of 101 loads per day, or 202 movements. The majority of traffic movements are to and from the south, via the A4059 to the A465.]

There would be no change to this established pattern as a consequence of the proposed development within the Application Site.

3.6 Alternatives

The previous Town and Country Planning (Environment Impact Assessment) Regulations 1999 indicated that where alternatives to a proposed development have been considered, then these should be outlined in an ES (reference Schedule 4, Part 1 (2) and Part 2 (4). This requirement has been strengthened by the Town and Country Planning (Environment Impact Assessment) (Wales) Regulations 2017 which requires that an environmental statement should include:

> *"a description of the reasonable alternatives studied by the applicant or appellant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the significant effects of the development on the environment" (ref Regulation 17 [3] [d]).*

The two alternatives assessed in this case have comprised the currently approved quarry development scheme, referred to as 'Scenario A', and the alternative scheme which forms the subject of the current planning application and this ES as 'Scenario B', which includes the retention of the Preserved Area'.

The 'Scenario A approved development scheme involves the progressive widening of the Quarry in a southerly direction to the lateral limits of planning permission ref 1/2427. The effect of this scheme will be to remove the central and western areas of the Twyn-y-Glog ridgeline. This approved 'Scenario A' development scheme is illustrated on **Plan TYG8** and would release total reserves of approximately 29.6m tonnes (as at 31st March 2019). Plan TYG 8 is reproduced at the end of this chapter as **Figure 3.4**

The Landscape and Visual Impact Assessment (LVIA - ref ES Chapter 5.0) has noted the effect of 'Scenario A' in terms of the physical removal of a prominent landscape feature (the western area of the Twyn-y-Glog ridge) which LANDMAP identifies as being of 'outstanding / 'high' value. The landscape effects are described in the LVIA as **'significant adverse'**. The photomontages which have been prepared (ref **Plans TYG12 and TYG14**) also highlight the significant changes to the landform and the effects on visual amenity arising from the removal of a prominent section of the Twyn y Glog ridge via 'Scenario A' The visual effects are described as **'moderate '/ major adverse'**.

The 'Scenario B' development (**Plan TYG9** and photomontages **TYG 13 and TYG15)**) would substantially retain these landscape and visually important features as the Preserved Area associated with the proposed 'land swop' scheme. With Scenario B, and the retention of the central and western areas of the Twyn y Glog ridge, the landscape and visual effects are described as **'minor adverse / negligible'.** Plan TYG 9 is reproduced at the end of this chapter as **Figure 3.5**

The Ecology Study (ES Chapter 6.0) notes the presence of a number of botanical features of interest amidst the rock outcrops on the flanks of the ridgeline, whilst the cultural heritage study notes the presence of a boundary wall of some local significance. All such features would be lost if the development proceeds as permitted by 'Scenario A'.

'Scenario B', illustrates a development scheme which includes quarrying within a discrete less environmentally sensitive area to the east of the main Twyn y Glog ridge, and if permission is granted, the commitment to relinquish the rights to quarry the more environmentally sensitive area to the west (i.e. the land which would be quarried as part of 'Scenario A'). The

'Scenario B' development scheme is depicted on **Plan TYG11** (and is reflected in the proposed scheme shown on **Plans TYG3 and TYG4**).

In terms of the consideration of alternatives required by Regulation 17, it has been concluded that the permitted 'Scenario A' development would give rise to 'significant effects' compared to the proposed 'Scenario B', notably in terms of the landscape and visual effects associated with quarrying the central and western area of the Twyn-y-Glog ridge. Photomontages have confirmed that the 'Scenario B' scheme could proceed without discernible changes to the visual appearance of the ridgeline in the wider landscape. In contrast, 'Scenario A' would result in substantive and permanent adverse changes to the landscape. 'Scenario B' also has the advantage of developing an area which has already been subject to some disturbance (lying between the current quarry and the Sinkhole Tip on its southern side).

The firm conclusion which has emerged from the review of alternative working schemes is that 'Scenario B' has considerable merit in comparison to the currently permitted 'Scenario A' in that it would allow the retention of the much more prominent and visually interesting central and western area of the Twyn-y-Glog ridgeline.

There would also be minor benefits in terms of hydrology and cultural heritage, as discussed in sections 6.4.5 and 8.6.2 below.

Scenario B would release total reserves of approximately 22.2 million tonnes (as at 31st March 2019) i.e. some 7.4 million tonnes less than Scenario A. There would thus be a further consequence of Scenario B in shortening the life of the permitted quarry development by some 15 years (at 500,000 tpa).

3.7 Restoration Strategy

The principles of a restoration strategy for the overall quarry area were submitted as part of the ROMP Review environmental statement. The quarry development scheme proposed as part of the ROMP review comprised the 'Scenario B' scheme and thus included the current Application Site as part of the quarry development (with the retention of the remaining central and western area of the Twyn y Glog ridge). The restoration strategy reflected this quarry development scheme, with the restoration proposals thus including provision for the restoration of the area which now forms the subject of the current planning application and this ES.

No changes are proposed to this overall quarry restoration strategy, although for the purposes of the planning application and this ES, the key focus is on the restoration of the discrete area of the Application Site, but as a component of the wider restoration strategy.

This is illustrated on the Restoration Strategy Plan TYG7 (reproduced at the end of this chapter as **Figure 3.6**), which shows the Application Site edged in red in the context of the restoration strategy for the overall Penderyn Quarry area.

From the overall restoration design principles and objectives set for the wider quarry as part of the ROMP Review restoration strategy, the key design principles of relevance to the Application Site are:

(i) Quarry waste would form the basis of the soil forming material to be used for the restoration. Clay, silt and mud recovered from pockets within the limestone during quarrying will supplement the quarry waste by creating suitable growing conditions. Opportunities will be taken to salvage rootable fines and soil forming materials from existing quarry waste tips as working progresses.

(ii) Quarry benches and faces would be progressively restored during quarry phases, where consistent with operational requirements, with a variety of treatments to enhance the ecological and landscape value of the site.

In view of the recognised ecological potential of restored mineral workings, the main objectives of the restoration proposals are ecological enhancement and nature conservation.

3.8 Restoration Details

The restoration strategy has been based on the anticipated final form of the overall quarry upon completion of quarrying. Detailed specifications and proposals for the treatment of individual quarry faces and benches will be produced during the development of the quarry when the respective faces and benches are formed and available for restoration. This will allow the

physical nature of the faces, benches and slopes to be assessed at a more detailed level. Detailed proposals for the individual faces and benches would therefore be determined, when the structure of the rock exposures become evident, but those finer details would be based upon the overall restoration strategy which includes the treatments set out below.

Outside the Application Site, the final water level within the quarry void following the cessation of dewatering will be at or below 265 m AOD. All progressive and final restoration will occur above this level on upper quarry benches, on land adjacent to the quarry void and on the plant site. In terms of the Application Site, restoration will be carried out on the quarry faces and benches above the 265m OAD level.

3.8.1 Quarry Faces: Restoration Treatments

The upper faces along the southern side of the quarry void will offer opportunities to retain attractive rock outcrops as crags, and to retain naturally occurring crevices and pockets in which different types of vegetation can establish. Species rich limestone grassland will naturally colonise rocky outcrops, which has occurred on the thin soils along the Twyn-y-glog ridgeline. Quarry faces would generally be left to regenerate naturally, which will in part be encouraged by low scree slopes and crushed rock placed at the toe of faces.

Where possible a suitably low fertility growing medium will be deposited into natural crevices and cracks on the lower sections of the upper face of the quarry to promote vegetation establishment. This material would be deposited during bench soiling operations when the lower sections of the quarry face are safely accessible and within the reach of a 360° excavator. The growing medium would consist of quarry waste and fine grained material derived from voids within the limestone bedrock. This material would be placed in suitable locations across the face, assisting natural regeneration of a diverse range of species. Similarly, localised small scree slopes and pockets of loose rock at the base of the quarry face would create different conditions with a variable and uneven surface texture creating suitable ground conditions to facilitate ecological succession. The resulting variety of vegetation types would avoid uniformity of restoration treatment, which would increase biodiversity, geodiversity and landscape interest.

3.8.2 Upper Quarry Bench: Restoration Treatments

Restoration work would commence on the upper benches within the Application Site, and more generally along the southern margin of the quarry void as soon as practicable. The quarry benches within the Application Site, which would all be above the final restoration water level, i.e. above 265m AOD would be restored principally through natural regeneration but supplemented by planting of locally native trees and shrubs where necessary. Habitat diversity would result from the range of conditions created by the bench treatments during restoration.

All future bench treatments will incorporate placed material to form rock trap profiles for geotechnical and health and safety reasons. This will consist of a permanent 1.5m high linear bund along the edge of each bench, which will assist in retaining any fine-grained material for restoration purposes placed on each bench. Bench treatments will be applied between this bund and the faces above.

Bench treatment within the Application Site would involve preparation to create a sufficient depth of growing medium for the establishment of woody vegetation. Quarry waste and soils derived from the on-site soil storage areas will be spread over the surface of some 60% of the benches along the southern boundary (including the Application Site above the 265 m AOD level). This depth would be made up of 750mm of overburden or quarry waste with a covering of 100mm of predominantly subsoil and fine-grained material derived from voids within the limestone bedrock during quarrying. Variations in the depth of this material will create hummocks and hollows, resulting in variable growing conditions.

A low maintenance grass seed mix would be sown across the soiled areas to achieve vegetative cover in the short term; this would act as a nurse sward allowing native tree and shrub species to colonise through natural regeneration.

As many upper benches are a significant distance away from nearest sources of tree seed, a selection of locally native trees and shrubs will be planted in suitable areas, sufficient to ensure future woodland/scrub cover and initiate subsequent regeneration.

3.9 Restoration Management

It is anticipated that the timing and location of restoration works will to a certain extent be flexible, subject to the requirement to place material on benches while there is still safe access for soil placement machinery and subsequent seeding/planting work. All restoration work will be governed by detailed method statements, which will be issued to site contractors, and closely supervised. These method statements will detail soil handling, storage and placement procedures, and the locations selected for each restoration treatment.

The restoration would be monitored throughout the quarry phases to identify any further management and/or improvements required. The monitoring programme would be designed to draw upon experience which could be applied in devising cost effective restoration proposals for the remainder of the quarry including the success achieved by planting / colonisation/succession.

A wider quarry management plan will be prepared for the restored areas to include the Application Site, with proposals for the management and enhancement of restoration works outside the Application Site including existing established perimeter vegetation and previous grassland restoration, as well as new proposed restoration both during quarrying operations and in the longer term following final restoration of the site.

Figure 3-1 Year 5 (Plan TYG 3)

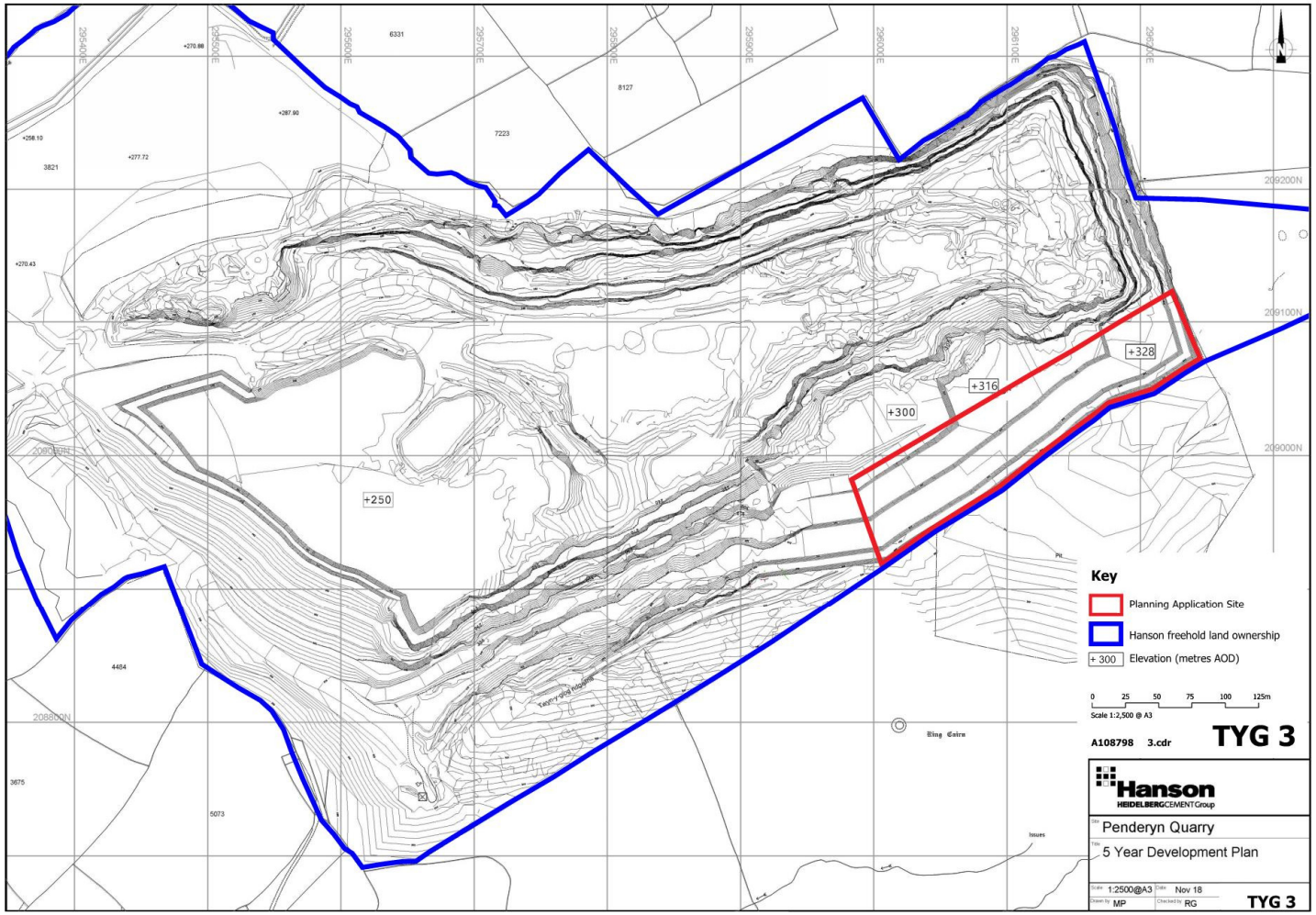


Figure 3-2 Year 15 (Plan TYG 4)

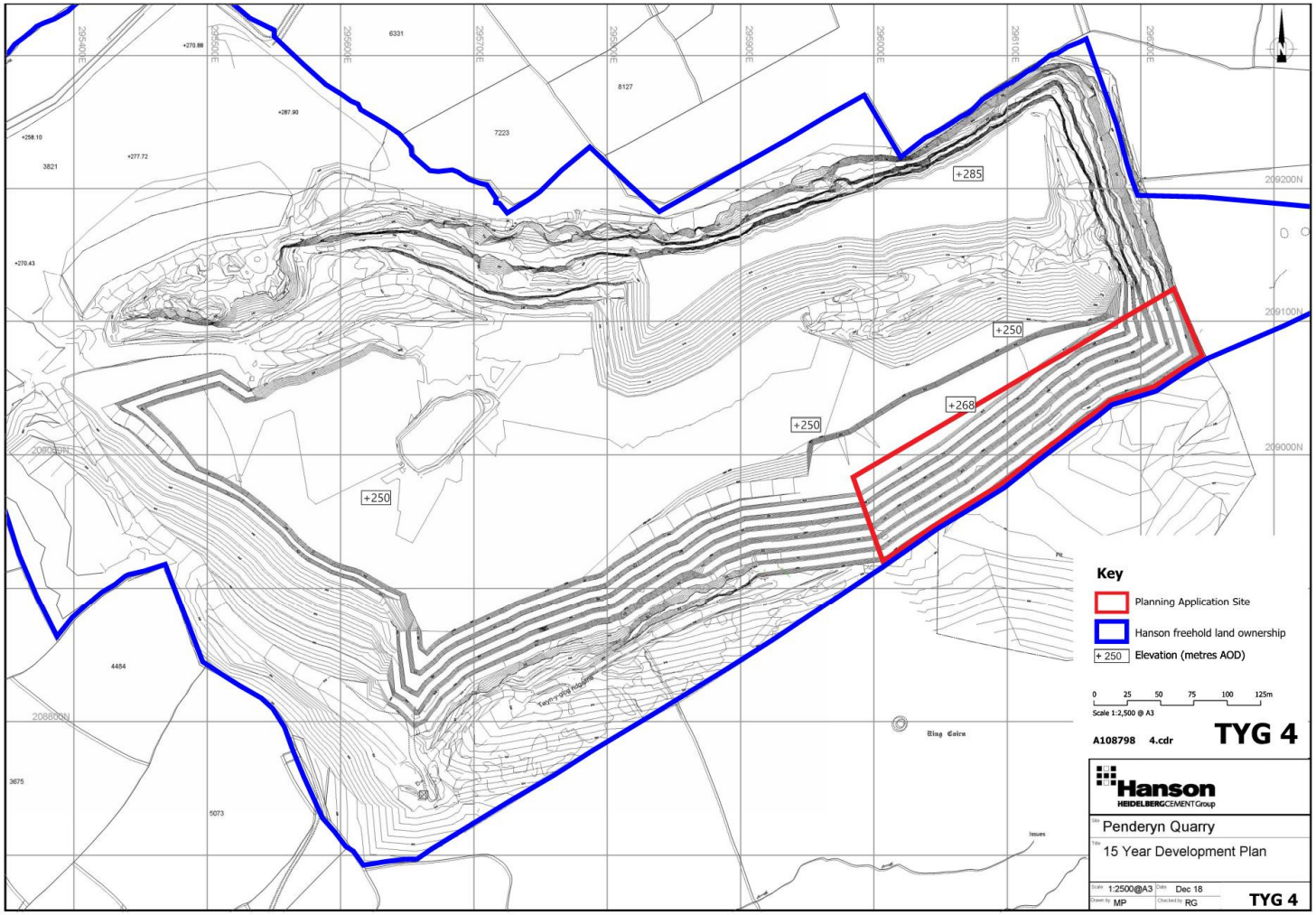


Figure 3-3 Final Quarry Layout (Plan TYG 5)

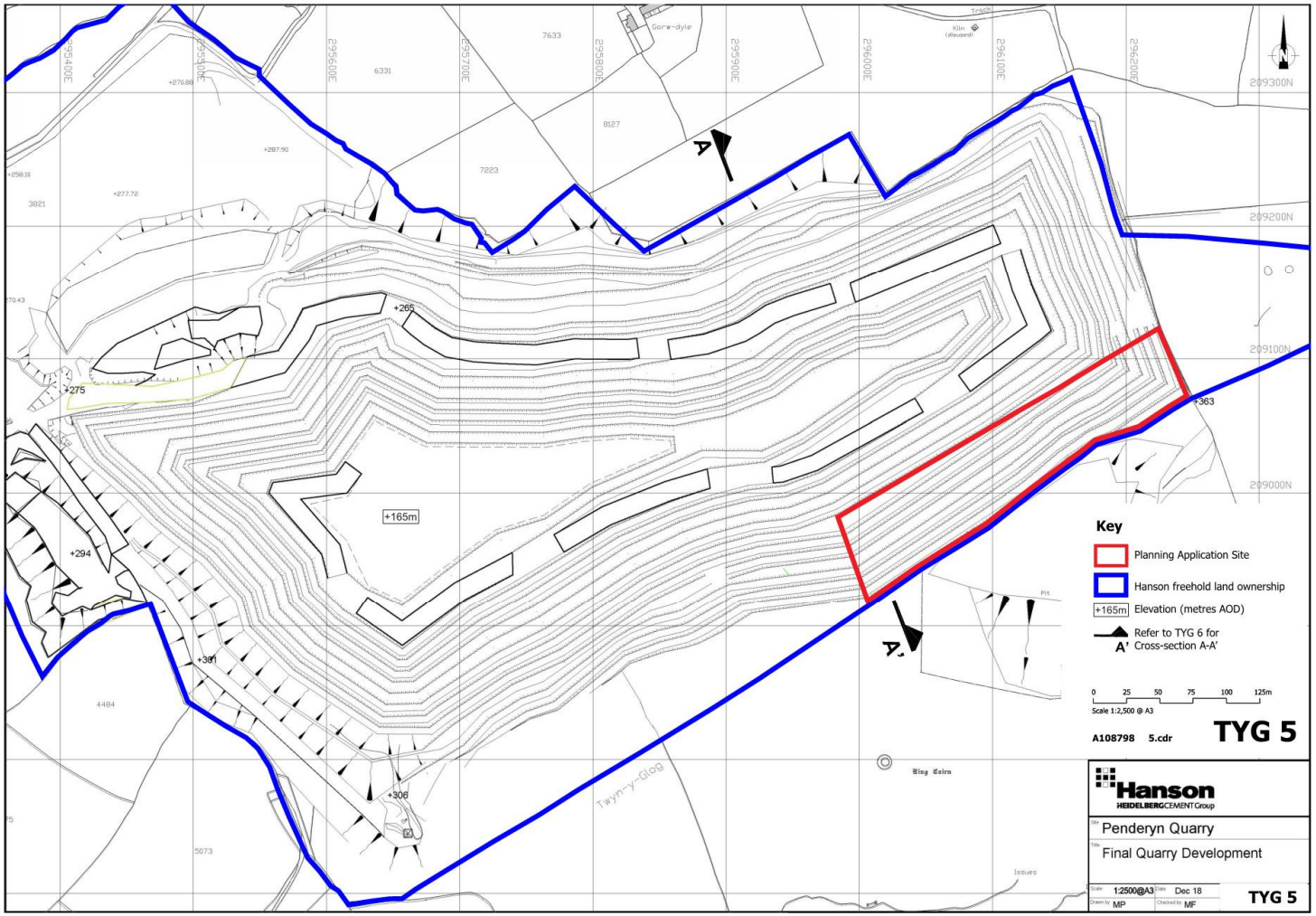


Figure 3-4 View of 'Scenario A' (Plan TYG 8)

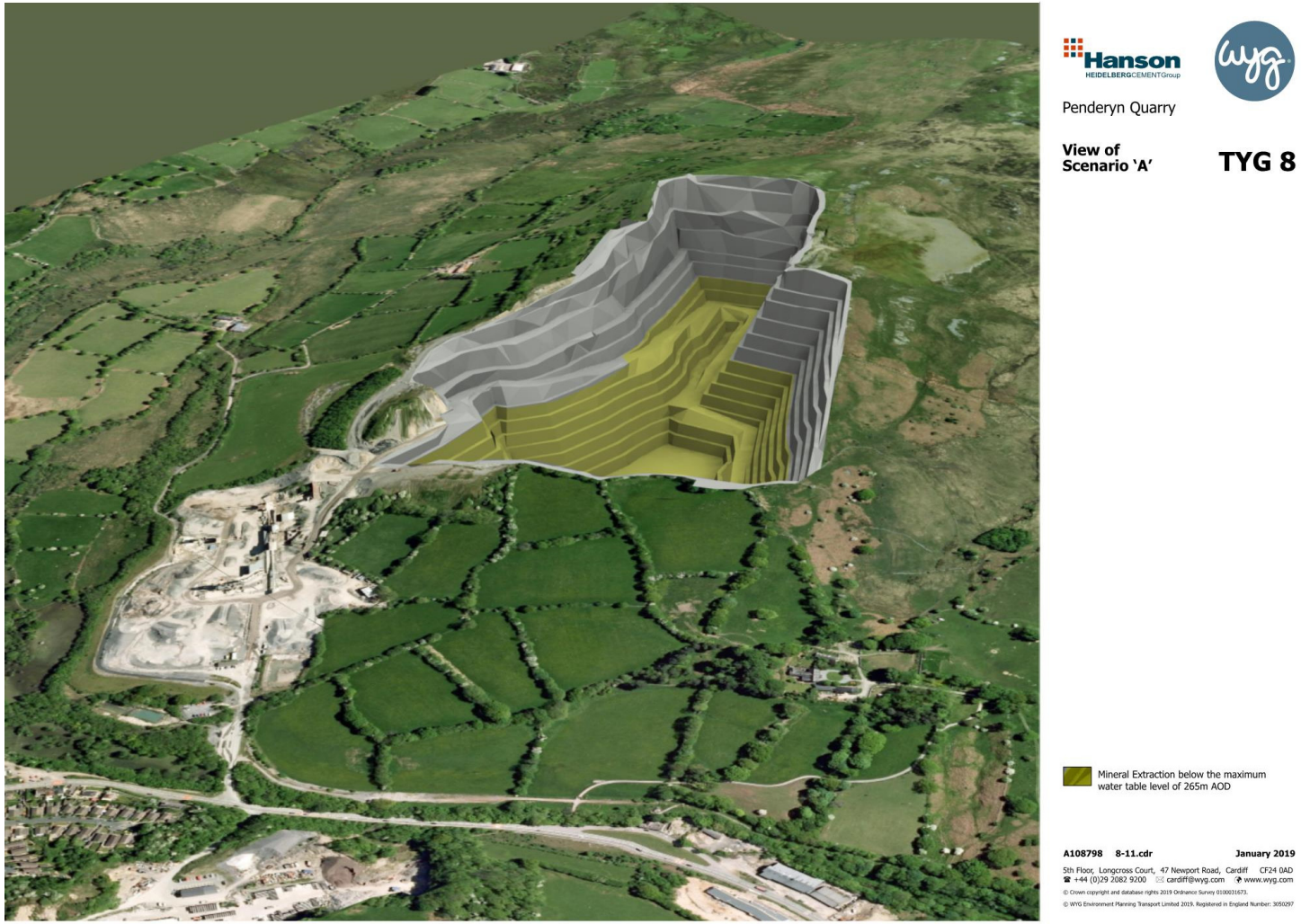


Figure 3-5 View of 'Scenario B' (Plan TYG 9)

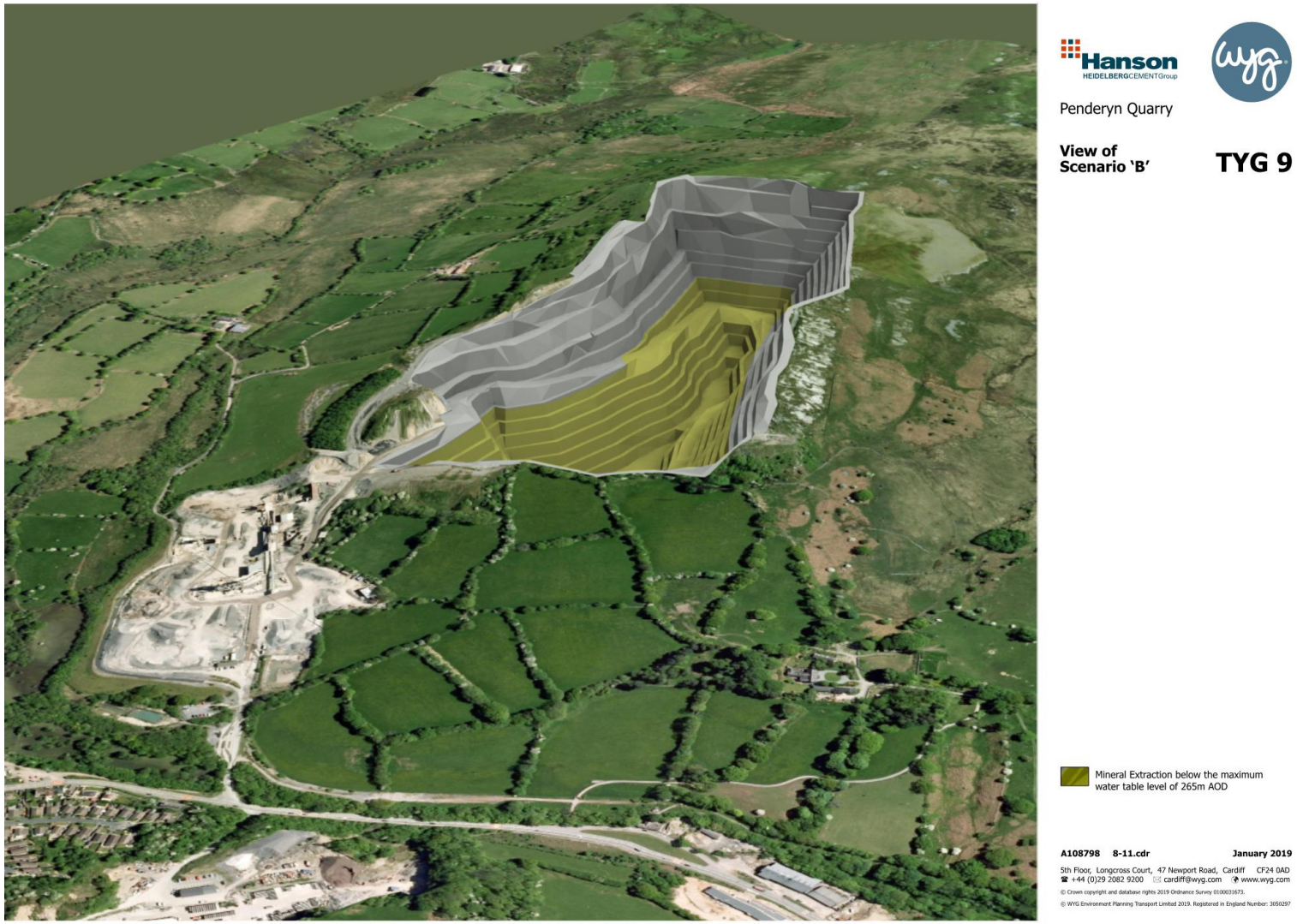
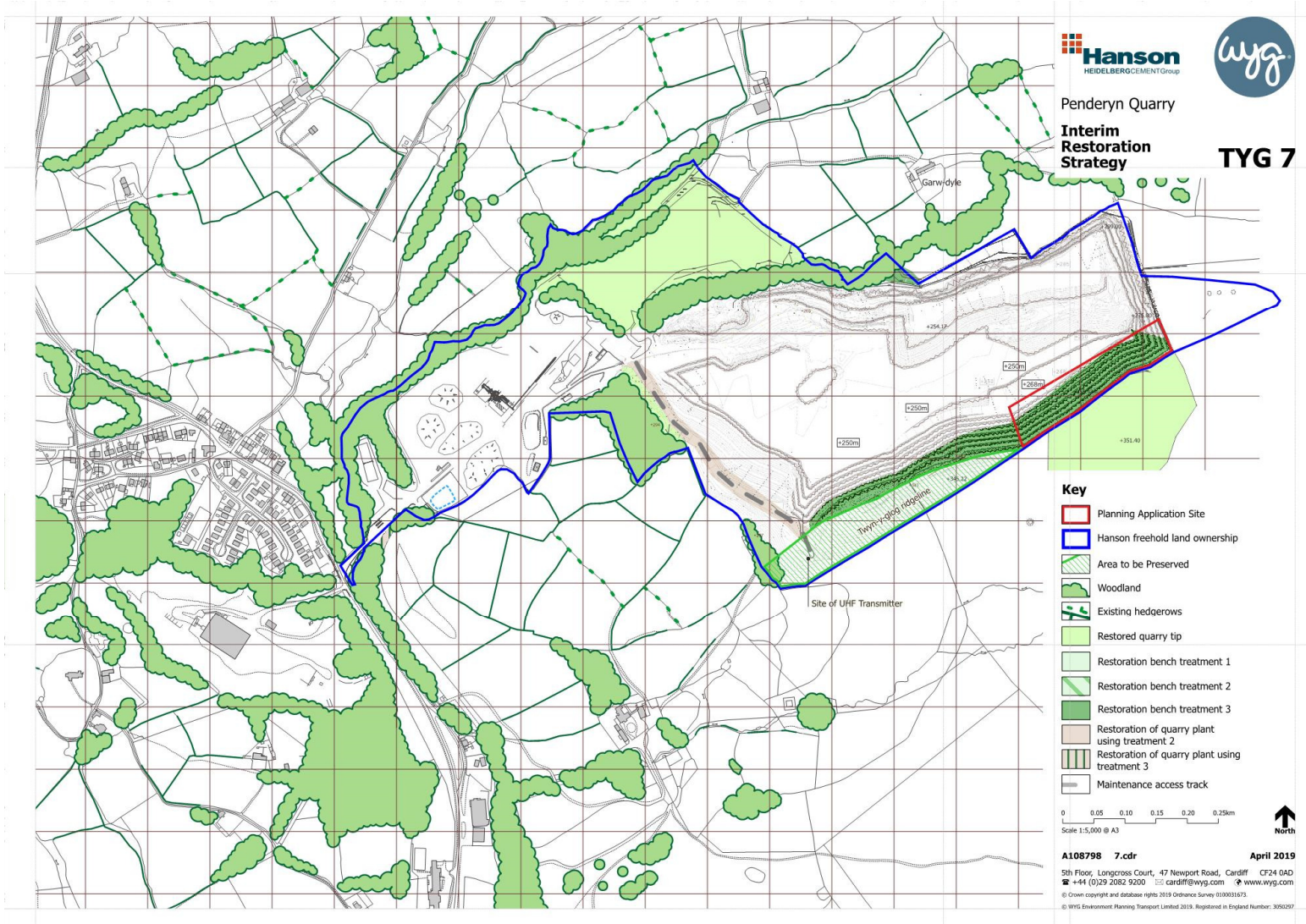


Figure 3-6 Interim Restoration Strategy (Plan TYG 7)



4.0 ENVIRONMENTAL IMPACT ASSESSMENT

4.1 Introduction

The potential environmental effects of the proposed Penderyn Quarry extension have been informed by (i) informal discussions with the Mineral Planning Officers representing the BBNPA (ii) the EIA studies which were undertaken as part of the 2011 ROMP review application; (iii) the Applicants' experience of environmental and amenity issues associated with the ongoing quarry development at Penderyn; and (iv) by feedback from a pre application community consultation programme (reported in Chapter 7.0 of the Planning Application Statement).

Particular attention has been paid to the informal discussions with the Mineral Planning Officers which confirmed the key topics which have the potential to give rise to significant environmental effects and which require particular attention as part of the EIA.

In terms of the existing quarry, environmental controls are already in place via the planning conditions set out on the respective planning permissions, most notably the 1995 permission (ref CV14033), which whilst relating to a discrete area of the quarry, imposes conditions which are applicable to the overall quarry area in terms of hours of working, control of blasting operations, dust management controls, and the use of best practicable means to minimise noise levels from operations at the site. Detailed controls are also in place in relation to the processing plant regulating dust and air quality emissions via the Environmental Permit (ref PPC/004-3.5-HQPEL/0104D) which via 105 conditions imposes controls to minimise dust and air quality emissions from the aggregate processing plant, asphalt plant, concrete batching plant, and related operations, and which require ongoing monitoring of emissions, with obligations to take remedial action in the event of any exceedances of the prescribed limits and requirements.

In due course, all planning conditions at the quarry will be updated via the determination of the ROMP application which has proposed a detailed schedule of updated conditions. As discussed in the Planning Application Statement it is intended that in the event that planning permission is granted for the new development / reserve swop in advance of the determination of the ROMP application, then the new permission would, by a Section 106 agreement, be incorporated into the wider 'mining site' which is the subject of the ROMP review. The whole quarry would then be covered by a single updated schedule of conditions which will result from the ROMP determination.

The result has been a comprehensive study which has addressed the identified key topics and provided a more general overview of other environmental issues.

4.2 EIA and ES

The key focus of the EIA has been to consider the effects of the proposed new development scheme, but it also considers the changes which would arise from the proposed relinquishment of the right to quarry permitted reserves in the Preserved Area. In particular, the Landscape and Visual Impact Assessment (LVIA) includes an analysis of the landscape and visual effects of implementing the currently approved quarry development scheme, which would remove the prominent Twyn y Glog ridgeline, compared to the proposed retention of that ridgeline as part of the intended 'reserve swap. The benefits of the development in landscape and visual terms are highlighted, and this is a key conclusion of this central theme of the EIA.

More generally, the studies have sought to provide a sound level of understanding of the environmental effects, upon which reasoned judgements can be made regarding potential direct and indirect effects, and the mitigation measures which might be available to address any residual effects.

In undertaking the EIA and preparing the ES, it has been recognised that there is no statutory provision as to the form of the ES, but it must contain the information specified in Regulation 17 (3) of the EIA Regulations 2017, and "*any additional information specified in Schedule 4 relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected*".

The ES may consist of one or more documents, but it must constitute a 'single and accessible compilation of the relevant information' (ref Berkeley v SSETR, 2000). The ES has been prepared to ensure compliance with these requirements, with Volume 1 (this document) intended to be read as a single document, with cross references to technical appendices and data (ES Volume 2).

Whilst only applicable in England, it is also useful to note the advice set out in the Planning Practice Guidance (March 2014 as amended and updated) to the National Planning Policy Framework (NPPF) (March 2012, revised July 2018) which provides further advice on the information to be included within an ES. It notes that whilst every ES should provide a full factual description of the development, the emphasis of Schedule 4 is on the "main" or "**significant**" effects to which a development is likely to give rise.

It also confirms that an ES "should be proportionate and not be any longer than is necessary to assess properly those effects. **Where, for example**, **only one environmental factor is likely to be significantly affected the assessment should focus on that issue only. Impacts which have little or no significance for the particular development in question will need only very brief treatment to indicate that their possible relevance has been considered"** (ref Planning Practice Guidance ID4-033).

The potential environmental and amenity effects have been considered in this context in a proportionate way to the potential significance of the respective topics.

5.0 LANDSCAPE & VISUAL IMPACT

5.1 Introduction

A Landscape and Visual Impact Assessment (LVIA) has been undertaken by WYG. The ensuing LVIA Report is produced in full as **Appendix 1** to this ES. This Chapter summarises the assessment which has been undertaken, the main findings, and the conclusions reached.

A key focus of the LVIA has been to assess the landscape and visual amenity issues associated with quarrying and restoration within the Application Site in the eastern area of the Twyn y Glog ridgeline, and the differences compared to the implementation of the currently approved quarry development scheme involving the removal of the central and western areas of the Twyn y Glog ridgeline.

A similar analysis was undertaken a part of the ROMP Review LVIA, where the same 'land swop' proposal was made. For consistency with the ROMP Review LVIA, these alternatives are referred to in the LVIA as:

- 'Scenario A' which represents the currently approved quarry development scheme; and
- 'Scenario B' which comprises the current planning application scheme involving a small expansion of the current working area into the south eastern corner of the quarry land and the relinquishment of planning permission for quarrying within the Preserved Area.

The respective areas are shown on Figure TYG 1 with the Application Site shown edged red, and the Preserved Area shown hatched green.

Whilst the proposed new quarrying within Scenario B represents a small lateral expansion of the currently existing quarry footprint, if permission is granted and the central and western areas of the Twyn-y-glog Ridge are retained then there will be an overall reduction in the permitted extraction area at the site of 0.58 Ha.

The Landscape and Visual Impact Assessment (LVIA) considers the landscape and visual effects of Scenarios A and B and the effects of not quarrying the Preserved Area, and reaches an overall conclusion based on the balance between the associated effects in each case.

The assessment process comprised a combination of desk studies and field surveys, with subsequent analyses, and involved:

- A review of landscape designations and planning policies for the landscape, and of other landscape studies relevant to the area, including LANDMAP.
- A survey of the site and landscape context study areas and inspection of views of the site from publicly accessible viewpoints, including a photographic survey.
- Evaluation of the features and elements of the landscape and their contribution to the landscape character, context and setting, based on these studies with a particular focus on the Twyn-y-Glog ridgeline.
- Analysis of the development proposals and consideration of potential landscape and visual effects of the proposed development.
- Assessment of the susceptibility and sensitivity of the landscape to the changes likely to arise from the two development scenarios.
- Identification of the extent of theoretic visibility of the development and viewers, their susceptibility and sensitivity, and view locations, supported by a viewpoint analysis.
- Consideration of the proposals and the mitigation measures to avoid, reduce or offset adverse effects.
- Assessment of magnitude of change arising from the proposal, the degree and nature of effects on the landscape and on visual amenity and their significance, with the mitigation proposals in place.

5.2 Landscape Effects: Key Findings

5.2.1 Landscape Features

The character of the landscape is linked to the pattern of landform and prominent landmark topography. The Twyn-y-Glog ridgeline is locally important, being an important element of the wider pattern of landform and providing screening of quarrying activities from the south. The pattern of landform and specifically the Twyn-y-Glog ridgeline is a receptor of high sensitivity.

The proposed Scenario A quarrying scheme would remove the western and central section of the Twyn-y-Glog ridge. The scheme would result in a **locally substantial** adverse impact on the landform pattern of the area during quarrying and following restoration of the site. This effect is caused by the loss of the prominent section of the ridge, which is a landmark feature in the wider landscape

In contrast, the proposed quarrying scheme based on Scenario B minimises adverse impacts on the Twyn-y-Glog ridge. This section of the ridge is a landmark feature in the wider landscape, reflected within the Geological Landscape LANDMAP study. The LANDMAP 'principal management recommendation' is, inter alia, to "*ensure…that other features of particular geological / geomorphological significance are not lost / damaged due to development*". This is reiterated as a 'long term guideline' to ensure that "*no significant features of geological / geomorphological significance are lost / damaged due to development / inappropriate restoration*". In terms of 'tolerance to change', LANDMAP goes further in indicating that "*no net loss of key geological / geomorphological features should be considered acceptable".*

The Scenario B quarrying proposals would retain the crest and southern flank of the Twyn-y-Glog ridge, minimising the potential for adverse landscape impacts, and ensuring the retention of an acknowledged feature of geomorphological significance.

5.2.2 Landscape Amenity

The Scenario A quarry development would be a prominent feature in the landscape and disturbance would be perceptible within the wider landscape, particularly to the south. Ongoing activity and disturbance within the site as a consequence of the Scenario A quarrying scheme would result in a **moderate adverse** impact on landscape amenity, increasing to **substantial** within 1km of the Twyn-y-glog Ridge.

In contrast, during the quarrying under Scenario B, the south-eastern advance of the quarry face would not result in a change in the impact on landscape amenity. The overall area of disturbance would not increase to a degree that would be perceptible within the wider landscape and the quarry plant would continue to operate as it does currently. Ongoing activity and disturbance within the site as a consequence of the proposals would result in a **minor adverse** impact on landscape amenity.

This level of impact would steadily reduce as screening vegetation establishes and following restoration towards a **negligible** impact. At this stage vegetation would have developed along upper benches within the Application Site and quarrying activity would have ceased. The quarry site would steadily become integrated into its landscape setting.

5.3 Visual Effects: Key Findings

The visual appraisal, informed by the Zone of Theoretical Visibility (ZTV) study, identified locations from which Penderyn Quarry is theoretically visible. Six viewpoints were identified as representative of the most sensitive views available and the impact of the proposed development were assessed against the baseline of the permitted scheme and existing quarry.

The visual impacts for the approved Scenario A scheme would range from **minor adverse** (viewpoints 01 and 02), through to **moderate adverse** (viewpoints 03, 04 and 05), to **major adverse** (viewpoint 06). The moderate and major adverse conclusions relate to views towards the site from the south where the removal of the Twyn-y-Glog ridge would result in the loss of a landmark feature. These effects are depicted on **Photomontages 11.1**

– 11.4, reproduced for ease of reference at the end of this chapter as F**igures 5.1 -5.4** , which show the substantial visual changes to the landform which would arise from the approved Scenario A scheme, compared to the retention of these important landscape and visual features via the Scenario B scheme.

The proposed Scenario B scheme results in the western and central section of the Twyn-y-Glog ridge being retained, offering effective screening of the quarry void from the south. When assessed against Scenario A, the proposed quarry development, 'Scenario B', would mitigate the adverse effects on views towards the quarry from the south. This would significantly reduce the effects of the quarry on visual amenity for these receptors.

The visual impact of the Scenario B scheme is assessed as varying between **minor adverse** to **negligible** during initial phase of quarrying, given the scale of the changes and the sensitivity of the views. The adverse effects relate to receptors located to the north and west where Scenario B would delay the restoration of faces due to ongoing quarrying.

The proportion of the view occupied by quarrying would not increase for visual receptors under Scenario B. The retention of the western and central section of the Twyn-y-Glog ridge would avoid potential visual effects from the south, retaining a locally significant landscape feature which adds to the visual diversity and attractiveness of views available from south.

5.4 Mitigation Measures

The primary mitigation measure under the Scenario B proposal is to relinquish the rights to extraction of the western and central section of the Twyn-y-Glog ridgeline. This section of the ridge offers effective screening of the quarry operations from the south and the ridge itself is an important element in defining landscape character.

Secondary mitigation measures relating to the upper quarry benches and faces along the southern side of the quarry are based on progressive restoration, where consistent with operational requirements. A variety of treatments would be used to enhance the ecological and landscape value of the site, as described in Chapter 3.0 of this ES.

5.5 LVIA Conclusions

The Scenario A quarrying would remove a prominent section of the Twyn-y-Glog ridgeline resulting in **significant adverse** effects on the pattern of landform and landscape character, particularly to the south of the quarry. The Scenario A quarrying would result in **locally significant** adverse effects on landscape receptors. When assessed against Scenario A, the proposed quarry development, 'Scenario B', would mitigate the adverse effects on the local landform pattern. This would significantly reduce the effects of the quarry on landscape character to **minor** / **negligible** effects.

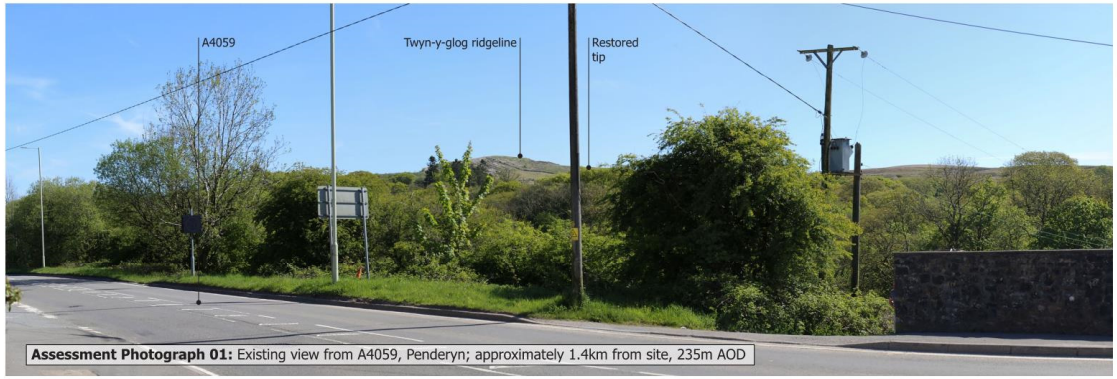
The visual effects of the Scenario A scheme would be **moderate and major** adverse when viewed from the south as a result of the removal of a prominent landmark feature. The Scenario B scheme results in the western and central section of the Twyn-y-Glog ridge being retained, offering effective screening of the quarry void from the south.

The visual impact of the Scenario B scheme is assessed as varying between **minor adverse** to **negligible** during initial phase of quarrying, given the scale of the changes and the sensitivity of the views.

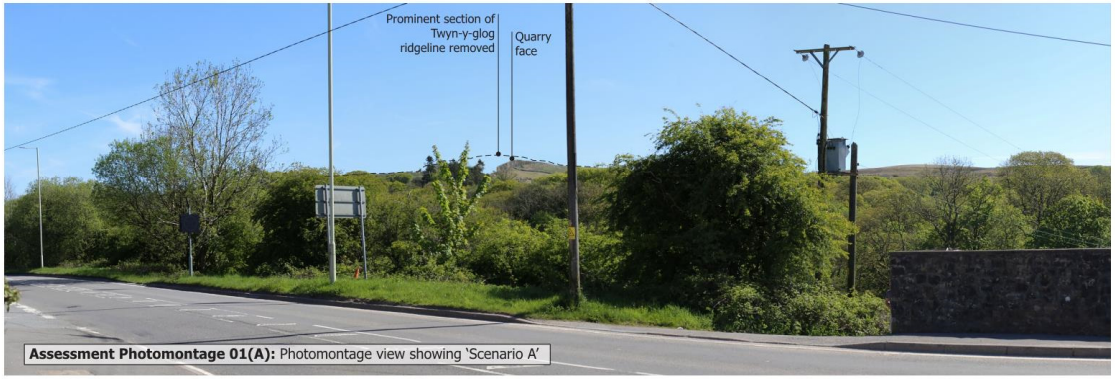
When assessed against Scenario A, the proposed quarry development, 'Scenario B', would mitigate the adverse effects on views towards the quarry from the south. This would significantly reduce the effects of the quarry on visual amenity for these receptors.

Figure 5-1 Photomontage 11.1 (TYG12)

View of 'Scenario A' from A4059 Penderyn



Assessment Photograph 01: Existing view from A4059, Penderyn; approximately 1.4km from site, 235m AOD



Assessment Photomontage 01(A): Photomontage view showing 'Scenario A'

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Penderyn Quarry

View of 'Scenario A' from A4059, Penderyn

TYG 12

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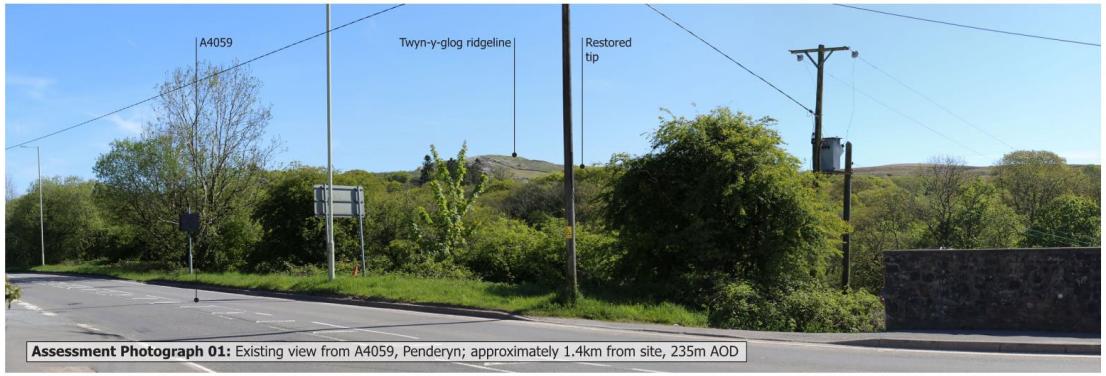
Figure 5-2 Photomontage 11-2 (TYG 13)

'Scenario B' from A4059 Penderyn following reserves swap.



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View of 'Scenario B' from A4059, Penderyn following proposed reserves swap **TYG 13**

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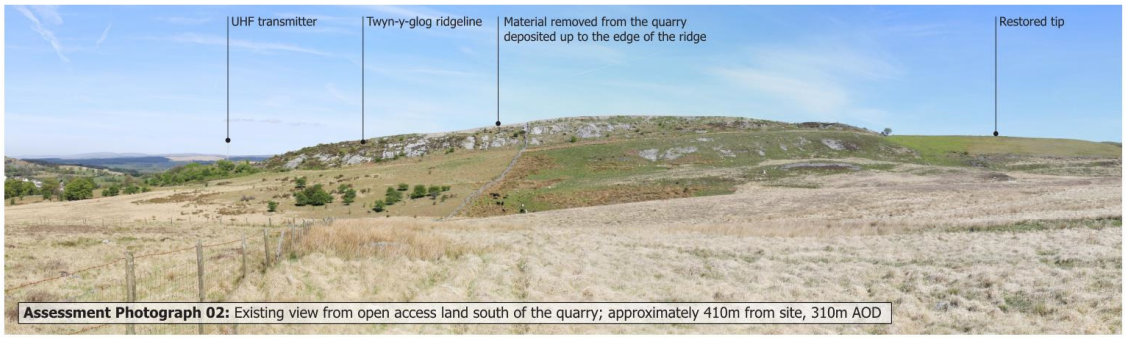
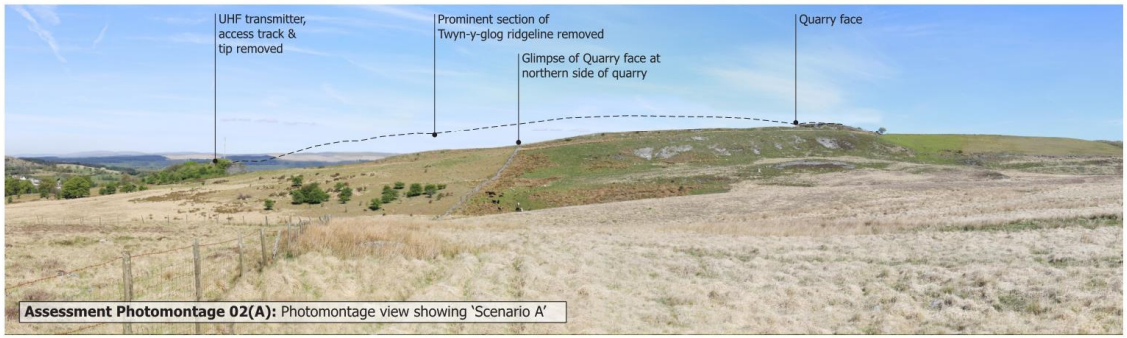
Figure 5-3 Photomontage 11-3 (TYG 14)

View of 'Scenario A' from the south





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View of 'Scenario A' from the south

TYG 14

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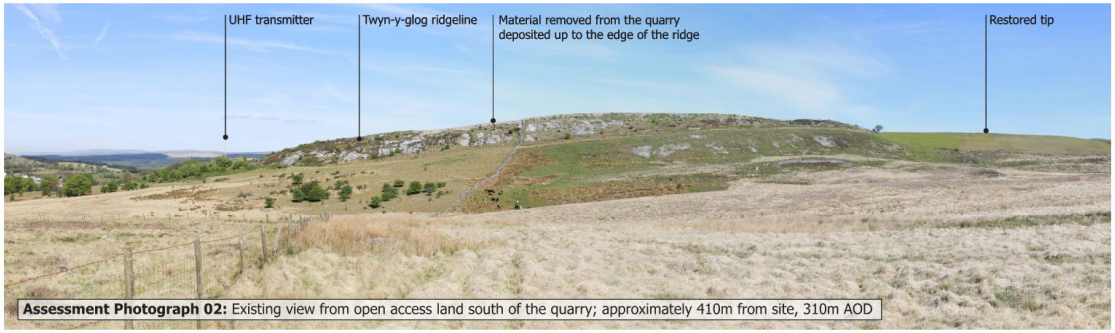
Figure 5-4 Photomontage 11-4 (TYG 15)

View of 'Scenario B' from the south following proposed reserves swap



Assessment Photograph 02: Existing view from open access land south of the quarry; approximately 410m from site, 310m AOD

Assessment Photomontage 02(B): Photomontage view showing 'Scenario B', following proposed reserves swap

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Penderyn Quarry

View of 'Scenario B' from the south following proposed reserves swap **TYG 15**

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6.0 HYDROLOGY AND HYDROGEOLOGY

6.1 Introduction

A Hydrological and Hydrogeological impact Assessment (HIA) has been undertaken by Stantec UK Ltd (based upon initial work undertaken by ESI Ltd who became part of Stantec in 2018).

The HIA is produced in full as **Appendix 2** to this ES. In pre-application discussions, Dwr Cymru Welsh Water (DCWW) have confirmed that certain information relating to the locations of abstraction points is deemed to be sensitive and should not be included in public documents. The HIA which is appended to the ES has been drafted accordingly without confirming precise locations for abstraction points. However, a separate 'sensitive' version has been prepared which can be used for limited restricted circulation to DCWW, local authority officers and NRW as part of the formal consultation exercise. This has been submitted separately to the ES and ES Appendices.

A Flood Consequences Assessment (FCA) has been produced as a separate document, which is produced as **Appendix 3**.

This Chapter summarises the assessment which has been undertaken, the main findings, and the conclusions reached.

The scope of the HIA has included:

- a review of the baseline hydrogeology of the site and surrounding area;
- identification of potential receptors;
- the preparation of a hydrogeological conceptual model;
- assessment of potential impacts to the identified potential receptors;
- a comparison of the potential impacts associated with the currently approved scheme and the development which is the subject of the current application; and
- recommendations for mitigation measures, if required.

6.2 Potential Receptors

In addition to the main surface water feature in the area, the Bogwigiad Stream to the south east of the site, the HIA identifies three key potential receptors.

6.2.1 Licensed Water Abstractions

The closest licenced abstraction to the site is operated by Hanson for use within Penderyn Quarry. The licence allows for water to be abstracted from the un-named tributary of the Nant Cadlan at a point adjacent to the northern boundary of the quarry. This licence allows for abstracted water to be utilised in the manufacture of ready-mixed concrete.

The next closest licenced abstraction is operated by Welsh Water (DCWW). Surface water is abstracted from the Bodwigiad Stream and Nant y Bwllfa. Water is transferred from the abstractions to Penderyn Reservoir (which has no natural inlet or outlet) where water is taken for public water supply purposes.

The third licenced abstraction is also operated by DCWW for public water supply purposes from a groundwater borehole located south-west of the site. The borehole from which the supply is sourced takes groundwater from the limestone aquifer.

6.2.2 Private Water Supplies

The closest private water supplies to the site are sourced from the farmstead of Bodwigiad from a mixed spring and groundwater source some 775m to the south west of the Application Site. The mean daily rate is small at some 1.8m3 / day.

The Penderyn Distillery abstraction, some 1km to the south is from a borehole installed within the limestone aquifer, with abstraction rates reported to be less tan 20m3 / day. With the exception of the Penderyn Distillery abstraction, all supplies are utilised for domestic purposes.

6.2.3 Designated Environmental Sites

As noted in section 7.2.2 below, the closest designated site to the site is Cwm Cadlan National Natural Reserve (NNR). Much of the NNR is also designated as a SSSI and Special Area of Conservation (SAC). Cwm Cadlan is designated for the species-rich grassland habitats at the site which include molina meadows. These habitats are primarily supported by surface water with some spring flushes.

The next closest designated site is the Blaen Cynon SAC (including component Woodland Park and Pontpren and Cors Bryn – Y – Gaer SSSIs). These sites are primarily designated for a diverse range of habitats that support the Mash fritillary butterfly. Dyffrynoedd Nedd a Mellte SSSI also lies within 2 km of the site and is designated for geological outcrops showing structural features and the geological sequence as well as a diverse range of habitats and vegetation.

6.3 Proposed Development

It is proposed to extract Carboniferous Limestone (both Dowlais Limestone and Oxwich Head Limestone) at the site. It is proposed to work the Application Site down to an elevation of not less than 265 m AOD (corresponding to a depth of around 85 m). Based on historical groundwater elevation data presented by Steffen, Robertson and Kirsten (UK) (1998), the water table would not be encountered even if the existing Penderyn Quarry had not been formed north of the site.

The development within the Application Site will thus be confined to levels above the water table, and for the purposes of this HIA, the assessment is confined to the effects of this discrete quarry development scheme within the lateral confines of the Application Site, and to the quarrying depths proposed within the Application Site.

The potential effects of the wider quarry development have been assessed as part of the ROMP Review HIA. However, that separate assessment is not relevant to the development under consideration in this current planning application EIA or HIA.

6.4 Potential Effects

6.4.1 Changes to surface water catchment

A catchment divide runs north-east to south-west through the Application Site. Runoff from the site either flows into the Penderyn Quarry void (north of the catchment divide) or discharges to the Bodwigiad Stream (south of the catchment divide). Quarrying will push the catchment divide further south-westwards and all runoff from the Application Site will discharge to the quarry void.

An assessment of how this change will impact on neighbouring receptors is outlined in the following sections.

6.4.2 Impacts on nearby abstractions

As dewatering at the Application Site will not be required, groundwater-dependent receptors could only be impacted by a reduction in recharge to Carboniferous Limestone body. However, given the small area of the Application Site compared to the entire limestone aquifer the net effect on recharge to the limestone aquifer is considered to be negligible.

It follows that the degree of effect on neighbouring licenced and private groundwater abstractions (including those from springs) is therefore classified as negligible producing a negligible degree of impact. This includes the licenced DCWW public water supply groundwater abstraction.

In terms of surface water abstractions, only the Bogwidiad Stream has the potential to be affected by the development. As noted above, DCWW is licenced to abstract water from locations on the Bodwigiad Stream and Nant y Bwllfa watercourse under the same licence. There will be negligible effects on abstractions sited outside the Bodwigiad Stream catchment and the degree of impact on other such abstractions would similarly be negligible.

The predicted loss of effective catchment area to the licenced DCWW abstraction due to quarrying under Scenario B is 0.39% of the total available

199 ha from both the Bodwigiad Stream and Nant y Bwllfa watercourses. This is considered to be a negligible level of effect and impact.

Recent monitoring visits indicate that the Bodwigiad Stream has been dry downstream of the DCWW abstraction point over the 2018 summer period. This information, together with the much greater catchment area of the Nant y Bwllfa (over three times greater) means it is probable that DCWW relies more on the abstraction from the Nant y Bwllfa than from the Bodwigiad Stream. Abstraction from the Nant y Bwllfa is hence inferred to be much more significant for topping up levels in the Penderyn Reservoir than abstraction from the Bodwigiad Stream. Information from DCWW indicates that they use their licenced groundwater abstraction borehole to supplement these abstractions during low flow conditions over the summer months.

A private water supply from a spring partly dependent on surface water runoff is also located at Bodwigiad. The loss of effective catchment area would be 0.77 ha. The total catchment available to the Bodwigiad private water supply is estimated to be approximately 57 ha. The loss of effective catchment in relation to the available catchment area for the abstraction is small (1.4%). Therefore, particularly as the private water supply is partly dependent on a spring (which would be unaffected) as well as the stream, the degrees of effect and impact are expected to be negligible.

6.4.3 Impacts on Sensitive Sites

Cwm Cadlan SSSI/SAC is the closest designated site to the Application Site. Surface water does not drain northwards towards Cwm Cadlan and the groundwater flow direction is to the south away from the SAC with all quarrying within the Application Site to take place above the level of the natural water table. There is also no direct pathway between the Site and the SAC. No effects will therefore occur on the SAC.

Whilst in accordance with the Standard Impact assessment Methodology applied (see Appendix F of the HIA Report included as Appendix 2 to this ES) the degree of impact is classified as 'negligible', there will in fact be zero impact.

6.4.4 Impacts on watercourses and waterbodies

Changes in baseflow could affect watercourses that are downgradient of the site. This includes the Bodwigiad Stream and Nant y Bwllfa. However, any changes in recharge that may occur will be slight and the conceptual model suggests that these watercourses are flashy and sourced primarily from surface runoff. Therefore, effects on neighbouring watercourses are considered to be negligible resulting in a negligible degree of impact.

Reductions in the overall catchment area of the Bodwigiad Stream would be expected to reduce flows in this watercourse (i.e. looking at effects on flows rather than effects of the abstraction). However, the change in effective catchment area (0.77 ha) in relation to the Bodwigiad Stream catchment area as a whole (estimated to be approximately 60 ha) is small (< 1.3%). Therefore, the degrees of effect and impact are expected to be negligible.

6.4.5 Comparison between the proposed development and the currently permitted scheme

The HIA which has been carried out in support of this application (Appendix 2) demonstrates that there are benefits from working the Application Site rather than the Preserved Area due to a lesser reduction in effective catchment area to the Bodwigiad Stream which, in turn, results in a lesser impact on the Bodwigiad Stream itself, the private water supply at Bodwigiad and the licenced DCWW abstraction.

Table 6.1 below (which reproduces Table 4.5 from the HIA) summarises and compares the losses of effective catchment area for the scenario of working the Application Site versus that of working the Preserved Area.

Table 6-1Comparison of loss of effective catchment of working the Site versus working the Preserved Area

Receptor	Loss of effective catchment from working the Application Site	Loss of effective catchment from working the Preserved Area	Net relative benefit from working the Site?
DCWW Licenced Surface water abstraction	0.77 ha (0.39%)	0.87 ha (0.44%)	Yes – lesser reduction in effective catchment area of 0.1 ha (0.05%)
Bodwigiad private water supply abstraction	0.77 ha (1.4%)	1.86 ha (3.3%)	Yes – lesser reduction in effective catchment area of 1.09 ha (1.9%)
Bodwigiad Stream	0.77 ha (1.3%)	1.86 ha (3.1%)	Yes – lesser reduction in effective catchment area of 1.09 ha (1.8%)

Although there is a small net relative benefit of working the Application Site, the impacts of both scenarios are considered to be negligible and mitigation measures are, therefore, not required.

6.5 Conclusions

The Application Site is to be worked to a level of 268m AOD and the excavations at the site will not require groundwater dewatering.

Potential impacts to neighbouring abstractions, surface water bodies, water quality and sensitive sites have been assessed. The most proximal receptors include a licenced DCWW surface water abstraction, the Bodwigiad Stream, private water supplies at Bodwigiad, and the limestone aquifer.

Impacts from working the Application Site are expected to be negligible and, hence, not significant. Impacts from working the Preserved Area would be expected to be similarly negligible and not significant; however, the loss of effective catchment area from working the Application Site is less than that lost from working the Preserved Area. Therefore, working the Application Site is expected to yield a slight net relative benefit, i.e. a lesser (but still negligible) impact on neighbouring receptors when compared with the Preserved Area.

7.0 ECOLOGY

7.1 Introduction

The EIA undertaken as part of the 2011 ROMP Review included an Ecological Impact Assessment (EcIA) which comprised:

(i) a baseline desk study of the presence of statutory and non-statutory designated wildlife sites and protected / notable species;
(ii) an extended Phase 1 Habitat Survey;
(iii) surveys for badgers, reptiles and invertebrates, and a general appraisal of the possible presence of other species undertaken as part of a walkover survey;
(iv) the evaluation of the value of the features and species present;
(v) the identification of potential and direct and indirect impacts;
(vi) proposals for measures to mitigate the identified impacts; and
(vii) conclusions based upon residual impacts.

This Chapter draws upon the content of that EcIA but with updates to reflect surveys undertaken in the intervening period, and to confirm the measures undertaken to implement recommendations of the EcIA, most notably with respect to:

- reptile translocation from the area of the current Application Site;
- an updated badger survey; and
- a bat survey of potential bat roost sites in a small cave in the southern face of the existing quarry (which would be disturbed by the proposed development in the Application Site.

Subject to these updates, there are no changes to the statutory and non-statutory designated sites in the vicinity of the Application Site and wider quarry, and no material changes to the habitats within the Application Site and remaining Twyn y Glog Ridge which would be protected as part of the development scheme. These baseline conditions are thus described below.

7.2 Ecology Baseline

7.2.1 Statutory and non-statutory designated sites

The Application Site is not affected by any statutorily designated nature conservation sites. The closest statutory European designation is the Cwm Cadlan Special Area of Conservation (SAC) / National Nature Reserve (NNR) which lies to the north of the existing Penderyn Quarry site, some 450m from the Application Site boundary, and separated from the Application Site by the existing Penderyn Quarry void. The Cwm Cadlan SAC is designated because of its examples of purple moor grass meadows and short sedge mire communities.

Some 1.3km to the south of the Application Site is the Blaen Cynon SAC designated because of its population of marsh fritillary butterfly, and some 3km to the north west is the Coedydd Nedd a Mellte SAC designated as an example of sessile woodland.

SSSI's are constituent parts of the above SAC's with additional SSSIs at Woodland Park and Pontpren, some 1.3km south west of the Application Site, again designated for the interest provided by the marsh fritillary butterfly, and Cors Bryn y Gaer, some 2.5km south east of the Application Site designated for its lowland bog.

There are no non-statutory sites of nature conservation importance within 2km of the Application Site.

7.2.2 Phase 1 Habitat Survey

The habitat survey undertaken as part of the ROMP EcIA included the full area of Penderyn Quarry and the immediately adjoining land. A copy of the Phase 1 Habitat Survey plan produced as Figure 2.02 of the ROMP ES is reproduced at the end of this chapter as **Figure 7.1**. The areas of relevance to the Application Site and adjoining Twyn y Glog ridge were included within 'area 4' of the habitat survey, and were described as follows:

Area 4 runs from the north eastern boundary of the Quarry Site to the south western boundary and includes the Twyn-y-Glog ridge, that remains to be quarried under existing consent 1/2427 (1958), and the area in the east where minerals may be worked in exchange for the preservation of the Tywn-y-Glog ridge,i.e. the proposal which comprises the current planning application.

Along the eastern boundary the extraction limit comes right to the fence line until the south east corner, where a small section of undisturbed grassland (the Application Site) is included within the Quarry Site boundary. This area is a small part of a large sheep pasture, parts of which are similar to but less diverse than the calcareous grassland in the north east of Area 3.

Along the southern edge there is a distinct change in the vegetation, with acid grassland and dry heath dominating. The areas closest to the existing extraction boundary have been disturbed and in the south east there is a recently restored waste tip (Sink Hole tip). The areas disturbed appear to have been over-tipped with quarry waste, used as access tracks or stripped to rock head.

The area along the southern part of the quarry site comprising the Twyn-y-Glog ridge can be divided into land in the south east comprising the current Application Site, and land in the west which is within the existing permitted area for quarrying (ref 1/2427; 1958).

The land within the Application Site is predominantly acid grassland with bracken over areas of previous disturbance comprising piles of loose rock and fractured outcrop. Towards the western end of the Application Site, there is an expanse of bare ground where vehicles accessed the 'Sink Hole' tip. There is also tipped quarry waste that has started to be colonised by a range of acid and calcareous grassland species that are found in adjacent undisturbed areas and includes species such as carline thistle, bird's foot trefoil, wild thyme and salad burnet.

The area of Twyn-y-Glog ridge to the west (which is permitted for quarrying) is distinctive in being dominated by south facing 45° rock exposures. These slabs are quite extensive and massive but where there are fractures and around the edges there are mosses and species encroaching from the surrounding heathland/acid grassland vegetation. It is here, and where the soil is shallowest, that the more diverse grassland occurs, where coarser heather (Calluna vulgaris) and bracken dominate. Crustose lichens form patches over the rocks. To the west of a stone wall**,** north towards the current extraction limit, there is an area below a shallow rock outcrop that may have been previously disturbed, but which has developed coarse grassland and heathland with patches of tussocky acid grassland. The coarse grassland has cock's foot, bracken, creeping thistle (Cirsium arvense), ribwort plantain, bird's foot trefoil, cuckoo flower (Cardamine pratensis), common sorrel (Rumex acetosa) and red fescue.

In places the acid grassland is quite diverse and includes species such as wild thyme, particularly where the soils are thin and the bedrock is exposed or near to the surface. The acid grassland has sheep's fescue and common bent with heath bedstraw (Galium saxatile), bilberry (Vaccinium myrtillus), green-ribbed sedge (Carex binervis) and a range of species also found in the calcareous grassland in the north west of the quarry site. These areas unlike the pastures around the north part of the quarry site are generally un-grazed, save by rabbits and itinerant sheep. Beyond the quarry site boundary, the vegetation changes to largely open moorland dominated by acid grassland, heathland and bracken with purple moor grass and rushes frequent over the wetter ground.

In the south west corner of the quarry, the rock outcrops end in a steep slope covered in rocks with heather, short scrub and acid grassland.

7.2.3 Species

The ROMP EcIA noted the presence of a number of large trees around the perimeter of the quarry which have the potential for roosting bats, but that there are no suitable trees which will be disturbed by future quarrying. The survey noted that there is suitable foraging/commuting habitat for bats around the perimeter of the quarry, particularly the northern boundary where there is a wooded watercourse with fields and hedgerows to the north. However, the southern and eastern boundary of the quarry (the Application Site) is exposed with little cover and beyond is extensive moorland that is generally of a lower quality for foraging.

The study recorded reptiles (common lizard) in the undisturbed Twyn y Glog ridge area, and a confidential badger report highlighted the presence of badgers.

7.3 Potential Effects

The ROMP EcIA considered the potential for the effects of the overall quarry development scheme to give rise to indirect effects on the Cwm Cadlan SAC. This focused primarily on the potential for indirect hydrological effects to arise from the dewatering of the quarry void.

These issues are not relevant to the proposed development within the Application Site wherethere would be no working below the water table and thus no dewatering within the Application Site which might affect the hydrological system within the Cwm Cadlan SAC. These issues are discussed further in Chapter 6.0 above, with the conclusion that the proposed development will have no effect on the Cwm Cadlan SAC.

Similarly, the development would have no effect on the other SACs in the general vicinity of the quarry based upon the features for which they are designated (marsh fritillary butterfly and old sessile oak woods) and their distance from the Application Site. Similarly, there would be no effect on other SSSIs in the general locality, again by virtue of distance, the features for which they are designated, and the absence of any dewatering with the Application Site.

There are no non-statutory designated nature conservation sites with a 2km radius and thus no potential effects to such designations.

Development of the quarry under Scenario B (the development proposed in the current application) would have some impact on the population of common lizard recorded in the Twyn-y-Glog area, but most of the habitat where the species was recorded would be retained via the 'scenario B development, but lost via the currently permitted 'scenario A' development.

7.4 Mitigation Measures

The key mitigation measure recommended in the ROMP EcIA of relevance to the current application and this ES relates to reptiles.

It was noted that common lizard has been recorded in the Twyn y Glog ridge area, notably within the Preserved Area. It was thus proposed that prior to entry into the defined areas, a scheme for the transfer of animals into suitable areas outside the operational area should be implemented. This would provide for a period of capture and transfer of animals from areas to be lost into suitable habitat elsewhere within the quarry site. It was noted that there may also have to be reptile fencing erected along the boundary of the working area with adjacent areas to remain undisturbed to prevent reptiles wandering into the working area.

By taking these reasonable avoidance measures during quarrying, it was concluded that this would negate any significant impact on reptiles and provide compliance with the protection that the species receives under Section 9 and Schedule 5 of the Wildlife and Countryside Act 1981 (as amended).

7.5 Updated Surveys and implemented measures

Based upon the context provided by the ROMP EcIA and its recommended mitigation measures, the updated ecological input has focused on:

(i) The implementation of a reptile translocation exercise;
(ii) An updated badger survey; and
(iii) A bat survey of the quarry face which would be affected by the proposed extension development.

The results of the studies and surveys are produced as **Appendix 4** to the ES, but the key issues are summarised below.

7.5.1 Reptile Translocation

The Application Site was enclosed with reptile exclusion fencing in July 2016. The area was trapped in the period 15th August – 12th October 2016 with a total of 34 reptiles moved from the exclusion area. All reptiles were captured in suitable weather conditions and translocated to areas to suitable habitat to the east and west of the site. Five days without capture was achieved in October 2016.

The carrying capacity of the habitat used for translocation will be increased by introducing stone pile refugia (for winter hibernation).

The reptile exclusion fencing is being maintained, and the Application Site is thus considered to be clear of constraints in terms of reptiles.

7.5.2 Bat Survey

The existing quarry face along the north western edge of the Application Site has two cracks that could potentially be two small caves that could have potential for use by roosting bats.

The cracks are situated high on the quarry wall which means that physical access is not possible. An Anabat detector was thus lowered over the edge of the quarry faces with the microphone positioned outside the potential roosting space. Monitoring was undertaken for 5 nights in August 2016, but no bats were recorded.

It is thus concluded that the cracks / caves are unlikely to be suitable for roosting bats. It is assumed that the cracks / caves are shallow and exposed to external elements, or potentially affected by rainwater through internal cracks. On this basis, it is considered that the proposed development would have no impacts on bats and a European Protected Species Licence will not be required.

7.5.3 Badger Survey

Badgers benefit from the status bestowed upon them by the Protection of Badgers Act 1992. The 1992 Act grants protection not only to the Badgers themselves but also to their setts. This prohibits certain activities within the vicinity of a sett and makes such actions illegal unless an appropriate licence is sought beforehand.

Field surveys were carried out throughout August and September 2016 while undertaking the above mentioned reptile translocation exercise . The survey was carried out at an optimal time under perfect conditions, so the ground was soft enough to identify species specific prints. The objectives of this survey were to:

- Determine the presence or likely absence of protected species;
- Provide an estimate on populations where appropriate;
- Assess the ecological constraints that potential presence may pose to the development and the provision of general information on mitigation techniques for species.

All areas within the development area were searched for signs of Badger activity, with attention to sett holes, footprints, latrines, hairs and paths which constitute characteristic evidence that badgers are present.

Where possible, holes were classified as well-used, partially-used or disused:

- Well-used holes show obvious signs of recent use by Badgers, including fresh spoil, bedding, fresh claw marks, dung, hair and footprints.
- Partially-used holes show no signs of recent use. The entrances may be partially blocked by leaf litter or small plants, but they could easily be re-used by Badgers. This includes setts that are only used occasionally at different times of the year.
- Disused holes show no sign of having been used by Badgers for many months (if not years) and include holes that show signs of

collapse or are barely discernible. Such holes could not be re-used by Badgers without substantial effort.

In this case, the study identified a hole exists beneath a large rock within the Application Site, which has been designated as a partially used sett. The entrance to the hole has grown over with tall ruderal plants and clearly hasn't recently been used.

Sand traps were positioned within the entrance to the potential sett to find footprints and establish occupancy. Traps were in place for fourteen days.

Wildlife Camera traps were also utilised, with five positioned outside and around the potential sett for a fourteen-day period.

The sand trap confirmed no activity at the set entrance and the camera traps didn't detect any badger activity.

The lack of any badger activity within the development means a licence to disturb badgers will not be required. The proposed development will not have an impact on badger foraging since no evidence of foraging was recorded during the survey.

Though no evidence of badgers was found during the survey, badgers are known to be in the area and the possibility exists for badgers to move into the sett. The following measures have thus been taken:

(i) The partially used sett was by surrounding with chain-link to ensure the sett cannot be dug into by Badgers. One-way gates were installed at the hole entrances as a precaution, in case a fox gains access to the sett before the chain-link is erected.

(ii) During the exclusion period the setts was be monitored every three days for any signs of equipment damage or any evidence of Badgers re-entering the sett.

(iii) No evidence of Badgers was found and the hole has thus been destroyed.

7.6 Conclusions

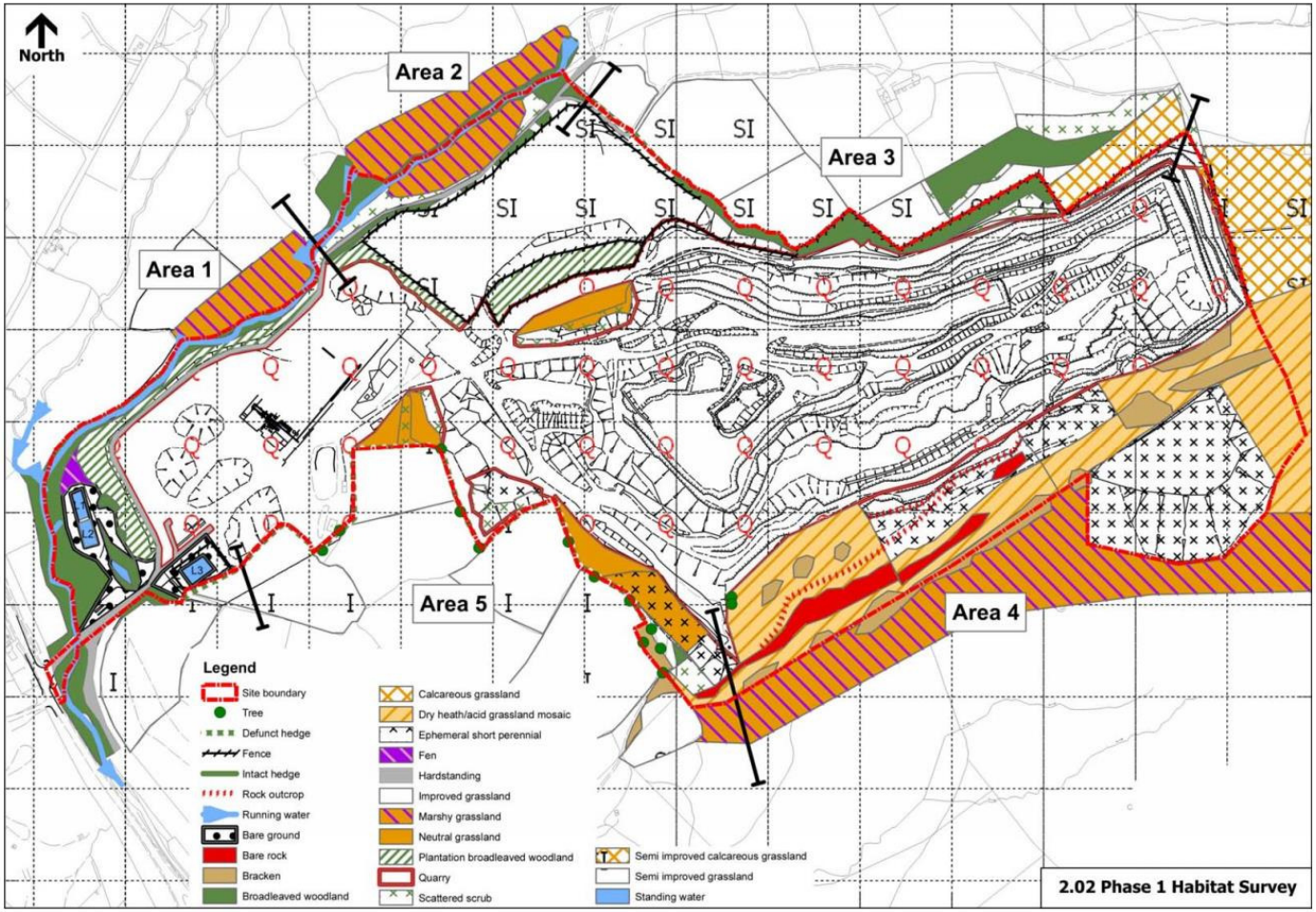
The Application Site comprises predominantly acid grassland with bracken over areas of previous disturbance comprising piles of loose rock and fractured outcrop. Towards the western end of this area, there is an expanse of bare ground where vehicles accessed the adjacent 'Sink Hole' tip.

In contrast, the remaining area of Twyn y Glog Ridgeline where the rights to quarry are proposed to be relinquished comprises a more ecologically diverse area dominated by south facing 45^{o} rock exposures. The exposures are quite extensive and massive with mosses and species around the edges, and with a diverse grassland encroaching from the surrounding heathland/acid grassland vegetation, with lichens forming patches over the rocks.

Species surveys confirmed that the Application Site contained a population of reptiles (common lizard). These have been captured and translocated to surrounding suitable habitats, with the Application Site provided with reptile exclusion fencing. There are no other species constraints to the development.

The site is not constrained by any statutory or non-statutory sites of nature conservation interest, and the development would have no indirect effect on designated sites of nature conservation interest in the general vicinity of the Application Site.

Figure 7-1 Phase 1 Habitat Map



8.0 OTHER ENVIRONMENTAL ISSUES

8.1 Introduction

Chapters 5.0 – 7.0 above have addressed what are perceived to be the key environmental issues associated with the proposed new area of quarrying/ reserve swap development.

However, it is conventional for environmental impact assessments associated with quarry developments to also address a range of other potential environmental and amenity effects arising from such developments. The significance of such effects will vary depending on the nature and circumstances of individual proposals. In this case, in the context of the location of the site, distance from sensitive residential receptors, and inter-relationship with the existing Penderyn Quarry operation, it has been informally agreed with the Mineral Planning Officers representing BBNP that such issues do not warrant detailed studies and assessment. However, it has been agreed that the issues should be briefly considered for completeness.

The following sections thus provide a brief overview of other environmental issues, drawing where appropriate from studies undertaken as part of the ROMP Review EIA and Welsh Government Guidance.

It is, however, important to note that the assessment of other environmental effects is confined to the operations which would be undertaken within the discrete area which comprises the Application Site. The assessment does not consider the environmental effects of the wider operation within Penderyn Quarry associated with, for example, the operation of the processing plant site, since this is covered by separate planning permissions, which themselves are subject to the consideration of updated planning conditions via the ROMP Review.

8.2 Noise

8.2.1 Site Context

The Application Site at the south eastern extremity of Penderyn Quarry is remote from residential property at a distance of some 1.1km from the village of Penderyn, at the closest point.

The closest residential property lies at Garw-dyle, some 380m to the north of the Application Site, but separated from the Application Site by the existing operational quarry area and intervening undisturbed land to the north of the operational area.

The property at Bodwigiad lies some 750m to the south west, separated from the site by the Twyn y Glog ridge, with the Penderyn Distillery some 1.05 km to the south west.

8.2.2 Welsh Government Guidance on Noise

Technical Advice Note (Wales) 11 (TAN 11)

The primary planning guidance on noise is contained in Planning Guidance (Wales) Technical Advice Note (Wales) 11 Noise dated October 1997.

Technical Advice Note 11 does not refer specifically to noise from surface mineral workings. However, following extensive consultation and research, the Department of the Environment and The Welsh Office prepared guidelines on noise from mineral workings for Planning Authorities and Minerals Operators. The advice was contained in Minerals Planning Guidance Note 11 dated April 1993, and whilst this advice has been cancelled in England, parts of MPG11 remain extant in Wales, as discussed below.

Minerals Technical Advice Note (Wales)1 (MTAN 1)

Minerals Technical Advice Note (MTAN) (Wales)1: Aggregates issued by the Welsh Assembly Government in March 2004 includes paragraphs 85 to 88 headed "Noise". MTAN 1 supersedes paragraphs 31 to 42 of MPG 11:1993, but the noise limits closely follow the advice contained in MPG 11: 1993 (since incorporated into MPS 2 and subsequently into the Technical Guidance to The National Planning Policy Framework and then Planning Practice Guidance in England).

Paragraph 88 relates to noise limits and states:

> "*Noise limits – noise limits should relate to background noise levels, subject to a maximum daytime noise limit of 55 dB(A) where background noise levels exceed 45 dB(A). 55dB(A) is the lower limit of daytime noise levels where serious annoyance is caused. Where background noise is less than 45 dB(A), noise limits should be defined as background noise levels plus 10 dB(A). Night-time working limits should not exceed 42 dB(A) at noise sensitive properties. Daytime working is defined as 0700-1900 hours and night-time as 1900-0700 hours. Noise limits should be set in terms of $L_{Aeq,T}$ over a 1-hour measuring period. LAeq is the noise index used to describe the "average" level of noise that varies with time (T) and should be measured "free-field" that is, at least 3.5 metres away from a façade to prevent reflection of noise by any façade that faces the noise source. During temporary and short-term operations higher levels may be reasonable but should not exceed 67dB(A) for periods of up to 8 weeks in a year at specified noise sensitive properties."*

Minerals Planning Guidance Note 11 (MPG 11)

The government prepared guidelines on noise from mineral workings for Mineral Planning Authorities (MPAs) and Minerals Operators. This advice was contained in Minerals Planning Guidance Note 11 "The Control of Noise at Surface Mineral Workings" dated April 1993. This guidance has since been replaced in England by MPS 2 which was then superseded by the National Planning Policy Framework.

MTAN 1 superseded paragraphs 31 to 42 of MPG 11, but the remainder of the document is still applicable in Wales

The aim of Minerals Planning Guidance Note 11 (MPG 11) as set out in paragraph 1 was "*to provide advice on how the planning system can be used to keep noise emissions from surface mineral workings within environmentally acceptable limits without imposing unreasonable burdens on minerals operators*."

8.2.3 ROMP Review Noise Assessment

Context

The noise study undertaken as part of the ROMP review EIA considered the effects of noise at residential properties around the overall Penderyn Quarry site, but in the context of the overall quarry operation including activities in the plant site, and related developments.

Much of this previous assessment is not relevant to the specific development within the current Application Site, but the assessment did include the current Application Site as part of the quarry development scheme, and thus, where relevant, the noise effects of extraction within the current Application Site, were included as part of the assessment.

This included consideration of the noise effects at what is the closest property to the current Application Site, to the north at Garw-dyle. The assessment included taking background noise measurements at the property using both an installed metre which recorded noise levels at 1 hour intervals over a period of one week, and a series of spot sample measurements.

The study noted that "

> *At this location, there was no view of the processing plant at the quarry and although it is one of the closest locations to the existing quarry void no activity within the quarry itself was heard during any of the visits for sample measurements or checking the installed meter. The dominant noise sources at this location were agricultural activity, specifically a tractor in the farm yard and at the farm buildings beyond the farm house and sheep / lambs in the nearby fields.*

The overall average noise levels from the unattended noise monitoring results for weekdays 0700 to 1900 are 33 dB $L_{A90,\ 1\ hour}$ and 48 dB $L_{Aeq,\ 1\ hour}$.

Noise Limits

The study further noted that:

The daytime background noise levels from the unattended noise monitoring results at Garw-Dyle Farm are in the range 27 to 40 dB LA90, 1 hour for weekdays 0700 to 1900. Existing quarry and processing plant site noise was not a significant contributor to the environmental noise measurements….

MTAN 1 paragraph 88 states "Where background noise is less than 45 dB(A), noise limits should be defined as background noise levels plus 10 dB(A)." For background noise levels in the range 27 to 40 dB LA90, 1 hour, free field limits at dwellings "defined as background noise levels plus 10 dB(A)" would be in the range 37 to 50 dB LAeq, 1 hour, free field . At the lower end of the range a limit of 37 dB LAeq, 1 hour, free field is below the night-time limit of 42 dB LAeq, 1 hour, free field at dwellings. This must inevitably lead to the logical argument that it would not be appropriate to require a daytime limit below the night-time limit. With reference to paragraph 38 of MPG 11 it would not normally be appropriate to require a daytime limit below 45 dB LAeq, 1 hour, free field at dwellings when background noise levels are below 35 dB LA90, 1 hour, free field. For background noise levels in the range 27 – 40 dB LA90, this would mean limits for a new quarry in the range 45 to 50 dB LAeq, 1 hour, free field.

For Penderyn Quarry, noise limits in the range 45 to 55 dB LAeq, 1 hour, free field at all existing dwellings are suggested for the period 0700-1900. The lowest noise limit of 45 dB LAeq, 1 hour, free field is proposed at Garw-Dyle Farm. For dwellings adjacent to the main road through Penderyn, Chapel Road, the highest noise limit of 55 dB LAeq, 1 hour, free field is proposed. For other dwellings, the suggested site noise limit is set at the reasonable worst-case calculated site noise level for future operations at the quarry (noting that in all these cases, the levels are below the highest noise limit of 55 dB LAeq, 1 hour, free field).) If more stringent control were to be sought by the MPA, then this could lead unreasonably to severe restrictions being placed on site operations.

Calculated Noise Levels

At Penderyn Quarry, the rock is extracted by drilling and blasting, loaded into dump trucks by a face shovel and taken to the processing plant site. The rock is transported to a feed area adjacent to the primary crusher after which it is passed through a chain of crushers and screens (the drystone plant). Some of the crushed and screened material is used for coated roadstone production in the asphalt plant and some material is used in the concrete batching process. After processing of the stone, wheeled loading shovels are used for stock handling and for loading lorries. Lorries and mixer trucks then transport the graded material, coated roadstone and concrete out of the plant site area, via the site access road and onto the road network for distribution.

The machinery and plant associated with rock extraction and processing can be divided into groups. These are (i) the rock drill and the face shovel; (ii) secondary breakage of material at the working face; (iii) dump trucks used to transport the rock from the face; (iv) crushing and screening plant for "drystone"; (v) the asphalt plant and the concrete batching plant; and (vi) associated loading shovels and road going lorries for the transportation of material off site.

Of these activities, only items (i) – (iii) are relevant to operations within the Application Site.

The plant items will work at different physical levels within the quarry, expressed in terms of metres above ordnance datum (m AOD). For development within the Application Site, the noise model assumed a rock head (top working face) of 360m AOD for the purposes of the noise assessment for Garw Dyle Farm, with the first bench down taken to 12m below the rock head as the highest point for secondary breakage of material and for loading operations.

Based upon these parameters, the calculated noise at Garw Dyle Farm is 41 dB LAeq,, compared to the suggested noise limit of 45 dB LAeq,

8.2.4 Noise Conclusions

The Application Site lies in a remote location, at distance from residential and other sensitive noise receptors. The noise criterion of 45 dB LAeq at the closest residential property at Garw Dyle Farm, referred to above, is relied upon for the purposes of the current noise assessment.

The defined operations within the Application Site could be undertaken within the noise criterion and there should thus be no noise constraints to the development proceeding.

It is noted that there are no noise limits imposed on the existing quarry, and prior to the determination of the ROMP application, the Applicants suggest that it would not be appropriated to impose a noise condition relating to the discrete Application Site which is the subject of this ES. It is thus suggested that the issue of noise limits for the Application Site be deferred for consideration as part of the ROMP review when noise limits can be set for the overall quarry. It is proposed that a Section 106 Agreement would provide for the ROMP conditions to also apply to the Application Site.

8.3 Blast Vibration

8.3.1 Effects of Blasting

Ground Vibration

There is considerable practical and theoretical research that has been undertaken into the damage potential of blast-induced ground vibration including that undertaken by Vibrock Limited[1].

Blast-induced vibration is impulsive and short-term in nature. A typical time history would show rapid build-up to a peak followed by a decay which may or may not involve several cycles of vibration.

A typical blast consists of a number of boreholes containing explosive charges. Each charge is detonated individually using a series of detonators with differing millisecond delays. The resulting blast-induced vibration is measured in terms of unfiltered particle velocity time histories in three component planes from which the peak values can be obtained.

The detonation of explosives within a confined borehole generates stress within the rock in the form of seismic waves causing localised vibration, distortion and/or cracking. This type of ground vibration is always generated, even in the most carefully designed blasts, and will radiate seismic waves away from the blast, attenuating as distance increases.

Research has concluded that the maximum value of particle velocity in any stress wave is the parameter of significance and is generally termed 'peak particle velocity' or ppv.

With experience and knowledge of the factors which influence ground vibration, such as blast type and design, site geology and the receiving structure, the magnitude and significance of the blast-induced seismic waves can be accurately predicted at any location.

In general terms, an average person would become aware of blast-induced vibration at levels of around 1.5mms^{-1}ppv; although under some circumstances this can be as low as 0.5mms^{-1}ppv. However, human beings are poor at determining relative magnitudes of vibration, for example, the difference between 4.0mms^{-1}ppv and 6.0mms^{-1}ppv is unlikely to be perceived by the average person.

Vibration levels between 0.6mms^{-1}ppv and 50.0mms^{-1}ppv are routinely experienced inside a property in everyday life and are considered wholly

[1] The Environmental Effects of Production Blasting from Surface Mineral Workings, Vibrock Limited. Published by the Stationery Office 1998 (ISBN 0-11-753412-9)

safe. It is apparent though, when similar levels are experienced due to blasting operations, it is not unusual for such a level to give rise to subjective concerns.

Table 8.1 gives examples of vibration levels routinely generated in a property.

Table 8-1 - Vibration Levels Generated in Everyday Activities

Activity	Vibration Level, mms^{-1}ppv
Walking, measured on a wooden floor	1.0 - 2.5
Door slam, measured on a wooden floor	2.0 - 5.0
Door slam, measured over the doorway	12.0 - 35.0
Foot stamps, measured on a wooden floor	5.0 - 50.0

With regard to physical damage to properties, extensive research has been carried out around the World, the most pertinent being undertaken by the United States Bureau of Mines (USBM). The USBM findings indicate that damage to structures could occur if dynamic vibration stresses induced within the structure exceed the allowable design stress for the specific building material. Classifications of building damage range from very fine plaster cracking to major cracking of structural elements. In particular, when defining damage to buildings, the following classifications are used:

- Cosmetic or threshold - the formation of hairline cracks or the growth of existing cracks in plaster, dry wall surfaces or mortar joints.
- Minor - the formation of large cracks or loosening or failing of plaster on dry wall surfaces or cracks through bricks/concrete blocks.
- Major or structural - damage to structural elements of the building.

Studies by the USBM concluded that vibration levels in excess of 50.0mms^{-1}ppv are required to cause structural damage. The onset of cosmetic damage can be associated with lower vibration levels. Vibration level between 19.0mms^{-1}ppv and 50.0mms^{-1}ppv for open pit blasting are generally considered safe in the UK. It should be noted that these levels are for the worst-case structure conditions and that they are independent of the number of blasting events and their duration. No damage has occurred in any of the published data at vibration levels of less than 12.7mms^{-1}ppv.

Airborne Vibration or Air Overpressure

Whenever blasting is carried out, energy is transmitted from the blast site in the form of airborne pressure waves in a wide range of frequencies; some of which are above 20Hz and therefore perceptible to the human ear but most are below the ears audible range. It is a combination of the sound and concussion that is known as ‘air overpressure’.

Any attenuation due to topography, either natural or man-made, between the blast and the receiving property does not significantly reduce air overpressure levels due to the high amounts of energy transmitted in the audible frequency range.

Overpressure may vibrate buildings, particularly windows, but damage caused by air overpressure is rare. Damage, in the form of broken windows, is possible but extremely unlikely at 140dB; more frequently the perception of vibration, and consequent complaints, are high-lighted by windows and loose ornaments rattling which is possible at 120dB.

Meteorological conditions, such as wind direction and speed, cloud cover, humidity and temperature inversions also influence the intensity of air overpressure levels. In view of this, the level of air overpressure experienced, irrespective of how well the blast is designed, is often outside the operators’ control.

Fly-rock

Fly-rock is the unexpected ejection of material from the blast site to any area beyond the designated safe area. Fly-rock occurs when the amount of explosive energy is greater than that required to break up the mass of rock between the blast position and the free face. The excess energy propels rock debris beyond the safe area.

Due to improvements in blast design technology, fly-rock incidents are extremely rare.

8.3.2 Welsh Government Guidance on Blast Vibration:

MTAN 1 provides advice on suitable planning conditions to control the environmental impact of blasting operations at quarries. Paragraph 83 states *"Planning conditions relating to the control of blasting should only: relate to those aspects of environmental management that are under the control of the operator; should be directly relevant to environmental issues; and, should not be in conflict with existing health and safety legislation. Consequently planning conditions should provide for:*

- *Acceptable days for blasting operations: unless there are exceptional circumstances such as a safety emergency, blasting should take place at regular times within the working week that is Mondays to Fridays. Blasting on Saturday mornings should be a matter for negotiation between the operator and the MPA taking into account the views of any nearby residents. No blasting should take place at any other time, that is, Saturday afternoons, Sundays or Bank or National Holidays;*
- *Acceptable times of blasting operations: blasting should only take place between the hours of 10:00 am and 16:00 pm, except when there is an emergency in the interests of safety;*
- *Maximum level of ground vibration at sensitive locations: ground vibration as a result of blasting operations should not exceed a peak particle velocity of 6mms^{-1} ppv in 95% of all blasts measured over any six month period, and no individual blast should exceed a peak particle velocity of 10 mms^{-1} ppv;*
- *Approval of a scheme by which air overpressure is managed and mitigated through careful design of blasting operations;*
- *Approval of a scheme of vibration monitoring so that compliance within set limits can be adequately demonstrated by the operator at any time."*

MTAN1 also discusses air overpressure in paragraph 81 which concludes that, due to the unpredictability of air pressure due to prevailing weather conditions, *"planning conditions to control air overpressure are unlikely to be enforceable"*.

8.3.3 Penderyn Quarry current blast vibration limits

The principal planning permission dated 14th September 1995 at Penderyn Quarry (ref CV 14033) contains the following conditions relating to blasting:

"17. *Blasting operations shall be controlled to ensure that*:

(a) Except in the case of emergency, no blasting shall be carried out on site except between 10.00am and 6.00pm Monday to Friday and 10.00am to 12.00 noon on Saturday. There shall be no blasting on Sundays or statutory Public/Bank Holidays.

(b) a warning siren shall be sounded prior to the commencement of blasting operations.

(c) at all times, blasting shall be designed so that peak particle velocity as measured in any one of three mutually perpendicular planes at the nearest residential property (existing at the date of this permission) shall not exceed 10 mm per second for 95% of all blasts as measured over a six months and no individual blast shall ever exceed a peak particle velocity of 12mm per second.

18. The operator shall make every practicable effort to reduce the effects of air overpressure arising from blasting, having regard to the blast design, methods of initiation and also to weather conditions prevailing at the time of the blast".

It will be noted from the above that the blast vibration limits recommended by MTAN1, which post-date the 1995 Penderyn planning permission, are more stringent in terms of ground vibration limits than those currently in place at the Quarry.

8.3.4 ROMP Review Blast Vibration Assessment

The blast vibration study undertaken as part of the ROMP review EIA included ground vibration measurements from a production blast which were used to generate a 'regression line' from which the allowable instantaneous explosive charge weights can be defined to comply with the vibration criteria detailed in MTAN1 of 6mms PPV at a 95% confidence level at a given separation distance. The regression line was also used to define the allowable maximum instances charge weights for the closest properties in order to comply with the recommended criterion of 6mms PPV at a 95% confidence level.

The study concluded that with attention to charge weights and blast design, it would be possible to continue blasting operations and comply with a criterion of of 6mms PPV at a 95% confidence level.

The study also concluded that with such low ground vibration levels, accompanying air overpressure would also be of a very low and hence safe level, although possibly perceptible on occasions at the closest of properties.

The study thus recommended that an updated planning condition should be drafted to reflect the MTAN1 recommended limit of 6 mms^{-1} peak particle velocity at a 95% confidence level (with an upper limit of 10mms PPV).

8.3.5 Blast Vibration Conclusions

Blasting operations within the proposed extension area would represent a continuation of well-established practices within the existing quarry.

The Application Site lies in a remote location, at distance from residential and other receptors who might be sensitive to blast vibration.

The defined operations within the Application Site could be undertaken in accordance with the existing blast vibration limits in place at the site (ref condition 17 of permission CV14033) or within the revised limit which has been suggested as part of the ROMP application. There should thus be no blast vibration constraints to the development proceeding.

8.4 Dust /Air Quality

8.4.1 Air Quality

The Air Quality Regulations prescribe National Air Quality Strategy objectives (AQO) to be achieved for a range of pollutants. Under the Regulations, Local Authorities are required to review the existing and projected airborne concentrations of these pollutants and to compare them with the AQOs. If an exceedence of any AQO appears likely, then an Air Quality Management Area (AQMA) is to be designated with the aim of achieving the objective by the date shown in Table 8.2

The pollutants of potential concern in connection with quarrying activity and processing operations are particulate matter less than 10µm (PM10) and particulate matter less than 2.5µm (PM2.5). The relevant AQOs and other non-statutory objectives are listed in Table 8.2 below.

Table 8-2 Air Quality Objectives

Pollutant	Objective	Date	Comment
PM10	40 µg/m3, annual mean	31 December 2004	
	50 µg/m3, 24 hour mean, not to be exceeded more than 35 times per annum	31 December 2004	
PM2.5	25 µg/m3, annual mean	2020	new, not in AQR
	15% reduction, urban background	2010 - 2020	target, UK urban areas

The mapped LAQM background data for 2015 for the grid squares covered by the quarry and access roads are summarised in the Table 8.3.

Table 8-3 Summary Background Air Quality Data

Location	OS Grid Square	Mean pollutant concentration (µg/m3)	
		PM10	PM2.5
		2015	2015
North of site	SN 955 095	10.9	7.2
South of site	SN 955 085	10.9	7.3
% NAQS objective		27	29

The data indicate that in 2015, the key pollutant concentrations were predicted to be well below the respective AQOs.

It is also noted that the air quality maps confirm a reduction below the 2010 levels quoted in the ROMP Environmental Statement for 2010 of 12.8 PM10 and 7.7 PM2.5.

8.4.2 ROMP Review Air Quality Assessment

The assessment provided an overview of operations undertaken at the quarry with particular reference to the activities which have the potential to give rise to dust emissions; the dust suppression measures which are in place at the quarry; the background air quality conditions; and the controls which are in place at the quarry, notably via the dust and air quality management and monitoring requirements set out in the Pollution Prevention and Control Permit, and Hanson's own Environmental Management System

The assessment also identified the principal potential sources of dust, listed as:

- soils stripping, storage and restoration (minimal due to working of quarry within existing void area),
- drilling and blasting,
- loading and tipping,
- site haulage,
- crushing and screening,
- conveyors,
- aggregates stocking,
- concrete batching,
- roadstone drying and coating,
- road transport, and
- wind blow across bare ground and stockpiles.

Of these potential sources, those relevant to the application which is the subject of this EIA and ES are confined to:

- soils stripping, storage and restoration,
- drilling and blasting,
- loading and tipping,
- site haulage, and

- wind blow across bare ground.

The ROMP ES addressed these issues as follows:

The surface soils around the quarry are generally free-draining, however the areas and volumes of soil for stripping, storage and restoration operations are so limited as to be unlikely to give rise to significant airborne dust emissions.

The drilling rigs are modern self-propelled units and are equipped with cyclones and filtration systems to minimise dust emissions. The blasting operations are designed to minimise excessive breakage, fly rock, noise and vibration and this will also reduce dust emissions. Any emissions from blasting will be short-lived and tend to be largely retained within the quarry void, which is remote from most potentially sensitive receptors, with the possible exception of Garw-dyle. Drilling and blasting is unlikely to result in significant dust emissions generally.

Loading of the blasted rock results in localised dust emissions but these are retained within the quarry void. Tipping of the rock at the primary crusher hopper may also result in visible dust emissions, although this area is remote from the site boundaries, and is well-equipped with dust suppression water sprays. The enclosure of the tipping point provides containment from the prevailing winds.

Site haulage is typically the greatest source of fugitive dust at quarries, particularly over longer haul distances when speeds tend to be higher and there is an added requirement to maintain a smooth well-drained surface. The haulage from the void to the primary crusher mostly lies within the quarry void, and for the approximate 150m distance between the void and feed hopper is equipped with fixed water sprays. The remote location from the site boundaries suggests minimal risk of any windblown dust leaving the site.

During dry windy conditions, visible wind blown dust may be raised from large areas of open or bare ground, including stockpiles and other un-surfaced areas, particularly where the materials are loose or have been disturbed by traffic or other operations. The principal areas include the stocking area.

In summary, the principal dust sources have been identified as site haulage and loading around the stocking area. Blasting is likely to raise dust on an infrequent basis (weekly or less), and a large proportion of this will be contained within the main quarry void.

In terms of potentially sensitive receptors, the ROMP ES provided an assessment of the risk of dust impact to receptors in the vicinity of the quarry, of which the property at Garw –dfyle is the closest to the current Application Site. The study noted that this property is some *160m to the north of the quarry at the closest point, but that the property is screened by the elevated crest of the quarry wall and intervening trees and hedges. The upper northern side of the quarry will remain undisturbed by future working, which will take place in the base of the quarry and southern side wall.*

The 'southern side wall' referred to is the current Application Site, which lies at a minimum distance of some 380m from Garw-dyle, where a combination of distance and the intervening quarry area are such as to render the potential for fugitive dust impacts at Garw dyle as negligible.

8.4.3 Dust Mitigation Measures

The ROMP ES confirmed a range of dust control mitigation measures, of which the following are relevant to the proposed development within the Application Site:

- *use of clean water for dust suppression, to avoid re-circulating fine material,*
- *high standards of house-keeping to minimise track-out and wind blown dust;*
- *effective staff training in respect of the causes and prevention of dust, and monitoring procedures; and*
- *Damping down of haul roads using water bowser in dry weather conditions*

Soil stripping and restoration are generally a short-term seasonal activities and there is considerable flexibility as to timing. Moreover, the majority of the permitted quarry area already forms part of the quarry footprint, with only relatively limited areas requiring soil stripping within the Application Site as part of the phased development scheme. Any soil bunds will be seeded at the earliest opportunity to bind the surface and minimise the effects of wind blow .

Impacts during mineral extraction, which are unlikely to be significant where their location is within a deep void, will be controlled by minimising the drop heights of as-dug material onto the ground. If necessary, any dry surfaces at the highest levels of the quarry should be sprayed using a rain gun attached to the water bowser before blasting and excavation is carried out.

Similarly, drop heights will be minimised to reduce any impacts associated with loading and tipping operations, particularly of any lighter soils materials.

Care will be taken in respect of site haulage, both of soils and overburden near the site boundaries and of mineral, although it is recognised that these are unlikely to give rise to significant impacts outside the site. The main dust mitigation measures for the principal haul route between the quarry and processing plant will continue to rely upon:

- *dust suppression by regular spraying from fixed spray points in dry conditions;*
- *regular compaction, grading and maintenance of the haul road;*
- *setting a site speed limit of 10 mph;*
- *fitting all site vehicles and plant with upswept exhausts and radiator fan shields;*
- *evenly loading vehicles to avoid spillages; and*
- *dampening down of haul roads using the on-site water bowser.*

All site traffic will keep to the designated haul routes to reduce the creation and subsequent entrainment of fine material into the atmosphere.

Water for dust suppression will be provided from the existing quarry sump.

The effects of wind blow across stripped surfaces and other areas of bare ground will be minimised by ensuring that loose soils and other materials are not left untreated on the ground. During dry conditions, water will be applied as necessary to stabilise any loose bare surfaces. Where surfaces within redundant areas of quarrying are likely to remain bare for a long period then these should be restored with vegetation.

8.4.4 Dust and Air Quality Conclusions

The above existing good management practices will ensure that quarrying and restoration operations within the Application Site will not give rise to any material dust or air quality effects.

8.5 Traffic

8.5.1 Introduction

Penderyn Quarry is located approximately 8km to the north of Aberdare, to the east of the A4059 Hirwaun to Brecon road and has direct access to the A4059 in the form of a simple priority T junction.

The ongoing operation of Penderyn Quarry is anticipated to reflect the current and historic activities in terms of the annual output remaining at around 500,000 tonnes, with processed limestone being distributed by HGV via the existing access on the A4059. In addition to the limestone extraction, processing and distribution, there is also a coated roadstone plant and a concrete batching within the quarry complex.

The proposed ‘reserve swop’ would have no implications in term of output or traffic movements: it would simply mean that a proportion of the reserves within the overall quarry complex would be partly sourced from the Application Area rather than from the Preserved Area.

However, the indirect effect of the development in terms of access to reserves at depth elsewhere in the quarry would mean a reduction in overall reserves by some 7.4 m tonnes (as discussed in Chapter 3.0 above). At output rates of 500,000tpa, this would shorten the overall duration mineral extraction at the site by some 15 years.

8.5.2 ROMP Review Traffic Assessment

A traffic impact assessment undertaken as part of the ROMP Review EIA concluded that the existing site access operates satisfactorily, and accommodates the daily traffic associated with the ongoing operations.

The existing highway network was found to retain a significant level of reserve capacity with the existing operations in place during the period of peak flow. It thus concluded that given that the ongoing future activities at Penderyn Quarry are predicted to remain at the current levels then it is not anticipated that the continuing operations will have a significant impact on the ability of the local highway network to function efficiently.

A review of accident data revealed that there are no inherent characteristics of the highway network that result in compromised safety for or as a result of existing HGV use. Again, given that the ongoing operations are not anticipated to change, and the proposed reserve swop would have no implications for output or traffic movements, then it is concluded that the ongoing development would have no significant detrimental impact in terms of highway safety.

There would however be a minor net benefit in highway terms arising from the indirect effect of shortening the duration of the currently permitted operation and related traffic flows by some 15 years (7.4m tonne reserve reduction).

8.5.3 Traffic Conclusions

Given that the proposed reserve swop would have no implications in terms of output or traffic movements, it is concluded that the development which is the subject of this EIA would have no highway capacity, safety of traffic impact implications.

8.6 Cultural Heritage

8.6.1 ROMP Review Cultural Heritage Assessment

A cultural heritage assessment undertaken as part of the ROMP Review considered the effects of the overall quarry development on below-ground archaeological resources, extant built heritage remains, and historic landscape. The assessment related to the full extent of the existing permitted Penderyn Quarry, the Application Area and a wider study area in a 500m radius around the site.

The study noted that there are no recorded archaeological features within the site. Historic cartographic sources record a dry-stone wall in the western area of the Twyn y Glog ridge. This boundary is part of a long, sinuous boundary wall that is first depicted in 1840, and extends into the Cefn Cadlan – Cefn Sychbant – Mynydd-y-Glog character area and is characteristic of early moorland-fringe enclosure.

Elsewhere, the study noted that small sheep pens and a field system of drystone walls have been identified within the quarry boundary from historic cartographic sources and historic aerial photography. These have been removed by subsequent quarrying. The extensive limestone quarrying of the majority of the site will have also removed any previously unrecorded archaeological remains.

The outer edge of the Twyn y Glog ridge has remained undisturbed, with the study noting that the ridge is a relatively prominent landscape feature, situated on the periphery of the Mynydd-y-Glog prehistoric landscape. No archaeological features were identified during the site visit, and gritstone frequently outcrops throughout the ridge, suggesting a limited potential for unrecorded archaeological deposits.

There are two scheduled ancient monuments to the south and south east of the site, show on Figure 2.06 (taken from Chapter 2.0 of the ROMP ES). These comprise a ring cairn (location 7) and a round cairn (location 8). Barrows/cairns are the defining features of the Bronze Age in the Welsh uplands and several Scheduled examples are recorded within the study area. These include a cairn of unsorted rubble with possible internal walling (Fig. 2.06, **8**) 250m south-east of the Application Site, and a ring cairn 10m in diameter (Fig. 2.06, **7**) 100m to the south. Both of these are situated on the south-east facing side of Twyn-y-Glog. These two cairns form part of a wider surviving ritual landscape of prehistoric monuments.

East Fforest Fawr and Mynydd-y-glog is included within the Register of Landscapes of Special Historic Interest in Wales[2]. It forms a narrow, but distinctive natural block of upland lying on the boundary between the former counties of Brecknock and Glamorgan. There is widespread and diverse, well-preserved archaeological evidence of occupation and land use from the prehistoric period to the recent past. There are several important groups of ritual monuments and significant evidence of early agriculture and medieval settlements. As noted above, there are numerous ring cairns throughout the area which are designated as Scheduled Monuments

Cadw was consulted as part of the assessment process who confirmed that the quarry is mainly outside of the East Forest Fawr and Myndd-y-Glog Landscape of Special Historic Interest and the proposals would have no direct impacts on the Registered area, with 'apparently negligible indirect impacts'. CADW also confirmed that an ASIDHOL2 assessment was not required.

8.6.2 Cultural heritage value

The drystone boundary wall recorded within the Preserved Area of the site is of low value, The remaining wall would not be impacted by the proposed development within the Application Site but the wall would be removed if the currently approved quarry development scheme is implemented (within the Preserved Area).

The magnitude of non-physical (visual) impact upon the Scheduled Monuments closest to the site, Fig. 2.06, 7 and Fig. 2.06, 8 to the south-east, will be negligible. The proposed development in the Application Site within the south eastern corner of the quarry would allow the retention of the Twyn y Glog ridgeline in the Preserved Area and thereby preserve the setting of Monument 7. The swapping of the extraction areas will not impact upon the inter-visibility of these two monuments, or their relationship with the wider prehistoric landscape of Mynydd-y-Glog to the east and south. The proposal involves a net reduction in the footprint of mineral excavations within an existing large quarry and the retention of an important landscape feature. This will not compromise the integrity of the prehistoric landscape but assist in retaining the character of that landscape.

8.6.3 Mitigation

The mitigation strategy devised as part of the ROMP Review EIA was to undertake an appropriate level of photographic and written recording of the surviving drystone wall within the quarry boundary. This would mitigate the impact of any partial removal, noting that the entirety of the wall would be lost if the currently approved quarry development scheme is implemented.

8.6.4 Cultural Heritage Conclusions

There are no recorded archaeological features within the Application Site or wider quarry area. Historic cartographic sources record a dry-stone wall, considered to be of low value, within the currently permitted Twyn y Glog Ridge area. The wall would not be affected if the 'reserves swop' proposal proceeds.

Cadw advised that the proposals would have no direct impacts on the Registered Landscape, with 'apparently negligible indirect impacts'. The magnitude of non-physical (visual) impact upon the Scheduled Monuments closest to the site will also be negligible.

[2] Register of Landscapes of Special Historic Interest in Wales, 2001 and Register of Landscapes of Outstanding Historic Interest in Wales, 1998; CADW, CCW and ICOMOS UK,

9.0 SUMMARY AND CONCLUSIONS

The ES provides a detailed and objective analysis of the potential environmental effects which would be associated with a proposal for a new area of working at the south eastern corner of Penderyn Quarry, but with the scheme proposing the relinquishment of the rights to quarry permitted reserves in the south western area of the quarry along the Twyn-y-Glog ridgeline, in effect ' a reserve swop'.

The consequence of quarrying within the Application Site compared to the currently permitted area proposed to be relinquished would be a net reduction in the available planned reserve at the overall quarry of some 7.4 million tonnes.

The objective of the scheme is to deliver a substantial landscape benefit via the retention of the prominent western half of the Twyn-y-Glog ridgeline which would otherwise be quarried and removed as part of the currently permitted quarry development scheme. The Application Site is also in a location which is more remote from residential properties and the village of Penderyn.

The Application Site lies within the boundary of a planning permission for quarrying granted in 1972 (reference 1/8523). However, a planning condition imposed on that permission prevents quarrying taking place within the confines of the current Application Site. Thus, whilst the current planning application intends to create a new area of working, that new area is within the boundary of an existing mineral planning permission area where ancillary operations associated with the construction of haulage roads for overburden placement etc have taken place within the defined area.

A ROMP Review application (March 2011) proposed an almost identical 'reserve swap', but the ROMP application has not been determined at the time of submitting this current application as a result of regulatory issues associated with the dewatering of the quarry workings at depth and the potential hydrogeological/ecological effects arising from such activities.

The consequence of the delay in determining the ROMP application has resulted in a position whereby there are now limited accessible reserves available at the quarry without either (a) deepening the quarry (as approved) or (b) quarrying the Twyn-y-Glog ridgeline (also as approved). Hanson has concluded that it would be prudent to submit a freestanding application to "extend" the quarry workings into the 'excluded' 1972 planning permission area and promote the 'reserve swap' associated with the preservation of the Twyn-y-Glog ridgeline. In effect, this would deliver the same objective of a 'reserve swap' as proposed as part of the ROMP Review application, but via a different mechanism and application.

Importantly in the context of the current planning Application Site, the quarrying of reserves within the discreet Application Site area would be confined to levels above the water table (above 265m AOD). The consequence would be that the potential hydrogeological/ecological effects associated with the wider quarry development (and consideration of the outstanding ROMP Review application) would not apply to the specific development within the 'extension' Application Site.

The ES draws together the inputs from specialist consultants who have undertaken the EIA and sets out the findings of the potential environmental effects of the development. The ES has focused on the key issue of the landscape and visual effects of the development in the reserved area and the effects of retaining the 'Preserved Area'. The LVIA concludes that there would be significant landscape and visual benefits associated with the the scheme which would protect the prominent Tywn y Glog ridgeline, replacing a 'major' adverse effect associated with the permitted scheme, with a 'minor adverse / negligiable' effect associated with the proposed scheme and the retention of the 'Preserved Area'.

In those terms, the scheme would deliver on a key objective of the LANDMAP study to 'ensure that no significant features of geological or geomorphological significance are lost due to development / inappropriate restoration'.

All other potential environmental and amenity effects have been considered, and the ES concludes that no significant adverse effects would arise from

the proposed development. Where relevant, the technical chapters make recommendations for measures to mitigate the environmental and amenity effects of the development which, in the majority of cases draw upon existing, well established and effective controls at the quarry.

In the light of the above considerations, it is concluded that the proposed development could proceed in an environmentally acceptable way, with significant landscape and visual benefits associated with the retention of the 'Preserved Area'.

These benefits are re-enforced by the planning policy analysis undertaken within the Planning Application Statement which concludes that the development could proceed in accordance with the development plan and national planning policy.

In all these circumstances it is considered that there should be a firm presumption in favour of permission being granted