# VAYNOR QUARRY

# Environment Act 1995
# First Periodic ROMP

## Environmental Statement

## Volume 1

**August 2022**

# ENVIRONMENTAL STATEMENT

# VOLUME 1

# VAYNOR QUARRY

## Environment Act ROMP Review

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### Merthyr Tydfil County Borough Council



### Brecon Beacons National Park Authority

# 1.0 INTRODUCTION

## 1.1 Context

This Environmental Statement (ES) sets out the results of an Environmental Impact Assessment (EIA) which has been undertaken to accompany applications to update the planning conditions which regulate operations at the currently mothballed Vaynor Quarry (hereafter referred to in this ES as 'the Quarry'). A plan illustrating the location of the Quarry is produced as **Figure 1.1** at the end of this chapter, with the Quarry Boundary being shown edged Green on application plans V6/PR/MT/2 and V6/PR/BBNP/2.

The extent of the Quarry is defined by three planning permissions for minerals extraction granted in 1959, 1962 and 1982 together with an area which was included within an 'Interim Development Order' (IDO) permission issued in July 1947. The latter area forms the southern part of the Quarry, north of Cefn Coed Road, and formerly contained the processing plant site. The mineral permission for the original IDO area has lapsed. There is also a separate planning permission for the tipping of quarry waste in the northern area of the quarry, granted in 1964.

The area covered by the extant mineral planning permissions at Vaynor Quarry straddles the boundary between the administrative areas of Merthyr Tydfil County Borough Council (MTCBC) and the Brecon Beacons National Park Authority (BBNPA), meaning that there are two separate 'mining sites' for the purposes of Section 96 of Schedule 14, paragraphs 1 and 2 of the Environment Act 1995, also referred to in paragraph 139 of Minerals Planning Guidance Note 14 (MPG14) (see also the definitions below).

Each Mining Site is the subject of a separate Periodic Review application to the local planning authority within whose administrative area the Mining Site lies. Separate application plans have been prepared for each application with the plans for the application to MTCBC bearing the prefix V6/PR/MT and those for the application to BBNPA bearing the prefix V6/PR/BBNP. In order to distinguish between the separate application areas and those parts of the quarry which do or do not have extant mineral planning permission the following terms are be used in this ES:

- **'Quarry'** – means the area shown edged Green on Plans V6/PR/MT/2 and V6/PR/BBNP/2 (Plan V6/PR/MT/2 reproduced at the end of this chapter as **Figure 1.2**).

- **'Overall Mining Site ('OMS')'** - means that area of land which is the aggregate of the two Mining Sites (see Plans V6/PR/MT/3 and V6/PR/BBNP/3)

- **Application Site** – means the area of land which is the subject of the Periodic ROMP application to either planning authority. It is the same area of land as comprises the Mining Site (paragraphs 1 and 2 of Section 96 of Schedule 14 of the Environment Act 1995), within the relevant planning authority's administrative area (see plans V6/PR/MT/4 and V6/PR/BBNP/4).

The majority of the Quarry falls within the administrative area of MTCBC, but with a narrow strip of land along the western boundary (amounting to approximately 12 hectares) and a small section on the eastern boundary (approximately 4 hectares) lying within the administrative area of the BBNPA.

Schedule 13 of the Environment Act 1995 (hereafter referred to as the 1995 Act) provides for the undertaking of an Initial Review of planning conditions at mineral sites where the predominant mineral permission relating to the site was granted before 22nd February 1982 and after 30th June 1948. This Initial Review was intended to provide a mechanism to review and update the planning conditions attached to earlier permissions, and to ensure that future quarrying operations are undertaken in accordance with modern standards designed to minimise environmental and amenity effects.

In accordance with timing requirements prescribed by the 1995 Act, an Initial 'Review of Old Mining Permissions' application (commonly referred to as a ROMP application) was submitted in May 1997. Given that Local Planning Authorities only have responsibility for land within their own administrative

areas, separate parallel Initial ROMP applications were submitted to MTCBC and the BBNPA on the same date.

The 1995 Act requires the Applicant to submit a list of update conditions which they consider should be applied, with MTCBC and BBNPA to then consider whether the updated conditions are appropriate or whether additional or revised conditions should be imposed. In the case of the 1997 applications, whilst the majority of the proposed conditions were common to the future quarrying operations to be undertaken within the two administrative areas, separate conditions were proposed for the respective areas where relevant.

The 1995 Act also specifies that if the Authorities have not provided written Notice of their determination within 3 months of receipt of the application (or such longer period as may be agreed in writing) then the application and the conditions submitted by the Applicant are to be regarded as approved by default. In the case of the 1997 Initial Review applications at Vaynor Quarry, the time period for determination was extended to 31st December 2001 by agreement between the Applicants and the two Authorities.

However, in the absence of the determination of the applications by that agreed extended date, the two applications, and the conditions proposed by the Applicant became approved by default on 1st January 2002. Copies of the approved schedule of conditions for the two Authority areas of the Quarry are produced as **Appendices 1.1 and 1.2** to this ES.

The 1995 Act also makes provision for undertaking Periodic Reviews of the conditions at 15 year intervals. This is designed to ensure that the conditions set by the Initial Review do not themselves become outdated with the passage of time.

Consistent with this requirement, a First Periodic Review date was originally set as 31st December 2016, i.e. 15 years from the deemed determination date of the Initial Review. Given that the Quarry has not operated over the intervening period, and for a variety of reasons associated with the timescale for undertaking studies associated with this EIA and ES, the deadline for the submission of the First Periodic Review applications has been agreed to be set as 31st August 2022.

This ES and the two parallel First Periodic Review applications submitted to MTCBC and BBNPA have been finalised and are being submitted in accordance with that deadline.

The EIA has been undertaken as a study to consider the environmental effects of the overall future mineral development scheme which, for the purposes of the EIA, disregards the administrative boundaries. It thus does not attempt to consider the separate environmental effects within the administrative areas of MTCBC and BBNPA since this would be contrived and inappropriate. Instead, it considers the environmental and amenity effects of the overall scheme and, via this ES, proposes a series of mitigation measures designed to minimise the effects of the development. These measures have in turn been translated into proposed updated planning conditions which would regulate the future development.

However, whilst a single EIA has been undertaken, with the results set out in this ES, as was the case with the 1997 Initial Review it is necessary to submit two separate but parallel First Periodic Review applications to the two Authorities (MTCBC and BBNPA) reflecting their administrative responsibilities for those areas of the Quarry which lie within their jurisdiction.

Procedural requirements associated with ROMP applications are set in Minerals Planning Guidance Note 14 (MPG14) issued by the Welsh Office in September 1995. It includes advice on procedures for 'cross boundary sites' in paragraph 17 for Initial Reviews, and in paragraph 142 for Periodic Reviews.

The guidance in paragraph 17 of MPG14 also draws attention to Section 101 of the Local Government Act 1972 which provides powers for two local authorities to make arrangements to discharge any of their functions jointly, and in effect allow one Authority to process and administer the two applications, albeit ultimately with decisions made and issued by the two Authorities. In this case there may be potential for the two applications to be combined into the Overall Mining Site for the purposes of the statutory consultation exercise, but this will be a matter for discussion with and between the two authorities following submission of the application.

As was the case with the 1997 Initial Review, separate schedules of proposed updated planning conditions have been proposed to accompany the applications, which are generally consistent across the two areas with the exception of conditions which are deemed to be exclusively relevant to the respective areas. These issues are discussed further in Chapter 15 below, with the proposed updated schedules of conditions produced as **Appendices 1.3 and 1.4** to the ES.

Finally, it is to be noted that not all of the land within the defined OMS is owned by the Applicant (Hanson UK). The area not owned by the Applicant comprises a block of undisturbed land covered by the 1959 permission, some 5.5 ha in extent within the administrative area of BBNPA, lying along the south western side of the Quarry, partly within the Merthyr Tydfil (Cilsanws) Golf Course which extends to the west of the Quarry. This area is shown lying outside the Applicant's ownership on plans ref. V6/PR/MT/3 and V6/PR/BBNP/3.

The Applicants do not intend to progress the future quarry development into this area and given that mineral development within the area could only realistically be undertaken via the main Quarry area, the area can effectively be regarded as being relinquished from the future mineral extraction area. The Quarry Boundary has been defined accordingly, and is shown coloured green on application plans ref. V6/PR/MT/2 and V6/PR/BBNP/2.

The mineral planning permissions in place at the Quarry comprise the following:

MTCBC and BBNPA Area

- Extension of working and tipping at Vaynor Quarry approved 16th April 1959 ref 1/1466
- Mineral Development on part of land comprising Blaen-y Duffryn, Llyn-yr-eos, Ffynon Rosser and Llyn-yr-Ryrddod Farms approved 27th July 1962 ref 1/4120.

MTCBC Area only

- Tipping of Quarry Waste approved 12th November 1964 ref 1/5066.
- Extension to Quarry approved 25th October 1982 ref 52/78/0718(N 3370).
- ROMP Initial Review Determination of Conditions deemed approved 1st January 2002 ref P/97/0200

BBNPA Area only

- ROMP Initial Review Determination of Conditions deemed approved 1st January 2002 ref MT13592.

Plans illustrating the boundaries of the respective permissions within MTCBC and BBNP are produced as **Figures 1.3 and 1.4** (application plans V6/PR/MT/5 and V6/PR/BBNP/5). Taken together, the 1959, 1962 and 1982 permissions comprise the OMS for the purposes of this Environment Act First Periodic Review, with the OMS being subdivided in administrative terms between MTCBC and BBNPA to form two separate Mining Sites, one for each administrative area, as described above. This ES refers to the 'Quarry' as the land within which future quarrying and related development will take place.

A separate planning permission was granted in 1964 for the tipping of quarry waste (ref 1/5066). The phased quarry development plans include development within the area permitted for quarry tipping, and future alternative provision for the tipping of quarry waste as part of the development scheme. The 1964 tipping permission is thus embraced within the overall scheme which is considered in this ES as part of the Periodic Review.

An area of land to the south of the Cefn Coed – Pontsticill Road enjoys the benefit of separate planning permissions granted in 1964 and 1968 for the stockpiling of aggregate. This area does not form part of either 'Mining Site' and does not form part of the Periodic Review.

Quarrying has taken place at Vaynor since the 1870's. Immediately prior to the introduction of planning legislation in 1947 the then quarry owners obtained an Interim Development Order (IDO) permission for the quarry comprising land to

the north of Cefn Coed Road (wholly within MTCBC) ref 0/3 V37 dated 3rd July 1947). The 1959 permission comprised an extension to that original IDO area.

Under the provisions of the Planning and Compensation Act 1991 it was necessary for IDO permissions to be formally registered by 25th March 1992. As a result of an oversight at the time, the IDO permission at Vaynor was not registered, with the consequence that the permission expired on that date.

The area covered by the original IDO permission north of the public highway has subsequently been used as 'ancillary mining land' under the provisions of the Town and Country Planning (General Permitted Development) Order 1995 (and its predecessor orders), and contained a fixed drystone processing plant and related stockpiles, asphalt plant, ready mixed concrete plant, site offices and plant maintenance areas.

The Quarry was last worked during 2007, with quarrying operations being intermittent for a number of years prior to that. The drystone processing plant was closed in 2002 and the asphalt plant also closed in 2003. The fixed plant was removed in 2008.

## 1.2 The Application Sites

As noted in Section 1.2 above, given the cross-boundary extent of the planning permissions governing the winning and working of minerals at Vaynor Quarry, it is necessary to submit two applications relating to the parts of the OMS which lie within the respective administrative areas of MTCBC and BBNPA.

The 1959 and 1962 permissions straddle the boundary between MTCBC and the BBNPA, with the 1982 permission for mineral extraction and the 1964 permission for tipping lying wholly within the administrative area of MTCBC. Plans illustrating the extent of the permissions with the respective administrative areas are produced as **Figures 1.3 and 1.4.** However, the respective areas are indistinguishable on the ground in terms of permission and administrative boundaries.

In summary, the majority of the OMS falls within MTCBC, but with a narrow strip of land along the western boundary (amounting to approximately 12 hectares) and a small section on the eastern boundary (approximately 4 hectares) lying within the BBNPA. A small triangular part of the area covered by the1962 permission lies east of the road to Llwyncilsanws Farm and any rights to extract minerals from that area will be relinquished.

The quarry has been developed into two separate limbs, one along the western side and another along the eastern side. These are separated by a block of land which is partly disturbed, and which contains some tipped quarry waste and overburden.

The remaining reserves of limestone within the quarry which are within the applicant's ownership amount to some 48.8 million tonnes, with some 42.6 million tonnes being within MTCBC and some 6.2 million tonnes being within the BBNPA. An additional planned reserve of some 5.3M tonnes which is not in the applicant's ownership lies within the land covered by the 1959 permission along the western side of the quarry within the BBNPA which it is not intended to be worked as part of the quarry development scheme and which is excluded from the boundary of the proposed Quarry site.

The remainder of the defined Quarry Site, to the south of the defined OMS comprises the former IDO permitted area and former plant site which would continue to be used as ancillary mining land for the purpose of housing site offices, weighbridge, wheel wash, aggregate stockpiles and despatch of aggregate.

## 1.3 The Quarry Development Scheme

In summary, the future development of the Quarry which forms the subject of the ROMP application comprises:

- An initial 5 year development scheme focused upon quarrying in the north western area, working from the existing floor of the quarry at a level of 335m – 340m AOD, and the advancement of benches at the circa 350 and 360m AOD levels. This will require a limited soil and overburden strip in the northern area to allow for the progression of the faces, with the overburden to be placed partly on the existing northern quarry tip, and partly used to construct a screen bund along the north

eastern side of the quarry designed to protect the amenities of residents of Llwyncilsanws Farm to the north east of the Quarry.

- At 10 years the faces in the north western area would be developed further, in tandem with initial quarry progression in the southern area working northwards into the 'central spine' which separates the current western and eastern limbs of the quarry. This will facilitate drainage from the western limb of the quarry into the existing quarry sump in the south eastern area of the quarry.
- At 15 years, the north western quarry faces would advance eastwards into the central spine, in conjunction with further progress of the south central quarry faces working northwards into the central spine.
- At 30 years, quarrying would progress eastwards across the central spine into the eastern limb of the quarry. This would be accompanied by the removal of the current northern quarry tip, with the material used partly for progressive restoration, and the residue placed in a new quarry tip at the base of the quarry in the eastern area of the site.
- At 60 years, there would be full quarry development across the central area of the site, with the faces progressing northwards towards to northern Quarry boundary.
- The Final Quarry Development Plan shows the quarry faces and benches worked back to the limits of the planning permissions (within the control of Hanson), and a gently sloping floor of the quarry which reflects the dip of the underlying strata.
- This will form the basis for the progressive implementation of a restoration strategy for the overall site with restoration of the quarry faces and benches being achieved through a combination of planting and natural re-colonisation, grassland and woodland planting on the quarry floor, and a shallow water feature in the southern area.

The quarry development scheme would release a reserve of some 49m tonnes. It is anticipated that the quarry will be worked at an average output of some 500,000 tonnes per annum (tpa). That output would be consistent with average annual sales at Hanson's Penderyn Quarry which Vaynor Quarry would eventually replace.

With reserves of some 49 m tonnes and an average annual output of 500,00 tpa it is evident that this will be a long-term development spanning circa 100 years.

Further details of the working and restoration scheme are set out in Chapters 3.0 and 4.0 below.

## 1.4 Environmental Impact Assessment

### 1.4.1 Context

It is apparent from the need to carry out a review of planning conditions that planning permission for mineral extraction at Vaynor Quarry already exists. The principle of quarrying is therefore not an issue for reconsideration as part of the Periodic Review, unless the environmental effects are deemed to be of such significance that the existing planning permission should be formally modified or revoked. If that were to occur, then compensation would be payable to the Applicants for the loss of their working rights.

In this context, the primary purpose of the ES is to assist in identifying environmental effects, and to use that information to:

- devise measures to minimise the environmental effects through specific mitigation/attenuation measures; and
- provide for the measures to be enshrined in updated planning conditions which regulate future quarrying in a way which is reflective of the conclusions and recommendations of the EIA.

At the outset it was agreed with the mineral planning advisors to the two Planning Authorities that the Periodic Review application should be supported by an EIA. In practical terms, an EIA is a constructive means of assisting the drafting of updated planning conditions in that it allows environmental effects to be identified through the EIA process. Measures to mitigate the identified effects can then be defined, and these in turn can be translated into updated planning conditions. The EIA can thus be an effective means of informing the

matters which should appropriately be covered by updated planning conditions, and in highlighting up to date environmental standards and criteria which should be applied.

### 1.4.2 Environmental Impact Assessment

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 implement EC Directive No. 85/337 on the assessment of the effects of certain public and private projects on the environment. The Directive's main aim is to ensure that the decision-making authority determine applications in the knowledge of any likely significant effects on the environment.

An EIA 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 Regulations categorise a range of developments into 'Schedule 1', where EIA is always required, and 'Schedule 2', where EIA may be required, depending on certain thresholds and criteria. The Applicants accepted at the outset that the development qualifies for EIA under these criteria, and that an EIA is therefore required. Consequently, the Applicants have not requested a formal 'screening opinion' from MTCBC / BBNPA to confirm whether an EIA is required (Regulation 5).

The Applicants have also held informal discussions in March 2018 with representatives of MTCBC / BBNPA via the specialist Mineral Planning Service provided by Carmarthenshire County Council to consider the topics which should be addressed as part of the EIA, and the nature of the studies which should be undertaken. The EIA which has been undertaken, and the content of this ES reflects the outcome of those discussions.

In addition, and more formally, in September 2017 the Applicants engaged with NRW regarding the scope of the hydrogeological / ecological impact assessment elements of the EIA. This was undertaken via the preparation of a 'Scoping Discussion Document' which was submitted to NRW via their 'pre-application advice service'. In summary, the Document sought to (i) highlight the potential hydrological and hydrogeological effects and indirect ecological effects associated with operations at the Quarry and (ii) seek agreement from NRW regarding the monitoring which was proposed to inform a Hydrogeological Impact Assessment (HIA) as part of the EIA.

NRW provided a detailed response in October 2017 with comments on the content of the Scoping Document, to which the Applicants responded in June 2018. In summary, the response agreed that the scope of the HIA was reasonable and that the key receptors had been identified. The response also set out a number of points of detail which assisted and informed the HIA and Ecological Impact Assessment (EcIA) which have subsequently been undertaken and which are reported in this ES.

A number of other discussions have also been held between the EIA project team and the technical advisors to the Authorities, which, inter alia, have sought to agree the scope of the noise, air quality, traffic and cultural heritage studies. Again, the outcome of these discussions is reflected in the respective EIA studies which have been undertaken, as summarised below.

### 1.4.3 Technical Studies

In order to ensure that the topics are comprehensively addressed, the Applicant has commissioned a number of specialist consultants to deal with the identified issues, namely:

- Landscape and Visual Impact and Restoration Design – WYG / Tetratech / Tir Collective
- Ecology – SLR Consulting Ltd
- Soil Resources and Agricultural Land Classification – Land Research Associates (LRA)
- Hydrology and Hydrogeology – Stantec Ltd
- Noise – WBM

- Blast Vibration – SLR Consulting Ltd
- Air Quality – SLR Consulting Ltd
- Traffic – Hurlstone Partnership
- Cultural Heritage – Cotswold Archaeology.

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

The EIA Quality Mark is a scheme, operated by IEMA, 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 Environmental Statement

The ES has been prepared to fulfil the requirements set out in the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 regarding the content of environmental statements (ref Regulation 17[3]). It also includes such additional information specified in Schedule 4 relevant to the specific characteristics of the development and the environmental features likely to be significantly affected.

The ES has been prepared to reflect these requirements. It has a clear structure and reads as a concise single document. It is sub-divided into the following Chapters, namely:

1.0 **Introduction** which sets out the background of the preparation of the ES and the procedural requirements.

2.0 **The site and its surroundings**, which provides a baseline description of the site from which the environmental effects of the development are assessed.

3.0 **The quarry development**, which describes the details of the phased quarry development schemes and the alternatives which have been considered.

4.0 **The Restoration Strategy**, which provides a description of the concept for the restoration of the overall site upon cessation of quarrying.

5.0-14.0 **Environmental effects and mitigation measures**, which describes, in detail, the potential effects of the development under the sub-headings of landscape and visual effects (6.0); ecology (7.0); soil resources and agricultural land quality (8.0); hydrology / hydrogeology (9.0); noise (10.0); blast vibration (11.0); dust / air quality (12.0); traffic (13.0); and cultural heritage (14.0).

15.0 **Summary of Environmental Issues**, which draws upon the content of preceding chapters in identifying issues which require control via planning conditions, and which cross refers to an updated schedule of conditions prepared by the Applicant.

16.0 **Planning Policy Considerations**, which analyses the planning policy issues against which the ongoing development can be considered, and which provides a further context for the drafting of planning conditions and

17.0 **Conclusions and Planning Conditions**, which provides a general overview of the EIA, and a cross reference to the proposed updated planning conditions produced as **Appendices 1.3 and 1.4** to the ES.

## 1.6 Submitted Documents

The ES seeks to provide an objective account of the environmental effects of the overall proposed development. The aims of the statement are to:

(i) Describe the baseline conditions at the site against which changes, and effects can be assessed.
(ii) Describe the details of the respective elements of the overall scheme.
(iii) Consider the potential environmental effects of the development.
(iv) Describe the measures which are available to mitigate those effects.
(v) Assess the likely effectiveness of the mitigation measures.
(vi) Draw conclusions which will assist in the drafting of planning conditions controlling the future operations at the Quarry.

The ES (Volume 1) draws together the inputs from the specialist technical consultants who have undertaken the EIA and is intended to be a self-contained document which covers all relevant topics. It does however cross-refer to a number of background documents and technical appendices prepared by the consultant team, which have been bound into Volume 2. The appendices have been numbered to accord with the ES chapter number such that, for example, appendices accompanying the LVIA Chapter 6.0 are numbered 6.1, 6.2 etc.

The ES reproduces a series of figures which have been prepared by the EIA project team as part of their inputs into the ES. These are referred to within the respective chapters of the ES and follow the chapter numbering sequence of the ES, such that, for example, figures within Chapter 6.0 are numbered 6.1, 6.2 etc. The respective figures are produced either within the chapter or in the appendix accompanying the technical study and chapter. A full list of figures is provided within the contents schedule of the ES.

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 quarry development and restoration plans which accompany the ROMP applications are produced as Volume 4. This includes 'application plans' identifying the respective areas of the 'mining site' which lies within MTCBC and BBNPA, and which formalise the separate but related applications made to the two Authorities.

## 1.7 Planning Conditions

The purpose of the ROMP Review is to formulate a schedule of updated planning conditions which reflect modern standards and controls which can be applied to those parts of the quarry within the two administrative areas of MTCBC and BBNPA. A discussed in section 1.1 above, two schedules of proposed conditions have been prepared reflecting the cross-boundary site between two Authorities. The schedules are generally identical, but with minor differences which reflect the operations to be undertaken within the respective administrative areas.

The initial onus is on the Applicant to propose updated schedules of planning conditions. The purpose of the EIA and this ES is to facilitate that exercise by providing an environmental context for the development scheme and environmental and amenity conditions which should logically be associated with the scheme. The ES also includes a review of planning policy guidance which recommends specific criteria levels for e.g. blast vibration which are more stringent than the limits prescribed in the current planning conditions.

MTCBC and BBNPA are not obliged to accept the planning conditions proposed by the Applicant, and they are entitled to impose different conditions or additional conditions. However, where a Mineral Planning Authority (MPA) determines conditions different from those submitted by the Applicant and the effect of the new conditions, other than restoration or aftercare, as compared with the effect of the existing conditions is to impose a restriction on working rights, then Applicants whose interests have been adversely affected by the restrictions will be entitled to claim compensation (ref. Schedule 14, paragraph 13 of the Environment Act 1995).

The conditions proposed by the Applicant are produced as **Appendices 1.3 and 1.4** to the ES, (with a schedule each for MTCBC and BBNPA), and the rationale behind the conditions is summarised in Chapter 15.0 of the ES.

The quarry development scheme and the proposed updated conditions are considered to represent a positive and constructive approach to devising an environmentally sensitive operation, and to regulating the development by modern, up to date planning controls. In those terms, the exercise associated with the EIA has been of positive value in preparing specific conditions which reflect the conclusions and recommendations of the EIA.

These matters will be discussed further with MTCBC and BBNPA during the determination of the applications.

**Figure 1-1:Site Location**

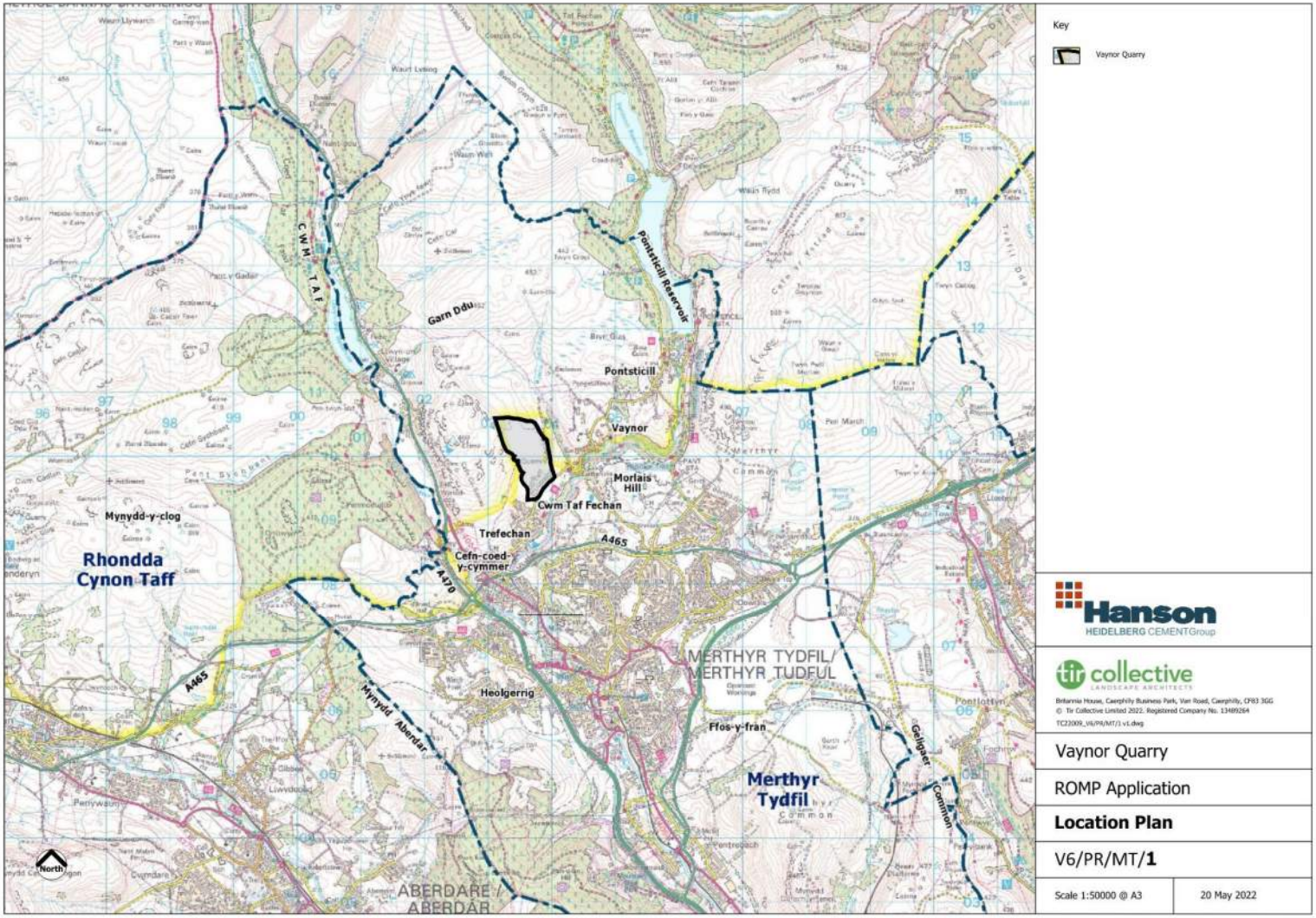


**Figure 1-2 Vaynor Quarry Site**

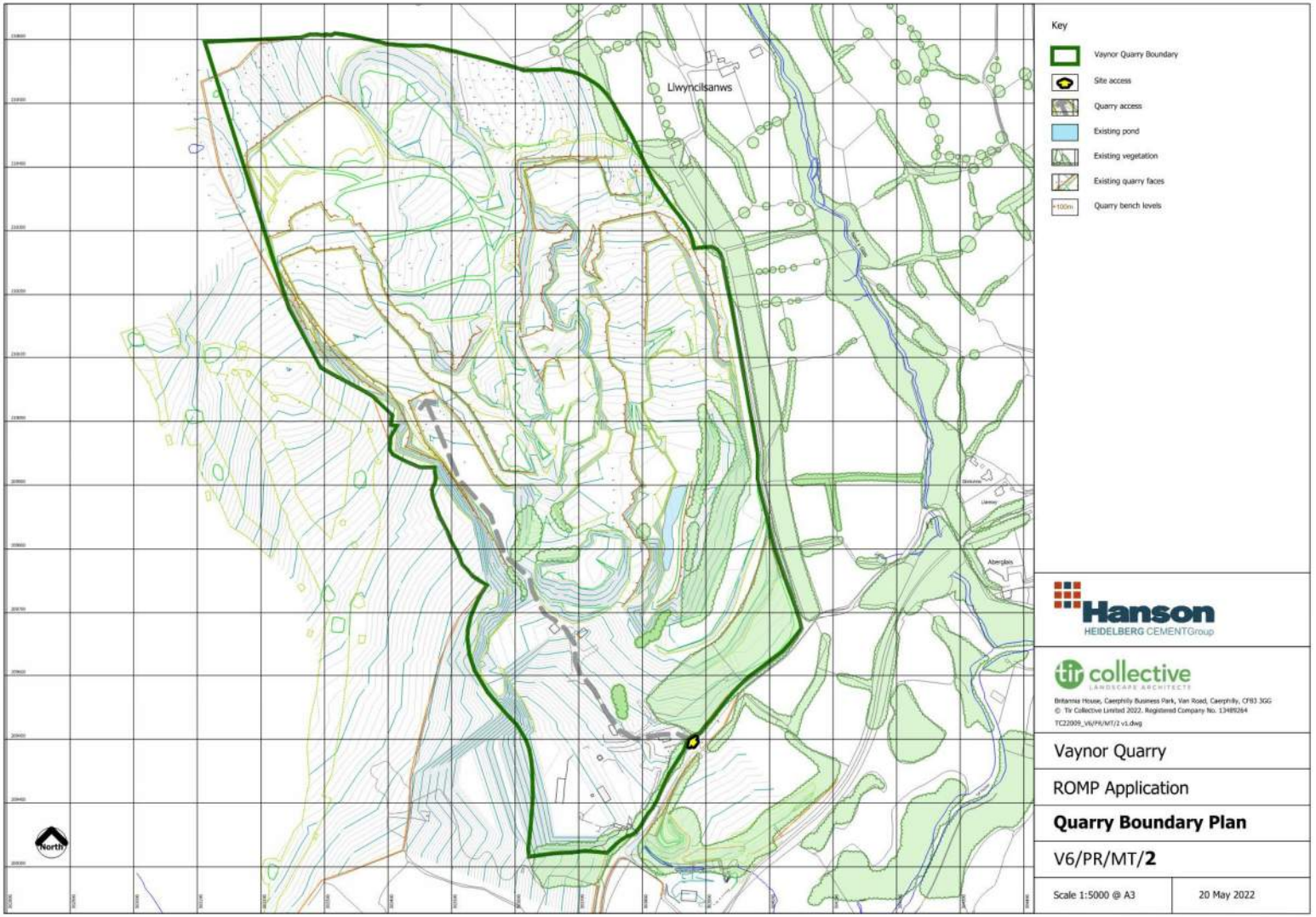


**Figure 1-3 Mineral Planning Permissions relating to the area of the Mining Site within MTCBC**

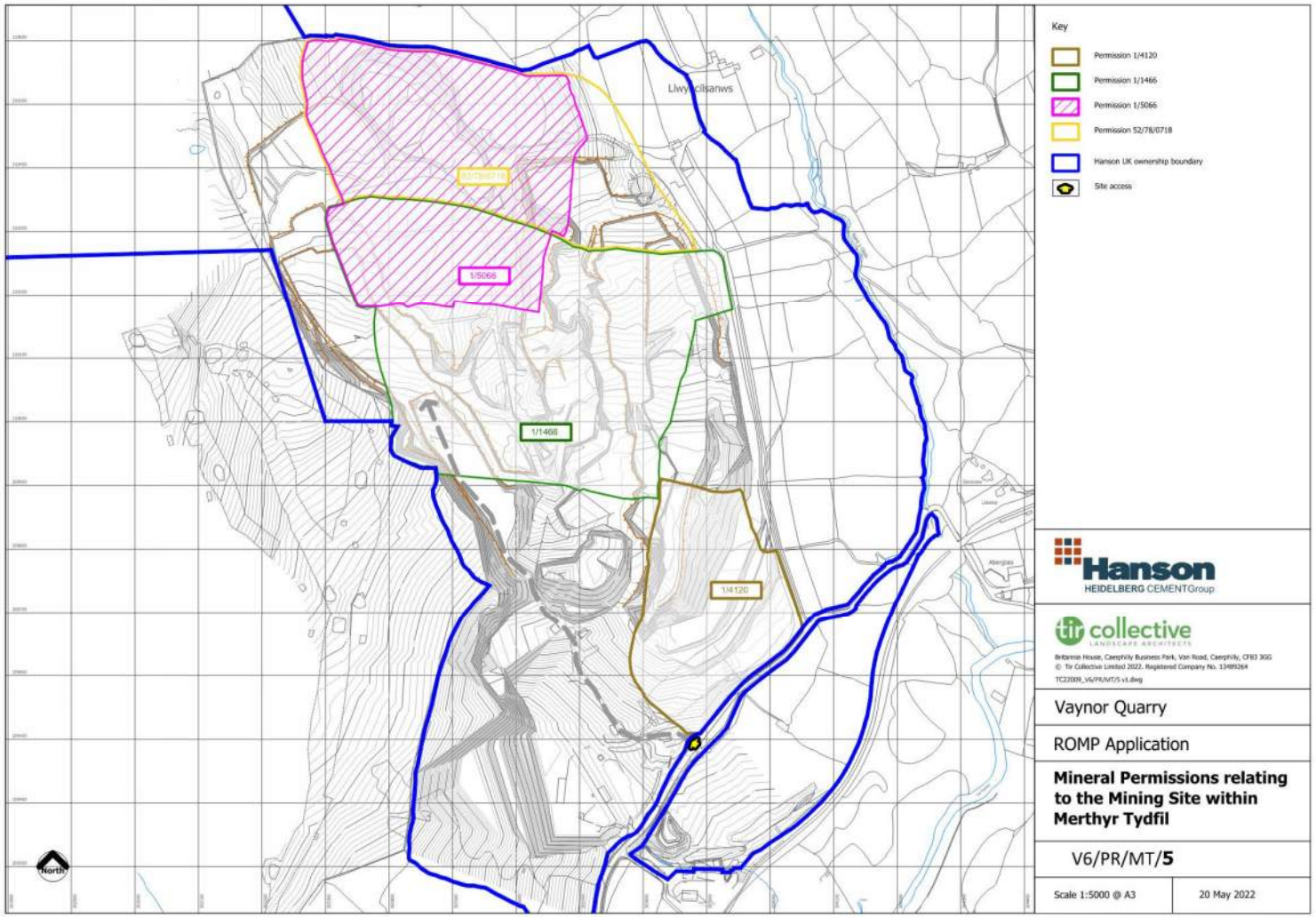
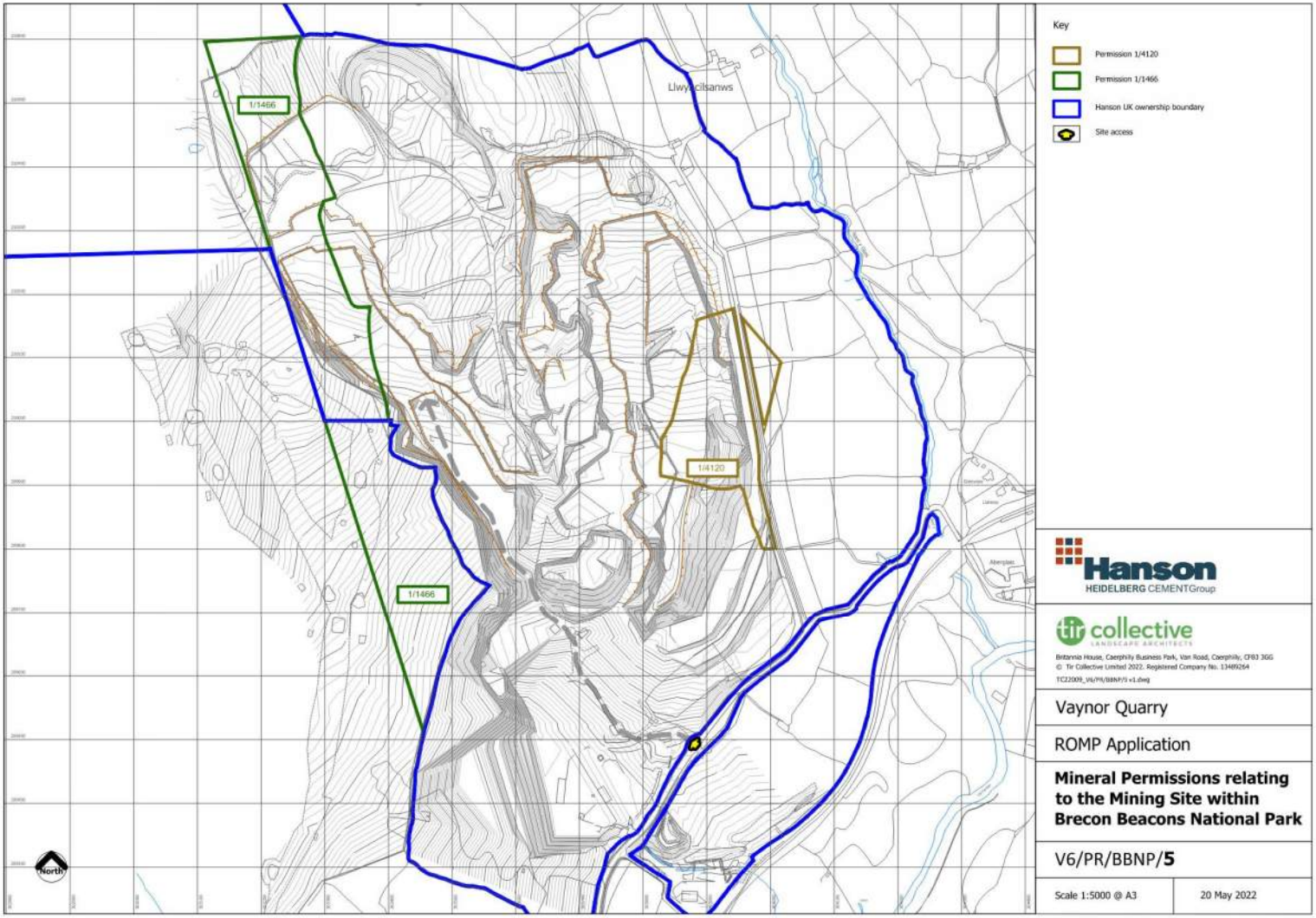


**Figure 1-4 Mineral Planning Permissions relating to the area of the Mining Site within BBNP**



# INTRODUCTION 1

# 2.0 THE APPLICATION SITE

## 2.1 Definitions

As noted in the Introductory Chapter 1.0, there are two separate 'Application Sites' reflecting the cross boundary extent of quarrying planning permissions between the administrative areas of MTCBC and the BBNPA.

The ROMP Application Sites are based upon the defined 'Mining Sites' within the two Authority areas which reflect the extent of the mineral planning permissions (and tipping permission) which apply within the respective administrative areas.

The 'Mining Site' within MTCBC is shown on plan ref V6/PR/MT/4.

The 'Mining Site' within BBNP is shown on plan ref V6/PR/BBNP/4.

Reference is also made in the ES to an 'Overall Mining Site' (OMS) which represents the total area covered by the respective extant mineral and tipping permissions within the two administrative areas.

The OMS is shown on plan ref numbers V6/PR/MT/3 and V6/PR/BBNP/3.

References in the ES to the 'Application Site' should therefore be regarded as relating to the area of land which is the subject of the Periodic ROMP application to either planning authority, and, in effect, is the same as the 'Mining Site' within the respective authority areas.

The ES also makes reference to the Quarry which relates to the overall extent of the permitted and historic Vaynor Quarry. 'The Quarry' comprises the OMS and the historic workings and former plant site lying between the OMS and Vaynor Road to the south. The Quarry is shown outlined in green on plan ref numbers V6/PR/MT/2 and V6/PR/BBNP/2.

## 2.2 Site Location

The Quarry is a currently a mothballed limestone quarry located approximately 3.2 km north-north-west of the centre of Merthyr Tydfil town and 100 m north of Trefechan village in Merthyr Tydfil County Borough (nearest postcode: CF48 2LA and NGR: SO 035103).

The Quarry is accessed from Vaynor Road, which lies to the south-east. Vaynor Road links with the A4054 at Cefn Coed some 1.6 km south west of the Quarry. The Heads of the Valleys Road (A465) lies 850 m south of the Quarry. All of the quarry void is located north of Vaynor Road. Land south of Vaynor Road includes settlement ponds and was historically used as an aggregates products storage and distribution area based upon a separate planning permission for that use. The land south of Vaynor Road does not form part of the Mining Site and is not part of the ROMP application.

The Quarry has been quarried worked for limestone for over 100 years. The Quarry temporarily ceased mineral extraction and was mothballed in 2007 though substantive quarrying operations ceased in the 1990s.

Other than Vaynor Quarry, land use in the area around the Quarry is predominantly rural, comprising various small settlements, agricultural land, woodland and moorland. Land immediately around the Quarry to the north and west is moorland and forms the eastern slopes of the hill Cefn Cil-Sanws, which peaks 750 m west of the Quarry at 461 m AOD.

The ground falls to the south and east of the Quarry, where to the immediate south of the Quarry is the village of Trefechan, built in the 1950s. In the east there is widespread, predominantly pastoral, agricultural land on the slopes while steep-sided gorges are dominated by deciduous woodland. Several farms are located in the surrounding area, the closest of which is Llwyncilsanws Farm located 160 m north-east of the Quarry.

BBNP envelopes the Quarry on its western, northern and eastern sides, and includes an area of 9.7 ha on the extreme western and eastern periphery of the 'Quarry'.

Cwm Taf Fechan Quarry of Special Scientific Interest (SSSI) follows the Taf Fechan river gorge to the south-east of Quarry within 170 m of the Quarry boundary. Nant y Glais SSSI lies in the gorge of the Nant y Glais 140 m north-east of the Quarry.

Settlements surrounding the Quarry include Trefechan (100 m south), Llwyn-on (1.9 km north-west) and Pontsticill (1.9 km north-east). A number of isolated dwellings and farms are located in the area around the Quarry, including Llwyncilsanws (160 m north-east), Aberglais Inn (330 m east), Blaenglais (370 m north), Pen-rhiw-glais (440 m east), Llwynrodin (650 m east), Hy-Brasail (680 m east), and Berthlwyd (850 m north-east). Regionally, the outskirts of Merthyr Tydfil lie 1 km south of the Quarry, and Vaynor (comprised of a small number of wide-spread dwellings) lies 1 km east.

Ground levels at the Quarry itself range from 250 – 400 m AOD. Topography rises above the Quarry to the west and north, and slopes away from the Quarry to the east and south. There are steep changes in topography within the Quarry boundary due to the presence of the quarry void that was worked historically to a minimum elevation of 270 m AOD in the south-east of the void. The maximum depth of the void is around 50 m in the north-west. The current base of the quarry void varies between 270 m AOD and 360 m AOD depending on location. East of the Quarry, topography falls towards the southward flowing Nant y Glais, which is at an elevation of between 250 – 281 m AOD along its closest approach.

Regionally, topography is dominated by the elevated moorland areas to the north of the Quarry within BBNP, including Garn Ddu (up to 462 m AOD), Twyn Croes (442 m AOD) and Gwaun y Pynt (528 m AOD). River valleys cut through this high land including Cwm Taf which holds Llwyn-onn Reservoir (2.1 km north-west of the Quarry) and Cwm Taf Fechan which holds the Pontsticill Reservoir (2.6 km north-east) and Pentwyn Reservoir (4.3 km north-east).

## 2.3 Site Description

The OMS covers an area of some 57.13 ha and extends over a proportion of the area subject to historical quarrying and an area where future quarrying will take place. Historical quarrying at the site has created a western and eastern limb or voids separated by a spur of land which has been party disturbed by historical quarry waste and overburden tipping. A more substantial quarry tip is present in the northern area of the Mining Site.

Land in the south eastern area of the Mining Site accommodates an existing pond with land beyond being well-vegetated with trees. Woodland along the eastern boundary of the site provides separation between the quarry and the Taf Fechan Valley to the east.

The land within the Quarry, south of the defined Mining Site has been disturbed by historical quarrying activity associated with the previous Interim Development Order permission for quarrying and the ancillary mining land north of Vaynor Road which was historically used to house a fixed processing plant and related infrastructure.

Woodland along the east boundary and higher ground along the western flank of the Quarry result in a good degree of visual containment. The substantial changes in a level within the site from circa 285m at the southern boundary to circa 475m and the northern boundary, along with the area of disturbed ground are not prominent beyond the site boundary because of this containment.

There are distant views available southwards of the valley floor and side slopes around Merthyr Tydfil from the northern, elevated boundary of the site. The open moorland of the BBNP is also visible towards the north, with the distant summit of Pen-y-fan visible on the horizon.

## 2.4 Other Baseline Environmental Descriptions

Further descriptions of the landscape context of the Quarry, the ecological features within the Quarry, its soil resources and land quality, the hydrological and hydrogeological setting and the cultural heritage context are described in the respective chapters 7.0, 8.0, 9.0 and 13.0 of the ES, where the baseline descriptions provide a context to the impact assessments set out in the respective chapters.

The issues are not repeated in this summary description of the application site, but reference should be made to the wider baseline descriptions set out in those chapters for a full description of the site and its context.

The key purpose of this chapter is to provide a brief description of the main features of the application site as a context for the description of the quarry development and restoration scheme which is described in the following chapters 3.0 and 4.0.

# 3.0 THE PROPOSED DEVELOPMENT

## 3.1 Introduction

The EIA Regulations require that ESs should include a description of the development, which then provides a context for the assessment of the aspects of the environment likely to be significantly affected by the development, and the measures available to prevent, reduce and where possible offset any significant effects on the environment (ref Schedule 4 to the EIA Regulations).

In the case of an ES prepared in support of a ROMP Review application, the identified mitigation measures can in turn provide a context for the drafting of pLanning conditions which require the implementation of the identified measures

This chapter, together with the following chapter 4.0 which describes the restoration strategy therefore provides a description of the development as an introduction to the environmental impact assessment chapters which follow as Chapters 6.0 – 14.0.

## 3.2 Existing Quarry

The existing Vaynor Quarry comprises:

(i) The ROMP 'Overall Mining Site' (OMS) which straddles the administrative boundaries between MTCBC and BBNPA, and which comprises the majority of the Quarry Site in the central / northern and south eastern areas.

(ii) The former processing plant area in the southern area of the site, with an access off Vaynor Road; and

(iii) The former IDO permitted area which occupies an area of land, undefined on the ground, between the OMS and the former processing plant site.

The OMS area within which future quarrying will take place has been subject to historical quarrying which has created a western and eastern limb or voids separated by a spur of land which has been party disturbed by historical quarry waste and overburden tipping. A more substantial quarry tip is present in the northern area of the OMS.

Land in the south eastern area of the OMS accommodates an existing pond to which surface water and perched groundwater from the eastern limb of the quarry drains and then soaks away into the underlying strata. The land to the south east of the pond is well-vegetated with trees and would not be disturbed by future quarrying operations.

The current situation at the quarry is shown on plan numbers V6/PR/MT/6 and V6/PR/BBNP/6 produced within ES Volume 4, with plan ref V6/PR/MT/6 reproduced at the end of this chapter at a smaller scale as **Figure 3.1**.

## 3.3 Proposed Quarry Development Scheme

The Environment Act 1995 makes provision for the planning conditions which regulate operations at quarries to be updated at 15 year intervals. The current application represents the first such periodic review, with a second review to take place 15 years following the determination of the current application.

Within this context, it has been deemed appropriate to prepare a quarry development scheme for the current application which provides details of the proposed quarry development scheme for an initial 15 year period (sub divided into 5, 10 and 15 year plans), followed by a year 30 plan (which would equate to the next review period).

The anticipated progression of the development is then shown on a year 60 plan, followed by a final quarry development plan representing the full exploitation of the permitted reserve.

Separate quarry development plans have been prepared for the purposes of formalising the applications within the two administrative areas, with the 'red line' application boundaries relating to the Mining Sites within each of the two administrative areas superimposed on the quarry development plans.

However, the plans show the same detail in terms of the quarry development scheme and differ only in terms of the red line Mining Site boundaries for the two Authorities. These plans use the MT (Merthyr Tydfil County Borough Council) and BBNP (Brecon Beacons National Park authority) abbreviations in the plan title to allow them to be differentiated, as follows:

- Quarry Phase 1: 5 Year Plan (ref V6/PR/MT/7 and V6/PR/BBNP/7), V6/PR/MT/7 reproduced at the end of this chapter at a smaller scale as ES Figure 3.2.
- Quarry Phase 2: 10 Year Plan (ref V6/PR/MT/8 and V6/PR/BBNP/8), V6/PR/MT/8 reproduced at the end of this chapter at a smaller scale as ES Figure 3.3.
- Quarry Phase 3: 15 Year Plan (ref V6/PR/MT/9 and V6/PR/BBNP/9), V6/PR/MT/9 reproduced at the end of this chapter at a smaller scale as ES Figure 3.4.
- Quarry Phase 4: 30 Year Plan (ref V6/PR/MT/10 and V6/PR/BBNP/10), V6/PR/MT/10 reproduced at the end of this chapter at a smaller scale as ES Figure 3.5.
- Quarry Phase 5: 60 Year Plan (ref V6/PR/MT/11 and V6/PR/BBNP/11), V6/PR/MT/11 reproduced at the end of this chapter at a smaller scale as ES Figure 3.6.
- Final Quarry Development Plan (ref V6/PR/MT/12 and V6/PR/BBNP/12), V6/PR/MT/12 reproduced at the end of this chapter at a smaller scale as ES Figure 3.7.

### 3.3.1 Quarry Phase 1: 5 Year Plan

An initial 5 year development scheme focuses upon quarrying in the north western area, working from the existing floor of the quarry at a level of circa 335m, and the advancement of benches at the circa 350 and 360m AOD levels.

This will require a limited soil and overburden strip in the northern area to allow for the progression of the faces, with the overburden to be placed partly on the existing northern quarry tip, and partly used to construct a screen bund along the north eastern side of the Quarry designed to protect the amenities of residents of Llwyncilsanws Farm to the north east of the Quarry.

An existing haul road would provide access into the western limb of the quarry (upgraded as appropriate) and to a mobile crushing and screening plant which would be sited in the vicinity of the defined extraction area. There would be no operations within the eastern limb of the quarry during this initial 5 year development period.

The Phase 1 development scheme would yield a reserve of some 2.7m tonnes.

### 3.3.2 Quarry Phase 2: 10 Year Plan

At 10 years the faces in the north western area would be developed northwards and eastwards, in tandem with initial quarry progression in the southern area working northwards into the 'central spine' which separates the current western and eastern limbs of the quarry. As discussed in section 3.7 below, this will facilitate drainage from the western limb of the quarry into the existing quarry sump in the south eastern area of the quarry.

The Phase 2 development scheme would yield a reserve of some 2.5m tonnes.

### 3.3.3 Quarry Phase 3: 15 Year Plan

At 15 years, the north western quarry faces would advance eastwards into the central spine, in conjunction with further progress of the south central quarry faces working northwards into the central spine.

The Phase 3 development scheme would yield a reserve of some 2.9 m tonnes.

### 3.3.4 Quarry Phase 4: 30 Year Plan

At 30 years, quarrying would progress eastwards across the central spine into the eastern limb of the quarry. This would be accompanied by the partial removal of the current northern quarry tip, with the material used partly for progressive restoration, and the residue placed in a new quarry tip at the base of the quarry in the eastern area of the site.

The Phase 4 development scheme would yield a reserve of some 11.7 m tonnes.

### 3.3.5 Quarry Phase 5: 60 Year Plan

At 60 years, there would be full quarry development across the central area of the site, with the faces progressing generally northward.

The Phase 5 development scheme would yield a reserve of some 9.6 m tonnes.

### 3.3.6 Final Quarry Development Plan

The Final Quarry Development Plan shows the quarry faces and benches worked back to the limits of the planning permission (within the control of Hanson), and a gently sloping floor of the quarry which reflects the dip of the underlying strata.

This will form the basis for the progressive implementation of a restoration strategy for the overall site with restoration of the quarry faces and benches with a combination of planting and natural re-colonisation, grassland and woodland planting on the quarry floor, and a shallow water feature in the southern area.

The final quarry development phase, progressing from the year 60 Plan, would yield a reserve of some 19.6m tonnes.

The respective phases are anticipated to yield an overall reserve of some 48.8m tonnes.

## 3.4 Processing Plant

The quarry will operate using a mobile crushing and screening processing plant which will be sited within the OMS, in proximity to the working area and which will be periodically relocated to reflect the progressive development of the working faces.

The mobile plant will comprise a conventional arrangement of a series of crushers to reduce the size of the stone, and screens to separate the stone into sized products, which will then be transferred to initial stockpiles by radial conveyors. The processed stone will then be lifted by face shovel and transferred by loading shovel or dump trucks to product stockpiles either within the OMS or in the southern ancillary mining area, ready for onward loading into road going vehicles.

The quarry processing activities will be controlled by an Environmental Permit which it is assumed will be issued by MTCBC as the principal Authority within whose administrative area the Quarry lies. If external contractors are used for crushing and screening operations, then the Permit will be registered at their operating base/registered office. In either case, such a Permit will impose detailed requirements to control emissions from the processing plant, stockpiles and roadways, together with obligations for the maintenance of records and training. The Permit is likely to subject to the overarching requirement to use "*the best available techniques for preventing or, where that is not practicable, reducing emissions from all aspects of the installation".*

## 3.5 Hours of Operation

The hours of working limitations imposed by the current schedules of planning conditions relating to the Quarry require that:

> *Except in the case of emergency, quarrying operations shall take place only from 0600 hours to 1800 hours Mondays to Fridays and from 0600 hours to 1600 hours on Saturdays, except that with the prior agreement of the MPA (such agreement not to be unreasonably withheld) quarrying operations may*

*also take place from 1800 hours to 2200 hours Mondays to Fridays and from 1600 hours to 800 hours on Saturdays.*

*No quarrying operations shall take place on Sundays, Bank Holidays or National Holidays with the exception of Good Friday when quarrying operations will be permitted.*

*NB: For the purposes of this condition 'quarrying operations' shall mean the stripping of overburden, the development of the quarry faces and the operation of the primary crusher or any replacement thereof.*

These hours of working limits were drafted in 1997 before more recent advice became available in Minerals Technical Advice Note (Wales) 1: Aggregates 2004 (MTAN1) regarding working hours. MTAN1 confirms that daytime working is defined as 0700 - 1900 hours and night-time as 1900 – 0700 hours (ref para 88).

Hanson has thus reviewed the permitted working hours in the context of this advice and the experience of the working hours at Penderyn Quarry which Vaynor Quarry will replace in the medium term.

It is thus proposed that quarrying and processing operations will be confined to the MTAN1 defined daytime hours, including a 07.00 start time, Mondays to Saturdays, rather than the currently approved 06.00 start time. It is also proposed to restrict operations on all Bank and National Holidays.

The proposed hours of working planning condition included in the proposed schedules of planning conditions included as Annexes 1 and 2 to the ES thus includes the following revised condition relating to hours of working:

*Except in the case of emergency, quarrying operations shall take place only from 0700 hours to 1800 hours Mondays to Fridays and from 0700 hours to 1600 hours on Saturdays.*

*No quarrying operations shall take place on Sundays, Bank Holidays or National Holidays.*

*NB: For the purposes of this condition 'quarrying operations' shall mean the stripping of overburden, the development of the quarry faces and the operation of the processing plant.*

## 3.6 Output and Traffic Movements

Based on the average production of 500,000 tonnes of stone per annum being distributed in 20 tonne average payloads over 287.5 working days gives an average of 87 loads / 174 HGV movements per day, which equates to around 8 loads / 16 HGV movements per hour when rounded up.

All of the HGV traffic would travel south west bound along Vaynor Road to /from the A4054 High Street / Upper High Street junction, from which it would distribute around the local road network based upon the origin and destination of the HGV transporting the load.

## 3.7 Water Management

Passive dewatering is required to allow the mineral to be extracted. Intercepted groundwater and runoff to the quarry void will be allowed to drain southwards along the dip of the limestone beds. This is in line with what is currently occurring. Groundwater will be directed towards a pond in the southern part of the void where it will infiltrate to the limestone aquifer in accordance with current practices. There will be no surface water outflows from the ponds within the quarry void.

In the first ten years of the quarry development, most quarrying will occur in the western arm. It has been assessed that the estimated increased groundwater and surface water inflows to the western arm as a result of this development can be accommodated through infiltration in the southern part of the western arm as currently occurs.

Before year 10 of the development, a connection will be made between the western arm and the eastern arm, so that drainage from the western arm can flow into the south-east pond. This will provide additional infiltration capacity as development progresses. As the quarry void expands, the south-east pond will

be enlarged to manage increased inflows from groundwater and surface water as the quarry void is deepened and the runoff catchment area increases. There will continue to be no surface water outflow from this pond, or anywhere else in the quarry void (although there will be from the wider site as discussed below).

Hanson intends to use mains water for various consumptive purposes, including wheel washing and dust suppression. If at a later stage the decision is made to abstract water from the quarry void for these uses, an abstraction licence would need to be applied for. The potential impacts (if any) of this abstraction would be considered by NRW during the licencing process.

Runoff and any intercepted groundwater in the processing plant area will be discharged off-site via the culvert beneath Vaynor Road as per the current situation.

## 3.8 Alternatives

The EIA Regulations 2017 require that Environmental Statements should include:

> *"a description of the reasonable alternatives studied by the applicant 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 requirement is re-iterated in Schedule 4 to the Regulations, which in addition to providing an indication of the main reasons for selecting the chosen option, suggest that it may also be appropriate to include "*a comparison of the environmental effects*" (ref Schedule 4 1.2.)

Whilst the requirement applies to all EIA's undertaken, the circumstances of a ROMP Review are different in that planning permission for the development has already been granted, and the EIA is thus not assisting the consideration of the principle of whether planning permission should be granted for the development, based upon the identified effects and mitigation measures. The underlying purpose of an EIA accompanying a ROMP application is to identify environmental effects and mitigation measures, and to use that information as a context to assist the drafting of an updated schedule of planning conditions designed to minimise the environmental effects of the already permitted development.

In the case of the Vaynor Quarry First Periodic ROMP, the consideration of alternatives has thus not related to alternatives to Vaynor Quarry in terms of supply etc, but rather, whether alternative quarry development schemes should be considered, and whether alternative or additional environmental mitigation measures should be introduced.

In terms of a quarry development scheme, the current quarry configuration represents historical quarrying practice with the development of the quarry in western and eastern limbs, separated by a central block of land, with a quarry tip at the northern end of the central block.

The faces and benches in the western limb were left in well-defined conditions upon the temporary mothballing of the Quarry, and the area towards the northern end of the western limb is in these terms a logical area within which to re-commence quarrying. In contrast, the eastern limb would require substantial preparatory works and removal of overburden and quarry waste to prepare faces ready for advancement as part of a quarry development scheme.

In addition, the ecological impact assessment has identified a population of great crested newt (GCN) within the quarry sump / surface water catchment area in the south eastern area of the quarry (ref ES Chapter 7.0). The ecological impact assessment includes a mitigation strategy for the relocation of the GCN to a receptor area outside the operational area, but in the short term, pending that relocation and associated habitat creation, there would be constraints on undertaking operations within 500m of the identified GCN area (the quarry sump) so as to avoid any adverse effects on that population.

The advantage of re-commencing operations in the northern area of the western limb is that such operations would be beyond such a 500m GCN protection zone, and operations could thus safely commence without detriment to the GCN population. This would also provide time for the creation of new GCN habitat

and the relocation of the GCN population prior to the commencement of activity in the central area and eastern limb of the Quarry, closer to the current GCN habitat.

Water management is a further operational issue which has influenced the quarry design. As quarrying progresses in the north western area, it will become necessary to allow surface water and passive groundwater drainage from the western limb of the Quarry to drain to the current sump / catchment area in the south eastern area, from where the water in the sump drains naturally to the underlying ground (ref Hydrogeological Impact Assessment reported in ES Chapter 9.0 and summarised in section 3.7 above). This drainage connection will be required between years 5 and 10 of the quarry development scheme and is shown on the year 10 phasing plan.

Having created this drainage channel, it would then be logical to advance the quarry faces and benches northwards from that channel as part of the future development of the quarry. In this way the western and eastern limbs of the Quarry would then eventually join, and quarrying would progress northwards across the full quarry footprint to the approved limits of extraction (as per the currently approved scheme).

These full limits of extraction dictate the configuration of the quarry for restoration purposes, and the restoration strategy has been based upon this configuration with the introduction of land uses deemed appropriate for that configuration and adjoining land uses (ref ES Chapter 4.0).

It is recognised that the delivery of the final restoration scheme will be a long-term issue, and that alternative land uses may be deemed appropriate at a later date before the restoration scheme is fully implemented. The proposed planning conditions cater for this by providing a mechanism for the submission of updated working and restoration schemes at periodic intervals.

It should also be noted that based upon the existing legislative requirements of the Environment Ac 1995, there will be a need to undertake Periodic Reviews of the planning conditions and the working and restoration scheme at intervals of no less than 15 years, such that, if deemed appropriate and necessary, there will be numerous opportunities to update the working and restoration scheme during the life of the development.

In terms of alternative or additional environmental mitigation measures, this has been reviewed within the respective environmental studies which, overall, conclude that conventional and well-established environmental mitigation measures are capable of being implemented at the Quarry which would be successful in minimising the environmental effects of the development. These measures can in turn be enforced by the imposition of updated planning conditions. In certain cases, the measures have been enshrined within Schemes / Management Plans designed to provide clarity to the environmental protection measures and assist the Planning Authorities in enforcing adherence to the respective measures. These measures are included in the respective technical chapters and are brought together in the summary chapter 15.0.

The Applicant thus concludes that there are no reasonable or necessary alternatives to the currently proposed working and restoration schemes, which is considered to represent the most environmentally acceptable means of developing the Quarry.

Alternative and additional environmental mitigation measures have been considered where appropriate and are reflected in the recommendations for mitigation measures which have in turn been translated into an updated schedule of planning conditions.

This is considered to be an appropriate response to the ROMP Review which has an underlying theme of improving environmental standards and performance associated with the future quarrying operations.

**Figure 3-1: Current Quarry Situation**

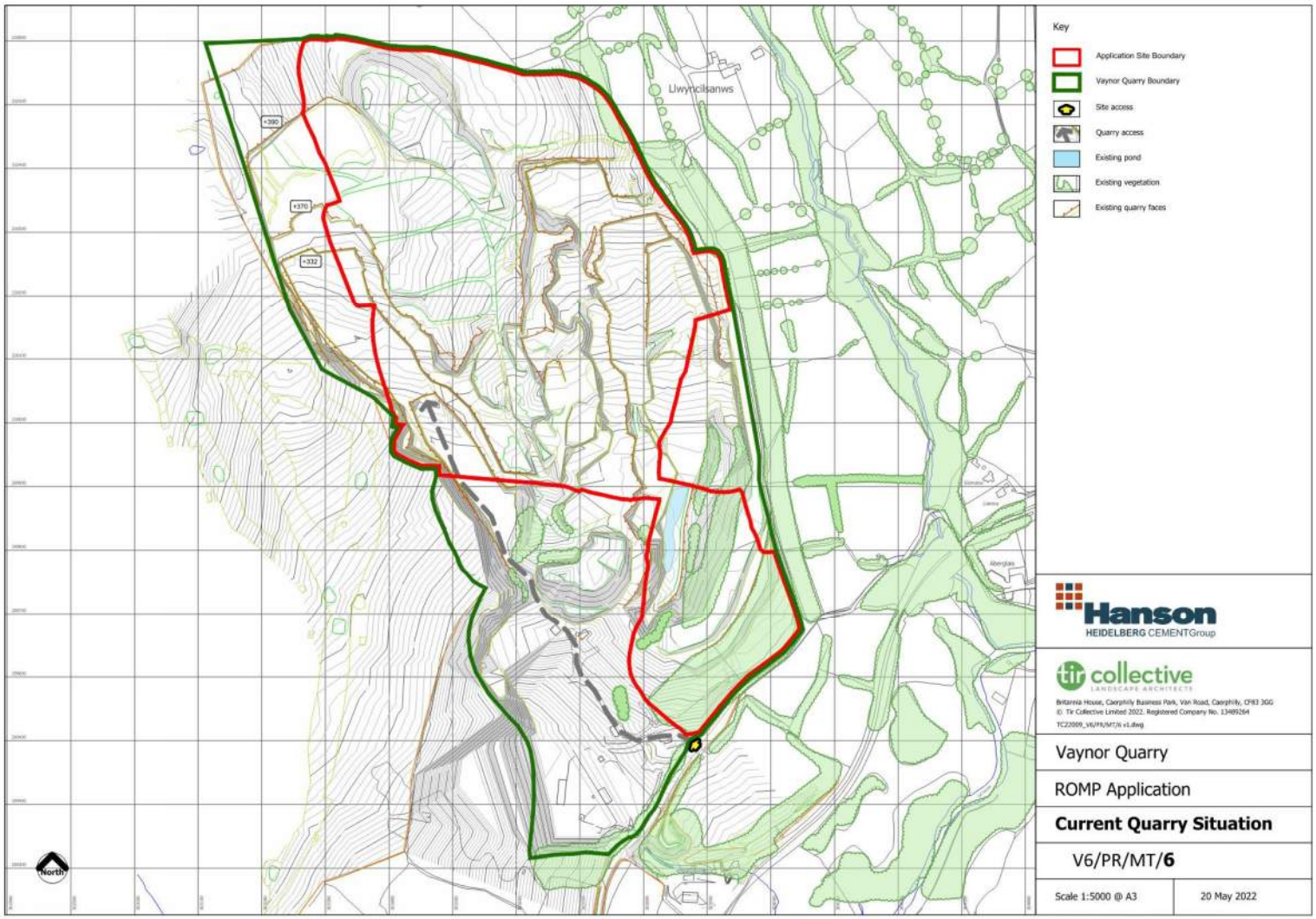


**Figure 3-2: Phase 1 After 5 years**

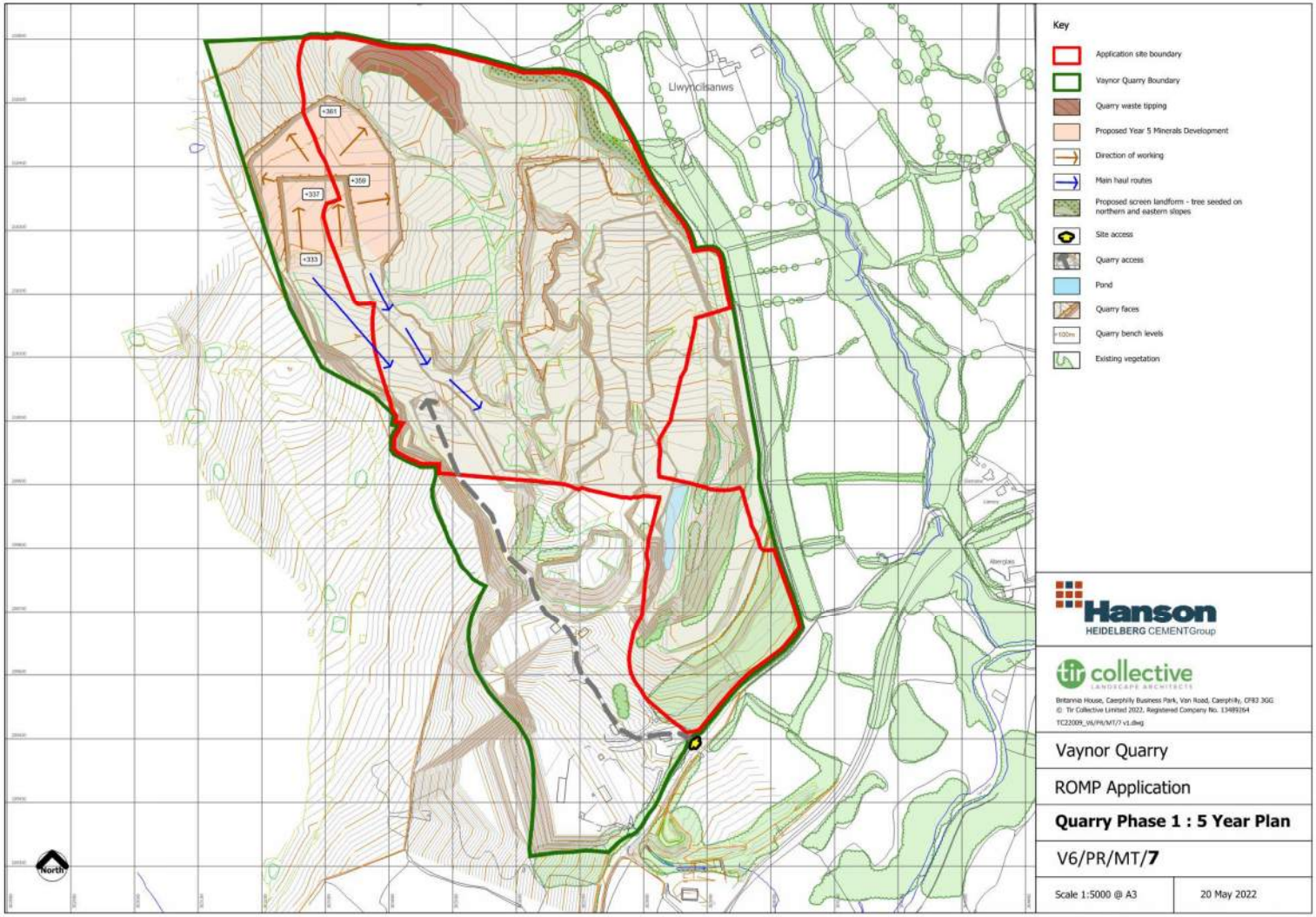


**Figure 3-3: Phase 2 After 10 years**

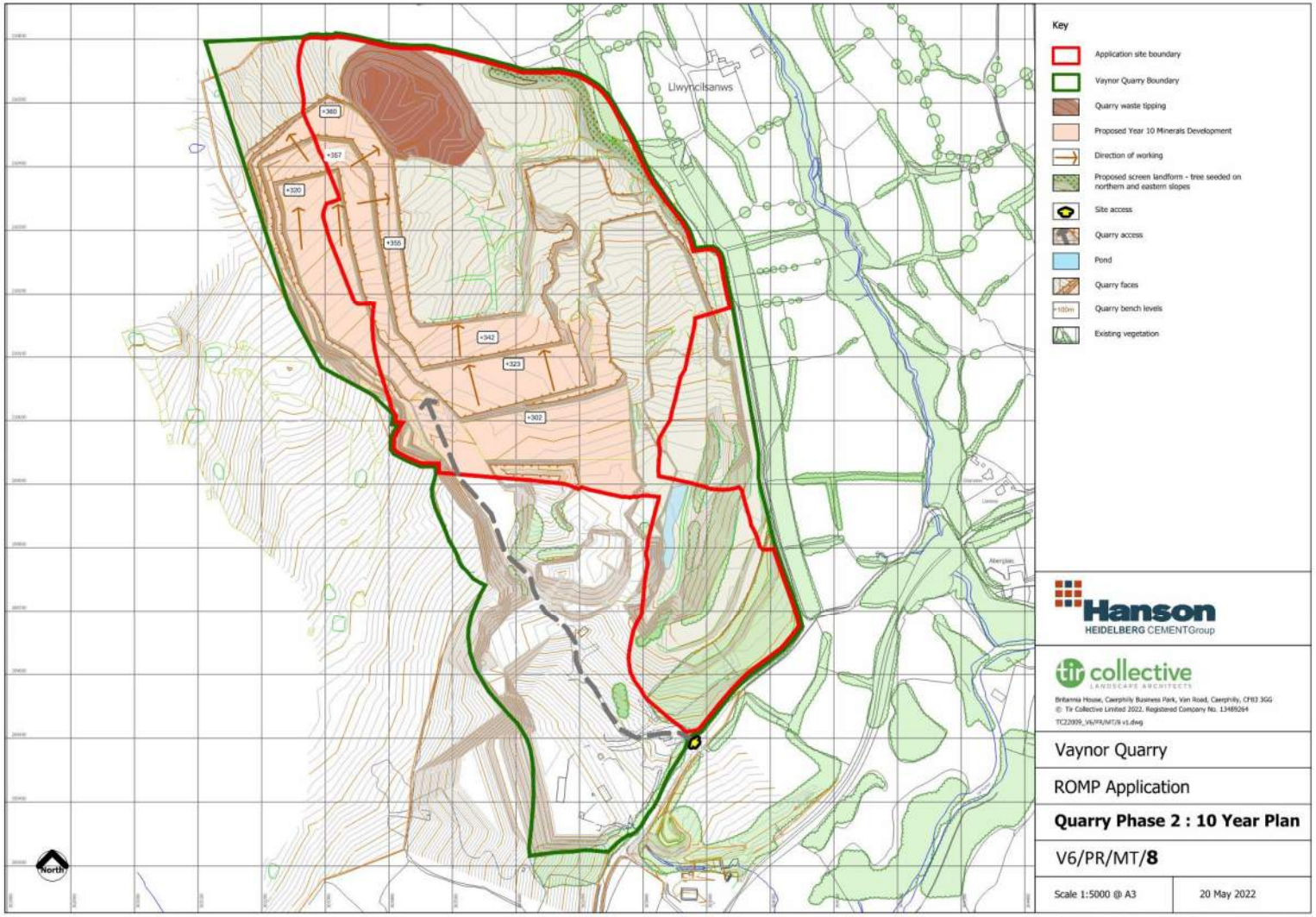


**Figure 3-4: Phase 3 After 15 years**

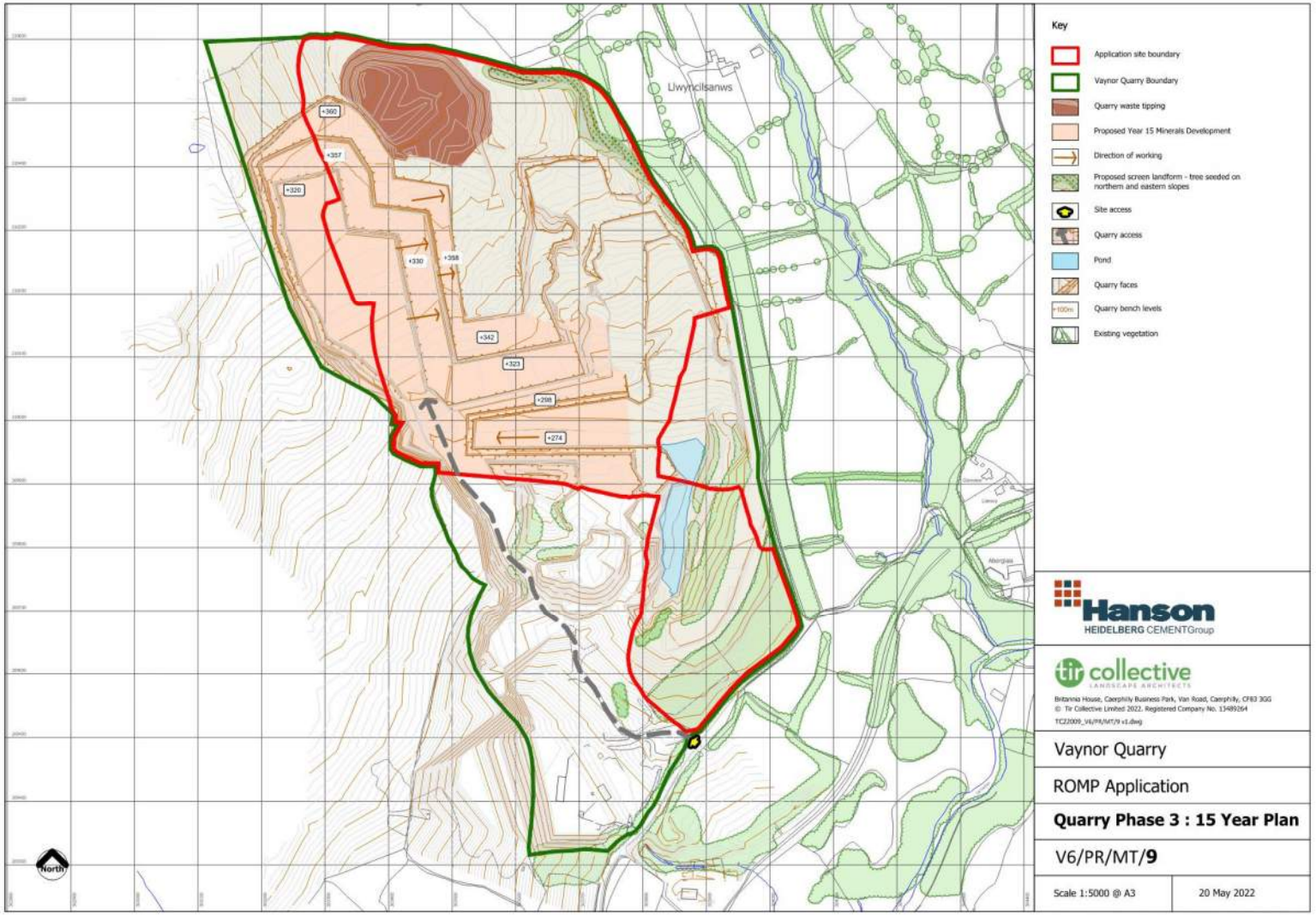


**Figure 3-5: Phase 4 After 30 years**

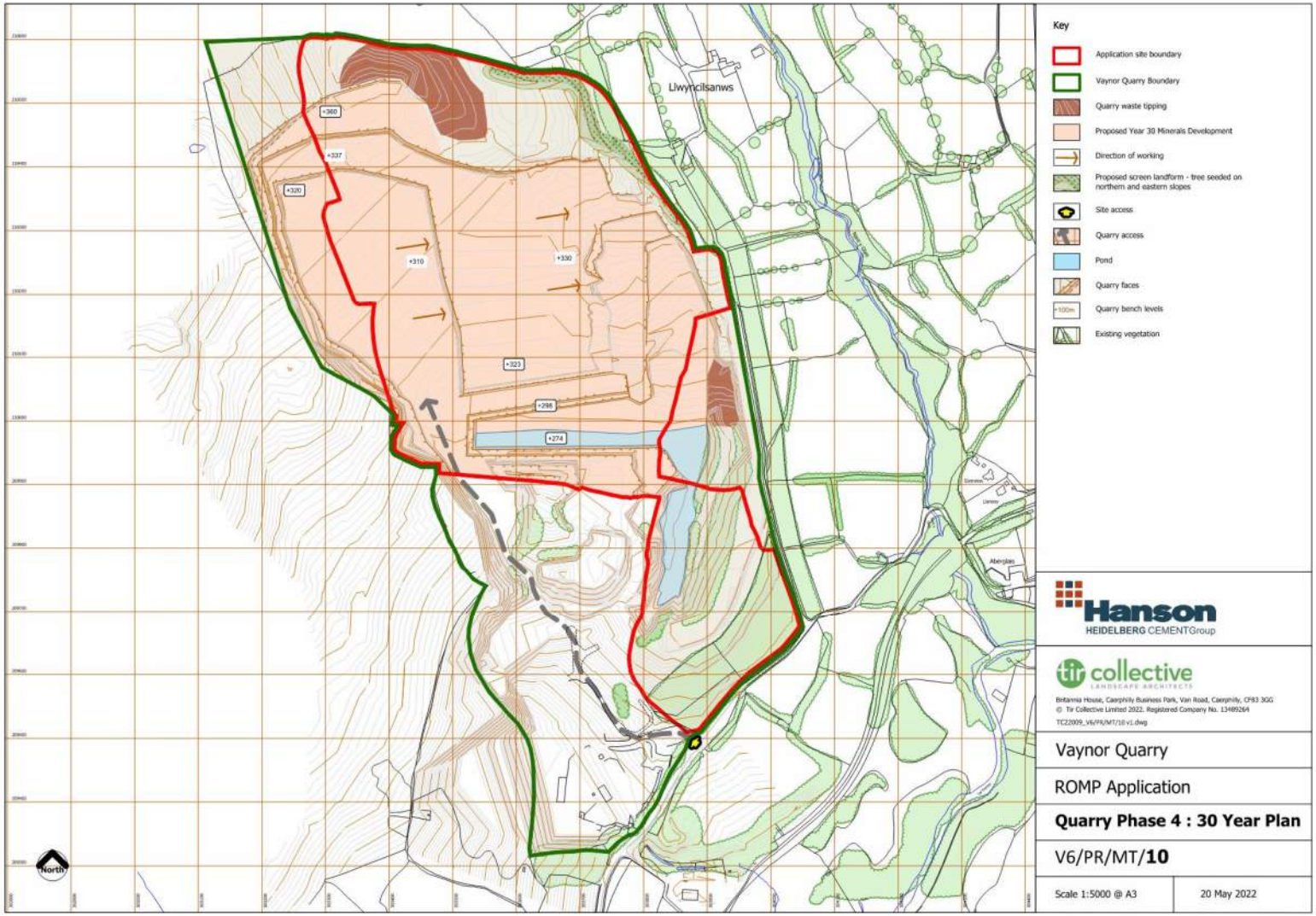


**Figure 3-6: Phase 5 after 60 years**

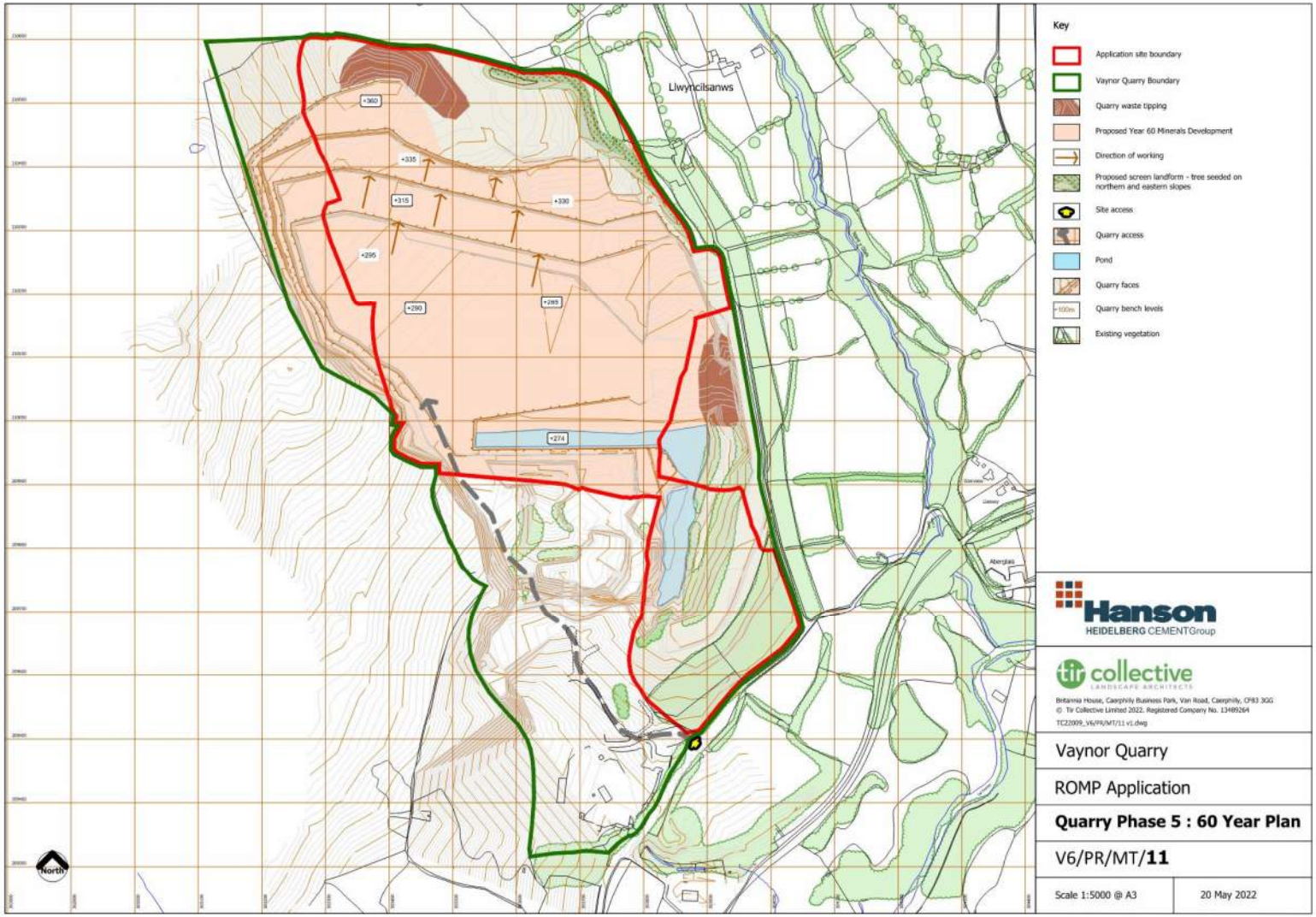
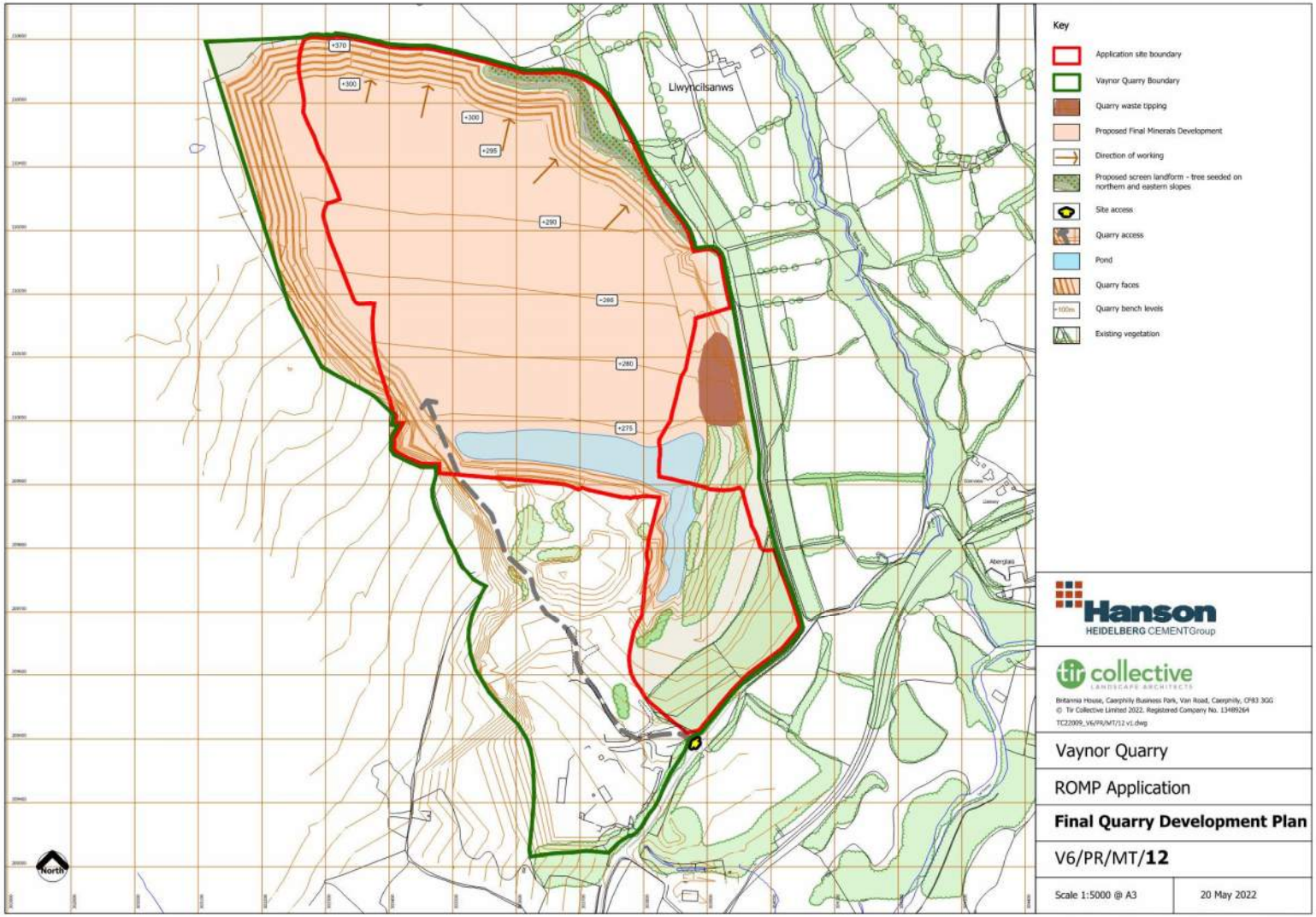


**Figure 3-7: Final Quarry Development**



# 4.0 RESTORATION STRATEGY

## 4.1 Introduction

The restoration strategy plan has been prepared to guide the long term restoration of Vaynor Quarry, and to assist in establishing restoration principles and restoration treatments. The finer details of the restoration works are likely to evolve as the quarrying progresses, and would be subject to amendment depending on the physical nature of the quarry benches, faces and slopes created. The strategy is therefore based upon a number of treatments or the retention of key features which would be used to create a diverse mix of habitats.

The approach is consistent with paragraph 97 of Minerals Technical Advice Note 1: Aggregates (MTAN1)[1]: '*For sites likely to work for longer duration, an initial restoration scheme should be submitted for approval at the outset with regular review of the restoration scheme during site operations'*. Paragraph 134 of MTAN1 support a strategy based on natural regeneration of mineral sites where there is a lack of topsoil. Paragraph 135 of MTAN1 proposes '*restoration by natural regeneration over parts of the site, so that a mosaic of habitats is established naturally. This approach is useful where there is a serious lack of soil material for restoration purposes. It would enable scarce soils to be used more constructively elsewhere on the site would contribute to habitat diversity'*.

## 4.2 Restoration design principles and objectives

The broad principles of the restoration strategy are illustrated on **Figure 4-1**, which reproduces plan ref **V6/PR/BBNP/14** and **V6/PR/MT/14** at a smaller scale**,** and incorporate four main elements, namely:

- on-site soils would be used for restoration planting in selected locations to reflect the pattern of existing woodland adjacent to the site
- 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 in the central part of the quarry will supplement the quarry waste by creating suitable growing conditions
- 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; and
- the quarry floor would be restored using fine granular material / quarry waste.

In view of the recognised ecological potential of restored mineral workings, the main objectives of the restoration proposals are ecological enhancement and nature conservation. This strategy is consistent with the approach outlined in Planning Policy Wales[2], paragraph 5.14.2, 4th bullet, and MTAN1.

The restoration strategy is also consistent with the ongoing natural regeneration of sections of existing faces and benches where no further mineral extraction is proposed.

## 4.3 Restoration Details

The restoration strategy has been based on the anticipated final form of Vaynor 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 in the latter stages of the overall development. In that context, it is proposed that planning conditions will provide

[1] Welsh Government, Minerals Planning Policy (Wales); Minerals Technical Advice Notes (Wales) 1: Aggregates, March 2004.

[2] Welsh Government, Planning Policy Wales, Edition 11, 2021.

for the approval of rolling 5 year Schemes of Working (as per the existing ROMP conditions) which will include details of progressive restoration.

Detailed proposals for the individual faces and benches would therefore be determined at a later stage, when the structure of the rock exposures become evident, but those finer details would be based upon the overall restoration strategy which has been prepared, and the 'treatments' set out below. This approach is consistent with the advice set out in MTAN1 paragraph 97 and 120.

### 4.3.1 Quarry Faces: Restoration Treatments

Opportunities are likely to be available to retain attractive rock outcrops as crags, and to retain naturally occurring crevices and pockets in which different types of vegetation can locally establish. Quarry faces would generally be left to regenerate naturally, which would in part be encouraged by low scree slopes and crushed rock placed at the toe of faces where practicable; refer to 'SS' on Figure 4.1.

Set within existing woodland along the eastern boundary of Vaynor Quarry, the faces would appear similar to natural outcrops occurring along the steep valley side slopes of the Taf Fechan and Taf Fawr valleys, for example, along Cefn Cil-Sanws and Twynau Gwynion (refer to Viewpoint 08 on Figure 6.9-8 at Appendix 6.2). Rock outcrops are also a feature of historic quarry workings within the context of the site at Morlais Hill (refer to Viewpoint 04 on Figure 6.9-4 at Appendix 6.2).

In selected locations, subject to safety considerations, a suitably low fertility growing medium would be deposited into natural crevices and ledges on the quarry faces to promote vegetation establishment. The growing medium would consist of subsoil/quarry waste/rootable fines and would be placed in suitable locations across the face, encouraging natural regeneration of a diverse range of species, as described in MTAN1, paragraph 135. Similarly, localised small scree slopes and pockets of loose rock 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, increasing biodiversity, geodiversity and landscape interest.

### 4.3.2 Quarry Benches: Restoration Treatments

Restoration work would commence on benches as soon as possible after they have been worked to their final position, and are no longer required for access purposes. The quarry benches would predominantly be restored through natural regeneration, consistent with MTAN1, paragraph 135. Habitat diversity would result from the variety of conditions created by the bench treatments during restoration.

Quarry benches would be restored using a combination of the following treatments, depending on the specific requirements of the area to be restored. The selection of the most appropriate treatment is based on landscape, visual and ecological considerations. Through the use of different treatments the development of a variety of plant communities would occur. Coarse rock and fine granular material remaining from quarrying would either be retained on the benches as a substrate, or form the basis of one of the alternative treatments set out below. This would provide a variable and uneven surface texture creating suitable ground condition to facilitate ecological succession.

All bench treatments would also incorporate placed material for rock trap profiles for geotechnical and health and safety reasons where access is available and it is safe to do so.

#### *Quarry Bench Treatment 1 (T1 on Figure 4.1)*

In a number of areas around the site the benches would be left as bare rock with any existing remaining loose material, with no further treatment, allowing vegetation to re-colonise naturally. Areas proposed for this treatment are those which are less visible due to the likely timescale over which re-vegetation would take to occur. Existing quarry benches in the southern part of Vaynor Quarry, where further access is not necessary, already have vegetation establishing successfully based on this approach.

Low fertility and poor growing conditions would result in gradual colonisation through natural ecological succession. This typically promotes the growth of less common species, which often appear following re-colonisation by more common pioneer species including mosses, ferns, bryophytes and lichens.

### *Quarry Bench Treatment 2 (T2 on Figure 4.1)*

In a number of areas around the site the benches would be covered with a layer of granular material and fines taken from the quarry waste stockpile. There would be no further treatment of this material once deposited, allowing vegetation to re-colonise naturally. The material with be deposited with a minimum depth of 150mm, including undulations in the surface. These would form hummocks and hollows, leading to more diverse growing conditions than would otherwise be the case. Particular care would be taken during the spreading of fine grain sized material to avoid trafficking as this would lead to compaction, slowing down the process of natural colonisation.

Bench treatment 2 is also proposed in less visible parts of the quarry due to the likely timescale over which re-vegetation would take to occur. Similar to bench treatment 1, the use of quarry waste on benches would create low fertility and poor growing conditions. It would result in gradual colonisation through natural ecological succession. This typically promotes the growth of less common species, which often appear following re-colonisation by more common pioneer species.

### *Quarry Bench Treatment 3 (T3 on Figure 4.1)*

The benches on the western and northern part of the quarry are proposed for measures to encourage vegetation establishment due to their more visually prominent location and ease of access during quarrying. Part weathered rock and loose material in this part of the site would form the substrate for soiling. Quarry waste and subsoil available on site would be spread over the surface of the benches to variable depths up to 500mm. Particular care would be taken during the spreading of the growing medium to avoid trafficking as this would lead to compaction, slowing down the process of natural colonisation. The benches would then be left to re-vegetate naturally.

### *Quarry Floor*

On completion of quarrying, the quarry floor would be re-profiled to smooth flowing contours of a suitable gradient using quarry waste. This approach would apply to the quarry floor within the quarry void of the **Mining Site**. The proposed southward sloping landform is illustrated on Figure 4.1. It would help to achieve positive drainage falls towards the pond located at the southern end of the Mining Site with a water level of up to 274m AOD. Undulations and depressions would be retained and enhanced to provide seasonal pools and wetland areas.

Given that the quarry floor is not visible from publicly accessible locations, a long term approach can be taken to its restoration. In that context, and subject to the basal levels on the year 60 plans (V6/PR/MT/11 Quarry Phase 5: 60 Year Plan and V6/PR/BBNP/11 Quarry Phase 5: 60 Year Plan), there may be opportunities to commence restoration of the southern area of the quarry floor at that stage, using material from the northern quarry tip.

The long term aim of the restoration strategy would be to establish species rich grassland across the quarry floor. Surface stability and erosion prevention are essential for vegetation establishment. The majority of the available soils within the site would be used for the restoration of the quarry benches.

Remaining soils available on site and potentially an imported source of organic matter would be mixed into the surface of the graded quarry waste across the quarry floor. The proportion of organic matter within the mix would aim to establish a rye grass mix and create a sward that would stabilise the surface to prevent erosion and gullying. Following the initial stabilisation of the surface, the rye grass will decline due to the progressive reduction in the nutrient content of the growing medium. Natural colonisation will occur and species diversity would increase during subsequent years as the fertility of the growing medium declines. Remaining soil resource would be used to establish small copses and where possible field boundary hedgerows to subdivide the quarry floor for livestock grazing.

On completion of quarrying, the floor of the Quarry to the south of the OMS would also be re-profiled to smooth flowing contours of a suitable gradient

using quarry waste. Remaining elements of offices, ancillary buildings and hard standings would be removed prior to quarry waste being spread. The long term aim of the restoration strategy would be to establish species rich grassland across this part of the Quarry Site.

### *Northeast noise screening landform*

The screening landform to the northeast shown on Drawing ref **V6/PR/BBNP/7** and **V6/PR/MT/7** would be retained following tree seeding, which would continue to establish over time. It would form a woodland block which will provide a visual and ecological connection between the woodland block near Llwyncilsanws.

## 4.4 Planting proposals

Planting would be undertaken along selected sections of the quarry benches as described above, and shown on the quarry restoration plan, Figure 4.1. The planting would supplement existing woodland along the eastern boundary of Vaynor Quarry and also provide habitat linkages.

All planting would be of native species, specified in accordance with the HTA National Plant Specification: 1997. In order to ensure that all planting is compatible with the local gene pool of the area, all woody plant species would be of local Forestry Commission provenance zone 303 as outlined in Forest Practice Note No. 8, entitled 'Using Local Seed Sources for Planting Native Trees and Shrubs', produced by the Forestry Commission (1999).

In order to provide feeding opportunities for birds outside of the breeding season, planting would incorporate berry and seed-bearing tree and shrub species, for example, Hawthorn, Blackthorn and Black Alder. Other suitable species that occur in abundance locally, for example Elder and Bramble would colonise the planting. Management would be undertaken where necessary to prevent over dominance of the plant mix by self-seeded plant species. Rabbit activity in the area would be reviewed before the use of rabbit guards is confirmed. If fitted, guards would be checked annually and replaced when necessary as part of the maintenance of the planting areas.

Soil amelioration is not proposed within areas to be planted. Tree establishment would involve traditional methods of planting using forestry transplants and root trainers. Planting would be undertaken between mid-October and April and individual plants would be at 2.0m centres in single species blocks of 3-5 no. per group. Plants would be notch planted and include the following suitable native species, reflecting the species composition of existing woodland and hedgerows in the area:

- Alnus glutinosa (black alder) 10%
- Betula pendula (silver birch) 10%
- Betula pubescens (downy birch) 5%
- Cornus sanguinea (dogwood) 5%
- Corylus avellana (hazel) 15%
- Crataegus monogyna (hawthorn) 20%
- Ilex aquifolium (holly) 5%
- Prunus spinosa (blackthorn) 5%
- Quercus petraea (oak) 20%
- Sambucus nigra (elder) 5%

Other species occur locally in hedgerows, for example Elm and Bramble. These species are not included in the plant list above but they would self-seed and become a part of the species mix over time, helping to maintain the local provenance of the establishing vegetation.

## 4.5 Fencing

All planting areas are located away from existing grazing by livestock, with the exception of the northeast noise screen bund. Any potential livestock grazing would only occur on the quarry floor. Whether or not livestock fencing is required would depend on the future potential of the habitats created to support light grazing. The need for fencing would be reviewed if grazing is proposed. If fencing is provided it would be stock-proof fencing to BS1722 Part 2 Table 2

(C8/80/15W). Stiles would be located within fence lines to allow for maintenance access.

## 4.6 Aftercare proposals

Regular maintenance of planting areas would continue for 5 years after planting in accordance with BS 7370:Part 4:1993, and advice in MTAN1 para 97,113, 119-121 and 125:

- invasive weeds would be removed
- shrubs or trees which die or appear sickly, would be replaced in the autumn/winter following planting
- tree/shrub ties, stakes and rabbit-guards will be checked, adjusted or replaced.
- regular aftercare meetings would review progress to date; and
- noxious or notifiable weeds invading the site such as Japanese Knotweed (*Fallopia japonica*) would be removed via an appropriate treatment.

Aftercare proposals for all other areas, including areas of natural regeneration, would consist of regular monitoring to identify specific maintenance requirements. Maintenance operations would be carried out when necessary to achieve specific aims set out in a management plan. A flexible and responsive approach to restoration based on a set of management aims is consistent with paragraph 125 of MTAN1, which states '*An aftercare scheme will usually be appropriate with a long-term permission where restoration and aftercare may not be begun for a number of years. It should provide a flexible framework for a successful programme of aftercare*'.

The schedules of proposed planning conditions make provision for formal annual aftercare site meetings between the operator, Planning Authorities and other relevant parties to review the aftercare operations which have taken place in the previous year, and the programme of management for the following year.

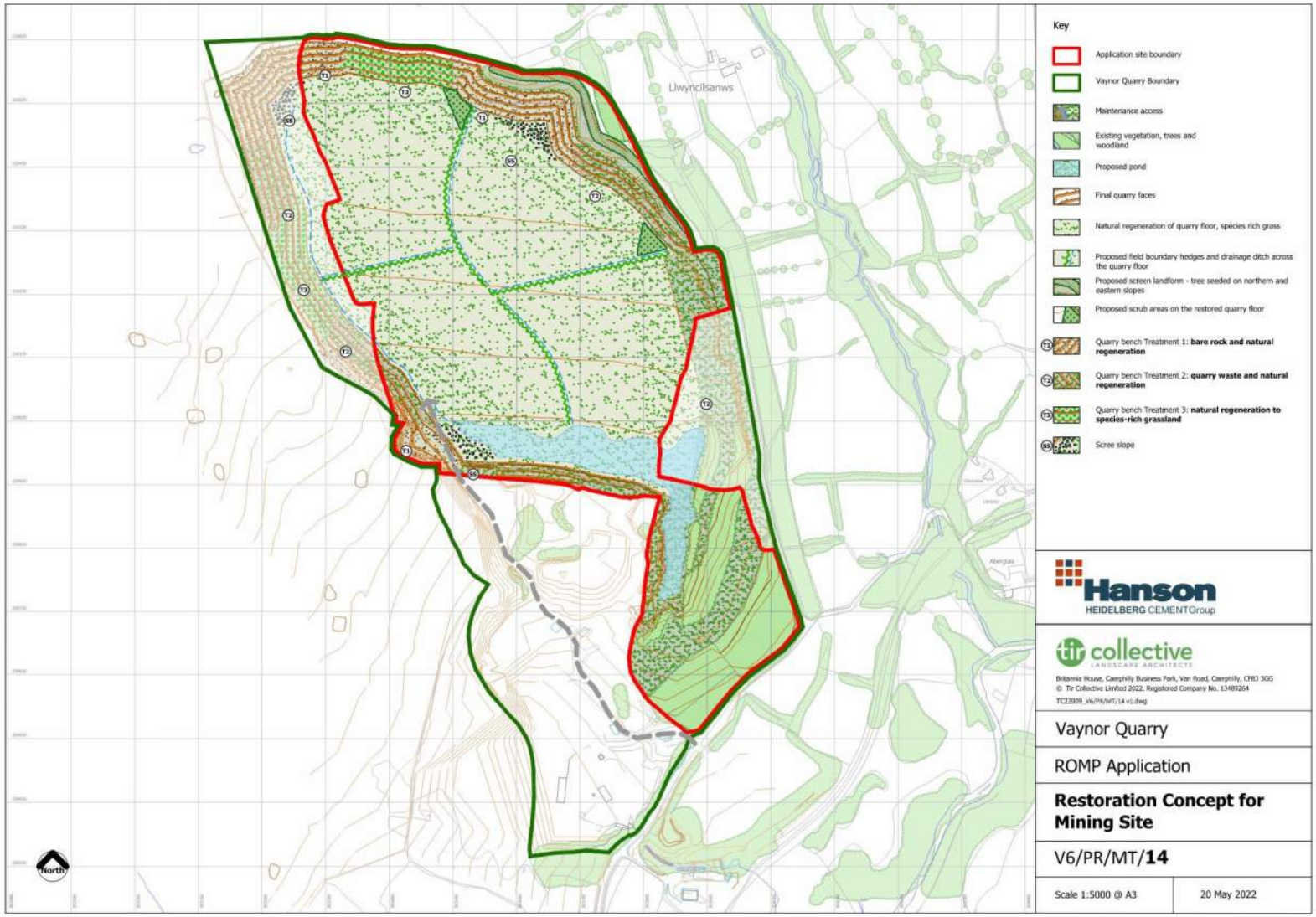
## 4.7 Coordination, monitoring and management

It is anticipated that the timing and location of restoration works would to a certain extent be flexible. All restoration work would be governed by detailed specifications, which would detail the locations selected for each restoration treatment.

It is recommended that the restoration is monitored throughout the quarry phases to identify any further management and/or improvements required. The monitoring programme would be carefully designed as the results may yield important information that can be applied in devising effective quarry restoration schemes in the future and may provide new information on colonisation/succession at hard-rock quarries.

Management of the areas would be important to the development of the ecological potential of the site. This would include a management plan setting out the objectives for the different habitat types, and guidance for the treatment of the vegetation to ensure desirable species are encouraged and undesirable species are prevented from becoming established.

**Figure 4-1: Restoration Concept for Overall Quarry**



# 5.0 ENVIRONMENTAL IMPACT ASSESSMENT

## 5.1 Introduction

The potential environmental effects of the future quarry development scheme at Vaynor Quarry has been informed by (i) an informal discussion with officers representing the Planning Authorities, supplemented by specific technical scoping studies for certain topics; (ii) the Applicants' knowledge of the site and surrounding area; and (iii) experience of environmental and amenity issues associated with operating similar limestone quarries elsewhere.

The result has been a comprehensive study which has addressed each of the individual topics, and, where relevant, the inter-relationship between topics and the potential for indirect effects.

## 5.2 EIA and ES

The ES describes in detail the potential environmental effects of the ongoing development, with reference to:

- Landscape and visual impact (Chapter 6.0)
- Ecology (Chapter 7.0)
- Soil Resources (Chapter 8.0)
- Hydrology and Hydrogeology (Chapter 9.0)
- Noise (Chapter 10.0)
- Blast Vibration (Chapter 11.0)
- Air Quality (Chapter 12.0)
- Transportation (Chapter 13.0)
- Cultural Heritage (Chapter 14.0)

An overall summary of the environmental effects is set out in Chapter 15.0 which draws upon the main environmental issues set out in preceding chapters, and the recommendations for mitigation measures. This provides a link between the conclusions and recommendation of the topic studies, the overall conclusions of the ES, and the proposed updated schedule of planning conditions produced as Annexes 1 and 2 to the ES.

Further context is provided by the consideration of planning policy and the way in which that can also inform the drafting of updated planning conditions (ref ES chapter 16.0).

## 5.3 Methodology

There are differences of approach in undertaking the respective assessments, which for certain topics are prescribed in detail by external guidance, but where others follow less prescriptive approaches.

Where applicable, each chapter sets out a methodology by which impacts are assessed and the way in which the significance of effects is defined.

The 'significance of effect' is presented in the respective chapters and takes into account the magnitude of an impact in combination with the importance and/ or the sensitivity of the receptor or resource, in line with defined significance criteria.

For each topic, the most relevant and latest guidance or best practice is used and therefore definitions of magnitude and sensitivity of impact will be tailored to each topic.

The LVIA uses a significance hierarchy ranging from severe > major > notable > moderate > neutral, based upon the Landscape Institute and Institute of Environmental Management Guidelines for Landscape and Visual Impact Assessment, third edition (GLVIA3), where notable effects and above are regarded as 'significant'.

The ecology study is based upon the concept of ecological significance set out in paragraphs 5.24 to 5.28 of the Chartered Institute of Ecology and Environmental Management Guidelines (CIEEM), where significance is a concept related to the weight that should be attached to effects when decisions are made. For the purpose of EcIA, a 'significant effect' is an effect that either

supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. Conservation objectives may be specific (e.g., for a designated site) or broad (e.g., national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local and the scale of significance of an effect may or may not be the same as the geographic context in which the feature is considered important.

The hydrology and hydrogeology study uses a hierarchy of major > moderate > minor > negligible effects, where major and moderate are regarded as significant effects requiring further consideration.

The noise study uses a hierarchy of major > moderate > minor > and negligible, based upon Guidelines for Environmental Noise Impact Assessments (Institute of Environmental Management and Assessment), with the air quality study using a hierarchy of substantial > moderate > slight > negligible as advised by the Institute of Air Quality Management.

The cultural heritage study uses a hierarchy of major > moderate > minor > negligible.

The respective approaches are thus all based upon established assessment methodologies and whilst the terminology used is slightly different between the respective assessments, there is a common theme which is reconcilable across the assessments, and where the definition of the terms is defined in the assessments.

The Chapters also follow a generally common approach with, where appropriate, sections which deal with:

- **Baseline conditions.**
- **Key Receptors.**
- **Summary of development,** highlighting those issues of relevance to the technical topic.
- **Design Mitigation,** highlighting the 'built-in' or 'designed-in' mitigation measures.
- **Assessment,** relevant to the technical chapter and following specific technical guidance, but with a description of the sensitivity of receptors, magnitude of impact, and significance.
- **Mitigation measures,** which are identified as a means of addressing identified impacts.
- **Residual impacts,** after taking into account in built and additional mitigation measures.
- **Summary of effects.**
- **Recommendations,** which can be translated into planning conditions; and
- **Conclusions.**

## 5.4 EIA and ES

The studies undertaken as part of the EIA have sought to provide a sound level of understanding of the environmental effects upon which reasoned assessments 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 as a minimum 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 and to the environmental features likely to be significantly affected.

The ES must include information reasonably required for reaching a reasoned conclusion on the significant effects of the development on the environment,

taking into account current knowledge and methods of assessment (ref Regulation 17 [4]).

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).

There is no additional up to date guidance available in Wales regarding the content of environmental statements. Welsh Office Circular 1/99, whilst is still in force, relates to the 1999 Environmental Impact Assessment Regulations and is becoming of limited applicability given that the 1999 Regulations have been updated on a number of occasions over the 20-year period since they were introduced. However, whilst not applicable in Wales, it is instructive to note the advice in England set out in the Planning Practice Guidance (originally introduced in March 2014, with subsequent updates on-line) to the National Planning Policy Framework (NPPF) (updated July 2021) which provides further advice on the information to be included within an ES.

In relation to EIA, and 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 should be on the "main" or "significant" effects to which a development is likely to give rise".

It further 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 Paragraph: 035 Reference ID: 4-035-20170728: Revision date: 28 07 2017)

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

# 6.0 LANDSCAPE & VISUAL IMPACT

## 6.1 Introduction

This Landscape and Visual Impact Assessment (LVIA) provides an assessment of the effects of the minerals development, on the landscape of the study site area and its context. The identification of mitigation measures incorporated within the design to minimise adverse effects, is informed by the findings of the assessment process as it progressed. In this LVIA, effects on features identified as important to the scenic quality, or effects on the landscape character of the site and its setting are assessed. Effects on peoples' views of the site and its setting, or visual amenity, are also assessed.

For the purposes of assessing the landscape and visual effects of the minerals development, the following study areas have been defined:

- The Study Site boundary extends to the Quarry Boundary shown on **Figure 6.1**
- The immediate landscape context extends to a radius of about 4km from the study site and the wider landscape context extends up to 6km from the study site boundary, see **Figure LA.6.2**.
- The visual study area extends to 4km from the study site boundary, see **Figure LA.6.8**.

The objectives of the assessment are to:

- Describe and evaluate the landscape of the study site, the surrounding landscape context, and the visual amenity of people in the surrounding area, which might be affected by the minerals development.
- Provide an input into the quarry design and development scheme, and to make recommendations for mitigation measures which can be incorporated into the development scheme;
- Examine the development proposals and analyse the potential effects on the landscape and visual amenity associated with the scheme's design, operation, and restoration.
- Provide an assessment of the significance of the landscape and visual effects of the proposed minerals development with integral mitigation measures in place; and
- Consider the need for any mitigation measures additional to those included as in built design mitigation measures.

Detailed information is provided in appendices in **ES Volume 2** as follows:

- **Appendix 6.1:** Landscape and Visual Figures
- **Appendix 6.2:** Assessment Methodology
- **Appendix 6.3** Assessments of Effects

The LVIA is presented with separate sections dealing with effects on landscape, effects on visual amenity. It is illustrated by plans and photographs as follows, which are in Appendix 6.1:

- Figure 6.1 Study Site Location
- Figure 6.2-1 Designations – Landscape and Ecology
- Figure 6.2-1 Designations – Historic and cultural
- Figure 6.3 Public Access
- Figure 6.4-1 LANDMAP – Geological Landscape
- Figure 6.4-2 LANDMAP – Landscape Habitats
- Figure 6.4-3 LANDMAP – Historic Landscape
- Figure 6.4-4 LANDMAP – Visual and Sensory
- Figure 6.5 Topography
- Figure 6.6-1 Context Views A and B
- Figure 6.6-2 Context Views C and D
- Figure 6.6-3 Context Views E and F
- Figure 6.7-1 Site Photographs 1 and 2
- Figure 6.7-2 Site Photographs 3 and 4
- Figure 6.7-3 Site Photographs 5 and 6
- Figure 6.8-1 Zone of Theoretical Visibility: Bare earth
- Figure 6.8-2 Zone of Theoretical Visibility: Screening
- Figure 6.9 Assessment Viewpoints 1 to 8

## 6.2 Methodology

The methodology used for assessing the landscape and visual effects is provided in **Appendix 6.2** (ES Volume 2). It is based on the recommendations in Guidelines for Landscape and Visual Impact Assessment 3rd Edition published by The Landscape Institute and the Institute of Environmental Management & Assessment in 2013 (GLVIA3).

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

A review of landscape designations and planning policies for the landscape, and of other landscape studies relevant to the area, as indicators of landscape value, including national and local landscape character assessments.

A survey of the study site, landscape context study areas, and inspection of views of the study 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.

Analysis of the minerals development proposals and consideration of potential landscape and visual effects.

Assessment of the sensitivity of the landscape to the changes likely to arise from the development.

Identification of the extent of theoretic visibility of the minerals development and potentially sensitive viewers or view locations, supported by a viewpoint analysis.

Consideration of proposals for mitigation and enhancement measures to avoid, reduce or offset significant adverse effects.

Assessment of magnitude of change and significance of effects on the landscape and on visual amenity, with the mitigation proposals in place.

### *Assessment and Mitigation*

The effects of the minerals development, whether beneficial or adverse, may vary in nature and degree through its lifecycle and, where feasible, mitigation measures are proposed to be incorporated in the design, operation and restoration proposals. Where design measures cannot address identified likely significant adverse effects, measures such as management of the operation of the quarry are proposed. The purpose of mitigation measures is first, to prevent or avoid the potentially adverse effects identified, and if that is not possible, to reduce the potential adverse effect. Where significant adverse effects are unavoidable, the purpose is to offset or compensate for the effect.

### *Guidance*

In addition to GLVIA3, the following sources of guidance were referred to:

- Landscape Institute's Technical Guidance Note, Visual Representation of Development Proposals, September 2019[3].
- Using LANDMAP in Landscape and Visual Impact Assessments GN46[4]
- An approach to Landscape Character Assessment, published by Natural England, 2014.
- Relevant policy, landscape character assessments, and other contextual information sources were also referred to, including:

### *Weather*

The weather is a factor affecting the assessment, especially of visual impacts. The Met Office[5] publish average statistics for weather patterns for the region, monthly and annual, for maximum and minimum temperatures, days of air frost,

[3] https://www.landscapeinstitute.org/visualisation/ [accessed Feb 2022]
[4] NRW guidance accessed on NRW website, January 2022, Using LANDMAP in Landscape and Visual Impact Assessments GN46

[5] Weather data from the Met Office website: http://www.metoffice.gov.uk/public/weather/climate/gcjtecwhq#?tab=climateTables

hours of sunshine, amount of rainfall - both generally and the number of days when rainfall is above 1mm. For Tredegar, the nearest Climate station to where the site is located:

Rainfall above 1mm per day, which limits visibility, occurs on an average of 166.5 days in the year, about 45.6% of the year

There are on average 58.7 days when air frost occurs, which can produce hazy conditions limiting visibility, about 16% of the year

There is an average of 1381.2 hours of sunshine per annum, less than the South Wales and South West England district average of 1519.7 hours).

### *Photography*

Photographs have a special role in describing landscape character and illustrating key views. In order for photographs to be representative and to create an image that is as similar as possible to that which is seen with the human eye, the Landscape Institute (LI) advises using a lens with a focal length equivalent to 50mm for a 35mm Single Lens Reflex (SLR) camera, and a horizontal field of view of a little under 40 degrees. The equipment used for the appraisal photography includes:

- A Canon EOS 5D Mark iii digital SLR camera with a full frame sensor;
- Canon 50mm EF 1:1.8 II lens; and
- Manfrotto tripod and panoramic head.

Photographs were taken with a focal length of 50mm.

Landscape photography includes wide angle or panoramic views requiring a sequence of photographs to be taken across the view. Where this approach is taken, a series of overlapping photographs are digitally spliced together in Photoshop / PTGui using a cylindrical projection to provide a panorama approximating to the normal field of view in a landscape context. Where necessary, the contrast and brightness of individual photographs is slightly manipulated in order to create a consistent panorama without visible joins.

The viewpoint locations were established using a camera mounted GPS device and verified against site survey or Ordnance Survey grid reference and height above Ordnance Datum.

## 6.3 Landscape Policy Context

### 6.3.1 National Planning policy

#### *Future Wales: The National Plan 2040*

Future Wales: The National Plan 2040, published 24 February, sets out the development plan for Wales, influencing "all levels of the planning system in Wales and will help shape Strategic and Local Development Plans."[6] The plan promotes development that enhances our wellbeing and our quality of life"[7] and embeds the principles of the Well-being of Future Generations (Wales) Act 2015. The plan sets out development policies for Wales, dividing it into 4 regions: The North, Mid Wales, The Southwest, and The Southeast, the study site is located in the southeast region.

The key policies that are of relevance to the proposed development include:

- **Policy 9 – Resilient Ecological Networks and Green Infrastructure aims** "To ensure the… provision of green infrastructure, the Welsh Government will work with key partners to:

  […]

  identify opportunities where existing and potential green infrastructure could be maximised as part of placemaking, requiring the use of nature-based solutions as a key mechanism for securing sustainable growth, ecological connectivity, social equality and well-being.

6 https://gov.wales/future-wales-national-plan-2040-0

7 Page 4, Future Wales The National Plan 2040

… In all cases, action towards securing the maintenance and enhancement of… green infrastructure assets must be demonstrated as part of development proposals through innovative, nature-based approaches to site planning and the design of the built environment."

- **Policy 19 – Strategic Policies for Regional Planning** states "Strategic Development Plans should embed placemaking as an overarching principle and should establish for the region (and where required constituent Local Development Plans):

  […]

  11. a co-ordinated framework for minerals extraction and the circular economy, including waste treatment and disposal."

### *Planning Policy Wales*

Planning Policy Wales (PPW) Edition 11 published 24 February 2021 sets out the land use planning policies of the Welsh Government. Its primary objective is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales, as required by the Planning (Wales) Act 2015, the Well-being of Future Generations (Wales) Act 2015 and other key legislation and resultant duties such as the Socio-economic Duty.

PPW translates The Welsh Government's commitment to sustainable development into the planning system, to be taken into account when preparing development plans, so that it can play an appropriate role in moving towards sustainability. The key policies that are of relevance to the development include:

- **Chapter 2 People and Places: Achieving Well-being Through Placemaking, paragraph 2.24** states "the creation of sustainable places and in recognition of the need to contribute to the well-being of future generations in Wales through placemaking… development proposals must seek to deliver developments that address national sustainable placemaking outcomes." Paragraph 2.28 lists environmental considerations that need to be taken into account, which include:
  - "will the important features of the natural and built environment be protected and enhanced;
  - are the environmental impacts of development on… amenity limited to acceptable levels…
  - will high standards of restoration, remediation, decommissioning and beneficial after uses be achieved;
  - will the causes of and impacts of climate change be fully taken into account through location… and restoration…"
- **Chapter 3 Strategic and Spatial Choices paragraph 3.9** states "The special characteristics of an area should be central to the design of a development. The layout, form, scale and visual appearance of a proposed development and its relationship to its surroundings are important planning considerations."

  **Paragraph 3.10** goes on to state "In areas recognised for their particular landscape… cultural or historic character and value it can be appropriate to seek to promote or reinforce local distinctiveness. In those areas, the impact of development on the existing character… will be particularly important."
- **Chapter 5 Productive and Enterprising Places, paragraph 5.14.2** states "The role of the planning authority in relation to mineral extraction is to balance the fundamental requirement to ensure the adequate supply of minerals with the protection of amenity and the environment. The key principles include:
  - protect environmental and cultural characteristic of places, including those highly cherished for their intrinsic qualities, such as…landscapes, ancient woodlands and historic features…
  - achieving without compromise, a high standard of restoration…"

**Paragraph 5.14.35** states "Minerals development should not take place in National Parks… except in very exceptional circumstances. It goes on to state "Consideration will include an assessment of…

- the detrimental effect of the proposals on the natural and historic environment and local community and landscape and the extent to which that can be moderated…
- in the case of extensions to existing quarries and other mineral extraction sites, the extent to which the proposal would achieve an enhancement to the local landscape…"

**Paragraph 5.14.36** states "Minerals development adjacent or close to a National Park… that might affect the setting of these areas, should be assessed carefully to determine whether the environmental and amenity impact is acceptable or not, or whether suitable, satisfactory conditions can be imposed to mitigate the impact."

**Paragraph 5.14.42** states "Mineral workings should not cause unacceptable adverse environmental or amenity impact." Paragraph 5.14.43 goes onto state "Development plans should set out clearly the criteria that will be applied to mineral proposals to ensure that they do not have an unacceptably adverse impact on the environment and the amenity of nearby residents. Issues that must be addressed include: …visual intrusion and general landscaping; … and restoration, aftercare and after-use."

**Paragraph 5.14.47** states "Extensions to existing working, whether they be time, lateral or depth extensions should be considered in the same manner as applications for new sites."

In relation to restoration, **paragraph 5.14.50** states "Restoration and aftercare should provide the means to at least maintain, and preferably enhance, the long-term quality of the land and landscapes taken for mineral extraction."

- **Chapter 6 Distinctive & Natural Places, paragraph 6.0.2** states "The special and unique characteristics and intrinsic qualities of the natural and built environment must be protected in their own right, for historic, scenic, aesthetic and nature conservation reasons."

**Section 6.3** Landscape, **paragraph 6.3.3** states "All the landscapes of Wales are valued for their intrinsic contribution to a sense of place, and local authorities should protect and enhance their special characteristics, whilst paying due regard to the social, economic, environmental and cultural benefits they provide, and to their role in creating valued places."

In relation to National Parks, **paragraph 6.3.5** states "Planning authorities have a statutory duty to have regard to National Parks… purposes. This duty applies in relation to all activities affecting National Parks…, whether those activities lie within, or in the setting of, the designated areas."

### *Technical Advice Notes (TANs)*

Planning Policy Wales is supplemented by Technical Advice Notes (TANs), and specifically Mineral TANs. Of relevance to the Vaynor Quarry and the ROMP application is **MTAN 1: Aggregates, March 2004**

This MTAN "sets out detailed advice on the mechanisms for delivering the policy for aggregates extraction by mineral planning authorities and the aggregates industry."

**Paragraph 7** states "The overarching objective in planning for aggregates provision… is to ensure supply is managed in a sustainable way so that the best balance between environmental, economic and social considerations is struck, while making sure that the environmental and amenity impacts of any necessary extraction are kept to a level that avoids causing demonstrable harm to interests of acknowledged importance."

In relation to National Parks, **paragraph 52** states "To justify allocations in development plans or the approval of proposals for… extensions to existing sites, for the extraction of aggregates of a particular specification in National Parks… it must be demonstrated that:- …that the detrimental effects of the proposal can be mitigated or compensated for."

In relation to visual impact, **paragraph 89** states "Hard rock quarrying physically alters the ground surface through the development of faces and benches, and these landscape changes are often irreversible. Other operations related to quarrying may have an impact on the landscape, including the historic landscape: quarry tips; aggregates storage areas; screening mounds; settlement ponds; processing plant; roads and buildings. Most quarries are

located in rural areas where their development introduces a visual intrusion... Proposals for… significant extensions to existing operations should be assessed carefully to determine the potential impact on the landscape character of the setting. This assessment will enable a comprehensive understanding of the visual impact of the proposed development from various locations to determine the acceptability of the development, the phasing and layout of the development, and, the most appropriate restoration strategy."

**Paragraph 90** goes on to state "Visual impact assessment should be undertaken from various viewpoints including main settlements, major traffic routes and footpaths, both close to the site and from greater distances to reflect its landscape setting. Photographs taken at specified locations or computer generated photomontage should be produced to illustrate the visual impact at various stages in the development, both with and without mitigating proposals."

**Paragraph 91** states "Specific site appraisals of landscape character will be required whether or not the site is within or close to a landscape designated for its intrinsic importance.

In relation to restoration and aftercare, **paragraph 97** states "Restoration and aftercare must provide the means to maintain or, wherever possible, enhance at the earliest opportunity the long-term quality of land that has been used for mineral extraction, so that it may become suitable for a beneficial use."

**Paragraph 101** goes onto state "The minimum practicable working space required should be determined at the outset of working to enable phased working areas to be designed so that restoration keeps pace with the site development."

**Paragraph 106** states "To demonstrate that a site can be reclaimed to an acceptable standard and after-use, the applicant is advised to prepare, at the outset, a working plan which includes restoration proposals and is based upon findings from the site investigation."

[8] https://www.beacons-npa.gov.uk/planning/draft-strategy-and-policy/local-development-plan-review/ [accessed April 2022]

### 6.3.2 Local Planning policy

The study site lies within the boundaries of Merthyr Tydfil, including partly within the Brecon Beacons National Park (BBNP). Local planning policy relevant to Vaynor Quarry is provided by the Merthyr Tydfil Replacement Local Development Plan (2016 - 2031), which was adopted on 29th January 2020.

For parts of the study site within the BBNP, planning policy is provided in the Brecon Beacons National Park Local Development Plan (2007-2022), adopted in 2013. Following the coronavirus pandemic, the Brecon Beacons National Park Authority have had to pause production on the Local Development Plan 2, and the current LDP remains in force until the adoption of LDP2[8].

#### *Merthyr Tydfil Replacement Local Development Plan 2016 2031*

- Social well-being policy **SW11: Sustainable Design and Placemaking** states "Development must contribute to the creation of attractive and sustainable places through high quality… design.

Where appropriate new development will be required to:

1. be appropriate to its local context in terms of scale…

2. integrate effectively with adjacent spaces… and historic environment…

3. not result in an unacceptable impact on local amenity… or visual impact, and incorporate a good standard of landscape design;

4. contribute to the provision of green infrastructure…"

- Cultural well-being policy **CW1: The Historic Environment** states "The integrity of our historic environment assets will be conserved and enhanced. Development proposals will only be permitted where it can be demonstrated they would preserve or enhance the… character … of our designated

historic environment assets. Development affecting undesignated historic environment assets… should have regard to their special character..."

- Environment well-being policy **EnW5: Landscape Protection** states "Development proposals will be permitted where it can be satisfactorily demonstrated that:

It would not cause unacceptable harm to the character and quality of the landscape setting of the County Borough;

[…]

c) Development respects the local distinctiveness and historic character of the landscape;

d) Development will safeguard local landscape character and landscape features, including views, which make a significant contribution to the character, history and setting of the locality;

e) Development secures the enhancement of the character, appearance and quality of the landscape, through restoration, management or enhancement where possible;

f) There is no satisfactory alternative and the benefits associated with the development can be demonstrated to outweigh the harm; and

g) Where damage to local landscape character cannot be avoided appropriate mitigation has been secured."

- Economic well-being policy **EcW11: Minerals Development** states "Proposals for mineral extraction and associated development will be allowed where: …
  - - They include acceptable proposals for progressive and final restoration, aftercare and beneficial after-use; …"
- Policy **EcW13: Minerals Safeguarding** states "New development will only be permitted in an area of known mineral resource where it has first been demonstrated that:

[…]

2. Prior extraction would not have an unacceptable impact on environmental or amenity considerations

[…]"

### *Brecon Beacons National Park Local Development Plan 2007 -2022*

- Strategic policy **SP1: National Park Policy** states "Development in the National Park will be required to comply with the purposes and statutory duty set out in legislation, and will be permitted where it:

conserves and enhances the Natural Beauty… cultural heritage of the Park;

[…]

- **Policy 1: Appropriate Development in the National Park** states "All proposals for development… in the National Park must comply with the following criteria, where they are relevant to the proposal:

i) the scale… will be appropriate to the surroundings and will maintain or enhance the quality and character of the Park's Natural Beauty…

ii) the proposed development is integrated into the landscape to the satisfaction of the NPA through planting and appropriate management of native species or through the construction of appropriate boundary features;

[…]

iv) the proposed development promotes opportunities for the conservation and enhancement of bio/geodiversity through appropriate design and landscaping…

- Strategic policy **SP3: Environmental Protection** states "All proposals for development… in the National Park must demonstrate that the proposed development does not have an unacceptable impact on, nor detract from, or prevent the enjoyment of;

the special qualities of the National Park as identified in the National Park Management Plan…

[…]

e) cultural and historic heritage… Registered Historic Parks Gardens and Historic Landscapes.

- **Policy 21: Historic Landscapes** states "Development which directly or indirectly either alone or in combination affects those areas listed within Part 2 of the 'Register of Landscapes, Parks and Gardens of Special Historic Interest in Wales' will only be permitted if the essential integrity and coherence of the area, as defined in the Register, is preserved or enhanced.

### 6.3.3 Designations

Designations provide an indication of landscape value. They are areas that have been recognised for the scenic beauty and recreational potential of the landscape. Designations are shown on **Figures 6.2-1 and 6.2-2**.

#### *National Park*

Part of the south boundary of the Brecon Beacons National Park (BBNP) loops around Vaynor Quarry, for the most part excluding the quarry from the National Park. However, part of study site is located within the BBNP. The BBNP extends northwards and covers the northern half of the 6km study area.

*Special Qualities*

The management plan for the national park[9] meets the requirements of the Environment Act 1995, covering the next 20 years and reviewed every five years. Within the section on 'Managing Change Together' the relevant special qualities are defined as:

- A feeling of vitality and healthfulness that comes from enjoying the Park's fresh air… **rural setting, open land**...
- **A sense of place and cultural identity** - "Welshness" - characterised by… relatively unspoilt historic towns, villages and family farms. The continued practices of traditional skills developed by local inhabitants… such as common land practices and grazing.
- A sense of discovery where people are able to explore… prehistoric ritual sites, medieval rural settlements, early industrial sites, local myths, legends and geological treasures.
- **The Park's sweeping grandeur and outstanding natural beauty observed across a variety of harmoniously connected landscapes**, including marvellous gorges and waterfalls, classic karst geology with caves and sink holes, contrasting glacial landforms such as cliffs and broad valleys carved from old red sandstone and prominent hilltops with extensive views in all directions.
- A working, living "patchwork" of contrasting patterns, colours, and textures comprising of well-maintained farmed landscapes, open uplands, lakes and meandering rivers punctuated by small-scale woodlands, country lanes, hedgerows, stone walls and scattered settlements.
- Extensive and widespread access to the Park's diversity of wildlife and richness of semi-natural habitats…
- In the context of the UK, geographically **rugged, remote and challenging landscapes**.
- Enjoyable and accessible countryside…

The Future Beacons: The Management Plan for the Brecon Beacons National Park 2022 – 2027 closed its public consultation on 4th March 2022[10]. Received comments are being considered prior to publication of the final version. It states that:

[9] A management plan for the Brecon Beacons National Park, 2015-2020

[10] https://www.beacons-npa.gov.uk/the-authority/who-we-are/npmp/management-plan-review/

*The landscape is vital to all that we are as a National Park. We will in all our endeavours work to guide and harmonise necessary changes in the landscape to ensure that the essence remains strong and vital. We will conserve and enhance landscape features which have intrinsic value due to their geological geomorphological, ecological, heritage or aesthetic value.*

*The landscape is vital to all that we are as a National Park. We will in all our endeavours work to guide and harmonise necessary changes in the landscape to ensure that the essence remains strong and vital.*

*We will conserve and enhance landscape features which have intrinsic value due to their geological geomorphological, ecological, heritage or aesthetic value.*

### *Special Landscape Areas*

Special Landscape Areas (SLAs) are a non-statutory landscape designation applied by the local planning authority to define areas of high landscape importance within their administrative boundary.

In June 2017 Merthyr Tydfil published the Local Development Plan (2016 – 2031) Background Paper: Special Landscape Areas. It identified five SLAs, based on the preferred methodology LANDMAP Guidance Note 1: LANDMAP and Special Landscape Areas, NRW 2016.

The study site is located adjacent to **SLA 2: Nant Morlais and Cwm Taf Fechan**. Relevant landscape value and contributions are identified as:

- A distinct and unique defensive character deriving from Morlais Castle, occupying an impressive, strategically important hilltop location…
- Culturally significant because of the range and variety of human influence on the landscape: 13th century Morlais Castle obscuring the hillfort; radical landscape change due to minerals extraction; a rare culturally significant rich mixture of remains of man's influence on the landscape
- Remote but influenced by proximity to the town. The area is of exposed upland character with moorland rising to 530m. The visual and sensory character is generally bleak and open with long views.
- The area is bounded by the steep sided gorge of the Taf Fechan below the quarries of Morlais Hill.
- Cyfarthfa Castle is a nationally important 19th century historic park and garden…
- The Taff Fechan valley is an enclosed wooded gorge with the mature deciduous woodland and many attractive intimate spaces… Important routes through include the Taff Trail… Disused quarries above the gorge add to the strong sense of place.

Relevant key policy issues for the SLA include:

Maintain and enhance field pattern framework as buffer landscape between town and open areas.

- Protect high quality gateway to the Brecon Beacons.
- Control development - appropriate design and materials for edge of National Park.
- Maintain current semi-rural character
- Protect distinctive character of Vaynor and Pontsticill.

A key management issue for the SLA includes “Restore semi-natural habitats in Vaynor Quarry.”

### *Ancient woodland*

The nearest ancient woodland is along the bottom of Nant y Glais valley, to the east of Vaynor Quarry, and a further area about 300m to the southeast of Vaynor Quarry along the banks of Taf Fechan. Landscape and Ecology Designations are shown on Figure 6.2-1.

### *Historic and cultural designations*

The setting of historic and cultural designations is a consideration for this LVIA as these features inform the overall landscape character, quality and value of the area. This LVIA does not address the effects on heritage assets however it considers the contribution these features make to landscape value and scenic quality.

Relevant historic and cultural designations are shown on **Figure 6.2-2.**

### *Conservation areas and listed buildings*

There are no conservation areas located within 1km of the study site. **Cyfarthfa Conservation Area** is the nearest conservation area to the study site, which is located circa 1.4km to the south. It covers Cyfarthfa Park, Cyfarthfa Ironworks, and Taf Fechan, the latter extending along the banks of the river as far as the A465.

No other conservation areas are located within 2.5km of the study site.

The nearest listed structure to the study site is the **Grade II listed Pont-Sarn, a road bridge** over a former railway, which now forms part of National Cycle Route 08 and The Taff Trail. The listed structure is located approximately 430m to the east of the study site. 100m further east along the former railway is the **Grade II* listed Pontsarn Railway Viaduct**.

### *Scheduled Ancient Monuments*

**Cefn Cil-sanws defended enclosure** is the nearest scheduled monument to the study site, located circa 470m to the west. The monument is of national importance for its potential to enhance our knowledge of Iron Age or Romano-British rural settlement and social organisation.

640m to the east of the study site is **Merthyr Tramroad: Morlais Castle section**, scheduled monument. The monument is of national importance for its potential to enhance and illustrate our knowledge and understanding of the development of the transport network associated with the iron industry.

There are five further scheduled monuments within 1km of the study site, which are: Cefn Cil-sanws, cairn to the southwest study side of, 900m to the west; Cefn Cil-Sanws ring cairn, 740m to the northwest of the study site; Enclosure East of Nant Cwm Moel, 890m to the north of the study site; Cae Burdydd Castle, 780m to the east of the study site; and Morlais Castle, 900m to the east of the study site.

### *Registered Parks and Gardens*

Registration is the way that a park or garden of special historic interest is recognised by law through the Historic Environment (Wales) Act 2016. The statutory register is expected to come into force in early 2022[11].

Cyfarthfa Castle Park Grade II* is the nearest registered park and garden to the site, located circa 1.3km to the south. The public park contains formal gardens and a lake that is overlooked and provides the landscape setting to the Grade I listed Cyfarthfa Castle.

Circa 1.2km to the southwest of the Vaynor Quarry is Cefn Coed Cemetery Grade II. The significant views at these sites are not towards the study site and are therefore scoped out from further consideration in this LVApp.

### *Registered Historic Landscapes*

Cadw, in partnership with the Natural Resources Wales (NRW) and the International Council on Monuments and Sites (ICOMOS UK) has compiled a non-statutory Register of 58 Landscapes of Outstanding or Special Historic Interest in Wales.

[11] https://cadw.gov.wales/advice-support/placemaking/legislation-guidance/registered-historic-parks-and-gardens [accessed February 2022]

The study site is located within the north of Merthyr Tydfil Landscape of Outstanding Historic Interest (LOHI) with much of the wider study area located within the LOHI. The designation covers all of the settlement area of Merthyr Tydfil and some outskirts that includes part of Merthyr Common and Dowlais. Merthyr "still retains its industrial landscape character as the most significant Welsh town of the Industrial Revolution. The town and its environs remain a potent example of an internationally renowned industrial landscape of the 18th and 19th centuries and a permanent reminder of man's exploitation of the landscape."[12]

Part of Gelli-gaer Common LOHI is located within the southeast of the 7km study area. Due to the distance of the LOHI from the study site and its very limited coverage by the ZTV, the Gelli-gaer Common LOHI has been scoped out from further consideration in this LVIA.

East Fforest Fawr and Mynydd-y-Glog Landscape of Special Historic Interest (LSHI). At its nearest point the LSHI is located approximately 2km from the study site. The LSHI mainly covers coniferous forest within the study area and is not covered by the ZTV. East Fforest Fawr and Mynydd-y-Glog LSHI is therefore scoped out from further consideration in this LVApp.

### *Ecology designations*

Ecological designations, although not specifically related to landscape amenity and not assessed within this report, are an indication of landscape value. Relevant ecological designations are shown on **Figure 6.2-1**.

#### *Sites of Special Scientific Interest (SSSI)*

There are two SSSIs within 1km of the study site: **Nant Glais Caves**, 130m to the northeast; and **Cwm Taf Fechan Woodlands**, which is split into two parcels, 600m to the east and 150m to the southeast of the study site.

[12] https://cadwpublic-api.azurewebsites.net/reports/historiclandscape/FullReport?lang=&id=HLW%20(MGL)%202 [accessed April 2022]

## 6.3.4 Public access

Public rights of way and access land within the 6km study area are shown on **Figure 6.3.**

### *Public rights of way*

Public rights of way routes and access land within the study area are generally concentrated on the surrounding hills, beyond the built-up area of Merthyr Tydfil and adjacent settlements, except for Long Distance Footpaths and National Cycle Routes which are described in more detail in the paragraphs below.

The majority of PRoWs follow the Taff Fechan valley or cross the adjacent farmland. An unmarked bridleway which has the appearance of being rarely used crosses the open moorland to the north of the study site. At its nearest point it is located circa 0.5km from the study site.

### *Long Distance Footpaths (LDFP)*

The Taff Trail is an 88km combined walking and cycling route that passes along the Taff valley between Brecon and Cardiff. Within the study area, the route heads in a southwest direction around Morlais Castle before connecting to Merthyr Tydfil and bearing to the southeast through the centre of the town, and then onwards through Abercanaid and Pentrebach. At its nearest point the Taff Trail is located approximately 0.2km to the southeast of the study site, following the alignment of the former Merthyr to Brecon railway.

The Taff Trail forms part of National Cycle Routes (NCR) 8. It is joined by NCR 46, which passes Merthyr Tydfil on its north-eastern side, just to the south of Pontsticill.

### *Open Access Land*

Parts of the 6km study area are designated as Open Country and Registered Common Land under the CROW Act[13].

The open moorland of Cefn Cil-Sanws to the west and north of the study site is open access land. There are also small areas of access land in Gurnos, to the south, and at Morlais, to the southeast of the study site.

The small area of land that lies in the east of the study site and within the BBNP is also designated access land.

## 6.4 The Proposed Development

Details of the proposed development are provided in Chapter 3 and Chapter 4 of the ES and on the ROMP Application drawings. This section describes the main aspects of the minerals development and its restoration which could potentially affect landscape and/or visual amenity. It also identifies features of the proposals which will assist in mitigating adverse landscape and visual impacts. The quarry Restoration Strategy is described in Chapter 4 of the ES.

### 6.4.1 Sources of Potential Landscape and Visual Effects

The main features of the development proposal which could potentially result in landscape and visual impacts are:

- Extraction with the existing quarry void and expanding the western wing of the void eastwards into the eastern wing of the quarry
- Site clearance operations involving clearance of small areas of scrub, the stripping of soil in the northern part of the site and its storage for re-use during site restoration
- The creation of a noise attenuation landform along the north-eastern boundary of the quarry as a permanent landscape feature, with tree planting / seeding designed to establish a woodland corridor linking to adjoining established woodland features
- Operation of the quarry plant site including the primary crusher
- The implementation, in the longer term, of a variety of restoration treatments, designed to create a range of conditions and habitats which would foster the biodiversity and geodiversity potential of the site, and assist in integration into its landscape context. This will include the emplacement of quarry waste on selected benches, the retention of crags and rock outcrops in appropriate locations and the creation of scree slopes
- The restoration of the site to a wildlife enhanced feature, which recognises and exploits the biodiversity potential associated with worked-out quarries, and the range of habitats which can be created; and
- The restoration of the quarry floor using quarry waste to allow natural regeneration.

[13] Countryside and Rights of Way Act, 2000

### 6.4.2 Restoration

The final restoration and after use proposals for the site represent the principal long-term measure in mitigation of potential landscape and visual effects. The upper quarry benches and faces would be restored when no longer required for operational purposes. A variety of treatments would be used to enhance the ecological and landscape value of the site. These are summarised below and described in detail in **Chapter 4**. Planting is also proposed along the eastern boundary of the quarry, to supplement the existing woodland.

In summary, the principal features of the restoration would be, as follows:

- There is significant potential for biodiversity enhancement during the restoration of the site, including quarry faces, benches and the quarry floor. The upper quarry benches and faces would be restored when no

longer required for operational purposes.. A variety of treatments would be used to enhance the ecological and landscape value.

- Quarry faces present an opportunity to retain attractive rock outcrops as crags, and to retain naturally occurring crevices and pockets in which different types of vegetation can locally establish. Quarry faces would generally be left to regenerate naturally, which would in part be encouraged by low scree slopes and crushed rock placed at the toe of faces. The resulting variety of vegetation types would avoid uniformity of restoration treatment; increasing biodiversity, geodiversity and landscape interest.
- Restoration work would commence on quarry benches as soon as possible after they have been worked to their final position, and are no longer required for access purposes. Once a section of bench has been ear-marked for restoration, no further physical disturbance would occur at that location. A variety of bench treatments are proposed. Coarse rock and scree remaining from quarrying would either be retained on the bench as a substrate, or form the basis of one of the alternative treatments to provide a variable and uneven surface texture creating suitable ground condition to facilitate ecological succession. In selected locations soiling of sections of quarry bench would take place to allow native scrub planting to be undertaken. Natural regeneration of vegetation would be more desirable in terms of the likely species diversity that would result in the longer term.

Management of the site, including the establishing vegetation, would focus on its nature conservation interest and amenity potential, resulting in substantial beneficial impacts on the biodiversity of the site. The landscape and visual appearance of the site would be improved as the tree planting and natural recolonisation establishes and matures.

## 6.5 Limitations of the assessment

This section describes the limitations and assumptions considered for the landscape character and visual amenity assessments.

### *Assessments*

The landscape and visual assessments only consider the minerals development that would occur in the study site, it does not provide assessments for mitigation proposals or plant operations beyond the study site boundary.

### *Zone of Theoretical Visibility (ZTV)*

The ZTV has been calculated to the existing ground surface level of the quarry with the proposed 5m high noise attenuation bund. Due to the level of uncertainty associated with the height of the waste tip beyond year 5, it has not been taken into consideration when calculating the ZTV.

### *Timeline of assessments*

For brevity, the LVIA does not assess each individual phase of the mineral development, but instead provides assessments at set intervals, which combines/ overlaps some phases. The set intervals are set out as follows:

- Years 0 - 5 - this includes site clearance, including vegetation removal and the stripping of soil in the northern part of the study site. Construction of the noise attenuation bund along the northeast boundary with tree planting and seeding. Operation of the minerals development.
- Years 5 - 30 – this includes the establishment of trees and vegetation on the noise attenuation bund. Continued operation of the mineral development.
- Beyond 30 years – this includes the continued operation of the minerals development. The restoration of the study site and establishment of habitats, including the restoration of the quarry and natural regeneration.

There is also some uncertainty beyond 30 years and potential changes that may occur in relation to the mineral development, as well as other influences such as policy changes, climate change, and pest and diseases. The assessments focus on the first 30 years of the minerals development with assumptions as set out beyond 30 years, including the restoration at circa year 100.

## 6.6 Landscape Baseline

The landscape baseline is a description and analysis of the existing landscape, against which the effects are assessed, first, by reference to landscape character assessments for the area in which the site is located, at national and local levels and then, from site-specific surveys and analysis carried out for the purposes of this assessment.

### 6.6.1 LANDMAP Characterisation

Landscape Assessment, following the LANDMAP methodology, has been undertaken for Merthyr Tydfil. The assessment uses the Natural Resources Wales (NRW) / Wales Landscape Partnership Group approach which separates the defining aspects of the landscape into five categories, or aspect layers: Geological Landscape, Landscape Habitats, Historic Landscape, Cultural Landscape Services, and Visual & Sensory.

It considers the relationship that exist between people and places; how people have given meaning to places through time and how the physical landscape has shaped their actions, or how their actions have shaped the landscape.

Summarised descriptions for the most relevant aspect areas to the site study area and its context are outlined below for all five aspect layers. The findings of the LANDMAP studies have formed the basis of the landscape and visual baseline within this appraisal. **Table 6-1** below defines the criteria that LANDMAP uses for evaluating each aspect area.

**Table 6-1Criteria for evaluating LANDMAP Aspect Areas[14]**

| LANDMAP Evaluation | Definition |
|---|---|
| Outstanding | of international or national importance |
| High | of regional or county importance |
| Moderate | of local importance |
| Low | of little or no importance |
| Unassessed | insufficient information exists to evaluate |

Characteristics of particular relevance to the site and its context are highlighted in **bold.** LANDMAP aspect areas for each of the aspect layers are illustrated on **Figures 6.4-1 to 6.4-4.**

#### *Geological Landscape (GL)*

The study site is located in the aspect area **Cwm Taf Fechan** (MRTHRGL011), which is classified as Doline or sink field, pavements, dry valleys etc (Level 3). The geographical and topographical character of the area (question GL4) is described as a "S-facing Dinantian Carboniferous Limestone dip slope with karstic shake holes east of Taf Fawr, **incised by meandering steep-sided river Cwm Taf Fechan valley**. Peat and boulder clay cover on slopes. NW-SE Dowlais/Gurnos Fault controlling **tributary Nant y Glais valley**. Caves, small areas of tufa in valleys, extensive head cover on lower valley slopes. Steep slopes into Taf Fawr to W, with head flanking slopes. **Working Vaynor quarry, and several disused limestone quarries."**

The **overall evaluation** (question GL33) for the area is **outstanding due to the** "SSSI Nant Glais Caves; Karstic dip slope, incised valleys with caves, tufa, working and disused limestone quarries; Potential RGIS".[15]

#### *Landscape Habitats (LH)*

The study site is mainly located within the aspect area **MRTHRLH006** (unnamed), which is classified as Calcareous grassland (Level 3). The key features of the area that define the area's biodiversity character (question LH24)

[14] LANDMAP Methodology Overview, June 2017 https://cdn.naturalresources.wales/media/681752/landmap-methodology-overview-2017-eng.pdf?mode=pad&rnd=131547814890000000

[15] https://landmap-portal.naturalresources.wales/view_survey.php?survey_id=549 [accessed April 2022]

are summarised as "**Two separate areas with Vaynor Quarry dominating one area** and Morlais Hill Quarry and golf course dominating the other." The area is also noted for a "good mosaic of habitats and a good example of how mine workings can be reclaimed, and a valuable habitat made."

The overall evaluation (question LH45) for the area is **high** as the area "contains a number of different mosaic of valuable habitat."[16]

The southeast corner of the site is located in the expansive aspect area **MRTHRLH005** (unnamed), which is classified as Improved grassland (Level 3). The key features of the area that define the area's biodiversity character (question LH24) are summarised as "Linear area based on the valleys of Afon Taff Fechan and Nant Glas rivers."

The **overall evaluation** (question LH45) for the area is **outstanding** as it **contains two SSSIs**."[17]

Minor areas along the northwest and northeast boundary of the site are located in the extensive aspect area **MRTHRLH001** (unnamed), which is classified as Marsh/Marshy grassland (Level 3). The key features of the area that define the area's biodiversity character (question LH24) are summarised as "Large area of **upland habitats based around Vaynor & Cilsanwys Common;** partly on limestone, but mostly acid or neutral soils."

The **overall evaluation** (question LH45) for the area is **high** for "Large areas on Marshy grassland and dry heath which provides connectivity throughout the aspect."[18]

### *Historic Landscape (HL)*

The study site is mostly located in aspect area **Vaynor Quarry** (MRTHRHL020), which is classified as Extractive (Level 3). The aspect area is described as (question HL4) "The area is **characterised as part of a discontinuous industrial extractive landscape** ranged along the Taff Fechan Valley and comprises large imposing limestone quarries associated with the Cyfarthfa, Penydarren, Dowlais, Ivor and Plymouth Ironworks. The **cavernous working faces of the quarries provide a striking visual impression of 19th century extraction**. Other dominant characteristics include limekilns and associated tramroads. **Vaynor Quarry, the only active quarry in the area**, originated during the 1870s to provide limestone for Crawshay's Cyfarthfa Ironworks. The current works have rapidly expanded since being re-opened under AW Lewis; **the area now contains an array of modem quarry buildings and structures, such as conveyors and hoppers**."

The **overall evaluation** (question HL40) for the area is **moderate** reflecting the "severe impact on the archaeological resource resulting from the **modern expansion of quarrying activity, which has destroyed many earlier landscape elements**..."

The southeast corner of the study site is located in aspect area **Taff Fechan valley** (MRTHRHL003) with the east boundary of the study site also bordering with the aspect area. It is classified as Irregular fieldscapes (Level 3). The aspect area is described (question HL4) as "**dispersed agricultural settlement and enclosed fields**; the other dominant characteristic of the area is as a **communication corridor: rail and road links**... There is also **evidence of limited small-scale extractive industry** and processing (limestone)... **The valley sides of the Taff Fechan are covered by dense woodland, much of it regenerated Ancient Woodland**...The aspect area is **characterised by the embankments**, **cuttings, bridges** and other features associated with a rail and road corridor. The remains of the Brecon and Merthyr Line, to the northeast of Pant junction are partly re-used by the current Brecon Mountain Railway..."

The **overall evaluation** (question HL40) for the area is **high** to reflect "the **largely intact nature of the fieldscape and settlement pattern and its historic associations as a long-established communications** route since

[16] https://landmap-portal.naturalresources.wales/view_survey.php?survey_id=642 [accessed April 2022]
[17] https://landmap-portal.naturalresources.wales/view_survey.php?survey_id=641 [accessed April 2022]
[18] https://landmap-portal.naturalresources.wales/view_survey.php?survey_id=637 [accessed April 2022]

the Roman period, distinguished by substantial remains of mid to late 19th century communications features, including the Morlais Tunnel and Pontsarn railway viaduct."[19]

A small part of the western boundary of the study site is located in aspect area **Garn Ddu** (MRTHRHL002), which is classified as Marginal land (Level 3). The aspect area is described (question HL4) "This area has characteristics typical of **unenclosed/semi-enclosed marginal upland common/moorland**… This area comprises the large block of upland between the Taff Fechan and Taff Fawr valleys; much of it still unenclosed moorland pasture… More recently, the southern areas have seen enclosure, including one isolated farm and walled land (now abandoned) at Cwm Moel, and there are also walled plantations. The upland is now subdivided by post-and-wire fences, some replacing 19th century iron posts…

The **overall evaluation** (question HL40) for the area is **outstanding** "representing an **extensive, unspoiled area of largely unenclosed upland common,** containing an exceptionally large and well-preserved series of cairns, hut circles and field/settlement enclosures and house platforms constituting a remarkable concentration of agricultural, funerary and settlement features ranging in date from the Bronze Age through to the medieval period."[20]

### *Cultural Landscape Services (CLS)*

Cultural Landscape Services (CLS) now supersedes the Cultural Landscape aspect layer, which was updated in 2020. CLS responds to "Recent environment and well-being legislation and developments in current thinking relating to culture suggest the dataset would benefit from a different approach to mapping if revisited..."[21] The data for CLS uses data from the other four aspect layers and provide no overall evaluations for each aspect area.

Refer to Visual and Sensory aspect layer below for further detail.

[19] https://landmap-portal.naturalresources.wales/view_survey.php?survey_id=1718 [accessed April 2022]
[20] https://landmap-portal.naturalresources.wales/view_survey.php?survey_id=1717 [accessed April 2022]

### *Visual & Sensory (VS)*

The study site is mostly located in aspect area **Vaynor Quarry** (MRTHRVS179), which is classified as Excavation (Level 3). The area is described as (question VS3) a "**Active limestone quarry cutting onto Vaynor uplands with moorland to the north and west and farmland to the south and east**. **The entrance to the quarry and related plant are screened to an extent by trees and mounding**. **Views of the upper faces are possible from the south and east. The quarry is more completely visible from further distances, particularly from the other side of the Taf Fechan valley to the south**.

The **scenic quality** (question VS46) is assessed as **low**, the **character** (question VS48) is assessed as **low** and the **overall evaluation** (question VS50) is also assessed as **low** as "the quarry, despite some screening and mitigation remains a **detractor in the landscape**."[22]

Along the west boundary small areas of the study site are located in aspect area **Vaynor uplands** (MRTHRVS387), which is classified as Upland moorland (Level 3). The aspect area is described as (question VS3) "This **big open unenclosed landscape** rises to over 490m AOD in the north east and to 300m AOD along its southern edge. It forms **a large block of upland between the Taf Fawr and Taf Fechan and looms high above the basin in which Merthyr Tydfil is located**… The **area is exposed, bleak and empty of settlement with almost no access** - there is one right of way crossing the southern quarter and a few footpaths skirting the edge… Most of the area **is typical of large parts of the upland moorland in the Brecon Beacons**. However, the distinctive craggy outcrops on Cefn Cilsanws… along the southern edge are a focal point with scrub vegetation and grey scree slopes below. This hillside forms a focal point on the main road north into the Brecon Beacons.

The **scenic quality** (question VS46) is assessed as **high**, the **character** (question VS48) is assessed as **high** and the **overall evaluation** (question

[21] LANDMAP Cultural Landscape Services, Report No 336, prepared by E.K Naumann, Dr K Metcalf, Environmental Systems, Cyfoeth Naturiol Cymru/Natural Resources Wales
[22] https://landmap-portal.naturalresources.wales/view_survey.php?survey_id=579 [accessed April 2022]

VS50) is also assessed as **high** as "The area has **high scenic quality with panoramic views**. It has **consistent and unspoilt character throughout and a strong sense of place** through rock outcrops and moorland character. The area **forms part of the Brecon Beacons upland area**."[23]

The east boundary of the study site is adjacent to part of aspect area **Vaynor Farmlands** (MRTHRVS198), which is comprised of two separate areas. It is classified as Upland grazing (Level 3) and described as (question VS3) "**sloping farmed landscape lies between open uplands and town**. It has a **distinctive and attractive small-scale field pattern** around Vaynor and Pontsticill - **a mix of stone walls and hedgebanks**... This is an **intimate undulating landscape** which contrasts in scale with the adjacent reservoir, moorland, forestry and quarries. The area **south of Taf Fechan** (between Morlais Hill and Gyrnos Farm) has **larger fields, a mosaic of woodlands and rough ground - it is less remote** than the area to the north. Access is possible from Merthyr to the south and the area is visible from, and **visually affected by, the adjacent the A465**. It still fulfils a **vital role providing a connection between the upland landscapes to the north with industrialised Merthyr**.

The **scenic quality** (question VS46) is assessed as **moderate**, the **character** (question VS48) is assessed as **moderate** and the **overall evaluation** (question VS50) is also assessed as **moderate** as "The area is a **pleasant pastoral human scale landscape with views to adjacent uplands and valley**. It has a **consistent character with distinctive stone walls and small scale field pattern**."[24]

### *LANDMAP Summary*

Table 6.2 below summarises the evaluations for each Aspect Area that the site study area is located in:

**Table 6-2 Summary of LANDMAP**

| Aspect Layer | Aspect Area name and Unique ID (UID) | Classifications (Level 3) | Overall Evaluations |
|---|---|---|---|
| Geological Landscape | Cwm Taf Fechan UID: MRTHRGL011 | Doline or sink field, pavements, dry valleys etc | Outstanding |
| Landscape Habitats | (Unnamed) UID: MRTHRLH006 | Calcareous grassland | High |
| | (Unnamed) UID: MRTHRLH005 | Improved Grassland | Outstanding |
| | (Unnamed) UID: MRTHRLH001 | Marsh/Marshy grassland | High |
| Historic Landscape | Vaynor Quarry UID: MRTHRHL020 | Extractive | Moderate |
| | Taff Fechan valley UID: MRTHRHL003 | Irregular Fieldscapes | High |
| | Garn Ddu UID: MRTHRHL002 | Marginal Land | Outstanding |
| Cultural Landscape Services | Vaynor Quarry UID: MRTHRCLS008 | Excavation | N/A |
| | Vaynor Uplands UID: MRTHRCLS021 | Upland moorland | |
| | Vaynor Farmlands UID: MRTHRCLS010 | Upland grazing | |
| Visual & Sensory | Vaynor Quarry UID: MRTHRVS179 | Excavation | Low |
| | Vaynor Uplands | Upland moorland | High |

[23] https://landmap-portal.naturalresources.wales/view_survey.php?survey_id=589 [accessed April 2022]

[24] https://landmap-portal.naturalresources.wales/view_survey.php?survey_id=581 [accessed April 2022]

| Aspect Layer | Aspect Area name and Unique ID (UID) | Classifications (Level 3) | Overall Evaluations |
|---|---|---|---|
| | UID: MRTHRVS387 | | |
| | Vaynor Farmlands UID: MRTHRVS198 | Upland grazing | Moderate |

### 6.6.2 County and District level landscape assessments

The most recently published Landscape Character assessment of relevance to the study site is the Brecon Beacons Landscape Character Assessment, which was published in August 2012. The study site is located adjacent to Landscape Character Area 8: Talybont and Taff Reservoir Valleys, which is defined as Broad Landscape Type: Upland Valleys. The relevant distinctive characteristics of the area are identified as:

- A series of **steep V-shaped valleys separated by flatter uplands**. The **Taff valleys have a strong north-south orientation** and drain southwards, whilst the Talybont valley lies broadly north-east to south-west and drains into the Usk.
- **Chains of artificial reservoirs occur in valleys, linked by rivers**. Mountain streams (and occasional waterfalls) flow down the steep valley sides, sculpting sandstone and limestone rocks.
- Coniferous forestry is dominant land use, plus reservoirs, pasture and open moorland.
- Surviving field boundaries usually stone walls, occasionally patched with post and wire. Some former field boundaries still visible within forestry plantations.
- **Extensive coniferous forests**, with some larch and patches of more mixed deciduous woodland (for example on the western side of the Llwyn-onn valley). **Deciduous trees also associated with watercourses**.
- Many historic features lost under reservoirs and forests. Surviving features include farms, field boundaries and Vaynor church. Parts of the Brecon and Newport Railway survive, including Pont-sarn viaduct, the opening of the tunnel which connected the Talybont and Taff valleys, and some track (now the Brecon Mountain Railway) and station buildings.
- **Very limited settlement** within the LCA (Llwyn- onn, Pontsticill and occasional farms). Other built development includes housing for reservoir workers, large-scale water treatment works below dams, and former limestone quarries.
- Generally a simple landscape composition, **with large blocks of forest in simple valley landform.** Forests appear strongly textured (especially where they include deciduous trees) and **contrast in colour with surrounding open moorland**.

Relevant forces for change in the landscape, past and present include:

- Past quarrying of limestone leaving scars in the landscape.
- Urban fringe' influences of adjacent urban areas and high visitor numbers (e.g. litter, fly-tipping, 'police operation' notices, evidence of car break-ins etc).
- Land uses just beyond the southern boundary associated with adjacent development, e.g. golf clubs, derelict quarry etc.

### 6.6.3 Landscape Context of the Study Site

The following paragraphs provide descriptions of the site and should be read alongside Site Photographs **Figures LA.6.7**.

#### *The landscape of the Quarry site*

The OMS covers an area of around 57.13ha and extends over a proportion of the area subject to historical quarrying and an area where future quarrying will take place. Historical quarrying at Quarry has created a western and eastern limb or voids separated by a spur of land which has been party disturbed by historical quarry waste and overburden tipping. A more substantial quarry tip is present in the northern area of the Quarry.

Land in the south eastern area of the Quarry accommodates an existing pond with land beyond being well-vegetated with trees. Woodland along the eastern boundary of the Quarry provides separation between the Quarry and the Taf Fechan Valley to the east.

Woodland along the east boundary and higher ground along the western flank of the Quarry result in a good degree of visual containment. The substantial changes in a level within the Quarry from 285m at the southern boundary to 475m and the northern boundary, along with the area of disturbed ground are not prominent beyond the Quarry boundary because of this containment.

There are distant views available southwards of the valley floor and side slopes around Merthyr Tydfil from the northern, elevated boundary of the Quarry. The open moorland of the BBNP is also visible towards the north, with the distant summit of Pen-y-fan visible on the horizon.

### *Characteristics and aesthetics*

The landscape character of the area is strongly influenced by the pattern of topography with steep, wooded valley side slopes rising from the narrow valley floor of the Taff Fechan Valley. The main topographical feature in the area, the Taf Fechan valley, is well wooded. Land to the west and northwest of the valley, upon which the quarry is located, rises toward the open upland of the BBNP where there is an extensive are plateau and hilltops over 400m AOD. The ridge of Cefn-cil-sanws rises to 460m to the west of the quarry.

There are areas of agricultural pasture within valleys, such as Nant Cwm Moel to the east of the Quarry. Here there small-scale fields end abruptly to the northeast of the Quarry where enclosed field give way to open moorland. This transition is shown on Viewpoint 03 taken from the bridleway in the Brecon Beacons National Park to the north of the study site. Fields have a variety of boundary types including hedgerows, fences and dry stone walls. The levels of maintenance for walls, hedges and fences vary considerably between areas.

Hedgerow trees, small areas of woodland and larger blocks of deciduous woodland are confined to valley side slopes and the valley floor, which is a characteristic of the area. Cwm Taf Fechan Woodlands, 0.2km south-east of the Quarry is designated as SSSI.

### *Public access*

There is no public access within the study site. Public rights of way end at the west and east boundary of the quarry, as shown on Figure 6.3. The Taff Trail long distance footpath and cycle route follows the dismantled railway within the Taf Fechan valley where there are also public footpaths.

### *Landscape Value*

The characteristics, sensitivities and descriptions in the existing landscape character assessments at national and local level, and the site-specific analyses carried out for the purposes of this LVIA, were taken into account as indicators of the aspects of the landscape important to the character.

Overall, the landscape value of the site and study area is of 'local' value due to the following factors:

- the Quarry has a previously developed appearance, with structures, plant and engineered topography/surface. The broader study area has a variable landscape quality, from locally designated semi-natural grassland and woodland habitat mosaics, to areas affected by former quarrying and agricultural use, as well as mosaic of built environment / settlement;
- scenic / visual quality varies from the confined views from within the quarry itself and with few views out, restricted views from the built up area to the south, but with longer-distant views towards and/or from the elevated hillsides and plateau, often with open moorland and woodland cover within valleys;
- the previously developed land within the Quarry is not considered to be a rare feature, but is representative of a land use that has taken advantage of the geology of the area (and provided construction materials for roads, etc) and is therefore locally distinct;
- the enclosed nature of the quarry, being worked into the natural hillside and benefiting from mature trees and woodland cover to the east

provides some assimilation with the adjacent areas. The Quarry is not widely visible, but where it is viewed, it contrasts with the landscape character of the wider, undeveloped parts of study area (e.g. with rock exposure textures, angular lines and often chaotic, but regular pattern);
- the study area has recreational uses both along public rights of way, long distance footpaths and National Cycle Routes, where visitors would appreciate the scenic qualities noted above, as well as other activities within the landscape;
- tranquillity is high due to the rural and upland setting in the study area surrounding the site; and
- no evidence of artistic or literary associations with the application site or study area has been noted as part of this appraisal.

The features/elements/characteristics identified as important or "key" to the landscape character of the study site include:

- The existing naturally regenerating quarry faces and benches
- Areas of woodland along the site boundaries

Beyond the study site, important or key landscape character areas that are considered further in this LVIA, that have not been scoped out, include:

- The BBNP and its open upland moorland
- The historic pasture field pattern
- The setting of public routes

## 6.7 Landscape Effects

### 6.7.1 Potential Landscape Effects

The physical disturbance of landscape elements and features at the application site as part of the further quarrying operational phases and subsequent final restoration would re-introduce visible or audible signs of human activity. This would result in the following changes to elements and features:

- progressive development of production benches up to the current edge of disturbance / approved quarry limits and basal levels.
- continued use of existing infrastructure, roads, access and plant site.
- creation of a noise attenuation bund along the northeast boundary of the quarry.
- enlargement of the existing quarry waste tip in the northern part of the quarry.
- bench treatments as part of restoration, where appropriate.
- restoration would utilise the existing soil materials stripped from undisturbed parts of the site (and quarry waste) to provide mainly natural regeneration and mosaic of grassland, scrub and woodland cover, with exposed rock outcrops and slopes.
- there would be no visually significant or mature landscape elements or features removed or created.

The aesthetic and perceptual aspects within the application site and its immediate landscape setting would be as follows:

- the overall scale of the quarry site would remain as large;
- the sense of enclosure would remain as confined (few views out) and mainly hidden from view, with woodland, regular field pattern, rock exposure texture, angular lines and muted colours being broadly unchanged;
- the existing strong sense of place / local distinctiveness of a limestone quarry would continue, until final restoration when its overall character would soften to that of a sheltered valley, with the development of mosaic of rocky grassland, scrub and woodland habitats.

### 6.7.2 Landscape Receptors

This section examines the significance of the landscape effects arising as a result of the minerals development with reference to:

- the potential operational effects on landscape fabric within the study site;
- the potential operational effects on landscape character, including consideration of the significance of effects on designated landscapes; and

- The potential effects on the landscape amenity of local residents, users of public rights of way and roads.

Landscape character is derived from the combination and pattern of landscape elements. The effects of proposed development on landscape character would arise from its relationship to these combinations and patterns, and thus the character of the landscape. Effects on the landscape features, qualities and character may occur where there are either direct or indirect physical changes to the landscape. Direct changes to landscape fabric would only occur within the study site.

The effect of the minerals development on landscape character will depend on key characteristics of the receiving landscape; the degree to which the minerals development are considered consistent with or at odds with them; and how the minerals development would be perceived within the setting, with perception being influenced by:

- the distance to the study site;
- weather conditions; and
- the appearance and 'fit' of the minerals development within the landscape.

The LVIA provides assessments at set intervals as set out in section 6.5.

### 6.7.3 Sensitivity of Landscape Receptors

Landscape sensitivity is a product of consideration of the value associated with the landscape receptor and its susceptibility to the changes likely to arise from the minerals development. The assessment of sensitivity is based on bringing value and susceptibility considerations together in one combined step, in accordance with the criteria set out in Appendix 6.2.

The receptors, their value and susceptibility are set out in the following table, with the resultant judgement of their sensitivity to the minerals development:

**Table 6-3 Susceptibility and Sensitivity of Landscape Receptors**

| Receptor | Value | Susceptibility | Sensitivity |
|---|---|---|---|
| **Within the study site** | | | |
| The existing naturally regenerating quarry faces and benches | Low-Medium (Local) | Low | Moderate |
| Woodland along site boundary and within the site | Low-Medium (Local) | Low | Moderate |
| **Beyond the study site** | | | |
| The BBNP and its open upland moorland | High Value | Medium | High |
| The historic pasture field pattern | Medium Value | Low | Moderate |
| The setting of public routes | High Value | Medium | Moderate |

### 6.7.4 Magnitude of Landscape Change

The magnitude of change considers the set intervals of the minerals development, as described in section 6.5, and the degree to which aesthetic or perceptual aspects of the landscape are altered by these changes associated with the minerals development. The magnitude of change is described in Table 6.6.2 below:

**Table 6-4 Landscape Receptors and Magnitude of Change**

| Landscape Receptor | Magnitude of change |
|---|---|
| **Within the study site** | |
| The existing naturally regenerating quarry faces and benches | Years 0 - 5: **Small**<br>Years 5 - 30: **Medium**<br>Beyond 30 years: **Medium** |
| Woodland along site boundary and within the site | Years 0 - 5: **Small**<br>Years 5 - 30: **Small**<br>Beyond 30 years: **Small** |
| **Beyond the study site** | |
| The BBNP and its open upland moorland | Years 0 - 5: **Negligible/no change**<br>Years 5 - 30: **Negligible/no change**<br>Beyond 30 years: **Negligible/no change** |
| The historic pasture field pattern | Years 0 - 5: **Small**<br>Years 5 - 30: **Small**<br>Beyond 30 years: **Small** |
| The setting of public routes | Years 0 - 5: **Small**<br>Years 5 - 30: **Small**<br>Beyond 30 years: **Small** |

## 6.7.5 Assessment of Landscape Effects

Consideration of the magnitude of change due to the minerals development is combined with consideration of the sensitivity of landscape receptors affected by the minerals development to assess the degree and nature of the effect at set intervals of the minerals development as set out in section 6.5.

Final conclusions about the degree of landscape effect, whether adverse or beneficial, relate the separate judgements about sensitivity of the receptors and magnitude of the changes, as illustrated in the indicative criteria shown in Table Appendix 6.2-6. The detailed assessment is provided in **Appendix 6.3**, Table Appendix 6.3.2, and a summary of the effects is provided below in Table 6.5.

**Table 6-5 Effects on Landscape Receptors**

| Landscape Receptors and Sensitivity | Effects and significance at years 0 -5 | Effects and significance at years 5 - 30 | Effects and significance beyond 30 years |
|---|---|---|---|
| **Within the study site** | | | |
| The existing naturally regenerating quarry faces and benches | minor-moderate adverse | moderate adverse | moderate adverse |
| Woodland along site boundary and within the site | minor-moderate adverse | minor-moderate adverse | minor-moderate adverse |
| **Beyond the study site** | | | |
| The BBNP and its open upland moorland | **Negligible** | **Negligible** | **Negligible** |
| The historic pasture field pattern | minor-moderate adverse | minor-moderate adverse | minor-moderate adverse |
| The setting of public routes | minor-moderate adverse | minor-moderate adverse | minor-moderate adverse |

## 6.8 Visual Baseline

This section deals with the effects on visual amenity, arising from changes in the views available to people in the surrounding area.

The general methodology for assessing the effects in this study is set out in **Appendix 6.2**.

The degree of the likely visual effects of the minerals development is determined by relating the sensitivity of the receptors to the changes arising from the development, and the degree and nature of the changes in the views available to people and in their visual amenity arising from the proposals.

### 6.8.1 Identification of Visual Receptors

#### *Zone of theoretic visibility*

Zones of Theoretic Visibility (ZTV) have been generated by computer to identify the geographic extents within which views may be available of the proposed minerals development. The ZTV is calculated to the existing surface ground level of the quarry and includes the proposed 5m high bund, refer to section 4.0 limitations of the assessment. The viewer eye-height for the ZTV has been set at 2m above ground level to represent 'worse case scenario'.

The computer generated ZTV is based on a digital terrain model generated from the 5m grid interval OS Terrain 5® dataset, but minor undulations in the terrain may not be reflected in the 5m grid interval of the data. The ZTV was based upon "bare earth scenario", i.e., no allowance has been made for the potential screening by, existing woodland, trees and vegetation, buildings, and minor variations in topography.

ZTV **Figure 6.8-1** illustrates that the surrounding topography of hills and valleys influences the potential visibility of the minerals development. Valley locations to the west, southwest, and northeast of the study site would not have views of the minerals development. As the elevation of the landscape rises to the northeast and southeast of the study site, potential views of the minerals development increases.

ZTV **Figure 6.8-2** includes the screening effects of the existing woodland and buildings within 8km of the study site. The woodland and building footprints have been sourced from the Ordnance Survey OS Open Map Local ESRI® Shapefile. The buildings have been given a height of 8.0m and the woodland has been given a mean average height of 10m. The screening effects of other surface features such as individual trees and hedgerows are not taken into consideration.

The ZTV shows that when screen features are taken into account potential visibility of the minerals development reduces, particularly from the settlement of Merthyr Tydfil to the south and wooded locations to the southwest.

### 6.8.2 Viewpoint study

A photographic survey was undertaken to identify the potential extent of the visibility of the minerals development by locating viewpoints available to sensitive receptors. To inform the initial viewpoint selection, a study area of 6km radius from the study site was mapped showing the surrounding landscape designations, public access, landscape character, and the ZTV for the Vaynor Quarry (Figure 6.8). Potentially sensitive visual receptors within the study area include residents, users of public rights of way and areas of open access land, visitors to the BBNP, and areas or sites of historic interest, visitor attractions, and road users.

Based on the collated data, the initial representative viewpoint locations have been selected that relate to the "receptors", that is, residents and users of the landscape, and locations from which they may have views towards or of the study site. For each of the viewpoints, the precise location was chosen during the field studies where local features such as vegetation, buildings or localised topographic variation are identified.

For each of the viewpoints, the precise location was chosen during the field studies to represent the most open view available subject to local features such as vegetation, buildings or localised topographic variation.

A total of 14 views were photographed to illustrate the study site and its appearance in publicly available locations. Of the 14 views that were photographed, 8 views were carried forward as representative viewpoints for the visual amenity assessment. The locations of the 8 viewpoint locations are shown on **Figures 6.8**.

The context photographs (non-assessment views) are shown on **Figures 6.6** and the viewpoints (assessment views) are presented on **Figures 6.9**. Photographs from within the study site, which is not publicly accessible, were also taken to illustrate its features and context, see **Figures 6.7**.

Table 6.7.1 below lists the 8 viewpoints, the location details, the receptors represented, and the reasons for selection.

### Table 6-6 Viewpoint details

| Ref | Location | Distance and direction to study site | Receptors represented and reasons for selection |
|---|---|---|---|
| 01 | **Pontsarn Road, north of Merthyr Tydfil** | 1.275km to the southeast | Nearby users of access land and local road users.<br>• The viewpoint is located within 2km of the study site.<br>• The ZTV indicates that the majority of the minerals development would be potentially visible.<br>• The viewpoint is located in a Special Landscape Area. |
| 02 | **Footpath to the northeast of the study site** | 780km to the northeast | Residents at nearby scattered farmsteads and users of the footpath.<br>• It represents key receptors including residents.<br>• The viewpoint is located within the Brecon Beacons National Park. |
| | | | • The ZTV indicates that there would potentially be views of the minerals development. |
| 03 | **Bridleway in the BBNP to the north of the study site** | 1.4km to the west | Users of the bridleway access land.<br>• The viewpoint is located within the Brecon Beacons National Park.<br>• It is an elevated location.<br>• The ZTV indicates that would potentially be some views of the minerals development. |
| 04 | **Pontsticill Road** | 2km to the east | Users of National Cycle Route 8 and road users.<br>• It represents key receptors.<br>• The viewpoint is located in a Special Landscape Area, the Merthyr Tydfil Landscape of Outstanding Historic Interest, and is close to the BBNP.<br>• The ZTV indicates that would potentially be views of the majority of the minerals development. |
| 05 | **Bridleway, Merthyr Common** | 2.4km to the east | Users of the bridleway and access land.<br>• The viewpoint is located within the Brecon Beacons National Park.<br>• It is an elevated location.<br>• The ZTV indicates that would potentially be views of the majority of the minerals development. |

| | | | |
|---|---|---|---|
| 06 | **Access land to the east of Pontsticill Station, Merthyr Common** | 3.4km to the northeast | Users of the access land.<br>• The viewpoint is located within the Brecon Beacons National Park.<br>• It is an elevated location.<br>• The ZTV indicates that would potentially be views of the majority of the minerals development.<br>• It is close to Scheduled Monuments. |
| 07 | **Footpath adjacent to Pengarnddu pond** | 3.1km to the southeast | Users of the cycle route and footpath.<br>• It represents key receptors.<br>• The viewpoint is located in the Merthyr Tydfil Landscape of Outstanding Historic Interest.<br>• The ZTV indicates that would potentially be views of the minerals development. |
| 08 | **Mynydd Aberdar** | 4.1km to the south | Nearby residents and users of access land.<br>• It represents key receptors.<br>• It is an elevated location.<br>• The viewpoint is located in the Merthyr Tydfil Landscape of Outstanding Historic Interest.<br>• The ZTV indicates that would potentially be views of the minerals development. |

**Appendix 6.3, Table 6.3.3** provides a description of the landscape context at each of the 8 viewpoint locations and description of the existing view towards the study site.

### 6.8.3 Visual receptors

The assessment of visual effects is described by considering how the different groups of "visual receptors" may be affected. The following is a review of the viewers (the visual receptors) and the views available to them at the selected representative locations.

#### *People in settlements and residential properties*

Settlement is mainly located within the southern half of the 6km study area with **Merthyr Tydfil** the principal settlement area. When screening features are taken into account, the majority of Merthyr Tydfil would not have views of the mineral development. Some elevated suburbs may have views of the mineral development, **viewpoint 08** represents nearby residents in **Heolgerrig**, also see **context view F**.

There are nearby settlements such as **Trefechan** to the southwest, which would also have limited views of the mineral development, see **context views A, B, C and D**. There are also several nearby farmsteads which is represented by **viewpoint 02**.

#### *Users of public rights of way and access land*

Walkers and cyclists experience changing views while moving through the landscape. Where a particular view is available these receptors are more likely to focus their attention or interest on the views or the visual amenity they experience at particular locations. The **BBNP is open access** where walkers would experience open distant panoramic views, including views towards the study site and Merthyr Tydfil. A representative sample of these views have been taken forward to the assessment, see **viewpoints 02, 03, 05 and 06**.

In the wooded valley locations, many potential views towards the study site are filtered or partly obscured by intervening features. The **Taff Trail** and **National Cycle Route 8**, mainly transects the valleys from which some views are oblique or partially screened. A representative sample of these views have been taken forward to the assessment, see **viewpoint 04,** also refer to **context view D**.

There are also several other public rights of way locally and areas of public access. A representative sample of these views have been taken forward to the assessment, see **viewpoints 01, 07 and 08**. Morlais Hill and disused quarries are also used informally by the public, see **context view E**.

### *Road users*

Users of public roads are less sensitive to changes in the wider context because their view is constantly changing as they travel through the landscape. Movement through the landscape results in views being filtered or partly obscured by intervening features and any specific views towards the minerals development would not be the focus of interest for a long duration. Roads are mainly concentrated within the southern half of the 6km study area with some local roads to the west and east of the study site. Within Merthyr the roads, dwellings, other buildings and the activity of the street would occupy the foreground of views for road users and provide a focus for the view available. A representative sample of these views have been taken forward to the assessment, see **viewpoints 01 and 04**, also refer to **context view A**.

### *Other areas with a specific landscape interest*

Visitors to the BBNP are more aware of changes in the landscape and the views available from public rights of way and access land. The available views from within the BBNP are generally more elevated locations to the east of the study site. A representative sample of these views have been taken forward to the assessment, see **viewpoints 02, 03, 05 and 06**.

## 6.9 Effects on Visual Amenity

The visual assessment covers the assessment set intervals of the minerals development as described in section 6.5.

### 6.9.1 Sensitivity

The susceptibility of viewers is affected by factors such as the distance to the viewer, the relative number of viewers affected and the importance of the site in the overall view. The context of the viewpoint may also contribute to the ability to accommodate change, for example, people viewing from residential properties or from a valued landscape might be regarded as less able to accommodate change, than those viewing from an industrial context. Table A6.2-8 in Appendix 6.2 provides examples of High, Moderate and Lesser sensitivity, demonstrating how the contributing factors are interpreted.

The sensitivity of the visual receptors is assessed as follows:

- People in settlements and residential properties: high susceptibility to changes in their visual amenity; open unobstructed views including the site assessed as of high value: high sensitivity, and filtered, oblique or partial views of medium value: moderate sensitivity.
- Users of public rights of way or access land within the BBNP: high susceptibility to change in their visual amenity; open views of the site high value: high sensitivity and filtered, oblique or partial views of medium value: moderate sensitivity.
- Users of public rights of way or access land: moderate susceptibility to change in their visual amenity; open views of the site of medium value: moderate sensitivity and filtered, oblique or partial views of low value: lesser sensitivity.
- Users of public roads: low susceptibility to change in their visual amenity: filtered, oblique or partial views of low value: lesser sensitivity.

### 6.9.2 Magnitude of Change

The existing views for each representative viewpoint are described in appendix 6.3, Table **Appendix 6.3.3**. Descriptions of the minerals development within each view is described and an analysis of the degree and nature of changes is presented in **Appendix 6.3**, Table **Appendix 6.3.4.** A summary of the magnitude of change is provided in Table 6.9.2 below.

**Table 6-7 Viewpoint and magnitude of change summary**

| Reference Viewpoints | Magnitude of change |
|---|---|
| **01 - Pontsarn Road, north of Merthyr Tydfil** | Years 0 - 5: **Small**<br>Years 5 - 30: **Medium**<br>Beyond 30 years: **Medium** |
| **02 - Footpath to the northeast of the study site** | Years 0 - 5: **Small-medium**<br>Years 5 - 30: **Medium**<br>Beyond 30 years: **Medium** |
| **03 - Bridleway in the BBNP to the north of the study site** | Years 0 - 5: **Small**<br>Years 5 - 30: **Small-medium**<br>Beyond 30 years: **Medium** |
| **04 - Pontsticill Road** | Years 0 - 5: **Small**<br>Years 5 - 30: **Small-medium**<br>Beyond 30 years: **Small-medium** |
| **05 - Bridleway, Merthyr Common** | Years 0 - 5: **Small**<br>Years 5 - 30: **Medium**<br>Beyond 30 years: **Medium** |
| **06 - Bridleway to the east of Pontsticill Station, Merthyr Common** | Years 0 - 5: **Small**<br>Years 5 - 30: **Small-medium**<br>Beyond 30 years: **Medium** |
| **07 - Footpath adjacent to Pengarnddu pond** | Years 0 - 5: **Small**<br>Years 5 - 30: **Small**<br>Beyond 30 years: **Small** |
| **08 - Mynydd Aberdar** | Years 0 - 5: **Negligible**<br>Years 5 - 30: **Negligible**<br>Beyond 30 years: **Negligible** |

### 6.9.3 Effects on visual receptors

Final conclusions about the degree of visual effects, whether adverse or beneficial, relate the separate judgements about sensitivity of the receptors and magnitude of the changes, as illustrated in the indicative criteria shown in Table A6.2-11. Visual receptors are grouped based on their sensitivity and the nature of the view available. For each group of receptors, representative viewpoints are listed. Detailed assessments are provided in **Appendix 6.3**, Table **Appendix 6.3.5** and a summary of the effects and significance is provided below in Table 6.9.2:

**Table 6-8 Effects and significance on visual receptors summary**

| Visual receptors, sensitivity, and reference viewpoints | Effects and significance at years 0 - 5 | Effects and significance at years 5 - 30 | Effects and significance beyond 30 years |
|---|---|---|---|
| Residents in scattered farmsteads to the east and within 1km of the study site with partially screened or oblique views towards the study site: **moderate sensitivity**<br>**02 - Footpath to the northeast of the study site** | **Minor-moderate adverse**<br>**Not significant** | **Moderate neutral**<br>**Not significant** | **Moderate neutral**<br>**Not significant** |
| People in settlement and users of public rights of way and access land beyond 3km to the southwest of the study site with partially screened or oblique views towards the study site:<br>**moderate sensitivity**<br>**08 - Mynydd Aberdar** | **Negligible** | **Negligible** | **Negligible** |

| | | | |
|---|---|---|---|
| Visitors and user of public rights of way and access in the BBNP and within 2km of the study site with open views towards the study site: **high sensitivity**<br>**02 - Footpath to the northeast of the study site**<br>**03 - Bridleway in the BBNP to the north of the study site** | **Minor-moderate adverse**<br>**Not significant** | **Moderate adverse**<br>**Not significant** | **Moderate adverse**<br>**Not significant** |
| Visitors and user of public rights of way and access in the BBNP between 2km and 4km of the study site to the east with open views towards the study site: **high sensitivity**<br>**05 – Bridleway, Merthyr Common**<br>**06 - Bridleway, east of Pontsticill Station, Merthyr Common** | **Minor-moderate adverse**<br>**Not significant** | **Moderate adverse**<br>**Not significant** | **Moderate adverse**<br>**Not significant** |
| Users of public rights of way and access land within 2km of the study site to the southeast with open views towards the study site: **moderate sensitivity**<br>**01 – Pontsarn Road, north of Merthyr Tydfil** | **Minor-moderate adverse**<br>**Not significant** | **Moderate adverse**<br>**Not significant** | **Moderate adverse**<br>**Not significant** |
| Users of public rights of way and access land between 2km and 4km of the study site with partially screened or oblique views towards the study site: **lesser sensitivity**<br>**04 - Pontsticill Road**<br>**07 – Footpath adjacent to Pengarnddu pond** | **Minor neutral**<br>**Not significant** | **Minor neutral**<br>**Not significant** | **Minor neutral**<br>**Not significant** |
| Road users within 2km of the study site: **lesser sensitivity**<br>**01 – Pontsarn Road, north of Merthyr Tydfil** | **Minor adverse**<br>**Not significant** | **Minor adverse**<br>**Not significant** | **Minor adverse**<br>**Not significant** |
| Road users between 2km and 4km of the study site: **lesser sensitivity**<br>**04 - Pontsticill Road** | **Minor neutral**<br>**Not significant** | **Minor neutral**<br>**Not significant** | **Minor neutral**<br>**Not significant** |

## 6.10 Summary and Conclusions

### 6.10.1 Baseline

This Landscape and Visual Impact Assessment (LVIA) provides an assessment of landscape and visual effects of the minerals development at Vaynor Quarry, Merthyr Tydfil. The identification of mitigation measures incorporated within the design to minimise adverse effects, is informed by the findings of the assessment process as it progressed.

The immediate landscape context extends to approximately 1km from the study site boundary and the wider landscape context extends 6km from the study site boundary. The visual study area extends 6km from the study site boundary and is influenced by the surrounding topography and screening features such as woodland and settlement.

The methodology used for assessing the potential effects on landscape character and visual amenity were based on the recommendations in GLIVA3. The application of the guidance document established an appropriate scope for this assessment to be undertaken.

### 6.10.2 Minerals development

The proposed minerals development involves extraction within the existing quarry void and expanding the western wing of the void eastwards into the eastern wing of the quarry. A noise attenuation landform is proposed along the north-eastern boundary of the quarry as a permanent landscape feature, with tree planting / seeding designed to establish a woodland corridor linking to adjoining established woodland features.

The minerals development is proposed over a circa 100-year period. Progressive restoration and final restoration is based on a variety of restoration treatments, designed to create a range of conditions and habitats which would foster the biodiversity and geodiversity potential of the site, and assist in integration into its landscape context. This will include the emplacement of quarry waste on selected benches, the retention of crags and rock outcrops in appropriate locations and the creation of scree slopes.

The restoration of the site to a wildlife enhanced feature, which recognises and exploits the biodiversity potential associated with worked-out quarries, and the range of habitats which can be created. The final restoration and after use proposals for the site represent the principal long-term measure in mitigation of potential landscape and visual effects. Restoration work would commence on quarry benches as soon as possible after they have been worked to their final position, and are no longer required for access purposes.

Management of the site, including the establishing vegetation, would focus on its nature conservation interest and amenity potential, resulting in substantial beneficial impacts on the biodiversity of the site. The landscape and visual appearance of the site would be improved as the tree planting and natural recolonisation establishes and matures.

### 6.10.3 Assessment

#### *Landscape assessment*

LANDMAP assessments and the BBNP Landscape Character Assessment were referred to. The key characteristics that are of relevance to the site and surrounding area include the presence of an “Active limestone quarry cutting onto Vaynor uplands with moorland to the north and west and farmland to the south and east”. The adjacent upland moorland is described as a “big open unenclosed landscape rises to over 490m AOD in the north east and to 300m AOD along its southern edge. It forms a large block of upland between the Taf Fawr and Taf Fechan and looms high above the basin in which Merthyr Tydfil is located”. The east boundary of the study site is adjacent to the Vaynor Farmlands aspect area described as “sloping farmed landscape lies between open uplands and town. It has a distinctive and attractive small-scale field pattern around Vaynor and Pontsticill - a mix of stone walls and hedgebanks”.

A site-specific appraisal was also carried out identifying the landscape features, characteristics, and aesthetics within the site which are sensitive to change, which are the existing naturally regenerating quarry faces and benches, and the

woodland along the site boundary / within the site. The existing naturally regenerating faces within the quarry make a contribution to landscape character, particular from elevated locations to the east where past and present quarrying are a recognisable feature of the landscape. The effects of the advancing faces and exposure of un-weathered limestone would be **Minor-moderate adverse** (Not significant) at Years 0-5, **Moderate adverse** at Years 5-30 and **Moderate adverse** after Year 30.

Woodland and vegetation pattern is sensitive to change and is a receptor of moderate sensitivity. Due to the small magnitude of change along the eastern and north-eastern boundary there would, be a **minor-moderate** adverse effect on woodland pattern during all phases of quarrying. After 30 years, woodland establishment within the site as part of the natural regeneration of vegetation would have a positive effect on vegetation pattern because the quarry would eventually appear as a woodland valley.

Within the wider context, the BBNP and its open upland moorland landscape was identified as a sensitive landscape receptor. Changes at the Site level, relative to the BBNP, would be extremely small in scale – no change. Despite the high sensitivity of this receptor the effects would be **Negligible/no change.**

The historic pasture field pattern and the landscape setting of public routes were identified as sensitive landscape receptors where indirect effects on landscape character/patterns may result in adverse effects. For all phases of quarrying the effects would be **Minor-moderate adverse**.

The effects identified on landscape receptors were all identified as **Not significant.**

### *Visual assessment*

To confirm the baseline studies of designations, landscape character, and ZTV mapping, a total of 14 views were photographed to illustrate the study site and its appearance in publicly available locations. Of the 14 views that were taken, 8 views were carried forward as representative viewpoints for the visual amenity assessment. The assessment of Visual Effects was based on eight receptors or groups of receptors.

Visual Effects on **residents in scattered farmsteads to the east** and within 1km of the study site with partially screened or oblique views towards the study site are represented by the views from the f**ootpath to the northeast of the study site**. The effects would be **Minor-moderate adverse** (Not significant) at Years 0-5, **Moderate neutral** at Years 5-30 and **Moderate neutral** after Year 30.

Visual Effects on **people in settlement** and users of public rights of way and access land beyond 3km to the southwest of the study site with partially screened or oblique views towards the study site are represented by the views from the **Mynydd Aberdar**. The effect would be **Negligible** (Not significant) for all phases of quarrying.

Visual Effects on **visitors and users of public rights of way** and access in the BBNP within 2km of the study site to the east with open views towards the study site are represented by the views from the footpath to the northeast of the study site and the bridleway in the BBNP to the north of the study site. The effects would be **Minor-moderate adverse** (Not significant) at Years 0-5, **Moderate adverse** at Years 5-30 and **Moderate adverse** after Year 30.

Visual Effects on **visitors and users of public rights** of way and access in the BBNP between 2km and 4km of the study site to the east with open views towards the study site are represented by the views from the bridleway at Merthyr Common and the bridleway, east of Pontsticill Station, Merthyr Common. The effects would be **Minor-moderate adverse** (Not significant) at Years 0-5, **Moderate adverse** at Years 5-30 and **Moderate adverse** after Year 30.

Visual effects on **users of public rights of way** and access land within 2km of the study site to the southeast with open views towards the study site are represented by a view from Pontsarn Road, north of Merthyr Tydfil. The effects would be **Minor-moderate adverse** (Not significant) at Years 0-5, **Moderate adverse** at Years 5-30 and **Moderate adverse** after Year 30. Effects on users of public rights of way between 2km and 4km of the study site to the southeast with site with partially screened or oblique views are represented by a view from Pontsticill Road and the footpath adjacent to Pengarnddu pond. The effect would be **Minor neutral** (Not significant) for all phases of quarrying.

Visual effects on **road users** between 2km and 4km are represented by a view from Pontsticill Road and would be **Minor neutral** (Not significant). Effects on road users within 2km are represented by a view from Pontsarn Road, north of Merthyr Tydfil and would be **Minor adverse** (Not significant). Effects on road users between 2km and 4km are represented by a view from Pontsticill Road and would be **Minor neutral** (Not significant).

The effects identified on visual receptors were all identified as **Not significant.**

### *Designated landscapes*

The Brecon Beacons National Park (BBNP) is partially located within the study site and covers the northern extent of the 6km study area. A Force for Change is developments to the south of the national park potentially affect views, particularly form higher ground. The landscape assessment concluded that changes at the quarry, relative to the BBNP, would be extremely small in scale and the impact of the quarry on the character of the BBNP would be **Negligible/no change**.

The key characteristics and special qualities of the BBNP would not be affected by the development proposals. This is because the proposals would be viewed in the context of the existing quarry and built development of Merthyr Tydfil in the distance. The visual assessment also concluded that effects on visual amenity to visitors to the nearest selected locations within the BBNP would be moderate adverse. The proposed development would form a distant feature viewed in context of the existing quarry and built development.

## 6.10.4 Conclusion

This Landscape and Visual Impact Assessment has examined the landscape and visual impacts in relation to the minerals development at the existing Vaynor quarry. All impact assessments are based on the proposed quarry phasing, which incorporates mitigation measures, along with a progressive and final restoration strategy. The potential impacts have been thoroughly assessed through a combination of desk study research and walk-over surveys of the study site and the surrounding context. The effects identified on landscape and visual receptors were all identified as **Not significant**

# LANDSCAPE AND VISUAL IMPACT 6

# 7.0 ECOLOGY

## 7.1 Introduction

An Ecological Impact Assessment (EcIA) has been prepared to be included in this Environmental Statement (ES) to provide decision-makers with information about the effects which have been predicted to occur on ecological features and their likely significance associated with the resumption and completion of quarrying activities at Vaynor Quarry, hereafter referred to as the 'quarry'. The EcIA has been undertaken by SLR Consulting Ltd.

## 7.2 Methodology

The scope the EcIA, i.e., the collection of baseline data, evaluation of ecological resources and description and assessment of the significance of impacts, follows guidelines set out by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018)[25] and references therein.

All ecologists that have led survey work and reporting associated with the EcIA are members of CIEEM and follow the Institute's Code of Professional Conduct when undertaking ecological work.

Ecological surveys have been based upon the relevant guidance for each species or habitat feature concerned, further details are provided below.

### 7.2.1 Collation of Baseline Data

#### *Consultation*

A degree of consultation has already taken place between the two planning authorities and key stakeholders when in 2010 the quarry was wrongly identified as an 'Undetermined ROMP' site. This included, but was not limited to scoping opinions being issued by MTCBC and the BBNPA, following scoping advice being issued by the Environment Agency Wales and the Countryside Council for Wales (both now Natural Resources Wales) which identified the need to consider in detail the potential hydrogeological effects of the continued operation, in particular upon ecologically designated sites.

As part of this initial consultation, one of the key environmental considerations identified for consideration in any future EIA, is the interaction between site hydrology/hydrogeology and important ecological receptors. This is due to the likelihood that the continued operation of Vaynor Quarry will eventually require passive de-watering during operational periods, which could have indirect effects on groundwater dependent habitats in the vicinity.

#### *Desk Study*

To inform the EcIA, the following organisations or online resources have provided background data:

- South East Wales Biodiversity Records Centre (SEWBReC) for information regarding statutory ecological designations (within 5km of the quarry boundary), non-statutory ecological designations (within 2km of the quarry boundary) and habitat inventories i.e. Section 42 habitats and ancient woodland (within 2km of the quarry boundary);
- Biodiversity Wales website for information on habitats and species of principle importance in Wales;
- Forestry Commission Wales (FCW) website for information on the 2011 Ancient Woodland Inventory (AWI);
- Consultation with the LPA ecologist for Merthyr Tydfil; and
- Consultation with NRW regarding Phase 2 vegetation survey data and Daren Fach SSSI.

[25] *CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal.* Chartered Institute of Ecology and Environmental Management, Winchester.

In the light of the initial consultation above, a further study was undertaken by SLR Consulting Ltd and ESI Ltd (now Stantec UK Ltd) in March 2017 to identify important ecological features (habitats) in the zone of potential hydrogeological influence. The objective of the study was to ensure that the baseline ecological surveys and Hydrological Impact Assessment (HIA) that would form part of the EIA were suitably designed to gather appropriate and sufficient baseline information to then enable a thorough assessment of the potential impacts upon ecological features to be completed and any necessary mitigation or compensation measure to be identified. This Ecological and Hydrological Desk Study (EHDS) is provided as part of **Appendix 7/1**.

The data search was updated in March 2018 and June 2022 to check for any additional species records submitted in the interim that may be relevant to the EcIA.

A summary of the information collated from these organisations for the purpose of this EcIA is included within this EcIA and as **Appendix 7/1**.

## *Field Surveys*

### *Habitats*

To inform this EcIA, a Phase 1 habitat survey of the site and immediate surroundings was undertaken following the standard methodology for Phase 1 habitat survey; this approach was developed by the Joint Nature Conservation Committee (JNCC) in the mid 1980's and has, as its core, the utilisation of a standardised series of colour, symbols and descriptive categories to record habitats, species and other physical features.

The methodology was developed in order to allow a quick, universal, means of mapping semi-natural and other habitats at up to a county scale.

A Phase 1 survey therefore provides a consistent approach to habitat recording and evaluation, and a means of identifying features which may be of value for protected species.

The Phase 1 survey was initially undertaken by Robert Williams and Pippa Dean in March 2018. The survey results were subject to review and refinement during subsequent site visits in 2018 in order to document any changes or additional plant species etc. as the seasons changed, this included a dedicated visit on the 31st July 2019 undertaken by Chris Mitchell.

Due to the time that has elapsed since work commenced on the baseline surveys, a further review of the habitat baseline was undertaken on 29th July 2021 by Chris Mitchell.

The habitat map is shown as Drawing 7/2 and is based upon the JNCC methodology[26], with detailed habitat descriptions in the form of Target Notes provided as **Appendix 7/2**.

### *Protected Species*

Full details relating to protected species surveys are provided as Appendices 7/3 to 7/6, a summary of which is set out below:

- **Appendix 7/3** sets out details of the bat survey work. This comprised a combination of bat roost and bat activity surveys undertaken between May and September 2018 in accordance with the Bat Conservation Trust (BCT) Guidelines[27].
- **Appendix 7/4** sets out details of a great crested newt survey undertaken in accordance with the Great Crested Newt Mitigation Guidelines[28].
- **Appendix 7/5** sets out details of a survey for reptiles undertaken in accordance with the Froglife guidelines29; and

[26] JNCC (1990). Handbook for Phase 1 habitat survey. NCC, Peterborough.
[27] Hundt, L. (2016). Bat Surveys: Good Practice Guidelines, 3rd edition. Bat Conservation Trust.
[28] English Nature (2001) Great Crested Newt Mitigation Guidelines.
[29] http://www.froglife.org/documents/FroglifeAdviceSheet10.pdf

- **Appendix 7/6** sets out details of the breeding bird survey was undertaken following an adapted form of the British Trust for Ornithology (BTO) Common Bird Census (CBC) methodology (Marchant, 1983).

In addition, a walkover survey for badger (*Meles meles*) setts has been undertaken across the site together with searches for evidence of otter (*Lutra lutra*) alongside other ecological survey work. Specific survey reports have not been prepared because no evidence of these species has been recorded (as set out in Section 7.3 below).

## *Limitations*

### *Desk Study*

Desk study data is unlikely to be exhaustive, especially in respect of species, and is intended mainly to set a context for the study. It is therefore possible that important habitats or protected species not identified during the data search could in fact occur within the vicinity of the site. Interpretation of maps and aerial photography has been conducted in good faith, using recent imagery, but it has not been possible to verify the accuracy of any statements relating to land use and habitat context outside of the field study area.

### *Field Survey*

The potential for limitations to occur has been considered in relation to specific surveys as reported in Appendices 7/3 to 7/6.

As would be expected to any prolonged survey period in a site which hasn't been operational for over 10 years, minor limitations have been identified in relation to accessibility.

None are of such significance that the ability to complete a thorough EcIA of the proposal has been compromised, especially when taking the current inactive status of the quarry and long term restoration for nature conservation benefit that is proposed into account.
Nonetheless it should be noted that lack of evidence of a species does not necessarily preclude it from being present at a later date. Due to the nature of the subjects of ecological surveys it is feasible that additional species are present that may not have been recorded by virtue of their seasonality, cryptic behaviour, habit or random chance.

It is recognised that protected species used to inform this EcIA were undertaken in 2018. It is often considered that ecological surveys should be reviewed and possibly updated on a regular basis, although the exact timing of updates will be dependent on many factors, such as importance (rarity) of the population, scale (significance) of potential impacts and whether there have been any changes i.e to supporting habitats or local populations, that could provide reasonable assumption that pre-existing survey data does not reflect the current status of a particular feature which may then change a previous conclusion or proposal.

To help consider the suitability of existing data sets for use in this EcIA, Section 3.5 of the CIEEM guidance identifies that "In the majority of cases, ecological data are likely to have been collected within one or two years prior to an EcIA being written and development activities may take place one or two years after. In these cases, the survey data may represent a reliable indication of the baseline conditions".

The most recent survey, an extended Phase 1 habitat survey, was undertaken in July 2021 and an updated desk study in June 2022. As set out in further detail below, only subtle changes to habitat types and extents were noted during the 2021 survey when compared to the conditions present in 2018 when protected species surveys were undertaken. The most recent data search did not identify any new or additional records that would influence the surveys undertaken in 2018.

It is considered that such minor changes are unlikely to materially result in changes to the species/assemblages of species that are present or would be subject to detailed survey.

It has been proposed in the EcIA to undertake update surveys, in particular with respect to bats and great crested newt, to inform the development of specific protected species licence applications. The results of such surveys are not deemed to be required to inform this EcIA, i.e. to identify the important

ecological features that are present and in need of assessment, as presence has been confirmed and appropriate mitigation measures can be proposed at this stage, particularly given the fact that the quarry will operate for a further 100 years once works resume. It is recognised within British Standard (BS) 42020 that further surveys should only be secured by planning conditions in "exceptional circumstances". Such circumstances include, but are not limited to, the following situations which are applicable to the proposed development: "Where original survey work repeated before commencement of development", "To inform later phases of developments" and "further survey is required to satisfy other consent regimes, e.g. an EPS licence".

As such, taking the CIEEM and BS 42020 recommendations into account, the information collected in 2018 is considered an appropriate data set to describe the baseline condition and assess the likely impacts of the continued working of Vaynor Quarry.

### 7.2.2 Approach to Assessment

The ecological evaluation and impact assessment approach used in this report is based on Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland ("CIEEM guidelines") (CIEEM, 2018).

#### *Important Ecological Features*

Ecological features can be important for a variety of reasons and the rationale used to identify them is explained in the text. Importance may relate, for example, to the quality or extent of the site or habitats therein; habitat and/ or species rarity; the extent to which such habitats and/ or species are threatened throughout their range, or to their rate of decline.

It is important to note that during the March 2017 initial study, the project Hydrogeologists were able to refine the 'standard 2km and 5km' search areas to a bespoke 'study area' shown in **Appendix 7/1**. In this instance, the study area has been defined on the basis of river catchments and underlying geology as these have an influence on the potential zone of influence from the quarry itself and in this case significantly reduce the zone of potential influence.

#### *Determining Importance*

The importance of an ecological feature should be considered within a defined geographical context. The following frame of reference has been used in this case, relying on known/ published accounts of distribution and rarity where available, and professional experience:

- International;
- National (i.e. Wales);
- Regional (i.e. South Wales);
- County (i.e. Merthyr Tydfil[30]); and
- Local (i.e. within circa 5km).

The above frame of reference is applied to the ecological features identified during the desk study and surveys to inform this EcIA.

The value of habitats has been measured against published selection criteria where available. Examples of relevant criteria include: descriptions of habitats listed on Annex 1 of the Habitats Directive; descriptions of habitats of principal importance for biodiversity under Section 42 of Natural Environment and Rural Communities (NERC) Act 2006; Local Wildlife Site Selection Criteria; and features identified in the Merthyr Tydfil Nature Recovery Action Plan (MTNRAP)[31] and Brecon Beacons National Park Biodiversity Action Plan[32].

In assigning a level of value to a species, it is necessary to consider its distribution and status, including a consideration of trends based on available

[30] Whilst the quarry partially overlaps the Brecon Beacons National Park, the reference to Merthyr Tydfil is to provide spatial context and does not imply features are not present within the BBNP administrative area of the site.

[31] merthyr-tydfil-nature-recovery-action-plan-2019.pdf

[32] Local Biodiversity Action Plan (LBAP) | Brecon Beacons National Park Authority (beacons-npa.gov.uk)

historical records. Reference has therefore been made to published lists and criteria where available. Examples of relevant lists and criteria include species of European conservation importance (as listed on Annexes II, IV and V of the Habitats Directive or Annex 1 of the Birds Directive), and species of principal importance for biodiversity under Section 42 of the NERC Act 2006 and Birds of Conservation Concern[33].

For the purposes of this EcIA, ecological features of Local importance or greater and/or subject to legal protection have been subject to detailed assessment. Effects on other ecological features are considered unlikely to be significant in legal or policy terms.

### *Impact Assessment*

The impact assessment process involves the following steps:

- identifying and characterising potential impacts;
- incorporating measures to avoid and mitigate (reduce) these impacts;
- assessing the significance of any residual effects after mitigation;
- identifying appropriate compensation measures to offset significant residual effects (if required); and
- identifying opportunities for ecological enhancement.

When describing impacts, reference has been made to the following characteristics, as appropriate:

- Positive or negative;
- Extent;
- Magnitude;
- Duration;
- Timing;
- Frequency; and
- Reversibility.

The impact assessment process considers both direct and indirect impacts: direct ecological impacts are changes that are directly attributable to a defined action, e.g. the physical loss of habitat occupied by a species during the operational quarrying process. Indirect ecological impacts are attributable to an action, but which affect ecological resources through effects on an intermediary ecosystem, process or feature, e.g. the (passive) dewatering of the quarry void resulting in hydrological changes, which, in the absence of mitigation, could lead to the drying out of adjacent habitats.

Consideration of conservation status is important for evaluating the effects of impacts on individual habitats and species and assessing their significance:

- Habitats – conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area.
- Species – conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.

### *Significant Effects*

The concept of ecological significance is addressed in paragraphs 5.24 through to 5.28 of CIEEM guidelines. Significance is a concept related to the weight that should be attached to effects when decisions are made. For the purpose of EcIA, a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more

[33] Eaton, M.A., Aebischer, N.J., Brown, A., Hearn, R.D., Lock, L., Musgrove, A.J., Noble, D.G., Stroud, D.A., & Gregory, R.D. (2015). Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man. *British Birds*, 108: 708-746.

wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local and the scale of significance of an effect may or may not be the same as the geographic context in which the feature is considered important.

### *Cumulative Effects*

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Cumulative effects can occur where a proposed development results in individually insignificant impacts that, when considered in-combination with impacts of other proposed or permitted plans and projects, can result in significant effects.

No specific cumulative effects have been identified in relation to the resumption of operations at Vaynor Quarry.

### *Avoidance, Mitigation, Compensation and Enhancement*

When seeking mitigation or compensation solutions, efforts should be consistent with the geographical scale at which an effect is significant. For example, mitigation and compensation for effects on a species population significant at a county scale should ensure no net loss of the population at a county scale. The relative geographical scale at which the effect is significant will have a bearing on the required outcome which must be achieved.

Where potentially significant effects have been identified, the mitigation hierarchy has been applied, as recommended in the CIEEM Guidelines. The mitigation hierarchy sets out a sequential approach beginning with the avoidance of impacts where possible, the application of mitigation measures to minimise unavoidable impacts and then compensation for any remaining impacts.

Once avoidance and mitigation measures have been applied, residual effects are then identified along with any necessary compensation measures, and incorporation of opportunities for enhancement.

It is important for the EcIA to clearly differentiate between avoidance mitigation, compensation and enhancement and these terms are defined here as follows:

- Avoidance is used where an impact has been avoided, e.g. through changes in scheme design;
- Mitigation is used to refer to measures to reduce or remedy a specific negative impact in situ;
- Compensation describes measures taken to offset residual effects, i.e. where mitigation in situ is not possible; and
- Enhancement is the provision of new benefits for biodiversity that are additional to those provided as part of mitigation or compensation measures, although they can be complementary.

## 7.3 Legal and Policy Considerations

### 7.3.1 National Policy – Planning Policy Wales 11

Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales. Section 6.4 of PPW relates to Biodiversity and Ecological networks.

Paragraph 6.4.5 of PPW states that:

“Planning authorities must seek to maintain and enhance biodiversity in the exercise of their functions. This means development should not cause any significant loss of habitats or populations of species, locally or nationally and must provide a net benefit for biodiversity. In doing so planning authorities must also take account of and promote the resilience of ecosystems, in particular the following aspects:

- diversity between and within ecosystems;
- the connections between and within ecosystems;
- the scale of ecosystems;

- the condition of ecosystems including their structure and functioning; and
- the adaptability of ecosystems."

It goes on to state that:

"The broad framework for implementing the Section 6 Duty and building resilience through the planning system includes addressing:

- Diversity: to ensure mechanisms are in place to minimise further loss and where circumstances allow for species' populations to expand and recolonise their natural range (former range) or adapt to future change. More diverse ecosystems are more resilient to external influences (this includes biological, geological and physical diversity on a site). This means development should not cause any significant loss of habitats or populations of species, locally or nationally and must provide a net benefit for biodiversity;
- Extent: to ensure mechanisms allow for the identification of potential habitat, the maintenance of existing assets and networks and promote the restoration of damaged, modified or potential habitat and the creation of new habitat. This means that planning decisions should incorporate measures which seek the creation, restoration and appropriate management of green networks and linkages between habitats and maintaining and enhancing other green infrastructure features and networks;
- Condition: Ecosystems need to be in a healthy condition to function effectively, to deliver a range of important ecosystem services. Planning decisions should not compromise the condition of ecosystems. By taking an integrated approach to development, for example, which considers both direct and wider impacts and benefits it should be possible to make a positive contribution. Planning for the long term management of retained habitats is key to maintaining condition through for example, the use of planning obligations;
- Connectivity: to take opportunities to develop functional habitat and ecological networks within and between ecosystems and across landscapes, building on existing connectivity and quality and encouraging habitat creation, restoration and appropriate management. The opportunities could include enlarging habitat areas, developing buffers around designated sites or other biodiversity assets or corridors, including transport and river corridors, and the creation of 'stepping stones' which will strengthen the ability of habitats and ecological networks to adapt to change, including climate change; and
- Adaptability to change: primarily in the form of climate change, for both species (diversity) and ecosystems requires action to protect the extent, condition and connectivity of habitats, features and ecological networks. Development plans, planning proposals and applications which build on protecting designated sites and securing and enhancing green infrastructure will be key ways of addressing the attributes of ecosystems resilience identified in the Environment Act as well as facilitating social and economic resilience aspirations of the Well-being of Future Generations Act."

PPW is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales.

TAN 5 deals with Nature Conservation and Planning and states in paragraph 2.4:

"When considering policies and proposals in local development plans and when deciding planning applications that may affect nature conservation, local planning authorities should:

- Pay particular attention to the principles of sustainable development, including respect for environmental limits, applying the precautionary principle, using scientific knowledge to aid decision making and taking account of the full range of costs and benefits in a long term perspective;
- Contribute to the protection and improvement of the environment, so as to improve the quality of life and protect local and global ecosystems, seeking to avoid irreversible harmful effects on the natural environment;

- Promote the conservation and enhancement of statutorily designated areas and undeveloped coast;
- Ensure that appropriate weight is attached to designated sites of international, national and local importance;
- Protect wildlife and natural features in the wider environment, with appropriate weight attached to priority habitats and species in Biodiversity Action Plans;
- Ensure that all material considerations are taken into account and decisions are informed by adequate information about the potential effects of development on nature conservation;
- Ensure that the range and population of protected species is sustained;
- Adopt a step-wise approach to avoid harm to nature conservation, minimise unavoidable harm by mitigation measures, offset residual harm by compensation measures and look for new opportunities to enhance nature conservation; where there may be significant harmful effects local planning authorities will need to be satisfied that any reasonable alternative sites that would result in less or no harm have been fully considered."

### 7.3.2 Local Policy

#### *Merthyr Tydfil Replacement Local Development Plan (LDP) 2016 – 2031*

This LDP has the following policies of relevance to the EcIA.

*Policy EnW1: Nature Conservation and Ecosystem Resilience*

Development proposals will be required to promote the resilience of ecosystems. In particular, proposals will be required to maintain and enhance biodiversity interests unless it can be demonstrated that:

1. The need for the development clearly outweighs the biodiversity value of the site; and
2. The impacts of the development can be satisfactorily mitigated and
3. acceptably managed though future management regimes.

*Policy EnW2: Internationally and Nationally Protected Sites and Species*

Development likely to have an adverse effect either directly or indirectly on the conservation value of an internationally or nationally designated site, including the area, structure and function of designated features, will only be permitted where it is demonstrated that:

1. There is no suitable alternative to the proposed development; and
2. It can be demonstrated that the benefits from the development clearly outweigh the special interest of the site; and
3. Appropriate compensatory measures are secured; or
4. The proposal contributes to the protection, enhancement and positive management of the site.

Development proposals likely to affect protected species will only be permitted where it is demonstrated that:

1. The population size, range, distribution and long-term prospects of the species will not be significantly adversely impacted;
2. There is no suitable alternative to the proposed development;
3. The benefits of the development clearly outweigh the adverse impacts on the protected species; and
4. Appropriate, avoidance, minimisation, mitigation, compensation and enhancement measures are provided.

*Policy EnW3: Regionally Important Geological Sites, Sites of Importance for Nature Conservation, Local Nature Reserves and Priority Habitats and Species*

Development proposals likely to have an adverse impact on Regionally Important Geological Sites, Sites of Importance for Nature Conservation, Local

Nature Reserves, or Priority Habitats and Species will only be permitted where it can be demonstrated that:

1. The need for the development clearly outweighs the conservation value of the site;
2. Adverse impacts on nature conservation features or geological features can be avoided;
3. Appropriate and proportionate mitigation and compensation measures can be provided; and
4. The development maintains and where possible enhances biodiversity and geodiversity interests.

### *Brecon Beacons National Park Local Development Plan (2007 to 2022)*

*SP3 Environmental Protection – Strategic Policy*

All proposals for development or change of use of land or buildings in the National Park must demonstrate that the proposed development does not have an unacceptable impact on, nor detract from, or prevent the enjoyment of;

…. b) ecology and biodiversity assets both within and beyond designated sites (see Policies 6, 7 and 8)….

*Policy 5 Sites of Importance for Nature Conservation*

Development on non-statutory sites of wildlife, geological or geomorphological importance will only be permitted where:

i. the need for the development outweighs the nature conservation importance of the site; and

ii. the proposals comply with Policy 6 and/or, where protected and important wild species are concerned, with Policy 7.

Where appropriate the NPA will consider the use of Planning Conditions and/or Planning Obligations to provide appropriate mitigation and / or compensatory measures.

*Policy 6 Biodiversity and Development*

Development will only be permitted where;

1. The developer proves to the satisfaction of the NPA that there is no unacceptable loss or fragmentation or other impact of a habitat or landscape feature and/or increased isolation on important species as listed under Section 42 of the NERC act (habitats and species of principal importance to Wales), OR
2. the developer identifies habitats and landscape features of importance for wildlife within the site and provides for the further creation, positive management, restoration, enhancement or compensation for these habitats and features to ensure that the site maintains its nature conservation importance; and

A. full provision is made for the future management of the site's habitats and features of nature conservation value. This will be secured either through Planning Obligations or the imposition of Planning Conditions; and

B. there is no unacceptable loss/breaching of linear features (e.g. hedgerows, woodland belts). Development should seek to enhance linear habitat features (e.g. hedgerow, woodland belts) 'dark corridors' and roosts used by bats

The NPA will require all development being judged against this policy to provide biodiversity enhancement through the scheme in accordance with the direction of the Planning Obligation Strategy.

*Policy 7 Protected and Important Wild Species*

Proposals on land or buildings that support protected or important species will only be permitted where:

i. the need for the development outweighs the nature conservation importance of the site, and in the case of European protected species, the criteria for derogation under the Habitats Regulations are met; and

ii. positive measures are provided to contribute to species and habitat conservation targets; and

iii. the developer proves to the satisfaction of the NPA that

a) the disturbance of the species and habitat in terms of the effect on species survival and reproductive potential or habitat function will be kept to a minimum; or

b) alternative areas are provided to sustain at least the current levels of populations or size of habitat affected by the proposal.

### 7.3.1 Environment (Wales) Act 2016

The Environment (Wales) Act puts in place the legislation needed to plan and manage Wales's natural resources in a more proactive, sustainable and joined-up way. Part 1 Section 6 of the Act introduces a new biodiversity duty, which replaces and enhances the biodiversity duties set out in the NERC Act 2006 and requires public authorities to seek to maintain and enhance biodiversity in the exercise of their functions and in so doing promote the resilience of ecosystems.

Section 7 of the Act lists living organisms and types of habitat in Wales considered to be of key significance to sustain and improve biodiversity in relation to Wales.

### 7.3.2 Legislation

Many individual wildlife species receive statutory protection under a range of legislative provisions. Local authorities should take measures to protect the habitats of these species from further decline through policies in local development documents.

A summary of legislation relevant to (onshore) biodiversity in Wales is provided below. Note that the summary provided here is intended for general guidance only and the original legislation should be consulted for definitive information.

#### *Conservation of Habitats and Species Regulations 2018*

The Conservation of Habitats and Species Regulations 2018 (the Habitats Regulations) consolidate the Conservation of Habitats and Species Regulations 2010 with subsequent amendments. The Regulations transpose Council Directive 92/43/EEC, on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive), into national law. Under the Habitats Regulations it is an offence to deliberately capture, kill or disturb1 wild animals listed under Schedule 2 of the Regulations. It is also an offence to damage or destroy a breeding site or resting place of such an animal (even if the animal is not present at the time).

#### *Wildlife & Countryside Act 1981*

The Wildlife and Countryside Act 1981, as amended by the Countryside and Rights of Way (CRoW) Act 2000 and the Natural Environment and Rural Communities (NERC) Act 2006, consolidates and amends existing national legislation to implement the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and Council Directive 79/409/EEC on the Conservation of Wild Birds (Birds Directive), making it an offence to:

- Intentionally kill, injure or take any wild bird or their eggs or nests (with certain exceptions) and disturb any bird species listed under Schedule 1 to the Act, or its dependent young while it is nesting;
- Intentionally kill, injure or take any wild animal listed under Schedule 5 to the Act;
- intentionally or recklessly damage, destroy or obstruct any place used for shelter or protection by any wild animal listed under Schedule 5 to the Act;
- intentionally or recklessly disturb certain Schedule 5 animal species while they occupy a place used for shelter or protection;
- Pick or uproot any wild plant listed under Schedule 8 of the Act; or

- Plant or cause to grow in the wild any plant species listed under Schedule 9 of the Act.

### *Protection of Badgers Act 1992*

The Protection of Badgers Act 1992 makes it illegal to kill, injure or take a badger or to intentionally or recklessly interfere with a badger sett. Sett interference includes disturbing badgers whilst they are occupying a sett or obstructing access to it.

## 7.4 Ecological Baseline

### 7.4.1 Designated Sites

### *Statutory Sites*

Table 7-1 identifies statutory designated sites occurring within the defined study area, these are shown In Appendix 7/1 with more refined context being shown on Drawing 7/1.

**Table 7-1**
**Statutory Ecological Designations**

| Site Name | Approx. location | Habitats and Features |
|---|---|---|
| Nant Glais Caves SSSI | c. 0.19km east of the site. | Limestone gorge of the Nant Glais and two vadose cave systems which lie parallel to it and under each bank. Both caves are formed at the contact of the oolitic and dolomitic facies within the Carboniferous Limestone and the contrasting solutional properties of the two lithologies have spectacularly influenced the passage morphology. The caves are also important for their unusually large populations of white trout. |
| | | |
| Cwm Taf Fechan Woodlands SSSI | c. 0.2km south-east of the site. | Partially wooded valley of the Taf Fechan crosses the north crop Carboniferous Limestone. Mixed deciduous woodlands over steep slopes and spoil from quarries with one of the few Glamorgan stations for *Gymnocarpium robertianum*. Interesting plant communities in flushes around tufa springs and luxuriant growths of bryophytes in the splash zone of the river.<br><br>The SSSI is also partly designated as a Local Nature Reserve. |
| Darren Fach SSSI | 1.1km west of the site. | Open scrub on low limestone cliffs with screes and woodland on the gentler slopes. The latter are dominated by ash inter-mixed with wych elm together with a well-developed understorey of hazel and hawthorn. Field maple is present and a group of small-leaved lime lies at the northern end. The primary interest lies in a concentration of Sorbus spp. on the southern end of the Darren Fach crags. This is the type locality for the rare Ley's Whitebeam *Sorbus leyana*. Several shrubs of *S. leyana* together with a specimen of *S. rupicola* grow in association with ash, yew and holly. |

Due to proximity and potential for hydrological connectivity to the site, Nant Glais SSSI and Cwm Taf Fechan Woodlands SSSI are considered to represent important ecological features in the context of the EcIA and are taken forward for further assessment.

Daren Fach SSSI has been scoped out of detailed assessment in the HIA (See SLR Ecological and Hydrological Desk Study provided within Appendix 7/1) and of the Air Quality Assessment (AQA) HIA due to separations distances involved.

### *Non-Statutory Sites*

SEWBReC identified three Sites of Importance for Nature Conservation (SINCs) within the study area as described in Table 7-2 below. Further details are provided in Appendix 7/1.

**Table 7-2**
**Non-Statutory Ecological Designations**

| Site Name | Approx. location | Habitats and Features |
|---|---|---|
| Cilsanws Common South SINC | 0.2km SW | Area of semi-upland and upland common land. The habitats include dry heathland and acid grassland mosaics, acid flushes, wet heathlands, extensive bracken slopes with scattered trees, and small areas of calcareous grassland and scrub. |
| Cwm Taf Fechan SINC and Wildlife Trust Reserve | 1km S | A linear site based on the valley of the Afon Taf Fechan and containing the Cwm Taf Fechan Woodlands SSSI but covering adjacent habitats supplementary to those of the SSSI and includes limestone woodlands, calcareous grasslands, species-rich neutral grasslands, heathlands and limestone scrub. It is considered the single most important biodiversity resource in the county borough.<br><br>The SINC additionally includes heathlands, acid and calcareous grasslands, bracken slopes, calcareous flushes and calcareous scrub woodland habitats. Many regionally rare and scarce plant species occur. |
| Cwm Taf Fawr SINC | 1.2km SW | Section of major river tributary of the Afon Taf with SINC which includes adjacent woodlands. The upper reaches in particular are of high ecological value, comprising limestone gorge woodland dominated by oak and ash, with a rich ground flora including numerous rare plant species. |

Due to their proximity, the above SINC designations are considered to represent important ecological features in need of further assessment and are therefore taken forward in the EcIA although it should be no additional consideration of these SINCs is required in the HIA as set out in the EHDS within Appendix 7/1.

### *Habitat Inventories*

The SEWBReC report also identified the presence of Ancient Semi Natural Woodlands (ASNW) within the search area although these woodlands occur within the ecologically designated sites identified above.

The presence of tufa-forming springs has been identified in the Nant y Glais valley and Cwm Taf Fechan Woodland SSSI. Tufa-forming springs are identified as an Annex I Habitat. Additional springs are also present in these valleys. Collectively, springs are identified as Habitats of Principal Importance in Wales. As such, springs are subject to assessment in the HIA and EcIA.

## 7.4.2 Habitats

The results of the Phase 1 Habitat survey are shown on Drawing 7/2. Full habitat descriptions and photographs including ecological features identified by the Target Note (TN) references shown on Drawing 7/2 are provided as **Appendix 7/2**. Brief descriptions of habitats present are provided below.

### *Quarry*

Bare ground is a prominent feature relating to the previously operational western and eastern voids, with areas of scree and aggregate.

Buddleja (*Buddleja davidii*) is sporadic, willow *(Salix sp.),* and hawthorn occur on the upper slopes/benches.

Vegetation is virtually absent from the majority of the quarry floor areas which are dominated by bare rock, scree and boulders.

Localised occurrences of early successional vegetation occur in the eastern void, with species such as marsh orchid (*Dactylorhiza*), common spotted orchid (*D. fuchsii*), yellow wort (*Blackstonia perfoliata*) colt's foot (*Tussilago farfara*) present.

### Bracken

Bracken (*Pteridium aquilinum*) has an occasional distribution in vegetated margins of the quarry and unworked reserve, although forms a continuous dominant stand in the north-east of the site.

### Disturbed Ground

This includes areas where overburden has been removed and minimal quarrying has occurred, together with a former tip area in the north of the quarry.

This includes frequent loose boulders and scree with species including fescues, mosses and purple moor grass with scattered hawthorn and willow scrub which have regenerated.

### Ffridd Mosaic and Marshy Grassland

A mosaic of grassland and scattered scrub/bracken habits.

A distinct stand of marshy grassland is dominated by purple moor grass (*Molinia caerulea*) to the north and along the spine of the site, with a transition to hawthorn and soft rush amongst scattered rocks and scree.

Grassland swards comprising of sheep's fescue (*Festuca ovina*), *moss sp.*, tufted hair grass (*Deschampsia cespitosa*), gorse (*Ulex* sp.), bracken, billberry (*Vaccinium myrtillus*), heather (*Calluna vulgaris*), purple moor grass, cocksfoot (*Dactylis glomerata*) and woodrush (*Luzula campestris*) is widespread.

### Plantation Woodland

A band of woodland has been planted in the south-eastern corner of the site to act as screening.

Species present include, Beech, alder, ash, silver birch, leylandi (*Cupressus × leylandii*), horse chestnut (*Aesculus hippocastanum*), goat willow, larch (*Larix sp.*), sycamore (*Acer pseudoplatanus*) and hazel (*Corylus avellana*). The understorey is sparse and includes ash saplings (*Fraxinus excelsior*), hawthorn and dog rose (*Rosa canina*).

### Scattered Scrub

Scattered scrub occurs on former spoil heaps and bunds throughout the site, although the main occurrence relates to a former tip area along the eastern flanks of the quarry void where goat willow and Buddleja are frequent.

### Standing Water

Within the site are seven water bodies of varying sizes. Of most notability are Pond 5, Pond 6 and Pond 7, which are fed by ground water from the cliff faces and have established aquatic plants and are permanent features within the quarry. Ponds 1 to 4 are small ephemeral scrapes which dry up following small periods of rain.

### Agricultural Grassland

Agricultural grasslands grazed by horses to the south and east of the site are comprised of grassland containing *Poa sp.*, thistles (*Cirsium spp*), creeping buttercup (*Ranunculus repens*), ribwort plantain (*Plantago lanceolata*), *moss sp.,* clover (*Trifolium sp.*).

## 7.4.3 Species

### *Fora*

*Protected and Notable Flora*

Two plant species listed on Schedule 8 of the Wildlife and Countryside Act 1981 (as amended), were identified in the desk study; bluebell, for which there are several records, and one record for water germander approximately 0.26km south of the site boundary.

No species listed on Schedule 8 of the Wildlife and Countryside Act 1981 were recorded during the Phase 1 survey.

*Invasive Flora*

Twelve species of plant listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) were identified by the desk study. These are: Japanese knotweed (*Fallopia japonica*), giant knotweed (*Fallopia sachalinensis*), Indian balsam (*Impatiens glandulifera*), rhododendron (*Rhododendron ponticum*), yellow archangel (*Lamium zaleobdolon* subsp. *argentatum*), hollyberry cotoneaster (*Cotoneaster bullatus*), wall cotoneaster (*Cotoneaster horizontalis*), small-leaved cotoneaster (*Cotoneaster microphyllus*), Himalayan cotoneaster (*Cotoneaster simonsii*), entire-leaved cotoneaster (*Cotoneaster integrifolius*), montbretia (*Crocosmia pottsii* x *aurea* = C. x *crocosmiiflora*) and curly waterweed (*Lagarosiphon major*).

The data search returned a record of New Zealand Willowherb (*Epilobium brunnescens*), an Invasive Non-Native Species (INNS) not listed on Schedule 9, to be present within the site itself.

The presence of Japanese knotweed and (*Cotoneaster horizontalis*) were confirmed on site in areas to be disturbed during the resumed operation.

### *Protected and Notable Fauna Baseline*

*Bats*

Eight species of bat were identified by the data search including common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), noctule (*Nyctalus noctula*), Daubenton's bat (*Myotis daubentonii*), brown long-eared bat (*Plecotus auritus*), lesser horseshoe bat (*Rhinolophus hipposideros*), serotine bat (*Eptesicus serotinus*) and *Myotis* sp. (*Myotis*).

A suite of bat surveys and assessments were undertaken within the site in 2018 by a team of experienced bat surveyors, this included daytime tree and building assessments, roost detection surveys of quarry faces and the former weighbridge building, and bat activity surveys based around manual and automated recording.

Trees with the potential to support bats have been identified although these occur beyond the working area and so no further surveys were required or undertaken.

The presence of a bat roost in the former weighbridge (Building 3 on Drawing 7/3.1) has been confirmed. This related to a peak count of three common pipistrelle and one soprano pipistrelle bats although use was not recorded during all surveys.

No direct evidence of bats emerging or returning to roosts in the cliff faces were observed or suspected during the surveys. Individual common and soprano pipistrelle bats were recorded at times within 30 minutes of sunset/sunrise which indicate emergence may have been from within the site, potentially including quarry cliff face fissures.

With the access limitations identified, it is considered a possibility that roosts occur in quarry faces that were not directly accessible.

The bat activity survey recorded the presence of common pipistrelle, soprano pipistrelle, noctule, serotine, brown long-eared, lesser horseshoe, greater horseshoe (*Rhinolophus ferrumequinum*) and Myotid bats. A provisional

identification of the Myotid bats group indicated this was likely to comprise Daubenton's and Brandt's bat (*M. Brandtii*), making a potential assemblage of nine bat species.

Bat foraging was widespread throughout the site albeit typically relating to individual pipistrelle species. The automated survey detected a greater range of species, which is not unexpected given the significantly greater recording period, although the majority related to very low numbers of registrations, especially for lesser horseshoe and greater horseshoe, which indicates occasional commuting rather than regular or sustained foraging.

Further details regarding survey timings, methods and results are provided as **Appendix 7/3** and bats are taken forward as an important ecological feature.

### *Hazel Dormouse*

The data search returned one record for hazel dormouse dating from 1993 approximately 2km south-west of the quarry void.

The presence of hazel dormouse cannot be fully discounted as suitable habitats do occur within the wider survey area, namely hedgerows, scrub and woodland, although such habitats are beyond the area to be affected by the resumption of quarrying. Where scrub does occur in the quarry, it is self-sown and of recent original, being isolated from any wider areas of established habitat.

As such, specific surveys for hazel dormouse were not deemed to be required or undertaken. This species is not taken forward as an important ecological feature.

### *Badger*

The desk top study identified the presence of badgers in the search area although beyond the site.

No evidence of badgers has been found within the site during the habitat survey or subsequent site visits. Their presence in the remaining working area is considered unlikely due to the absence of preferred habitats and upland fringe setting of the site.

As such, badgers are not taken forward as an important ecological feature but further recommendations have been made as the future presence of badger cannot be fully discounted.

### *Otter*

The desk study identified the presence of otter within the search area; the closest is 0.2km south east of the site at the Cwm Taf Fechan.

The waterbodies within the site do not contain fish although otter can utilise such ponds seasonally to exploit amphibian food sources. As such, searches for evidence of otter were made during the initial habitat survey and subsequent great crested newt surveys (i.e the spring months when any potential for use would be greatest).

No evidence of otter was found. As such, otter are not taken forward as an important ecological feature but further recommendations have been made as the future presence of otter cannot be fully discounted.

### *Great Crested Newts*

Records for great crested newt (GCN), common frog and common toad were provided within the 2km radius. There are two records for GCN record approximately 1.5km south east and 2km south west. A record made in 2018, only detected by the 2022 data search, also exists within the quarry which states 'several found whilst searching for invertebrates'.

A survey of six ponds has been undertaken which recorded a large population of great crested newt. This comprised a peak count of 180 great crested newts in Pond 5 and four great crested newts in Pond 6, potentially making an overall maximum peak count of 184 great crested newts. The presence of common frog, common toad and palmate newt was also recorded during the surveys.

The locations of the ponds are shown on Drawing 7/4 with further details provided in **Appendix 7/4.**

## *Reptiles*

Records of common lizard (*Zootoca vivipara*) and slow worm (*Anguis fragilis*) were returned by the desktop study, the closest record is for slow worm located 0.3km south of the site.

A reptile survey of suitable habitats was undertaken during May and June 2018, with the presence of slow-worm and common lizard was confirmed.

The peak count for slow worm during a single visit was two animals and for common lizard was four animals although it was considered both species are likely to occur at low densities throughout the site where suitable habitats occur.

The locations of artificial refugia are shown on Drawing 7/5 and further details provided in **Appendix 7/5.**

## *Birds*

The data search identified 18 species of bird listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) together with a range of species of recognised conservation importance and common and widespread species.

A breeding bird survey was undertaken during May and June 2018, encompassing the site as well as noting any bird species seen or heard in adjacent habitats connected to the site.

A total of 45 bird species were recorded, of which 20 bird species are recognised priority for concern.

Of these, just three species were identified as confirmed breeders and were recorded in the grasslands on the central spine within the main worked area and are detailed on Drawing EC6, this included willow warbler (*Phylloscopus trochilus*), whinchat (*Saxicola rubetra*) and meadow pipit (*Anthus pratensis*).

A further seven species not recognised as priority for conservation concern species were also identified as confirmed breeders within the main worked area including, jackdaw (*Coloeus monedula*), raven (*Corvus corone*), great tit (*Parus major*), blackbird (*Turdus merula*), redstart (*Phoenicurus phoenicurus*), stonechat (*Saxicola rubicola*) and pied wagtail (*Motacilla alba*).

Probable breeders within the site include 16 bird species of which five are priority of conservation concern species including, skylark (*Alauda arvensis*), song thrush (*Turdus philomelos*), whinchat (*Saxicola rubetra*), linnet (*Linaria cannabina*) and lesser redpoll (*Acanthis cabaret*).

Possible breeders within the site include 12 bird species of which six are priority for conservation concern included cuckoo (*Cuculus canorus*), kestrel (*Apus apus*), mistle thrush (*Turdus viscivorus*), spotted flycatcher (*Muscicapa striata*), bullfinch (*Pyrrhula pyrrhula*) and dunnock (*Prunella modularis*).

Peregrine falcon (*Falco peregrinus*) was present within the western void of the main worked area on several occasions throughout the 2018 survey period. No nests were located but historic records indicate the presence of nesting peregrine within the site and so this species cannot be discounted from future breeding due to the suitability of nesting habitat present within the site.

Further details regarding survey timings, methods and results are shown on Drawing 7/6 and **Appendix 7/6**. Birds are taken forward as an important ecological feature

## *Invertebrates*

Pearl-bordered Fritillary (*Boloria euphrosyne*) and white letter hairstreak (*Satyrium w-album*), species listed on Schedule 5 Wildlife and Countryside Act 1981 (as amended) have been identified by the desk study together with a range of notable species such as marsh fritillary (*Euphydryas aurina*) and grayling (*Hipparchia semele*) butterflies.

The habitats present offer varying degrees of suitability for invertebrates, areas of highest suitability include the mosaic habitat of the quarry rim, moorland, woodland and aquatic habitats.

Whilst marshy grassland with purple-moor grass, as found at TN9, can provide suitable habitat for marsh fritillary, a walkover survey in July 2018 did not record any devil's-bit scabious (*Succisa pratensis*) which is required as a larval foodplant.

As the immediate surroundings contain substantial areas of alternative, and higher value, habitats for invertebrates that will be retained or occur throughout the phased quarry development as part of the successional process of habitat creation associated with minerals extraction sites, no specific invertebrate surveys were deemed to be required or proposed as part of the EcIA scope.

Furthermore, significant areas of suitable invertebrate habitat will be created during restoration. As such, invertebrates are not considered as an important ecological feature in need of specific assessment and are therefore not taken forward in the EcIA.

## 7.5 Summary of Important Ecological Features

Table 7-3 summarises the important ecological features in need of specific assessment as part of the EcIA.

**Table 7-3**
**Summary of Important Ecological Features Subject to Detailed Assessment**

| Ecological Feature | Scale at which Feature is Important | Comments on Legal Status and/or Importance |
|---|---|---|
| Nant Glais Caves SSSI | National | Statutory designation receives protection under Wildlife and Countryside Act. |
| Cwm Taf Fechan Woodlands SSSI | National | Statutory ecological designation receives protection under Wildlife and Countryside Act. |
| Cilsanws Common South SINC | County | Non-statutory designation, not formally protected by legislation but planning policy seeks to avoid loss or detrimental impact. |
| Cwm Taf Fechan SINC and Wildlife Trust Reserve | County | Non-statutory designation, not formally protected by legislation but planning policy seeks to avoid loss or detrimental impact. |
| Cwm Taf Fawr SINC | County | Non-statutory designation, not formally protected by legislation but planning policy seeks to avoid loss or detrimental impact. |
| Springs (including Tufa/petrifying springs) | County | Identified as Habitat of Principle Importance and tufa-forming springs listed on Annex I of Habitats Directive. |
| Undesignated habitats | Local | Undesignated habitats although some i.e marshy grassland and ponds, recognised as Habitats of Principle Importance |
| Invasive flora | N/A | Listed on Schedule 9 of the Wildlife and Countryside Act which makes introducing or causing the spread of these species in the wild an offence. |
| Bats | Local | European and UK Protected species. Lesser horseshoe bat also of higher conservation priority as Annex II species. Common pipistrelle, soprano pipistrelle, brown long-eared bat and lesser horseshoe bat are recognised as species of principal importance under Section 7 of Environment Act and lesser horseshoe bat is identified in the LBAP. |

| | | |
|---|---|---|
| Great crested newt | Regional | European and UK Protected species. Recognised as a species of principal importance under Section 7 of the Environment Act and also a LBAP species. |
| Reptiles | Local | All native reptiles are UK Protected species and recognised as species of principal importance under Section 7 of the Environment Act. |
| Birds | Local | All species protected whilst nesting under Wildlife and Countryside Act (peregrine falcon also protected from disturbance under Schedule 1). |

## 7.6 Assessment of Effects and Mitigation Measures

Taking the above into account, the principal potential impacts of the continued operation of Vaynor Quarry are outlined in the following sections.

As a general 'high level' consideration, the use of an existing site has lower overall environmental impact than if the development were being proposed on a new greenfield site which would require new infrastructure i.e., access, services and hardstanding etc, and potentially result in greater land take than resuming operations at existing sites, particularly at Vaynor where the extent of the extraction area is largely already defined by earlier operations. This principle is also reflected by National Planning Policy.

Potential impacts relate to direct effects that are typically associated with the operational phase i.e., habitat loss to enable quarrying and restoration activities, whereas indirect impacts encompass adverse effects such as alterations to hydrology, introduction of artificial lighting etc that may occur during operational and post-operational stages. Consideration to both stages is given in the following assessment as applicable to the identified ecological feature.

Proposed mitigation measures relate to those embedded in the scheme design i.e., the phasing of works and early / phased establishment of new habitats to provide compensatory habitats for protected species, in particular great crested newt.

Where any significant residual effects are identified, further compensation may then be required.

### 7.6.1 Nant Glais Caves SSSI

#### *Potential Effects*

There would be no direct effects to the SSSI as a result of resuming operations. As the quarrying progresses, groundwater will be intercepted and passive dewatering will lower groundwater levels in the surrounding area, and this in turn could cause a change in hydrological regimes within the SSS resulting in adverse changes in the habitats or species present. Although the SSSI is primarily notified on account of geological reasons, the citation and species associated with the SSSI include white trout, lesser horseshoe bats and the cave spider *Porrhomma rosenhaueri* is also known to occur.

The Hydrological Impact Assessment (HIA) is set out at Chapter 9 and assesses the potential for the resumed operation of the quarry to result in any changes to surface water or groundwater flows or quality which in turn could, potentially, have an adverse effect on the Nant y Glais and in turn the Nant Glais SSSI.

The Nant y Glais is the most proximal watercourse to the site and lies 160 m east at its closest approach. After review of the potential hydrological impacts of the resumption of operations and subsequent restoration it was concluded that impacts on Nant Y Glais watercourse would be negligible, with no specific mitigation measures required. As such, it is concluded that the environmental conditions and associated faunal interest of the Nant Glais cave system would not be adversely affected.

#### *Proposed Mitigation*

No mitigation is proposed or deemed to be required.

### *Proposed Compensation*

No compensation is proposed or deemed to be required.

## 7.6.2 Cwm Taf Fechan Woodlands SSSI

### *Potential Effects*

*Potential Hydrological Impacts*

There would be no direct impact to the SSSI as a result of resuming operations. As above, passive de-watering of the quarry void when working below the water table has the potential to cause a change in hydrological regimes within the SSSI resulting in adverse changes in the habitats or species present. This potentially includes impacts upon the Taf Fechan itself and the springs that feed into the river.

Extensive hydrological monitoring has been undertaken, most recently between July 2018 and April 2019, to inform the HIA and quarry design process. This has been an iterative process with ecologist involvement. As a result, the quarry design has been undertaken to ensure continuity of soak-away conditions via a sump pond in the same location to that currently present in the eastern arm of the Quarry (TN18 on Drawing 7/2) to ensure the hydraulic gradient remains. No pumping will be required to dewater the workings, so no decrease in flow to the springs or base flow of the Cwm Taf Fechan springs or Taf Fechan, is predicted as a result of future quarrying operations.

*Potential Dust-Related Impacts*

Potential air quality impacts relate to increased dust deposition i.e. from mineral extraction activities, or road traffic emissions having a negative effect on vegetation growth which in turn changes the habitat structure or composition.

The Air Quality Assessment (AQA) set out in Chapter 12 assesses the potential impact of air quality upon Cwm Taf Fechan SSSI. The AQA uses guidance from the Institute of Air Quality Management (IAQM) to conclude the dust impact risk and magnitude of any effect upon the SSSI are both negligible.

The predicted development-generated HGV movements are below the indicative screening threshold. Potential impacts from road traffic emissions on the ecological designations are therefore likely to be imperceptible, whereby resultant effects can be classed as insignificant.

### *Proposed Mitigation*

Based on the finding of the HIA and AQA together with the fact no direct loss of SSSI designated land would occur, no specific mitigation is proposed or deemed to be required.

### *Proposed Compensation*

Based on the finding of the HIA and AQA together with the fact no direct loss of SSSI designated land would occur, no specific compensation is proposed or deemed to be required.

## 7.6.3 Cilsanws Common South SINC, Cwm Taf Fechan SINC / Wildlife Trust Reserve and Cwm Taf Fawr SINC

These SINC's have been grouped together for this section of the EcIA as no direct impacts are predicted on account of the designated areas all being beyond, albeit often in close proximity to, the area subject to direct disturbance. As such, it is the potential indirect effects which require consideration, and the potential impacts are applicable to all of the SINC designated sites.

### *Potential Effects*

The potential impacts relate to alterations in habitat composition or quality through changes in the hydrological regime or dust deposition.

The 2017 ecological and hydrological desk study scoped out any potential impacts to the SINC designations as a result of changes to current hydrological regimes.

The Air Quality study (ES chapter 12.0) notes that harmful practises identified for the SINCS do not reference dust deposition and the sites are not considered to have a sensitivity to dust. They have thus been screened out for further assessment based upon the IAQM guidance referred to in Chapter 12.0.

### *Proposed Mitigation*

Based on the low likelihood of significant air quality impacts, together with the fact no direct loss of SINC designated land would occur, no specific mitigation is proposed or deemed to be required.

### *Significance of Residual Effects*

No significant residual effects upon SINC designated habitats are predicted.

## 7.6.4 Habitats

### *Potential Effects*

Direct effects to habitats would take place during the resumption of quarrying activities during the stripping of vegetation and overburden from previously un-worked areas (direct impacts). The potential also exists for indirect impacts to occur during operational stages of mineral extraction i.e., through fragmentation and isolation of retained habitats.

The habitat losses associated with the continued operation are summarised below. Marshy grassland occurs in areas yet to be disturbed and is recognised as a priority for conservation under Section 7 of the Environment Act, with the remaining habitats of the existing/previously worked quarry effectively representing open mosaic on previously developed land:

Habitats directly lost to enable mineral extraction and progressive restoration works within previously permitted quarry development areas equate to:

- Quarry, bare ground, scree, aggregate, early successional vegetation 26.2ha;
- Bracken 0.4ha;
- Ffridd mosaic in previously disturbed locations10.3ha:
- Marshy grassland 1.1ha;
- Scattered scrub 1.4 ha; and
- Standing water 0.3ha.

This is phased over the phases of quarry development with minimal loss of established habitats in the initial phases of development, as shown in Table 7-4.

**Table 7-4 Summary of Phased Habitat Loss**

| Phase | Bracken | Disturbed ground/Existing Quarry | Standing Water | Ffridd mosaic | Marshy Grassland | Scrub |
|---|---|---|---|---|---|---|
| Year 5 | 0 | 2.954 | 0.005 | 1.860 | 0 | 0 |
| Year 10 | 0 | 0.070 | 0 | 1.731 | 0 | 0 |
| Year 15 | 0 | 10.373 | 0.033 | 1.765 | 0 | 0.063 |
| Year 60 | 0 | 11.212 | 0.269 | 1.878 | 0 | 1.221 |
| Final Quarry Development (c. Year 100) | 0.4 | 1.599 | 0 | 3.030 | 1.1 | 0.109 |
| **Total (ha)** | 0.4 | 26.2 | 0.3 | 10.3 | 1.1 | 1.4 |

Based on the nature of quarry development design, no particular fragmentation effects are predicted as no retained habitats would be severed.

Indirect effects are also possible as a result of changes to hydrological regimes, with the interaction between hydrology and ecology being a key element of the EIA studies since 2017.

The HIA predicts a negligible impact upon the Nant y Glais and Taff Fechan water courses and, as such, no significant ecological impacts are predicted to the rivers or associated riparian habitats.

There is less certainty regarding the effect on three of the ten springs present in the Nant y Glais and Taff Fechan valley's i.e within the context of the potential zone of influence identified by the HIA

Spring NG01 and NG02 are tufa-forming springs within the Nant y Glais valley but outside the SSSI designated area. The HIA predicts that deepening of the quarry and associated passive dewatering may divert groundwater that currently moves east to the springs, and this may reduce deep groundwater flow to the springs. However, the positioning of the springs on the Dowlais Fault and uncertainty regarding the overall deep and shallow water flows to the springs make any change difficult to accurately predict.

Spring NG03 is within the SSSI designated area and non-tufa forming. Due to its position higher up the valley, the HIA considers that this spring is less likely to have reduced flow and would be only subject to negligible effects.

### *Proposed Mitigation*

Full details of the proposed habitat creation and aftercare are set out in Chapter 4. This includes the following habitat creation and restoration treatments to encompass the full extent of the quarry:

- Broadleaved woodland / tree planting along the north-eastern screening landform;
- Natural regeneration of the quarry floor to species rich grassland;
- Quarry bench treatment 1 – bare rock and natural regeneration.
- Quarry bench treatment 2 – quarry waste and natural regeneration.
- Quarry bench treatment 3 – natural regeneration to species rich grassland; and
- Scree slope.

A further 10ha of habitat creation and enhancement will be undertaken in order to establish a great crested newt receptor site. This will include new ponds and enhancement of agricultural grassland and plantation woodland habitats within land under the applicant's control, largely to the east of the Quarry.

Whilst there are potential effects predicted in relation to Springs NG01 and NG02, which are tufa-forming (petrifying) springs and an Annex I habitat, there is no mitigation proposed as the impact cannot be accurately predicted or mitigated (in a hydrological sense) with any certainty.

The early stages of tufa formation have been noted in quarry seepages, and such features will be present in perpetuity and potentially increase once the quarry deepens. Whilst not direct mitigation or a quantifiable 'creation', this does ensure the continued presence of tufa in the locality in the event that groundwater flow is reduced to the extent that Springs NG01 and NG02 decline or dry up and tufa does not persist.

### *Proposed Compensation*

No specific compensation beyond these measures is proposed.

### *Significance of Residual Effects*

The HIA predicts the potential degradation/loss of flow to two tufa-forming springs (NG01 and NG02). This habitat is of recognised importance under the Habitats Directive and Environment Act Wales. However, there is no long term viable mitigation solution available and, following a precautionary / worst case basis, it is assumed these two springs will be lost.

Additional tufa springs are known to occur in the Taff Fechan and whilst the full number of springs in Wales is unknown, there are known to be at least 15 sites in Wales[34].

The potential loss of two springs would therefore be considered significant at up to County level.

### 7.6.5 Invasive Flora

#### *Potential Effects*

The potential effects to invasive species relate to quarrying operations occurring which cause or enable the further spread of invasive non-native species, in particular Japanese knotweed, Himalayan balsam and *Cotoneaster horizontalis*, all of which are listed on Schedule 9 of the Wildlife and Countryside Act.

Whilst this would not be a negative impact to the invasive species themselves, this is likely to have a negative effect on native flora, either in retained habitats or areas subject to restoration intended for habitat creation.

#### *Proposed Mitigation*

In order to minimise the risk of invasive non-native species spreading, either to retained habitats within or beyond the site or areas of restoration, an invasive plants control programme will be implemented to reduce the likelihood of these species spreading.

#### *Proposed Compensation*

No specific compensation is proposed or deemed to be required.

[34] FARR, G, GRAHAM, J AND STRATFORD, C. 2014. Survey characterisation and condition assessment of *Palustriella* dominated springs H7220 Petrifying springs with tufa *formation (Cratoneurion). Centre for Ecology and Hydrology and the British Geological Survey (NERC)*

#### *Significance of Residual Effects*

The control and removal of invasive species would represent a positive residual effect.

### 7.6.6 Bats

#### *Potential Effects*

The potential direct effects to bats relate to loss of roost sites, loss of foraging grounds and the disruption of flight lines (commuting routes). The potential for indirect effects also exists as a result of noise and visual disturbance.

##### *Potential Direct Effects to Roosts*

The proposed quarry development would result in the loss of potential (but unconfirmed) roost features associated with quarry faces.

Based on the survey results obtained, destruction of these roost sites in the absence of mitigation would potentially result in the killing or injury of common pipistrelle and soprano pipistrelle bats. The uncertainty is due to the restricted access meaning direct observation of certain faces is not possible to gauge exact numbers and species. It is, however, considered likely that roosting occurs by low numbers or individual bats of both species.

##### *Potential Indirect Effects of Roosts*

The resumption of quarrying may result in the loss or disturbance of one confirmed roost site within the former weighbridge building (Building 3 on Drawing EC3.1).

At present, the building is to be retained and re-used but will almost certainly require maintenance works in advance due to its decline in condition whilst the

site has been inactive. It is foreseeable, subject to exact lead in periods, that the building becomes unsustainable to repair and requires demolition.

*Potential Impacts to Foraging Habitats and Commuting Routes*

In terms of potential impacts, these relate to the loss of habitat and severance of commuting routes.

Foraging behaviour recorded was widespread throughout the site, but typically of individual pipistrelle species and of low levels. The gradual phasing of the quarry development, focussing initially on the western limb, is considered to slow effects upon foraging habitat loss, allowing time for habitat creation associated with the great crested newt receptor site (which will be of benefit and value to bats) to establish. During initial phases of quarry development, habitat loss largely relates to bare ground of the existing void and habitats that have established in previously worked areas. Losses of scrub, marshy grassland and established ponds (habitats more likely to be used for foraging) will not occur until Year 15 onwards, by which time more extensive areas of comparable or higher value habitat will have been created in relation to the great crested newt mitigation proposals.

Any bats currently commuting along existing quarry benches and faces, in preference to direct flight over the voids and open fields, could continue to do so during the operational period due to the nature of the quarry phasing and extent of development which retains peripheral woodland and hedgerow habitats. It is considered that the phased operation of the quarry would not significantly increase the overall distance a bat would need to fly to move through the site and therefore will not fundamentally affect the conservation status of any bat species known to use the site, including greater horseshoe bat which has been detected occasionally. Given there would be no other factors or potential issues to discourage bats from using the retained corridors, such as artificial lighting, there is no significant impact predicted in terms of adversely affecting conservation status for any species present.

## *Proposed Mitigation*

*Mitigation for loss of roosts*

The following approach is proposed and considered appropriate given the current status of the site being inactive and no known resumption date for which there will be a lead in period prior to any resumption of quarrying:

- A review of previous survey findings by way of up-dated bat roost potential surveys prior to a resumption of quarrying activity, and then thereafter ahead of each phase of works or stage of land take. This will confirm the exact number and location of roosts to be removed in the phase. Depending on the findings, update roost detection surveys are then likely to be required at previously confirmed or potential roosts due to the high potential for these to change over time.

- No specific roost provision is proposed in respect of quarry face roosts, as there will be a multitude of comparable opportunities present at every stage of quarry development and in the long-term following cessation of all operations.

- In the event of it not being possible to retain the identified roost in Building 3 (considered highly unlikely), then roost closure will follow widely adopted methods under licence from Natural Resources Wales. Based on the species and numbers of bats recorded, provision of artificial boxes would be sufficient to maintain current levels of roosting at the site.

- In all cases, destruction of roosts will seek to be undertaken at times when bats are least likely to be present. Where this is not possible, roosts will be excluded using measures appropriate to the individual circumstances under licence and following recognised best practice measures.

*Mitigation in respect of foraging and commuting*

The phased approach to operations and restoration, including advance habitat creation works associated with the great crested newt receptor site, are such that loss of habitat is staged, and a comparable balance of habitats is maintained within the site though each stage of development.

This is considered sufficient to ensure that the bat species known to forage and commute within the quarry can continue to do so at comparable levels. As such, no detriment to population fitness, local distribution or conservation status of any bat species is predicted and no further mitigation to that embedded in the scheme design is proposed or considered necessary.

### *Significance of Residual Effects*

The final residual situation will provide a gain for bat species.

## 7.6.7 Great Crested Newt

### *Potential Effects*

The potential impacts to great crested newt relate to the killing or injury of animals during habitat removal and the resumption of site operations. This will include the loss of a confirmed breeding pond and associated terrestrial habitats which could result in a decline in population status.

Surveys undertaken have identified the presence a large population centred on the eastern arm of the quarry, a low number of individuals were also recorded in ephemeral pools in the western arm.

The majority of the working area comprises bare ground and exposed rock which are of negligible value to great crested newt.

### *Proposed Mitigation Measures*

The great crested newt is fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017 (The Habitats Regulations).

As part of the ROMP process, the proposed quarry phasing presented has been developed to minimise impacts on ecology. At a high level, the quarry design ensures continuity of a quarry sump (soak-away area ) to maintain the hydraulic gradient between the site and Taff Fechan springs. Secondary to this, phasing has been developed to enable implementation of great crested newt mitigation as summarised below and set out in more detail as **Appendix 7/7.**

- It is proposed to implement a great crested newt translocation exercise under an EPSL from Natural Resources Wales.
- Phase 1 of the working scheme has been designed to focus quarrying more than 250m from great crested newt ponds with only minimal loss of potential terrestrial habitats during this stage, following capture of great crested newt, to enable reinstatement of the internal haul road and stock yard etc.
- This will then enable advance establishment of a dedicated receptor area to the east as shown on Drawing GCN2 within **ES Appendix 7/7**, where five purpose-built ponds will be created for great crested newt in conjunction with conservation led management of grassland and woodland habitats already present.
- Translocation of great crested newts from the remaining areas where impacts are predicted and suitable habitats occur. This will be undertaken using a combination of trapping at ponds, pitfall trapping (where ground conditions allow), and night searches. Based on a large sized population and current guidelines, a minimum period of 90 days effort will be employed during suitable weather conditions; and
- Population monitoring and habitat management as required under the EPSL.

### *Significance of Residual Effects*

There are no significant residual negative effects on great crested newt due to the ability to implement proven capture and translocation of animals to a dedicated receptor site in conjunction with longer term restoration of the quarry to habitats that will also benefit great crested newt.

## 7.6.8 Reptiles

### *Potential Effects*

The resumption of quarrying would result in the direct loss of habitats where reptiles have been recorded, or where their presence is possible by virtue of comparable habitats that are connected to such locations. The survey confirmed relatively low numbers of common lizard and slow worm, with a peak of four and two animals respectively.

To reach the final quarry development, this relates to the loss of approximately 11.8 ha of suitable habitat which is predominantly a Ffridd mosaic that has in part established in areas already disturbed by past quarrying.

This would have the potential to kill or injure reptiles present when any habitat removal takes place, and potentially result in a decline in the local status of these two species in the event of these site-based populations being removed.

### *Proposed Mitigation*

The commonly occurring reptile species are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) in respect of part of sub-section 9(1) and all of sub-section 9(5) only. As such, it is an offence to intentionally kill, injure or trade these species. These species are also identified as conservation priorities under Section 7 of the Environment Act.

In order to minimise the risk of killing or injury, a reptile exclusion exercise will be completed using capture and translocation as the primary basis to relocate reptiles from the working area. This will be undertaken alongside the great crested newt mitigation scheme described above as the approaches, timescales and efforts will be commensurate and compatible to those required to ensure the risk of killing or injury of reptiles is minimised.

Additional reptile translocation will be required in areas not subject to formal great crested newt translocation i.e. parts of the of the unstripped reserve areas more than 500m from GCN ponds.

Based on the low numbers likely to be encountered, this is anticipated to take the form of advance habitat manipulation in advance of each phase of quarry development to displace reptiles into adjacent retained habitat. This will be achieved by successive cuts of vegetation of a week during conditions that are favourable for reptile activity i.e dry and above 9oC, followed by a destructive search under an ecological clerk of works.

### *Proposed Compensation*

Initial habitat creation for reptiles would be undertaken as part of the great crested newt receptor site and enhancement area through the provision of species-rich tussocky grassland and hibernacula features as described in **Appendix 7/7**.

Habitat creation in undisturbed areas in conjunction with quarry restoration will eventually reinstate the quarry and increase overall provision of suitable habitat for reptiles to recolonise the restored site on completion of works.

### *Significance of Residual Effects*

No significant residual effects are predicted.

### 7.6.9 Birds

#### *Potential Effects*

The potential impacts to breeding birds relate to direct impacts i.e. whilst nesting, and indirect impacts i.e. loss of foraging habitat reducing population fitness or displacement of breeding territories.

Phase 1 of quarrying operations does not require the removal of established vegetation but will require blasting and site activity. Peregrine falcon has been confirmed at the site and is subject to additional protection from disturbance. The risk of disturbance to peregrine falcon will also remain during remaining phases of quarry development, subject to the exact location of any future nest site.

Vegetation removal will then be required during each subsequent phase of quarrying which will result in the loss of nest sites and foraging habitat, although only a proposition of the habitat available locally will be removed at any one time.

#### *Proposed Mitigation Measures*

The nests of wild birds, regardless of how common the species are, are protected under the Wildlife and Countryside Act 1981 (as amended) whilst they are occupied or being built. Peregrine falcon also receives a higher level of protection through Schedule 1 of the Wildlife and Countryside Act 1981 (as amended).

There are two approaches to mitigation that are relevant to peregrine falcon:

- A resumption of site operations (this may include preparatory work) during the nesting season will require a specific survey to be undertaken in order to confirm the presence/absence and precise nesting location. A buffer may then be required between any working area and the nest location. Specific buffers are not provided at this stage as any requirement will be subject to judgement by an experienced ornithologist and depending on factors such as the plan distance, vertical separation, stage of nesting and type/duration of activity.

- A resumption in site operations outside of the nesting season would generally avoid the risk of disturbance and it would be expected that peregrine falcon would habituate to quarrying activity. Notwithstanding this, a general watching brief will be required to confirm there is no risk of disturbance.

As a general measures, removal of established vegetation in Phase 2 onwards will be undertaken outside of the nesting bird season (the season is typically March to end of August) or subject to an advance check for nesting birds by an appropriately qualified ecologist if this is not possible.

#### *Significance of Residual Effects*

No significant residual effects on birds are predicted.

### 7.6.10 Summary of Effects

A summary of potential impacts, proposed mitigation, residual effects and, where relevant, proposed compensation measures is provided for each important ecological feature included in the assessment in Table 7-5.

### Table 7-5 Summary of Potential Impacts, Proposed Mitigation, ResidualEffects and Proposed Compensation Measures

| Ecological feature | Potential impact | Proposed mitigation, compensation or enhancement | Means of delivering | Residual effects |
|---|---|---|---|---|
| Nant Glais Caves SSSI<br><br>Statutory Ecological Designation | Alteration in base flow and environmental conditions within cave system affecting species of interest through changes to hydrological regime. | N/A - Potential impacts discounted by HIA. | N/A | No residual effect predicted. |
| Cwm Taf Fechan Woodlands SSSI<br><br>Statutory Ecological Designation | Alteration in vegetation structure or habitat composition through changes to hydrological regime or dust deposition. | N/A - Potential impacts discounted by HIA and AQA. | N/A | No residual effect predicted. |
| Cilsanws Common South SINC, Cwm Taf Fechan SINC and Wildlife Trust Reserve, Cwm Taf Fawr SINC.<br><br>Non-statutory ecological designations | Alteration in vegetation structure or habitat composition through changes to hydrological regime or dust deposition. | N/A - Potential impacts discounted by HIA and AQA. | N/A | No residual effect predicted. |
| Tufa forming springs (NG01 and NG02).<br><br>Identified as Annex I Habitat by Habitats Regulations. | Potential reduction in baseflow through passive dewatering of quarry (uncertain). | Due to uncertainty of impact and possibility of successful mitigation, none proposed. | N/A | Negative residual effect at County level i.e Merthyr Tydfil. |
| Undesignated site habitats including priorities under Section 7 of Environment Act and LBAP. | Loss of habitats as follows:<br>• Quarry, bare ground, scree, aggregate, early successional vegetation 26.2ha;<br>• Bracken 0.4ha; | Phased restoration of site to habitats of recognised biodiversity value in combination with management of additional | Planning condition requiring implementation of approved restoration, associated EPSL commitments. | No significant negative residual effected predicted. |

| Ecological feature | Potential impact | Proposed mitigation, compensation or enhancement | Means of delivering | Residual effects |
|---|---|---|---|---|
| | • Ffridd mosaic in previously disturbed locations10.3ha:<br>• Marshy grassland 1.1ha;<br>• Scattered scrub 1.4 ha; and<br>• Standing water 0.3ha. | land as part of great crested newt mitigation proposals. | | |
| Invasive Plant Species (Japanese knotweed and *Cotoneaster horizontalis*).<br><br>Listed on Schedule 9 of WCA 1981. | Resumption of operations causes the spread of invasive plant species. | Implementation of invasive species control programme. | Planning condition. | No significant negative residual effected predicted, removal will represent a positive residual effect. |
| Bat assemblage (comprising up to nine species for foraging and commuting and two species roosting).<br><br>All bats are protected under the provisions of Section 9 (pt. 1-5) of WCA 1981 and Habitat Regulations. | Loss of foraging habitats, commuting routes, potentially one confirmed roost site (building 3) and unconfirmed quarry face roosts. | Site restoration to provide comparable and higher value habitats for bats, bats will benefit from habitat enhancement within great crested newt receptor site and update surveys of quarry faces prior to resumption. | Planning condition and, where relevant, EPSL commitments in relation to any loss of roosts. | No significant negative residual effected predicted. |
| Great crested newt<br><br>Protected under the provisions of Section 9 (pt. 1-5) of WCA 1981 and Habitat Regulations. | Potential killing or injury during removal of habitats. Loss of one breeding pond supporting large population and associated terrestrial habitats resulting in decline in population status. | Quarry development plans have been designed to delay any impact to GCN and allow phased clearance of site. Advance habitat creation to provide overall gain for this species upon restoration and translocation undertaken in advance of existing habitat removal to minimise risk of killing or injury. | Planning condition and EPSL commitments. | No significant negative residual effected predicted. |

| Ecological feature | Potential impact | Proposed mitigation, compensation or enhancement | Means of delivering | Residual effects |
|---|---|---|---|---|
| Reptile assemblage (slow worm and common lizard)<br><br>Partial protection under Schedule 5 of the Wildlife and Countryside Act. | Potential killing or injury during vegetation removal, reduced foraging area. | Provision of alternative habitats linked to great crested newt receptor site and implementation of reptile translocation. | Planning condition. | No significant negative residual effected predicted. |
| Breeding bird assemblage (including peregrine falcon and 20 species of conservation priority)<br><br>Protected under Wildlife and Countryside Act 1981 whilst nesting.<br>(Peregrine falcon also protected from disturbance whist breeding under Act) | Loss of nesting and foraging habitat, potential disturbance of peregrine falcon whilst nesting (subject to timing of operations resuming). | Phased removal of habitats, outside of nesting season or subject to advance survey, alongside habitat creation.<br><br>Advance surveys for peregrine falcon and implementation of buffer if required. | Planning condition. | No significant negative residual effected predicted. |

## 7.7 Conclusions

SLR Consulting Limited was instructed to undertake an EcIA to provide technical input into an Environmental Statement and ROMP applications in respect of the continued operation of Vaynor Quarry.

An assessment of the significance of predicted ecological impacts that would result from the resumption of extraction and progressive restoration has been undertaken following current CIEEM guidance.

The scope of this EcIA has been informed following a review of information available from SEWBReC, consultation with stakeholders and a suite of ecological surveys.

An Extended Phase 1 habitat survey was undertaken, initially in March 2018 and subject to review, most recently in 2021, by an experienced terrestrial ecologist. This was followed by a suite of protected species surveys and habitat assessments undertaken in accordance with relevant guidelines between March and September 2018.

Due to the potential for hydrological impacts to affect ecological receptors being identified at an early stage, there has also been considerable effort since 2017 not only to define suitable areas of study for these elements of the EIA but also to ensure the proposed quarry design and phasing sought to minimise effects as far as possible.

The potential for any significant or detrimental impact upon ecologically designated sites has largely been ruled out.

It has been concluded that the later stages of quarrying may reduce base flow of two tufa forming springs (NG01 and NG02) which could in turn reduce or prevent the continued formation of tufa. Tufa springs are an Annex I habitat and this potential loss is considered significant at the County level.

The presence of notable habitats i.e. those identified as priorities under Section 7 of the Environment Act and the LBAP, has been identified, although no significant residual impacts are predicted as the proposed restoration is dedicated to habitats of comparable biodiversity value.

The presence of protected species has been identified, including bats, great crested newt, reptiles and breeding birds. The phased approach to quarrying has been designed to minimise impacts, whilst additional habitat creation establishes, in particular for great crested newt. The extent and type of habitat creation is embedded within the restoration scheme and ability to provide a separate receptor site meaning that any residual impacts are considered unlikely to be ecologically significant or have a negative effect on conservation status.

It is proposed that an Ecological Management Plan is submitted as a means of drawing together the proposed mitigation measures for protected species, and this commitment is reflected in the schedules of proposed planning conditions.

Whilst no specific mitigation is proposed or required in relation to badger or otter, it is recommended that a review of the 2018 surveys is undertaken prior to the resumption of operations to confirm the continued absence of these species, in particular badger.

# 8.0 AGRICULTURAL LAND QUALITY AND SOIL RESOURCES

## 8.1 Introduction

The Agricultural Land Quality and Soil Resources Environmental Statement (ES) chapter has been prepared by Land Research Associates Ltd (LRA). It considers the effect of the project on agriculture and soil resources.

The site includes historic quarry workings and a currently undisturbed area of land in the northern area of the site which forms part of the permitted Quarry area, and which would be worked as part of the proposed quarry development scheme. The undisturbed area has the potential for use as agricultural land and is therefore a receptor of potential effects arising from the project.

The soil on which current and future land uses are based acts as a filter to attenuate and immobilise substances falling on it; regulates rainfall movement to surface water and groundwater; and supports ecological habitats and biodiversity. The sustainable management of soil and land is a central pillar in sustainable development, and consequently any effects of the Project on soil resources will also be important.

## 8.2 Methodology

### 8.2.1 Assessment Methodology

The assessment is designed to consider the effect of the proposed quarry development on two receptors: agricultural land and soil resources.

Soil resources were reviewed by means of a desk study of published and unpublished soil maps and reports and more accurately assessed by a detailed survey across the application site. The detailed survey involved observations of soil and land characteristics at the intersects of a 100 m grid.

Agricultural land quality was assessed using information from the soil resources survey and other constraints to agricultural land use, such as climate, flooding and slope. The survey was undertaken in line with post 1988 Agricultural Land Classification published by the former Ministry of Agriculture, Fisheries and Farming (MAFF) by an experienced soil surveyor.

### 8.2.2 Significance Criteria

There is no nationally agreed scheme for classifying the effects of development on agriculture or soils, and the approach used in this chapter has been developed over a number of years. Effects of a project can be adverse, causing significant negative effects on a receptor, beneficial, resulting in advantageous or positive effects on a receptor, or negligible

The magnitude of effect on best and most versatile land will depend on the amount to be taken by the development. Town and Country Planning (Development Management Procedure) (Wales) (Amendment)Order 2016 only requires the Welsh Government Agriculture Department (Welsh Ministers) to be consulted on development that involves the loss of not less than 20 ha of grades 1, 2 or 3a agricultural land.

Consequently, the magnitude of losses smaller than this threshold is considered to have a small effect on the national stock of best and most versatile land. Losses of over 80 ha of best and most versatile land are equivalent to the size of a medium to large farm and consequently the magnitude of effect in those cases is considered to be high. The judgment-based classification is given in Table 8.1 below.

**Table 8-1: Magnitude of Impacts**

| Receptor | High | Medium | Low | Negligible |
|---|---|---|---|---|
| **Soil Resource** | Loss or irreversible damage to all topsoil resources. Sealing[1] of more than 75% of the soils within the site. | Loss or irreversible damage to at least 50% of topsoil resources. Sealing of 50 – 75% of the soils. | Beneficial re-use of all or nearly all good quality topsoil resources[2]. Sealing of less than 50% of the soils within the site. | Only minor disturbance of soils within the site, minimal surface sealing. |
| **Agricultural Land** | Irreversible loss of more than 80 ha of best and most versatile land. | Irreversible loss of 20 – 80 ha of best and most versatile land. | Irreversible loss of 5 – 20 ha of best and most versatile land. | Irreversible loss of less than 5 ha of best and most versatile land. |

[1]as by impermeable surfaces or through over-compaction of exposed soils

[2] defined for this purpose as loamy, freely to imperfectly draining topsoils

Assessing the effects on soil is complicated as it is a multi-functional resource. Soils are able to mitigate flood risk, provide physical support and nutrient cycling to plants and dispose and decompose of wastes and dead organic matter. A provisional classification, for this chapter, is included in Table 8.1

Permeable loamy soils are regarded as of the highest sensitivity, since these soils are most effective at mitigating the effects of flooding and are of highest quality for reuse in gardens and planting schemes (and are most likely to meet British Standards criteria for use at other sites). Lower quality soils are more susceptible to damage and less valuable if lost.

Best and most versatile agricultural land (i.e. Grades 1, 2 and 3a on MAFFs 1988 Agricultural Land Classification (ALC) system) is considered to be a finite national resource, is given special consideration in national policy, and can be considered to be of higher sensitivity than land in Grades 3b, 4 and 5. In line with Welsh Government Planning Policy best and most versatile land should be conserved as a finite resource for the future (ref paragraph 3.54 of Planning Policy Wales Edition 10 December 2018).

The sensitivity criteria used in the assessment of effects on soils and agricultural land are summarised in table 8.2 below. Table 8.3 combines the magnitude and sensitivity to give the overall significance of effect.

**Table 8-2 Sensitivity of Receptors**

| | High | Medium | Low |
|---|---|---|---|
| **Soil Resources** | Permeable loamy soils providing a broad range of ecosystem services and/or supporting valuable habitats. | A mixture of soils, none of them supporting valuable habitats. | Slowly permeable damaged or contaminated soils providing a limited range of ecosystem services. |
| **Agricultural Land** | Grades 1, 2 and Subgrade 3a | | Subgrades 3b, 4 and 5 |

**Table 8-3 Significance of Effects**

| MAGNITUDE | SENSITIVITY | | | |
|---|---|---|---|---|
| | High | Medium | Low | Negligible |
| High | Major | Major | Moderate | Minor |
| Medium | Major | Moderate | Minor | Negligible |
| Low | Moderate | Minor | Minor | Negligible |
| Negligible | Minor | Negligible | Negligible | Negligible |
| N.B. major adverse effects are considered significant | | | | |

## 8.3 Baseline Conditions

The survey area primarily comprises areas of current workings with land to the north of the quarry comprising acid loams with peaty surface layers.

### 8.3.1 Survey Methodology

A desk study and soil resource and agricultural land quality survey was undertaken of 51.1 ha of land at Vaynor Quarry in July 2021.The detailed soils and agricultural quality survey was carried out in July 2021 in strict accordance with MAFF (1988) guidelines. It was based on observations at intersects of a 100 m grid, giving a density of one observation per hectare. During the survey, soils were examined by a combination of pits and augerings to a maximum depth of 1.2 m.

### 8.3.2 Agricultural Land Classification

The agricultural quality of the land is determined by adverse climate, wetness and soil depth. Other potentially limiting factors have been assessed, but do not affect the land grading. The potential agricultural land within the Quarry was found to be of Grade 5 quality (6.1 ha). This grade comprises the land in the north with peaty soils which is poorly-draining and cannot be improved, limiting land use to rough grazing. Also included are the very thin soils and rocky outcrops in the north-west which prohibit cultivation and can carry limited livestock densities due to poor grass growth. This land is also limited to rough grazing use.

The majority of the site (45.0 ha) comprises non-agricultural land made up of existing quarry workings, buildings and blocks of woodland/scrub.

### 8.3.3 Soil Resources

Two main soil types were identified: Loamy soils with peaty topsoil and very shallow rocky soils. The loamy soils with peaty topsoils occur in an area of limited extent on a level summit in the north of the survey area. They comprise a peat surface layer over freely-draining mineral layers, with some evidence of podzolisation (extreme acidity caused by leaching under acid vegetation). In the north-east of the site these soils are very shallow over hard limestone.

The very shallow rocky soils occur in the north-west of the site where rocky exposed crags are interspersed with sparse grassland and scrub. The soils are extremely shallow (less than 10 cm) and absent from large areas. At least some of the area appears to have been disturbed by quarry operations. These soils do not comprise a useful resource for restoration and are not described further.

## 8.4 Assessment of Effects

### 8.4.1 Potential Impacts

#### *Soil Resources*

There is the potential for soil resources to be damaged during the working phase of the proposed development through improper soil handling and storage. This would result in the loss of suitable topsoil and subsoil resources which would otherwise be available for restoration of the site. The peaty topsoils and loamy subsoils are high sensitivity receptors, the loss of which would be of high magnitude resulting in a potential major adverse impact of the proposed development.

### *Agricultural Land*

As mineral working of the proposed development proceeds, the potential use of the agricultural land will cease. There will therefore be a loss of 6.1 ha of grade 5 agricultural land – a minor adverse impact of the Proposed Development.

## 8.5 Mitigation Measures

### 8.5.1 Soil Resources

There is the potential for all soil resources to be damaged if handled incorrectly (i.e. stripped when wet or compaction through excessive trafficking). This would render them unsuitable for use in quarry restoration. Mitigation for the loss or damage of soil resources requires the adoption of a Soil Management Plan (see Section 8.6 below), undertaken by a suitably qualified practitioner in accordance with the principals outlined in the Construction Code of Practice for Sustainable Use of Soils on Construction Sites, which will detail:

- Depth and method of topsoil stripping and stockpiling
- Identification of landscaping topsoil requirements and assessment of suitability and availability of on-site resources
- Means of subsoil protection from compaction damage and remedial measures to remove damage

Adhering to the Soil Management Plan would protect the entire soil resource within the site allowing for its beneficial re-use in restoration, thereby, mitigating the magnitude of effects to negligible-low on high sensitivity receptors. This is a minor adverse impact of the proposed development.

### 8.5.2 Agricultural land

There will be a loss of 6.1 ha of very poor quality agricultural land within the Quarry. Land of similar quality could be restored at the base of the quarry following completion of extraction.

## 8.6 Soil Management Plan

### 8.6.1 Soil Resources

Topsoil (TS) and subsoil (SS) resources have been identified for reuse as follows:

**TOPSOIL**

**TS1 – Peats**

This topsoil occurs in the north of the site and comprises humified acid peat. It is of limited agricultural value, but holds a significant carbon store; this is likely to degrade if the material is used elsewhere, but kept in situ at this elevation would be expected to be relatively stable. Average thickness is approximately 200 mm.

*Estimated potential yield TS1: 5,800 m3*

**SUBSOIL**

**SS1 – loams**

This resource comprises all of the subsoils at the site, which are slightly stony medium to coarse loams, loose and friable. Depth varies considerably across the site from 200 mm to over 1 m. Subsoil resources should be stripped to bedrock, or to a maximum of 1 m and stockpiled separately from topsoils.

*Estimated potential yield SS1: 23,620 m3*

Soils under existing woodland/scrub areas could not be effectively separated for reuse, and therefore are best treated as overburden. Thin rocky soils to the north-west are similarly of limited reuse value. No soil resources were identified within the working quarry area.

### 8.6.2 Stripping and Stockpiling

Soil resources can be damaged by being stripped or moved when wet. Consequently, stripping should only take place in the drier parts of the year and avoided during or just after heavy rainfall. Soils should be stripped using the excavator and dumper method as described by Sheet 1 in the MAFF Good Practice Guide for Handling Soils.

The resources should be stripped to the depths recommended in Section 8.6.1 and stored separately in low bunds (no more than 3 m high for topsoil and 5m high for sub soil). Topsoil should be stripped from areas designated for storing subsoil. The bunds should be constructed either by excavator or bulldozer (Sheets 2 and 14 in the MAFF Good Practice Guide) avoiding over-compaction. They should be sown with grass to help maintain biological activity and prevent water erosion if in situ for greater than six months.

#### *Handling conditions*

Soil handling should cease during rain, sleet or snow. Where rainfall occurs during operations, the disturbed soil profile being worked on should be removed to base level before stopping works. The following criteria should be applied:

- In light drizzle soil handling may continue unless soils become plastic (soil field test applied after 4 hours to verify).
- In light rain soil handling must cease after 30 minutes.
- In heavy rain and intense showers, handling should cease immediately.
- After rain has ceased, soil field tests should be applied to determine when handling may restart.

No soil handling should take place when there are pools of water on the land surface.

Field tests

Field tests should be applied prior to soil handling to assess the suitability of soil conditions. The tests include visual examinations of the soil and a physical assessment of soil consistency and are applied to representative samples of each soil layer to be handled.

Visual Examination Test:

- If the soil is wet, films of water are visible on the surface of particles or aggregates (e.g. clods or peds) and/or when a clod or ped is squeezed in the hand it readily deforms into a cohesive 'ball' – No Handling should take place when the soil is in this condition.
- If the sample is moist (i.e. there is a slight dampness when squeezed in the hand) but it does not significantly change colour (darken) on further wetting, and clods break up/ crumble readily when squeezed in the hand rather than forming into a ball – Handling OK.
- If the sample is dry, it looks dry and changes (darkens) if water is added, and it is brittle – Handling OK.

Consistency Test:

First Test – attempt to mould soil sample into a ball by hand:

- Impossible because soil is too dry and hard – Handling OK.
- Impossible because the soil is too loose and dry – Handling OK.
- Impossible because the soil is too loose and wet – No Handling.
- Possible – Go to next test.

Second Test – attempt to roll ball into a 3mm diameter thread using the flat of the hand on a plate glass square or the back of a spade:

- Impossible because soil crumbles or collapses – Handling OK.

- Possible – No Handling

## 8.7 Residual Effects

### 8.7.1 Soil Resources

All of the top soil and sub soil resources will be stripped and stockpiled in bunds and would be available for reuse. In practice, the soil resources would be used partly for the construction of the north eastern screen bund, with the residual material to be placed in temporary separate storage bunds adjoining the northern quarry tip. This will represent a sustainable use of the soil resource, which would be retained and be available for re-use in the long term either for other agricultural purposes on the restored floor of the quarry, or for other restoration within the quarry. The effect of the proposed development on soil resources remains minor adverse.

### 8.7.2 Agricultural land

The floor of the quarry would be restored to species rich grassland sub divided by hedgerows, using the limited soil resources supplemented by suitable soil forming material. This remains a negligible adverse impact of the proposed development.

## 8.8 Conclusions

The proposed development will have minor adverse effects to soil resources and negligible adverse effects to agricultural land resources. The Soil Management Plan will ensure the protection of all soil resources and sustainable use and potential re-use.

# 9.0 HYDROLOGY AND HYDROGEOLOGY

## 9.1 Introduction

### 9.1.1 Background

Hanson UK Ltd (Hanson) is submitting a Review of Old Mineral Permissions (ROMP) application to update the planning conditions regulating future quarrying operations at Vaynor Quarry. Vaynor Quarry is a currently 'mothballed' limestone quarry which enjoys the benefit of planning permission for the extraction of limestone with substantial reserves remaining to be worked. The Quarry is located approximately 1 km north of the outskirts of Merthyr Tydfil.

**Error! Reference source not found.**Figure 9.1 produced within **Appendix 9.1** shows the location of Vaynor Quarry relative to the surrounding area. Vaynor Quarry straddles the administrative boundary between Merthyr Tydfil County Borough Council (MTCBC) and the Brecon Beacons National Park Authority (BBNPA), with the majority of the quarry lying within the administrative area of MTCBC. The current quarry void is split into two "limbs" lying east and west of a central ridge.

The OMS with planning permission for mineral extraction (sub divided as two applications submitted to the respective Authorities) is shown edged Red on Figure 9.1 and covers an area of approximately 65.3 ha. The 'Quarry' as referred to in this chapter is shown edged in green on **Figure 9.1** within ES Appendix 9.1, and, for the purposes of this chapter, is defined as the area where quarrying and associated activities have, or will, take place. This includes those parts of the OMS that will be developed as part of the future quarry development scheme (but excludes some parts of the OMS that are not proposed to be developed). The black hatched area is the full extraction area once all mineral is exhausted (expected to be after 100 years). The maximum proposed extent of the extraction area is 39.7 ha.

The quarry void will be passively dewatered and quarrying is expected to take approximately 100 years at an expected annual output rate of 500,000 tonnes. Once limestone extraction is complete, the quarry void will be restored to low key agricultural use and nature conservation. Details of the proposed development are set out in Chapters 3.0 and 4.0 of the ES.

In September 2017, ESI Ltd (ESI) (now Stantec) prepared a Scoping Discussion Document to inform and assist initial discussions with Natural Resources Wales (NRW) regarding potential hydrological and hydrogeological impacts, and the nature of the monitoring and related studies which should be undertaken to inform the hydrogeological impact assessment (HIA) (ESI 2017). NRW subsequently responded to the Scoping Discussion Document on 30 October 2017. SLR Consulting Ltd (SLR) responded to NRW on behalf of Hanson on 20 June 2018 to set out proposed hydrological and hydrogeological monitoring that would be undertaken to refine the initial conceptualisation developed by ESI (2017).

The results of this monitoring to October 2019 have been used to inform the conceptualisation and impacts discussed in this study and define the baseline. Groundwater level monitoring has continued since this time, but flow monitoring and water sampling has since ceased now that the baseline has been established. The monitoring record reviewed for this report is considered sufficient to characterise the hydrogeological conceptual model.

This chapter of the ES constitutes a Hydrogeological Impact Assessment (HIA) that has been prepared on behalf of Hanson in support of the ROMP applications. A Flood Consequence Assessment (FCA) has also been produced as a separate document (Stantec, 2022), which is produced as ES **Appendix 9.2**.

### 9.1.2 Scope of work

Hanson instructed Stantec UK Ltd. (Stantec) in April 2018 to undertake a HIA in support of the ROMP applications, which followed a scoping and conceptualisation exercise that began in 2016 (ESI, 2017). The HIA as reported in this chapter focusses on the hydrogeological impacts of the mineral working and subsequent restoration at the Quarry and has been written in line with the Planning Policy Wales (PPW) guidance.

The scope of work undertaken for this HIA includes the following:

- Review of the baseline geology and hydrogeology for the Quarry and surrounding area.
- identification of receptors and assessment of potential impacts.
- recommendations for appropriate monitoring and mitigation measures; and
- preparation of an HIA for the proposed development (this chapter).

The impact assessment is supported by groundwater flow modelling that is the subject of a supplementary report (Stantec, 2021) (ES **Appendix 9.3**).

### 9.1.3 Data sources

The information and assessments in this chapter are predominantly based on secondary data analysis associated with both the Quarry itself and the surrounding land area. The main sources of data are summarised below:

- Proposed development plans provided by Hanson, as referred to in ES chapter 3.0
- proposed restoration plan as referred to in ES chapter 4.0
- geological data from monitoring well and exploration drilling
- flow gauging and water quality monitoring undertaken by Stantec
- conceptualisation and impact assessment reports for the Quarry Site by ESI (now Stantec)
- site visits undertaken by ESI (now Stantec) on 31 March 2016 and by Stantec on 21 November 2019 and 9 July 2021.
- groundwater and surface water level monitoring data provided by Hanson.
- flow data obtained for the Centre for Ecology and Hydrology (CEH);
- British Geological Survey (BGS) mapping.
- Ordnance Survey mapping; and
- data from NRW including rainfall, historical landfill data, LiDAR data and abstraction licences.

### 9.1.4 Chapter outline

This chapter constitutes the HIA for the ROMP applications, and includes the following:

- A review of the relevant baseline conditions and conceptual model for the Quarry (Section 9.2)
- an outline of the proposed quarry development (Section 9.3)
- an assessment of the potential impacts of the development (Section 9.4)
- a summary of the results and key conclusions (Section 9.5); and
- recommendations for any appropriate monitoring and mitigation measures (Section 9.6)

The technical approach of this HIA is in accordance with the requirements of the Environment Agency's approach to protecting groundwater (UK Government, 2017) (the guidance adopted by NRW) to ensure the protection of groundwater in the vicinity of the Quarry.

## 9.2 Baseline Conditions

### 9.2.1 Quarry Location

The Quarry is a currently a mothballed limestone quarry located approximately 3.2 km north-north-west of the centre of Merthyr Tydfil town and 100 m north of Trefechan village in Merthyr Tydfil County Borough (nearest postcode: CF48 2LA and NGR: SO 035103).

The Quarry is accessed from Vaynor Road, which lies to the south-east. Vaynor Road is accessed 1.6 km from the Quarry from the A4054. The Heads of the

Valleys Road (A465) lies 850 m south of the Quarry. All of the quarry void is located north of Vaynor Road. The portion of the land south of Vaynor Road includes settlement ponds and was historically used as an aggregates products storage and distribution area based upon a separate planning permission for the use,

The Quarry has been quarried worked for limestone for over 100 years. The Quarry site temporarily ceased mineral extraction and was mothballed in 2007 though substantive quarrying operations ceased in the 1990s.

Other than Vaynor Quarry, Land use in the area around the Quarry is predominantly rural, comprising various small settlements, agricultural land, woodland and moorland. Land immediately around the Quarry to the north and west is moorland and forms the eastern slopes of the hill Cefn Cil-Sanws, which peaks 750 m west of the Quarry at 461 m AOD.

The ground falls to the south and east of the Quarry, where to the immediate south of the Quarry is the village of Trefechan, built in the 1950s. In the east there is widespread, predominantly pastoral, agricultural land on the slopes while steep-sided gorges are dominated by deciduous woodland. Several farms are located in the surrounding area, the closest of which is Llwyncilsanws Farm located 160 m north-east of the Quarry.

BBNP lies to the north of the Quarry and overlaps an area of 9.7 ha (15%) based on the area of the ‘ Quarry ‘ ] of the Quarry in the east and west. Cwm Taf Fechan Quarry of Special Scientific Interest (SSSI) follows the Taf Fechan river gorge to the south-east of Quarry within 170 m of the Quarry boundary. Nant y Glais SSSI lies in the gorge of the Nant y Glais 140 m north-east of the Quarry. Section 9.2.7 contains more information about these designated sites.

Settlements surrounding the Quarry include Trefechan (100 m south), Llwyn-on (1.9 km north-west) and Pontsticill (1.9 km north-east). A number of isolated dwellings and farms are located in the area around the Quarry, including Llwyncilsanws (160 m north-east), Aberglais Inn (330 m east), Blaenglais (370 m north), Pen-rhiw-glais (440 m east), Llwynrodin (650 m east), Hy-Brasail (680 m east), and Berthlwyd (850 m north-east). Regionally, the outskirts of Merthyr Tydfil lie 1 km south of the Quarry, and Vaynor (comprised of a small number of wide-spread dwellings) lies 1 km east.

Figure 9.20 (ES **Appendix 9.1**) shows a map of LiDAR topography data around the Quarry. Ground levels at the Quarry itself range from 250 – 400 m AOD. Topography rises above the Quarry to the west and north, and slopes away from the Quarry to the east and south. There are steep changes in topography within the Quarry boundary due to the presence of the quarry void that was worked historically to a minimum elevation of 270 m AOD in the south-east of the void. The maximum depth of the void is around 50 m in the north-west. The current base of the quarry void varies between 270 m AOD and 360 m AOD depending on location. East of the Quarry, topography falls towards the southward flowing Nant y Glais, which is at an elevation of between 250 – 281 m AOD along its closest approach.

Regionally, topography is dominated by the elevated moorland areas to the north of the Quarry within BBNP, including Garn Ddu (up to 462 m AOD), Twyn Croes (442 m AOD) and Gwaun y Pynt (528 m AOD). River valleys cut through this high land including Cwm Taf which holds Llwyn-onn Reservoir (2.1 km north-west of the Quarry) and Cwm Taf Fechan which holds the Pontsticill Reservoir (2.6 km north-east) and Pentwyn Reservoir (4.3 km north-east).

## 9.2.2 Geology

### *Regional Geology*

#### *Bedrock*

The bedrock geology of the area around the Quarry consists of Carboniferous strata. **Figure 9.2** (ES **Appendix 9.1**) shows the bedrock geology as taken from the 1:50,000 scale geological map of the area (BGS, 1979). A summary of the regional geological sequence is provided in Table 9-1 and is discussed in greater detail in this section.

Carboniferous Dowlais Limestone Formation of the Pembroke Limestone Group crops out over almost the entirety of the Quarry. The Dowlais Limestone Formation is comprised of thick-bedded grainstone, packstone and wackestone limestones with some interbedded shale strata. The age of the bedrock strata gets progressively younger in a broadly southerly direction. Cropping out south-west of the Quarry is the younger Oxwich Head Limestone Formation

(containing the Penderyn Oolite Member). North-east of the Quarry the older Llanelly Formation and the older still Abercriban Oolite Subgroup crop out. All of these units belong to the Pembroke Limestone Group.

The Oxwich Head Limestone Formation unconformably overlies the Dowlais Limestone Formation and is formed of thick-bedded fine to coarse grained recrystallised packstones with ooidal limestones. The Llanelly Formation underlies the Dowlais Limestone Formation and is comprised of well bedded micritic to grainstone limestones with basal clay interbeds. Unconformably underlying the Llanelly Formation is the Abercriban Oolite Subgroup, a massive ooidal grainstone with interbedded dolomitic strata.

Successively older formations crop out to the north of the Quarry and at depth beneath it. The Cwmyniscoy Mudstone Formation of the Avon Group crops out 650 m north of the Quarry and is comprised of interbedded mudstones and skeletal packstones. This unit is underlain by the Castell Coch Limestone Formation across the region, although this latter unit pinches out at depth to the west prior to reaching the Quarry and is not found in any exploration boreholes at the Quarry. Beneath these, the Devonian Grey Grits Formation and Brownstones Formation, both of the Old Red Sandstone Supergroup, are present at depth at the Quarry and crop out 1.2 km north of the Quarry.

On the higher ground 170 m to the west of the Quarry, the younger Twrch Sandstone Formation of the Marros Group unconformably overlies the Oxwich Head Limestone Formation. The Twrch Sandstone Formation is formed of quartz arenites and quartz conglomerates with minor mudstone strata. The younger Bishopston Mudstone Formation, also of the Marros Group, and then the South Wales Lower Coal Measures Group crop out 1 km and 1.4 km respectively to the south-east of the Quarry.

The geological structure of the area is complex and heavily faulted, with the main structural elements in the area largely dating to the late Carboniferous – early Permian Variscan orogeny. Bedrock strata at the Quarry dip gently at 5 - 10º to the south-east and form part of a regional gently-dipping stratigraphic succession on the northern limb of the synclinal basin of the South Wales Coalfield.

The Dinas Fault is a regionally significant steeply northerly dipping normal fault, and this runs north-east to south-west 2.5 km north of the Quarry. This major fault is cross-cut by a series of north-west to south-east orientated faults, including the Dowlais Fault, which passes 170 m east the Quarry, and an offshoot of the Dowlais Fault, the Gyrnos Fault, which begins 320 m to the south-east of the Quarry. The predominant structural alignment of the Quarry is therefore dominated by these steeply-inclined cross-faults that trend north-north-west to south-south-east (Barclay, Taylor, & Thomas, 1988).

**Table 9-1 Regional bedrock stratigraphy**

| Period | Group | Formation | Description | Thickness (m) | Local presence |
|---|---|---|---|---|---|
| Carboniferous | South Wales Coal Measures | South Wales Lower Coal Measures | Coal-bearing mudstones and siltstones, with seat-earths and minor sandstones | 80 - 300 | 1.2 km south-east |
| | Marros | Bishopston Mudstone | Mudstones, with some interbedded siltstones and minor quartzitic sandstones | 750 | 900 m south-east |
| | | Twrch Sandstone | Quartz arenites and quartz conglomerates with minor mudstones | 190 | 150 m west |

| Period | Group | Formation | Description | Thickness (m) | Local presence |
|---|---|---|---|---|---|
| | Pembroke Limestone | Oxwich Head Limestone (containing Penderyn Oolite) | Thick-bedded fine to coarse grained, recrystallised packstones with ooidal limestones | 125 - 183 | Present |
| | | Dowlais Limestone | Thick-bedded grainstone, packstone and wackestone limestones with shale interbeds; minor micritic and ooidal limestones and some basal sandstones | Up to 120 | Present |
| | | Llanelly | Well bedded micritic to grainstone limestones with basal clay interbeds | 20 | Present |
| | | Abercriban Oolite | Massive ooidal grainstone with micritic and dolomitic interbeds | 30 | Present |
| **Devonian** | Avon | Cwmyniscoy Mudstone | Interbedded mudstones and thin- to medium-bedded skeletal packstones | 10 - 60 | At depth |
| | | Castell Coch Limestone | Thick-bedded oolitic and skeletal grainstones with thin mudstone units | Up to 30 | Not recorded at depth (pinches out to the west) |
| | Upper Old Red Sandstone | Grey Grits (containing Plateau Beds) | Fluvial sandstones and conglomerates | 24 - 73 | At depth |
| | Lower Old Red Sandstone | Brownstones | Fluvial sandstones with mudstone interbeds | 140 | At depth |

*Superficial*

Figure 9.3 (ES **Appendix 9.1**) shows the superficial deposits that overlie the bedrock strata around the Quarry. Quaternary deposits cover the bedrock geology across much of the surrounding region, with glacial till mapped across the eastern part of the Quarry and on higher ground to the east and south of the Quarry. Much of the till mapped at the Quarry roughly follows the alignment of the Nant y Glais and Taf Fechan but at the Quarry these deposits are now partially absent, having been stripped away by historical quarrying activities.

Peat is also present 600 m to the north of the Quarry, along with alluvium associated with watercourses, including the Taf Fechan. Glaciofluvial deposits, polymictic head, river terrace deposits and alluvium occupy a strip of land 1.4 km west of the Quarry, associated with the Afon Taf Fawr. Superficial deposits are absent from much of the land immediately to the north of the Quarry, along with the high ground to the west.

### *Local geology*

Information on the geology in the vicinity of the Quarry has been obtained from the following sources:

- Monitoring well and exploration drilling at the Quarry;
- previous reports written for the Quarry and surrounding areas;
- publicly available geology maps; and
- publicly available borehole logs sourced from the BGS.

Ten exploration boreholes were drilled over the period 1985 to 1987 within the Quarry boundary. A further three monitoring boreholes were drilled in 2018 in the Quarry vicinity. The locations of these boreholes are shown in **Figure 9.5** (ES **Appendix 9.1**). Borehole logs for all boreholes drilled at the Quarry are produced as **Appendix 9.4**.

The borehole log data corroborates the 1:10,000 scale geological map of the area. Logged strata were not always assigned to named units at the time of drilling. This, together with the variable composition of some of the lithological formations, creates a degree of uncertainty in the geological sequence at depth. A 3D geological model of the Quarry and its immediate surrounds has been constructed using all available data, which has been built using Leapfrog Works software. At the Quarry, superficial deposits are largely absent, having been removed by quarrying and these have not been included in the model.

The 3D geology model illustrates a sequence of carbonate-dominated units dipping shallowly to the south and bounded by faults along the eastern and western boundaries of the Quarry. The locally significant Dowlais Fault strikes north-north-westwards to the east of the Quarry, with 3D modelling indicating that the main Quarry area is downthrown by up to 20 m. Several nearby subsidiary faults also strike north-north-west, including a minor fault running parallel to the west of the Quarry boundary that modelling suggests is downthrown approximately 11 m to the east. This has resulted in the majority of the Quarry being located within this north-south trending graben fault block.

The economic mineral at the Quarry is the Dowlais Limestone Formation, which is described in borehole logs as a hard, grey, fine to medium grained limestone with occasional thin calcareous mudstone or shelly bands throughout (e.g. Borehole 2 in the centre of the Quarry). One such mudstone bed was observed in the quarry faces during the site visit (see **Appendix 9.5**). The existing quarry is formed of two arms either side of a ridge of Dowlais Limestone. This ridge is understood to have not been worked because the Dowlais Limestone at the surface has a relatively high proportion of mudstone compared to other areas of the Quarry. Within the quarry, the Dowlais limestone is very well bedded and the quarry floor is a bedding plane, meaning that each bench slopes broadly southwards. Based on surface water flow directions, the western arm appears to dip south-westwards.

The maximum thickness of Dowlais Limestone Formation observed at the Quarry is 79 m (borehole 3/87, drilled prior to quarrying in this area). An overall local maximum thickness has been estimated using 3D geological modelling to be 105 m.

The Llanelly Formation has a maximum observed thickness of 21.7 m (borehole VaynOB6) but is more commonly around 5 m in thickness. **Figure 9.4** (ES **Appendix 9.1**) shows the variation in thickness of the Llanelly Formation across the Quarry, as modelled in 3D using all available data. The Llanelly Formation thickens towards the south-east of the Quarry, observed at 15.6 m and 21.9 m thickness in VaynOB5 and VaynOB6, respectively. This closely compares with

the 20 m thickness of the type section of the Llanelly Formation (BGS, 1979). Borehole logs describe the Llanelly Formation as silty, calcareous, brecciated mudstone with thin bands of fine limestone and mudstone clasts (e.g. boreholes 1 and 3).

The Abercriban Oolite Subgroup is described in borehole logs from the Quarry as argillaceous, fine grained limestone with thin calcite veining, brecciated bands and, commonly, stylolites (e.g. boreholes 4 and 6). The Cwmyniscoy Mudstone Formation is described at the Quarry as dark grey, silty, calcareous mudstone with occasional thin limestone bands (e.g. boreholes 1 and 6).

The sedimentary limestone sequence dips at between 5 - 8º southwards throughout the Quarry. Immediately adjacent to faults this can rise to around 40º dip, although this is rare and only local in extent (Barclay, Taylor, & Thomas, 1988). BGS borehole log data collected 1.2 km south of the Quarry has been used to constrain the upper contact of the Dowlais Limestone Formation and indicates a continued dip at depth of around 5º southwards.

### *Nant-y-Glais Cave System*

The Nant y Glais cave system lies north-east of the Quarry in a small gorge holding the Nant y Glais stream and running parallel with the Dowlais Fault and another minor fault, as shown in **Figure 9.6** (ES **Appendix 9.1**). Both the gorge and cave system have developed in the Abercriban Oolite Subgroup where it rests above dolomitised limestones of the upper Cwmyniscoy Mudstone Formation, at an elevation of approximately 300 m AOD (Ford, 1989). The Nant y Glais feeds and resurges from most of the caves in the gorge.

The cave system is subdivided into two main components – Ogof y Ci and Ogof Rhyd Sych, in addition to a number of smaller associated caves. These lie on either side of the Dowlais Fault that runs along the Nant y Glais. Ogof y Ci is approximately 548 m in length (Ford, 1989) and lies to the west of the Nant y Glais. Ogof Rhyd Sych is 914 m in length and lies to the east of the Nant y Glais on the opposite side of the stream to the Quarry. Faulting in the gorge has resulted in the profile of Ogof Rhyd Sych lying approximately 5 - 10 m below Ogof y Ci and slightly below riverbed level (Ford, 1989). This implies that the westernmost Dowlais Fault downthrows to the west and the eastern (interpreted to be smaller offset) fault downthrows to the east, resulting in a small horst block.

### *Infilled geology/landfilling*

Ten historical landfills lie within 4 km of the Quarry. These landfills are shown in Figure 9.7 (ES Appendix 9.1), and further details are provided in Table 9.2.

Vaynor historical landfill is the most proximal to the Quarry and is located 525m north-east of the Quarry. Vaynor historical landfill accepted various waste types including industrial, commercial and household wastes and closed in 1979. The operator of Vaynor landfill was Merthyr Tydfil Borough Council.

**Table 9-2 Historical landfills within 4 km of the Quarry**

| Landfill | Operator | Status | Distance from Site | Waste Accepted | Area (ha) |
|---|---|---|---|---|---|
| **Vaynor** | Merthyr Tydfil Borough Council | Historical: 1960 - 1979 | 525 m north-east | Inert, industrial, commercial, household & special | 3.79 |
| **Fairview TCE** | Unknown | Historical | 1.4 km south-west | Industrial & household | 0.196 |
| **Ffrwd Quarry** | Welsh Water | Historical: 1990 - 1992 | 1.5 km south-west | Inert | 1.01 |
| **Greenie** | Merthyr Tydfil Borough Council | Historical: 1960 - 1975 | 2.2 km south-east | Inert, industrial, commercial, household & special | 0.196 |

| Landfill | Operator | Status | Distance from Site | Waste Accepted | Area (ha) |
|---|---|---|---|---|---|
| **Winchfawr Heolgrig** | Private individual | Historical: 1987 - 1989 | 3.2 km south-west | Inert | 0.439 |
| **Blaen Morlais Farm** | Private individual | Historical: 1989 - 1991 | 3.2 km east | Inert | 0.971 |
| **BSC Dowlais Tips** | British Steel Corporation | Historical: 1978 - 1998 | 3.2 km south-east | Inert, industrial, commercial & liquid sludge | 11.43 |
| **Abercriban Quarry** | Private individual | Historical: 1993 | 3.4 km north-east | Inert | 0.808 |
| **Llwyn Onn** | Welsh Water | Historical: 1991 - 1992 | 3.8 km north-west | Inert | 0.405 |
| **Jasonic** | Private individual | Historical: 1991 - 1992 | 4.0 km east | Inert | 0.4 |

### 9.2.3 Hydrology

#### *Rainfall*

Rainfall data provided by NRW for April 2013 – October 2019 is available from the following sources:

- Llwyn-on Main gauge (2.2 km north-west of the Quarry);
- Pontsticill Upper WTW gauge (2.5 km north-east of the Quarry).

Table 9-3 summarises annual rainfall data for both the Llwyn-on Main and Pontsticill Upper gauges. This indicates that annual rainfall varies from 1,499 mm (Pontsticill Upper, 2017) to 2,055 mm (Llwyn-on Main, 2015). Mean monthly rainfall ranges between 77 mm (April, Pontsticill Upper and Llwyn-on Main) and 284 mm (December, Llwyn-on Main). There is a strong seasonality and summer months are typically much drier than winter months. Annual rainfall fluctuates between years and at Pontsticill Upper generally declined between 2014 and 2017 but the same trend is not present at Llwyn-on Main.

Table 9-3 shows that rainfall is higher at Llwyn-on Main than at Pontsticill Upper. Llwyn-on-Main is at around 240 m AOD, whilst Pontsticill Upper is at approximately 350 m AOD. Although it might be expected that rainfall would be higher on higher ground, rainfall is lower at Pontsticill Upper because it is further east and is in the orographic rain shadow formed by higher ground to the west.

The Standard Average Annual Rainfall (SAAR) for the Quarry is 1,659 mm, which lies within the data range and is consistent with the mean rainfall recorded at Pontsticill Upper (1,657 mm) but is below the mean rainfall at Llwyn-on Main (1,928 mm). This is likely to be because of its geographic location being further south and east of Llwyn-on Main. Given this, rainfall data from Pontsticill Upper is considered most representative of rainfall at the Quarry.

**Table 9-3 Rainfall data statistics (May 2013 - September 2019)**

| Statistic | | Llwyn-on Main Value (mm) | Pontsticill Upper Value (mm) |
|---|---|---|---|
| Mean monthly rainfall | January | 247 | 203 |
| | February | 176 | 165 |
| | March | 141 | 148 |
| | April | 77 | 77 |
| | May | 101 | 99 |
| | June | 102 | 83 |

| Statistic | | Llwyn-on Main Value (mm) | Pontsticill Upper Value (mm) |
|---|---|---|---|
| | July | 100 | 87 |
| | August | 165 | 143 |
| | September | 137 | 124 |
| | October | 163 | 154 |
| | November | 230 | 180 |
| | December | 284 | 231 |
| Annual rainfall | Mean (2014 - 2018) | 1,928 | 1,657 |
| | Median (2014 - 2018) | 1,970 | 1,553 |
| | Minimum (2014 - 2018) | 1,748 | 1,499 |
| | Maximum (2014 - 2018) | 2,055 | 1,936 |

## *Surface water features*

### *Watercourses*

**Figure 9.8** (ES **Appendix 9.1**) shows neighbouring surface water courses in the Quarry vicinity. The hydrology of the area around the Quarry is dominated by the south-westerly draining Taf Fechan 270 m to the south-east of the Quarry and the southerly draining Afon Taf Fawr, approximately 1.4 km to the west. These watercourses are sourced from the Llwyn-onn Reservoir and Pontsticill Reservoir respectively, which are sourced in turn from watercourses and further reservoirs higher in the catchments (see waterbodies section below).

The Taf Fechan and the Afon Taf Fawr are confluent 2.1 km south of the Quarry, where they continue southwards as the Afon Taf/River Taff. The estuary of the River Taff is at Cardiff Bay approximately 38 km south of the Quarry. The Quarry is located high in the River Taff catchment, with its constituent tributaries draining steep hillsides.

The Nant y Glais is the most proximal watercourse to the Quarry and lies 160 m east at its closest approach. This is sourced from the Nant Cwm-moel and Nant y Wern, both of which drain an area of moorland north of the Quarry and join to form the Nant y Glais approximately 600 m north of the Quarry. The Nant y Glais flows southwards, predominately through the Nant y Glais cave system rather than the riverbed (Section 9.2.2 – *Local geology*), to its confluence with the Taf Fechan approximately 300 m to the south-east of the Quarry. The Quarry sits within the catchments of the Nant y Glais and the Taf Fechan, into which surface runoff from the Quarry under pre-development (greenfield) conditions would have drained.

OS mapping shows a series of springs along the hillsides on the true right (western) bank of the Nant y Glais, east of the Quarry. These contribute to the flow along the Nant y Glais at various points along its course. An unnamed tributary of the Nant y Glais catchment flows into a swallow hole 1 km north-east of the Quarry and its location of re-emergence is unknown. Areas of Dowlais Limestone Formation and Marros Group outcrop at and around the Quarry have a lower density of watercourses compared to areas underlain by older Avon Group and Old Red Sandstone strata. The density of streams is greater north of the Quarry with most flowing broadly southwards in line with the regional topographic slope.

Watercourses are generally absent to the west of the Quarry on the high ridge of Cefn Cil-Sanws and to the north on high ground at Garn Ddu. OS mapping and LiDAR data indicate the presence of sinkholes in the limestone. **Figure 9.3** (ES **Appendix 9.1**) shows that these sinkholes are not covered by glacial till. These sinkholes will capture runoff and increase recharge to the underlying limestone aquifer and, in so doing, will limit surface water runoff that could then form streams. The presence of sinkholes in these areas is considered further in Section 9.2.5 (below).

Although not covered by OS mapping, a series of minor watercourses was identified at the Quarry during a site visit. **Figure 9.9** (ES **Appendix 9.1**) shows a map of surface water features identified during the site visit. These are

sourced from a series of seepages in the quarry faces and from springs in the quarry floor. Water draining from these sources in the eastern arm drains from the north-eastern upper part of the quarry along the quarry floor and cascades in a series of waterfalls over the quarry benches to a pond in the south-eastern part of the quarry (see below). Photographs of these features are provided in **Appendix 9.5**.

Water draining from springs in the north-western part of the western arm of the quarry drains to a series of ponds along the western edge. In the south a spring forms a watercourse which drains to a culvert that passes beneath Vaynor Road to a heavily vegetated settlement lagoon. There is an outlet from the settlement lagoon to the Taf Fechan however, at the time of the site visit this was not flowing.

### *Waterbodies*

**Figure 9.8** (ES **Appendix 9.1**) shows neighbouring surface waterbodies in the Quarry vicinity. The closest major waterbodies to the Quarry are as follows:

- Pontsticill Reservoir 2.6 km north-east of the Quarry; and
- Llwyn-onn Reservoir 2.1 km north-west of the Quarry.

Both Pontsticill Reservoir and Llwyn-onn Reservoir are fed by inflows from watercourses further up the catchments and have outflows from dams into Afon Taf Fawr and Taf Fechan, respectively. The most proximal waterbodies are a series of small ponds 700 m north-east of the Quarry and several small ponds occupying dolines and sinkholes (see Section 9.2.5) on the upper slopes of Cefn Cil-Sanws, 500 m west of the Quarry. These mostly do not appear to have outlets and likely drain to the limestone aquifer. The small ponds appear to be dry on the latest available aerial images.

A series of water features were identified at the Quarry during the site visit (**Figure 9.9** ES **Appendix 9.1**). In the western arm, a number of small ponds are located adjacent to the western quarry faces. These do not have any clear surface water outlet and appear to drain to groundwater. In the eastern arm, most runoff and groundwater ingress drain to a pond in the south-east (referred to as the "south-east pond" throughout the remainder of this chapter). This also has no outlet and drains to the limestone aquifer. A number of much smaller ponds are also present in the eastern arm.

In the southern part of the Quarry around the former processing plant area, a pond is present which discharges through a culvert beneath Vaynor Road to a settlement lagoon.

## *Surface water flows*

### *Taf Fawr, Taf Fechan and River Taff*

The National River Flow Archive holds surface water flow data at the following locations (CEH, 2019):

- Taf Fawr at Llwynon Reservoir (2.1 km west-north-west of the Quarry);
- Taf Fechan at Taf Fechan Reservoir (2.5 km north-east); and
- Taff at Merthyr Tydfil (2.6 km south).

Table 9-4 summarises the catchment characteristics and measured flows from each of these gauging locations. However, the degree to which these statistics are representative of natural flow is uncertain due to the controlling influence of the reservoirs on flows in the Taf Fawr and Taf Fechan.

The two gauges at the reservoirs are thought to measure reservoir outflows and hence will not represent a natural flow regime. Taff at Merthyr Tydfil is located downstream of the two reservoirs and hence will also be influenced by the dammed outflows. The baseflow indices for these watercourses are relatively low and indicate that the contribution to flow from groundwater in these catchments is less significant than surface water.

**Table 9-4 Flow statistics for neighbouring flow gauging locations (CEH, 2019)**

| Parameter | Taf Fawr at Llwynon Reservoir | Taf Fechan at Taf Fechan Reservoir | Taff at Merthyr Tydfil |
|---|---|---|---|
| **Available record** | 1931 – 2019 | 1936 – 1973 | 1978 – 2019 |
| **Location and distance from Site** | 2.1 km west-north-west | 2.5 km north-east | 2.6 km south |
| **Baseflow Index** | 0.34 | 0.46 | 0.37 |
| **Catchment area ($km^2$)** | 43.0 | 33.7 | 104.1 |
| **95% exceedance ($m^3/s$)** | 0.178 | 0.221 | 0.749 |
| **70% exceedance ($m^3/s$)** | 0.265 | 0.252 | 1.12 |
| **50% exceedance ($m^3/s$)** | 0.374 | 0.360 | 1.49 |
| **10% exceedance ($m^3/s$)** | 2.738 | 2.053 | 9.44 |
| **Mean flow ($m^3/s$)** | 1.093 | 0.783 | 3.824 |
| **Estimated effective rainfall (mm)** | 802 | 733 | 1,158 |
| **Estimated recharge based on $Q_{95}$ (mm)** | 133 | 207 | 227 |

*Nant-y-Glais*

The Nant y Glais flows southwards approximately 160 m east of the Quarry at its closest approach. The hydrology of the Nant y Glais is complex due to the karstic nature of the terrain. Stantec collected monthly flow gauging data at three locations along the Nant y Glais between March 2018 and June 2019 (inclusive). The data collected over these 16 months is considered adequate to aid our understanding for this assessment. As shown in **Figure 9.8** (ES **Appendix 9.1**) and at larger scale in **Figure 9.10**, the gauging points are located at:

- Blaenglais (560 m north of the Quarry), which is approximately 1.7 km downstream of the river source and immediately downstream of the confluence between the Nant Cwm Moel and the Nant y Wern;
- Ogof Rhyd Sych (260 m east of the Quarry), which is downstream of the river's emergence from the Nant y Glais cave system; and
- Aberglais (300 m east of the Quarry), which is immediately upstream of the river's confluence with the Taf Fechan.

During a site visit in March 2016 by ESI Ltd (now Stantec), the Nant y Glais was flowing along its full length, although flow appeared to decrease in the reach between Blaenglais and downstream of the caves further to the south. Monthly field observations made between March 2018 and June 2019 indicate the stream is usually dry in:

1. the reach starting approximately 200 m downstream from the Blaenglais gauging location to the NG03 spring; and
2. the reach approximately 210 m upstream of the NG02 spring, i.e. upstream of the caves.

These reaches are marked as dry reaches in **Figure 9.10** (ES **Appendix 9.1**). Flow continues underground across these reaches through the underlying cave system and fractures in the limestone.

During the monthly 2018/2019 monitoring visits, flow was observed in these reaches only on 14 November 2018 and 14 June 2019 (i.e. two out of 17 visits). Both occasions were associated with relatively heavy rainfall events totalling 45 - 50 mm in the preceding five-day period. Anecdotal evidence obtained from a local resident in March 2016 corroborates the observation that the downstream reach is dry for most of the time.

The gauging data (see **Figure 9.11** ES **Appendix 9.1**) indicates that the flow rate in the monitored time period was highest in the winter months (November - March) with a maximum flow of 200 l/s recorded in December 2018 at the

downstream monitoring point (Aberglais). The flow rate is significantly lower between April and October with the minimum measured value of 5.7 l/s at the upstream monitoring point (Blaenglais) in June 2018.

Flow rate appears to be primarily controlled by rainfall (see Figure 9.11); for example, peak flow rates recorded on 14 November and 11 December 2018 correlate to high rainfall events on 9 November and 6 December 2018, respectively. Due to the relatively small size of the catchment (approximately 500 ha) and steepness of the slopes, water passes through the system quickly. However, delayed inflows from the limestone aquifer recharged through sinkholes could be significant.

**Figure 9.13** (ES **Appendix 9.1**) shows synthetic flow rates calculated at Blaenglais, Ogof Rhyd Sych and Aberglais gauging locations using a transient water balance model in order to further our understanding of the hydrogeological system. The transient water balance methodology is based on ESI (2007) and is an established methodology that has been used successfully by ESI Ltd (now Stantec) on other limestone quarries in South Wales. A copy of a technical note explaining the methodology is included in Appendix 9.6. Note that the technical note refers to sites in the vicinity of another quarry, but the methodology is transferable.

The analytical equations used are the same as in Streetly (2008) and the parameters were calibrated to fit the monthly gauging data. The modelled flows achieved an overall good fit, though there is less confidence in the predicted peak flows due to an absence of spot flow gauging measurements during high flow events.

Modelled flow rate statistics are presented in Table 9-5 for time period between March 2018 and August 2019. The mean flow rate increases by 31.8 l/s (33% increase) between Blaenglais and Ogof Rhyd Sych thus suggesting overall gaining conditions between these locations. Meanwhile, the flow rate between Ogof Rhyd Sych and Aberglais monitoring points increases only by 5.6 l/s (4.4% increase) which is consistent with the upslope catchment area increase (33% and 4.2%, respectively). The estimated recharge rate slightly decreases moving downstream but is largely consistent at around 60 mm/year.

This recharge rate is likely not representative of the actual long-term average recharge rate because the Nant y Glais loses water along its course and therefore, this recharge value should be treated as an underestimate. Furthermore, as the recharge rate calculation is based on the slow recharge from baseflow (i.e. Q95), it does not include the rapid recharge from fracture flow during high rainfall events. Estimated long-term average recharge rates in Table 9-4 range from 133 and 227 mm/year and these are considered more appropriate.

Groundwater levels in the Dowlais Formation (as recorded in VaynOB7a approximately 280 m from Nant y Glais, see Figure 9.11) show a rainfall signature. Between September 2018 and April 2019, the groundwater levels have a monthly fluctuation of 2 - 4 m indicating a highly responsive system typical of karstic aquifers. Furthermore, during this period both the groundwater levels and stream flow rates are elevated compared to the low levels and flows between July to September 2018 and April to July 2019. Although the correlation between the groundwater levels and the stream's flow rates is not strong, the stream may be in hydraulic connection with the groundwater table but it this may not be evident with the monthly stream flow gauging frequency and the complexities of the karst system.

**Figure 9.14** (ES **Appendix 9.1**) shows Nant y Glais flow rate variation over time; in all cases the flow rate increases between Blaenglais and Ogof Rhyd Sych monitoring points. Flow in this reach is, in part, controlled by the karstic nature of the faulted and exposed limestone. There are no tributaries present in this reach and instead the water is gained through several springs (in the sides of the gorge), interactions with the limestone aquifer and runoff from adjacent agricultural land and moorland scrub. The Nant y Glais cave system through which the stream passes can be seen in Figure 9.10.

Meanwhile, the change in flow rate between Ogof Rhyd Sych and Aberglais is much more variable; the reach alternates between losing and gaining conditions without a discernible pattern or correlation with either rainfall or groundwater levels.

This could be caused by complexities of the karstic system and/or inaccuracies in the Aberglais flow gauging measurements. The monitoring location is located

in a pebble/boulder-rich reach which creates non-ideal gauging conditions due to turbulent and non-lateral flow).

**Table 9-5 Flow statistics for modelled flow rates at Nant y Glais (between March 2018 and August 2019)**

| Parameter | Blaenglais | Ogof Rhyd Sych | Aberglais |
|---|---|---|---|
| **Catchment area ($km^2$)** | 3.6 | 4.8 | 5.0 |
| **95% exceedance (l/s)** | 6.8 | 9.0 | 9.4 |
| **70% exceedance (l/s)** | 27.4 | 32.9 | 33.8 |
| **50% exceedance (l/s)** | 44.8 | 49.2 | 50.0 |
| **10% exceedance (l/s)** | 141.2 | 155.6 | 173.4 |
| **Mean flow (l/s)** | 94.9 | 126.7 | 132.3 |
| **Estimated recharge based on $Q_{95}$ (mm/year)** | 60.2 | 59.5 | 59.4 |

## *Surface water levels*

A gauge board and water level logger (recording at hourly intervals) were installed in the south-east pond in August 2018 by BCL Ltd (BCL). Results of this monitoring are shown in **Figure 9.15** (ES **Appendix 9.1**). The gauge board datum has not been surveyed, however, based on a general site survey, the gauge board zero datum elevation is around 270.5 m AOD.

Monitoring results show that surface water levels in the south-east pond are mostly static at around 0.2 m. Levels rise rapidly in response to rainfall events by up to 2 m and recede more steadily, but still relatively quickly. Water discharges to the south-east pond from groundwater that flows across the floor of the quarry void (Figure 9.9)). During rainfall events, runoff from most of the eastern arm will discharge to the south-east pond (see Stantec (2020)). A 2 m rise in water level would be accommodated in the south-east pond without it leaving the pond and overflowing to the south. Due to the topography of the Quarry, pond levels would have to rise by approximately 9.3 m to 280 mAOD before overtopping and discharging to surface water. Therefore, water must infiltrate to the underlying aquifer. Stantec (2020) estimates the infiltration rate to be 0.0056 mm/s (0.48 m/day). The spill over points for the eastern and the western arms of the quarry are shown on **Figure 9.24** (ES **Appendix 9.1**).

**It is confirmed in Appendix 9.2 (Flood Consequence Assessment - Stantec, 2022) that spill over of water after storm events would not occur due to the high infiltration rate from the base.**

Infiltration of all runoff and groundwater inflows must also be occurring in the western arm, which is another closed catchment as there are no outfall or streams leading from it and the pond features are ephemeral. Although there are no monitoring data for the largest pond at the lowest point in the western arm, groundwater contours suggest there is 3-8 m of unsaturated zone below the pond; and there is no evidence of overtopping. It is therefore expected that infiltration rates at this pond will be comparable to those at the south east pond.

## *Surface water classification*

The Quarry lies entirely within the *Taf Fechan – source to conf Afon Taf Fawr* catchment (ID GB109057033160). The status of this catchment was last assessed as part of the Water Framework Directive (WFD) Cycle 2 interim assessment and has a “moderate” ecological status, a “good” chemical status and a “moderate” overall status.

Based on the Catchment Abstraction Management Strategy (CAMS) status, water is available less than 30% of the time (NRW, 2017).

### 9.2.4 Quarry Drainage and Water Management

#### *Site water management plan*

There is no site water management plan in place at the Quarry. Most runoff currently drains to the limestone aquifer beneath the Quarry following the pathways shown in **Figure 9.9** (ES **Appendix 9.1**) and described above. Some runoff also drains to the Nant y Glais and Taf Fechan. The extant quarry floor is interpreted to intercept the groundwater surface causing seepages and this is classified as passive dewatering.

This dewatering is the subject of a transfer licence application that was submitted under the transitional abstraction licencing arrangements on 11 December 2019 (ref The Water Abstraction (Transitional Provisions) Regulations 2017).

The Quarry holds a discharge permit for the discharge of site drainage from the former processing plant area to the Taf Fechan in the south. The details of the Permit are summarised in Table 9.6 and a copy of the Permit is provided in **Appendix 9.7**.

The permit allows the discharge of groundwater and surface water runoff, which has passed through the Quarry's settlement lagoon system south of Vaynor Road. These includes groundwater seepages from the spring in the northern part of the former processing plant area.

**Table 9-6 Discharge permit details**

| Discharge location | NGR | Limits | Permit ID |
|---|---|---|---|
| **Taf Fechan** | SO 03960 093110 | Suspended solids 60 mg/l<br>Oil/grease 10 mg/l<br>pH 5 - 9 | AF4026001/T002 |

A site water management plan will be developed for the operational and restoration phases and more details on this are provided in Section **Error! Reference source not found.**.

### 9.2.5 Hydrogeology

#### *Aquifer classification*

The sequence of the Abercriban Oolite Subgroup, Llanelly Formation, Dowlais Limestone Formation, Penderyn Oolite member, and Oxwich Head Limestone Formation are defined as principal aquifers. Principal aquifers are defined as layers of rock or drift deposits that have high intergranular and/or fracture permeability – meaning they usually provide a high level of water storage. They may support water supply and/or river baseflow on a strategic scale.

The Grey Grits Formation, Cwmyniscoy Mudstone Formation and Twrch Sandstone Formation are classed as Secondary A aquifers by NRW. Secondary A aquifers are defined as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

The Quarry lies within the SE Valleys Carboniferous Limestone groundwater body (ID GB40901G203600) and has a "good" quantitative status, a "good" chemical status and a "good" overall status. NRW (2017) indicates that, due to complexities in the hydrogeology of this area, groundwater resource availability is considered on a case-by-case basis.

#### *Groundwater levels and flow*

##### *Available data*

As part of the monitoring regime at the Quarry, groundwater levels are monitored at ten monitoring locations. These locations are listed in Table 9-7 and are shown in **Figure 9.12** (ES **Appendix 9.1**).

Seven of these locations monitor groundwater levels within the Dowlais Limestone while the remaining three monitor levels within the underlying Abercriban Oolite.

VaynOB1 – VaynOB4 were installed in 1998 and the installation details are unknown, although based on the borehole depths, they are thought to monitor levels in the Dowlais Limestone.

Borehole logs for VaynOB5 – VaynOB7, which were installed in 2017, are appended in **Appendix 9.4.**

VaynOB5 – VaynOB7 are paired (i.e. separate, not nested) boreholes. The shallower installations (those ending in "A") are screened across the Dowlais Limestone, whereas the deeper installations are screened across the Abercriban Oolite. These two units are separated by the Llanelly Formation.

VaynOB1 was last monitored in April 2005 and has now been quarried out. VaynOB5A has not been dipped since January 2019 due to a blockage in the standpipe. Otherwise, the monitoring locations are dipped manually at monthly intervals.

VaynOB1 – VaynOB4 inclusive were monitored using a logger between summer 2001 and winter 2004.

It is understood that NRW does not monitor groundwater levels in the surrounding area.

**Table 9-7 Groundwater level monitoring borehole**

| Name | Easting | Northing | Depth (m) | Screened Interval (m bgl) | Screened Interval (m AOD) | Lithology |
|---|---|---|---|---|---|---|
| **VaynOB1** | 303828 | 209711 | 35 | Unknown | | Dowlais Limestone* |
| **VaynOB2** | 303788 | 210394 | 60 | | | Dowlais Limestone* |
| **VaynOB3** | 303131 | 210426 | 130 | | | Dowlais Limestone* |
| **VaynOB4** | 303637 | 210079 | 85 | | | Dowlais Limestone* |
| **VaynOB5** | 303965 | 209376 | 95.95 | 64 -95.95 | 199.5 - 167.6 | Abercriban Oolite |
| **VaynOB5A** | 303963 | 209374 | 59 | 3 - 59 | 260.8 - 204.8 | Dowlais Limestone |
| **VaynOB6** | 303984 | 210197 | 89.9 | 54.5 – 89.9 | 252.9 - 217.5 | Abercriban Oolite |
| **VaynOB6A** | 303986 | 210192 | 30 | 9 – 30 | 298.2 - 277.2 | Dowlais Limestone |
| **VaynOB7** | 303683 | 210562 | 102.5 | 65 – 102.5 | 285.2 - 247.7 | Abercriban Oolite |
| **VaynOB7A** | 303685 | 210564 | 47 | 10 – 47 | 339.8 - 302.8 | Dowlais Limestone |

*Groundwater levels*

Table 9-8 provides a statistical summary of groundwater levels recorded in the Site monitoring wells. Groundwater levels vary from 250.8 – 352.7 m AOD across the Quarry, being highest at VaynOB3 in the north-west and lowest at VaynOB5 and VaynOB5A in the south. Depth to groundwater is lowest in the south, being around 10 m below ground level, and deepest in the north-east, at up to 73 m below ground level.

**Figure 9.17** 9ES **Appendix 9.1**) shows groundwater hydrographs for the Dowlais Limestone boreholes. Seasonal changes vary from around 2 – 16 m. Most of the boreholes show a typical seasonal change in groundwater level, being typically lower over summer and higher over winter. The strongest seasonal signature is VaynOB3.

VaynOB3 shows a high magnitude fluctuation that does not vary uniformly with the seasons (i.e. groundwater lows and higher do not always correlate with summer and winter respectively). This timing, coupled with the large annual fluctuation of around 16 m and high frequency of fluctuations in the logger data, instead implies a rapid response to rainfall recharge and a low storage. VaynOB3 is situated to the north of the quarry void and is proximal to sinkholes that have been identified on moorland north of the quarry void (see below). The seasonal variations suggest that the borehole may be connected to this area of sinkholes. Higher variability in this area may also be related to its location further from the dampening influence of the watercourses to the south and east.

VaynOB2, VaynOB4 and VaynOB6A all show relatively recent stepped changes in groundwater levels, as marked on **Figure 9.17**. The stepped changes all occur at different times and are in different directions. VaynOB2 (in the north-east) shows a stepped increase, whilst VaynOB4 and VaynOB6A (located at a similar northing to the east) show a stepped decrease that occurs at the same time. The lowering correlates with a dry period and could be caused by extremely low rainfall over this time. The reason for the stepped increase at VaynOB2 is unclear. The step change at VaynOB6A has now largely reversed.

VaynOB7A shows a declining trend in groundwater levels since January 2019. The reason for this is unclear, but the Cumulative Annual Mean Monthly Rainfall Residual (CAMMRR), which is a proxy for changes in rainfall through time, does also show a declining trend. Groundwater levels dependent on rainfall would be expected to correlate well with the CAMMRR. VaynOB7A, in the northern part of the Site, does not show the same recharge signature as VaynOB3, but this does not necessarily mean that groundwater levels are not influenced by rainfall. Storage could be much higher at VaynOB7A, or it could be more influenced by karst than some of the other monitoring locations.

VaynOB2 – VaynOB4 all show an increase in groundwater levels between the end of the first phase of monitoring in 2005 and the re-commencement of monitoring in 2016. The increase in levels is by around 4 – 6 m, being greatest at VaynOB4 in the centre of the Quarry and lowest in VaynOB2 in the north-east. The rise in water levels is evident in the logger data at VaynOB3, which shows a gradual rise between 2001 and 2004. There is ongoing passive dewatering at the quarry void and it is assumed that while the quarry void was being actively worked, there may have been improved, faster drainage in the void that may have allowed less groundwater recharge. This would have caused some lowering of groundwater levels, particularly in the centre of the void. After the quarry had ceased being worked, this drainage may have been removed or degraded, and this allowed more recharge thus allowing groundwater levels to recover.

**Figure 9.18 (**ES **Appendix 9.1**) shows groundwater hydrographs for the Abercriban Oolite boreholes compared to the corresponding hydrographs for the Dowlais Limestone. Seasonal changes in groundwater levels in the Abercriban Oolite are around 2 – 5 m, being greatest at VaynOB7. Being deeper, groundwater levels in the Abercriban Oolite appear to be less strongly dependent on rainfall recharge and this causes a more subdued seasonal variability.

Groundwater levels in the Abercriban Oolite are different to levels in the Dowlais Limestone and this causes vertical gradients. Vertical gradients between the Dowlais Limestone and Abercriban Oolite are as follows:

- At VaynOB5 in the south, the vertical gradient is almost always downwards or approximately static, with head difference being a maximum of around 0.5 m

- At VaynOB6 east of the quarry void, the vertical gradient is always downwards with a head difference of 13 – 17 m that decreases during drier periods.
- At VaynOB7 in the north, the vertical gradient has varied; prior to November 2018, it was always downwards, but since this time it has been variable. Head differences vary from 3.5 m (downwards) to 2.8 m (upwards).

**Figure 9.4** shows the thickness of the Llanelly Formation based on borehole logs. The Llanelly Formation is thickest (21.7 m) at VaynOB6. The Llanelly Formation is composed of silty mudstone and is therefore thought to be of lower permeability than the Dowlais Limestone and Abercriban Oolite. Where it is thicker, higher vertical gradients are therefore expected. Llanelly Formation thickness varies across the Site and is much thinner (< 0.5 m) at VaynOB7. Where the Llanelly Formation is thinner, vertical gradients and head contrasts between the Dowlais Limestone and Abercriban Oolite will likely be much reduced. The reversals at VaynOB7 in part appear to be related to a stronger dependence of levels in the Dowlais Limestone to rainfall recharge.

**Table 9-8 Groundwater level summary**

| Name | Available Record | No. Readings[1] | Minimum (m AOD) | Mean (m AOD)[1] | Maximum (m AOD) | Minimum (m bgl) | Mean (m bgl)[1] | Maximum (m bgl) |
|---|---|---|---|---|---|---|---|---|
| **VaynOB1** | 1998 - 2005 | 35 | 262.6 | 264.0 | 265.9 | 7.94 | 9.84 | 11.2 |
| **VaynOB2** | 1998 - 2019 | 76 | 310.6 | 315.9 | 320.0 | 18.6 | 22.6 | 28.0 |
| **VaynOB3** | 1998 - 2019 | 77 | 330.0 | 342.3 | 352.7 | 50.4 | 60.7 | 73.0 |
| **VaynOB4** | 1998 - 2019 | 77 | 287.5 | 292.5 | 295.8 | 39.1 | 42.4 | 47.5 |
| **VaynOB5** | 2017 - 2019 | 11 | 250.8 | 251.5 | 253.1 | 10.0 | 11.7 | 12.4 |
| **VaynOB5A** | 2017 - 2019 | 18 | 250.8 | 251.5 | 253.1 | 10.2 | 11.9 | 12.6 |
| **VaynOB6** | 2017 - 2019 | 23 | 278.3 | 279.1 | 281.2 | 26.5 | 28.5 | 29.3 |
| **VaynOB6A** | 2017 - 2019 | 17 | 292.2 | 294.6 | 296.1 | 11.1 | 12.5 | 15.0 |
| **VaynOB7** | 2017 - 2019 | 24 | 332.2 | 337.3 | 340.0 | 9.76 | 12.5 | 17.6 |
| **VaynOB7A** | 2017 - 2019 | 24 | 333.4 | 337.8 | 339.8 | 9.65 | 11.6 | 16.1 |

*Groundwater flow*

The Dowlais Limestone and Abercriban Oolite are the main aquifers at the Quarry and are vertically separated by the Llanelly Formation. The Llanelly Formation is of lower permeability and causes hydraulic separation of the two aquifer units, particularly where the Llanelly Formation is thickest. The Cwmyniscoy Mudstone at the base of the Abercriban Oolite likely forms a largely impermeable based to this unit.

The groundwater flow pattern implied by the groundwater monitoring broadly follows the topographic slope, with descending groundwater levels and flow toward the Nant y Glais and Taf Fechan. The quarry floor appears to intersect the upper groundwater level surface and a series of springs and ponded areas are present.

Contour plots of recent high (April 2019) and recent low (July 2019) groundwater levels have been produced based on measured groundwater levels and stream levels (estimated from LiDAR). These are shown in **Figure 9.13** and **Figure 9.14** respectively. These show groundwater flow at the Quarry to be broadly toward the south-east. Groundwater levels for the Abercriban Oolite suggest that the groundwater flow direction will be similar in this unit.

The south-eastward flow of groundwater may be primarily occurring along the south-easterly dipping bedding planes. Seepages in the faces of the quarry void appeared to be dominantly flowing along bedding planes. In general, groundwater flow in both the Dowlais Limestone and Abercriban Oolite is thought to occur along karstic features, fractures and bedding planes that may have become enlarged through solution processes. It is expected that most flow will be concentrated in the shallow zone where permeability will have been enhanced by dissolution.

Lower permeability mudstone bands are present within the Dowlais Limestone (observed during the site visit in the quarry faces). These could allow the formation of perched layers above low permeability mudstone layers. Tip material (generally comprised of lower permeability areas of limestone) has been deposited in the south-east of the void and along the central ridge. This may have reduced recharge and increased runoff in these areas but its influence is expected to be localised.

Recharge to the Dowlais Limestone is sourced from rainfall recharge. This can occur through direct rainfall recharge over the outcrop and also by recharge through sinkholes that may capture runoff from a wider area. LiDAR data and OS mapping show a series of sinkholes is present on the moorland north and west of the Quarry and these may capture runoff from areas underlain by Cwmyniscoy Mudstone further north. Runoff from the Cwmyniscoy Mudstone may also recharge the Abercriban Oolite where it is exposed via sinkholes. A series of karstic features are evident in the quarry void and these may also act as recharge pathways.

Recharge to the Abercriban Oolite will also be sourced from rainfall recharge over its outcrop to the north of the Quarry and also via sinkholes in this area. There will also be some percolation of water from the overlying Dowlais Limestone where the vertical gradient is directly downwards. This is thought to be the prevailing condition across much of the Quarry.

Groundwater is expected to discharge to the Nant y Glais and Cwm Taf Fechan, to springs around the Quarry (see below) and to various waterbodies within the quarry void. The Abercriban Oolite is also expected to discharge to the same locations. It is expected that the Cwm Taf Fechan is primarily gaining but may lose to groundwater periodically when river flows are high or groundwater levels are low. The Nant y Glais is known to lose flow along its reach, and flow continues in an underground cave system (see above).

The Nant y Glais caves have roughly triangular cross-sections with horizontal floors as they lie very closely above a layer of less soluble dolomite. Dye tracer tests were carried out in the 1960s to determine sources of the water in the Nant y Glais and caves. Introduction of tracer at the “Old Quarry Sink” approximately 950 m north-east of the Quarry on the eastern bank of the Nant y Glais showed no connection with Ogof Rhyd Sych. This could be because it is on the opposite side of the Dowlais Fault.

The Dowlais Fault may act as a barrier to groundwater flow where the lower permeability Cwmyniscoy Mudstone has been juxtaposed against the more permeable Dowlais Limestone and Abercriban Oolite.

There is expected to be limited interaction between superficial strata and the limestone. Glacial till is primarily absent across much of the Quarry. Where this overlies the limestone, this will limit direct rainfall recharge.

## *Springs*

### *Vaynor Quarry*

Areas of the extant quarry floor intersect the groundwater surface causing a series of seepages which often occur along bedding planes. Some of these seepages may be draining perched aquifer layers above low permeability layers within the limestone. **Appendix 9.5** contains photographs of these seepages and **Figure 9.9** (ES **Appendix 9.1**) shows their locations. All identified seepages are sourced from the Dowlais Limestone Formation and flow to ponds in the south of the quarry void from which water infiltrates back to the limestone aquifer. As the quarry floor intersects the groundwater surface, this is classified as passive dewatering and this activity is subject to a transitional transfer licence application (see Section 9.2.4).

A spring is also located to the north of the former processing plant area and is the southernmost spring shown on **Figure 9.9**. This spring emerges from the limestone here and flows southwards as a drainage channel to a culvert that passes beneath Vaynor Road. Stantec (2020c) has undertaken tracer testing and water quality analyses to determine the source of this spring. Based on the analyses, it is considered most likely that this spring is at least partially sourced from the ponds in the western arm of the quarry void. It is unlikely that the spring is sourced from the south-east pond. This is based on the results of the tracer test and water quality analyses and that groundwater flow is thought to be south-eastwards, broadly in line with the stratigraphic dip. For flow in the spring to be sourced from the south-east pond, groundwater would need to flow almost parallel to the groundwater contour lines shown in **Figure 9.13** and **Figure 9.14**. It is possible that the spring is sourced from the land to the west, which is occupied by a golf course. There are no obvious water features or streams suitable for further tracer testing to determine this.

### *Nant y Glais and Cwm Taf Fechan*

A number of springs are present in the Nant y Glais SSSI and Cwm Taf Fechan woodlands SSSI (**Figure 9.5**). Table 9.9 lists the known springs in these locations. Two of the springs on the western side of the Nant y Glais to the south of the Nant y Glais SSSI are tufa depositing springs (NG01 and NG02).

The smaller, northernmost spring has been visually estimated to be flowing at less than 1 l/s and the larger, southernmost spring was visually estimated to be flowing at around 10 l/s (ESI, 2017). Further south another spring is marked immediately north of the Trefechan-Vaynor road close to Glais Bridge. This was observed to be dry during the site visit.

It is expected that the springs are sourced to varying degrees from slow-flowing groundwater that is filtering through the aquifer and rapid-flowing groundwater that has entered the system through sinkholes and travels rapidly through the aquifer along karstic features. The proportion of the rapid-flowing groundwater is expected to increase following high rainfall events and is also expected to have water quality values that reflect lower levels of mineralisation.

The Nant y Glais springs are sourced from karstic features in the western bank of the Nant y Glais and discharge eastwards to the Nant y Glais. Based on their location and geological mapping, they appear to be sourced from the Dowlais Limestone Formation (NG01 and NG02) and Abercriban Oolite (NG03). NG01 and NG02 could be related to the Dowlais Fault and appear to lie west of the fault (see **Figure 9.6**), i.e. on the same side as the Quarry.

The Cwm Taf Fechan SSSI springs are likely to be sourced from karstic features or fractures in the Dowlais Limestone Formation or they could discharge at the point the steep-sided slopes of the Taf Fechan intercept the groundwater surface. It is likely that water infiltrating to the limestone from the south-east pond, at least partly supports spring flows in the Cwm Taf Fechan SSSI springs.

**Table 9-9 Springs present in Cwm Taf Fechan and Nant y Glais localities**

| Name | Description | Flowing to | Source Geology |
|---|---|---|---|
| **CTFW01** | Cluster of 3 springs joining into one channel | Taf Fechan | Dowlais Limestone Formation |
| **CTFW02** | One spring emerging in a pool with a short channel to the Taf Fechan | Taf Fechan | Dowlais Limestone Formation |
| **CTFW03** | Spring flows from vegetation along short channel to river | Taf Fechan | Dowlais Limestone Formation |
| **CTFW04** | Sinuous channel through boggy ground | Taf Fechan | Dowlais Limestone Formation |
| **CTFW05** | Cluster of 3 springs converging into single channel | Taf Fechan | Dowlais Limestone Formation |
| **CTFW07** | Rises on northern side of footpath and flows across path to the river | Taf Fechan | Dowlais Limestone Formation |
| **CTFW08** | Rises among trees and flows over boggy ground to river | Taf Fechan | Dowlais Limestone Formation |
| **NG01** | Tufa spring runs down the side of the gorge | Nant y Glais | Dowlais Limestone Formation |
| **NG02** | Dome-shaped tufa spring overhanging the river and running down the gorge side | Nant y Glais | Dowlais Limestone Formation |
| **NG03** | Spring flows from rocks on the western side of the gorge | Nant y Glais | Abercriban Oolite |

Seven springs in Cwm Taf Fechan and three springs in Nant y Glais have been monitored from March 2018 to June 2019 to qualitatively record flow and other hydrological aspects at each location. Spring flow can vary significantly between springs despite their close proximity, as demonstrated in **Figure 9.15** (ES **Appendix 9.1**).

The Cwm Taf Fechan springs generally have similar flows at any given time, whether that is low/no flow or high flow, regardless of the season. All of these springs showed, to some degree, increased flows in the second half of the monitoring period; this coincides with the winter and spring of 2018/19, although January and February 2019 were considerably drier than the monthly average for 2013 - 2019. Summer 2018 was particularly dry, and in June 2018 two springs had low flow and the remaining five had no flow. CTFW01 was observed to be flowing at every monitoring visit; there is a possibility this spring may be linked to drainage from the former processing plant area within the Quarry.

Springs along the Nant y Glais tend to show fairly consistent low to moderate flow. Two of these three springs were observed to be flowing at every monitoring visit (NG02, NG03). In contrast, NG01 is only recorded as flowing once over a thirteen month period (May 2018 – June 2019).

Overall, the Nant y Glais springs tend to have a more consistent flow than the Cwm Taf Fechan springs, although this may not be statistically significant given the sample sizes.

### *Other springs*

To the west of the Site, springs are marked on OS mapping along the eastern bank of the Afon Taf Fawr. These do not originate from the limestone but from sandstones of the Grey Grits Formation which underlies the Cwmyniscoy Mudstone Formation. Although not marked on the 1:25,000 OS map, the citation for the Darren Fach SSSI indicates issues and springs are also present here. None of the springs to the west of the Quarry has been visited as part of this work.

## *Aquifer properties*

Aquifer property testing has not been undertaken at the Quarry or in the monitoring boreholes around Vaynor Quarry. However, estimates of the likely hydraulic properties can be made from borehole log descriptions of the encountered strata and literature sources.

Glacial till and the glaciofluvial and glaciolacustrine superficial strata will have spatially heterogeneous aquifer properties dependent on the relative

proportions of clay and sand and gravel. Where clay comprises a greater proportion of the unit, permeability will be lower. Based on the lithological descriptions, the geological composition of the glacial till is variable, and the permeability of this unit is also expected to vary.

Hydraulic properties of the limestone (including both Dowlais Limestone and Abercriban Oolite) are expected to vary spatially and with depth. Limestone will be most permeable where karst is well developed and this is expected to mostly be the case at shallow depths. Permeability will also be enhanced along fractures, although may be reduced by fracture infills from later sedimentation.

A borehole drilled into the Lower Coal Measures and Carboniferous Limestone around 7 km east of the Quarry at Rhymney Bridge (BGS ID: 262145) records Dowlais Limestone Formation from 59 – 130 m depth (BGS, 2020). Pump testing at this borehole yielded a transmissivity of 10 - 20 $m^2$/day and a storage coefficient of 4 - 9 x $10^{-4}$ (Allen, et al., 1997). This borehole is situated where the limestone aquifer is confined and the low transmissivity value is inferred to be due to poor solution development. This value could be representative of the matrix of the aquifer and where karst is less well developed. A pumping test at a borehole drilled into unconfined limestone 9 km east of the Quarry gave similarly poor results, with an estimated long-term yield of 2 l/s and transmissivity of 10 $m^2$/day (Allen, et al, 1997).

As a result of various tests undertaken in the Carboniferous Limestone on the northern limb of the South Wales Coalfield Syncline, it is highly likely that most fractures in the aquifer are developed above the water table (Allen, et al, 1997), likely as a result of karstic weathering. This would explain their ability to provide conduits for rapid flow to springs and resurgences, such as at the Quarry and the surrounding SSSIs, while being unable to supply a water-bearing system at depths suitable for exploitation by boreholes.

The Twrch Sandstone is reported to be well cemented meaning that intergranular permeability is likely to be low. Permeability may be locally enhanced around fractures and faults.

### 9.2.6 Surface Water and Groundwater Quality

#### *Water quality monitoring results*

Water quality analyses have been undertaken at four locations by Stantec, one for surface water and three for groundwater. The four monitoring locations were visited on a quarterly basis (i.e. on four occasions) between July 2018 and April 2019. Further water quality analysis was undertaken by Stantec in November 2020, and the results of this are presented in Stantec (2020c) (**Appendix 9.8**).

#### *Surface water quality*

Quarterly surface water quality monitoring of the Nant y Glais has been undertaken downstream of the cave system at Ogof Rhyd Sych (**Figure 9.10**, ES **Appendix 9.1**)) between July 2018 and April 2019. Laboratory analysis of major ions was undertaken and summary statistics are presented in Table 9.10. Results collected during the monitoring period suggest that surface water quality is good. The only parameter in exceedance of Drinking Water Standards (DWS) is dissolved iron, which is not unexpected in a karstic environment where mixing of surface water and groundwater can result in elevated iron and manganese levels.

**Table 9-10 Water quality results**

| | | | Electrical Conductivity (µS/cm) | Total Dissolved Solids | Dissolved Oxygen | Dissolved Oxygen (% | Alkalinity (Total) | Chloride (mg./l) | Nitrate (mg./l) | Sulphate (mg./l) | Calcium (mg./l) | Potassium (mg./l) | Magnesium (mg./l) | Sodium (mg./l) | Total Hardness | Dissolved Iron (mg/l) | Dissolved Manganese |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DWS** | | | **2500** | | | | | **250** | **50** | **250** | | | **50** | **200** | | **0.2** | **50** |
| **EQS** | | | | | | | | **250** | | **250** | | | | | | **1** | |
| **Groundwater** | Borehole – VaynOB5A | Max. | 470 | 310 | 8.5 | 93 | 310 | 9.1 | 9.6 | 18 | 80.4 | 2.5 | 13.8 | 6.5 | 275 | **0.24** | 16 |
| | | Min. | 360 | 230 | 8.3 | 91 | 235 | 6.6 | 2.7 | 13.5 | 63 | 1.25 | 12 | 3.7 | 210 | 0.01 | 0.5 |
| | | Mean | 435 | 274 | 8.35 | 91.5 | 281 | 7.4 | 4.6 | 16.1 | 71.5 | 1.73 | 13.0 | 5.18 | 235 | 0.173 | 7.03 |
| | | Std D. | 50.7 | 30.3 | 0.1 | 1.0 | 29.7 | 1.0 | 2.8 | 1.8 | 6.7 | 0.5 | 0.6 | 1.3 | 25.0 | 0.1 | 7.3 |
| | Cwm Taf Fechan Spring – CTFW01 | Max. | 370 | 220 | 8.4 | 92 | 180 | 10 | 5.9 | 47 | 72 | 1.4 | 6.9 | 6.9 | 210 | 0.17 | 5.4 |
| | | Min. | 280 | 180 | 8.10 | 89 | 160 | 7.40 | 2.80 | 17.0 | 53.0 | 0.60 | 3.80 | 3.80 | 150 | 0.01 | 0.50 |
| | | Mean | 325 | 205 | 8.28 | 90.8 | 170 | 8.45 | 4.25 | 25.8 | 63.0 | 1.08 | 5.63 | 4.98 | 183 | 0.09 | 1.73 |
| | | Std D. | 37.0 | 17.3 | 0.13 | 1.26 | 8.16 | 1.10 | 1.58 | 14.37 | 7.87 | 0.34 | 1.30 | 1.45 | 25.0 | 0.07 | 2.45 |
| | Nant y Glais Spring – NG02 | Max. | 410 | 270 | 8.5 | 93 | 250 | 11 | 7.6 | 11 | 77 | 1.2 | 4.7 | 5.3 | 210 | 0.19 | 1 |
| | | Min. | 350 | 230 | 8.2 | 90 | 200 | 7.4 | 6.5 | 5.5 | 66 | 0.58 | 3.9 | 3.5 | 180 | 0.01 | 0.5 |
| | | Mean | 390 | 250 | 8.35 | 91.5 | 220 | 8.45 | 6.88 | 7.23 | 71.8 | 0.86 | 4.3 | 4.63 | 195 | 0.1012 | 0.625 |
| | | Std D. | 23.5 | 15.8 | 0.11 | 1.12 | 18.7 | 1.48 | 0.45 | 2.20 | 4.15 | 0.22 | 0.29 | 0.70 | 11.2 | 0.07 | 0.22 |
| **Surface Water** | Nant y Glais – downstream of caves | Max. | 230 | 150 | 8.5 | 93 | 130 | 26 | 3.9 | 21 | 44 | 0.9 | 3.3 | 6 | 120 | **0.21** | 2.3 |
| | | Min. | 150 | 98 | 8.3 | 91 | 62 | 5.7 | 2 | 5.1 | 26 | 0.25 | 2.4 | 2.6 | 76 | 0.028 | 0.5 |
| | | Mean | 183 | 117 | 8.38 | 91.8 | 93.3 | 12.0 | 3.08 | 9.73 | 32.25 | 0.71 | 2.75 | 4.25 | 91 | 0.1 | 1.43 |
| | | Std D. | 29.5 | 20.9 | 0.08 | 0.83 | 27.9 | 8.28 | 0.68 | 6.53 | 6.94 | 0.27 | 0.34 | 1.22 | 17.12 | 0.07 | 0.71 |

Red text indicates a result above the DWS or EQS

### *Groundwater quality*

Groundwater quality monitoring was undertaken at three locations between July 2018 and April 2019 and at VaynOB5A in November 2020. Table 9-10 shows mean groundwater quality results for the period at each monitored location. The three monitoring locations are as follows:

- Dowlais Limestone (borehole VaynOB5A);
- Nant y Glais spring (NG02);
- Cwm Taf Fechan spring (CTFW01).

Groundwater quality in the Dowlais Limestone around Vaynor Quarry is generally good and as expected in an upstream, agricultural area of the catchment. Water quality results from VaynOB5A are characteristic of groundwater in limestone terrain, with higher calcium and total hardness values. The only exceedance of DWS is for dissolved iron in borehole VaynOB5A. Elevated concentrations of manganese and iron are not unusual in groundwater.

As mentioned in Section 9.2.5 - *Springs*, it is expected that the springs NG02 and CTFW01 contain a mix of groundwater that has travelled both rapidly along karstic features or more slowly by percolation through the rock mass. This is supported by water quality data that indicates both springs contain water with a signature between that of the borehole (groundwater) and the Nant y Glais stream (surface water). Many parameters in Table 9-10 have values for both springs that lie between the concentration recorded at the borehole (assumed to be representative of limestone groundwater), which tends to be higher in concentrations, and the Nant y Glais value, which tends to have lower concentrations (for example, of total dissolved solids, chloride and total hardness). In general, NG02 has concentrations slightly closer to a groundwater signature than CTFW01.

The Nant y Glais surface water values show that concentrations decrease from October 2018 which coincides with a seasonal increase in rainfall. This decrease in major ion concentrations is likely indicative of natural dilution processes due to an increase of the faster-flowing groundwater component of the Nant y Glais.

## 9.2.7 Potential Receptors

### *Surface water features*

Potential surface water receptors in the vicinity of the Quarry that could potentially be influenced by the proposed development are:

- Nant y Glais;
- Taf Fechan; and
- Various ponds at the Site.

### *Licenced water abstractions*

NRW has provided details of five abstraction licences within 5 km of the Quarry. Details of these are provided in Table 9.11 and the locations are shown in **Figure 9.17** (ES **Appendix 9.1**). All of these are surface water abstractions and there are no licenced groundwater abstractions within 5 km of the Quarry. The closest licenced abstraction to the Site is operated by Welsh Water (DCWW) for public water supply purposes. The licence allows for water to be abstracted from the Llwyn-onn Reservoir at the point of the reservoir outfall. The next closest licenced abstraction is also operated by Welsh Water and also allows for abstraction from Llwyn-onn Reservoir. Abstracted water is utilised for hydroelectric power generation as well as aquaculture at the Cress Pond Throughflow.

Other licenced abstractions within 5 km of the Quarry include a public water supply from Pontsticill Reservoir operated by Welsh Water and an abstraction for hydroelectric power generation from Garwent Fawr, a tributary flowing into Llwyn-onn Reservoir.

### *Private water supplies*

Details of private water supplies within 4 km of the Quarry were requested from Merthyr Tydfil County Borough Council (MTCBC) and Rhondda Cynon Taf Council (RCTC) in August 2019.

MTCBC has no records of private water supplies within 4 km of the Quarry but one private water supply was reported by RCTC within this radius. This is sourced from a spring around 2.2 km north-west of the Site and supplies a domestic property. According to RCTC data, the abstraction rate is approximately 1.8 $m^3$/day. Based on its location, it is likely that this supply is sourced from the Grey Grits Formation and is not sourced from the younger Pembroke Limestone Group which is absent.

Another abstraction is known to exist at Llwyncilsanws Farm. Details of this abstraction have been obtained from 12 monthly monitoring visits to the springs by Stantec (from July 2018 to June 2019), personal communications with the farmer owner, and an ARC (now Hanson) internal memorandum (ARC, 1991). The water supply is purportedly from 11 springs which are located in a small area approximately 330 m north of the Quarry and west of the former Blaenglais farmhouse. Based on BGS mapping, it is probable that the springs are sourced from the Dowlais Limestone Formation. The springs converge and rise into two concrete-lined tanks, approximately 1.5 m square and 0.5 m deep, which are partially sunk into the field. **Figure 9.18** (ES **Appendix 9.1**) shows one of these concrete tanks. Water collected in each tank is discharged through a pipe onto the field surface and flows into a larger pipe which is conveyed to Llwyncilsanws Farm.

The water supply at Llwyncilsanws Farm is used for domestic supply and agricultural purposes (including stock watering and shed washdown). Anecdotally, this supply only dried up on one occasion in the 35 years prior to 2018 (approximately 20 years ago during a summer drought). Anecdotal evidence from the Stantec monitoring indicates that the springs also dried up in July 2018 after an extended period of dry weather. This indicates that the supply is susceptible to drought. Flows and rates of water use have not been precisely determined, but flow was observed on each of Stantec's monthly visits.

A disused well is located at Blaen-y-dyffryn approximately 130 m north-east of the Quarry boundary. This was previously understood to have been dry since at least 1991, however when this well was visited in July 2021 there was water at the base of the well. The well is 6 m deep and the water level was 5.25m below ground level (which is equivalent to a water level c. 326 mAOD. This is slightly higher than expected based on the groundwater level at the neighbouring VAYNOB2 (319 mAOD). However, there is some uncertainty in the groundwater contours in this area. Therefore, this water level may be the main water table or it could be a locally perched water table. However, since this well has not been used for at least 30 years and there are no plans to use it again, this well is not considered further.

**Table 9-11 Information on licenced abstractions within 5 km of the Quarry from NRW**

| Licence Holder | Type of abstraction | Licence ID | Distance from Site | Source | Purpose | Mean Permitted Daily Rate ($m^3$/day) |
|---|---|---|---|---|---|---|
| **Welsh Water** | Surface water | 21/57/21/0001 | 2.1 km north west | Llwyn-onn Reservoir | Public water supply | 93,425 |
| **Welsh Water** | Surface water | 21/57/21/0004 | 2.1 km north west | Llwyn-onn Reservoir | Hydroelectric power generation | 51,840 |
| | | | | | Aquaculture | |
| **Welsh Water** | Surface water | 21/57/21/0002 | 2.6 km north east | Pontsticill Reservoir | Public water supply | 109,403 |
| **Natural Resources Wales** | Surface water | WA/057/0021/009 | 4.2 km north west | Garwent Fawr | Hydroelectric power generation | 6825.6 |
| **Miller Argent (South Wales) Ltd** | Surface water | 21/57/22/0009 | 5.0 km south east | Surface water pond | Transfer between sources | 272.76 |

### *Designated environmental sites*

Designated sites within 4 km of the Quarry are summarised in Table 9-12 and the locations of these are shown in **Figure 9.19** (ES **Appendix 9.1**). Five of these seven designated sites support various habitats and therefore could be water dependent. Two areas of the Site also overlap with the boundary of the BBNP. The closest designated site to the Site is Nant y Glais SSSI, which is 140 m north-east of the Quarry at its closest approach. Nant y Glais SSSI is designated for the extensive cave systems present in the limestone gorge (see Section 9.2.2 – *Local geology*) and their fauna include white trout and a species of cave-dwelling spider.

The next closest designated site is Cwm Taf Fechan SSSI, which lies 150 m south-east of the Quarry and is designated for mixed deciduous woodland including flora living around tufa springs. Approximately half of this SSSI is also designated as a Local Nature Reserve (LNR).

**Table 9-12 Neighbouring designated sites (within 4 km)**

| Name | Designation | Distance from Quarry | Reason(s) for designation(s) | Water-dependent? | Within VHSB[35] |
|---|---|---|---|---|---|
| **Brecon Beacons** | National Park | Present in west and east of Site | Wide variety of habitats, flora, fauna and geology | Yes | Yes |
| **Nant y Glais** | SSSI | 140 m north-east | Limestone gorge with two extensive vadose cave systems that host fauna assemblages of white trout and invertebrates | Yes | Yes |
| **Cwm Taf Fechan** | SSSI | 150 m south-east | Mixed deciduous woodland on steep slopes, with flora assemblages around tufa springs and bryophytes | Yes | Yes |
| **Cwm Taf Fechan** | LNR | 150 m south-east | | | |
| **Daren Fach** | SSSI | 1.1 km west | Upland ash woodland with limestone grassland; assemblage of rare and scarce flora including *Sorbus leyana* and *Hieracium cyathis* | Yes | No |
| **Penmoelallt** | SSSI | 1.5 km west | Mixed deciduous woodland including the rare species *Sorbus leyana* | Yes | No |
| **Baltic and Tyle-r Bont Quarries** | SSSI | 2.5 km north-east | Designated for geological outcrops of Dinantian limestone stratigraphy in disused quarries | No | No |
| **Abercriban Quarries** | SSSI | 3.0 km north-east | Geological outcrops of the Grey Grit Formation in disused quarries, including the type section | No | No |
| **Cwm Glo a Glyndyrys** | SSSI | 3.5 km south | Marsh and acid grassland habitats with diverse assemblages of grassland fungi | Yes | No |

[35] VHSB = Vaynor Hydrological Scope Boundary defines the limits of potential hydrological impacts from the Site. Receptors outside this area would not be affected by the development of the Site. See Section 9.2.8.

Daren Fach, Penmoelallt and Cwm Glo a Glyndyrys SSSIs lie 1.1 km west and 3.5 km south of the Quarry respectively and are designated for woodland and grassland habitats. This includes the rare whitebeam species Sorbus leyana, which is believed to only be present at Daren Fach and Penmoelallt SSSIs in all the world. Daren Fach SSSI citation indicates issues and springs are also present.

Baltic and Tyle-r Bont Quarries SSSI and Abercriban Quarries SSSI, located 2.3 – 3.0 km north-east of the Site, are designated for geological outcrops showing Dinantian limestone stratigraphy and the Grey Grits Formation type section, respectively.

### 9.2.8 Hydrogeological Conceptual Model

**Figure 9.26** and **Figure 9.27** (ES **Appendix 9.1**) show conceptual hydrogeological cross sections running approximately east-west and north-west to south-east through the Quarry respectively. These cross sections have been drawn to demonstrate the conceptual understanding and more details are outlined in this section.

The bedrock geology consists of Carboniferous strata with the economic Dowlais Limestone Formation being underlain by the Llanelly Formation and Abercriban Oolite. Each of these formations consists of various types of limestone interbedded with shale, clay and dolomite (Abercriban Oolite only). The Cwmyniscoy Mudstone Formation, dominantly comprised of interbedded mudstones, forms the base of this sequence. These strata dip gently at 5 - 10º to the south-east.

Contacts between the bedrock strata are offset by faulting, particularly by the faults associated with the Nant-y-Glais cave system to the east. This causes older strata to be juxtaposed against the Dowlais Limestone, as is shown in **Figure 9.26**. It is inferred that the faults form a horst block of older strata. The Abercriban Oolite forms the base on the caves in this area.

Superficial deposits coverage is limited in extent and drift deposits primarily occur along river valleys with glacial till cropping out on some of the interfluves.

The hydrology of the area around the Quarry is dominated by the south-westerly draining Taf Fechan 300 m to the south of the Quarry and the southerly draining Afon Taf Fawr, approximately 1.3 km to the west. The Nant y Glais flows along a section of the eastern Site boundary and drains moorland north of the Site. The Nant y Glais flows southwards, predominantly through the Nant y Glais cave system and joins the Taf Fechan approximately 200 m to the south-east of the Quarry.

Rapid recharge would occur to the aquifer through sinkholes that are present across much of the Dowlais Limestone Formation outcrop area. This capturing of runoff by the aquifer leads to a reduction in the number of streams. Recharge will be through rainfall over the aquifer outcrop areas and from runoff from the Cwmyniscoy Mudstone Formation to the north. The presence of glacial till will limit rainfall recharge where this is present (potentially redistributing it elsewhere).

Groundwater flow through the limestone is expected to be through fissures, fractures, and karst features. Groundwater flows to the south-east at the Site, broadly parallel to the dip of the formation. Discharge will be to the watercourses and springs to the south, east, and west. At the location of the Quarry the groundwater flow direction is to the south east, in line with the stratigraphic and pre-quarrying topographic dip.

The boundaries of the groundwater unit within which the Quarry sits can be defined by the south (Taf Fechan), east (Nant y Glais) and west (Afon Taf Fawr). The underlying Cwmyniscoy Mudstone Formation acts as an aquitard forming the effective base of the regional aquifer and the northern boundary of the groundwater unit (as defined in ESI (2017) and agreed with NRW). This boundary is referred to as the Vaynor Hydrological Scope Boundary (VHSB) and defines the boundary to the aquifer that could be impacted by the quarry development. Areas outside this boundary would not be affected by the development of the Quarry. Low hydraulic conductivity units within the overlying limestones, in particular within the Llanelly Formation, appears to limit vertical flow locally, depending on the unit thickness. This results in a vertically downwards hydraulic gradient and some hydraulic separation between formations. Some perching is also expected above lower permeability mudstone layers.

The role of faults in groundwater flow is unclear. They may restrict groundwater flow perpendicular to them and enhance it parallel to them, but this has not been demonstrated. This may limit flows from the Quarry to the Nant y Glais cave system. The caves which lie along the Nant y Glais have a strong connection with the stream and accept water from it via sinks in the stream bed as well as discharging to it via a number of resurgences. Under normal conditions most of the flow immediately upstream of the northernmost sinks is diverted into the caves. Much of this flow is interpreted to be "rapid flow" from the shallow groundwater system.

Groundwater discharges via springs in the Cwm Taf Fechan and Nant y Glais SSSIs. These springs have variable flow regimes but all are thought to be sourced from the Limestone aquifer.

## 9.3 Proposed Development

### 9.3.1 Operational Stage

Operational plans are provided in ES Chapter 3.0 . These have been produced to indicate the extent of quarrying over six phases (end of years 5, 10, 15, 30, 60 and full quarry development) and a summary of the proposed development at each stage is provided in Chapter 3.0. A mobile mineral processing plant would be used during each of the operational phases.

In the first five years of the development, quarrying will occur in the western arm only, with some extraction up to 4.5 m below the water table. All of this additional groundwater inflow, along with surface water runoff, will be contained within the western arm and will infiltrate (as per current conditions). The surface water runoff catchment area for the western arm will increase slightly.

From Year 5 to 10, quarrying will continue in the northern area of the western arm, but also in the central area between the two quarry arms to provide a connection for water from the western arm to flow into the south-east pond. Flow from the western arm would then occur once water levels reach 300 mAOD. This connection is proposed to be in place before Year 10 of the development.

From Year 10 to Year 15, quarrying continues in the central area to develop the south-east pond to its final depth across the width of the quarry by Year 15. This is to accommodate an increase in passive dewatering and runoff volumes as the catchment area to the south-east pond increases and the quarry is deepened. Quarrying will also continue in the north of the western arm. From Year 15 onwards, quarrying continues across the full quarry area to final development.

### 9.3.2 Restoration

It is proposed to restore the Quarry to a combination of low key agriculture and nature conservation as shown by the restoration plans in ES Chapter 4.0.

### 9.3.3 Estimate of Passive Dewatering

#### *Methodology*

Groundwater inflows intercepted by the quarry void have been estimated using a groundwater flow model calibrated to observed groundwater heads at the Site. Full details are provided by Stantec (2021) (see **Appendix 9.3**). Although this groundwater model is based on a previous iteration of the final development scheme, including quarrying to the south beyond the Overall Mining Site, the groundwater inflows are very unlikely to be significantly different as most inflows will occur in the northern part of the Quarry. The slightly larger extraction area used in the model means that it is conservative. The groundwater model acts as a proof of concept for the passive dewatering scheme and it is not considered necessary to update the model.

Groundwater inflows have been estimated for the current condition and full development condition by modelling the quarry void as a drain. Surface flows to the pond in the south-east have been estimated based on the catchment of the pond for the current void and final worked void conditions.

#### *Current groundwater inflows*

Under the Water Act transitional arrangements, Stantec on behalf of Hanson submitted an application for a transfer licence to NRW for the ongoing passive

dewatering at the Quarry (Stantec, 2019). Based on site visit observations, this estimated the current passive groundwater dewatering rate to be 900 m3/day (10.4 l/s). This water is removed from the limestone aquifer as the current base of the void intersects the groundwater surface. It then flows along the base of the void and re-infiltrates to the aquifer via ponds.

### *Future groundwater inflows at final development*

On the basis of the model calculations described in Stantec (2021) (see **Appendix 9.3**), the groundwater discharge following the proposed extension of the quarry to the north is calculated to increase to 20 l/s. It is noted that the model does not simulate perched water discharges and it is possible that the total combined discharge of perched and regional groundwater could be 25 l/s.

### *Future total inflows at final development*

Water inflows to the quarry comprise rainfall and groundwater discharges. Losses will occur from evaporation. Section 9.2.3 gives a SAAR rainfall of 1,659 mm/a. If it is assumed that 50% of this is lost due to evaporation, the net rainfall is 830 mm/a. The catchment area of the quarry void for the final development area is 52.97 ha. Thus, the net volume of water input to the Quarry from rainfall is 1,203 m3/d or 14 l/s. Groundwater discharge has been estimated above as 25 l/s, giving a total inflow of 39 l/s.

### *Total inflows at Year 10 in western arm*

Inflows into the western arm in the first ten years of development is discussed in more detail in the FCA (Stantec, 2022) produced as ES **Appendix 9.2**.

Before there is a drainage connection from the western arm to the south east pond, the western arm will need to accommodate runoff from a catchment that is 16% larger by Year 10 and with marginally higher groundwater inflows than at present. For a 24 hour 1 in 100 year storm event with 10% climate change allowance, there would be 15,077 m3 of runoff in the western void (based on the storm events in Stantec (2022) prorated by area). There is 14,600 m3 of storage in the western infiltration pond up to the spill-over point of 301.4 mAOD, plus an infiltration rate of up to 5,011 m3/day (based on 0.48 m/day at maximum pond extent). There are also other ponds in the western arm that provide additional storage. There are no reports or indications of overtopping at present and these calculations are conservative. Therefore, it is deemed that during the first ten years of the development there will be no runoff from the western arm leaving the Quarry.

### *Water management and discharge routes*

Passive dewatering is required to allow the mineral to be extracted. Intercepted groundwater and runoff to the quarry void will be allowed to drain southwards along the dip of the limestone beds. This is in line with what is currently occurring. Groundwater will be directed towards a pond in the southern part of the void where it will infiltrate to the limestone aquifer in accordance with current practices. There will be no surface water outflows from the ponds within the quarry void.

In the first ten years of the quarry development, most quarrying will occur in the western arm. It has been assessed that the estimated increased groundwater and surface water inflows to the western arm as a result of this development can be accommodated through infiltration in the southern part of the western arm as currently occurs (see above,– Total inflows at Year 10 in western arm).

Before year 10 of the development, a connection will be made between the western arm and the eastern arm, so that drainage from the western arm can flow into the south-east pond. This will provide additional infiltration capacity as development progresses. As the quarry void expands, the south-east pond will be enlarged to manage increased inflows from groundwater and surface water as the quarry void is deepened and the runoff catchment area increases. There will continue to be no surface water outflow from this pond, or anywhere else in the quarry void (although there will be from the wider Quarry to the south as discussed below).

Hanson intends to use mains water for various consumptive purposes, including wheel washing and dust suppression. If at a later stage the decision is made to abstract water from the quarry void for these uses, an abstraction licence would need to be applied for. The potential impacts (if any) of this abstraction would be considered by NRW during the licencing process.

Runoff and any intercepted groundwater in the former processing plant area will be discharged off-site via the culvert beneath Vaynor Road as per the current situation.

## 9.4 Hydrogeological Impact Assessment

### 9.4.1 Potential Impacts and Proposed Mitigation Measures

The array of potential impacts from quarrying activities associated with mineral extraction and subsequent quarry void restoration is well understood. A well designed quarry and standard mitigation measures can avoid many of these potential impacts. Table 9-13 lists potential impacts and the typical mitigation measures applied.

In the following sections the potential for the general hydrogeological impacts listed in Table 9-13 to apply to the receptors identified in Section 9.2.7 is discussed for the operational and restoration phases at the Quarry. The impact assessment methodology applied is set out in **Appendix 9.9**.

Each of the identified receptors has been assigned a value from low to high and, along with the magnitude of effect at each receptor, an associated degree of impact has been deduced. Where the degree of impact is more than minor, the potential impact is considered significant and mitigation measures have been proposed. These mitigation measures are detailed in Section 9.6.

**Table 9-13 Potential impacts of quarry development**

| No. | Type of Impact | Typical Mitigation Measures |
|---|---|---|
| **A** | **Impacts from quarry operation through lower groundwater levels in surrounding aquifer unit** | |
| **A1** | Impacts on water levels in nearby abstractions | Avoid working nearby, wet working, cut off walls, recharge trenches, discharge of compensation flows to drains |
| **A2** | Impacts on habitats sensitive to shallow groundwater levels | |
| **A3** | Impacts on water levels in any nearby ponds and lakes in connection with the aquifer | |
| **A4** | Impacts on baseflows in drains and watercourses sourced from dewatered aquifer | |
| **A5** | Impacts on neighbouring buildings and infrastructure caused by drawdown related settlement | |
| **B** | **Impacts from quarry operation on water quality** | |
| **B1** | Impacts on groundwater and surface water quality from standard plant operation | Settlement lagoons, standard planning conditions regarding bunding of fuel tanks, appropriate spill response procedures etc. |
| **C** | **Impacts from discharge of water** | |
| **C1** | Impacts on receiving watercourse quality | Settlement lagoons, controlled by discharge consent to be applied for |
| **C2** | Impacts on receiving watercourse flows | Covered by FCA |
| **C3** | Diversion of baseflow from one catchment to another | Relocation of discharge point, discharge of compensation flows to drains |
| **D** | **Impacts from restoration** | |
| **D1** | Long-term impact on groundwater levels and baseflow (can be either increased or decreased depending on restoration scheme) | Appropriate design of restoration, particularly the materials used to restore slopes and the level and location of the overflow point |
| **D2** | Additional loss of water from open water evaporation | Reduce areas of open water in restoration concept |

| No. | Type of Impact | Typical Mitigation Measures |
|---|---|---|
| D3 | Faster runoff and increased flood risk | SuDS-style overflow channels to minimise peak flows |

### 9.4.2 Impacts from the Operational Phase

#### *A1 Neighbouring abstractions*

All identified licenced abstractions are from surface water bodies and are at least 2 km away from the Quarry and most are beyond the boundaries of the regional aquifer system (VHSB). Based on an understanding of the hydrogeological conceptual model, the radius of influence from passive dewatering is not expected to extend this far and the level of effect and degree of impact on these highly sensitive and High/Medium value receptors are therefore both Negligible.

The spring-fed water supply at Llwyncilsanws Farm is 330 m north of the Site and is a Medium sensitivity receptor that could be affected by passive dewatering. However, it is also possible that the supply is fed by shallow groundwater sourced from upgradient of the Quarry that may be hydraulically isolated from passive dewatering at the Quarry. Indeed, the supply has only ceased to flow during periods of drought, even though passive dewatering has been ongoing. The level of effect could be Negligible to High dependent on the degree of connection, meaning that the degree of impact could also be Negligible to Major. Monitoring and mitigation measures have therefore been proposed.

#### *A2 Sensitive sites*

Nant y Glais SSSI, Cwm Taf Fechan Woodlands SSSI and Daren Fach SSSI are also considered as High value receptors.

Spring NG03 lies within the Nant y Glais Woodlands SSSI. The source of the water for NG03 is unclear but is likely to be at least partly related to flow in the limestone aquifer from the north and west. NG03 appears to be sourced from the Abercriban Oolite and lies on the opposite side of the Nant y Glais and Dowlais Fault. Although the behaviour of the fault is not known, it is likely that the degree of effect on NG03 will be Negligible and will result in a Negligible impact on the SSSI.

Cwm Taf Fechan SSSI is located to the south of the Quarry. It is expected that water draining from the south-east pond currently contributes to flows in the Cwm Taf Fechan SSSI springs and baseflow in the Taf Fechan. The pond will be retained and enlarged through quarrying. This will allow the hydraulic gradient south of the Quarry to remain unchanged. Indeed, as the pond is expanded, the hydraulic gradient may steepen through time meaning and in either case there will be no decrease in flows at the springs within the SSSI as a result of the development. Therefore, there will be no loss of flow to the Cwm Taf Fechan SSSI springs and the degrees of effect and impact are expected to be Negligible.

Daren Fach SSSI is located 1.1 km west of the Quarry and also features a number of springs. Given that it is outside of the VHSB (due to it not being underlain by Dowlais Limestone and the presence of intervening faults) there is not likely to be a hydraulic connection with the Quarry. Also, even if there was a connection, given the distance from the Quarry and the intervening faults, any drawdown effects here would be unlikely to be detectable. Therefore, the degrees of effect and impact are considered to be Negligible.

#### *A3 Ponds and lakes in connection with the aquifer*

The small ponds to the north-east of the Quarry are located east of the Nant y Glais and are most likely to be fed by rainfall. Impacts on these Medium value waterbodies will hence be Negligible. Similarly, small water features occupying dolines and sinkholes are likely to be ephemeral and fed by rainfall. Impacts on waterbodies outside of the Quarry boundary are therefore expected to be Negligible.

The south-east pond at the Quarry is relatively large and forms a habitat for great crested newt. This is therefore classified as a Medium value receptor. The degrees of effect and impact on the south-east pond will both be Negligible (following the implementation of the great crested newt translocation mitigation

strategy). The other smaller waterbodies in the quarry void are deemed to have no value and are therefore not considered to be receptors.

### *A4 Baseflow in drains and watercourses*

The Taf Fechan itself is not explicitly mentioned in the Cwm Taf Fechan Woodlands SSSI citation and therefore this watercourse is assessed as a High value receptor. The Nant y Glais cave system is an important habitat for white trout and therefore is considered as a High value receptor.

Baseflow in the Nant y Glais east of the extraction area at the Quarry is likely to supported by the Abercriban Oolite on which it lies. The Abercriban Oolite is separated from the Dowlais Limestone by the lower permeability Llanelly Formation. Therefore, it is likely that the degree of effect on the baseflow in the Nant y Glais in this area will be Negligible. This concept is further supported by the groundwater modelling which suggests an insignificant change in baseflow along the Nant y Glais due to the passive dewatering.

Baseflows in the Taf Fechan are currently supported by flow in the limestone sourced from the south-east pond. The hydraulic gradient south of the Quarry will be unchanged or may steepen through time meaning there will be no decrease in baseflows to the Taf Fechan and baseflow, or flow to the springs in the valley, may actually slightly increase. Therefore, there will be no loss of flow to the Taf Fechan and the degrees of effect and impact are expected to be Negligible. This concept is also consistent with the findings of the groundwater flow model.

Spring flows in NG01 and NG02 (outside of the SSSI) are sourced from the Dowlais Limestone and are directly east of the extraction area of the Quarry. Precise measurement of flow rates from these springs is not possible due to the difficulty in accessing the springs; however, records of visual observations confirm that NG01 rarely flows whereas NG02 has a consistent low-moderate flow on the order of 10 l/s.

These springs are both outside of the SSSI and downstream of it, and their contribution to the flow of the Nant y Glais is small. If small quantities of water are diverted from these springs due to the passive dewatering of the quarry void, it will ultimately discharge from groundwater as baseflow further downstream. . These springs are thought to be tufa-forming and therefore are an Annex I Habitat and, considering their small, localised and low-flowing nature, are classified as Medium value receptors.

The effect of dewatering at the quarry on spring flow is not clear as it depends on the catchment of the spring and the proportion of water from shallow recent rainfall recharge and deeper more long-term groundwater. NG01 and NG02 lie on the Dowlais Fault which may act as a pathway to more distant groundwater source in the north, rather than the Dowlais Limestone immediately from the west (where the Quarry is located). The effect on the flow rates in NGO1 and NG02 could be up to Medium due to the reduction in flow from the deeper, slow moving groundwater. . This results in a Moderate degree of impact. An assessment of mitigation requirements is discussed in Section 9.6.

### *A5 Settlement risk*

Buildings and other infrastructure could be susceptible to settlement if groundwater levels are drawn down at the Quarry and the underlying strata are compressible. The most proximal receptors are Trefechan (100 m south) and Llwyncilsanws Farm (160 m north-east). Both of these are identified as High Value receptors.

The limestone aquifer is a strong hard rock that has a low compressibility meaning that the risk of settlement from dewatering this stratum is negligible. The most compressible lithology within the Quarry vicinity that could experience drawdown is glacial till. Glacial till is often gravelly clay and could therefore be compressible. Geological mapping suggests that glacial till is present in the south and east of the Quarry but is absent beneath Llwyncilsanws Farm to the north. The level of effect on this receptor would therefore be Negligible. Drawdown effects to the south as intercepted groundwater would be re-infiltrated back into the limestone aquifer. Therefore, the level of effect on Trefechan will also be Negligible, meaning there will be a Negligible degree of impact.

### *B1 Impacts on water quality from plant operation*

Water quality could be affected by chemical spillages or mobilisation of suspended solids. The limestone aquifer is utilised for private water supply abstractions and supplies springs in SSSIs and has been assigned as a High value receptor.

Spills at the Quarry could feasibly occur from the accidental loss of fluids from mobile or fixed plant equipment. The level of effect on the limestone aquifer is considered to be Medium, meaning that there could be a Major degree of impact. Due to the potentially Major degree of impact on the limestone aquifer, mitigation measures are required.

Although the limestone aquifer is in hydraulic continuity with surrounding surface watercourses and waterbodies, there will be an inwards hydraulic gradient caused by passive dewatering. This means that there would not be any impact on receptors to the north, east and west. Spills that affect the limestone could, however, potentially affect surface water receptors to the south of the Quarry, namely the Taf Fechan and springs. Dilution and attenuation would reduce the effect of any spills; however, if transport is along karstic features, this would be minimal. The level of effect is therefore also assessed as Medium with the degree of impact being Major on these High value receptors.

### *C1 Impacts on receiving watercourse quality*

Runoff within the quarry void catchment will infiltrate to the limestone aquifer and will discharge to neighbouring watercourses; namely the Taf Fechan, via springs or as baseflow. This water will pass through the limestone aquifer prior to discharge which will provide some filtration leading to removal of fines. Therefore, the level of effect and degree of impact will be Negligible.

Runoff from the former fixed processing plant site will continue to discharge off-site south of Vaynor Road under the current arrangements, and the discharge will be undertaken in accordance with the existing discharge permit (**Appendix 9.7**). Once off-site, the discharge passes through a settlement pond south of Vaynor Road prior to the discharge compliance point. Hanson will clean out the settlement pond as required to ensure that the discharge consent is complied with. Therefore, the degrees of effect and impact on receiving watercourses will be Negligible.

### *C2 Impacts on receiving watercourse flows*

There is to be no water discharge from the Quarry above greenfield runoff rates, and all excess runoff will be attenuated within the Site. Further information regarding this is found in the accompanying FCA (Stantec, 2022), produced as **Appendix 9.2.**

### *C3 Diversion of baseflow from one catchment to another*

Modelling suggests that there will be limited change in baseflow in the Nant y Glais or the Taf Fechan due to passive dewatering at the Quarry.

## 9.4.3 Impacts following restoration

### *D1 Long term impacts on groundwater levels and baseflow*

Passive dewatering at the Quarry will be permanent and therefore the impacts to water receptors during the operational phase discussed in Section 9.4.2 will continue after restoration. As supported by the groundwater model, there will continue to be no significant impacts on downgradient groundwater levels following restoration of the Quarry. Whilst large drawdowns will occur to the north and lesser drawdowns to the east and west, these are not considered to be significant impacts. The degree of impact on adjacent receptors identified as part of A1 – A5 (above), will be maintained following restoration.

### *D2 Additional loss of water from open water evaporation*

A restored lake in the southern area of the extraction area is planned as part of the restoration scheme. Open water evaporation would cause losses to groundwater which could affect the availability of water in the catchment. Losses to groundwater could affect baseflows in the neighbouring watercourses and discharges to local groundwater discharge points. However, the proposed

area of open water and hence the rate of evapotranspiration is relatively small in comparison to the total catchments of the neighbouring watercourses. Consequently, the level of effect and degree of impact is inferred to be negligible.

### *D3 Faster runoff and increased flood risk*

Runoff at the Quarry will increase due to climate change. This runoff will be attenuated and infiltrated by the restored lake and as such there would not be an increased flood risk. The accompanying FCA contains a detailed drainage strategy to ensure that runoff from the Quarry will not increase above the greenfield runoff rates (Stantec, 2022), **Appendix 9.2**.

## 9.5 Summary

Table 9-14 summarises the impacts of the operational phase. Table 9-15 summarises the impact from the proposed Site restoration.

**Table 9-14 summary of impacts - operational phase**

| No. | Type of Impact | Receptor | Receptor Value | Degree of Effect | Degree of Impact pre mitigation | Mitigation Required | Degree of Impact post mitigation |
|---|---|---|---|---|---|---|---|
| **A** | **Impacts on groundwater levels** | | | | | | |
| **A1** | Neighbouring abstractions | Llwyncilsanws Farm | Medium | Negligible – High | Negligible – Major | Yes | Negligible |
| | | Other licenced abstractions | Medium/High | Negligible | Negligible | No | Negligible |
| **A2** | Effects on environmental sites | Nant y Glais SSSI (NG03) | High | Negligible | Negligible | No | Negligible |
| | | Cwm Taff Fechan SSSI/LNR | High | Negligible | Negligible | No | Negligible |
| | | Daren Fach SSSI | High | Negligible | Negligible | No | Negligible |
| **A3** | Impacts on surface water bodies | South-east pond<br>Ponds east of Nant y Glais | Medium | Negligible | Negligible | No | Negligible |
| **A4** | Impacts on baseflow and watercourses | Nant y Glais | High | Negligible | Negligible | No | Negligible |
| | | Springs at Nant y Glais (NG01 and NG02) | Medium | Medium | Moderate | See Section 9.6 | Moderate |
| | | Taff Fechan | High | Negligible | Negligible | No | Negligible |
| **A5** | Settlement risk | Surrounding buildings and infrastructure | High | Negligible | Negligible | No | Negligible |
| **B** | **Water quality impacts** | | | | | | |
| **B1** | Spillage of fuels and release of suspended solids etc. | Limestone aquifer | High | Medium | Major | Yes | Negligible |
| | | Taff Fechan | High | Medium | Major | Yes | Negligible |
| **C** | **Impacts from discharge of water from dewatering operations** | | | | | | |

| No. | Type of Impact | Receptor | Receptor Value | Degree of Effect | Degree of Impact pre mitigation | Mitigation Required | Degree of Impact post mitigation |
|---|---|---|---|---|---|---|---|
| **C1** | Effects on receiving watercourse water quality | Taff Fechan | High | Negligible | Negligible | No | Negligible |
| **C2** | Impacts on receiving watercourse flows | Taff Fechan | See Stantec (2022) | | | | |
| **C3** | Diversion of baseflow between catchments | Nant y Glais / Taff Fechan | High | Negligible | Negligible | No | Negligible |

**Table 9-15 Summary of impacts – restoration phase**

| No. | Type of Impact | Receptor | Receptor value | Level of Effect | Degree of Impact | Mitigation Required |
|---|---|---|---|---|---|---|
| **D1** | Long term impact on groundwater levels | Limestone aquifer and dependent downstream receptors as given in Table 9.14 | High | Negligible | Negligible | No |
| **D2** | Additional loss of water from open water evaporation | Limestone aquifer and dependent downstream receptors as given in Table 9.14 | High | Negligible | Negligible | No |
| **D3** | Faster runoff and increase in flood risk | Buildings & infrastructure | See Stantec (2022) | | | |

## 9.6 Mitigation Measures

Section 9.4.2 above concludes that with the exception of possible impacts to the spring-fed water supply to Llwyncilsanws Farm, there will be negligible impact to other neighbouring abstractions based upon distance and the predicted degree of drawdown. Similarly, the potential impact to other sensitive sites (springs and SSSIs in the vicinity), and on baseflows in surface watercourses are all assessed as 'negligible' with no mitigation required (ref Table 9.14). The required mitigation is thus confined to conventional fuel and oil handling protocols, and mitigation measures in the event of an identified adverse impact to the Llwyncilsanws Farm private water supply which is attributable to quarrying operations at Vaynor..

Possible reduction in flows at the spring NG01 and NG02 are considered to result in up to a Moderate impact. This is due to their status as an Annex I Habitat. Water diverted from the springs will discharge slightly further downstream, resulting in an overall minimal change in discharge from groundwater to surface water. Maintaining tufa formation through augmentation of water flows to the springs would present significant challenges, as tufa forms under specific physico-chemical conditions and this would require pumping in perpetuity. It is noted that NG01 rarely flows and both springs are outside of the Nant y Glais SSSI, and therefore it is considered that this impact is not significant and does not change the overall character of the Nant y Glais. Mitigation therefore is not proposed due to the environmental costs (and economic viability) of pumping in perpetuity with the effectiveness not guaranteed.

Potential water quality impacts will be addressed by standard planning conditions. A spill is considered unlikely; however, were this to occur, it would be retained within the active quarry void for a sufficient length of time to allow it to be collected using oil absorbent materials, with standard operational procedures from a Hanson ISO 14001 certified environmental management system. Contaminated material would then be disposed of in accordance with current best industry practices.

Facilities for the storage of soils, fuels or chemicals will be sited on an impervious base and surrounded by impervious bund walls. The volume of the bunded compound will be greater than the tank capacity (i.e. at least 110%). Filling points, vents, gauges and sight glasses will be located within the bund walls. The bund drainage system will be sealed with no discharge to any watercourse, land, or underground strata permitted. Associated pipework will be located above ground and protected so as to prevent accidental damage. All filling points and tank overflow pipe outlets will discharge downwards into the bund.

Drainage systems at the Quarry will be regularly inspected to ensure that visible oil is not present. The environmental management system will be used to ensure that all procedures follow best practice.

Water in the pond at the southern end of the quarry void will be groundwater and rainfall runoff, and hence is expected to be clean. Suspended solid concentrations may become elevated due to the movement of mobile plant equipment or runoff, particularly during storm events. Discharge from the pond will be via infiltration back into the limestone aquifer through the base of the pond and there is not expected to be any surface water outflow.

Any discharge from areas of the former processing plant area (south of the pond) will be controlled by the terms of the existing discharge permit (ID: AF4026001/T002). It is recommended that the suspended solids concentration of any off-site discharge is monitored regularly to allow compliance in accordance with the discharge permit.

Flood risk and drainage mitigation measures are presented separately in the accompanying FCA (Stantec, 2022).

## 9.7 Proposed monitoring

Flows at the Llwyncilsanws Farm private water supply springs will be monitored initially on a monthly basis with the option to review this frequency. Should a material reduction in spring flow occur that is not related to climate, Hanson will provide Llwyncilsanws Farm with an alternative source of water. This could be through drilling a water supply borehole or by connection to mains water. Any such measures would be agreed privately between Hanson and the Farm owner.

## 9.8 Conclusions

Hanson is proposing to recommence limestone extraction from the currently mothballed Vaynor Quarry at some future date. It is proposed that limestone extraction will be undertaken over multiple phases, lasting approximately 100 years. During limestone extraction, the quarry void will be passively dewatered. Intercepted groundwater and runoff will be infiltrated back into the limestone aquifer at the southern end of the extraction area and there will be no net loss of water from the aquifer. Following completion of the quarrying operations, the Quarry will be restored to a predominantly nature conservation based after-use.

Stantec has reviewed the potential hydrogeological and hydrological impacts of the development at the Quarry and subsequent restoration. Potential impacts to neighbouring abstractions, surface water bodies, water quality and sensitive sites have been assessed.

The most proximal receptors include a private water supply abstraction (at Llwyncilsanws Farm), the Nant y Glais SSSI, the Cwm Taf Fechan SSSI, the Nant y Glais and the limestone aquifer. The study has concluded that impacts on all receptors, prior to any mitigation measures, would be insignificant except at the private water supply at Llwyncilsanws Farm, potential water quality impacts on the limestone aquifer, and at springs on the Nant y Glais (NG01 and NG02). Upon implementation of the proposed mitigation measures, the study concludes that the impact at Llwyncilsanws Farm and the limestone aquifer water quality would be insignificant. Whilst impacts to the springs (NG01 and NG02) are potentially significant, they are not reasonably mitigable.

Passive dewatering could cause potentially significant impacts on the Llwyncilsanws Farm private water supply abstraction. It is therefore proposed to implement a monitoring programme to monitor effects at that receptor. Should monitoring indicate a significant impact at Llwyncilsanws Farm, Hanson would provide an alternative source of water.

Potential water quality impacts on the limestone aquifer will be mitigated by applying standard planning conditions to the planning permission requiring the implementation of fuel and oil handling protocols.

## 9.9 References

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# 10.0 NOISE

## 10.1 Introduction

A study of the noise effects associated with the recommencement of working at the currently inactive Vaynor Quarry has been undertaken by Walker Beak Mason Limited (WBM). As part of that exercise, baseline noise surveys have been carried out to establish existing noise levels in the vicinity of the site. The noise implications of the proposed operations have been assessed by comparing calculated site noise levels with suggested site noise limits.

This chapter of the ES examines the environmental noise impact of rock extraction operations, processing operations and associated workings at Vaynor Quarry. It sets out the findings of noise surveys conducted in July 2021 at positions representative of the closest dwellings to the site. It also provides the calculated noise levels arising from the workings and considers the possibility of the need for any mitigation measures where necessary aimed at enabling the site to conform with acceptable noise levels at all dwellings.

In order to appreciate some of the terms, **Appendix 10.1** describes the noise units that are referred to in this chapter.

## 10.2 Assessment Methodology

The various relevant noise guidance documents used in this assessment are detailed below.

### 10.2.1 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 (TAN 11).

TAN 11 provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development.

TAN 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 (MPG11) which, in England, was superseded by Minerals Planning Statement 2 (MPS 2) "Controlling and Mitigating the Environmental Effects of Mineral Extraction" Annex 2: Noise, dated March 2005. MPS2 was cancelled for England by the National Planning Policy Framework (NPPF) in March 2012, but parts of MPG11 remain extant in Wales, as discussed below.

### 10.2.2 Minerals Technical Advice Note 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.

Paragraph 85 of MTAN 1 requires noise impacts to be minimised to acceptable levels, where aggregate extraction and related operations occur close to noise sensitive areas.

Paragraph 86 of MTAN 1 refers to MPG 11 and TAN 11.

Paragraph 87 of MTAN 1 states: "*The aggregates industry should aim to keep noise emissions at a level that reflects the highest possible environmental standards, taking all reasonable steps to achieve quieter working while having regard to the principles of BATNEEC – the best available technique not entailing excessive cost. MPAs should have regard to the background noise levels and the threshold at which significant effects are likely at noise sensitive areas and properties when considering the acceptability of proposals or setting site noise limits in a planning condition. Conditions on planning permissions should identify the noise sensitive properties at which site noise limits are set and establish a scheme of monitoring that identifies how, where and when noise is to be measured and how the results will be used and assessed.*"

Paragraph 88 relates to site 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."*

### 10.2.3 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. As noted above, 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 MPG11 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*."

## 10.3 Site Description

The Hanson Vaynor site lies to the north of Trefechan, Merthyr Tydfil in a mainly rural location.

The majority of residential properties near to the site are on Sweetwater Park and High Trees, located to the south of the site in the north part of Trefechan. There are isolated properties to the north-east and east of the site.

There is undeveloped countryside to the west of the site.

The locations of the nearest residential properties to the site are shown in **Appendix 10.2** and considered in more detail in Section 10.4.

## 10.4 Existing Noise Levels

The closest noise sensitive properties, in each direction, to the extraction, processing and stockpiling/loading areas have been selected as representative of the properties potentially most affected by the operation.

The receptors selected for the purposes of this study are:

A/B Llwyncilsanws Farm (2 locations)
C Pen-rhiw-glais
D Glenview
E Llansay
F Former Pontsarn Hotel
G Aberglais
H Sweetwater Park 1 (western extent)
I Sweetwater Park 2 (No 62)
J Sweetwater Park 3 / High Trees

The noise assessment locations are shown on a site plan in **Appendix 10.2**.

The following locations were selected for the attended noise sample measurements undertaken as part of the baseline noise surveys.

1. Llwyncilsanws Farm (to represent receptors A & B)
2. Pen-rhiw-glais (to represent receptor C)
3. Taf Fechan Nature Reserve (for informative purposes only)
4. Sweetwater Park / High Trees (to represent receptor J)
5. Sweetwater Park (to represent receptor H & I
6. Glenview, LLansay, Pontsarn Hotel and Aberglais (to represent receptors D to G).

These measurement locations are also shown on a plan in **Appendix 10.2.**

Attended sample measurements were undertaken on the following days for daytime working periods ( 07.00 hrs – 19.00 hrs ):

Thursday 15 July 2021 between 12:30 and 16:15;

Friday 16 July 2021 between 09:30 and 12:00;

Thursday 22 July 2021 between 12:45 and 17:00; &

Friday 23 July 2021 between 09:15 and 13:00.

In addition to the sample measurements, a data logging sound level meter was installed at Llwyncilsanws Farm (Location 1) on Thursday 15 July 2021 and was collected on Friday 23 July 2021.

Distant and local road traffic noise controlled the background and ambient noise levels, but the noise climate at individual locations was also affected at times by wind movement in trees, birdsong, aircraft and local activity.

The survey details and results are presented in **Appendix 10.3** for the installed meter, and in Appendix 10.4 for the sample measurements.

### 10.4.1 Existing Daytime Noise Levels (07:00-19:00)

The average daytime background noise levels, $L_{A90,T}$, measured during the surveys in July 2021 for each of the closest noise sensitive properties have been averaged arithmetically from the individual sample results and from the longer term surveys.

These averages represent the existing daytime background noise levels at the nearest noise sensitive properties to the site in each direction. It is usual to average the results of two or more surveys in this way, since background level may vary with wind direction and speed, rather than selecting the results from only one survey or the absolute minimum values from a number of surveys.

The survey, instrumentation and calibration details and the results of the surveys are shown in **Appendices 10.3 and 10.4**. The weather conditions during installation period are presented in **Appendix 10.3** and the weather conditions during the attended surveys are shown in **Appendix 10.4.**

The existing daytime noise levels from the attended sample measurements at each of the dwellings are summarised in table 10.1 below with the average measured weekday daytime noise levels from the installed sound level meter also presented.

**Table 10-1: Existing Average Daytime Noise Levels**

| Location | Average Results dB | |
|---|---|---|
| | $L_{A90,15min}$ | $L_{Aeq,15min}$ |
| 1. Llwyncilsanws Farm (samples) | 33 | 45 |
| 1. Llwyncilsanws Farm (install) | 32 | 46 |
| 2. Pen-rhiw-glais | 34 | 53 |
| 3. Taf Fechan Nature Reserve | 45 | 48 |
| 4. Sweetwater Park (High Trees) | 39 | 58 |
| 5. Sweetwater Park (No. 62) | 34 | 52 |
| 6.Llansay/Glenview/Pontsarn Hotel/Aberglais | 37 | 50 |

The baseline noise surveys were undertaken during July 2021 when activity in the UK was affected by the pandemic. Although there were no specific lockdowns in place during the surveys, local activities and road traffic flows appeared to be reduced. The impact of this on the baseline noise surveys is that the measured background levels may be lower than compared to those measured during “normal” activities.

In general, the average background noise levels at residential receptors (Locations 1, 2, 4, 5 and 6) were in the range 32-39 dB $L_{A90,15min}$ mainly due to distant road traffic.

The background level at Location 3 (Taf Fechan Nature Reserve) was higher at 45 dB $L_{A90,15min}$ due to noise from flowing water from the local waterway.

## 10.5 Site Noise Calculations Methodology

### 10.5.1 Site Operations and Scenarios Examined

At Vaynor Quarry, the rock will be extracted by drilling and blasting, loaded into crushing and screening plant within the extraction area before being hauled by dump trucks for stockpiling in a stockyard close to the entrance to the quarry.

The machinery and plant associated with rock extraction and processing can be divided into groups. These are the rock drill on the rock head; excavators and secondary breakage of material at the working face one bench down; crushing and screening plant in the extraction area, with dump trucks used to transport the rock from the face; and use of a loading shovel in the stockyard area with road going lorries for the transportation of material off site.

The plant items will work at different physical levels within the quarry, based on the topographic data provided by the operator over the course of the life of the site.

The topographic data has been provided for the following development years:

- Existing;
- 5 years;
- 10 years;
- 15 years;
- 30 years; and
- 60 years.

A final topographic map showing the site after extraction has been completed was also provided.

The different scenarios considered in the calculations are as follows:

- Existing to Five Years (extraction in western part of site);
- Five Years to Ten Years Scenario 1 (extraction at highest/closest point to Llwyncilsanws Farm);
- Five Years to Ten Years Scenario 2 (extraction at closest point to Sweetwater Park and eastern receptors);
- Ten Years to Fifteen Years Scenario 1 (extraction at highest/closest point to Llwyncilsanws Farm);
- Ten Years to Fifteen Years Scenario 2 (extraction at closest point to Sweetwater Park and eastern receptors);
- Fifteen Years to Thirty Years Scenario 1 (extraction at highest/closest point to Llwyncilsanws Farm);
- Fifteen Years to Thirty Years Scenario 2 (extraction at closest point to Sweetwater Park and eastern receptors);
- Thirty Years to Sixty Years Scenario 1 (extraction at highest/closest point to Llwyncilsanws Farm);
- Thirty Years to Sixty Years Scenario 2 (extraction at closest point to Sweetwater Park and eastern receptors);
- Sixty Years to End Scenario 1 (extraction at highest/closest point to Llwyncilsanws Farm); and
- Sixty Years to End Scenario 2 (extraction at closest point to Sweetwater Park and eastern receptors)

These scenarios were selected to represent the realistic worst-case conditions for each stage of the development of the site.

### 10.5.2 Calculation Assumptions

The following assumptions apply to the calculation scenarios:

The rock drill is placed on the highest ground level possible for each scenario with the remaining plant that will be used in the bench below the rock drill (excavators, crushers, screens).

The dump truck route to the stockyard area has been approximated for the purposes of the calculations.

Stockpiling of the processed material and loading into HGVs for transport off site is included in the model in the designated stockyard area close to the site entrance.

Following preliminary calculations, a 5 metre high soil storage bund in the vicinity of Llwyncilsanws Farm is included in the calculations from Year 5 onwards.

No additional mitigation measures have been included in the model due to the topography to the south and east of the site being such that bunding in those areas would be ineffective.

The calculations do take into account the existing and future topography across the site.

The plant items included in the noise assessment are listed as part of the SoundPLAN calculation assumptions, presented in **Appendix 10.5**.

Sound Power Levels, or noise output of each selected plant item (along with on times/number of movements and source heights) are also shown in the SoundPLAN calculation assumptions table presented in **Appendix 10.5**. The plant noise data are for typical plant and machinery that are used at such a site. The specific plant items to be used could not be measured at the Vaynor site as it is not currently operational, and therefore measurements at other site of items similar to those proposed have been used in the calculations.

It has been assumed that most plant items work 100% of the assessment period of one hour at these locations apart from use of the hydraulic hammer (which has been input as taking place 50% of the hour), use of the loading shovel in the stockpile area to load HGVs (25%) and the tipping of aggregate material in the stockyard (10%).

### 10.5.3 Calculations and Calculated Site Noise Levels

The noise output from the proposed operations depends on the method of working and the plant chosen to work the site as much as on the distance to the neighbouring properties and the effects of intervening ground. Proper allowance can be made for noise decay with distance from the various noise sources and for the effects of ground absorption or screening.

In order to present the noise levels for the proposed site operations, the contribution from each significant specific noise source has been evaluated separately and then combined together to give the overall noise level.

The combined effect of drilling and secondary breaking, loading at the face, crushing and screening, hauling, stockyard activity and access road noise has been calculated in terms of $L_{Aeq,T}$ noise levels at the representative receptor properties with screening from the intervening landforms, and the proposed soil/overburden storage bund (after 5 years) or working face taken into account. The realistic "worst case" $L_{Aeq,T}$ noise levels, representing the highest site noise levels calculated for each property, are presented in this chapter.

Calculations have been undertaken for two scenarios:

- Scenario 1 - extraction occurs at the highest/closest point to Llwyncilsanws Farm.
- Scenario 2, extraction occurs at the closest point to Sweetwater Park and the eastern receptors.

The calculations are based on ISO 9613-2:1996. Plots of the noise contour maps generated for the proposed operations in each of the scenarios considered over the life of Vaynor Quarry are presented in **Appendix 10.6.**

The reasonable worst case overall $L_{Aeq,1h}$ noise levels for site noise due to routine operations on site, calculated at each property under the conditions set out, are tabled in **Appendix 10.7**.

## 10.6 Calculated Site Noise – Routine Operations

The calculated site noise levels for each receptor are summarised per receptor (or group of receptors) in this section. Where the summary table is for a group of receptors, the range of calculated site noise level is shown.

For Scenario 1, extraction occurs at the highest/closest point to Llwyncilsanws Farm. For Scenario 2, extraction occurs at the closest point to Sweetwater Park and the eastern receptors.

Note that the calculations take both distance and screening into account. For some scenarios, the screening provided by the intervening landform or bund may be reduced compared to other scenarios, resulting in elevated noise levels.

### 10.6.1 Receptors A & B

This calculation summary is for Receptors A & B at Llwyncilsanws Farm to the north of the site.

**Table 10-2: Calculated Site Noise at Receptors A & B**

| Development Years | Scenario | Calculated Site Noise Level dB $L_{Aeq,1h}$ |
|---|---|---|
| Existing to 5 years | 1 only | 32 |
| 5-10 years | 1 | 31 |
| | 2 | 41 |
| 10-15 years | 1 | 34 |
| | 2 | 44-45 |
| 15-30 years | 1 | 43-46 |
| | 2 | 40-41 |
| 30-60 years | 1 | 38-39 |
| | 2 | 40 |
| 60 years to end | 1 | 37-38 |
| | 2 | 37 |

Note that some calculated noise levels for Scenario 2 are greater than those for Scenario 1 due to the reduction in screening attenuation.

At Llwyncilsanws Farm the average background noise levels were 33 dB $L_{A90,15min}$ from the sample measurements and 32 dB $L_{A90,15min}$ from the installed meter.

Following the guidance in MTAN1, the usual approach would be to suggest a noise limit of 42 dB $L_{Aeq,1h}$ based on the lower background noise measured during the installed meter.

This limit can be met for most of the development years and scenarios considered, however, the limit would be exceeded for Development Years 10-15 Scenario 2 (by 3 dB) and Development Years 15-30 Scenario 1 (by 4 dB). The highest calculated site noise level is 46 dB $L_{Aeq,1h}$ for 15-30 years Scenario 1.

### 10.6.2 Receptor C

This calculation summary is for Receptor C at Pen-rhiw-glais to the east of the site.

**Table 10-3: Calculated Site Noise at Receptor C**

| Development Years | Scenario | Calculated Site Noise Level dB $L_{Aeq,1h}$ |
|---|---|---|
| Existing to 5 years | 1 only | 38 |
| 5-10 years | 1 | 32 |
| | 2 | 52 |
| 10-15 years | 1 | 38 |
| | 2 | 52 |

| Development Years | Scenario | Calculated Site Noise Level dB $L_{Aeq,1h}$ |
|---|---|---|
| 15-30 years | 1 | 51 |
| | 2 | 49 |
| 30-60 years | 1 | 48 |
| | 2 | 49 |
| 60 years to end | 1 | 48 |
| | 2 | 47 |

At Pen-rhiw-glais the average background noise level was 34 dB $L_{A90,15min}$ from the sample measurements. Following the guidance in MTAN1, the usual approach would be to suggest a noise limit of 44 dB $L_{Aeq,1h}$

This limit would be exceeded for the majority of the development years and scenarios considered by up to 8 dB. The highest calculated site noise level is 52 dB $L_{Aeq,1h}$ for 5-10 years Scenario 2 and 10-15 years Scenario 2.

### 10.6.3 Receptors D to G

This calculation summary is for Receptors D to G to the east of the site. These include Glenview, Llansay, the former Pontsarn Hotel and Aberglais.

**Table 10-4: Calculated Site Noise at Receptors D to G**

| Development Years | Scenario | Calculated Site Noise Level dB $L_{Aeq,1h}$ |
|---|---|---|
| Existing to 5 years | 1 only | 36-37 |
| 5-10 years | 1 | 30 |
| | 2 | 48-50 |
| 10-15 years | 1 | 36-38 |
| | 2 | 48-50 |
| 15-30 years | 1 | 49-51 |
| | 2 | 47-49 |
| 30-60 years | 1 | 46-47 |
| | 2 | 48-49 |
| 60 years to end | 1 | 46-48 |
| | 2 | 43 |

At Receptors D to G (isolated properties to the east of the site) the average background noise level was 37 dB $L_{A90,15min}$ from the sample measurements. Following the guidance in MTAN1, the usual approach would be to suggest a noise limit of 47 dB $L_{Aeq,1h}$

This limit would be exceeded for several of the development years and scenarios considered by up to 4 dB. The highest calculated site noise level is 51 dB $L_{Aeq,1h}$ for 15-30 years Scenario 1.

### 10.6.4 Receptors H & I

This calculation summary is for Receptors H and I on Sweetwater Park to the south of the site. The calculation results for these receptors are presented separately

**Table 10-5: Calculated Site Noise at Receptors H & I**

| Development Years | Scenario | Calculated Site Noise Level dB $L_{Aeq,1h}$ | |
|---|---|---|---|
| | | Receptor H | Receptor I |
| Existing to 5 years | 1 only | 37 | 44 |
| 5-10 years | 1 | 34 | 40 |
| | 2 | 45 | 46 |
| 10-15 years | 1 | 39 | 44 |
| | 2 | 44 | 46 |
| 15-30 years | 1 | 45 | 47 |
| | 2 | 41 | 45 |
| 30-60 years | 1 | 41 | 45 |
| | 2 | 42 | 45 |
| 60 years to end | 1 | 43 | 46 |
| | 2 | 36 | 43 |

At Receptors H & I on Sweetwater Park to the south of the site the average background noise level was 34 dB $L_{A90,15min}$ from the sample measurements. Following the guidance in MTAN1, the usual approach would be to suggest a noise limit of 44 dB $L_{Aeq,1h}$

For Receptor H (western extent of Sweetwater Park) this limit would be met for the majority of development year and scenarios considered. It is only exceeded for two years/scenarios and only by 1 dB.

For Receptor I (central Sweetwater Park) the limit would be exceeded for several of the development years and scenarios considered by up to 3 dB. The highest calculated site noise level is 47 dB $L_{Aeq,1h}$ for 15-30 years Scenario 1.

### 10.6.5 Receptor J

This calculation summary is for Receptor J, representing properties on the east end of Sweetwater Park and on High Trees, to the south of the site.

**Table 10-6: Calculated Site Noise at Receptor J**

| Development Years | Scenario | Calculated Site Noise Level dB $L_{Aeq,1h}$ |
|---|---|---|
| Existing to 5 years | 1 only | 41 |
| 5-10 years | 1 | 35 |
| | 2 | 43 |
| 10-15 years | 1 | 35 |
| | 2 | 43 |
| 15-30 years | 1 | 44 |
| | 2 | 41 |

| Development Years | Scenario | Calculated Site Noise Level dB $L_{Aeq,1h}$ |
|---|---|---|
| 30-60 years | 1 | 43 |
| | 2 | 42 |
| 60 years to end | 1 | 44 |
| | 2 | 38 |

At Receptor J, Sweetwater Park / High Trees, the average background noise level was 39 dB $L_{A90,15min}$ from the sample measurements. Following the guidance in MTAN1, the usual approach would be to suggest a noise limit of 49 dB $L_{Aeq,1h}$ This limit would be met for all of the development years and scenarios considered.

### 10.6.6 Suggested Noise Limits

As set out in Section 10.2, the primary planning guidance on noise in Wales is set out in TAN 11, which provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development.

The guidance in MTAN 1 (specifically for minerals sites in Wales) advises that aggregates sites should take all reasonable steps to achieve quieter working while having regard to the principles of BATNEEC – the best available technique not entailing excessive cost.

Similarly, MPG 11 provides advice on how to keep noise emissions from mineral site within environmentally acceptable limits without imposing unreasonable burdens on minerals operators (ref MPG1 para 1).

The proposed scheme at Vaynor includes a 5m bund to the north-east of the extraction area to protect Llwyncilsanws Farm from Year 5 onwards. No additional mitigation measures have been included in the model due to the topography to the south and east of the site being such that bunding in those areas would be ineffective. It is also proposed to use mobile crushing and screening plant located within the Application Site void, at distance from potentially sensitive receptors, rather than reinstate crushing and screening plant in the original southern plant site area which would be in close proximity to properties at Sweetwater Park. As such, the scheme has already undertaken reasonable steps to mitigate noise.

The usual approach with regard to noise limits would be to base these on the guidance in MTAN 1 and the measured background noise levels. The results of the baseline noise surveys found that average background levels in the vicinity of the nearest residential receptors were low, in the range 32-39 dB $L_{A90,T}$. MTAN1 suggests that noise limits should be based upon background noise limits plus 10 dB(A) which would indicate noise limits in the range of 42 – 49 $dB_{LAeq}$ ( see Table 10.1 above ). MTAN1 also makes reference to an upper limit of 55$dB_{LAeq}$ which it notes as being a lower limit of daytime noise where serious annoyance is caused.

The following table sets out the suggested noise limits for each receptor based on either the MTAN 1 guidance or, where the worst-case site noise calculations exceed this, the highest calculated site noise level.

**Table 10-7: Suggested Site Noise Limits**

| Receptor | Average Background Level dB $L_{A90,T}$ | Highest Calculated Site Noise Level dB $L_{Aeq,1h}$ | Suggested Site Noise Limit dB $L_{Aeq,1h}$ |
|---|---|---|---|
| A/B Llwyncilsanws Farm | 32 | 46 | **46** |
| C Pen-rhiw-glais | 34 | 52 | **52** |
| D Glenview | 37 | 51 | **51** |
| E Llansay | | | |

| Receptor | Average Background Level dB $L_{A90,T}$ | Highest Calculated Site Noise Level dB $L_{Aeq,1h}$ | Suggested Site Noise Limit dB $L_{Aeq,1h}$ |
|---|---|---|---|
| F Former Pontsarn Hotel | | | |
| G Aberglais | | | |
| H Sweetwater Park 1 | 34 | 45 | **45** |
| I Sweetwater Park 2 | 34 | 47 | **47** |
| J Sweetwater Park 3 | 39 | 44 | **49** |

Although the suggested limits for the majority of receptors are above the usual MTAN 1 approach of background noise levels + 10 dB, all of the suggested noise limits are below the upper limit of 55 dB $L_{Aeq,1h}$ set out in MTAN 1

To meet lower site noise limits would require substantial mitigation, such as restricting operations in terms of the allowable on-time per hour or restricting the geographical occurrence of operations within the site boundaries, which would impose an 'unreasonable burden' on Hanson as the mineral operator.

Guidance for ROMP applications are set in Minerals Planning Guidance Note 14 (MPG14) issued by the Welsh Office in September 1995. Paragraph 174 of MPG14 states the following with regard to periodic reviews:

"*174. The approach to be adopted to the determination of conditions following periodic reviews broadly follows that for initial reviews with two main differences. First, there is no distinction between periodic review sites that are working and those that are not. Secondly, where mpas determine conditions difference from those submitted by the applicant; and the effect of those conditions, other than restoration or aftercare conditions, is to restrict working rights further than before the review, a liability for compensation will always arise…*"

## 10.7 Calculated Site Noise – Temporary Operations

The operations of topsoil and overburden stripping, bund formation and the final restoration processes are often noisier than extraction as they tend to be closer and are usually unscreened but are of relatively short duration.

Paragraph 88 of MTAN1 states "*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."* This limit applies to operations that are capable of completion in a total period of no more than eight weeks in any twelve month period.

The most significant operation of this kind at Vaynor Quarry will be the construction of the soil storage bund to the north-east of the site in the vicinity of Llwyncilsanws Farm.

For the purpose of calculating the site noise levels due to the temporary operation of constructing the soil storage bund in the vicinity of Llwyncilsanws Farm, the following plant items were included in the calculations:

- Excavator;
- Dozer; and
- Dump Trucks.

The calculated noise level at Llwyncilsanws Farm due to the bund construction operations at the nearest point to the property is 62 dB $L_{Aeq,1h}$, i.e. below the MTAN1 recommended noise limit for such operations of 67 dB $L_{Aeq,1h}$. and it should be possible to complete the construction of the bund within a period of less than 8 weeks.

## 10.8 Conclusions

A study of the noise effects associated with the recommencement of working at the currently inactive Vaynor Quarry has been undertaken by Walker Beak Mason Limited (WBM).

As part of that exercise, noise surveys were conducted in July 2021 to provide baseline noise data at the nearest dwellings in the vicinity of the currently inactive quarry near Merthyr Tydfil. The noise surveys indicate that distant and local road traffic is the controlling noise source throughout the area with individual locations also being affected by other sources.

The extraction operation, crushing/screening, and associated operations, have been described and set out in terms of the equipment proposed to be used and typical Sound Power Levels of the plant to be used. These values have been used to determine the worst-case noise levels affecting the surrounding residential receptors.

Mitigation is incorporated into the scheme in the form of a bund to the north-east of the site, as well as confining mineral processing operations within the Overall Mining Site where future mineral extraction will take place, rather than in the former processing plant area further south. Calculations have determined that further screening from bunds to protect dwellings to the east and south of the site would be neither practical nor effective.

Noise limits have been suggested for the residential receptors based on either the guidance in MTAN 1 or the worst-case calculated site noise level. All of the suggested noise limits are below the upper limit of 55 dB $L_{Aeq,1h}$ set out in MTAN 1

To meet lower site noise limits would require substantial mitigation, such as restricting operations in terms of % on-time or restricting the geographical occurrence of operations within the site boundaries, which would impose an 'unreasonable burden' on Hanson as the mineral operator by restricting working rights.

# 11.0 BLAST VIBRATION

## 11.1 Introduction

This chapter considers the potential effects upon nearby receptors from vibration generated by blasting operations which will be associated with future operations undertaken at Vaynor Quarry.

The assessment notes the existing limits imposed by planning conditions and identifies a range of good practice measures which may be used to enable any identified impacts to be minimised and mitigated.

The detonation of explosive charges in a borehole (often referred to as a 'shot hole') generates stress waves causing localised distortion and cracking of the rock mass. Outside of this immediate vicinity, permanent deformation does not occur. Instead, the rapidly decaying stress waves cause the ground to exhibit elastic properties whereby rock particles are returned to their original position.

Despite the substantial design process involved in determining the parameters of the blast, such as borehole diameter, spacing, depth, amount of explosive etc, all blasts will generate vibration. This vibration occurs both through the ground and through the air (as a pressure wave). Ground vibration arising from blasting is calculated in terms of 'peak particle velocity' (PPV) and is measured in millimetres per second ($mms^{-1}$).

Air-Blast Overpressure represents the increase in pressure caused by a shock wave over and above normal atmospheric pressure. Modern blast-monitoring equipment is also capable of measuring peak overpressure data in terms of unweighted decibels (dB). Decibels, as used to describe airblast, should not be confused with or compared to dB(A), which are commonly used to describe relatively steady-state noise levels (as in ES chapter 10.0 above).

If not properly regulated, blast induced vibration has the potential to cause damage to properties or structures and loss of amenity to residential properties. It is however important to realise that for any given blast it is very much in the operator's interest to always reduce vibration, both ground and air borne to the minimum possible in that this substantially increases the efficiency and hence the economy of blasting operations.

## 11.2 Policy and other Guidance

### 11.2.1 Legislation and Planning Policy Guidance

#### *Minerals Technical Advice Note (Wales) 1: Aggregates 2004*

Minerals Technical Advice Note (Wales) 1: Aggregates (MTAN1) provides the latest advice on planning controls and good practice methods for minerals extraction sites in Wales. It also provides guidance on keeping blast induced vibrations from mineral extraction sites to acceptable levels including advice on peak particle velocity (ppv) limits for various operational stages on mineral developments.

The guidance suggests that operators should take all reasonable steps, through the use of BATNEEC (best available techniques not entailing excessive cost), to minimise blast induced vibrations and maintain the highest possible environmental standards.

In paragraph 83 of the guidance, MTAN1 states:

> *"maximum level of ground vibration at vibration sensitive locations: ground vibration as a result of blasting operations should not exceed a peak particle velocity of 6 mms-1 ppv in 95% of all blasts measured over any 6 month period, and no individual blast should exceed a peak particle velocity of 10 mms-1 ppv;."*

#### *British Standard 6472-2:2008*

British Standard 6472:2008 *Guide to evaluation of human exposure to vibration in buildings* Part 2: *Blast-induced vibration* gives guidance on human exposure to blast-induced vibration in buildings and is primarily applicable to blasting operations associated with mineral extraction.

BS6472-2:2008 advises on the maximum satisfactory magnitudes of vibration for residential and other properties, as set out in Table 11.1 below.

**Table 11-1**
**Maximum satisfactory magnitudes of vibration with respect to human response**

| Place | Time | Satisfactory magnitude [A] ppv $mms^{-1}$ |
|---|---|---|
| *Residential* | **Daytime**<br>08:00 to 18:00 hrs Monday to Friday<br>08:00 to 13:00 hrs Saturday | 6.0 to 10.0 |
| *Offices* [B] | Any time | 14.0 |
| *Workshops* [B] | Any time | 14.0 |

[A] The satisfactory magnitudes are the same for the working day and the rest day unless otherwise stated;
[B] Critical working areas where delicate tasks impose more stringent criteria than human comfort are outside the scope of this standard.

As the British Standard is concerned with human response within buildings, the external levels are set so as to achieve satisfactory internal levels.

## *British Standard 7385-2:1993*

BS7385-2:1993 *Evaluation and Measurement for Vibration in Buildings: Guide to Damage Levels from Groundborne Vibration* gives guidance on the levels of vibration above which building structures could be damaged. It identifies the factors which influence the vibration response of buildings and describes the basic procedure for carrying out measurements. Vibrations of both transient and continuous character are also considered.

The standard comments on page 1 of the document that there is a lack of reliable data on the threshold of vibration-induced damage in buildings both in countries where national standards already exist and in the UK. The standard has been developed from an extensive review of UK data, relevant national and international documents and other published data.

Although a large number of case histories were assembled in the UK database, very few cases of vibration-induced damage were found. It was therefore necessary to refer to the results of experimental investigations carried out in other countries into vibration-induced damage thresholds.

BS7385 gives guide values to prevent cosmetic damage to property. Between 4 Hz and 15 Hz, a guide value of 15 - 20 mm/s is recommended, whist above 40 Hz the guide value is 50 mm/s.

The standard also comments that "*Minor damage is possible at vibration magnitudes which are greater than twice those given in Table 11.2, and major damage to a building structure may occur at values greater than four times the tabulated values*."

Table 11.2 from BS7385 is reproduced below as Table 11.2 to the ES.

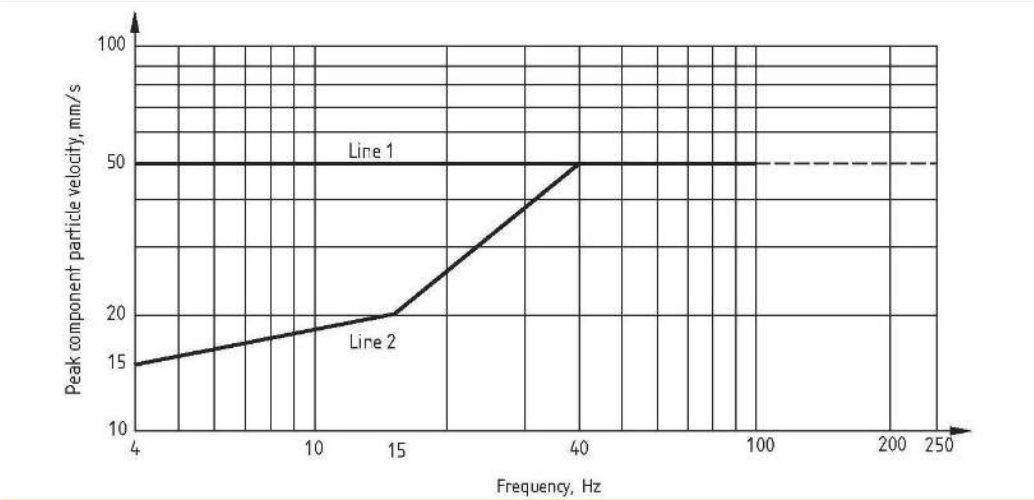
**Table 11-2**
**Transient Vibration Guide Values for Cosmetic Damage**

| Line | Type of Building | Peak component particle velocity in frequency range of predominant pulse | |
|---|---|---|---|
| | | 4 Hz to 15 Hz | 15 Hz and above |

| Line | Type of Building | Peak component particle velocity in frequency range of predominant pulse | |
|---|---|---|---|
| *1* | *Reinforced or framed structures. Industrial and heavy commercial buildings* | 50 $mms^{-1}$ at 4 Hz and above | 50 $mms^{-1}$ at 4 Hz and above |
| *2* | *Unreinforced or light framed structures Residential or light commercial type buildings* | 15 $mms^{-1}$ at 4 Hz increasing to 20 $mms^{-1}$ at 15 Hz | 20 $mms^{-1}$ at 15 Hz increasing to 50 $mms^{-1}$ at 40 Hz and above |
| | Note 1 - Values referred to are at the base of the building. Note 2 - for line 2, at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded | | |

From Table 11.2, line 2 for a residential building, a ppv of greater than 15 $mms^{-1}$ at 4 Hz , greater than 20mms-1 at 15Hz or greater than 50 $mms^{-1}$ at 40 Hz or above, measured at the base of the building, could give rise to cosmetic damage.

The figure below, reproduced from Page 6 of BS7385, depicts transient vibration guide values for cosmetic damage.




## 11.3 Current Planning Conditions

The current Initial Review schedules of conditions impose a consistent condition relating to blast vibration for the Quarry areas within MTCBC and BBNPA, namely:

*Unless otherwise previously agreed in writing with the MPA no blasting shall be carried out within the Quarry other than as detailed hereunder:-*

a. *Except in the case of emergency no blasting shall be carried out except between the following times:*

*10.00 hours and 1600 hours Mondays to Fridays*

*There shall be no blasting on Sundays, Bank Holidays or National Holidays.*

b. *At all times blasting shall be designed so that the peak particle velocity as measured in any one of three mutually perpendicular planes at the*

*nearest residential property (existing at the Date of Determination) shall not exceed 10mm per second in 95% of all blasts measured over any period of 6 months and no individual blast shall exceed a peak particle velocity of 12mm per second.*

c. *No stone shall be broken up by the use of explosives other than in primary blasting.*

From the above condition it is noteworthy that the ground vibration limits at residential property at 10mms for 95% of blasts and an upper limit of 12mms are less stringent than the more up to date guidance in MTAN1 which suggests a limit of 6mms for 95% of blasts with an upper limit of 10mms.

The opportunity is available via the Periodic ROMP to update the blast vibration limits to accord with the guidance in MTAN1.

## 11.4 Effects of Blasting

### 11.4.1 Ground Vibration

There is considerable practical and theoretical research that has been undertaken into the damage potential of blast induced ground vibration including research undertaken by Vibrock Limited (ref *The Environmental Effects of Production Blasting from Surface Mineral Workings, Vibrock. Published by the Stationery Office 1998 (ISBN 0-11-753412-9)*

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

A typical blast consists of a number of boreholes into which are placed explosive charges. Each borehole is detonated individually by the use of a series of detonators each with differing millisecond delays.

Blast-induced vibration is measured in terms of unfiltered time histories if three component particle velocities from which the peak values can be identified.

The detonation of explosives within a confined borehole generates stress (seismic) waves causing localised vibration, distortion or cracking. This type of ground vibration is always generated, even by the most well-designed blasts, and will radiate away from the blast source, 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 (ppv).

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

In general terms, a person will 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, humans are very 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 a person.

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

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

Table 11.3 gives examples of vibration levels routinely generated in a property.

**Table 11-3**
**Vibration Levels Generated by 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 prominent being undertaken by the United States Bureau of Mines (USBM). Damage to a structure could occur if the dynamic stresses induced in a structure by vibration exceed the allowable design stress for the specific building material. Classifications of building damage range from very fine plaster cracking up to major cracking of structural elements. In particular, when defining damage to buildings, the following classifications are used:

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

Studies by the USBM concluded that vibration levels in excess of 50mms$^{-1}$ ppv are required to cause structural damage. The onset of cosmetic damage can be associated with lower vibration levels. Vibration levels between 19mms$^{-1}$ ppv and 50mms$^{-1}$ ppv for open pit blasting are generally considered safe in the UK. It should be noted that these limits are for the worst-case structure conditions and that they are independent of the number of blasting events and their durations. No damage has occurred in any of the published data at vibration levels of less than 12.7mms$^{-1}$ ppv.

### 11.4.2 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 will be above 20Hz, and hence perceptible to the human ear, but most are below the 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 receiver do not significantly reduce air overpressure levels due to the greater amount of energy transmitted in the inaudible frequency range.

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

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

In this context, MTAN1 notes that “b*ecause air overpressure is transmitted through the atmosphere, meteorological conditions such as wind speed and direction, cloud cover and humidity will all affect the intensity of the impact. In view of this unpredictability, planning conditions to control air overpressure are*

*unlikely to be enforceable. This is not a reason for doing nothing and careful blast design should be able to resolve excessive levels of air overpressure* (ref para 81).

### 11.4.3 Fly-rock

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

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

## 11.5 Blast Monitoring

The current Initial Review schedules of conditions also impose a consistent condition relating to blast monitoring, namely:

*Within 3 months of the Date of Determination the operator shall submit for the approval of the MPA detailed schemes for:-*

1 *The monitoring of blasting operations including the location of monitoring points and the equipment to be used.*

2 *The methods to be employed to minimise the effects of air overpressure arising from blasting operations.*

Notwithstanding this condition, it is conventional practice for quarry operators to monitor all blasts, and this would be the practice when quarrying operations recommence at Vaynor. However, at present, given that the Quarry was 'mothballed' in 2007, and quarrying operations were intermittent in the period from 2002 (when the Initial Review conditions were deemed approved ), there is no up to date blast monitoring data available.

In this context, the opportunity is available via the current ROMP Periodic Review to provide a Scheme for Blast Vibration Monitoring which reflects up to date guidance regarding ground vibration from blast vibration, and for updated planning conditions to require implementation of the Monitoring Scheme. The opportunity is also available to include a planning condition to ensure that blasts are designed to minimise air overpressure. This is reflected in the proposed schedules of conditions produced as **Appendices 1.3 and 1.4** to the ES.

## 11.6 Mitigation Measures

It is proposed that the currently imposed ground vibration limit of 10mm/s for 95% of blast and the upper limit of 12mm/s should be revised to reflect the more up to date advice and more stringent limits recommended in MTAN1 of 6mms for 95% of blasts, with an upper limit of 10mm/s.

Accordingly, all blasts should be designed in order to comply to a vibration criterion of 6 mm/s peak particle velocity at a 95% confidence level.

Adherence to these levels will ensure that all vibration will be of a low order of magnitude and would be entirely safe. It will also be within the levels deemed to be satisfactory in terms of human perception.

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.

A Scheme for Blast Vibration Monitoring has been prepared as a means of ensuring adherence to the suggested updated ground vibration limits and to set out a protocol for future blast vibration monitoring. A copy of the Scheme is produced as ES **Appendix 11.1**. The schedule of proposed planning conditions require the implementation of the Scheme for Blast Vibration Monitoring, with a separate condition proposed relating to the design of blasts to minimise air overpressure.

A number of general good practice measured are also outlined below to further reduce the potential for adverse impacts due to blast vibration at the site.

### *Good Practice – General*

The means of controlling ground vibration, air overpressure and fly-rock have many features in common. Many of these measures are required for safety reasons by the Quarries Regulations 1999 and the approved Code of Practice.

- correct blast design is essential and should include a survey of the face profile prior to design, ensuring appropriate burden to avoid over-confinement of charge which may increase vibration by a factor of two
- the setting out and drilling of shot holes should be as accurate as possible and the drilled holes should be surveyed for deviation along their lengths and, if necessary, the blast design adjusted
- correct charging is obviously vital, and if free poured bulk explosive is used, its rise during loading should be checked. This is especially important in fragmented ground to avoid accidental over charging
- correct stemming will help control air overpressure and fly-rock and will also aid the control of ground vibration. Controlling the length of the stemming column is also important; too short and premature ejection occurs, too long and there can be excessive confinement and poor fragmentation. The length of the stemming column will depend on the diameter of the hole and the type of material being used
- monitoring of blasting and re-optimising the blast design (if necessary), in light of the results, changing conditions and experience should be carried out as standard; and
- avoid blasting in adverse/unsuitable weather conditions in order to minimise air overpressure.

## 11.7 Residual Effects

Blast-induced vibration is a short-term phenomenon lasting only for very short periods during the blasting event with no residual effects.

## 11.8 Conclusion

An assessment of predicted blast-induced vibration levels has been made with reference to existing policy guidance and standards.

Reference has also been made to the limits on ground vibration imposed by the current planning conditions.

However, it has been noted that the currently defined ground vibration limits at residential property are less stringent than the limits recommended by MTAN1 (2004) which post-dates the deemed 1st January 2002 Initial ROMP conditions within MTCBC and BBNPA.

It has therefore been recommended that the planning conditions should be updated to reflect the ground vibration limits for residential property as set out in MTAN1.

In addition, to determine as far as reasonably practicable that the blasting associated with the future development at Vaynor Quarry is not causing an exceedance in the stipulated limits at the nearest vibration sensitive receptors, a detailed Scheme of Blast Vibration Monitoring is proposed and is produced as **Appendix 11.1.**

Updated planning conditions have been proposed relating to ground vibration limits and blast monitoring as set out in the schedules of proposed conditions produced as Annexes 1 and 2.

# BLAST VIBRATION 11

# 12.0 AIR QUALITY

## 12.1 Introduction

This chapter has been prepared by SLR Consulting Ltd and considers the potential for a resumption in mineral extraction and processing and subsequent restoration activities at Vaynor Quarry to impact upon air quality.

For the purposes of this chapter, the OMS includes the Application Site within the administrative area of Merthyr Tydfil County Borough Council (MTCBC), and the related Application Site within the administrative area of the Brecon Beacons National Park Authority (BBNPA), both of which form parts of the Quarry defined on the respective application drawings V6/PR/MT/2 and V6/PR/BBNP/2.

The chapter describes the scope, relevant legislation, assessment methodology and the baseline conditions currently existing at the Quarry and its surroundings. It then considers any potentially significant environmental effects that the proposed development would have on this baseline environment and the mitigation measures required to prevent, reduce, or offset any significant adverse effects; and the likely residual impacts after these measures have been employed.

A full description the Application Site and the proposed development can be found in Chapters 2 and 3 of this ES, respectively.

### 12.1.1 Scope

As the majority of the Quarry lies within MTCBC the scope of this assessment has been based upon best practice and guidance as well as consultation[36] with the Environmental Health Officer (EHO) at MTCBC. The following scope of works, as agreed with MTCBC, has been undertaken:

- baseline review – identification of relevant receptors, background pollutant concentrations and meteorological conditions;
- a qualitative minerals dust assessment – considering dust deposition and suspended airborne dust with an aerodynamic diameter of less than 10 microns ($PM_{10}$);
- a detailed operational phase road traffic emissions assessment (via dispersion modelling); and
- a review of the proposed dust control measures and recommendations for additional controls, as required.

## 12.2 Legislation, Guidance, and Industry Good Practice

### 12.2.1 Legislative Context

#### *Air Quality Standards*

The Air Quality Standards Regulations 2010[37] (AQSR) transpose both the EU Ambient Air Quality Directive (2008/50/EC)[38], and the Fourth Daughter Directive (2004/107/EC)[39] within UK legislation, in order to align and bring together in one statutory instrument the Government's obligations. The AQSR includes Limit Values, Target Values, Objectives, Critical Levels and Exposure Reduction Targets for the protection of human health and the environment. Limit values are legally binding and are considered to apply everywhere with the exception of the carriageway and central reservation of roads and any location where the

[36] E-mail correspondence between SLR Consulting Ltd and Garin Eldred and Lucy Marley, Environmental Health team, Merthyr Tydfil County Borough Council, dated between 28/10/21 and 16/12/21.
[37] The Air Quality Standards Regulations (England) 2010, Statutory Instrument No 1001, The Stationary Office Limited.
[38] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.
[39] Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004.

public do not have access (e.g. industrial sites). These locations are harmonised across all Member States.

In the interim period the UK has formally left the EU, however despite this, EU rules and regulations referred above have subsequently been written into UK law and are still relevant.

### *Air Quality Strategy*

Irrespective of the above, the UK Government and the Devolved Administrations are required under the Environment Act 1995 to produce a national air quality strategy to improve air quality. The latest Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland was published in 2007[40]. The AQS provides the over-arching strategic framework for air quality management in the UK and contains national air quality standards and objectives established by the UK Government and Devolved Administrations for the protection of public health and the environment. There is no legal requirement to meet these objectives except where they mirror an equivalent legally binding Limit Value as prescribed within EU legislation, however compliance is regulated by local planning authorities.

The AQS objectives apply at locations outside buildings or other natural or man-made structures above or below ground, where members of the public are regularly present and might reasonably be expected to be exposed to pollutant concentrations over the relevant averaging period – herein referred to as relevant exposure. **Table 12-2** provides an indication of those locations.

The ambient air quality standards of relevance to human receptors in this assessment (collectively termed Air Quality Assessment Levels (AQALs) throughout this report) are provided in **Table 12-1**.

**Table 12-1 Relevant Ambient AQALs**

| Pollutant | AQAL (µg/m$^3$) | Averaging Period |
|---|---|---|
| *Particles ($PM_{10}$)* | 40µg/m$^3$ | Annual mean |
| | 50µg/m$^3$ | 24-hour mean (not to be exceeded on more than 35 occasions per annum) |
| *Particles ($PM_{2.5}$)* | 25µg/m$^3$ | Annual mean |
| *Nitrogen Dioxide ($NO_2$)* | 40µg/m$^3$ | Annual mean |
| | 200µg/m$^3$ | 1-hour mean (not to be exceeded on more than 18 occasions per annum) |

**Table 12-2 Human Health Relevant Exposure**

| AQAL Averaging Period | AQALs should apply at | AQALs should not apply at |
|---|---|---|
| *Annual mean* | Building facades of residential properties, schools, hospitals etc. | Facades of offices<br>Hotels<br>Gardens of residences<br>Kerbside sites |
| *24-hour mean* | As above together with hotels and gardens of residential properties | Kerbside sites where public exposure is expected to be short term |
| *1-hour mean* | As above together with kerbside sites of regular | Kerbside sites where public would not be expected to have regular access |

[40] Defra, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, July 2007.

| AQAL Averaging Period | AQALs should apply at | AQALs should not apply at |
|---|---|---|
| | access, car parks, bus stations etc. | |

### *Local Air Quality Review & Assessment*

As reinforced within the AQS, Part IV of the Environment Act 1995 induces a statutory duty for local authorities to undergo a process of Local Air Quality Management (LAQM). This requires local authorities to Review and Assess air quality within their boundaries to determine the likeliness of compliance, regularly and systematically.

Where any of the prescribed AQS objectives are not likely to be achieved, the authority must designate an Air Quality Management Area (AQMA). For each AQMA, the local authority is required to prepare an Air Quality Action Plan (AQAP), which details measures the authority intends to introduce to deliver improvements in local air quality in pursuit of the objective. AQMAs can give rise to potential constraints to development, or at least a higher degree of scrutiny to air quality assessment work. Local authorities therefore have formal powers to control air quality through a combination of LAQM and through application of wider planning policies.

## 12.2.2 Ecological Habitats

Ecological habitats vary in terms of their sensitivity, perceived ecological value, geographic importance, and level of protection. Within the UK, there are three types of nature conservation designations: international, national and local designations, which are all provided environmental protection from developments, including from atmospheric emissions, with a greater level of protection afforded to the former, relative to the latter.

The Conservation of Habitats and Species Regulations 2017 (the 'Habitats Regulations')[41] introduces the precautionary principle for protected European sites, i.e. that projects can only be permitted to proceed; having ascertained that there will be no adverse effect on the integrity of the designated site. It requires an assessment to determine if significant effects (alone or in-combination) are likely, followed by an 'appropriate assessment' by the competent authority, if necessary. European sites include Special Areas of Conservation (SAC) and Special Protection Areas (SPA). These regulations were subsequently amended in 2019 to make them operable from 1 January 2021 despite the UK's withdrawal from the EU[42].

Other sites of international significance are Ramsar sites, which are wetlands protected under the 1971 Ramsar Convention[43]. Many of these sites in the UK were initially selected on the basis of their importance to waterbirds and are therefore also classified as SPAs.

The Wildlife and Country Act 1981 (as amended, primarily by The Countryside and Rights of Way (CRoW) Act 2000) provides protection to Sites of Special Scientific Interest (SSSI) to ensure that developments are not likely to cause damage.

## 12.2.3 General Nuisance Legislation

Part III of the Environmental Protection Act (EPA) 1990 (as amended) contains the main legislation on Statutory Nuisance and allows local authorities and individuals to take action to prevent a statutory nuisance. Section 79 of the EPA defines, amongst other things, smoke, fumes, dust and smells emitted from industrial, trade or business premises so as to be prejudicial to health or a nuisance, as a potential Statutory Nuisance.

Fractions of dust greater than 10µm (i.e. greater than $PM_{10}$) in diameter typically relate to nuisance effects as opposed to potential health effects and therefore are not covered within the UK AQS. In legislation there are currently no numerical limits in terms of what level of dust deposition constitutes a nuisance.

[41] The Conservation of Habitats and Species Regulations 2017 Statutory Instrument 490.
[42] The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019.
[43] Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat.

### 12.2.4 Planning Policy

The following policies have been considered within this assessment.

#### *National Policy*

The Planning Policy Wales (PPW)[44] document sets out the Welsh Government's land use planning policies for development across Wales.

The document states the following in relation to air quality and planning:

> "*6.1.32 When considering a scheme of enabling development, planning permission should be granted only where all of the following can be applied:*
>
> *[…]*
>
> *• the enabling development does not give rise to significant risks, for example residential development in the floodplain or significantly impact on air quality or soundscape.*"

Furthermore, in relation to addressing air quality in the planning system:

> "*6.7.4 The planning system should maximise its contribution to achieving the well-being goals, and in particular a healthier Wales, by aiming to reduce average population exposure to air and noise pollution alongside action to tackle high pollution hotspots. In doing so, it should consider the long-term effects of current and predicted levels of air and noise pollution on individuals, society and the environment and identify and pursue any opportunities to reduce, or at least, minimise population exposure to air and noise pollution, and improve soundscapes, where it is practical and feasible to do so.*
>
> *6.7.5 In taking forward these broad objectives the key planning policy principle is to consider the effects which proposed developments may have on air or soundscape quality and the effects which existing air or soundscape quality may have on proposed developments. Air Quality and soundscape influence choice of location and distribution of development and it will be important to consider the relationship of proposed development to existing development and its surrounding area and its potential to exacerbate or create poor air quality or inappropriate soundscapes. The agent of change principle says that a business or person responsible for introducing a change is responsible for managing that change. In practice, for example, this means a developer would have to ensure that solutions to address air quality or noise from nearby pre-existing infrastructure, businesses or venues can be found and implemented as part of ensuring development is acceptable.*"

Specifically in relation to minerals developments and air quality, PPW states:

> "*The role of the planning authority in relation to mineral extraction is to balance the fundamental requirement to ensure the adequate supply of minerals with the protection of amenity and the environment. The key principles are to:*
>
> *[…]*
>
> *• reduce the impact of mineral extraction and related operations during the period of working by ensuring that impacts on relevant environmental qualities caused by mineral extraction and transportation, for example air quality and soundscape, are within acceptable limits; and […]*'

#### *Local Policy*

MTCBC adopted the Replacement Local Development Plan 2016 – 2031[45] on 29th January 2020. The Plan contains the following policy of relevance to air pollution:

[44] Welsh Government, Planning Policy Wales, Edition 11, February 2021.

[45] Merthyr Tydfil County Borough Council, Replacement Local Development Plan (2016 – 2031), adopted 29th January 2020.

**Policy EnW4: Environmental Protection**

> "*Development proposals will be required to demonstrate they will not result in an unacceptable impact on people, residential amenity, property and / or the natural environment from either:*
>
> - *Pollution of land, surface water, ground water and the air;*
> - *Land contamination;*
> - *Hazardous substances;*
> - *Land stability;*
> - *Noise, vibration, dust, odour nuisance and light pollution; or*
> - *Any other identified risk to public health and safety.*
>
> *Where impacts are identified the Council will require applicants to demonstrate that appropriate measures have been incorporated to reduce, or minimise the impact identified to the lowest possible acceptable level.*
>
> *Planning conditions may be imposed or legal obligation entered into, to secure any necessary mitigation and monitoring processes. […]*"

BBNPA adopted their Local Development Plan[46] on 17th December 2013. Policy 14 relating to Air Quality confirms that:

> *"Proposals for development will only be permitted where it is proven that no detrimental impact, individually or cumulatively will be had on air quality. Proposals for development which are likely to impact negatively on air quality or are potentially polluting will not be permitted unless mitigation measures to avoid the impact are provided".*

[46] Brecon Beacons National Park Authority, Local Development Plan 2007-2022, adopted 17th December 2013.
[47] Local Air Quality Management Technical Guidance 16, Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland. April 2021.
[48] MIRO, Good practice guide: control and measurement of nuisance dust and $PM_{10}$ from the extractive industries, Issue 1 February 2011.
[49] Welsh Government, Minerals Planning Policy (Wales), Minerals Technical Advice Note (Wales), 1: Aggregates, March 2004.

### 12.2.5 Assessment Guidance

This assessment has been carried out in accordance with the principles contained within the guidance documents below.

- Department of Environment Food and Rural Affairs (Defra), in partnership with the Welsh Government: Local Air Quality Management Technical Guidance (LAQM.TG(16))[47];
- The Mineral Industry Research Organisation (MIRO): Good Practice Guide[48];
- Welsh Government, Minerals Technical Advice Note, 1: Aggregates[49];
- The Institute of Air Quality Management (IAQM): Guidance on the Assessment of Mineral Dust Impacts for Planning[50];
- Environmental Protection UK (EPUK) and IAQM: Land-Use Planning and Development Control: Planning for Air Quality[51];
- Welsh Government: Design Manual for Roads and Bridges (DMRB) – LA 105 Air Quality[52]; and
- IAQM: A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites[53].

## 12.3 Assessment Approach

### 12.3.1 Dust Assessment

The assessment has been undertaken in accordance with the IAQM's mineral dust guidance document. The methodology is summarised below and available

[50] IAQM, Guidance on the Assessment of Mineral Dust Impacts for Planning, v1.1 2016.
[51] EPUK and the IAQM, Land-Use Planning and Development Control: Planning for Air Quality, v1.1 2017.
[52] Highways England, Transport Scotland, Welsh Government and Department for Infrastructure, Design Manual for Roads and Bridges, LA 105 Air Quality, 2019.
[53] IAQM, A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites, 2020.

to download on the IAQM website[54] and therefore not reproduced in full within this assessment.

The IAQM method is a risk-based approach based on the source-pathway-receptor conceptual model, i.e. the hypothetical relationship between the source (S) of the pollutant, the pathway (P) by which exposure might occur, and the receptor (R) that could be adversely affected.

The key steps are:

- assess the site characteristics and baseline conditions: Incorporates a review of baseline conditions including $PM_{10}$ background; a description of activities to inform the Source Term; and characterisation of the site setting in terms of the location and sensitivity of representative receptors, and meteorological conditions (wind patterns and rainfall);
- estimate dust impact risk: The Dust Impact Risk for each representative receptor is determined from the Source Term (residual dust risk after embedded mitigation) and Pathway. The 'pathway effectiveness' is based upon the distance of the receptor from the dust source and the frequency at which it is down-wind from the source (factoring out the frequency of wet days). The assessment of impact considers emissions from all potential dust generating activities and sources within the Quarry; and
- estimate likely magnitude of effect: The risk predicted at each representative receptor is considered together with the sensitivity of that receptor, to give the likely magnitude of the effect that will be experienced.

The IAQM uses a distance-based screening criterion for both airborne concentrations and deposited dust.

In relation to airborne concentrations (i.e. $PM_{10}$), the guidance recommends a screening distance of 1km. This is to be consistent with the national PPG for minerals sites[55], which sets out an 'Assessment Framework' stating the need for further assessment of $PM_{10}$ when sensitive receptors and land uses are present within 1km of site activities.

In relation to deposited dust, the guidance states "*from the experience of the working group, adverse dust impacts from sand and gravel sites are uncommon beyond 250m and beyond 400m from hard rock quarries, measured from the nearest dust generating activity.*"

In accordance with the IAQM methodology for hard rock sites, if there are sensitive receptors within 1km and 400m of the Quarry then further assessment of potential dust impacts for $PM_{10}$ and deposited dust, respectively, will be required.

With respect to $PM_{10}$, if backgrounds are less than 17µg/m$^3$, it is considered there is little risk of the Process Contribution (PC) from the quarry complex causing an exceedance of the annual mean AQAL. Where backgrounds are greater than 17µg/m$^3$, the PC is estimated, and total Predicted Environmental Concentration (PEC) used to assess the potential significance of effects on the surrounding receptors.

### 12.3.2 Road Traffic Emissions Assessment

#### *Human Receptors*

In order to appropriately assess road traffic impacts associated with the operation of the proposed development, detailed dispersion modelling has been undertaken using the Cambridge Environmental Research Consultants (CERC) ADMS-Roads v5.0.0.1 dispersion model, focussing on concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$ for the following scenarios:

- 2019 Base Case (2019 BC) – Base flows for the year (2019) utilised for model verification only;
- 2023 Do Minimum (2023 DM) – Without development flows for the assumed year of opening (2023), projected from the 2019 BC flows (existing road network); and

[54] https://iaqm.co.uk/guidance/

[55] https://www.gov.uk/guidance/minerals

- 2023 Do Something (2023 DS) – 2023 DM flows, plus all trips associated with the proposed development flows for the proposed year of opening (2023) (existing road network).

For the above future year scenarios (2023), concurrent emission factors and background pollutant concentrations have been used.

2023 has been adopted as the potential earliest opening year of the development. In reality, the opening year may be later, however adoption of 2023 is considered conservative in air quality terms, given the forecast reductions in background concentrations and emission factors in future years. Use of 2023 ensures worst-case impacts associated with the operation of the proposed development have been appropriately captured in the assessment.

The average output of 500,000 tonnes per annum (tpa) from the proposed development would result in an increase in Heavy-Duty Vehicle (HDV) flows of 138 on the local road network, in 24-hour Annual Average Daily Traffic (AADT) format. 138 HDV AADT has therefore been applied to all road links in the 2023 DS scenarios that constitute a route to/from the Quarry and the A465 i.e. assuming 100% trip generation on all relevant links. On reflection, this approach is considered to be conservative as it assumes no reduction in vehicle trips is achieved via distribution.

Following consultation with the EHO, due consideration has been given to the committed A465 highways project, specifically 'section 5 to 6' Dowlais Top to Hirwaun; largely due to its impact on the potential routing to and from the Quarry.

By 2023, 'section 5 to 6' of the A465 project will be partially complete, with full completion expected in 2025. As such, there is uncertainty regarding the extent of the future road network during operation of the Quarry.

Prior to the A465 project, the most logical and shortest route to/from the Quarry to the A465 was via Grawen Lane, which connects to the A4054 Upper High Street almost opposite the Vaynor Road/A4054 High Street junction. However, as part of the A465 highways project, Grawen Lane has already been closed to provide space for the new dual carriageway. This route to the A465 is currently no longer available.

The traffic flows and road geometry utilised in the main assessment are reflective of the current road network (rather than the completed A465 project), accounting for the closure of Grawen Lane as the full A465 project is not yet complete.

To ensure the A465 highways project is sufficiently captured within the assessment, specifically in relation to the widening and realignment of the A465 through Cefn Coed, an additional set of future year model scenarios have been assessed, whereby the A465 highways project is completed. These scenarios therefore reflect the future road network, and where possible, the future road traffic flows have been sourced from publicly available datasets. Consistent with the approach adopted within the main assessment, a 100% trip generation has been adopted for all relevant links. This additional assessment is detailed within **Appendix 12.4**.

Full details of the dispersion modelling methodology are provided in **Appendix 12.1**.

### *Ecological Receptors*

The assessment procedure outlined within the IAQM's guidance document has been used in relation to the assessment of sensitive ecological receptors. This initially comprises a screening assessment to indicate whether:

- any sensitive qualifying features are located within 200m of a road link projected to experience developmental-generated vehicle movements; and
- these links are projected to experience a change greater than 1,000 in AADT on a road link, and/or >200 HDV within 200m of the ecological receptor. If these values are exceeded, resultant impacts should then be calculated to determine whether >1% of the Critical Load/Level.

Whilst assessing impacts on internationally designated ecological sites (e.g. Special Areas of Conservation (SAC), Special Protection Areas (SPA) etc.), screening should be undertaken in-combination with other projects and plans, following relevant legislation (Section 12.2.2). However, whilst assessing impacts on national and/or local ecological designations, it is appropriate to assess developmental trips in isolation (i.e. project alone). This is reflective of the level of protection afforded to these sites.

The outcomes of the above will determine whether impacts could result in a likely significant effect on the assessed ecological feature (either alone, or in-combination in the context of international sites).

If the above conditions are not met, then impacts on ecological designations are likely to be imperceptible, whereby resultant effects can be classed as insignificant.

### *Uncertainty*

Dispersion modelling is inherently uncertain and is principally reliant on the accuracy and representativity of its inputs. In acknowledgement of this, the ADMS-Roads dispersion model has been verified with the latest representative publicly available local monitoring data, as collected by MTCBC.

In addition, there is a widely acknowledged disparity between emission factors and ambient monitoring data[56]. To help minimise any associated uncertainty when forming conclusions from the results, this assessment has utilised the latest EFT version 11.0 utilising COPERT 5.3 emission factors, and associated tools/datasets published by Defra.

Furthermore, the dispersion modelling assessment has utilised 2023 as the development opening year, however in reality this may be later. As such, use of this year introduces an element of conservatism into the assessment, bringing forward the opening year. This is likely to exaggerate resultant concentrations and effects, given the forecasted reductions in vehicle emission factors and background pollutant concentrations. Use of further sensitivity modelling is not considered relevant or appropriate (i.e. too pessimistic).

## 12.3.3 Assessing Significance

### *Minerals Dust Assessment*

The IAQM minerals guidance provides a framework, inclusive of a series of matrices, to determine the likely magnitude of effect (disamenity and ecological) from deposited dust at individual, representative receptor locations. From this, an estimation of the overall effect as a result of the proposed development is required by the assessor.

In terms of $PM_{10}$, the IAQM guidance provides a recommended approach for assessment to determine $PM_{10}$ impacts at individual receptor locations. Determination of the overall significance of $PM_{10}$ impacts is then required by the assessor.

In determining the overall significance of residual dust effects, the assessor may consider several factors, including (but not limited to): the degree of adverse effects predicted, the different numbers and types of receptors to experience the adverse effect, and consideration of factors highlighted in national and local planning guidance.

### *Road Traffic Emissions Assessment*

Guidance for determining the significance of a development's impact on human receptors is provided by EPUK and IAQM.

When describing the developmental impact at a specific receptor, the resultant total concentration as well as the magnitude of change in relation to respective AQALs are both considered – using the approach detailed in **Table 12-3**.

[56] Carslaw, et al. (2011). Trends in $NO_x$ and $NO_2$ emissions and ambient measurements in the UK.

**Table 12-3 Impact Descriptor Matrix for Human Receptors**

| Long Term Average Concentration at Receptor in Assessment Year | Change in Concentration relative to AQAL | | | |
|---|---|---|---|---|
| | 1% [A] | 2-5% | 6-10% | >10% |
| *75% or less of AQAL* | Negligible | Negligible | Slight | Moderate |
| *76-94% of AQAL* | Negligible | Slight | Moderate | Moderate |
| *95-102% of AQAL* | Slight | Moderate | Moderate | Substantial |
| *103-109% of AQAL* | Moderate | Moderate | Substantial | Substantial |
| *110% or more of AQAL* | Moderate | Substantial | Substantial | Substantial |

Note: [A] Changes <0.5% will be described as Negligible

Following derivation of impacts at all receptor locations assessed, the overall significance of the developmental 'effect' is determined based upon consideration, as necessary, of the following factors:

- the existing and future air quality in the absence of the proposed development;
- the extent of current and future population exposure to the impacts;
- the worst-case assumptions adopted when undertaking the prediction of impacts; and
- the extent to which the proposed development has adopted best practice to eliminate and minimise emissions.

## 12.4 Baseline Conditions

### 12.4.1 Site and Surroundings

A full description of the Application Site is provided in Chapter 2 of this ES. The sections below set out those aspects of the environment relevant to the air quality assessment.

The Quarry is located approximately 3.5km from the town centre of Merthyr Tydfil. The locale surrounding the Quarry is characterised by agricultural land and woodland areas to the east, the residential area of Trefechan located approximately 1km to the south, Merthyr Tydfil Golf Club located directly to the west, and the Brecon Beacons National Park borders the northern, western and eastern boundary of the Quarry, with small areas of the OMS lying within the boundary of the National Park on the western and south eastern fringes of the Quarry.

The proposed development will result in the re-commencement of quarrying, therefore introducing potential dust generating activities to the surroundings. Sensitive receptor locations are considered further in the following sections and the dust assessment.

Vehicular access to the Quarry is gained via the existing purpose-built entrance off Vaynor Road.

### 12.4.2 Baseline Air Quality

Monitoring data collected prior to the COVID-19 pandemic (i.e. pre-2020) has been used to characterise the baseline environment, as pollutant concentrations monitored during 2020 and 2021 are expected to be atypical, and not representative of the local environment and have therefore not been considered.

### *Local Air Quality Management*

MTCBC, in fulfilment of statutory requirements, has conducted an on-going exercise to review and assess air quality within its administrative area. The latest publicly available LAQM report for MTCBC (not impacted by the COVID-19 pandemic) at the time of writing is the 2020 Annual Progress Report (APR)[57].

MTCBC presently have one declared AQMA for exceedances of the annual mean $NO_2$ AQAL at locations of relevant exposure. The 'Twynyrodyn Road' AQMA is located in Merthyr Tydfil town centre, approximately 4.3km south-east of the Quarry.

### *Air Quality Monitoring*

#### *Automatic Air Quality Monitoring*

MTCBC undertake automatic (continuous) monitoring at two locations within their administrative area; one analyser monitors $NO_2$ only, and one monitors $PM_{10}$ and $PM_{2.5}$.

The details and recent results from the $PM_{10}$/$PM_{2.5}$ monitor are presented in **Table 12-4** to **Table 12-7**. Given the 'suburban' setting of the $PM_{10}$/$PM_{2.5}$ analyser, the results were considered relevant to the assessment to provide comparison with the Defra mapped background concentrations. The $NO_2$ analyser is not located in proximity to the Quarry or within the modelled domain and has, therefore, not been considered further in this assessment.

**Table 12-4 Automatic Monitoring Sites: Details**

| Site ID | Site Type | NGR | | Pollutants Measured | Distance to Site (km) |
|---|---|---|---|---|---|
| | | X | Y | | |
| *APM1* | Suburban | 305821 | 206008 | $PM_{10}$, $PM_{2.5}$ | 4.4 |

[57] Merthyr Tydfil County Borough Council, 2020 Air Quality Progress Report, September 2020.

**Table 12-5 Automatic Monitors: 2015-2019 Annual Mean $PM_{10}$ Results**

| Site ID | 2019 Data Capture % | Annual Mean $PM_{10}$ Concentration (µg/m$^3$) | | | | |
|---|---|---|---|---|---|---|
| | | 2015 | 2016 | 2017 | 2018 | 2019 |
| *APM1* | 96 | 9.3 | 8.4 | 11.3 | 8.7 | 8.8 |

**Table 12-6 Automatic Monitors: 2015-2019 Number of $PM_{10}$ Daily Mean Exceedances**

| Site ID | 2019 Data Capture % | Daily $PM_{10}$ Means in Excess of 50µg/m$^3$ | | | | |
|---|---|---|---|---|---|---|
| | | 2015 | 2016 | 2017 | 2018 | 2019 |
| *APM1* | 96 | 0 | 0 | 0 | 0 | 0 |

**Table 12-7 Automatic Monitors: 2015-2019 Annual Mean $PM_{2.5}$ Results**

| Site ID | 2019 Data Capture % | Annual Mean $PM_{2.5}$ Concentration (µg/m$^3$) | | | | |
|---|---|---|---|---|---|---|
| | | 2015 | 2016 | 2017 | 2018 | 2019 |
| *APM1* | 96 | 5.0 | 3.8 | 4.5 | 4.5 | 4.2 |

As noted in **Table 12-5**, annual mean $PM_{10}$ concentrations have remained well below the annual mean AQAL (40µg/m$^3$) for the period presented. Furthermore, no daily $PM_{10}$ means in excess of 50µg/m$^3$ have been recorded during the period, and therefore the results are in compliance with the 24-hour mean AQAL, whereby 35 exceedances of 50µg/m$^3$ are permitted.

Annual mean $PM_{2.5}$ concentrations have also remained well below the annual mean AQAL (25µg/m$^3$) for the period presented.

#### *Passive Diffusion Tube Monitoring*

Passive $NO_2$ diffusion tube monitoring is currently undertaken by MTCBC at numerous locations in fulfilment of statutory LAQM obligations.

The details and results of the monitoring locations of relevance to the assessment (i.e. located closest to the Quarry and/or within the modelled domain) are presented in Table 12-8 and Table 12-9, whilst their locations are presented in Figure 12.A-3 of **Appendix 12.6**. All monitoring results presented have been ratified by MTCBC.

**Table 12-8 LAQM $NO_2$ Passive Diffusion Tube Monitoring Sites: Details**

| Site ID | Site Type | NGR | | Distance to Site (km) |
|---|---|---|---|---|
| | | X | Y | |
| *2* | Urban Background | 304743 | 206261 | 3.7 |
| *6* | Roadside | 305426 | 205144 | 5.0 |
| *9* | Suburban | 303525 | 206388 | 3.5 |
| *10* | Roadside | 305180 | 206744 | 3.4 |
| *16* | Suburban | 303360 | 206822 | 3.0 |
| *30* | Roadside | 303570 | 206676 | 3.2 |
| *31* | Roadside | 304782 | 205886 | 4.1 |

**Table 12-9 LAQM $NO_2$ Passive Diffusion Tube Monitoring Sites: Results**

| Site ID | 2019 Data Capture % | Annual Mean $NO_2$ Concentration (µg/m$^3$) | | | | |
|---|---|---|---|---|---|---|
| | | 2015 | 2016 | 2017 | 2018 | 2019 |
| *2* | 100 | 16.4 | 18.1 | 17.9 | 15.2 | 16.6 |
| *6* | 75 | 16.3 | 17.0 | 15.9 | 17.3 | 25.3 |
| *9* | 100 | 10.8 | 10.6 | 10.2 | 10.0 | 10.6 |
| *10* | 100 | - | - | - | - | 30.7 |
| *16* | 100 | 11.9 | 12.6 | 12.9 | 12.1 | 11.6 |
| *30* | 100 | - | - | 17.0 | 20.0 | 17.8 |
| *31* | 42 | - | - | - | - | 22.1 |

As displayed in Table 12-9, annual mean $NO_2$ concentrations have remained below the AQAL (40µg/m$^3$) for the monitors and period presented. Concentrations at the 'urban background' and 'suburban' monitoring sites (ID: 2, 9 and 16) have been 'well below' the AQAL (i.e. <75%) for the period 2015-2019.

In line with LAQM.TG(16), exceedances of the 1-hour mean $NO_2$ AQAL can be considered unlikely where annual mean concentrations are <60µg/m$^3$. This applies to the monitors and period presented.

### *Defra Mapped Background Concentrations*

Defra maintains a nationwide model of existing and future background air quality concentrations at a 1km grid square resolution which is routinely used to support LAQM requirements and air quality assessments. The data sets include annual average concentration estimates for $NO_x$, $NO_2$, $PM_{10}$ and $PM_{2.5}$ using a reference year of 2018 (the year in which comparisons between modelled and monitoring are made).

The Defra mapped annual mean background concentrations of $NO_x$, $NO_2$, $PM_{10}$ and $PM_{2.5}$ for a base year of 2019 and the earliest predicted opening year of the development (2023) across the modelled domain are presented in **Table 12-10**.

All of the mapped background concentrations presented are well below the respective annual mean AQALs.

**Table 12-10 Defra Mapped Background Pollutant Concentrations**

| Grid Square (x, y) | Year | Annual Mean Background Concentration (µg/m$^3$) | | | |
|---|---|---|---|---|---|
| | | $NO_x$ | $NO_2$ | $PM_{10}$ | $PM_{2.5}$ |
| *303500, 209500* | 2019 | 6.5 | 5.2 | 14.0 | 7.5 |
| | 2023 | 5.6 | 4.5 | 13.3 | 7.0 |
| *303500, 208500* | 2019 | 8.6 | 6.8 | 11.8 | 7.5 |
| | 2023 | 7.2 | 5.7 | 11.2 | 7.0 |
| *302500, 208500* | 2019 | 7.3 | 5.8 | 11.1 | 7.1 |
| | 2023 | 6.2 | 5.0 | 10.5 | 6.7 |
| *303500, 207500* | 2019 | 10.6 | 8.2 | 11.9 | 7.8 |
| | 2023 | 8.9 | 7.0 | 11.3 | 7.3 |
| *304500, 207500* | 2019 | 9.2 | 7.2 | 12.0 | 7.9 |
| | 2023 | 7.9 | 6.2 | 11.4 | 7.4 |
| *304500, 206500* | 2019 | 11.8 | 9.1 | 12.1 | 8.1 |
| | 2023 | 10.0 | 7.8 | 11.5 | 7.6 |

### 12.4.3 Meteorological Conditions

The most important climatic parameters governing the release and dispersal of fugitive emissions from the Quarry are wind speed, direction, and rainfall:

- wind direction determines the broad direction of dispersal;
- wind speed affects ground level concentrations by increasing the initial dilution of pollutants in the emission. It will also affect the potential for dust entrainment; and
- rainfall naturally supresses dust release.

Meteorological data from Sennybridge meteorological station was utilised in the assessment – 2015 to 2019 data in the dust assessment, and 2019 data in the dispersion modelling assessment. A windrose is presented in Figure 12.A-8 of **Appendix 12.7**. From this, it is evident that winds from the south-west sector are predominate in the area. Therefore, receptors located to the north-east and downwind of dust generating activities and pollutant sources are most likely to be impacted by emissions.

Relevant rainfall data applicable to the Quarry has been obtained from the Meteorological Office website[58] of UK mapped climate averages for 1991-2020. The average annual rainfall >0.2mm/day for the area of the Quarry is 220 to 240 days per year, comprising 60% to 66% of the year.

## 12.5 Sensitive Receptors

AQALs apply to locations where members of the public may be reasonably likely to be exposed to air pollution for the duration of the relevant AQAL. Therefore, the annual mean should apply only at locations where people are likely to be present for long periods (examples given are residential properties, schools, hospitals, and care homes). In the case of the 24-hour AQAL a relevant location would be one where the individuals may be exposed for eight hours or more in a day.

### 12.5.1 Dust Sensitive Human Receptors

With respect to amenity impacts, the sensitivity will relate to the level of amenity that can be reasonably expected. For example, residential dwellings and

[58] Met Office, https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages, accessed December 2021.

schools are more sensitive than industrial units or farmland typically. Receptor locations have been characterised as high, medium, or low sensitivity according to IAQM guidance. The IAQM screening distance applied for hard rock quarries is 400m for deposited dust and 1km for $PM_{10}$.

Nineteen human receptor locations (DR1 to DR19), including nearby footpaths/bridleways, considered to be representative of the local area for the assessment of dust and $PM_{10}$ impacts are presented in Figure 12.A-6 of **Appendix 12.6** and detailed in Table 12-11. The receptor sensitivities have been assigned in line with the IAQM guidance.

**Table 12-11 Summary of Dust Receptors: Human**

| Ref. | NGR | | IAQM Sensitivity |
|---|---|---|---|
| | X | Y | |
| *DR1: Residential* | 303921 | 210553 | High |
| *DR2: Footpath* | 304123 | 210526 | Low |
| *DR3: Footpath* | 303941 | 210274 | Low |
| *DR4: Bridleway* | 304036 | 209802 | Low |
| *DR5: Residential* | 304312 | 209939 | High |
| *DR6: Residential* | 304362 | 209806 | High |
| *DR7: Commercial (Restaurant)* | 304368 | 209733 | High |
| *DR8: Bridleway* | 304199 | 209687 | Low |
| *DR9: Commercial* | 303861 | 209265 | Medium |
| *DR10: Footpath* | 303791 | 209305 | Low |
| *DR11: Residential* | 303776 | 209156 | High |
| *DR12: Residential* | 303694 | 209194 | High |
| *DR13: Residential* | 303721 | 209102 | High |
| *DR14: Residential* | 303641 | 209022 | High |
| *DR15: Residential* | 303608 | 209145 | High |
| *DR16: Residential* | 303557 | 209259 | High |
| *DR17: Residential* | 303438 | 209305 | High |
| *DR18: Bridleway* | 303366 | 209797 | Low |
| *DR19: Golf Course* | 303247 | 210077 | Low |

### 12.5.2 Dust Sensitive Ecological Receptors

There are several designated nature conservation sites within 400m of the Quarry, as follows:

- Nant Glais Caves SSSI;
- Cwm Taf Fechan Woodlands SSSI;
- Cwm Taf Fechan Woodlands Local Nature Reserve (LNR);
- Taf Fechan Site of Importance for Nature Conservative (SINC);
- Cilsanws SINC; and
- several unnamed Ancient Woodland (AW).

The conservation sites have been represented in the dust assessment with the use of discrete receptors, and receptor sensitivities have been assigned in line with the IAQM guidance, reflective of the level of protection afforded to the site. Where multiple sites overlap, the highest sensitivity has been applied, as detailed in Table 12-12.

**Table 12-12 Summary of Dust Receptors: Ecological**

| Ref. | NGR | | IAQM Sensitivity |
|---|---|---|---|
| | X | Y | |
| *ER1: Nant Glais Caves SSSI* | 303704 | 210856 | Medium |
| *ER2: Nant Glais Caves SSSI* | 303816 | 210674 | Medium |
| *ER3: Nant Glais Caves SSSI* | 303980 | 210464 | Medium |
| *ER4: Nant Glais Caves SSSI / AW* | 304044 | 210343 | Medium |
| *ER5: Nant Glais Caves SSSI / AW* | 304094 | 210227 | Medium |
| *ER6: AW* | 304171 | 210090 | Medium |
| *ER7: AW* | 304249 | 209871 | Medium |
| *ER8: Cwm Taf Fechan Woodlands SSSI / LNR / SINC* | 304231 | 209707 | Medium |
| *ER9: Cwm Taf Fechan Woodlands SSSI / LNR / SINC* | 304186 | 209548 | Medium |
| *ER10: Cwm Taf Fechan Woodlands SSSI / LNR / SINC* | 304114 | 209403 | Medium |
| *ER11: Cwm Taf Fechan Woodlands SSSI / LNR / SINC* | 303976 | 209276 | Medium |
| *ER12: Cwm Taf Fechan Woodlands SSSI / LNR / SINC* | 303895 | 209087 | Medium |
| *ER13: Cilsanws SINC* | 303285 | 209166 | Low |

### 12.5.3 Road Traffic Emissions Human Receptors

Human receptors considered in the assessment of emissions from road traffic are shown in Table 12-13, whilst their locations are illustrated in Figure 12.A-4 of **Appendix 12.6**.

Receptors HR1 – HR17 are representative of worst-case exposure locations at existing receptors within the development locale, relative to the affected road network discussed (i.e. routes to/from the A465).

All receptors were considered in relation to exposure at breathing height at ground level relative to the adjacent modelled road, i.e. 1.5m.

**Table 12-13 Summary of Road Traffic Receptors: Human**

| Ref. | NGR | | Height (m) |
|---|---|---|---|
| | X | Y | |
| *HR1* | 303702 | 209116 | 1.5 |
| *HR2* | 303607 | 208701 | 1.5 |
| *HR3* | 303278 | 208320 | 1.5 |
| *HR4* | 303237 | 208229 | 1.5 |
| *HR5* | 303225 | 208176 | 1.5 |
| *HR6* | 302649 | 208506 | 1.5 |
| *HR7* | 302785 | 208389 | 1.5 |
| *HR8* | 303012 | 208094 | 1.5 |
| *HR9* | 303067 | 208063 | 1.5 |
| *HR10* | 303076 | 208041 | 1.5 |
| *HR11* | 303167 | 207957 | 1.5 |
| *HR12* | 303340 | 207872 | 1.5 |
| *HR13* | 303431 | 207799 | 1.5 |
| *HR14* | 303673 | 207638 | 1.5 |
| *HR15* | 304053 | 207079 | 1.5 |
| *HR16* | 304209 | 206953 | 1.5 |
| *HR17* | 304071 | 206705 | 1.5 |

### 12.5.4 Road Traffic Emissions Ecological Receptors

As discussed, there are several designated nature conservation sites in proximity to the Quarry. Further to this and in relation to road traffic emissions, the Cwm Taf Fechan Woodlands SSSI and LNR, and some AW sites are located within 200m of the affected road network. No international ecological designations are found within 200m of the affected road network for both road layout scenarios assessed.

In line with the IAQM guidance, a screening assessment has been undertaken. The predicted development-generated trips are 138 HDV AADT and therefore below the indicative screening threshold of 200 HDV AADT.

Potential impacts from road traffic emissions on the ecological designations are therefore likely to be imperceptible, whereby resultant effects can be classed as insignificant.

Given that all the ecological sites within 200m of the affected road network are national or local designations, developmental trips have been assessed in isolation (i.e. project alone). No further assessment or consideration of in-combination effects is required, and the effects of road traffic emissions on ecological receptors have not been considered further in this assessment.

## 12.6 Assessment of Effects and Significance: Dust Emissions

This section describes the assessment of dust effects from the Quarry, considering all potential dust sources and activities.

### 12.6.1 Screening Assessment: $PM_{10}$ and Deposited Dust

On the basis of the adopted screening criteria, an assessment of deposited dust and particulate matter (PM) is required at human receptors within 400m and 1km, respectively. In terms of ecological receptors, an assessment of dust deposition is required for those designated sites located within 400m of the Quarry or activities.

### 12.6.2 Further Assessment: $PM_{10}$

The IAQM minerals guidance states that if the $PM_{10}$ background concentration is less than 17µg/m³ it is considered unlikely that any PC from the additional activities proposed would lead to an exceedance of the annual mean AQAL.

Utilising the Defra background maps (Table 12-10), the maximum annual mean $PM_{10}$ concentration across the area in 2019 is 14µg/m³ and therefore less than 17µg/m³. In addition, background concentrations are predicted to decrease year on year and by 2023 the maximum concentration is predicted to be 13.3µg/m³. Furthermore, annual mean $PM_{10}$ concentrations at the MTCBC suburban monitor APM1 have been <12µg/m³ for the period 2015-2019.

It is therefore considered that in the absence of additional mitigation, the effect of the proposed operations on human health from emissions of $PM_{10}$ will be negligible.

### 12.6.3 Further Assessment: Deposited Dust (Disamenity)

An assessment of potential dust impacts has included all areas to be utilised by the proposed development and the subsequent activities. This is limited to the OMS, and the area of the Quarry directly south of the OMS used as ancillary mining land.

#### *Current Site Operations*

The Quarry is currently mothballed, and therefore the proposed development would represent a re-commencement of quarrying operations and mineral extraction on-site.

#### *Proposed Site Operations*

The proposed operations include for mineral extraction activities, and subsequent mineral processing and storage within the Quarry.

Once open the quarry is expected to be operational for 287.5 days of the year, with the majority of activities taking place between 07:00 and 19:00 Monday to Friday, and between 07:00 and 16:00 on Saturdays.

An average output of 500,000tpa is expected, however this may fluctuate with market demand. Assuming a 20 tonne payload an output of 500,000tpa would result in 87 one-way / 174 two-way HDV movements per working day associated with the transport of mineral.

### *Sources of Dust*

Activities or sources associated with the proposed development that have the potential to result in the release of dust include:

- site preparation and restoration;
- mineral (limestone) extraction;
- mineral processing;
- storage of material;
- on-site transportation; and
- off-site transportation.

#### *Site Preparation and Restoration*

Prior to the commencement of extraction within each phase, there is a degree of site preparation. This would include the removal of vegetation and stripping of soils and overburden to expose the rock head. However, it is noted that the rock face is already exposed in certain areas of the OMS and therefore site preparation would be minimised in those areas.

The soil and overburden would be stripped using hydraulic excavators and will initially be utilised to construct a soil screening bund located at the north eastern corner of the Quarry.

The removal of soils and overburden can be considered an intense activity, although temporary and short-term in nature. In the absence of mitigation this presents a high dust emission potential, which can be exacerbated by adverse meteorological conditions (i.e. dry and windy).

Bund formation is also an intense activity with high dust emission potential, however, it is short-term in nature. In addition, soil bund construction can be timed to avoid adverse weather conditions, (i.e. dry and windy) therefore decreasing the potential for dust emissions.

Restoration activities involve placement, tipping, shaping and compaction activities of potentially dusty material and are therefore of high dust emission potential in the absence of mitigation. During dry and windy meteorological conditions these intermittent, yet intensive, operations have an increased potential for dust generation.

The majority of restoration activities would take place within the void. As such, they are therefore sheltered from the wind.

Overall and given the above, site preparation and restoration presents a medium dust emission potential, however activities are temporary and short-term in nature.

#### *Mineral Extraction and Mineral Waste Tipping*

Based on the predicted reserves within the OMS, the proposed development is likely to provide mineral for up to circa 100 years, at an average output of 500,000tpa.

Working within the OMS will be undertaken in a series of progressive phases, varying spatially. Extraction activities will begin in Phase 1, located in the north western area, progressing for circa 5 years. Phase 2 continues in the north western area in tandem with initial progression in the southern area working northwards into the 'central spine' which separates the current western and eastern limbs of the Quarry. Phase 3 continues to advance the north western quarry faces eastwards, in conjunction with the south central quarry faces working northwards into the central spine, marking approximately 15 years of the development lifespan.

Phase 4 would see quarrying progress eastwards across the central spine into the eastern limb of the Quarry, expected to take the development up to 30 years. At Phase 5, marking 60 years, there would be full quarry development across the central area, with faces progressing northwards towards the northern Quarry boundary.

Following Phase 5, the quarry faces and benches would be worked back to the edge of the Quarry in all directions to capture the remaining reserves.

Based on the available plant and site staff, it is likely that 5 to 10 items of mobile plant will be operating at any one time within the extraction area, depending on demand.

Blasting is required to fragment the rock mass at the quarry face. Quarry blasting is carefully undertaken in line with strict health and safety legislation and industry best practice. Blasting can only be undertaken during set times of day and each blast is designed to minimise dust generation.

Nevertheless, blasting is inherently a dusty activity, albeit short-term in duration. Furthermore, blasting is undertaken at the quarry face and therefore within the void where it is largely sheltered from winds which have the potential to transport dust emissions.

Dust suppression equipment (e.g. water sprays) is available for use during mineral extraction activities when required. In addition, specialist dust suppression equipment is fitted to the drill rigs and fine material removed prior to blasting.

The periodic ROMP and proposed scheme include mineral waste tipping, whereby mineral waste materials are tipped and stored for later use in restoration activities. The northern quarry waste tip will be extended during phases 1 to 3, after which the material will be used. From phase 4 onwards, a new eastern tip will be formed. Best practice in relation to dust control will be adopted for the mineral waste tipping, and drop heights will be minimised where possible.

Overall and given the above, the mineral extraction and mineral waste tipping activities present a medium dust emission potential.

### *Mineral Processing*

Extracted mineral would be transported via dump trucks to the mobile plant for processing. Primary crushing of the blasted rock is undertaken using a primary crusher. This reduces the size of the rock.

The mineral undergoes further processing by the aggregate processing plant. This reduces the size of the rock further and screens it into a range of graded products. Mineral processing is an inherently dusty process. However, potential dust emissions would be controlled by ensuring equipment is well maintained and fitted with dust suppression equipment where feasible. Furthermore, the operation of the plant would be subject to certain conditions under the Environmental Permit (EP). Such conditions aim to minimise the environmental impact of the plant, including potential impacts from dust emissions.

Dust suppression equipment (e.g. water sprays) would be available for use, as and when required.

In line with the extraction rate, approximately 500,000tpa of mineral will require processing.

Overall and given the above, the processing of mineral presents a medium dust emission potential.

### *Storage of Material*

A certain amount of material and extracted mineral is subject to storage within the Quarry, including:

- a soil screening bund on the north eastern boundary of the OMS;
  an extension of the northern quarry waste tip and creation of a new eastern tip located in the eastern extent of the OMS; and
- storage of processed mineral within the stocking areas.

The north eastern bund would be grass seeded and maintained as an essentially permanent landform for the duration of the development.

The exposed surfaces of the quarry tips initially present a potential source of dust emissions. The magnitude of dust generation is dependent upon the surface conditions (moisture and level of disturbance) and erosion due to rainfall and wind. As the tips weather, the potential for dust emissions is reduced as the particles aggregate and a surface crust forms (provided disturbance levels are low). Furthermore, a level of natural re-vegetation is also likely to occur which will stabilise the tips and prevent wind erosion of the surfaces. Without additional mitigation measures there is potential for a low level of dust emission from the tips.

Any long-term stockpiles within the stocking areas would be profiled to optimise wind dynamics and reduce dust entrainment, where feasible.

Dust suppression equipment will be available throughout the quarry complex for use during potentially dusty activities, and on stockpiles and bunds/stores, as required.

Overall and given the above, the storage of soils and overburden presents a small dust emission potential. Furthermore, the storage of mineral presents a small dust emission potential.

### *On-site Transportation*

On-site transportation presents a high dust emission potential in the absence of mitigation. The potential for dust emissions from unpaved haul roads can depend on the weight, the number of wheels in contact with the road surface, the moisture content of the road, and vehicle speed; all of which can be controlled by effective operational measures. In line with this, it is proposed that a 20mph speed limit is implemented across the Quarry.

Blasted rock would be loaded onto dump trucks at the quarry face using hydraulic excavators or loading shovels. The dump trucks would transport the rock via the internal haul roads to the primary crusher. From there the crushed rock is transferred to the remainder of the mobile processing plant, and following this, crushed and processed mineral would be transported to the stocking areas in the south of the Quarry for storage prior to transport off-site to the point of sale.

The internal haul roads across the Quarry would generally be formed on quarry benches and ramps between the working levels, with edge protection placed at the edges of the haul roads to ensure stability. As such, the majority of internal haul roads are situated within the quarry void and below ground level, reducing their exposure to winds. Vehicle movements will be controlled and managed.

Dust suppression equipment (e.g. tractor and water bowser unit) will be available for use on haul roads, as required.

Overall and given the above, the risk of dust emissions from on-site transportation is considered medium, providing effective mitigation is in place.

### *Off-site Transportation*

Extracted and processed material (product) is transported off-site. This presents potential risk of trackout if dust and dirt is transported onto the public road network, where it may be deposited and then re-suspended by vehicles using the network.

As per existing arrangements, vehicles will exit the Quarry via the purpose-built entrance off Vaynor Road, which is approximately 100m in distance to the stocking areas. The access road is hard-surfaced and paved.

Dust suppression equipment would be available for use on the haul road, if required. A 10mph speed limit will be enforced on the access road.

Based on the 500,000tpa average output, and 287.5 working days in a year, this would result in 87 one-way (i.e. 174 two-way) HDV movements leaving the Quarry per working day.

Wheel cleaning facilities will be made available for use prior to HDVs leaving the Quarry.

Overall and given the above, the risk of dust emissions from off-site transportation is considered small.

## *Environmental Design and Mitigation Measures*

Existing measures to mitigate dust have been addressed in two sections:

- mitigation measures that apply to day to day quarry operations; and
- environmental design mitigation measures (such as aspects of phasing, layout, and other specific design measures).

### *Operational Mitigation Measures*

Operations will be undertaken in line with industry good practice. In addition to the measures already mentioned in the above sections, the MIRO guide was reviewed for dust control measures appropriate to the proposed development, as presented in **Table 12-14**.

**Table 12-14 MIRO Dust Control Measures**

| Potential Source/Process | Measure | Estimate of Effectiveness |
|---|---|---|
| *Hydraulic excavators and loaders* | Use of water sprays to moisten material being handled. | Moderate |
| | Minimise drop heights when unloading material. | |
| | Protect from exposure to wind where possible. | |
| *Blasting* | Avoid blasting under unfavourable weather conditions subject to safety consideration. | Moderate |
| *Hydraulic breakers* | Water spraying of rock prior to fragmentation when high degree of control required. | Moderate |
| *Drill rigs* | Enclosure of plant with shrouds. | High |
| | Use of dust suppression (filters) on waste air vented from equipment. | |
| *On-site Transportation* | Minimise on-site transportation distances. | High |
| | Use of water sprays to moisten road surfaces during dry weather. | |
| | Use mechanical road sweepers during working hours, especially during dry weather, to limit visible dust emissions. | |
| | Restrict vehicle speeds through signage/staff training. | |
| *Crushers & screens/graders* | Dust suppression spraying of material to be crushed. | High |
| | Enclosure of plant. | |
| *Storage (Stockpiles / Bunds)* | Seed surfaces of completed mounds of overburden and topsoil (restoration materials). | High |
| | Limit mechanical disturbance. | |
| | Shield from wind, e.g., through the use of tree planting or screening. | |
| | Use of water sprays to moisten surfaces during dry weather. | Moderate |

### *Environmental Design Measures*

A number of specific mitigation measures have been incorporated into the Quarry layout and design; these measures include:

- mobile processing plant would be located in the quarry void and therefore sheltered;

- tarmacked access road off Vaynor Road, approximately 100m in length to any active areas;
- extraction areas located away from the majority of sensitive receptor locations;
- stocking areas located upwind from the majority of sensitive receptor locations; and
- wheel washing facilities to be located at the Quarry entrance.

The above dust mitigation measures have been incorporated into a Dust Management Plan (**Appendix 12.7**) which sets out the proposed management procedures and dust controls for the Quarry.

### 12.6.4 Assessment of Effects – Disamenity Dust

#### *Summary of Residual Source Emissions*

The residual source emission magnitude (i.e. the potential magnitude of dust emission after the designed in environmental measures have been taken into account) for each of the dust generating activities is presented in **Table 12-15**.

**Table 12-15 Residual Source Emissions Magnitude**

| Potential Dust Source | Factors and Assumptions | IAQM Residual Source Emissions |
|---|---|---|
| *Site Preparation and Restoration* | 5-10 No. of heavy plant active at any one time.<br>Minimal site preparation given historic use.<br>Working area approx. 5-10ha. | Medium |
| *Mineral Extraction and Mineral Waste Tipping* | Average 500,000tpa output.<br>Blasting required.<br>Blasting undertaken within the quarry void.<br>Specialist dust suppression equipment fitted to the drill rig.<br>Quarry working faces covering an area approx. 5-15ha. | Medium |
| | Disturbance of tips minimised to allow stabilisation / natural re-vegetation. | |
| *Mineral Processing* | Mobile plant located within quarry void.<br>Average 500,000tpa throughput.<br>A combination of crushing and processing. | Medium |
| *Storage of Material* | Designated stocking areas.<br>Average output of 500,000tpa.<br>Stockpiles located upwind of sensitive receptor locations.<br>Soil screening bund seeded. | Small |
| *On-site Transportation* | 20mph speed limit.<br>Set haul roads and controlled movements.<br>Majority of haul roads located within the quarry void.<br>Edge protection on haul roads. | Medium |
| *Off-site Transportation* | 10mph speed limit on access road.<br>An average of 87 one-way / 174 two-way HDV movements per working day.<br>Tarmacked access road approx. 100m in length.<br>Wheel cleaning facilities. | Small |

To present a worst-case assessment, the overall residual source emissions magnitude is considered to be 'medium', in accordance with the IAQM guidance.

### *Summary of Screening Assessment*

The IAQM screening distance of 400m has been applied to receptors in relation to their distance to the OMS and Quarry area to the south of the OMS used as ancillary mining land, as detailed in Table 12-16.

Only the areas that are within 400m of the receptor have been considered as potentially impacting on that receptor.

This is considered a worst-case assessment, as it effectively assumes that the area boundary is concurrent with potential dust generating activities which is unlikely to always be the case and considers the area as a whole.

**Table 12-16 Summary of Screening Assessment**

| Ref. | Areas within 400m |
|---|---|
| *DR1* | OMS |
| *DR2* | OMS |
| *DR3* | OMS |
| *DR4* | OMS, Quarry area south of OMS |
| *DR5* | OMS |
| *DR6* | OMS |
| *DR7* | OMS |
| *DR8* | OMS, Quarry area south of OMS |
| *DR9* | OMS, Quarry area south of OMS |
| *DR10* | OMS, Quarry area south of OMS |
| *DR11* | OMS, Quarry area south of OMS |
| *DR12* | OMS, Quarry area south of OMS |
| *DR13* | Quarry area south of OMS |
| *DR14* | Quarry area south of OMS |
| *DR15* | OMS, Quarry area south of OMS |
| *DR16* | OMS, Quarry area south of OMS |
| *DR17* | OMS, Quarry area south of OMS |
| *DR18* | OMS, Quarry area south of OMS |
| *DR19* | OMS, Quarry area south of OMS |
| *ER1* | OMS |
| *ER2* | OMS |
| *ER3* | OMS |
| *ER4* | OMS |
| *ER5* | OMS |
| *ER6* | OMS |
| *ER7* | OMS |
| *ER8* | OMS, Quarry area south of OMS |
| *ER9* | OMS, Quarry area south of OMS |
| *ER10* | OMS, Quarry area south of OMS |
| *ER11* | OMS, Quarry area south of OMS |
| *ER12* | Quarry area south of OMS |
| *ER13* | OMS, Quarry area south of OMS |

### *Summary of Pathway Effectiveness*

The pathway effectiveness at each receptor has been assigned in accordance with the IAQM criteria and is based on the distance of the receptor to the stated area and the frequency of potentially dusty winds (>5m/s and dry). A summary of pathway effectiveness is displayed in Table 12.A-12 of **Appendix 12.5**.

### *Summary of Dust Effects*

On the basis of the source term, receptor sensitivity and pathway effectiveness, the magnitude of effect due to potential dust deposition at each receptor has been assessed. Table 12.A-13 of **Appendix 12.5** presents a summary of the magnitude of effect at the human and ecological receptor locations.

The magnitude of effect predicted is considered ‘negligible’ at the majority of receptor locations (human and ecological). This is largely due to the receptors being located upwind of activities, and/or not located ‘close’ to activities (see following section).

Furthermore, the Quarry experiences a large percentage of days per year where daily rainfall exceeds 0.2mm. In line with IAQM minerals guidance, this is considered sufficient to suppress potential dust emissions and has therefore been factored into the assessment.

One 'slight adverse' effect is predicted at Receptor DR1 in relation to the OMS. Receptor DR1 is located to the east/north-east of the OMS and therefore downwind of potential activities within this area. However, the assessment approach is considered 'worst-case' as it does not account for the timing and duration of dust generating activities; which are likely to be short-term in nature, resulting in temporary effects. In addition, the assessment assumes the boundary of the OMS to be always concurrent with dust generating activities. This is unlikely to be the case as activities will vary spatially and not cover the whole OMS at any given time.

A soil screening bund is due to be constructed within the initial stage of the proposed development, positioned along the north-east periphery of the Quarry. This screening bund is likely to provide protection to Receptor DR1, acting as a physical barrier between potential dust generating activities.

### *Further Assessment of Mineral Extraction Phases*

In relation to the proposed development's lifespan (i.e. circa 100 years) the mineral extraction phasing has been considered in further detail; based on the conceptual location and anticipated advancement of the working face within the OMS and the duration of each extraction phase.

Relative to the extraction phasing described, the locations of sensitive dust receptors have been considered. In line with the IAQM methodology and due to the nature of the risk matrices, receptors located close, i.e. <100m, or intermediate, i.e. 100-200m, from a dust source or activity are most at risk from potential adverse dust impacts. The receptor locations classified as close or intermediate to each extraction phase are detailed in Table 12-17.

**Table 12-17 Summary of Phasing Areas and Receptor Locations**

| Phase | Lifespan (years) | Receptors Classified As | |
|---|---|---|---|
| | | 'Close' <100m | 'Intermediate' 100-200m |
| *1* | 0-5 | DR19 | None |
| *2* | 5-10 | DR19 | DR18 |
| *3* | 10-15 | DR19 | DR18 |
| *4* | 15-30 | DR3, DR19 | DR18 |
| *5* | 30-60 | DR3, DR19 | DR18, ER3, ER4 |
| *Final* | 60-100 | DR3, DR19 | DR1, DR18, ER2, ER3, ER4, ER5 |

As displayed in Table 12-17, most of the receptor locations considered within the assessment are located >100m from the proposed mineral extraction phases. Only Receptor DR19 (Merthyr Tydfil Golf Course) is located within 100m of all phases, and Receptor DR3 (footpath) is located within 100m of phase 4, 5 and the final phase.

In addition to the above, Receptor DR18 is located within 200m of phases 2-5, and the final phase, Receptor ER3 and ER4 are located within 200m of phase 5 and the final phase, and DR1, ER2 and ER5 are also located within 200m of the final phase.

The number of receptor locations located 'close' or 'intermediate' to the extraction phases increases as the development progresses, suggesting that the latter phases have greater potential to result in dust impacts. However, this potential is largely counteracted, as most of the receptors in Table 12-17 are classified as 'low' or 'medium' sensitivity in line with IAQM guidance.

Of the receptors identified in Table 12-17 only DR1 (residential dwelling) is classified as 'high' sensitivity in line with IAQM guidance. This follows the dust assessment results, whereby only one 'slight adverse' impact is predicted, at DR1 (Table 12.A-13 of **Appendix 12.5**). Given that DR1 is located within 200m of the final phase only, this potential impact would relate to the final phase only; at which point the north-eastern soil screening bund would be well established.

In consideration of the receptor locations and proposed minerals extraction phasing, it is considered unlikely that adverse impacts would materialise.

Overall and based on the assessments undertaken, the effect of the proposed development in terms of dust deposition is considered to be 'not significant'.

This conclusion is reliant on the designed-in and operational mitigation measures, which have been accounted for in the assessment.

### 12.6.5 Assessment of Effects and Significance: $PM_{10}$

The effect of $PM_{10}$ emissions can be classified as negligible (see Section 12.6.2), therefore the overall effect of the proposed development on $PM_{10}$ concentrations in the local area is considered to be 'not significant'.

## 12.7 Assessment of Effects and Significance: Road Traffic Emissions

This section presents the potential air quality impacts and effects associated with the road traffic emissions resultant of the vehicle movements generated by the Quarry.

The following sections present the results from the 'main assessment' considering the current road network, whilst accounting for the closure of Grawen Lane. Appendix 12-4 presents the results from 'additional assessment' which considered the future alignment of the A465 through Cefn Coed, in recognition of the A465 highways project (section 5 to 6).

### 12.7.1 $NO_2$ Modelling Results

The $NO_2$ modelling results are presented in full in Table 12.A-5 of **Appendix 12.3**.

The maximum predicted annual mean $NO_2$ concentration with the proposed development in place (2023 DS) was at Receptor HR9 with a predicted concentration of 17.3µg/m$^3$; this represents 43.3% of the AQAL. Receptor HR9 is located off the A4054 High Street, adjacent to the A465 Head of Valleys Road. The change in annual mean $NO_2$ concentration at this location due to the proposed development (2023 DS vs. 2023 DM) relative to the AQAL was 0.6%.

The maximum observed increase in annual mean $NO_2$ concentrations as a result of the proposed development (2023 DS vs. 2023 DM) was 0.9% of the AQAL at Receptor HR8. Receptor HR8 is located at the junction of Vaynor Road / A4054 Upper High Street and would therefore experience the uplift in traffic flows on both these links.

In accordance with EPUK and IAQM guidance, the impact of the development on annual mean $NO_2$ concentrations at all assessed receptors is considered to be 'negligible'. Given the marginal increase in annual mean $NO_2$ concentrations associated with the proposed development, and that there are no predicted exceedances of the annual mean $NO_2$ AQAL, unmitigated effects associated with annual mean $NO_2$ concentrations at all assessed receptor locations are therefore considered to be 'not significant'.

The empirical relationship given in LAQM.TG(16) states that exceedances of the 1-hour mean $NO_2$ AQAL are unlikely to occur where annual mean concentrations are <60µg/m$^3$. Annual mean $NO_2$ concentrations predicted at all receptor locations are well below this limit. Therefore, it is unlikely that an exceedance of the 1-hour mean AQAL will occur. Effects associated with likely 1-hour mean $NO_2$ concentrations at all assessed receptor locations are therefore considered to be 'not significant'.

### 12.7.2 $PM_{10}$ Modelling Results

The $PM_{10}$ modelling results are presented in full in Table 12.A-6 of **Appendix 12.3**.

The maximum predicted annual mean $PM_{10}$ concentration with the proposed development in place (2023 DS) was at Receptor HR9 with a predicted concentration of 14.4µg/m$^3$; this represents 36.0% of the AQAL. The change in annual mean $PM_{10}$ concentration at this location due to the proposed development (2023 DS vs. 2023 DM) relative to the AQAL was 0.3%.

The maximum observed increase in annual mean $PM_{10}$ concentrations as a result of the proposed development (2023 DS vs. 2023 DM) was 0.3% of the AQAL at Receptors HR8, HR9 and HR10. HR10 is located at the roadside of the A4054 High Street, where increases in traffic flows as a result of the proposed development may be experienced.

In accordance with EPUK and IAQM guidance, the impact of the development on annual mean $PM_{10}$ concentrations at all assessed receptors is considered to be 'negligible'. Given the marginal increase in annual mean $PM_{10}$ concentrations associated with the proposed development, and that there are no predicted exceedances of the annual mean $PM_{10}$ AQAL, unmitigated effects associated with annual mean $PM_{10}$ concentrations at all assessed receptor locations are therefore considered to be 'not significant'.

Based upon the maximum predicted annual mean $PM_{10}$ concentration of 14.4µg/m$^3$, this equates to less than 1 day where 24-hour mean $PM_{10}$ concentrations are predicted to be greater than 50µg/m$^3$. This is well below the 35 permitted exceedances, and therefore the number of maximum exceedances is in compliance with the 24-hour mean AQAL. Effects associated with likely 24-hour mean $PM_{10}$ concentrations at all assessed receptor locations are therefore considered to be 'not significant'.

### 12.7.3 $PM_{2.5}$ Modelling Results

The $PM_{2.5}$ modelling results are presented in full in Table 12.A-7 of **Appendix 12.3**.

The maximum predicted annual mean $PM_{2.5}$ concentration with the proposed development in place (2023 DS) was at Receptor HR9 with a predicted concentration of 8.9µg/m$^3$; this represents 35.6% of the AQAL. The change in annual mean $PM_{2.5}$ concentration at this location due to the proposed development (2023 DS vs. 2023 DM) relative to the AQAL was 0.2%.

The maximum observed increase in annual mean $PM_{2.5}$ concentrations as a result of the proposed development (2023 DS vs. 2023 DM) was 0.3% of the AQAL at Receptor HR8.

In accordance with EPUK and IAQM guidance, the impact of the development on annual mean $PM_{2.5}$ concentrations at all assessed receptors is considered to be 'negligible'. Given the marginal increase in annual mean $PM_{2.5}$ concentrations associated with the proposed development, and that there are no predicted exceedances of the annual mean $PM_{2.5}$ AQAL, unmitigated effects associated with annual mean $PM_{2.5}$ concentrations at all assessed receptor locations are therefore considered to be 'not significant'.

## 12.8 Mitigation Measures

### 12.8.1 Dust Control Measures

The working of the OMS would represent a re-commencement of operations at Vaynor Quarry. Dust control measures (both operational and designed-in) are considered intrinsic to site operations.

The assessment has predicted effects from $PM_{10}$ concentrations and disamenity from deposited dust to be 'not significant' as a result of the proposed development.

A series of designed-in and operational mitigation measures have been considered in the assessment, with recommendations for further mitigation measures from the MIRO guide, as required. All measures have been included within the proposed Dust Management Plan (**Appendix 12.7**).

### 12.8.2 Road Traffic Emissions

In accordance with EPUK and IAQM guidance, the overall effect of the development on $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations at all assessed receptor locations is considered to be 'not significant', despite the overly worst-case assessment approach, i.e. assuming maximum number of operational vehicle trips generated by the proposed development on all routes to/from the Quarry to the A465.

As such, additional long-term scheme-specific mitigation measures are therefore not considered to be necessary.

## 12.9 Residual Effects

### 12.9.1 Dust Emissions

Residual effects are those impacts that cannot be reasonably mitigated. The assessment has considered a series of environmental designed-in measures that would control dust emissions, whilst additional dust control measures have been recommended, as required. Such measures are generally accepted by the minerals industry as providing effective control against the impacts of airborne dust.

On account of the mitigation measures and the assessment outcomes, there are not considered to be any significant residual effects as a result of the proposed development.

### 12.9.2 Road Traffic Emissions

Given the outcomes of the assessment, long-term scheme-specific mitigation measures in relation to operational effects arising from road traffic emissions are not considered to be necessary. No mitigation is therefore proposed, and residual effects are not applicable in this instance, but can otherwise be assumed to be 'not significant' in the absence of mitigation.

## 12.10 Cumulative Effects

### 12.10.1 Dust Emissions

There is the potential for cumulative effects from dust emissions to occur when a receptor screens within the relevant distances for more than one dust source. For example, a receptor may be positioned within 400m of the Quarry and within an applicable screening distance of an additional dust source.

Upon review of the Quarry and surrounding area, there are not believed to be any additional dust sources within the applicable screening distances from the receptors considered in this assessment. Furthermore, the assessment has taken account of all active areas of the Quarry and is therefore cumulative in nature.

As presented in **Table 12-10**, annual mean $PM_{10}$ background concentrations are below the 17µg/m$^3$ recommended screening value across the study area.

Given all of the above, cumulative effects in terms of dust and air quality are considered to be 'not significant'.

### 12.10.2 Road Traffic Emissions

The traffic flows used for the future assessment scenarios (2023 DM/DS) includes vehicle movements associated with growth and development across the area. As such, the dispersion modelling results presented are inherently cumulative in nature. The cumulative operational effect of the proposed development is therefore considered to be 'not significant'.

In relation to the A465 highways project (section 5 to 6), this has been considered within the road traffic emissions assessment; where applicable within the main ES assessment and in detail within the additional assessment – presented in **Appendix 12.4**. The closure of Grawen Lane, as part of the A465 project, resulted in consideration of a larger modelled domain to ensure all routes to/from the Quarry to the A465 were captured in both the main and additional assessments. Effects and cumulative effects were therefore considered over a larger area. In consideration of the main and additional assessment results, effects are considered 'not significant'.

## 12.11 Recommendations

On the basis of the risk assessment completed, it is recommended that the environmental design measures and standard industry best practise as described in Section 12.6.3 and incorporated into the proposed Dust Management Plan (**Appendix 12.7**) are applied.

Furthermore, the Dust Management Plan sets out dust monitoring and complaints procedures, contingency actions, and the site management responsibilities.

In terms of road traffic emissions, effects on all assessed receptor locations are considered to be 'not significant' regardless of the route to/from the Quarry to the A465 chosen. The best operational route can therefore be selected without any implications for local air quality.

## 12.12 Summary and Conclusions

### 12.12.1 Dust Assessment

The assessment has been undertaken in line with the IAQM minerals guidance and has considered the potential significance of effects on amenity, human health (from $PM_{10}$) and ecological receptors as a result of operations within the Quarry.

The proposed scheme is considered unlikely to cause adverse effects with the correct mitigation measures in place and all potential dust impacts are considered to be reversible, i.e. the risk of impact will cease on completion of the extraction and restoration activities at the Quarry.

The conclusions in relation to the dust assessment are that:

- the effect on amenity is considered to be 'not significant';
- the effect on $PM_{10}$ concentrations at receptors is considered to be 'not significant'; and
- the effect from dust on ecological receptors are considered to be 'not significant'.

These conclusions rely on the implementation of operational mitigation measures and the environmental design measures throughout the proposed development. With this, the overall effect is 'not significant'.

### 12.12.2 Road Traffic Emissions Assessment

The assessment considered impacts on all relevant receptors from operational road traffic emissions associated with the proposed development. Furthermore, an additional set of future year scenarios were considered to ensure that the proposed road layout changes, resultant of the A465 highways project, were captured in the assessment.

The ADMS-Roads dispersion model (version 5.0.0.1) was used to determine the likely $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations at all assessed receptor locations for a series of scenarios, in accordance with technical guidance presented in LAQM.TG(16). Predicted pollutant concentration changes at existing receptor locations as a result of the proposed development were assessed using the EPUK and IAQM significance criteria.

In accordance with EPUK and IAQM guidance, the impacts of the proposed development on $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations at all assessed receptor locations are considered to be 'negligible' for both the main and additional assessments. Unmitigated effects associated with $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations at all assessed receptor locations are therefore considered 'not significant' for both the main and additional assessments.

# 13.0 TRANSPORTATION

## 13.1 Introduction

This chapter of the ES has been prepared by The Hurlstone Partnership Limited and considers the potential for the proposed development to impact upon the existing highway network in the vicinity of the application site. The chapter describes the scope, relevant legislation, assessment methodology and the baseline conditions currently existing at the application site and its surroundings. It then considers any potential significant environmental affects the proposed development would have on this baseline environment; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual impacts after these measures have been employed.

Within this chapter, references to the 'application site' and 'the site' refer to the overall Quarry site comprising the Periodic ROMP application sites, and the historically quarried ancillary mining land to the south of the ROMP sites which will be used for minerals stockpiling, site offices, weighbridge and an internal haulage route to the public highway at Vaynor Road.

The proposed development has been described in detail within Chapter 3.0 of the ES and briefly comprises the resumption of extraction and processing within the permitted extraction site using mobile plant to produce aggregate at a rate of approximately 500,000 tonnes per annum, which would be distributed by the existing site access to Vaynor Road.

In terms of transport and highway matters there would be no significant increase beyond what has previously been agreed to be acceptable on the majority of the local road network. However, as a result of the A465 improvement scheme, which has closed the direct connections between Cefn-coed-y-cymmer, there would be an increase in Quarry traffic along the A4054 Upper High Street, as it would be necessary to use that route and thereafter the A470 in order to access the A465, as would a proportion of other existing traffic travelling between the village and the A465. Nevertheless, based on data provided by Transport for Wales, the route has sufficient capacity to accommodate the diverted traffic movements, as is demonstrated in this study.

## 13.2 Site Access

The existing site access is located approximately 1.75km northeast along Vaynor Road from its junction with the A4054 High Street / Upper High Street in Cefn-coed-y-cymmer.

The existing site access extends approximately 31.3m along the north side of Vaynor Road and narrows via kerbed radii to the 5.9m wide gateway (hinge to hinge – 6.0m post to post) set back 9.4m from the road edge.

The access is surfaced in asphalt and has a pedestrian footway around the southwest radius which continues towards Trefechan on the north side of the carriageway for approximately 61m at which point it switches to the opposite side for a further 128m before returning back to the north side of Vaynor Road as it continues southwest.

Approximately 53m to the northeast of the access, the speed limit increases from 30 mph to 60 mph when travelling away from the site. At the access itself and heading southwest through Trefechan and onwards to Cefn-coey-y-cymmer, Vaynor Road is subject to a 30 mph speed limit.

When travelling southwest, signage confirms to road users that speed cameras are present within the 30 mph speed limit area, where street lighting is also introduced, which includes the site access.

Visibility at the access to Vaynor Quarry was measured on site using traffic cones and a road-wheel to extend 144.5m to the nearside edge, 157.6m to the centreline of the near (oncoming) traffic lane, 166mm to the centreline of the carriageway to the right (southwest) from a 2.4m X distance (set back from the road edge) at the access centreline.

The comparable visibility to the left (northeast) extended 141m to the near edge, 133.5m to the carriageway centreline,128.2m to the centreline of the far

(oncoming) traffic lane and 121m to the far edge of the carriageway. Forward visibility was also measured towards the front of vehicles waiting to join Vaynor Road from the Quarry access to extend 159.4m from the southwest and 126m from the northeast.

On the opposite side of Vaynor Road to the main quarry access there is an access to a stock yard, which was previously used when the quarry was operational. This access extends 27.1m along the south side of the carriageway and narrows to the 4m wide gate set back 6.6m from the carriageway.

Visibility at the stockyard access extends 30m to the near edge, 54.5m to the centreline, 66.3m to the centreline of the far (oncoming) traffic lane and 76.5m to the far carriageway edge to the left (southwest) from the 2.4m X distance. The comparable view to the right (northeast) extended 112.5m to the near edge, 119m to the centre of the near (oncoming) traffic lane and 123m to the centreline of Vaynor Road.

Forward visibility towards the stock yard access extends 175m from the southwest and 123m from the northeast.

It was apparent on site that the visibility splays were, to a greater or lesser degree, restricted by vegetation growing within or overhanging the verge area. This vegetation would be trimmed back when activities resume at the site, which would increase the visibility splays for drivers when compared with the distances measured above.

## 13.3 Development Proposals

### 13.3.1 Application Details

The proposed development represents the resumption of quarrying activities within the site. Stone extracted would be processed using mobile plant to create the required aggregate / stone sizes. The products would then be distributed via the established site access via Vaynor Road to the southwest.

Whilst the current planning permission allows access to the site on a 24/7 basis, and the flexibility to allow such working is to be retained, the majority of activity would typically take place between 07:00 – 19:00 Monday to Friday and 07:00 – 16:00 on Saturdays. When allowing for Public Holidays and extended shut-down between Christmas and New Year, a total of 287.5 working days per annum has been established.

The reopening of Vaynor Quarry would effectively supplement and/or replace the supply from Penderyn Quarry in due course. Analysis of weighbridge data from Penderyn Quarry revealed an average payload of 20 tonnes.

Based on the proposed aggregate production activities, when allowing for loader drivers, plant operatives etc. it is anticipated that there would be a total of 11 people directly employed at the site.

Based on the remaining reserves within the permitted working areas and the predicted average output of 500,000 tonnes per annum, Vaynor Quarry could supply demand for aggregate for a period of up to 100 years.

### 13.3.2 Trip Generation

Based on an average production of 500,000 tonnes of stone per annum being distributed in 20 tonne average payloads over 287.5 working days gives an average of 87 loads / 174 HGV movements per day, which equates to around 8 loads / 16 HGV movements per hour when rounded up.

All of the HGV traffic would travel to / from the southwest along Vaynor Road to / from the A4054 High Street / Upper High Street junction, from which it would be distributed around the local road network based upon the origin and destination of the HGV transporting the load.

### 13.3.3 Highway Infrastructure

Vaynor Road is a single carriageway route which descends gradually from the site access in a generally southwest direction through Trefechan towards Cefn-coed-y-cymmer.

In the vicinity of the site access, Vaynor Road has a width of 7.3m. However, beyond the end of the kerbs extending to the northeast from the access bellmouth, approximately 106m distant, the width of the carriageway narrows to around 5.3m and becomes more rural in nature.

As previously described, the speed limit increases from 30 mph in the vicinity of the access to the national limit of 60 mph for single carriageway routes, approximately 53.0m from the access centreline. Beyond the 30 mph speed limit the street lighting, which continues southwest within the 30 mph zone, terminates.

Continuing southwest from the site access into Trefechan, the width of Vaynor Road reduces to approximately 6.6m, as measured at the signal-controlled pedestrian crossing on Vaynor Road near to the Trefechan Fish Bar.

The footway on the north side of the carriageway terminates immediately to the southwest of Sweetwater Park (Parc Sweetwater) approximately 430m from the site access, but is replaced by that on the south side, which is reintroduced at the High Trees (Coed Uchel) junction, approximately 40m beforehand. The pedestrian footway on the south side then continues down and into High Street at Cefn-coed-y-cymmer, whilst there are also intermittent sections introduced at various locations on the north side of Vaynor Road over the remaining distance.

On-carriageway bus stops, some of which have shelters, are distributed along Vaynor Road.

As Vaynor Road approaches the existing staggered right-left crossroads with the A4054 High Street / Upper High Street and Grawen Lane opposite, as the minor arm on the northeast side, its width reduces slightly to 6.3m.

Both minor arms of the staggered crossroads are controlled by Give Way markings and associated signage. The bellmouth of Vaynor Road extends approximately 23m along the north side of the A4054 High Street / Upper High Street and incorporates kerbed radii. Double-yellow lines extend from the A4054 around the western kerb radius at the junction to prevent on-street parking in its vicinity. Double-yellow lines extend along both sides of Grawen Lane and continue along the A4054 in both directions along its southwest side.

Immediately to the southeast of the Vaynor Road junction, the A4054 High Street crosses above the A465 Heads of the Valleys Road on a bridge as it descends in a southeast direction into and through Cefn-coed-y-cymmer.

Visibility at the junction extends 43m to the near edge, 48.1m to the centreline of the near (oncoming) traffic lane and 56.3m to the centreline of the carriageway to the right (northwest) from a 2.4m X distance on Vaynor Road, with the boundary wall to the adjacent property forming the constraint to a driver's view.

To the left (southwest), from the minimum driver's eye height of 1.05m, which represents a low sports car, due to the bridge parapet over the A465, visibility to the near edge is limited to 26m to the near edge, 49m to the centreline, 60m to the centreline of the far (oncoming) traffic lane and 71.5m to the far carriageway edge, assuming the on-street parking spaces along the far side of the road are unoccupied. If taking the offside of a parked car as the far carriageway edge, the visibility to that point reduces to approximately 62.3m.

The visibility splay to the left falls in front of the bridge parapet when the X distance reduces to 1.5m for lower vehicles. However, for taller vehicles, such as HGVs, where the driver's eye height of 2.0m is assumed, the parapet does not provide a constraint to visibility as the line of sight sits above the structure, resulting in a view to the near edge of around 85m.

The forward visibility towards a vehicle emerging from Vaynor Road for drivers travelling along the A4054 extends 71m from the northwest and 160m from the southeast.

To the northwest, the A4054 continues approximately 1.3km to a priority T junction with the A470, around 1.5km north of the A470 / A465 roundabout. The width of the route to the northwest varies between approximately 5.7m and 8.5m along its length.

To the southwest the A4054 continues approximately 2km to its signal-controlled junction with the A4102, which runs between the A470 approximately 0.6km to the west and the A4060 approximately 2.8km to the east through Merthyr Tydfil. Within High Street, the carriageway width varies between 7.45m

at the Vaynor Road junction to 6.9m when continuing south. However, as a result of on-street parking in places, the effective carriageway width of High Street is reduced to approximately 4.6m in some areas.

Historically, access to / from the A465 Heads of the Valleys Road was gained either via Grawen Lane, opposite Vaynor Road, which provided a left in / left out junction from / to the eastbound traffic lane, or via High Street to the southeast then Lower Vaynor Road, the latter providing a similar left in / left out arrangement with the westbound traffic lane of the A465.

However, the A465 is being upgraded to a dual carriageway, with the existing A470 / A465 roundabout being upgraded to a grade separated dumb-bell intersection with the link between the two roundabouts sitting below the A465, which would cross via an over-bridge. Slip roads will be provided from the A470 intersection to provide access to and from both carriageways of the A465, effectively creating an all-movements junction.

As a result of these revisions to the road network, the connections to the A465 via Grawen Lane and Lower Vaynor Road will be removed. Traffic currently using these routes to access the A465 will therefore re-route along the A4054 to the northwest or southeast. The information provided for the scheme advises: *"The existing Grawen Lane would be closed, with local traffic linking to the A470 along Upper High Street, improvements to the existing junction with the A470 would be provided."*

The improvements to the A470 junction involve increased radii at the bellmouth to accommodate the general uplift in traffic volumes and the diversion of HGV traffic servicing Cefn-coed-y-cymmer, In addition, a ghost-island right-turn lane is to be provided for traffic turning to the A4054 from the northbound lane of the A470, due to the increase in right turn movements associated with the permanent diversion of traffic from the slip roads which previously provided access to / from the village. This will prevent delays to the northbound traffic flows continuing along the A470 towards Brecon.

The existing bridge of the A4054 High Street, to the southeast of Vaynor Road is also being replaced as part of the scheme. As a result, the existing junction between Vaynor Road and the A4054 High Street / Upper High Street has been temporarily closed. A short diversion route from Vaynor Road, around the property on the north side of the junction has been constructed, which joins Upper High Street approximately 41m to the north of the existing Vaynor Road junction.

Signage during the site visit on 02nd September 2021 confirmed "*This road closed 13/09/2021 for 24 months*" and the diversion link was in the process of being constructed.

At present, other temporary works include the provision of all-movements mini-roundabout junctions are provided on the A465 at the Grawen Lane and Lower Vaynor Road junctions, which facilitate access to both the westbound and eastbound carriageways at each of the junctions. These junctions will remain operational until May 2023 and form part of the diversion route for traffic whilst the High Street bridge is being replaced. In May 2023, the connections to / from the A465 at Grawen Lane and Lower Vaynor Road are to be permanently closed, at which time traffic would re-route via the A4054 to the northwest / southeast.

The timescale for completion of the A465 improvement scheme is currently mid-2025.

### 13.3.4 Traffic Flow Data

In the absence of any recent traffic survey information on Vaynor Road, two Automatic Traffic Counters (ATCs) were installed for a 7 day period between Friday 10th and Thursday 16th September 2021. ATC Site 1 was fixed to a telegraph pole approximately 80m to the northeast of the Vaynor Road / A4054 High Street / Upper High Street junction at Cefn-coed-y-cymmer, opposite the bus stop shelter southwest of Cloth Hall Lane.

Site 2 was fixed to telegraph pole reference number 1b approximately 30m beyond the 30 mph speed limit, within the national speed limit zone, and 85m northeast of the access to Vaynor Quarry, in order to obtain vehicle flows and southbound approach speeds towards the access.

The grid references for the ATC locations were:

Site 1 = SO 03075 08131 (E. 303075 N. 208131 )

Site 2 = SO 03934 09561 (E. 303934 N. 209561 ).

The results revealed the average daily flows at Site 1 over the 7 day period were 4,340 vehicles, which was established from the individual daily flows ranging between 3,480 (Sunday) and 4,835 (Monday). Between Monday to Friday inclusive, the lowest daily flow was 4,335 (Tuesday), giving a day-to-day variation of 500 vehicles over the 5 day and 1,355 vehicles over the 7 day period.

The comparable HGV flows for the same periods varied between 26 (Sunday) and 90 (Thursday), giving a day-to-day variation of 64 vehicles over 7 days, which reduced to 27 over the 5 day Monday to Friday period, based on the lowest flow of 63 HGVs on Tuesday. The overall HGV proportion at Site 1 was established to be 1.63%.

The weekday (Monday to Friday) AM peak hour occurred between 08:00 – 09:00 with an average flow of 377 movements from daily totals ranging between 328 (Friday) and 466 (Monday), giving a day-to-day variation of 138 movements. The comparable PM peak hour period occurred between 15:00 – 16:00 with an average of 384 vehicles from daily flows between 358 (Thursday) and 401 (Monday), giving a day to day variation of 43 vehicles.

The Monday AM peak flow of 466 movements (198 northeast bound / 268 southwest bound) was the highest hourly flow recorded at Site 1, where 85$^{th}$ percentile speeds of 30.3 mph northeast bound and 30.2 mph southwest bound were established from 15,444 and 14,938 vehicles recorded over the 7 day period respectively.

At Site 2, the 7 day average daily flow was 1,698 vehicles from daily flows ranging from 1,525 (Sunday and Tuesday) to 1,815 (Thursday), giving a day-to-day variation of 290 vehicle movements.

As the Tuesday and Sunday flows were identical, the daily variation over the Monday to Friday period was the same as that established over 7 days.

The comparable HGV flows for the same periods varied between 10 (Sunday) and 20 (Friday), giving a day-to-day variation of 10 vehicles over 7 days, which reduced to 9 over the 5 day Monday to Friday period, based on the lowest flow of 11 HGVs on Tuesday. The overall proportion of HGV traffic at Site 2 was established to be 0.79%.

The weekday (Monday to Friday) AM peak hour occurred between 08:00 – 09:00 with an average flow of 114 movements from daily totals ranging between 80 (Friday) and 134 (Monday), giving a day-to-day variation of 54 movements. The comparable PM peak hour period occurred between 16:00 – 17:00 with an average of 160 vehicles from daily flows between 136 (Friday and Monday) and 188 (Thursday), giving a day to day variation of 52 vehicles.

The Thursday PM peak flow of 188 movements (98 northeast bound / 90 southwest bound) was the highest hourly flow recorded at Site 2, where 85$^{th}$ percentile speeds of 39.3 mph northeast bound and 38.6 mph southwest bound were established from 6135 and 5756 vehicles recorded over the 7 day period respectively.

In terms of traffic flows on the wider highway network, due to the significant revisions being implemented as part of the A465 roadworks, which will sever existing connections to the A465 Heads of the Valleys Road, the existing traffic patterns will undoubtedly change at the local level.

The Environmental Statement produced to accompany the A465 improvement scheme (ref ES Supplement Volume 1: Main Text March 2018), provides traffic data in Tables 5.12 and 5.12a for the (then) proposed opening year of 2022 and 2037 Design Year for both the Do Minimum (i.e. no scheme) and Do Something (i.e. with scheme) scenarios. However, no data is provided for the A4054 High Street / Upper High Street at Cefn-coed-y-cymmer.

However, Transport for Wales (TfW) has helpfully provided comparative data from the traffic model used to design the A465 improvement scheme, which confirms that the traffic surveys and model output are a good match on this route and that the Annual Average Daily Traffic Flows (i.e. that averaged over 365 days per year) were 1534 in the 2015 base year and 1873 in 2022 when the scheme was previously predicted to open.

The information provided by TfW also advises: *"As a simple indication of hourly flow a simple 10% of AADT in peak hour may be used, giving 153 vehicles in 2015 and 187 in 2022. This suggests a possible increase of 30 vehicles per hour in the peak hour. However, based on the nature of traffic and road closure, a larger figure may occur in peaks due to commuting traffic and the scheme opening; peak hour growths up to 60 per hour may be expected in the peak hour.*

*The traffic levels on this road are well within the capacity which this road can accommodate (which would exceed 1200 vehicles per hour). This capacity of over 20 vehicles a minute (or 10 vehicles per minute each way) compares against opening year forecast flows of below 4 vehicles per minute."*

A review of the *roadtraffic.dft.gov.uk* website revealed a manual count was undertaken on the A4054 High Street in 2020, which revealed an AADT flow of 6,078 vehicles including 62 HGVs at Count Point 99648. Previous manual counts were undertaken in 2008 (4,714 vehicles including 57 HGVs) and in 2000 (5,341 vehicles including 149 HGVs).

A review of the manual survey data revealed the busiest hourly flow occurred in 2000 with a total of 505 vehicles including 19 HGVs, reducing to 439 including 8 HGVs in 2008 and 376 including 1 HGV in 2020, when flows would be expected to be lower as a result of the Covid 19 travel restrictions. It is therefore surprising that the AADT flows for 2020 are higher than all recorded and estimated comparators during the preceding years from 2000 to 2019 inclusive.

Another Count Point (No. 99647) is located on the A4054 Upper High Street. This site provided AADT flows based on manual counts from 2000 (744 vehicles including 29 HGVs), 2010 (679 vehicles including 9 HGVs) and 2020 (678 vehicles including 4 HGVs). The highest estimated AADT flow of 829 vehicles including 31 HGVs was identified in 2007.

From the manual count data, the peak hour flows were found to be 78 vehicles including 5 HGVs in 2000, 81 vehicles including 3 HGVs in 2010, and 94 vehicles including 0 HGVs in 2020.

### 13.3.5 Highway Capacity

It is apparent from the traffic survey data that baseline traffic flows in the area on the local roads are relatively low in absolute terms. To put the traffic flows in context, they may be compared with the hourly design capacity flows published in TA 79/99 "*Traffic Capacity of Urban Roads*", which formed part of DMRB until it was withdrawn in March 2020 but not replaced as part of the ongoing update of the guidance.

Within Table 2 of the document, a 6.1m wide busy high street carrying predominantly local traffic with frontage activity including loading and unloading, with a 30 mph speed limit, unlimited access to houses, shops and businesses, unrestricted parking and loading, frequent at-grade pedestrian crossings and kerbside bus stops, could accommodate up to 1250 vehicle movements per hour of which up to 15% (187) could be HGV movements.

Traffic growth is predicted to occur over time. TEMPro, the national forecasting software predicts between 2021 and 2051, which is the furthest into the future growth factors project to, indicates the AM peak period flows in the Merthyr Tydfil 003 Middle Super Output Area, within which the Quarry and the majority of the local road network considered within this chapter sits, will experience an increase of 13.55% over the period. The comparable growth for the PM peak period is 13.6%, with the average weekday increasing by 13.47% and the AADT by 13.72%.

The earliest year for the TEMPro growth factors is 2011, whilst the highest flow from the data available occurred in 2000 on High Street. Notwithstanding this, as is apparent from the later 2008 data at the same count point, it appears that there has been a reduction in peak hour activity. Therefore, applying growth to the highest flow of 505 movements, which occurred between 15:00 – 16:00 is considered to be robust.

Between 2011 and 2051 the traffic growth for that period of the day is predicted to be 15.81%, increasing to 15.98% for the traditional PM peak hour period between 16:00 – 18:59. Increasing the 505 movements by 15.98% results in a 2051 flow of 586 vehicles, which represents just 46.9% of the 1250 vehicle movements identified as an hourly capacity.

It is therefore apparent that the local road network retains significant levels of reserve of spare capacity in the baseline conditions, both currently and in the future 2051 design year.

### 13.3.6 Safety Risks: Accident Statistics

The safety of the site access has been reviewed using the observed speed data and relevant design guidance.

Based on the observed southwest-bound speed of 38.6 mph at Site 2, the visibility splay to the left (northeast) from the access to Vaynor Quarry is calculated to be 62.0m (rounded) based on Manual for Streets parameters, which are recommended at speeds of up to 40 mph at paragraph 1.3.6 of Manual for Streets 2 (MfS2). If applying the Design Manual for Roads and Bridges (DMRB) trunk road standards, the visibility splay lengths from the same 85$^{th}$ percentile speed are calculated to be 74.997m based on the ability for a vehicle to slow down and stop safely, and 95.21m if designing to allow for the continuous speed of traffic along the priority route (Vaynor Road in this case).

As is apparent by comparing the calculated stopping distances with the measured visibility splays reported previously, irrespective of which parameters are applied (MfS2 or DMRB) the visibility splays at the site access under existing conditions where the vegetation has not been trimmed back, exceed the requirements to maintain acceptable road safety.

Within the 30 mph speed limit, MfS parameters are recommended. For vehicles travelling at 30 mph a visibility splay length of 43m is specified. This is exceeded in all directions from both the Quarry and stockyard access, with the exception of that to the left (southwest) of the latter. Whilst the 43m distance is achieved to the centreline of Vaynor Road, and therefore the nearside edge of the far (approaching) traffic lane, the nearside edge visibility splay is currently limited to 30m but increases to 54.5m by the time carriageway centreline is reached.

Due to the likely position of vehicles in the far traffic lane as they approach from the left / southwest of the stockyard access, and the limited likelihood of vehicles overtaking on the approach, due to the slight crest and right-hand bend on Vaynor Road, the visibility splays are considered to be acceptable as measured. Notwithstanding this, it was apparent it would be possible to achieve the desirable 43m to the near edge of the carriageway with only minor trimming of vegetation within the verge area.

It is therefore concluded that the visibility at the access to Vaynor Quarry and the stockyard is acceptable.

A review of the wider highway network performance has also been undertaken by interrogating the Crashmap database, which revealed there have been no personal injury accidents recorded along Vaynor Road or the A4054 corridor between its junctions with the A470 to the north and A4102 to the south involving HGVs within the most recent 5 year period for which data is available (2016 – 2020 inclusive).

In the event there is a feature on the road network that results in compromised safety for its users, it is normal to find a number of incidents with common characteristics at that location.

It is apparent from the traffic flow data that HGV activity is regularly experienced on the local road network without resulting in personal injury accidents occurring. This indicates the routes are of an acceptable design standard to safely accommodate such vehicles, based on the evidence-based approach advocated in current design guidance.

## 13.4 Development Traffic Impact

As was established in section 13.3.5 above, the local road network retained a reserve or spare capacity of some 664 vehicle movements per hour on the busiest route within the study area, which equates to some 53%.

The proposed development is predicted to attract 87 loads / 174 HGV movements per day, in addition to the traffic movements associated with the 11 staff to be based at the site, resulting in a total of 196 movements, assuming the worst-case scenario whereby all members of staff travel independently by car to / from the site.

In practical terms, due to the proposed main operating hours of 07:00 – 19:00 Monday to Friday and 07:00 – 16:00 on Saturdays, staff travel would not occur during the peak hours on the network and would therefore have an insignificant impact on the operation of local roads.

Notwithstanding this, even if the entire daily traffic associated with Vaynor Quarry is added to the base flows in 2051, the cumulative total of (586 + 196) 782 vehicle movements remains 468 movements and 37.4% below the design capacity of the busiest link.

It is therefore apparent that capacity of the local roads is not a constraint to the proposed resumption of permitted operations at Vaynor Quarry.

Similarly, as demonstrated through the traffic survey and collision data, the local road network can safely accommodate regular HGV movements. Given the apparent spare capacity of the road network and its excellent safety record, there is no reason to conclude that the resumption of permitted activities would have a material impact on highway safety.

## 13.5 Mitigation Measures

Although Vaynor Quarry benefits from planning permission to extract, process and distribute stone, the operation has been mothballed for a number of years, during which vegetation has grown in the vicinity of the site access.

Whilst the visibility at the access has been found to be acceptable, it is recommended that the vegetation be periodically trimmed to ensure the visibility from and towards turning traffic is not limited by un-checked growth.

The sheeting of vehicles and cleaning of vehicles' wheels is recommended to avoid detritus being deposited on the public highway.

Normal quarry management protocols adopted to minimise adverse transport impacts, such as agreed driver conduct codes, strict vehicle maintenance etc. should also be adopted.

## 13.6 Residual Impacts

Following completion of the extraction and distribution of processed aggregate from Vaynor Quarry, there are not anticipated to be any residual cumulative impacts beyond the existence of the site accesses, which would facilitate the future use and/or maintenance of the land, following its life as a mineral site.

## 13.7 Recommendations

Subject to the imposition of reasonable planning conditions to minimise impacts associated with the HGV activity and maintenance of the site access, it is concluded that a resumption of operations at the quarry is acceptable insofar as highways and transport matters are concerned.

## 13.8 Summary

Vaynor Quarry has planning permission to extract, process and distribute stone via the established access and local road network.

The reopening of Vaynor Quarry would effectively supplement and/or replace the supply from Penderyn Quarry in due course and would provide a long-term source of aggregate for construction projects.

Based on the predicted average output of 500,000 tonnes per annum, in average payloads of 20 tonnes per vehicle, the Quarry would attract an average of 87 loads / 174 HGV movements per full working day, which would travel to/from the southwest via Vaynor Road to the junction with the A4054 High Street / Upper High Street at Cefn-coed-y-cymmer, from which the vehicles would distribute based upon the origin and destination of the haulier's HGV.

In addition to the HGV movements, there would also be trips associated with 11 staff employed at the site.

The large majority of activity at Vaynor Quarry would take place between 07:00 – 19:00 Monday to Friday and 07:00 – 16:00 on Saturdays. As result, staff

activity would be concentrated outside the observed AM and PM peak hours on local roads, thereby resulting in an insignificant impact on the highway network.

A review of traffic survey and collision data confirmed the local road network safely accommodates regular HGV activity, and that traffic flows are relatively low, resulting in significant levels of reserve or spare capacity when compared with guidance for comparable routes.

The level of spare capacity is such that if the entire daily traffic flow associated with Vaynor Quarry is artificially added to the busiest hour identified on the local roads, the cumulative flow in 2051, which is the furthest into the future traffic growth may be predicted at present, would remain 468 movements and 37.4% below the hourly design capacity of the busiest link.

The existing site access was reviewed and found to be acceptable in terms of its layout and visibility provision, based on empirical speed survey data.

## 13.9 Conclusions

Having considered the findings of the review undertaken, it is concluded that subject to the imposition of reasonable planning conditions to minimise impacts associated with the HGV activity and maintenance of the site access, a resumption of operations at the quarry is acceptable insofar as highways and transport matters are concerned.

# TRANSPORTATION 13

# 14.0 CULTURAL HERITAGE

## 14.1 Introduction

This Chapter has been prepared by Cotswold Archaeology and considers the effects of the proposed development on the cultural heritage resource and describes, the assessment methodology, the baseline conditions, the likely significant environmental effects, the mitigation measures required to prevent, reduce, or offset any significant adverse effects, and likely residual effects after these measures have been employed.

This Chapter is supported and informed by **Appendix 14-1** (historic environment desk-based assessment).

In summary, the proposed development associated with a resumption of quarrying operations at the Quarry is not expected to result in effects (significant or otherwise) on the cultural heritage resource. However, this Chapter summarises the key cultural heritage matters that were considered to allow this conclusion to be reached.

For simplicity, references in this Chapter to the 'Application Site' relates to the Overall Mining Site covered by the two Periodic ROMP applications, as defined in ES Chapter 1.0.

It should be noted that the Historic Environment Desk-Based Assessment which comprises Appendix 14-1 of the ES defined a 'Site' area which comprised the Vaynor Quarry Boundary. However, and in agreement with consultees in an approved Written Scheme of Investigation (see Appendix 14-1), a broader 2km 'study area' was also addressed in the assessment, in order to provide suitable baseline information on historic assets in the adjacent land.

The Overall Mining Site (OMS) includes a relatively limited additional area of land on the western side of the existing quarry. The Appendix 14-1 provides the necessary baseline information on this additional land. That information has also been reviewed to inform the conclusions of the present ES chapter.

## 14.2 Consultation

The historic environment desk-based assessment that informs this chapter, and which is included as **Appendix 14.1**, was undertaken in accordance with a Written Scheme of Investigation (WSI), formalising the adopted scope and methodology. The WSI was submitted to the Planning Officer (MTCBC), Glamorgan-Gwent Archaeological Trust (GGAT) and the Heritage Officer, Brecon Beacons National Park Authority (BBNPA), for review, comment and approval prior to the assessment being undertaken.

To characterise the known and potential historic resource within the environs of the Quarry, a study area measuring 2km around the Quarry boundary was agreed upon within the WSI. This was considered sufficient to capture the relevant HER data and provide the necessary context. All archaeological sites, monuments and other heritage assets within this area were analysed, and then refined to narrow the research focus onto those of relevance to the Quarry.

The data sources utilised in assessing the study area included:

- Cadw – information relating to designated historic assets, e.g., World Heritage Sites, Listed Buildings, Scheduled Monuments, and Registered Parks and Gardens.
- GGAT HER – database of known archaeological sites, findspots, historic buildings and previous archaeological works; and published and unpublished documentary sources.
- Aerial photography – vertical and oblique aerial photography ranging in date from the 1940s to present obtained from the Central Register of Aerial Photography for Wales (Welsh Government).
- Historic cartographic sources – obtained from National Library of Wales and Envirocheck.
- British Geological Survey (BGS) – Geological mapping (bedrock and superficial deposits) and borehole data within the Application Site and study area.
- Archives – a search of archival material pertaining to the Application Site from Glamorgan Archives.

Additionally, further consultation was undertaken with Cadw regarding the requirement of an ASIDOHL 2 (assessment of the significance of development on historic landscapes) being required. Email correspondences with the Senior Historic Environment Planning Officer, Cadw, confirmed that an ASIDOHL 2 was not required.

## 14.3 Methodology

This section sets out the approach for assessing the value of historic assets, the magnitude of change brought about by the Proposed Development and thus the significance of the effects.

### 14.3.1 Criteria for Historic Value

The assessment of historic value has been guided primarily by the policies and guidance contained in 'Conservation Principles' (Cadw, 2011). The value of a historic asset has been identified to the following four key forms of value set out in Table 14-1 below.

**Table 14-1 Historic Values**

| Value | Description |
|---|---|
| *Evidential* | Derives from those elements of an historic asset that can provide evidence about past human activity, including its physical remains or historic fabric. |
| *Historical* | Derives from aspects of past ways of life, or association with notable families, persons, events, or movements – it embodies the connection between past events and society with the present |
| *Aesthetic* | Derives from the sensory and intellectual stimulation drawn from an historic asset. It may include its physical form, and how it lies within its setting. It may also be the result of design, or an unplanned outcome of a process of events. |
| Communal | Derives from the meanings that an historic asset has for the people who relate to it, or for whom it figures in their collective experience or memory. It may be commemorative or symbolic and relate to issues of identity or collective memory. |

Criteria for assessing historic value (sensitivity) are set out in Table 14-2 below. These broad categories of significance reflect current heritage statute and policy for Wales, and professional best-practice guidance (the latter including the Cadw publications 'Setting of Historic Assets in Wales' (Cadw 2017a) and 'Heritage Impact Assessment in Wales' (Cadw 2017b). The terms expressed in Paragraph 6.1.3 of the PPW (Edition 11, 2021) were used. This defines the 'most important historic assets', namely World Heritage Sites, Scheduled Monuments, Protected Wreck Sites, Registered Battlefields, Grade I and II* Listed Buildings, and Grade I and II* Registered Parks and Gardens.

**Table 14-2 Historic Value (sensitivity)**

| Value of asset | Description |
|---|---|
| *High* | World Heritage Sites and heritage assets of acknowledged international importance, or that can contribute significantly to acknowledged international research objectives. Historic landscapes of international sensitivity (designated or not) and extremely well-preserved historic landscapes with exceptional coherence, time depth, or other critical factor(s).<br>Scheduled Monuments and undesignated assets of Schedulable quality and importance, according to the non-statutory criteria for scheduling ancient monuments utilised by the Secretary of State. Heritage assets or groups of assets that can contribute substantially to acknowledged national research objectives. Historic landscapes exhibiting considerable coherence, time depth or other critical factors and displaying considerable evidential, historic, aesthetic, and communal value as identified by Conservation Principles. Grade I and II* Registered Parks/Gardens. |

| Value of asset | Description |
|---|---|
| | Grade I and II* Listed Buildings or other Listed Buildings that can be shown to have exceptional qualities in their fabric or associations not adequately reflected in their Listing grade, or undesignated structures of clear national importance. Conservation Areas containing very important buildings. |
| *Medium* | Historic assets, or groups of assets or landscapes, that contribute to regional research objectives. Historic landscapes exhibiting reasonable coherence, time depth or other critical factors (including degree of preservation) and displaying evidential, historic, aesthetic, and communal value as identified by Conservation Principles. Grade II Registered Parks/Gardens. Grade II Listed Buildings or historic buildings which can be shown to be of comparable significance. Conservation Areas containing important buildings which contribute significantly to their historic character, or historic townscapes with important historic integrity. |
| *Low* | Historic assets displaying limited evidential, historic, aesthetic, or communal value as identified by Conservation Principles. Historic assets, or groups of assets, that contribute to a limited degree to regional research objectives. Historic landscapes exhibiting limited coherence, time depth or other critical factors. Historic landscapes whose sensitivity is limited by poor preservation and/or poor survival of contextual associations. Locally Listed buildings and unlisted buildings of modest quality in their fabric or historical association. |
| Negligible | Historic assets with very little or no surviving archaeological interest. Historic assets or groups of assets that cannot appreciably contribute to acknowledged regional research objectives. Historic landscapes exhibiting little or no coherence, time depth or other critical factors and displaying evidential, historic, aesthetic, and communal value as identified by Conservation Principles. Buildings of no architectural or historical note. |

### 14.3.2 Criteria for Magnitude of Change

The descriptions of change describe the ways in which a historic asset or elements of its setting may be harmed (or benefitted) by the proposed development. This will include the consideration of such issues as: which, and how many, elements of an asset are affected; whether the change physically modifies the asset or whether it comprises changes in visual aspects, noise or access that would alter its setting; and whether the change in the significance of an asset will be adverse or beneficial.

The magnitude of change on each individual heritage asset is assessed using the criteria in Table 14-3 below. Changes may be adverse or beneficial, however, in the most part the descriptions offered below focus on adverse change.

**Table 14-3 Magnitude of Change**

| Magnitude of Change | Description |
|---|---|
| *High* | Change to most or all key archaeological or historic building elements, such that the asset is totally altered. Total changes to setting of archaeological or historic building assets. Change to most or all key historic landscape elements, parcels, or components; extreme visual effects; gross change of noise or change to sound quality; fundamental changes to use or access; resulting in total change to the character of a historic landscape area. |
| *Medium* | Changes to many key archaeological or historic building elements, such that the asset is noticeably modified. Changes to setting of archaeological or historic building assets, such that it is noticeably modified. Changes to many key historic landscape elements, parcels, or components; visual change to many key aspects of the historic landscape; noticeable differences in noise or sound quality; considerable changes to use or access; resulting in moderate changes to the character of a historic landscape area. |

| Magnitude of Change | Description |
|---|---|
| *Slight* | Changes to key archaeological or historic building elements, such that the asset is slightly modified. Changes to setting of archaeological or historic building assets, such that it is slightly altered and noticeably changed. Change to few key historic landscape elements, parcels, or components; slight visual changes to few key aspects of historic landscape; limited changes to noise levels or sound quality; slight changes to use or access; resulting in limited changes to the character of a historic landscape area. |
| *Negligible* | Very minor changes to archaeological or historic building elements or their settings. Very minor changes to key historic landscape elements, parcels, or components; virtually unchanged visual effects; very slight changes in noise levels or sound quality; very slight changes to use or access; resulting in very small change to the character of a historic landscape area. |

### 14.3.3 Criteria for Significance of Effect

The significance of effect upon any historic asset is a product of the value of the asset, and the magnitude of impact upon it. This is summarised in Table 14-4 below. Where two alternatives are given in the table, professional judgement is used to decide which best reflects the significance of effect upon the heritage asset.

**Table 14-4 Criteria for Significance of Effect**

| Magnitude of Change | Historic Asset Value (sensitivity) | | | |
|---|---|---|---|---|
| | High | Medium | Low | Negligible |
| *High* | Major Adverse/ Beneficial | Major Adverse/ Beneficial | Minor to Moderate Adverse/Beneficial | Negligible/ none |
| *Medium* | Major to Moderate Adverse/Beneficial | Minor to Moderate Adverse/Beneficial | Minor Adverse/Beneficial | Negligible/ none |
| *Slight* | Minor to Moderate Adverse/Beneficial | Minor to Moderate Adverse/Beneficial | Minor Adverse/Beneficial | Negligible/ none |
| *Negligible or none* | Negligible/ none | Negligible/ none | Negligible/ none | Negligible/ none |

### 14.3.4 Assessment of Significance (of Effect)

Regarding the significance of the effect upon historic assets, the key principle to be considered is whether the effect is significant. In Environmental Impact Assessment terms, 'significant' effects are considered to be of 'Moderate' significance of effect or higher, as highlighted in Table 14-4 above. The significance of effect can be adverse or beneficial. Such effects may also be temporary or permanent, and reversible or irreversible.

The measured significance of effect may be equated to key concepts in planning policy and heritage guidance regarding the assessment of development effects upon heritage assets, as per Table 14-5 below. Key principles that are considered, in accordance with PPW are that when a significant effect is identified, it may be appropriate to propose suitable mitigation measures to avoid, reduce or offset the effect.

**Table 14-5 Description of the significance of effect with regards to heritage policy**

| Significance of Effect | Criteria |
|---|---|
| *Major Adverse* | Extensive harm to or total loss of the value of a designated historic asset (or asset worthy of designation) such that development should not be consented unless substantial public benefit is delivered by the development.<br>Total loss of a non-designated heritage asset of medium value (i.e., which may contribute to regional research objectives) without compensatory mitigation measures agreed with statutory consultees.<br>Harm to a landscape designated by virtue of its historic landscape value. |
| *Moderate Adverse* | Less than extensive harm to or total loss of the value of a designated historic asset (or asset worthy of designation) such that the harm should be weighed against the public benefit delivered by the development to determine consent.<br>Total loss of a non-designated historic asset of medium value (i.e., which may contribute to regional research objectives) with compensatory mitigation measures agreed with statutory consultees.<br>Harm to a non-designated historic asset, of a greater degree than that perceived of as Minor Adverse, which should be considered in determining an application.<br>Harm to a historic landscape type of more than limited significance, and of some rarity |
| *Minor Adverse* | Harm to a non-designated historic asset that can be adequately compensated through the implementation of a program of industry standard mitigation measures.<br>Harm to a historic landscape type of limited heritage significance, and not of a rare form.<br>Less than substantial harm to the value of a designated historic asset, of a lesser degree than that perceived as Moderate Adverse, but which should still be weighed against the public benefit delivered by the development to determine consent. |
| *Negligible/ None (not significant)* | Effect that is nil, imperceptible, and not significant. |
| *Minor Beneficial* | Development will deliver a positive contribution and / or better reveal the value of a non-designated historic asset. |
| *Moderate Beneficial* | Development will deliver a positive contribution and / or better reveal the value of a designated historic asset (or asset worthy of designation) such that an application should be treated favourably. |
| *Major Beneficial* | Development will deliver a positive contribution and / or better reveal the value of a historic asset of recognised international value such that an application should be treated very favourably. |

## 14.4 Designations and Planning Policy

The assessment has been written within the following legislative, planning policy and guidance context:

- Ancient Monuments and Archaeological Areas Act (1979)
- Planning (Listed Buildings and Conservation Areas) Act (1990)
- Historic Environment (Wales) Act 2016
- Technical Advice Note (TAN) 24: The Historic Environment
- Planning Policy Wales (Edition 11, February 2021)

Further advice has been published by Cadw, including:

- Conservation Principles (2011)
- Setting of Historic Assets in Wales (2017)

- Heritage Impact Assessment in Wales (2017)

### 14.4.1 Local Planning Policy

The Quarry is located both within Merthyr Tydfil County Borough Council (MTCBC) and the Brecon Beacons National Park Authority (BBNPA).

The current Local Development Plan (LDP) for MTCBC, 'Replacement Local Development Plan (2016 – 2031)', was adopted in January 2020. The relevant policies relating to the historic environment are described in the Section entitled, 'Improving our Cultural Well-being', and the policies are Policy CW1: The Historic Environment and Policy CW2: Cyfarthfa Heritage Area.

The current LDP for BBNPA, 'Brecon Beacons National Park Authority Local Development Plan (2007 – 2022)', was adopted in December 2013. Policies relating to the historic environment are discussed in the section entitled, 'Conserving the Historic Environment'. The relevant policies to this assessment include: Policy 15 – Listed Buildings, Policy 17 – The Setting of Listed Buildings, Policy 18 – Protection of Buildings of Local Importance, and Policy 22 – Areas of Archaeological Evaluation.

The policies discussed above can be seen in more detail in **Appendix 14-1**.

## 14.5 Summary of Baseline Conditions

### 14.5.1 The Overall Mining Site (OMS)

The OMS is located within Vaynor Quarry, a large limestone quarry that originated in the 19th century and continued to be used into the latter half of the 20th century. The OMS is located *c.* 1km south-west of the village of Vaynor, and *c.* 3.5km north of Merthyr Tydfil town centre.

### 14.5.2 Archaeological and historical evidence

There are no designated historic assets, including archaeological remains, within the OMS (see Sections 3 and 5 of **Appendix 14-1** for detail on the archaeological and historical baseline information).

There are two records of non-designated historic assets within OMS. One refers to a Romano-British or early medieval inscribed stone, noted as found in this area. However, available sources do clearly establish the exact location of the find: it is also the case that the stone, if indeed found here, would have been removed and any associated features would have been destroyed by subsequent quarrying activities.

The second non-designated historic asset relates to a post-medieval limekiln. The limekiln was in an area of intense quarrying activities and has also have been destroyed by subsequent activities within the OMS.

Studies of the immediate environs of the OMS emphasise that area was once a rich prehistoric landscape. There are several designated and non-designated prehistoric features to the north, north-east and north-west of the OMS. These features are predominantly burial monuments, comprising of Bronze Aged cairns, along with occasional enclosure features of probable Bronze Age or Iron Age date.

Historic cartographic records and later aerial photography illustrate the OMS as being within an area of mixed agricultural land, consisting of pasture, arable, and meadowland. The evidence shows the gradual growth of Vaynor Quarry from the late 19th century up until the late 20th century. During this time most of the farming land within the OMS boundary was incorporated into the quarry, and any existing agricultural buildings and structures were subsequently destroyed.

Aerial photography suggests that the northernmost area of the OMS is still partially former agricultural land that has not been subjected to intense quarrying activities. Therefore, there is potential for prehistoric or post-medieval archaeological features to exist within the northernmost area of the OMS.

### *Physical Effects*

There will be no physical effects upon any known designated or non-designated historic asset. The inscribed stone and limekiln, discussed above, have already been removed from the OMS and there will be no effect upon these.

The assessment of the archaeological potential of the OMS has suggested that there is some limited potential of encountering prehistoric and/or post-medieval archaeological features. These potential features would be in the northernmost area of the OMS, i.e., areas that have not previously been quarried. There will be no archaeological remains within areas of the OMS that have previously been quarried.

### *Non-Physical Effects*

The potential non-physical effects upon the Registered Historic Landscape of Merthyr Tydfil and the Scheduled Monuments of Merthyr Tramroad: Morlais Castle section, Morlais Castle, and Morlais Hill ring cairn were assessed (see Technical **Appendix 14.1** for detail). These historic assets are of 'high' historic value.

Other historic assets were initially considered as part of 'step 1' of the staged settings assessment but were not progressed to subsequent stages following a combination of GIS analysis and a visit to the Quarry and walkover survey of the OMS, which considered, amongst other factors, the surrounding topographic and environmental conditions, built form, vegetation cover, and lines of sight, within the context of the assets' historic significance (see Section 6, **Appendix 14-1**).

The Scheduled Monuments of Merthyr Tramroad: Morlais Castle section, Morlais Castle, and Morlais Hill ring cairn are located at some distance from the OMS. Additionally, the natural topography and lack of locations where the legible elements of these asset's character and appearance can be experienced or appreciated results in a conclusion of a Negligible/ Neutral effect upon these historic assets.

The Registered Historic Landscape of Merthyr Tydfil is divided into several Historic Landscape Character Areas (HLCAs). Five of these areas were considered in the assessment: Vaynor Quarry (HLCA 051), Taff Fechan (HLCA 027), Morlais Castle Quarries (HLCA 044), Morlais Hill and Castle (HLCA 045), and Trefechan (HLCA 057). Similarly, there will be a Negligible/ Neutral effect upon these historic assets. Although the OMS is within Vaynor Quarry (HLCA 051) and in proximity to Trefechan (HLCA 057), the assessment has concluded that an active Vaynor Quarry was the traditional backdrop to these areas. For the most of Trefechan's existence the quarry at Vaynor was in full operation (see Section 6, **Appendix 14-1**).

## 14.6 Mitigation Measures

The potential for prehistoric and/or post-medieval archaeological features within previously unquarried areas of the OMS, i.e., the northernmost area, indicates that further archaeological mitigation would be beneficial. It is envisaged that such mitigation could consist of a programme of archaeological observation and recording during any topsoil and subsoil stripping in this area of the OMS. All further archaeological mitigation will need to be agreed with GGAT and BBNPA, and the scope and methodology of additional work agreed within a Written Scheme of Investigation.

## 14.7 Residual Effects

No significant residual effects will occur to historic assets.

## 14.8 Recommendations

There are no further recommendations.

## 14.9 Conclusions

The proposals will have no more than a Negligible/None effect upon any known historic assets (including designated or non-designated historic assets).

Regarding physical effects, an assessment of the archaeological resource for the area has identified that the OMS has a limited potential for previously unknown archaeological remains because of extensive quarrying activities. Specifically, the northernmost area of the OMS has not previously been quarried and there is some limited potential of encountering prehistoric/post-medieval remains in this area. To mitigate possible effects upon potential archaeological remains it is suggested that further archaeological investigation are needed in this area only. The archaeological investigation may appropriately consist of a programme of archaeological observation and recording during any topsoil and subsoil stripping in this area of the OMS.

With regard to non-physical effects, assessment has considered any effects of the proposals upon the setting and significance of any historic assets in its wider environs. The Registered Historic Landscape, Merthyr Tydfil (Fig. 2, **RHL1**), Merthyr Tramroad: Morlais Castle section (Fig. 3, **SM10**), Morlais Castle (Fig. 3, **SM11**), and Morlais Hill ring cairn (Fig. 3, **SM12**) were identified as potentially be susceptible to change, and the effects of the proposals on their historic significance assessed. It is concluded that the significance of none of these historic assets would be harmed to more than a negligible degree by the proposed resumption and extension of quarrying.

Subject to the implementation of a programme of industry-standard archaeological mitigation, the proposals are in compliance with national and local policy directed to protecting heritage assets.

## 14.10 References

Cadw 2011 *Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment in Wales*

Cadw 2017 *Setting of Historic Assets in Wales*

Chartered Institute for Archaeologists 2020 *Standard and Guidance for Historic Environment Desk-Based Assessment*

Welsh Archaeological Trusts 2018 *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)*

Welsh Government 2017 *Technical Advice Note 24: The Historic Environment (TAN 24)*

Welsh Government 2021 *Planning Policy Wales (PPW), Edition 11*

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# 15.0 SUMMARY OF ENVIRONMENTAL EFFECTS

## 15.1 Introduction

The preceding chapters 6.0 to 14.0 have considered the potential environmental effects of the future quarry development and restoration scheme at Vaynor Quarry and related elements of the overall development scheme.

The respective environmental studies have identified the environmental issues associated with the development and, where relevant, have made a series of recommendations for measures which could minimise effects. The measures can in turn be translated into planning conditions which is the underlying purpose of the ROMP review.

These issues are summarised below as a brief resumé of the preceding chapters and the conclusions which are drawn. For each topic, the summary describes the key elements of the study which has been undertaken, the mitigation measures which have been incorporated into the development scheme or which will be implemented as part of the ongoing development, and the assessed residual effects taking into account the mitigation measures.

Where applicable, the summary highlights the recommendations for planning conditions and these recommendations form the context for the drafting of updated planning conditions, as set out in Appendices 1.3 and 1.4 to the ES which draw upon the recommendations which have been made.

## 15.2 Landscape and Visual Effects

### 15.2.1 LVIA Study

The Landscape and Visual Impact Assessment (LVIA) provides an assessment of landscape and visual effects of the minerals development at Vaynor Quarry. The identification of mitigation measures incorporated within the design to minimise adverse effects, is informed by the findings of the assessment process as it progressed.

The immediate landscape context extends to approximately 1km from the study site boundary and the wider landscape context extends 6km from the study site boundary. The visual study area extends 6km from the study site boundary and is influenced by the surrounding topography and screening features such as woodland and settlement.

The methodology used for assessing the potential effects on landscape character and visual amenity were based on the recommendations in GLIVA3. The application of the guidance document established an appropriate scope for this assessment to be undertaken.

### 15.2.2 Minerals development

The proposed minerals development involves extraction within the existing quarry void and expanding the western wing of the void eastwards into the eastern wing of the quarry. A noise attenuation landform is proposed along the north-eastern boundary of the quarry as a permanent landscape feature, with tree planting designed to establish a woodland corridor linking to adjoining established woodland features.

The minerals development is proposed over a circa 100 year period. Progressive restoration and final restoration is based on a variety of restoration treatments, designed to create a range of conditions and habitats which would foster the biodiversity and geodiversity potential of the site, and assist in integration into its landscape context. This will include the emplacement of quarry waste on selected benches, the retention of crags and rock outcrops in appropriate locations and the creation of scree slopes.

The Quarry would be restored to a wildlife enhanced feature, which recognises and exploits the biodiversity potential associated with worked-out quarries, and the range of habitats which can be created. The final restoration and after use proposals for the site represent the principal long-term measure in mitigation of potential landscape and visual effects. Restoration work would commence on quarry benches as soon as possible after they have been worked to their final position and are no longer required for access purposes.

Management of the site, including the establishing vegetation, would focus on its nature conservation interest and amenity potential, resulting in substantial beneficial impacts on the biodiversity of the site. The landscape and visual appearance of the site would be improved as the tree planting and natural recolonisation establishes and matures.

### 15.2.3 LVIA Assessment

#### *Landscape assessment*

LANDMAP assessments and the BBNP Landscape Character Assessment were referred to as part of a baseline understanding of the landscape context of the Quarry.

A site-specific appraisal was also carried out identifying the landscape features, characteristics, and aesthetics within the Quarry which are sensitive to change, noting in particular the existing naturally regenerating quarry faces and benches, and the woodland along the Quarry boundary / within the Quarry. The existing naturally regenerating faces within the Quarry make a contribution to landscape character, particular from elevated locations to the east where past and present quarrying are a recognisable feature of the landscape. The effects of the advancing faces and exposure of un-weathered limestone would be Minor-moderate adverse (Not significant) at Years 0-5, Moderate adverse at Years 5-30 and Moderate adverse after Year 30.

Woodland and vegetation pattern is sensitive to change and is a receptor of moderate sensitivity. Due to the small magnitude of change along the eastern and north-eastern boundary there would, be a minor-moderate adverse effect on woodland pattern during all phases of quarrying. After 30 years, woodland establishment within the site as part of the natural regeneration of vegetation would have a positive effect on vegetation pattern because the Quarry would eventually appear as a woodland edged valley.

Within the wider context, the BBNP and its open upland moorland landscape was identified as a sensitive landscape receptor. Changes at the site level, relative to the BBNP, would be extremely small in scale – no change. Despite the high sensitivity of this receptor the effects would be Negligible/no change.

The historic pasture field pattern and the landscape setting of public routes were identified as sensitive landscape receptors where indirect effects on landscape character/patterns may result in adverse effects. For all phases of quarrying the effects would be Minor-moderate adverse.

The effects identified on landscape receptors were all identified as Not significant.

#### *Visual assessment*

Based upon baseline studies of designations, landscape character, and ZTV mapping, a total of 14 views were photographed to illustrate the study site and its appearance in publicly available locations. Of the 14 views that were taken, 8 views were carried forward as representative viewpoints for the visual amenity assessment. The assessment of Visual Effects was based on eight receptors or groups of receptors.

Visual Effects on residents in scattered farmsteads to the east and within 1km of the study site with partially screened or oblique views towards the study site are represented by the views from the footpath to the northeast of the study site. The effects would be Minor-moderate adverse (Not significant) at Years 0-5, Moderate neutral at Years 5-30 and Moderate neutral after Year 30.

Visual Effects on people in settlement and users of public rights of way and access land beyond 3km to the southwest of the study site with partially screened or oblique views towards the study site are represented by the views from the Mynydd Aberdar. The effect would be Negligible (Not significant) for all phases of quarrying.

Visual Effects on visitors and users of public rights of way and access in the BBNP within 2km of the study site to the east with open views towards the study site are represented by the views from the footpath to the northeast of the study site and the bridleway in the BBNP to the north of the study site. The effects would be Minor-moderate adverse (Not significant) at Years 0-5, Moderate adverse at Years 5-30 and Moderate adverse after Year 30.

Visual Effects on visitors and users of public rights of way and access in the BBNP between 2km and 4km of the study site to the east with open views towards the study site are represented by the views from the bridleway at Merthyr Common and the bridleway, east of Pontsticill Station, Merthyr Common. The effects would be Minor-moderate adverse (Not significant) at Years 0-5, Moderate adverse at Years 5-30 and Moderate adverse after Year 30.

Visual effects on users of public rights of way and access land within 2km of the study site to the southeast with open views towards the study site are represented by a view from Pontsarn Road, north of Merthyr Tydfil. The effects would be Minor-moderate adverse (Not significant) at Years 0-5, Moderate adverse at Years 5-30 and Moderate adverse after Year 30. Effects on users of public rights of way between 2km and 4km of the study site to the southeast, with partially screened or oblique views, are represented by a view from Pontsticill Road and the footpath adjacent to Pengarnddu pond. The effect would be Minor neutral (Not significant) for all phases of quarrying.

Visual effects on road users between 2km and 4km are represented by a view from Pontsticill Road and would be Minor neutral (Not significant). Effects on road users within 2km are represented by a view from Pontsarn Road, north of Merthyr Tydfil and would be Minor adverse (Not significant). Effects on road users between 2km and 4km are represented by a view from Pontsticill Road and would be Minor neutral (Not significant).

The effects identified on visual receptors were all identified as Not significant.

### *Designated landscapes*

The Brecon Beacons National Park (BBNP) is partially located within the study site and covers the northern extent of the 6km study area. The landscape assessment concluded that changes at the quarry, relative to the BBNP, would be extremely small in scale and the impact of the Quarry on the character of the BBNP would be Negligible/no change.

The key characteristics and special qualities of the BBNP would not be affected by the development proposals. This is because the proposals would be viewed in the context of the existing quarry and built development of Merthyr Tydfil in the distance. The visual assessment also concluded that effects on visual amenity to visitors to the nearest selected locations within the BBNP would be moderate adverse. The proposed development would form a distant feature viewed in context of the existing quarry and built development.

## 15.2.4 Conclusion

The LVIA has examined the landscape and visual impacts in relation to the minerals development at the existing Vaynor Quarry. All impact assessments are based on the proposed development phasing, which incorporates mitigation measures, along with a progressive and final restoration strategy. The potential impacts have been thoroughly assessed through a combination of desk study research and walk-over surveys of the study site and the surrounding context. The effects identified on landscape and visual receptors were all identified as Not significant

## 15.2.5 Proposed Planning Conditions

The key elements of landscape and visual mitigation relate to the phased progressive nature of the working scheme, and the opportunities for progressive restoration of faces and benches when they have reached their final positions. These elements are catered for in the schedules of proposed conditions with provision for the submission of updated quarry development plans at 5-year intervals, with the plans to include reference to progressive restoration planned for the respective periods.

The restoration concept also makes provision for a wildlife enhanced landscape with revised conditions designed to secure the implementation of the restoration scheme in the longer term.

The proposed northeast screen bund is primarily associated with noise attenuation, but it would also assist in visual screening. The proposed woodland planting on the outer flank of the bund would visually integrate with other woodland in the vicinity as a further landscape screening measure. Again, provision for the construction of the bund and planting is included in the schedule of proposed conditions.

## 15.3 Ecology

### 15.3.1 Ecology Study

The scope of the Ecological Impact Assessment (EcIA) has comprised the collection of baseline data, evaluation of ecological resources and description and assessment of the significance of impacts. The assessment has followed the guidelines set out by the Chartered Institute of Ecology and Environmental Management (CIEEM 2018).

It has included a desk study review of available published information, and a series of field surveys comprising an initial; habitat survey and subsequent species surveys of the potential of the site to support legally protected or notable species, comprising a survey for bats, great crested newts in ponds within a 250m radius, reptiles, and breeding birds.

In addition, a walkover survey for badger setts has been undertaken across the site together with searches for evidence of otter alongside other ecological survey work.

#### *Bats*

Trees with the potential to support bats have been identified although these occur beyond the future working area and so no further surveys were required or undertaken.

The presence of a bat roost was recorded in the former weighbridge, although use was not recorded during all surveys.

No direct evidence of bats emerging or returning to roosts in the cliff faces were observed or suspected during the surveys although it is considered a possibility that roosts occur in quarry faces that were not directly accessible.

Bat foraging was widespread throughout the site.

#### *Great Crested Newts*

A survey of six ponds has been undertaken which recorded a large population of great crested newt. This included a peak count of 180 great crested newts in the pond in the south eastern area of the Quarry, The presence of common frog, common toad and palmate newt was also recorded during the surveys.

#### *Reptiles*

A reptile survey of suitable habitats was undertaken during May and June 2018, with the presence of slow-worm and common lizard was confirmed.

The peak count for slow worm during a single visit was two animals and for common lizard was four animals although it was considered both species are likely to occur at low densities throughout the site where suitable habitats occur.

#### *Birds*

A breeding bird survey was undertaken during May and June 2018, encompassing the site as well as noting any bird species seen or heard in adjacent habitats connected to the site.

A total of 45 bird species were recorded, of which 20 bird species are recognised priority for concern.

Of these, just three species were identified as confirmed breeders and were recorded in the grasslands on the central spine within the main worked area.

Peregrine falcon was present within the western void of the main worked area on several occasions throughout the 2018 survey period. No nests were located but historic records indicate the presence of nesting peregrine within the site and so this species cannot be discounted from future breeding due to the suitability of nesting habitat present within the site.

### *Badger*

No evidence of badgers has been found within the Quarry during the habitat survey or subsequent site visits. Their presence in the currently unworked northern area is considered unlikely due to the absence of preferred habitats and upland fringe setting of the Quarry.

However, recommendations have been made as the future presence of badger cannot be fully discounted.

### *Otter*

Similarly, no evidence of otter was found but further recommendations have been made as the future presence of otter cannot be fully discounted.

### *Designated Sites*

## Nant Glais Caves SSSI

There would be no direct effects to the SSSI as a result of resuming operations. Although the SSSI is primarily notified on account of geological reasons, the citation and species associated with the SSSI include white trout, lesser horseshoe bats and the cave spider is also known to occur.

The Hydrological Impact Assessment (HIA) concludes that impacts to the Nant y Glais watercourse would be negligible, with no specific mitigation measures required. As such, it is concluded that the environmental conditions and associated faunal interest of the Nant Glais cave system would not be adversely affected.

No mitigation is proposed or deemed to be required.

## Cwm Taf Fechan Woodlands SSSI

There would be no direct impact to the SSSI as a result of resuming operations. Passive de-watering of the quarry void when working below the water table has the potential to cause a change in hydrological regimes within the SSSI resulting in adverse changes in the habitats or species present. This potentially includes impacts upon the Taf Fechan itself and the springs that feed into the river.

The quarry design has been undertaken to ensure continuity of soak-away conditions via a sump pond in the same location to that currently present in the eastern arm of the Quarry to ensure the hydraulic gradient remains. No pumping will be required to dewater the workings, so no decrease in flow to the springs or base flow of the Cwm Taf Fechan springs or Taf Fechan, is predicted as a result of future quarrying operations.

Based on the finding of the HIA together with the fact that no direct loss of SSSI designated land would occur, no specific mitigation is proposed or deemed to be required.

### *Habitats*

Habitats directly lost to enable mineral extraction and progressive restoration works within previously permitted quarry development areas equate to:

- Quarry, bare ground, scree, aggregate, early successional vegetation 26.2ha;
- Bracken 0.4ha;
- Ffridd mosaic in previously disturbed locations10.3ha:
- Marshy grassland 1.1ha;
- Scattered scrub 1.4 ha; and
- Standing water 0.3ha.

This is phased over the identified phases of quarry development with minimal loss of established habitats in the initial phases of development.

The HIA predicts a negligible impact upon the Nant y Glais and Taff Fechan water courses and, as such, no significant ecological impacts are predicted to the rivers or associated riparian habitats.

Spring NG01 and NG02 are tufa-forming springs within the Nant y Glais valley but outside the SSSI designated area. The HIA predicts that deepening of the quarry and associated passive dewatering may divert groundwater that currently moves east to the springs, and this may reduce deep groundwater flow to the springs. However, the positioning of the springs on the Dowlais Fault and uncertainty regarding the overall deep and shallow water flows to the springs make any change difficult to accurately predict.

### 15.3.2 Ecology Mitigation Measures

#### *Habitats*

Full details of the proposed habitat creation and aftercare are set out in Chapter 4. This includes the following habitat creation and restoration treatments to encompass the full extent of the quarry:

- Broadleaved woodland / tree planting along the north-eastern screening landform;
- Natural regeneration of the quarry floor to species rich grassland;
- Quarry bench treatment 1 – bare rock and natural regeneration.
- Quarry bench treatment 2 – quarry waste and natural regeneration.
- Quarry bench treatment 3 – natural regeneration to species rich grassland; and
- Scree slope.

A further 10ha of habitat creation and enhancement will be undertaken in order to establish a great crested newt receptor site. This will include new ponds and enhancement of agricultural grassland and plantation woodland habitats within land under the applicant's control, largely to the east of the Quarry.

Whilst there are potential effects predicted in relation to Springs NG01 and NG02, there is no mitigation proposed as the impact cannot be accurately predicted or mitigated (in a hydrological sense) with any certainty.

The early stages of tufa formation have been noted in quarry seepages, and such features will be present in perpetuity and potentially increase once the quarry deepens. Whilst not direct mitigation or a quantifiable 'creation', this does ensure the continued presence of tufa in the locality in the event that groundwater flow is reduced to the extent that Springs NG01 and NG02 decline or dry up and tufa does not persist.

Given that there is no long term viable mitigation solution available for Springs NG01 and NG02, following a precautionary / worst case basis, it is assumed these two springs will be lost.

#### *Bats*

*Mitigation for loss of roosts*

The following approach is proposed and considered appropriate given the current status of the quarry being inactive and no known resumption date for which there will be a lead in period prior to any resumption of quarrying:

- A review of previous survey findings by way of up-dated bat roost potential surveys prior to a resumption of quarrying activity, and then thereafter ahead of each phase of works or stage of land take. This will confirm the exact number and location of roosts to be removed in the phase. Depending on the findings, update roost detection surveys are then likely to be required at previously confirmed or potential roosts due to the high potential for these to change over time.

- No specific roost provision is proposed in respect of quarry face roosts, as there will be a multitude of comparable opportunities present at every stage of quarry development and in the long-term following cessation of all operations.

- In the event of it not being possible to retain the identified roost in Building 3 (considered highly unlikely), then roost closure will follow widely adopted methods under licence from Natural Resources Wales. Based on the species and numbers of bats recorded, provision of artificial boxes would be sufficient to maintain current levels of roosting at the site.

- In all cases, destruction of roosts will seek to be undertaken at times when bats are least likely to be present. Where this is not possible, roosts will be excluded using measures appropriate to the individual circumstances under licence and following recognised best practice measures.

*Mitigation in respect of foraging and commuting*

The phased approach to operations and restoration, including advance habitat creation works associated with the great crested newt receptor site, are such that loss of habitat is staged, and a comparable balance of habitats is maintained within the site though each stage of development.

This is considered sufficient to ensure that the bat species known to forage and commute within the quarry can continue to do so at comparable levels. As such, no detriment to population fitness, local distribution or conservation status of any bat species is predicted and no further mitigation to that embedded in the scheme design is proposed or considered necessary.

### *Great Crested Newt*

It is proposed to implement a great crested newt translocation exercise under an EPSL from Natural Resources Wales.

Phase 1 of the working scheme has been designed to focus quarrying more than 250m from great crested newt ponds with only minimal loss of potential terrestrial habitats during this stage, following capture of great crested newt, to enable reinstatement of the internal haul road and stock yard etc.

This will then enable advance establishment of a dedicated receptor area to the east (as shown on Drawing GCN2 within ES Appendix 7/7), where five purpose-built ponds will be created for great crested newt in conjunction with conservation led management of grassland and woodland habitats already present.

Translocation of great crested newts would be undertaken from the remaining areas where impacts are predicted and suitable habitats occur. This will be carried out using a combination of trapping at ponds, pitfall trapping (where ground conditions allow), and night searches. Based on a large sized population and current guidelines, a minimum period of 90 days effort will be employed during suitable weather conditions; and

Population monitoring and habitat management will be undertaken as required under the EPSL.

### *Reptiles*

In order to minimise the risk of killing or injury, a reptile exclusion exercise will be completed using capture and translocation as the primary basis to relocate reptiles from the working area. This will be undertaken alongside the great crested newt mitigation scheme described above as the approaches, timescales and efforts will be commensurate and compatible to those required to ensure the risk of killing or injury of reptiles is minimised.

Additional reptile translocation will be required in areas not subject to formal great crested newt translocation i.e. parts of the of the unstripped reserve areas more than 500m from GCN ponds.

Based on the low numbers likely to be encountered, this is anticipated to take the form of advance habitat manipulation in advance of each phase of quarry development to displace reptiles into adjacent retained habitat. This will be achieved by successive cuts of vegetation during conditions that are favourable for reptile activity i.e. dry and above 9C, followed by a destructive search under an ecological clerk of works.

Initial habitat creation for reptiles would be undertaken as part of the great crested newt receptor site and enhancement area through the provision of species-rich tussocky grassland and hibernacula features as described in **Appendix 7/7**.

Habitat creation in undisturbed areas in conjunction with quarry restoration will eventually reinstate the quarry and increase overall provision of suitable habitat for reptiles to recolonise the restored site on completion of works.

### *Birds*

As a general measure, removal of established vegetation in Phase 2 onwards will be undertaken outside of the nesting bird season (the season is typically March to end of August) or subject to an advance check for nesting birds by an appropriately qualified ecologist if this is not possible.

There are two approaches to mitigation that are relevant to peregrine falcon:

- A resumption of site operations (this may include preparatory work) during the nesting season will require a specific survey to be undertaken in order to confirm the presence/absence and precise nesting location. A buffer may then be required between any working area and the nest location. Specific buffers are not provided at this stage as any requirement will be subject to judgement by an experienced ornithologist and depending on factors such as the plan distance, vertical separation, stage of nesting and type/duration of activity.

- A resumption in site operations outside of the nesting season would generally avoid the risk of disturbance and it would be expected that peregrine falcon would habituate to quarrying activity. Notwithstanding this, a general watching brief will be required to confirm there is no risk of disturbance.

### *Badger and Otter*

Whilst no specific mitigation is proposed or required in relation to badger or otter, it is recommended that a review of the 2018 surveys is undertaken prior to the resumption of operations to confirm the continued absence of these species, in particular badger.

### 15.3.3 Ecology Conclusions

An Extended Phase 1 habitat survey was undertaken, initially in March 2018 and subject to review, most recently in 2021, by an experienced terrestrial ecologist. This was followed by a suite of protected species surveys and habitat assessments.

The potential for any significant or detrimental impact upon ecologically designated sites has largely been ruled out.

It has been concluded that the later stages of quarrying may reduce base flow of two tufa forming springs (NG01 and NG02) which could in turn reduce or prevent the continued formation of tufa.

The presence of notable habitats has been identified, although no significant residual impacts are predicted as the proposed restoration is dedicated to habitats of comparable biodiversity value.

The presence of protected species has been identified, including bats, great crested newt, reptiles and breeding birds. The phased approach to quarrying has been designed to minimise impacts, whilst additional habitat creation establishes, in particular for great crested newt. The extent and type of habitat creation is embedded within the restoration scheme and ability to provide a separate receptor site meaning that any residual impacts are considered unlikely to be ecologically significant or have a negative effect on conservation status.

### 15.3.4 Proposed Planning Conditions

The specific mitigation measures recommended for bats, reptiles and birds are reflected in requirements for an Ecological Management Plan set out in the proposed schedules of conditions, with the mitigation measures for great crested newt to be addressed via an EPSL.

## 15.4 Agricultural Land Quality and Soils

### 15.4.1 ALC and Soils Study

Soil resources were reviewed by means of a desk study of published and unpublished soil maps and reports and more accurately assessed by a detailed

survey across the Quarry. The detailed survey involved observations of soil and land characteristics at the intersects of a 100 m grid.

Agricultural land quality was assessed using information from the soil resources survey and other constraints to agricultural land use, such as climate, flooding and slope. The survey was undertaken in line with post 1988 Agricultural Land Classification published by the former Ministry of Agriculture, Fisheries and Farming (MAFF) by an experienced soil surveyor.

The agricultural quality of the land is determined by adverse climate, wetness and soil depth. Other potentially limiting factors have been assessed, but do not affect the land grading. The potential agricultural land within the Quarry was found to be of Grade 5 quality (6.1 ha). This grade comprises the land in the north with peaty soils which is poorly-draining and cannot be improved, limiting land use to rough grazing. Also included are the very thin soils and rocky outcrops in the north-west which prohibit cultivation and can carry limited livestock densities due to poor grass growth. This land is also limited to rough grazing use.

The majority of the OMS (some 45.0 ha) comprises non-agricultural land made up of existing quarry workings, buildings and blocks of woodland/scrub.

Two main soil types were identified: Loamy soils with peaty topsoil and very shallow rocky soils. The loamy soils with peaty topsoils occur in an area of limited extent on a level summit in the north of the survey area. They comprise a peat surface layer over freely-draining mineral layers, with some evidence of podzolisation (extreme acidity caused by leaching under acid vegetation). In the north-east of the site these soils are very shallow over hard limestone.

The very shallow rocky soils occur in the north-west of the site where rocky exposed crags are interspersed with sparse grassland and scrub. The soils are extremely shallow (less than 10 cm) and absent from large areas. At least some of the area appears to have been disturbed by quarry operations. These soils do not comprise a useful resource for restoration.

There is the potential for soil resources to be damaged during the working phase of the proposed development if there were improper soil handling and storage. This would result in the loss of suitable topsoil and subsoil resources which would otherwise be available for restoration of the site.

As mineral working of the proposed development proceeds, the potential use of the agricultural land will cease. There will therefore be a loss of 6.1 ha of grade 5 agricultural land – a minor adverse impact of the proposed development.

### 15.4.2 Mitigation Measures

There is the potential for all soil resources to be damaged if handled incorrectly (i.e. stripped when wet or compaction through excessive trafficking). This would render them unsuitable for use in quarry restoration. Mitigation for the loss or damage of soil resources requires the adoption of a Soil Management Plan (see Section 8.6 of the ES) undertaken by a suitably qualified practitioner in accordance with the principals outlined in the Construction Code of Practice for Sustainable Use of Soils on Construction Sites, which will detail:

- Depth and method of topsoil stripping and stockpiling
- Identification of landscaping topsoil requirements and assessment of suitability and availability of on-site resources
- Means of subsoil protection from compaction damage and remedial measures to remove damage

Adhering to the Soil Management Plan would protect the entire soil resource within the Quarry allowing for its beneficial re-use in restoration, thereby, mitigating the magnitude of effects to negligible-low on high sensitivity receptors. This is a minor adverse impact of the proposed development.

### 15.4.3 Soils Conclusions

All of the top soil and sub soil resources will be stripped and stockpiled in bunds and would be available for reuse. In practice, the soil resources would be used partly for the construction of the north eastern screen bund, with the residual material to be placed in temporary separate storage bunds adjoining the

northern quarry tip. This will represent a sustainable use of the soil resource, which would be retained and be available for re-use in the long term either on the redundant quarry benches or on the restored floor of the quarry,. The effect of the proposed development on soil resources remains minor adverse.

The floor of the quarry would be restored to species rich grassland sub divided by hedgerows, using the limited soil resources supplemented by suitable soil forming material. This remains a negligible adverse impact of the proposed development.

The proposed development will have minor adverse effects to soil resources and negligible adverse effects to agricultural land resources. The Soil Management Plan will ensure the protection of all soil resources and sustainable use and potential re-use.

### 15.4.4 Proposed Planning Conditions

The recommendation for soil handling to be undertaken in accordance with a Soil Management Plan is reflected in the proposed schedule of planning conditions which cross references the Soil Management Plan set out in Section 8.6 of the ES.

## 15.5 Hydrology and Hydrogeology

### 15.5.1 Hydrology and Hydrogeology Study

The Hydrogeological Impact Assessment (HIA) considers the potential hydrogeological impacts of the mineral working and subsequent restoration at the site and includes the following:

- Review of the baseline geology, hydrology and hydrogeology at the Quarry and surrounding area
- Formulation of a conceptual model based on the above
- Identification of receptors and assessment of potential impacts; and
- Recommendations for appropriate monitoring and mitigation measures (as required).

A Flood Consequence Assessment (FCA) has also been undertaken, which is appended to the ES (Appendix 9.2), with a Groundwater Flow Modelling Report produced as Appendix 9.3.

The study describes the baseline conditions at the site in terms of topography, geology, hydrology, site water management, hydrogeology, surface and groundwater quality, and licenced water abstractions, and develops a conceptual model based upon this baseline data.

The potential impacts arising from the operational quarry development have been identified as follows:

#### *Neighbouring abstractions*

All identified licenced abstractions are from surface water bodies and are at least 2 km away from the Quarry and most are beyond the boundaries of the regional aquifer system defined within the Vaynor Hydrological Scope Boundary (VHSB). Based on an understanding of the hydrogeological conceptual model, the radius of influence from passive dewatering is not expected to extend beyond the VHSB and the level of effect and degree of impact on these receptors is considered to be negligible.

The spring-fed water supply at Llwyncilsanws Farm is 330 m north of the Quarry that could be affected by passive dewatering. However, it is also possible that the supply is fed by shallow groundwater sourced from upgradient of the Quarry that may be hydraulically isolated from passive dewatering at the Quarry. Indeed, the supply has only ceased to flow during periods of drought, even though passive dewatering has been ongoing. The level of effect could be Negligible to High dependent on the degree of connection, meaning that the degree of impact could also be Negligible to Major. Monitoring and mitigation measures have therefore been proposed.

#### *Sensitive sites*

Cwm Taf Fechan SSSI is located to the south of the Quarry. It is expected that water draining from the south-east pond currently contributes to flows in the Cwm Taf Fechan SSSI springs and baseflow in the Taf Fechan. The pond will

be retained and enlarged through quarrying. This will allow the hydraulic gradient south of the Quarry to remain unchanged as the pond is expanded, the hydraulic gradient may steepen through time and in either case there will be no decrease in flows at the springs within the SSSI as a result of the development. Therefore, there will be no loss of flow to the Cwm Taf Fechan SSSI springs and the degrees of effect and impact are expected to be Negligible.

### *Ponds and lakes in connection with the aquifer*

The small ponds to the north-east of the Quarry are located east of the Nant y Glais and are most likely to be fed by rainfall. Impacts on these waterbodies will hence be Negligible.

The south-east pond at the Quarry is relatively large and forms a habitat for great crested newt. The degrees of effect and impact on the south-east pond will both be Negligible (following the implementation of the great crested newt translocation mitigation strategy). .

### *Baseflow in drains and watercourses*

Baseflow in the Nant y Glais east of the extraction area at the Quarry is likely to supported by the Abercriban Oolite on which it lies. The Abercriban Oolite is separated from the Dowlais Limestone by the lower permeability Llanelly Formation. Therefore, it is likely that the degree of effect on the baseflow in the Nant y Glais in this area will be Negligible. This concept is further supported by the groundwater modelling which suggests an insignificant change in baseflow along the Nant y Glais due to the passive dewatering.

Baseflows in the Taf Fechan are currently supported by flow in the limestone sourced from the south-east pond. The hydraulic gradient south of the Quarry will be unchanged or may steepen through time, meaning there will be no decrease in baseflows to the Taf Fechan and baseflow, or flow to the springs in the valley, may actually slightly increase. Therefore, there will be no loss of flow to the Taf Fechan and the degrees of effect and impact are expected to be Negligible. This concept is also consistent with the findings of the groundwater flow model.

There are two springs directly east of the extraction area within the Quarry, referred to in the HIA as springs NG01 and NG02. Precise measurement of flow rates from these springs is not possible due to the difficulty in accessing the springs; however, records of visual observations confirm that NG01 rarely flows whereas NG02 has a consistent low-moderate flow on the order of 10 l/s.

These springs are both outside of the SSSI and downstream of it, and their contribution to the flow of the Nant y Glais is small. If small quantities of water are diverted from these springs due to the passive dewatering of the quarry void, it will ultimately discharge from groundwater as baseflow further downstream. These springs are thought to be tufa-forming and therefore are an Annex I Habitat and, considering their small, localised and low-flowing nature, are classified as Medium value receptors.

The effect of dewatering at the quarry on spring flow is not clear as it depends on the catchment of the spring and the proportion of water from shallow recent rainfall recharge and deeper more long-term groundwater. NG01 and NG02 lie on the Dowlais Fault which may act as a pathway to more distant groundwater source in the north, rather than the Dowlais Limestone immediately from the west (where the Quarry is located). The effect on the flow rates in NGO1 and NG02 could be up to Medium due to the reduction in flow from the deeper, slow moving groundwater. . This results in a Moderate degree of impact

### *Impacts on water quality from plant operation*

The limestone aquifer is utilised for private water supply abstractions and supplies springs in SSSIs, and water quality could be affected by chemical spillages or mobilisation of suspended solids.

Spills at the Quarry could feasibly occur from the accidental loss of fluids from mobile or fixed plant equipment and mitigation measures are thus required.

Although the limestone aquifer is in hydraulic continuity with surrounding surface watercourses and waterbodies, there will be an inwards hydraulic gradient caused by passive dewatering. This means that there would not be any impact on receptors to the north, east and west. Spills that affect the limestone could, however, potentially affect surface water receptors to the south of the Quarry, namely the Taf Fechan and springs. Dilution and attenuation

would reduce the effect of any spills; however, if transport is along karstic features, this would be minimal.

### *C1 Impacts on receiving watercourse quality*

Runoff within the quarry void catchment will infiltrate to the limestone aquifer and will discharge to neighbouring watercourses; namely the Taf Fechan, via springs or as baseflow. This water will pass through the limestone aquifer prior to discharge which will provide some filtration leading to removal of fines. Therefore, the level of effect and degree of impact will be negligible.

Runoff from the former fixed processing plant site will continue to discharge off-site south of Vaynor Road under the current arrangements, and the discharge will be undertaken in accordance with the existing discharge permit. Once off-site, the discharge passes through a settlement pond south of Vaynor Road prior to the discharge compliance point. Hanson will clean out the settlement pond as required to ensure that the discharge consent is complied with. Therefore, the degrees of effect and impact on receiving watercourses will be negligible.

### *Impacts on receiving watercourse flows*

There is to be no water discharge from the Quarry above greenfield runoff rates, and all excess runoff will be attenuated within the Site.

## 15.5.2 Hydrogeological Mitigation and Monitoring Measures

### *Mitigation*

The HIA concludes that with the exception of possible impacts to the spring-fed water supply to Llwyncilsanws Farm, there will be negligible impact to other neighbouring abstractions based upon distance and the predicted degree of drawdown. Similarly, the potential impact to other sensitive sites (springs and SSSIs in the vicinity), and on baseflows in surface watercourses are all assessed as 'negligible' with no mitigation required. The required mitigation is thus confined to conventional fuel and oil handling protocols, and mitigation measures in the event of an identified adverse impact to the Llwyncilsanws Farm private water supply which is attributable to quarrying operations at Vaynor.

In relation to springs NG01 and NG02 it is considered that maintaining tufa formation through augmentation of water flows to the springs would present significant challenges, as tufa forms under specific physico-chemical conditions and this would require pumping in perpetuity. It is noted that NG01 rarely flows and both springs are outside of the Nant y Glais SSSI, and therefore it is considered that this impact is not significant and does not change the overall character of the Nant y Glais. Mitigation therefore is not proposed due to the environmental costs (and economic viability) of pumping in perpetuity with the effectiveness not guaranteed.

Potential water quality impacts will be addressed by standard planning conditions. A spill is considered unlikely; however, were this to occur, it would be retained within the active quarry void for a sufficient length of time to allow it to be collected using oil absorbent materials, with standard operational procedures from a Hanson ISO 14001 certified environmental management system. Contaminated material would then be disposed of in accordance with current best industry practices.

Facilities for the storage of soils, fuels or chemicals will be sited on an impervious base and surrounded by impervious bund walls. The volume of the bunded compound will be greater than the tank capacity (i.e. at least 110%). Filling points, vents, gauges and sight glasses will be located within the bund walls. The bund drainage system will be sealed with no discharge to any watercourse, land, or underground strata permitted. Associated pipework will be located above ground and protected so as to prevent accidental damage. All filling points and tank overflow pipe outlets will discharge downwards into the bund.

Drainage systems at the Quarry will be regularly inspected to ensure that visible oil is not present. The environmental management system will be used to ensure that all procedures follow best practice.

Water in the pond at the southern end of the quarry void will be derived from groundwater and rainfall runoff, and hence is expected to be clean. Suspended solid concentrations may become elevated due to the movement of mobile plant

equipment or runoff, particularly during storm events. Discharge from the pond will be via infiltration back into the limestone aquifer through the base of the pond and there is not expected to be any surface water outflow.

Any discharge from areas of the former processing plant area (south of the pond) will be controlled by the terms of the existing discharge permit. It is recommended that the suspended solids concentration of any off-site discharge is monitored regularly to allow compliance in accordance with the discharge permit.

### *Monitoring*

Flows at the Llwyncilsanws Farm private water supply springs will be monitored initially on a monthly basis with the option to review this frequency. Should a material reduction in spring flow occur that is not related to climate, Hanson will provide Llwyncilsanws Farm with an alternative source of water. This could be through drilling a water supply borehole or by connection to mains water. Any such measures would be agreed privately between Hanson and the Farm owner.

## 15.5.3 Hydrology and Hydrogeology Conclusions

During limestone extraction, the quarry void will be passively dewatered. Intercepted groundwater and runoff will be infiltrated back into the limestone aquifer at the southern end of the extraction area and there will be no net loss of water from the aquifer. Following completion of the quarrying operations, the Quarry will be restored to a predominantly nature conservation based after-use.

The most proximal receptors include a private water supply abstraction (at Llwyncilsanws Farm), the Nant y Glais SSSI, the Cwm Taf Fechan SSSI, the Nant y Glais and the limestone aquifer. The study has concluded that impacts on all receptors, prior to any mitigation measures, would be insignificant except at the private water supply at Llwyncilsanws Farm, potential water quality impacts on the limestone aquifer, and at springs on the Nant y Glais (NG01 and NG02). Upon implementation of the proposed mitigation measures, the study concludes that the impact at Llwyncilsanws Farm and the limestone aquifer water quality would be insignificant. Whilst impacts to the springs (NG01 and NG02) are potentially significant, they are not reasonably mitigable.

Passive dewatering could cause potentially significant impacts on the Llwyncilsanws Farm private water supply abstraction. It is therefore proposed to implement a monitoring programme to monitor effects at that receptor. Should monitoring indicate a significant impact at Llwyncilsanws Farm, Hanson would provide an alternative source of water.

Potential water quality impacts on the limestone aquifer will be mitigated by applying standard planning conditions to the planning permission requiring the implementation of fuel and oil handling protocols.

## 15.5.4 Proposed Hydrogeological Planning Conditions

These issues are reflected in the schedule of proposed planning conditions which includes measures to avoid fuel spillage and a requirement to agree a fuel handling protocol.

## 15.5.5 Noise Study

The noise study examines the environmental noise impact of rock extraction operations, processing operations and associated workings at Vaynor Quarry. It sets out the findings of noise surveys conducted in July 2021 at positions representative of the closest dwellings to the site. It also provides the calculated noise levels arising from the workings and considers the possibility of the need for any mitigation measures where necessary aimed at enabling the site to conform with acceptable noise levels at all dwellings.

The closest noise sensitive properties, in each direction, to the extraction, processing and stockpiling/loading areas have been selected as representative of the properties potentially most affected by the operation.

The receptors selected for the purposes of this study are:

A/B Llwyncilsanws Farm (2 locations)

C Pen-rhiw-glais

D Glenview

E Llansay

F Former Pontsarn Hotel

G Aberglais

H Sweetwater Park 1 (western extent)

I Sweetwater Park 2 (No 62)

J Sweetwater Park 3 / High Trees

The noise assessment locations are shown on a site plan in ES **Appendix 10.2**.

### *Noise Limits*

The conventional approach to setting noise limits is outlined in Minerals Technical Guidance Note 1: Aggregates (MTAN1) which indicates that '*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*).....(ref MTAN 1 paragraph 88).

### *Calculated Noise Levels*

In order to present the noise levels for the proposed site operations, the contribution from each significant specific noise source has been evaluated separately and then combined together to give the overall noise level.

The combined effect of drilling and secondary breaking, loading at the face, crushing and screening, hauling, stockyard activity and access road noise has been calculated in terms of $L_{Aeq,T}$ noise levels at the representative receptor properties with screening from the intervening landforms, and the proposed north east soil/overburden storage bund (after 5 years) or working face taken into account. The realistic "worst case" $L_{Aeq,T}$ noise levels, representing the highest site noise levels calculated for each property, are presented in this chapter.

Calculations have been undertaken for two scenarios:

- Scenario 1 - extraction occurs at the highest/closest point to Llwyncilsanws Farm.
- Scenario 2, extraction occurs at the closest point to Sweetwater Park and the eastern receptors.

At **Receptor A/B**, Llwyncilsanws Farm, the average background noise levels were 33dB LA90,15min from the sample measurements and 32 dB LA90,15min from the installed meter.

Following the guidance in MTAN1, the usual approach would be to suggest a noise limit of 42 dB LAeq,1h based on the lower background noise measured during the installed meter monitoring.

This limit can be met for most of the development years and scenarios considered, however, the limit would be exceeded for Development Years 10-15 Scenario 2 (by 3 dB) and Development Years 15-30 Scenario 1 (by 4 dB). The highest calculated site noise level is 46 dB LAeq,1h for 15-30 years Scenario 1.

At **Receptor C** at Pen-rhiw-glais to the east of the site, At Pen-rhiw-glais the average background noise level was 34 dB $L_{A90,15min}$ from the sample measurements. Following the guidance in MTAN1, the usual approach would be to suggest a noise limit of 44 dB $L_{Aeq,1h}$

This limit would be exceeded for the majority of the development years and scenarios considered by up to 8 dB. The highest calculated site noise level is 52 dB $L_{Aeq,1h}$ for 5-10 years Scenario 2, and 10-15 years Scenario 2.

For **Receptors D to G** to the east of the site, including Glenview, Llansay, the former Pontsarn Hotel and Aberglais, the average background noise level was 37 dB $L_{A90,15min}$ from the sample measurements. Following the guidance in MTAN1, the usual approach would be to suggest a noise limit of 47 dB $L_{Aeq,1h}$

This limit would be exceeded for several of the development years and scenarios considered by up to 4 dB. The highest calculated site noise level is 51 dB $L_{Aeq,1h}$ for 15-30 years Scenario 1.

Fot **Receptors H and I** on Sweetwater Park to the south of the site, the average background noise level was 34 dB $L_{A90,15min}$ from the sample measurements. Following the guidance in MTAN1, the usual approach would be to suggest a noise limit of 44 dB $L_{Aeq,1h}$

For **Receptor H** (western extent of Sweetwater Park) this limit would be met for the majority of development year and scenarios considered. It is only exceeded for two years/scenarios and only by 1 dB.

For **Receptor I** (central Sweetwater Park) the limit would be exceeded for several of the development years and scenarios considered by up to 3 dB. The highest calculated site noise level is 47 dB $L_{Aeq,1h}$ for 15-30 years Scenario 1.

For **Receptor J**, representing properties on the east end of Sweetwater Park and on High Trees, to the south of the site. the average background noise level was 39 dB $L_{A90,15min}$ from the sample measurements. Following the guidance in MTAN1, the usual approach would be to suggest a noise limit of 49 dB $L_{Aeq,1h.}$ This limit would be met for all of the development years and scenarios considered.

Although the suggested limits for the majority of receptors are above the usual MTAN 1 approach of background noise levels + 10 dB, all of the suggested noise limits are below the upper limit of 55 dB $L_{Aeq,1h}$ set out in MTAN 1

To meet lower site noise limits would require substantial mitigation, such as restricting operations in terms of the allowable on-time per hour or restricting the geographical occurrence of operations within the site boundaries, which would impose an 'unreasonable burden' on Hanson as the mineral operator.

Guidance for ROMP applications are set in Minerals Planning Guidance Note 14 (MPG14) issued by the Welsh Office in September 1995. Paragraph 174 of MPG14 states the following with regard to periodic reviews:

"*174. The approach to be adopted to the determination of conditions following periodic reviews broadly follows that for initial reviews with two main differences. First, there is no distinction between periodic review sites that are working and those that are not. Secondly, where mpas determine conditions difference from those submitted by the applicant; and the effect of those conditions, other than restoration or aftercare conditions, is to restrict working rights further than before the review, a liability for compensation will always arise…*"

MTAN1 also provides guidance on noise limits for temporary operations such as screen bund formation, which indicates that "d*uring 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'* (ref MTAN 1 para 88).

The calculated noise level at Llwyncilsanws Farm due to the bund construction operations at the nearest point to the property is 62 dB $L_{Aeq,1h}$, i.e. below the MTAN1 recommended noise limit for such temporary operations of 67 dB $L_{Aeq,1h}$. and it should be possible to complete the construction of the bund within a period of less than 8 weeks..

### 15.5.6 Noise Mitigation Measures

Mitigation is incorporated into the scheme in the form of a bund to the north-east of the site, as well as confining mineral processing operations within the Overall Mining Site where future mineral extraction will take place, rather than in the former processing plant area further south. Calculations have determined that further screening from bunds to protect dwellings to the east and south of the site would be neither practical nor effective.

### 15.5.7 Noise Conclusions

A study of the noise effects associated with the recommencement of working at the currently inactive Vaynor Quarry has been undertaken.

As part of that exercise, noise surveys were conducted in July 2021 to provide baseline noise data at the nearest dwellings in the vicinity of the currently inactive quarry near Merthyr Tydfil. The noise surveys indicate that distant and local road traffic is the controlling noise source throughout the area with individual locations also being affected by other sources.

The extraction operation, crushing/screening, and associated operations, have been described and set out in terms of the equipment proposed to be used and typical Sound Power Levels of the plant to be used. These values have been

used to determine the worst-case noise levels affecting the surrounding residential receptors.

Noise limits have been suggested for the residential receptors based on either the guidance in MTAN 1 or the worst-case calculated site noise level. All of the suggested noise limits are below the upper limit of 55 dB $L_{Aeq,1h}$ set out in MTAN 1

To meet lower site noise limits would require substantial mitigation, such as restricting operations in terms of % on-time or restricting the geographical occurrence of operations within the site boundaries, which would impose an 'unreasonable burden' on Hanson as the mineral operator by restricting working rights.

### 15.5.8 Proposed Planning Conditions

Planning conditions have been proposed which reflect the suggested noise limits for the respective properties in the vicinity of the Quarry (for both normal and temporary operations), together with the requirement for a noise monitoring scheme to be submitted which, inter alia, includes requirements for:

(i) the provision of measures to reduce noise levels from quarrying operations and specify a methodology for monitoring

(ii) the results of monitoring to be submitted to the Local Planning Authority within 1 month of the monitoring being undertaken, together with confirmation of action required and/or undertaken to remedy any breach of the noise limits set out in Table 1.; and

(iii) steps to be taken upon receipt of a complaint of noise nuisance, including the commencement or continuation of the noise monitoring programme to assist in the investigation of any relevant complaint if appropriate

## 15.6 Blast Vibration

### 15.6.1 Blast Vibration Study

A study has been undertaken of the potential effects upon nearby receptors of vibration generated by blasting operations. The study has been undertaken in accordance with guidance set out in Minerals Technical Advice Note 1: Aggregates' [MTAN1], which provides advice on keeping blast induced vibration from mineral extraction sites to acceptable levels including advice on peak particle velocity (ppv) limits for ground vibration, and relevant British Standards which set parameters for maximum satisfactory magnitudes of human exposure to blast induced vibration in buildings.

The detonation of explosive charges in a borehole (often referred to as a 'shot hole') generates stress waves causing localised distortion and cracking of the rock mass. Outside of this immediate vicinity, permanent deformation does not occur. Instead, the rapidly decaying stress waves cause the ground to exhibit elastic properties whereby rock particles are returned to their original position.

Despite the substantial design process involved in a blast, such as borehole diameter, spacing, depth, amount of explosive etc, all blasts will generate vibration. This vibration occurs both through the ground and through the air (as a pressure wave).

If not properly regulated, blast induced vibration has the potential to cause damage to properties or structures and loss of amenity to residential properties. It is however important to realise that for any given blast it is very much in the operator's interest to always reduce vibration, both ground and air borne to the minimum possible in that this substantially increases the efficiency and hence the economy of blasting operations.

Ground vibration arising from blasting is calculated in terms of 'peak particle velocity' (PPV) and is measured in millimetres per second ($mms^{-1}$).

Air-Blast Overpressure represents the increase in pressure caused by a shock wave over and above normal atmospheric pressure. Modern blast-monitoring

equipment is also capable of measuring peak overpressure data in terms of unweighted decibels (dB). Decibels, as used to describe air blast, should not be confused with or compared to dB(A), which are commonly used to describe relatively steady-state noise levels.

Blast vibration limits for the existing Quarry as set out in the Initial ROMP deemed conditions set a peak particle velocity limit *of 10mm per second at any residential property in 95% of all blasts measured over any period of six months, with no blast to exceed a level of 12mm per second.*

The advice in MTAN1 which post-dates the Initial ROMP Review is that ground vibration at vibration sensitive locations (residential properties) as a result of blasting operations '*should not exceed a peak particle velocity of 6 mms-1 ppv in 95% of all blasts measured over any 6 month period, and no individual blast should exceed a peak particle velocity of 10 mms-1 ppv'* (ref MTAN 1 para 83).

It is thus noteworthy that the current ground vibration limits at residential property at 10mms for 95% of blasts and an upper limit of 12mms are less stringent than the more up to date guidance in MTAN1 which suggests a limit of 6mms for 95% of blasts with an upper limit of 10mms.

The opportunity is available via the Periodic ROMP to update the blast vibration limits to accord with the guidance in MTAN1.

As noted above. in addition to ground vibration, whenever blasting is carried out, energy is transmitted from the blast site in the form of airborne pressure waves known as 'air overpressure'.

Meteorological conditions, such as wind direction and velocity, cloud cover, humidity and temperature inversions influence the intensity of air overpressure levels at any given location. In view of this, unlike with ground vibration, predictions of air overpressure can be made less certain by atmospheric conditions. Accordingly, MTAN1 does not recommend the imposition of limits on air overpressure, and the most effective method of control is its minimisation at source.

### 15.6.2 Blast Vibration Mitigation Measures

It is proposed that the currently imposed ground vibration limit of 12mms should be revised to reflect the more up to date advice and more stringent limit recommended in MTAN1 of 6mms for 95% of blasts, with an upper limit of 10mms.

Accordingly, all blasts should be designed in order to comply to a vibration criterion of 6 mms-1 peak particle velocity at a 95% confidence level.

Adherence to these levels will ensure that all vibration will be of a low order of magnitude and would be entirely safe. It will also be within the levels deemed to be satisfactory in terms of human perception.

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.

A number of general good practice measured are also outlined to further reduce the potential for adverse impacts due to blast vibration at the site including:

- correct blast design;
- accurate setting out and drilling of shot holes;
- correct charging of shot holes with explosives to avoid accidental over charging;
- correct stemming (placement of material in the shot hole above the explosive charge), to help control air overpressure and ground vibration.;
- monitoring of blasting and re-optimising the blast design (if necessary), in the light of the results, and
- avoid blasting in adverse/unsuitable weather conditions.

### 15.6.3 Blast Vibration Conditions

The recommendations for the imposition of an updated ground vibration limit from blasting to reflect the advice in MTAN1 is reflected in the schedule of proposed conditions.

This is supplemented by the submission of a Scheme for Blast Vibration Monitoring and a Scheme for the Control of Air Overpressure.

### 15.6.4 Blast Vibration Conclusions

An assessment of predicted blast-induced vibration levels has been made with reference to existing policy guidance and standards.

Reference has also been made to the limits on ground vibration imposed by the current planning conditions, which notes that the defined ground vibration limit measures at residential property is less stringent than the limit recommended by MTAN1 (2004) which post-dates the ROMP Initial Review.

It has therefore been recommended that the planning conditions relating to residential property should be updated to reflect the ground vibration limits set out in MTAN1.

In addition, to determine as far as reasonably practicable that the blasting associated with the future development at Vaynor Quarry is not causing an exceedance in the stipulated limits at the nearest vibration sensitive receptors, a detailed Scheme for Blast Vibration Monitoring has been prepared which is referred to in the schedules of proposed planning conditions. A scheme has also been prepared for the control of air overpressure**.**

## 15.7 Air Quality

### 15.7.1 Air Quality Study

The Air Quality study describes the scope, relevant legislation, assessment methodology and the baseline conditions currently existing at the application site and its surroundings. It then considers any potential significant environmental effects the development would have on this baseline environment; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed.

The scope of the assessment has comprised:

- baseline review – identification of relevant receptors, background pollutant concentrations and meteorological conditions;
- a qualitative minerals dust assessment – considering dust deposition and suspended airborne dust with an aerodynamic diameter of less than 10 microns ($PM_{10}$);
- a detailed operational phase road traffic emissions assessment (via dispersion modelling); and
- a review of the proposed dust control measures and recommendations for additional controls, as required.

The study highlights the Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland which provides the over-arching strategic framework for air quality management in the UK and contains national air quality standards and objectives established by the UK Government and Devolved Administrations for the protection of public health and the environment.

Of particular note is the Air Quality Assessment Level (AQAL) or limit of 40µg/$m^3$ of $PM_{10}$ particulate as an annual mean, and a nitrogen dioxide($N_{02}$) limit of 200µg/$m^3$ as a one hour mean.

For the purposes of assessment, nineteen human receptor locations (DR1 to DR19) have been considered, including residential properties and nearby footpaths/bridleways, deemed to be representative of the local area for the assessment of dust and $PM_{10}$ impacts.

Twelve ecological receptors have been considered (ER1-ER12) including locations within the Nant y Glais Caves SSSI and the Cwm Taf Fechan SSSI.

For the road traffic emissions study, seventeen receptors (residential properties) have been considered (receptors HR1 – HR17) as being representative of worst-case exposure locations within the development locale, relative to the affected road network discussed (i.e. routes to/from the A465).

### *PM10 Assessment*

The Institute of Air Quality and Management (IAQM) minerals guidance states that if the $PM_{10}$ background concentration is less than 17µg/m³ it is considered unlikely that any Process Contribution (PC) from the additional activities proposed would lead to an exceedance of the annual mean AQAL.

Utilising data set out in Defra background maps, the maximum annual mean $PM_{10}$ concentration across the area in 2019 is 14µg/m³ and therefore less than 17µg/m³. In addition, background concentrations are predicted to decrease year on year and by 2023 the maximum concentration is predicted to be 13.3µg/m³. Furthermore, annual mean $PM_{10}$ concentrations at the MTCBC suburban monitor APM1 have been <12µg/m³ for the period 2015-2019.

It is therefore considered that in the absence of additional mitigation, the effect of the proposed operations on human health from emissions of $PM_{10}$ will be negligible.

### *Deposited Dust Assessment*

Activities or sources associated with the proposed development that have the potential to result in the release of dust include:

- site preparation and restoration;
- mineral (limestone) extraction ;
- mineral processing;
- storage of material;
- on-site transportation; and
- off-site transportation.

The magnitude of effect predicted is considered 'negligible' at the majority of receptor locations (human and ecological). This is largely due to the receptors being located upwind of activities, and/or not located 'close' to activities (see following section).

Furthermore, the Quarry experiences a large percentage of days per year where daily rainfall exceeds 0.2mm. In line with IAQM minerals guidance, this is considered sufficient to suppress potential dust emissions and has therefore been factored into the assessment.

In line with the IAQM methodology, receptors located close, i.e. <100m, or intermediate, i.e. 100-200m, from a dust source or activity are most at risk from potential adverse dust impacts. In this case, most of the receptor locations considered within the assessment are located >100m from the proposed mineral extraction phases. Only Receptor DR19 (Merthyr Tydfil Golf Course) is located within 100m of all phases, and Receptor DR3 (footpath) is located within 100m of phase 4, 5 and the final phase.

In addition to the above, Receptor DR18 is located within 200m of phases 2-5, and the final phase, Receptor ER3 and ER4 are located within 200m of phase 5 and the final phase, and DR1, ER2 and ER5 are also located within 200m of the final phase.

The number of receptor locations located 'close' or 'intermediate' to the extraction phases increases as the development progresses, suggesting that the latter phases have greater potential to result in dust impacts. However, this potential is largely counteracted, as most of the receptors are classified as 'low' or 'medium' sensitivity in line with IAQM guidance (Ref ES Table 12-17).

Of the receptors identified only DR1 (Llwyncilsanws residential dwelling) is classified as 'high' sensitivity in line with IAQM guidance. However, given that DR1 is located within 200m of the final phase only, this potential impact would relate to the final phase only; at which point the north-eastern soil screening bund would be well established.

Overall and based on the assessments undertaken, the effect of the proposed development in terms of dust deposition is considered to be 'not significant'. This conclusion is reliant on the designed-in and operational mitigation measures, which have been accounted for in the assessment, as discussed in Section 15.8.4 below.

### *Traffic Emissions Assessment*

Based upon the modelling results, and in accordance with Environmental Protection UK (EPUK) and IAQM guidance, the impact of the development on annual mean $NO_2$ concentrations at all assessed receptors is considered to be 'negligible'.

Given the marginal increase in annual mean $NO_2$ concentrations associated with the proposed development, and that there are no predicted exceedances of the annual mean $NO_2$ AQAL, unmitigated effects associated with annual mean $NO_2$ concentrations at all assessed receptor locations are therefore considered to be 'not significant'.

### *Ecological Receptors*

In relation to road traffic emissions, the Cwm Taf Fechan Woodlands SSSI and LNR, and some ancient woodland sites are located within 200m of the affected road network.

In line with the IAQM guidance, a screening assessment has been undertaken. The predicted development-generated trips are 138 HDV AADT and therefore below the indicative screening threshold of 200 HDV AADT.

Potential impacts from road traffic emissions on the ecological designations are therefore likely to be imperceptible, whereby resultant effects can be classed as insignificant.

## 15.7.2 Air Quality Mitigation Measures

A number of specific mitigation measures have been incorporated into the Quarry layout and design; these measures include:

- mobile processing plant would be located in the quarry void and therefore sheltered;
- tarmacked access road off Vaynor Road, approximately 100m in length to any active areas;
- extraction areas located away from the majority of sensitive receptor locations;
- stocking areas located upwind from the majority of sensitive receptor locations; and
- wheel washing facilities to be located at the Quarry entrance.

## 15.7.3 Air Quality Planning Conditions

The above dust mitigation measures have been incorporated into a Dust Management Plan [DMP] (ES Appendix 12.7) which sets out the proposed management procedures and dust controls for the Quarry. Planning conditions are included in the proposed schedule of conditions requiring adherence to this DMP.

## 15.7.4 Air Quality Conclusions

The assessment has been undertaken in line with the IAQM minerals guidance and has considered the potential significance of effects on amenity, human health (from $PM_{10}$) and ecological receptors as a result of operations within the Quarry.

The proposed scheme is considered unlikely to cause adverse effects with the correct mitigation measures in place

The conclusions in relation to the dust assessment are that:

- the effect on amenity is considered to be 'not significant';
- the effect on $PM_{10}$ concentrations at receptors is considered to be 'not significant'; and
- the effect from dust on ecological receptors are considered to be 'not significant'.

These conclusions rely on the implementation of operational mitigation measures and the environmental design measures throughout the proposed development.

## 15.8 Traffic

### 15.8.1 Traffic Study

The traffic study considers the potential for the proposed development to impact upon the existing highway network in the vicinity of the Quarry. It describes the scope, relevant legislation, assessment methodology and the baseline conditions currently existing at the Quarry and its surroundings. It then considers any potential significant environmental affects the proposed development would have on this baseline environment; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual impacts after these measures have been employed.

In summary, the proposed development comprises the resumption of extraction and processing within the permitted extraction site using mobile plant to produce aggregate at a rate of approximately 500,000 tonnes per annum, which would be distributed by the existing site access to Vaynor Road.

In terms of transport and highway matters there would be no significant increase beyond what has previously been agreed to be acceptable on the majority of the local road network. However, as a result of the A465 improvement scheme, which has closed the direct connections between Cefn-coed-y-cymmer, there would be an increase in quarry traffic along the A4054 Upper High Street, as it would be necessary to use that route and thereafter the A470 in order to access the A465, as would a proportion of other existing traffic travelling between the village and the A465. Nevertheless, based on data provided by Transport for Wales and the analyses undertaken as part of the traffic study, the route has sufficient capacity to accommodate the diverted traffic movements.

Based on an average production of 500,000 tonnes of stone per annum being distributed in 20 tonne average payloads over 287.5 working days gives an average of 87 loads / 174 HGV movements per day, which equates to around 8 loads / 16 HGV movements per hour when rounded up.

#### *Traffic Routing and A465 Improvements*

All of the HGV traffic would travel to / from the southwest along Vaynor Road to / from the A4054 High Street / Upper High Street junction, from which it would be distributed around the local road network based upon the origin and destination of the HGV transporting the load.

Historically, access to / from the A465 Heads of the Valleys Road was gained either via Grawen Lane, opposite Vaynor Road, which provided a left in / left out junction from / to the eastbound traffic lane, or via High Street to the southeast then Lower Vaynor Road, the latter providing a similar left in / left out arrangement with the westbound traffic lane of the A465.

However, the A465 is being upgraded to a dual carriageway, with the existing A470 / A465 roundabout being upgraded to a grade separated dumb-bell intersection with the link between the two roundabouts sitting below the A465, which would cross via an over-bridge. Slip roads will be provided from the A470 intersection to provide access to and from both carriageways of the A465, effectively creating an all-movements junction.

As a result of these revisions to the road network, the connections to the A465 via Grawen Lane and Lower Vaynor Road will be removed. Traffic currently using these routes to access the A465 will therefore re-route along the A4054 to the northwest or southeast.

The improvements to the A470 junction involve increased radii at the bellmouth to accommodate the general uplift in traffic volumes and the diversion of HGV traffic servicing Cefn-coed-y-cymmer, In addition, a ghost-island right-turn lane is to be provided for traffic turning to the A4054 from the northbound lane of the A470, due to the increase in right turn movements associated with the permanent diversion of traffic from the slip roads which previously provided access to / from the village. This will prevent delays to the northbound traffic flows continuing along the A470 towards Brecon.

### *Traffic Survey*

In the absence of any recent traffic survey information on Vaynor Road, two Automatic Traffic Counters (ATCs) were installed for a 7 day period between Friday 10th and Thursday 16th September 2021. ATC Site 1 was fixed to a telegraph pole approximately 80m to the northeast of the Vaynor Road / A4054 High Street / Upper High Street junction at Cefn-coed-y-cymmer, opposite the bus stop shelter southwest of Cloth Hall Lane.

Site 2 was fixed to telegraph pole approximately 30m beyond the 30 mph speed limit, within the national speed limit zone, and 85m northeast of the access to Vaynor Quarry, in order to obtain vehicle flows and southbound approach speeds towards the access.

The results revealed the average daily flows at Site 1 over the 7 day period were 4,340 vehicles. The comparable HGV flows for the same periods varied between 26 (Sunday) and 90 (Thursday). The overall HGV proportion at Site 1 was established to be 1.63%.

The weekday (Monday to Friday) AM peak hour occurred between 08:00 – 09:00 with an average flow of 377 movements. The comparable PM peak hour period occurred between 15:00 – 16:00 with an average of 384 vehicles.

At Site 2, the 7 day average daily flow was 1,698 vehicles. The comparable HGV flows for the same periods varied between 10 (Sunday) and 20 (Friday). The overall proportion of HGV traffic at Site 2 was established to be 0.79%.

The weekday (Monday to Friday) AM peak hour occurred between 08:00 – 09:00 with an average flow of 114 movements. The comparable PM peak hour period occurred between 16:00 – 17:00 with an average of 160 vehicles.

In terms of traffic flows on the wider highway network, due to the significant revisions being implemented as part of the A465 roadworks, which will sever existing connections to the A465 Heads of the Valleys Road, the existing traffic patterns will undoubtedly change at the local level.

### *Highway Capacity*

It is apparent from the traffic survey data that baseline traffic flows in the area on the local roads are relatively low in absolute terms. To put the traffic flows in context, TA 79/99 "*Traffic Capacity of Urban Roads*" indicates that a road of this type could accommodate up to 1250 vehicle movements per hour of which up to 15% (187) could be HGV movements.

It is therefore apparent that the local road network retains significant levels of reserve of spare capacity in the baseline conditions, both currently and in the future.

### *Safety Risks: Accident Statistics*

A review of the wider highway network performance has been undertaken by interrogating the Crashmap database, which revealed there have been no personal injury accidents recorded along Vaynor Road or the A4054 corridor between its junctions with the A470 to the north and A4102 to the south involving HGVs within the most recent 5 year period for which data is available (2016 – 2020 inclusive).

In the event there is a feature on the road network that results in compromised safety for its users, it is normal to find a number of incidents with common characteristics at that location.

It is apparent from the traffic flow data that HGV activity is regularly experienced on the local road network without resulting in personal injury accidents occurring. This indicates the routes are of an acceptable design standard to safely accommodate such vehicles, based on the evidence-based approach advocated in current design guidance.

### *Development Traffic Impact*

As established above, the local road network retained a reserve or spare capacity of some 664 vehicle movements per hour on the busiest route within the study area, which equates to some 53%.

The proposed development is predicted to attract 87 loads / 174 HGV movements per day, in addition to the traffic movements associated with the 11 staff to be based at the site, resulting in a total of 196 movements, assuming the worst-case scenario whereby all members of staff travel independently by car to / from the site.

In practical terms, due to the proposed main operating hours of 07:00 – 19:00 Monday to Friday and 07:00 – 16:00 on Saturdays, staff travel would not occur during the peak hours on the network and would therefore have an insignificant impact on the operation of local roads.

Notwithstanding this, even if the entire daily traffic associated with Vaynor Quarry is added to the base flows in 2051, the cumulative total of (586 + 196) 782 vehicle movements remains 468 movements and 37.4% below the design capacity of the busiest link.

It is therefore apparent that capacity of the local roads is not a constraint to the proposed resumption of permitted operations at Vaynor Quarry.

Similarly, as demonstrated through the traffic survey and collision data, the local road network can safely accommodate regular HGV movements. Given the apparent spare capacity of the road network and its excellent safety record, there is no reason to conclude that the resumption of permitted activities would have a material impact on highway safety.

### 15.8.2 Traffic Mitigation Measures

Although Vaynor Quarry benefits from planning permission to extract, process and distribute stone, the operation has been mothballed for a number of years, during which vegetation has grown in the vicinity of the site access.

Whilst the visibility at the access has been found to be acceptable, it is recommended that the vegetation be periodically trimmed to ensure the visibility from and towards turning traffic is not limited by un-checked growth.

The sheeting of vehicles and cleaning of vehicles' wheels is recommended to avoid detritus being deposited on the public highway.

Normal quarry management protocols adopted to minimise adverse transport impacts, such as agreed driver conduct codes, strict vehicle maintenance etc. should also be adopted.

### 15.8.3 Highways Planning Conditions

Based upon the above recommendations, planning conditions have been included within the proposed schedules of conditions relating to maintaining the visibility splays at the site entrance, sheeting of vehicles, and use of HGV wheel cleaning equipment.

### 15.8.4 Traffic Conclusions

Having considered the findings of the review undertaken, it is concluded that subject to the imposition of reasonable planning conditions to minimise impacts associated with the HGV activity and maintenance of the site access, a resumption of operations at the quarry is acceptable insofar as highways and transport matters are concerned.

## 15.9 Cultural Heritage

### 15.9.1 Cultural Heritage Study

This Cultural Heritage Study considers the effects of the proposed development on the cultural heritage resource and describes the assessment methodology, the baseline conditions, the likely significant environmental effects, the mitigation measures required to prevent, reduce, or offset any significant adverse effects, and likely residual effects after these measures have been employed.

The historic environment desk-based assessment that informs the study was undertaken in accordance with a Written Scheme of Investigation (WSI), formalising the adopted scope and methodology. The WSI was submitted to the Planning Officer (MTCBC), Glamorgan-Gwent Archaeological Trust (GGAT) and the Heritage Officer, Brecon Beacons National Park Authority (BBNPA), for review, comment and approval prior to the assessment being undertaken.

To characterise the known and potential historic resource within the environs of the Quarry, a study area measuring 2km around the Quarry boundary was agreed upon within the WSI. This was considered sufficient to capture the relevant data and provide the necessary context. All archaeological sites, monuments and other heritage assets within this area were analysed, and then refined to narrow the research focus onto those of relevance to the Quarry.

There are no designated historic assets, including archaeological remains, within the OMS.

There are two records of non-designated historic assets within OMS. One refers to a Romano-British or early medieval inscribed stone, noted as found in this area. However, available sources do clearly establish the exact location of the find: it is also the case that the stone, if indeed found here, would have been removed and any associated features would have been destroyed by subsequent quarrying activities.

The second non-designated historic asset relates to a post-medieval limekiln. The limekiln was in an area of intense quarrying activities and has also have been destroyed by subsequent activities within the OMS.

Studies of the immediate environs of the OMS emphasise that area was once a rich prehistoric landscape. There are several designated and non-designated prehistoric features to the north, north-east and north-west of the OMS. These features are predominantly burial monuments, comprising of Bronze Aged cairns, along with occasional enclosure features of probable Bronze Age or Iron Age date.

Historic cartographic records and later aerial photography illustrate the OMS as being within an area of mixed agricultural land, consisting of pasture, arable, and meadowland. The evidence shows the gradual growth of Vaynor Quarry from the late 19th century up until the late 20th century. During this time most of the farming land within the OMS boundary was incorporated into the quarry, and any existing agricultural buildings and structures were subsequently destroyed.

Aerial photography suggests that the northernmost area of the OMS is still partially former agricultural land that has not been subjected to intense quarrying activities. Therefore, there is potential for prehistoric or post-medieval archaeological features to exist within the northernmost area of the OMS.

### *Physical Effects*

There will be no physical effects upon any known designated or non-designated historic asset. The inscribed stone and limekiln, discussed above, have already been removed from the OMS and there will be no effect upon these.

The assessment of the archaeological potential of the OMS has suggested that there is some limited potential of encountering prehistoric and/or post-medieval archaeological features. These potential features would be in the northernmost area of the OMS, i.e., areas that have not previously been quarried. There will be no archaeological remains within areas of the OMS that have previously been quarried.

### *Non-Physical Effects*

The potential non-physical effects upon the Registered Historic Landscape (RHLA) of Merthyr Tydfil and the Scheduled Monuments of Merthyr Tramroad: Morlais Castle section, Morlais Castle, and Morlais Hill ring cairn were assessed with a conclusion that indirect effects would be negligible.

## 15.9.2 Cultural Heritage Mitigation Measures

The potential for prehistoric and/or post-medieval archaeological features within previously unquarried areas of the OMS, i.e., the northernmost area, indicates that further archaeological mitigation would be beneficial. It is envisaged that such mitigation could consist of a programme of archaeological observation and recording during any topsoil and subsoil stripping in this area of the OMS. All further archaeological mitigation will need to be agreed with GGAT and BBNPA, and the scope and methodology of additional work agreed within a Written Scheme of Investigation (WSI).

### 15.9.3 Planning Conditions

This mitigation measure is reflected in a proposed planning condition which requires the submission of a WSI in advance of any soil stripping within the northern area of the OMS.

### 15.9.4 Cultural Heritage Conclusions

The proposals will have no more than a Negligible/None effect upon any known historic assets (including designated or non-designated historic assets).

Regarding physical effects, an assessment of the archaeological resource for the area has identified that the OMS has a limited potential for previously unknown archaeological remains because of extensive quarrying activities. Specifically, the northernmost area of the OMS has not previously been quarried and there is some limited potential of encountering prehistoric/post-medieval remains in this area. To mitigate possible effects upon potential archaeological remains it is suggested that further archaeological investigation are needed in this area only. The archaeological investigation may appropriately consist of a programme of archaeological observation and recording during any topsoil and subsoil stripping in this area of the OMS.

With regard to non-physical effects upon the setting and significance of any historic assets in its wider environs, it is concluded that the significance of none of these historic assets would be harmed to more than a negligible degree by the proposed resumption and extension of quarrying.

Subject to the implementation of a programme of industry-standard archaeological mitigation, the proposals are in compliance with national and local policy directed to protecting heritage assets.

# SUMMARY OF ENVIRONMENTAL EFFECTS 15

# 16.0 PLANNING POLICY

## 16.1 Introduction

When undertaking EIA's and preparing an ES, it is conventional practice to carry out a review of planning policy relevant to the development. This is not an express requirement of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017, but for planning applications accompanied by an EIA it is helpful in allowing the principle of the development and its details to be assessed against a checklist of planning policy objectives and requirements. For ROMP applications, whilst the principle of the development is not a matter for consideration, the environmental and amenity protection policies can further assist in identifying the key environmental issues associated with a particular development which should be regulated by updated planning conditions.

Planning applications which are accompanied by an EIA must be considered in the context of 'Regulation 3' of the EIA Regulations which prohibits the grant of planning permission unless an EIA has been carried out in respect of that development. In parallel, planning applications must be determined in accordance with the development plan, unless material considerations indicate otherwise (ref Section 38 (6) of the Planning and Compulsory Purchase Act 2004). In effect, Section 38(6) of the 2004 Act introduces a presumption in favour of granting planning permissions for proposals which are in accordance with policies in the development plan.

In practice, the two requirements are complimentary in that policies in the development plan will conventionally seek to safeguard environmental interests and will generally presume against developments which are likely to give rise to significant adverse environmental and amenity effects.

As noted above, distinctions can however be drawn between the circumstances of a planning application, where the principle of a development needs to be assessed against policies in the development plan, and those associated with a ROMP application, where the principle of the mineral development is already established by virtue of the extant planning permissions for quarrying which exist. The relevance of the development plan in these circumstances is more towards providing guidance and advice regarding environmental controls and operational practices which should be enshrined within up to date planning conditions. It is not the function of a ROMP application to re visit the appropriateness of the development consent, unless the EIA identifies issues of such magnitude that the MPA consider that the planning consent should be modified (as discussed earlier in section 1.5.1 of this ES).

At a National / Welsh Government level, the key planning policy and technical guidance/advice documents comprise:

1. Planning Policy Wales (PPW) Edition 11, December 2018; and
2. Minerals Technical Advice Note 1: Aggregates (MTAN1), March 2004

The development plan in relation to the MTCBC area of the OMS comprises the Replacement Local Development Plan (LDP) 2016 – 2031, adopted in January 2020, and for the BBNPA, the Brecon Beacons National Park LDP 2007 – 2022, adopted December 2013.

This chapter is structured to firstly consider national planning policy, followed by policy in the adopted development plans. The chapter does not seek to undertake an exhaustive review of each planning policy, but rather its objective is to identify relevant policies and context which assist with the drafting of updated planning conditions. Similarly, it does not address policies relating to individual environmental topics, unless relevant to informing planning conditions. However, general environmental and other policy issues are briefly referenced in the topic chapters of the ES as a policy context for the environmental assessments which have been undertaken. These issues are not repeated in this overview chapter which focuses primarily on the wider mineral planning policy content of PPW and MTAN1 as the key statements of national planning policy relevant to minerals, and the advice relating to issues associated with the objective to minimise the impact of mineral extraction.

## 16.2 National Planning Policy Context

The Well Being of Future Generations (Wales) Act 2015 (WBFGA) places a duty on public bodies that they must carry out sustainable development. The

principle of sustainable development has been at the heart of planning policies since Planning Policy Wales (PPW) was first published in 2002. However, the concept has been expanded and reinforced under the WBFGA to require a process of improving the economic, social, environmental and cultural wellbeing of Wales (Section 2), by taking action in accordance with the sustainable development principle (defined in Section 5), aimed at achieving the well-being goals (listed in Section 4). The WBFGA (Section 3.0) also requires public bodies to set well-being objectives designed to maximise their contribution towards achieving each of the wellbeing goals.

The seven well-being goals seek to secure a prosperous Wales, a resilient Wales, a healthier Wales, a more equal Wales, a Wales of cohesive communities, a Wales of vibrant culture and thriving Welsh language, and a globally responsible Wales. The relevance of the goals will vary depending on the function being exercised by the public body, but they guide the overarching requirements for public bodies to exercise their functions in order to achieve sustainable development.

Section 2 of the WBFGA defines sustainable development as the process of improving the economic, social, environmental and cultural well-being of Wales by taking action in accordance with the sustainable development principle aimed at achieving the well-being goals. Section 5 of the WBFGA defines the sustainable development principle as acting in a manner which seeks to ensure that the needs of the present are met without compromising the ability of future generations to meet their own needs. In order to act in that manner, account must be taken of:

- the importance of balancing short-term needs, with the need to safeguard the ability to meet long term needs;
- the need to take an integrated approach by considering how the wellbeing objectives of the public body may impact on each of the wellbeing goals;
- the importance of involving other persons with an interest in achieving the wellbeing goals;
- the need to act in collaboration to meet wellbeing objectives; and
- deploying resources to prevent problems occurring or getting worse.

These are referred to as the 'five ways of working' with elaboration in Planning Policy Wales Edition 11 (PPW11) highlighting the need for policy and development plans to consider the long-term, the integration of policy issues to ensure balanced decisions; collaboration with public bodies and interested parties to secure availability of evidence and assessments; involvement of the public and stakeholders through the planning system; and limiting environmental impacts in the wider public interest.

The Planning (Wales) Act 2015 introduced a statutory requirement for any statutory body carrying out a planning function to exercise those functions as part of carrying out sustainable development in accordance with the WBFG for the purpose of ensuring that the development and use of land contribute to improving the economic, social, environmental and cultural well-being of Wales. The planning system is therefore necessary and central to achieving sustainable development in Wales.

The Environment (Wales) Act 2016 introduces the concept of 'Sustainable Management of Natural Resources' (SMNR) and sets out a framework to achieve this as part of decision making. Natural Resources as defined, includes animals, plants and other organisms, minerals and geological features (reference Part 1 Section 2). Sustainable management of natural resources is defined as using natural resources in a way and at a rate that promotes the achievement of sustainable objectives to meet the needs of current generations without compromising the ability of future generations to meet their needs, and to contribute to the achievement of the wellbeing goals in Section 4 of the WBFG Act.

As noted above, the Planning and Compulsory Purchase Act 2004 (Section 38 (6), sets a now well-established requirement that planning applications must be determined in accordance with the adopted development plan unless material considerations indicate otherwise. In that respect, it is relevant to note that the sustainable development requirements are re-enforced by Section 39(2) of the Planning and Compulsory Purchase Act which places a duty on plan makers to exercise their function with the objective of contributing to sustainable development. The adopted MTCBC and BBNPA LDPs were thus prepared in accordance with that duty.

## 16.3 Planning Policy Wales (PPW) Edition 11: 2021

PPW 11 issued in February 2021, like its predecessor PPW10 has been redrafted from the previous version 9 to ensure that it is fully aligned with the sustainable development requirements of the Planning (Wales) Act 2015 and the well-being goals defined in the WBFG which underpin sustainable development. It seeks to build upon the five ways of working set out in the WBFG, noting that the planning system is one of the key policy decision making and delivery mechanisms, and it should seek to maximise the delivery of outcomes against all aspects of well-being/sustainable development, thus seeking the maximise the contribution towards the goals of the WBFG Act.

It sets 5 key principles for planning of:

1 Growing our economy in a sustainable manner;
2 Making the best use of resources
3 Facilitating accessible and healthy environments
4 Creating and sustaining communities
5 Maximising environmental protection and limiting environmental impact (ref PPW11 Figure 4).

PPW 11 indicates that these principles enable the goals and ways of working set out in the WBFG Act and Environment Act to be realised through planning, and they provide a context and catalyst for the positive delivery of the planning system across Wales (para 2.14).

PPW 11 is structured around the themes of sustainable 'place making', with four elements of 'strategic and spatial choices', 'active and social places', 'productive and enterprising places', and 'distinctive and natural places'. It emphasises that in responding to the key principles for the planning system, development proposals must seek to deliver development that addresses the national sustainable placemaking outcomes, albeit recognising that "not every development will be able to demonstrate they can meet all of these outcomes" (ref para 2.20).

The approach of PPW10 is to firstly to assess proposals against the 'strategic and spatial choices' issues and the national sustainable placemaking outcomes; then to consider the detailed impact and contribution to active and social places, productive and enterprising places, and distinctive and natural places, noting that the consideration within each of these themes will vary on a case by case basis depending on the proposal concerned. Finally, the process should result in a proposal which contributes to the creation or sustaining of sustainable places and which delivers on the national sustainable placemaking outcomes (ref PPW10 Figure 7).

It also confirms that in assessing the sustainable benefits of development, "social, economic environmental and cultural benefits" should be considered in the decision-making process to ensure a balanced assessment in carried out and to implement the WBFG and sustainable development principles. There may be occasions when one type of benefit of a development proposal outweighs others.

PPW 11 confirms that in assessing benefits, key factors include:

<u>Social considerations</u>

- Identifying the interested and affected people and communities
- Who will benefit from any impact from the proposal?
- What are the short term and long-term consequences of the proposal?

<u>Economic considerations</u>

- Whether the development will support regeneration opportunities;
- Whether the development will upgrade the environment
- The contribution to achieving wider strategies, for example growth
- Support for the achievement of a more prosperous, resource efficient Wales.

<u>Cultural considerations</u>

- Whether the development protects areas and assets of cultural and historic significance.

<u>Environmental considerations</u>

- Will important features of natural environment be protected and enhanced?

- Are the environmental impacts of development limited to acceptable levels and is the resilience of eco systems improved?
- Is environmental protection for people and natural resources maximised and are environmental risks prevented or appropriately managed?
- Will high standards of restoration, remediation decommissioning and beneficial after use be achieved?
- Will the depletion of non-renewable resources be minimised, or waste prevented, and the efficient and most appropriate use of materials made and reuse and recycling promoted?

These issues are considered further in the planning policy conclusion at the end of this section. Before doing so, the sections below discuss the topic-based planning policies relating to minerals and landscape and examine the extent to which the proposed development meets the requirement of these policies, the sustainable objectives of PPW11 and hence the contribution to the well-being goals and objectives of the WBFG Act. This provides a context for the drafting of updated planning conditions designed to ensure that the quarry development continues in accordance with established principles if sustainable development.

## 16.4 Minerals (PPW10 Section 5.14)

There are three main elements of policy of relevance to the future quarry development at the OMS:

### *(i) Key principles*

PPW11 confirms that the key principles are to:

> *Provide positively for the safeguarding and working of mineral resources to meet society's needs now and in the future, encouraging the efficient and appropriate use of high-quality materials.*

The proposed scheme is a 'positive' approach to the working of minerals which will meet society's needs for mineral into the long-term future.

> *Protect environmental and cultural characteristics of places, including those highly cherished for their intrinsic qualities such as wildlife, landscape, ancient woodland and historic features, and protect human health and safety and general wellbeing.*

Each of these issues have been assessed as part of the EIA, with careful attention to the protection of amenity via the proposed noise and blast vibration restrictions, and the Dust Management Plan, all of which could be enforced via the proposed updated schedule of planning conditions.

> *Reduce the impact of mineral extraction and related operations during the period of working by ensuring that impacts on relevant environmental qualities caused by mineral extraction and transportation, e.g. air quality and soundscape are within acceptable limits.*

This is the underlying purpose of the Periodic ROMP and has been the primary focus of the environmental studies which have been undertaken as part of the EIA, notably via the specific attention to air quality, noise, blast vibration and hydrological / ecological mitigation measures designed to ensure that environmental effects can be minimised.

> *Achieving, without compromise, a high standard of restoration and aftercare so as to avoid dereliction and to bring discernible benefits to communities, heritage and /or wildlife including beneficial after uses or opportunities for enhancement of biodiversity and the historic environment.*

A restoration concept for Vaynor Quarry has been submitted as part of the ROMP application. This is the first such scheme to be prepared for the Quarry, noting that the current planning conditions require the submission of a scheme for progressive restoration, with the scheme to be reviewed at intervals not greater than 15 years. The provision for such updates is retained in the proposed updated schedules of conditions, but where such updates can be undertaken in the context of a specific initial restoration concept scheme. That scheme is itself designed to bring discernible landscape and biodiversity benefits in the long term.

### *(ii) Ensuring aggregate supply*

PPW 11 reiterates a series of well-established principles. These are set out below with brief comments on their applicability to the proposed development:

*Each MPA should ensure that it makes an appropriate contribution to meeting local, regional and UK needs for primary minerals, (para 5.14.10)*

The currently permitted reserves at Vaynor Quarry are included within the landbank of permitted reserves in MTCBC and are relied upon as part of the future aggregate supply strategy set out in the LDP as the Authority's contributions towards meeting needs for primary aggregate minerals (ref LDP para 6.7.111, discussed further below.

The BBNPA LDP indicates that new quarries or extensions to quarries in the National Park should not be required except in very exceptional circumstances (as reiterated in PPW11 para 5.14.35), but this position does not directly apply to quarries in the National Park which already enjoy the benefit of planning permission for extraction.

*An examination of landbanks for aggregates should be undertaken to highlight any shortfalls and to ensure productive capacity is maintained... Planning authorities should include policies in their development plans for the maintenance throughout the plan period of land-banks for non-energy minerals which are currently in demand... (ref para 5.14.15)*

As noted above, the MTCBC LDP relies upon the existing permitted reserves at Vaynor Quarry to maintain the required landbank of aggregates in the Plan period and beyond (ref LDP Policy EcW10 and para 6.7.94).

### *(iii) Reducing the impacts of mineral extraction and related operations*

The key requirement is that:

*Mineral workings should not cause unacceptable adverse environmental or amenity impact. Where this is not possible, working needs to be carefully controlled and monitored so that any adverse effects on local communities and the environment are fully mitigated to acceptable limits. Any effects on local communities and the environment must be minimised and thereafter ameliorated to an acceptable standard (ref para 5.14.42).*

The ES has concluded that the future quarrying operations at Vaynor would not give rise to 'unacceptable adverse environmental or amenity impact'.

The development scheme represents a progression of the currently approved scheme which via the grant of the existing planning permissions has been deemed acceptable in terms minimising environmental effects.

The ROMP Review provides an opportunity to consider the acceptability of existing planning controls, and via an updated schedule of conditions, ensure that the future operation is regulated by planning conditions which provide a mechanism to minimise the impacts of future quarrying to an 'acceptable standard' (ref proposed schedule of conditions produced as Annex 1 to the ES).

## 16.5 Minerals Technical Advice Note 1: Aggregates March 2004 (MTAN1)

### 16.5.1 Landbanks and Reserves

MTAN 1 requires the Regional Aggregates Working Parties for North and South Wales to produce Regional Technical Statements which review aggregate sales and reserves, and which make recommendations for the additional reserves which need to be released to ensure adequate future supplies. The most recent Regional Technical Statement (RTS) for South Wales was issued in September 2020 as a Second Review (RTS2) of an original RTS issued in 2008.

RTS2 identifies an annualised 'apportionment' for each Authority as its contribution towards supplies required to maintain a minimum 10 year landbank of crushed rock aggregates throughout the 15 year period of RTS2 (2016 – ~~2041~~ 2031), resulting in a minimum provision period of 25 years. This apportionment is then compared with the extent of existing permitted reserves to establish whether additional allocations for aggregates extraction are required to be made in LDPs.

For MTCBC and BBNPA the analysis is partly combined where the annual apportionments of some 0.37m tonnes for BBNPA (9.2m tonnes for the 25 year provision period) and 0.2 m tonnes for MTCBC (4.98m tonnes for the RTS2

provision period) are compared against a joint landbank for the two Authorities of some 120m tonnes. The calculation thus concludes that there are sufficient permitted reserves to meet this requirement and that additional allocations in the next round of LDP reviews will not be required.

In this context, it should be noted that the 120m tonnes reserve in the two combined Authorities includes the reserves at Vaynor Quarry which is thus factored-in to potential future supplies. Reducing the impacts of mineral extraction

MTAN1 sets out detailed advice on the mechanisms for delivering the policies of the then extant Minerals Planning Policy Wales (MMPW) March 2000. MPPW was cancelled by PPW 9 which embraced the content of the former MPPW as Chapter 14 within PPW9. The key elements of national mineral policy have been incorporated into PPW 11 Section 5.14, with a consistency of approach.

MTAN1 remains part of Welsh Government policy and advice, and the technical content of the document continues to provide practical guidance on, inter alia, measures available to reduce the impact of aggregates production. This is reflected in 'Section C' of MTAN 1 which outlines a number of measures to fulfil that principle, including the control of dust, blast vibration, noise and visual impact.

These issues have been considered as part of the EIA and are reported in the ES, which concludes that the mitigation measures available would allow operations to proceed in a way which minimises impacts, and in terms of PPW, minimises impacts to within 'acceptable limits' (PPW para 5.14.42).

### 16.5.2 Blast Vibration

MTAN1 reviews the effects of blasting in terms of ground vibration and air over pressure, and highlights conventional controls designed to minimise effects. It suggest that planning conditions should provide for acceptable days for blasting operations (normally Mondays to Fridays at regular times); acceptable times for blasting operations; maximum levels of ground vibration at vibration sensitive properties (which should not exceed a peak particle velocity of 6 $mms^{1}ppv$ in 95% of all blasts measured over any 6 month period, and no individual blast should exceed a peak particle velocity of 10 $mms^{1}ppv$); approval of a scheme to minimise air overpressure; and approval of a scheme for vibration monitoring to ensure adherence to the set limits.

The future operations at Vaynor Quarry could be undertaken in accordance with the above blast vibration limits which have formed the basis of the blast vibration study undertaken as part of the EIA (ref ES chapter 12.0). In that respect, it is noted that the blast vibration limits referred to in the current planning conditions at Vaynor Quarry are less restrictive than those recommended in MTAN1. The opportunity is thus available via the ROMP Review to impose the more restrictive limits recommended by MTAN1, and this is reflected in the schedule of proposed conditions included as Annexes 1 and 2 to the ES.

### 16.5.3 Noise

MTAN1 emphasises that the effects of noise should be fully considered in formulating future proposals for aggregates extraction and noise impact must be limited to acceptable levels (ref para 85). In that respect, it should be noted that there are no noise limits imposed as planning conditions via the ROMP Initial Review conditions, and the opportunity is available via the current Periodic Review to impose suitable noise conditions and noise limits at nearby noise sensitive properties.

This reflected within the noise study reported in Chapter 11.0 of the ES (Volume 1) which has had regard to the advice set out in MTAN1. For the reasons set out, the conclusion reached is that the proposed noise limits are appropriate and can be regulated as part of the schedule of proposed planning conditions (ref Annexes 1 and 2 to the ES).

### 16.5.4 Visual Impact

MTAN1 highlights the fact that hard rock quarries physically alter the ground surface through the development of faces and benches, and these landscape changes are often irreversible. It therefore advises that proposals for new aggregates extraction or extensions to existing sites should be assessed carefully to determine the potential impact on the character of the landscape.

The assessment should also facilitate a comprehensive understanding of the visual impact of a development from various locations which will assist in devising an appropriate layout and phasing, and the most appropriate restoration strategy (ref para 90).

In the case of Vaynor Quarry, the historical operations have disturbed a substantial area of the permitted quarry footprint with associated landscape and visual effects which, based upon local topography, cannot be fully screened from all vantage points. Whist the Periodic ROMP application does not propose any extension to the currently approved quarry limits, it is acknowledged that there would be further landscape and visual effects associated with developing the quarry to those approved limits.

A landscape and visual impact assessment has thus been undertaken as part of the EIA to identify the landscape and visual effects, to identify the scope for screening mitigation measures, and to provide a context for the preparation of a restoration strategy (noting that no such restoration strategy is currently in place).

## 16.6 MTCBC LDP

The MTCBC Replacement LDP 2016 – 2031 was adopted in January 2020.

The accompanying Proposals Map illustrates the extent of Vaynor Quarry within the administrative area of MTCBC as 'permitted mineral reserve'. The area shown includes part of the OMS which is the subject of this ES and the 'ancillary mining land' in the southern area of the quarry which was the subject of the now lapsed IDO permission (ref section 1.2 of this ES).

The LDP notes that in terms of Minerals the Plan's role is:

1. *To safeguard mineral resources and protect mineral reserves.*

2. *To contribute to an adequate and sustainable regional supply of aggregates for the construction industry and to promote their efficient and appropriate usage, including the use of recycled aggregates where possible.*

3. *To ensure the impacts of extraction are carefully managed (ref para 6.7.91).*

The LDP continues by recognising that the obligation for the Authority area to contribute to the regional supply of land-won primary aggregates, and that the 'regional apportionment' is set out in the then extant First Review of the 'Reginal Technical Statement (RTS1, 2014). A broadly similar picture was set out in RTS1 as is now extant in RTS2 (section 16.5.1 above), with a joint apportionment with BBNPA of 0.82 million tonnes of crushed rock per annum. The LDP noted that this equates to 20.5 million tonnes of crushed rock over the 25 year provision period (2011-2036) for RTS1 (ref para 6.7.94).

It continues by noting that Vaynor and Gelligaer quarries have significant permitted reserves for crushed rock which provides an adequate aggregates landbank of reserves for more than 50 years extraction. As this meets the MTAN1: Aggregates requirement to provide a minimum 10-years supply throughout the plan period no new allocations for crushed rock are required (ref para 6.7.95).

As noted in section 16.5.1, this position is reliant upon the availability of future aggregate supply from Vaynor Quarry. The key requirement is this to ensure that the impacts of extraction at Vaynor quarry are 'carefully managed) (ref item 3 above) and the current ROMP Review provides a mechanism for this to be secured.

## 16.7 BBNPA LDP

The Brecon Beacons National Park Local Development Plan was adopted by the Brecon Beacons National Park Authority on 17th December 2013.

Amongst a comprehensive list of LDP objectives, the LDP seeks to "*protect the National Park against new mineral workings and extensions to existing mineral workings* " (objective SQ12), whilst recognising that "*statutory designation does not necessarily prohibit development, but proposals for development must be carefully assessed for their effect on those natural heritage interests which the designation is intended to protect*" (ref para 3.3.1).

It continues by noting that in National Parks "*special considerations apply to major development proposals*". '*Major Proposals* 'are defined in in the LDP glossary (Appendix 9) as including development requiring Environmental Impact Assessment (EIA). The LDP further notes that "it is the potentially serious impact that a development may have on the qualities of the Park that qualifies it for the title 'Major Development'.

The LDP also cross references MTAN1 and national planning guidance regarding the national tests of 'exceptional circumstances' and 'rigorous examination' which need to be undertaken for mineral proposals in National Parks, with LDP policy SP2 (and LDP Section 10.1: minerals) further cross referencing those requirements now contained in PPW11 namely:

> *Minerals development should not take place in National Parks and AONB except in very exceptional circumstances. All mineral applications must therefore be subject to the most rigorous examination and all major mineral developments demonstrated to be in the public interest before being allowed to proceed. Consideration will include an assessment of:*
>
> - *the need for the development in terms of UK considerations of mineral supply;*
> - *the impact on the local economy of permitting the development or refusing it;*
> - *whether alternative supplies can be made available at reasonable cost, and the scope for meeting the need in some other way;*
> - *the detrimental effect of the proposals on the natural and historic environment and local community and landscape and the extent to which that can be moderated, and / or the detrimental effect of the proposals on the nature conservation interest of the site in terms of habitat, protected species and biodiversity; and*
> - *in the case of extensions to existing quarries and other mineral extraction sites, the extent to which the proposal would achieve an enhancement to the local landscape and provide for nature conservation and biodiversity. (ref PPW11, para 5.14.35).*

However, there are distinctions between the applicability of this policy to new mineral development in National Parks compared to ROMP Reviews of existing permitted mineral development in National Parks, where the principle of mineral extraction has been established and is enshrined in the planning permissions for mineral extraction which apply at the defined site.

In those terms, given that a ROMP Review is not considering the merits of whether permission should be granted for mineral extraction, the key elements of relevance to a ROMP review are to identify the effects of the permitted development and ensure that such effects can be 'moderated' (ref bullet point 4 above).

## 16.8 Planning Policy Conclusions

The summary review of national and local planning policies has assisted in highlighting the advice and policy issues which should be reflected in planning conditions controlling future activities at Vaynor Quarry.

The advice and policies represent up to date criteria and best environmental management practice relating to, inter alia, noise, blast vibration, and dust control, and more general advice relating to landscape.

The policies have provided a further checklist of environmental issues relevant to the assessment, and the topics and issues which are likely to require control via planning conditions.

The Applicants have thus sought to fully reflect this advice in the updated schedule of conditions they have prepared, which are produced in Appendices 1.3 and 1.4 to the ES.

# 17.0 CONCLUSIONS

This Environmental Statement (ES) sets out the results of an Environmental Impact Assessment (EIA) which has been undertaken to accompany 'Review of Old Mining Permissions' ('ROMP') applications for Vaynor Quarry.

Schedule 13 of the Environment Act 1995 provides for the undertaking of an Initial Review of planning conditions at mineral sites where the predominant mineral permission relating to the site was granted before 22nd February 1982 and after 30th June 1948. This Initial Review was intended to provide a mechanism to review and update the planning conditions attached to earlier permissions, and to ensure that future quarrying operations are undertaken in accordance with modern standards designed to minimise environmental and amenity effects.

An initial Review of the planning conditions regulating operations at Vaynor Quarry was completed on 1st January 2002.

The Environment Act 1995 Act also makes provision for undertaking Periodic Reviews of the conditions at 15 year intervals. This is designed to ensure that the conditions set by the Initial Review do not themselves become outdated with the passage of time. The deadline for the submission of the First Periodic Review applications has been agreed to be set as 31st August 2022.

This ES and the two parallel First Periodic Review applications submitted to MTCBC and BBNPA have been finalised and are being submitted in accordance with that deadline.

The EIA has been undertaken as a study to consider the environmental effects of the overall future mineral development scheme which, for the purposes of the EIA, disregards the administrative boundaries. It thus does not attempt to consider the separate environmental effects of quarrying and related operations within the administrative areas of MTCBC and BBNPA since this would be contrived and inappropriate. Instead, it considers the environmental and amenity effects of the overall scheme and, via this ES, proposes a series of mitigation measures designed to minimise the effects of the development. These measures have in turn been translated into proposed updated planning conditions which would regulate the future development.

However, whilst a single EIA has been undertaken, with the results set out in this ES, as was the case with the 1997 Initial Review it is necessary to submit two separate but parallel First Periodic Review applications to the two Authorities (MTCBC and BBNPA) reflecting their administrative responsibilities for those areas of the Quarry which lie within their jurisdiction.

The ES draws together the inputs from specialist consultants who have undertaken the EIA, and sets out the results of very careful, detailed and systematic research into each of the potential environmental effects of the development. Where relevant, the technical chapters make recommendations for measures to mitigate the environmental and amenity effects of the development which employ conventional and well established controls at such quarries.

The primary purpose of the ES is to assist in identifying environmental effects, and to use that information to (i) devise measures to minimise the environmental effects through mitigation/ attenuation measures; and (ii) provide for the measures to be enshrined in up to date planning conditions which regulate ongoing quarrying in a way which is reflective of the EIA.

The purpose of the Review is to formulate a schedule of updated planning conditions which reflect modern standards and controls, and which provide (i) detailed controls over on-going operations for the 15 year Review period; and (ii) a context for subsequent Periodic Reviews by confirming the intentions for the development of the Quarry, and the final restoration strategy.

The ROMP procedure places the initial onus on the Applicants to propose updated schedules of planning conditions. This has been undertaken, with proposed schedules for MTCBC and BBNP included as Appendices 1.3 and 1.4 to the ES. The schedules draw partly upon the existing planning conditions which are in place, where in certain cases no changes are deemed to be necessary, but they also propose new and updated conditions which reflect the recommendations for mitigation measures set out in the technical chapters of

the ES, and the way in which those mitigation measures can be translated into planning conditions.

The ES also includes a review of planning policy, noting that there have been some significant changes since 2002 Initial ROMP review notably in terms of limits for ground vibration from blasting. Particular attention has thus been paid to the way in which planning policy and advice can inform the drafting of up to date planning conditions.

The updated conditions are considered to represent a positive and constructive approach which will ensure an environmentally sensitive operation regulated by modern, up to date planning controls. In those terms, the EIA has been of positive value in preparing specific conditions which reflect the conclusions and recommendations of the EIA.