



Oernant Extension Area, Penparc Quarry, Cardigan

Air Quality Assessment

27th September 2023

inacoustic | **cymru**

C5 Business Centre, North Road, Bridgend Industrial Estate, Bridgend, Cymru, CF31 3TP

029 2009 8830 cymru@inacoustic.co.uk

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Version	1	2	3
Comments	Air Quality Assessment	Team Comments	Team Comments
Date	8 th September 2023	15 th September 2023	18 th September 2023
Authored By	Jo Kirk BSc Hons MSc MIAQM MIEEnvSc	Jo Kirk BSc Hons MSc MIAQM MIEEnvSc	Jo Kirk BSc Hons MSc MIAQM MIEEnvSc
Checked By	William Best BA (Hons)	Neil Morgan BSc Hons MSc MIOA	Neil Morgan BSc Hons MSc MIOA
Project Number	23-353-AQ	23-353-AQ	23-353-AQ
Version	4	5	6
Comments	Team Comments		
Date	27 th September 2023		
Authored By	Jo Kirk BSc Hons MSc MIAQM MIEEnvSc		
Checked By	Neil Morgan BSc Hons MSc MIOA		
Project Number	23-353-AQ		

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1. INTRODUCTION

1.1. Overview

inacoustic has been commissioned by Carter Jonas, on behalf of the Cardigan Sand and Gravel Company Limited, to undertake an air quality assessment in connection with the proposed Oernant Extension Area at Penparc Quarry, Penparc, Cardigan (the 'Site').

The Site is located to the west northwest of Penparc village within Ceredigion County Council (CCC). The council have not declared any Air Quality Management Areas (AQMA) within the county, as the air quality objectives are currently being met at all locations of relevant exposure.

This report addresses the impact of the proposed extension of the quarry on local air quality. Potential sources of emissions are identified and assessed in the context of existing air quality and emission sources and the nature and location of receptors.

A glossary of common air quality terminology is provided in Appendix A to assist the reader.

1.2. Scope and Objectives

The proposed extension of works at Penparc Quarry will not change the current mineral output from the Site and therefore there will be no change in vehicle movements as a result of the proposals.

As there will be no additional vehicle movements associated with the extension, the impacts on local air quality as a result of traffic emissions are considered to be negligible and have been scoped out of this assessment.

The site operations are associated with the extraction of sand only. Whilst the existing quarry has a planning provision for the importation of inert waste for restoration purposes, only quarry waste arising from the existing quarry will be utilised in the restoration of the application site. The process of sand extraction and handling of sand does not generate any odorous emissions. As this is the only material excavated there will be no odour effects associated with the proposals and any further consideration of odour has been scoped out of this assessment.

An assessment associated with the impacts of dust from the proposed extraction works on nearby sensitive receptors, has been undertaken using the approach set out in the guidance on the 'Assessment of Mineral Dust Impacts for Planning' published by the Institute of Air Quality Management.

2. CONCEPTUAL BACKGROUND AND REGULATORY GUIDANCE

The development proposals for the Site are guided by the following policies and guidance:

2.1. National Legislation and Policy

2.1.1. Air Quality Regulations

The Air Quality Standards (Wales) Regulations 2010¹ and Air Quality EU Exit Regulations 2019² set out a series of limit values for the protection of human health and critical levels for the protection of vegetation. The UK is currently exceeding the objective limits for NO₂ and PM₁₀ within London and a number of other air quality zones within the UK.

2.1.2. The UK Air Quality Strategy

The UK Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland (AQS) published in July 2007³, pursuant to the requirements of Part IV of the Environment Act 1995. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. The AQS is designed to be an evolving process that is monitored and regularly reviewed.

The AQS sets standards and national air quality objectives (NAQO) for ten main air pollutants to protect health, vegetation and ecosystems. These are benzene (C₆H₆), 1,3-butadiene (C₄H₆), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO₂), oxides of nitrogen (NO_x), particulate matter (PM₁₀, PM_{2.5}), sulphur dioxide (SO₂), ozone (O₃) and polycyclic aromatic hydrocarbons (PAHs).

The air quality standards are long-term benchmarks for ambient pollutant concentrations which represent negligible or zero risk to health, based on medical and scientific evidence reviewed by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO). These are general concentration limits, above which sensitive members of the public (e.g., children, the elderly and the unwell) might experience adverse health effects.

The air quality objectives are medium-term policy-based targets set by the Government which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e., a limited number of permitted exceedances of the standard over a given period.

For some pollutants, there is both a long-term (annual mean) standard and a short-term standard. In the case of NO₂, the short-term standard is for a 1-hour averaging period, whereas for PM₁₀ it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants (e.g., temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road).

The current statutory standards and objectives for PM₁₀, the pollutant of most concern when assessing effects from mineral working sites in relation to human health, are set out in Table 1, overleaf.

¹ Air Quality Regulations 2010-Statutory Instrument 2010 No.1433 (W.126)

² Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019 - Statutory Instrument 2019 No. 74

³ The Air Quality Strategy for England, Scotland, Wales and Northern Ireland - July 2007

TABLE 1: INVENTORY OF SOUND MEASUREMENT EQUIPMENT

Pollutant	Concentrations	Measured As	Date to be Achieved by
Particulate Matter (PM ₁₀)	50 µg/m ³	24-hour mean	31 December 2004
	40 µg/m ³	Annual mean	31 December 2004

The statutory standards and objectives apply to external air where there is relevant exposure to the public over the associated averaging periods within each objective. Guidance is provided within Local Air Quality Management Technical Guidance 2022 (LAQM.TG (22))⁴ issued by DEFRA for Local Authorities on where the objectives apply, as detailed in Table 2. The objectives do not apply in workplace locations, to internal air or where people are unlikely to be regularly exposed (i.e., centre of roadways).

TABLE 2: LOCATIONS WHERE AIR QUALITY OBJECTIVES APPLY

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual Mean	All locations where members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, care home etc.	<p>Building facades of offices or other places of work where members of the public do not have regular access.</p> <p>Hotels, unless people live there as their permanent residence.</p> <p>Gardens of residential properties.</p> <p>Kerbside sites (as opposed to locations at the building facade), or any other location where public exposure is expected to be short term.</p>
24 Hour Mean	All locations where the annual mean objective would apply together with hotels. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building facade), or any other location where public exposure is expected to be short term.
1 Hour Mean	<p>All locations where the annual mean and 24-hour mean objectives apply.</p> <p>Kerbside Sites (e.g., pavements of busy shopping streets).</p> <p>Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where the public might reasonably be expected to spend 1-hour or more. Any outdoor locations where the public might reasonably be expected to spend 1-hour or longer.</p>	Kerbside sites where the public would not be expected to have regular access.

⁴ DEFRA (2022) Local Air Quality Management. Technical Guidance LAQM.TG(22)

2.1.3. Local Air Quality Management

Local Authorities are seen to play a particularly important role. The AQS describes the Local Air Quality Management (LAQM) regime that has been established, whereby every Local Authority has to undertake regular reviews and assessments of air quality within its area to identify whether the objectives have been or will be achieved at relevant locations by the applicable date. If the objectives are not being met, the Local Authority must declare an Air Quality Management Area (AQMA) and prepare an action plan which identifies measures that will be introduced in pursuit of the objectives.

2.1.4. Clean Air Strategy

The Clean Air Strategy⁵ sets out policies to lower national emissions of pollutants in order to reduce background pollution and human exposure. It aims to create a strong framework to tackle air pollution and to reduce the number of people living in locations with PM_{2.5} concentrations exceeding 10 µg/m³ by 50% by 2025.

2.2. Planning Policy

2.2.1. National Planning Policy

Planning Policy Wales (PPW)⁶, the latest edition published in February 2021, sets out the land use planning policies of the Welsh Government. This is supplemented by a series of Technical Advice Notes.

At the heart of the PPW is a presumption in favour of sustainable development to ensure that social, economic and environmental issues are balanced and integrated by the decision-maker when determining planning applications (paragraph 4.2.2). It requires Local Plans to be consistent with the principles and policies set out in the PPW with the objective of contributing to the achievement of sustainable development.

Paragraph 4.26 states that *'those proposing development also have a responsibility to provide sufficient information to enable the decision maker to make an informed judgement on whether the proposed development is sustainable'*.

Paragraph 4.3 sets out the 'Sustainable Development Principle', established in the Wellbeing of Future Generations (Wales) Act⁷. This ensures the needs of the present are met without compromising the ability of future generations to meet their needs.

In dealing specifically with air quality, chapter 13, paragraph 13.10.1 states that *'the planning system should determine whether a development is an acceptable use of land and should control other development in proximity to potential sources of pollution rather than seeking to control the processes or substances used in any particular development.'*

Paragraph 13.10.3 continues to state that *'where pollution considerations, which may be relevant to a pollution control authorisation or licence or result from the need to comply with any statutory environmental quality standards or objectives, affect the use and development of land they can be material planning considerations. This provision extends to air quality objectives set out under Part IV of the Environment Act 1995 and the local authority's action plans for Air Quality Management Areas.'*

⁵ Defra. (2019). Clean Air Strategy. London: HMSO

⁶ Welsh Government (2021) Planning Policy Wales Edition 11, February 2021

⁷ Welsh Government (2015) Well-being of Future Generations (Wales) Act 2015

Section 13.12 refers to the potential for pollution affecting the use of land as being a material consideration in deciding whether to grant planning permission. Possible material considerations in determining applications for potentially polluting developments include:

- *Location, taking into account such considerations as the reasons for selecting the chosen site itself;*
- *Impact on health and amenity;*
- *The risk and impact of potential pollution from the development, insofar as this might have an effect on the use of other land and the surrounding environment (the environmental regulatory regime may well have an interest in these issues, particularly if the development would impact on an Air Quality Management Area or SAC);*
- *Prevention of nuisance;*
- *Impact on the road and other transport networks, and in particular on traffic generation; and*
- *The need, where relevant, and feasibility of restoring the land to standards sufficient for an appropriate after use.*

With regard to mineral workings, Paragraph 5.14.42 states 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 mitigated to acceptable limits. Any effects on local communities and the environment must be minimised to an acceptable standard.'*

Paragraph 5.14.43 continues *'Development plans should set out clearly the criteria that will be applied to minerals 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:*

- *Access and traffic generation including the routes to be used for minerals transportation;*
- *The control of air pollution namely dust, smoke and fumes.*

PPW stresses the importance of buffer zones and that planning authorities should use them to provide protection around permitted and proposed mineral workings so that there is no new mineral extraction or sensitive development within the zone. Buffer zones should also be identified in development plans around existing or proposed mineral sites.

2.2.2. Minerals Technical Advice Note 1 (Wales): Aggregates

The Minerals Technical Advice Note 1⁸ sets out detailed advice on the mechanisms for delivering the policy for aggregates extraction by mineral planning authorities and the aggregates industry.

Para 7 states that *'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.'*

Paras 70 and 71 indicated that buffer zones of at least 200 m should be applied around all hard rock quarries so as to protect land uses that are most susceptible to the impact of mineral operations. The main potential impacts are identified as dust, noise, traffic and vibration from blasting.

⁸ Welsh Assembly Government (2004) Minerals Technical Advice Note (Wales), March 2004

2.2.3. Control of Dust and Particulates

Part III of the Environmental Protection Act (1990)⁹ contains the main legislation on statutory nuisance and allows local authorities and individuals to take action to prevent statutory nuisance. Section 79 of the Act defines, amongst other things, dust, steam, smell or other effluvia emitted from industrial, trade or business premises so as to be prejudicial to health or a nuisance. Statutory nuisance is defined as:

- *'Any dust or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance'; and*
- *'Any accumulation or deposit which is prejudicial to health or a nuisance'.*

Statutory nuisance is not intended to secure a high level of amenity but rather to act as a basic safeguard standard that is intended to deal with excessive emissions. The test for considering whether a process presents a statutory nuisance relies upon considering a range of factors including the character of the locality, the frequency, duration and intensity of the impact.

Local Authority Environmental Health/Environmental Protection Officers have a duty to inspect their districts from time to time for statutory nuisance. They also have a duty to investigate any complaint of an alleged dust nuisance from the public. Once the authorised officer has formed the view that a statutory nuisance exists, the local authority has a statutory duty to serve an abatement notice on those responsible for the nuisance, requiring the nuisance to be abated.

Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

2.3. Local Planning Policy

2.3.1. Ceredigion Local Development Plan

The Ceredigion Local Development Plan¹⁰ was adopted in April 2013 and provides the local planning policy framework for Ceredigion County Council up to 31 March 2022. The relevant criteria applicable to mineral proposals include Policy LU28. The relevant criteria that will be Applied to Mineral Proposals state:

'All mineral planning applications must include sufficient information to enable them to be fully assessed to establish whether individually or cumulatively they will have an unacceptable adverse impact on the environment and/or the amenity of nearby residents and will only be approved where it can be fully demonstrated that they will not.'

'Each of the two areas shown allocated for future sand and gravel extraction on the Proposals Map (see Policy S01) represent the fullest extent of the allocated potential operational area, including associated margins for accommodation works, bunding or other mitigation requirements. The outer boundary of the allocation is not to be interpreted as the acceptable extent of future extraction. Approval of the precise form and extent of workings within the allocated area will be dependent on detailed consideration of the impacts arising from any scheme submitted for planning permission, in order to ensure an acceptable form of development in all material respects.'

Policy DM22: General Environmental Protection and Enhancement states:

'In order to help achieve environmental protection and enhancement, proposed development will be permitted provided that:

⁹ Secretary of State, The Environment Act 1990 HMSO

¹⁰ Ceredigion County Council (2013) Ceredigion Local Development Plan (2007-2022) Volume 1

1. It protects and enhances, where possible air, soil and the water environment and safeguards water resources, both on and off site;
2. It does not have a significant adverse effect on noise and light levels, both on and off site; [and]
3. A step wise approach is adopted to ensure that it does not have a significant adverse effect on natural processes and ecosystem services, both on and off site, and, where possible, seeks to restore, achieve favourable condition of or enhance associated features; [...]

2.4. Air Quality Guidance

2.4.1. DEFRA Technical Guidance, LAQM.TG(22)

Local Authorities are seen to play a particularly important role. Section 82 of the Environment Act 1995 requires every Local Authority to conduct a review of the air quality from time to time within the Local Authority's area. The recently released LAQM.TG (22) continues with this streamlined approach to the Local Air Quality Management (LAQM) regime, whereby every Local Authority has to undertake and submit a single Annual Status Report/Annual Progress Report within its area, to identify whether the objectives have been or will be achieved at relevant locations by the applicable date. If the objectives are not being met, the Local Authority must declare an Air Quality Management Area (section 83 of the Act) and prepare an action plan (section 84) which identifies measures that will be introduced in pursuit of the objectives.

The key updates to the new LAQM.TG (22) guidance include:

- An updated section on consultation, steering groups and engaging with relevant public Authorities (RPA);
- The requirement to declare and AQMA within 12 months of an identified exceedance or risk of exceedance;
- Updated study on assumptions for exceedances of short term NO₂ objectives;
- Updated study on relationship of PM₁₀ and PM_{2.5} for the purpose of estimating PM_{2.5} concentrations where only PM_{2.5} monitoring data is available;
- A worked example of model verification for modelling of road emissions;
- Clarified section on diffusion tubes with wind caps;
- Further clarity is provided for completion of source apportionment where detailed modelling had not been completed; and
- Inclusion of potential mitigation processes for non-transport sources.

2.4.2. IAQM Land-Use Planning and Development Control: Planning for Air Quality

The Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) have published joint guidance on the assessment of air quality impacts for planning purposes. This includes information on when an air quality assessment is required, what should be included in an assessment and criteria for assessing the significance of any impacts. The approach set out within this guidance has been used to inform the methodology used for assessing operational impacts within this report.

2.4.3. IAQM Guidance on the Assessment of Mineral Dust Impacts for Planning

Guidance produced by the IAQM on assessing impacts of dust from mineral sites¹¹ uses a simple distance-based screening process to identify those mineral sites where the dust impacts are unlikely to be significant and therefore require no further assessment. Where a detailed assessment is required, the guidance employs the **Source** → **Pathway** → **Receptor** approach to evaluate the risk of dust impacts and effects. The predicted scale of effects is classified as either 'significant' or 'not significant'. Where effects are predicted to be 'significant', further mitigation is required.

¹¹ IAQM (2016) Guidance on the Assessment of Mineral Dust Impacts for Planning, May 2016

3. SITE DESCRIPTION

3.1. Site and Surrounding Area

Penparc Quarry is located on land approximately 0.8 km to the northwest of the village of Penparc and approximately 2.9 km to the northeast of Cardigan in the County of Ceredigion, Wales. An internal road provides access to the quarry infrastructure including the concrete batching plant, fixed plant site area, buildings and settlement lagoons, which are located at the southern end of the existing quarry.

Surrounding land uses are predominantly agricultural/farmland which lies to the north, west and south of the quarry. The proposed extension area, highlighted in red on the plan below, extends to approximately 0.6 ha and is currently agricultural grazing land.

The closest residential properties to the application area lie approximately 178 m to the southeast of the proposed extension site boundary, at Pant-y-dwr, with Bryn haf and Pant-y-dwr Annex located approximately 202m and 205m to the east northeast and south southeast respectively.

The location of the Site is shown below in Figure 1.

FIGURE 1: APPLICATION SITE AND SURROUNDING AREA



3.2. Proposed Development Overview

Cardigan Sand and Gravel Company Ltd is an established sand and gravel quarry, supplying the construction, cattle and animal bedding industries. The company has been in operation since 1959 and benefits from a number of planning permissions, set out overleaf:

- C1/404: Retrospective application for the extension of Cardigan Sand and Gravel Quarry and the import of earth-spoils for use in landscaping and restoration. Approved subject to conditions 15/03/1994;
- 941083: Variation of condition to allow extension to hours of work etc. Temporary permission 06/12/1994;
- 931283: Extension of quarry and importation of earth-spoils for use in landscaping. Approved subject to conditions 15/03/1994; and
- 960155: Variation of condition 27 of C1/4040 controlling hours of work Approved subject to conditions 18/04/1996.

It is proposed to extend the current sand and gravel extraction operations at Penparc Quarry by approximately 0.6 ha (Figure 1: Application Site and Surrounding Area). Sand and gravel from the proposed extension will be extracted in accordance with all aspects of the existing planning permissions on the adjacent quarry and no change in operations practice would be required. Minerals would be extracted via an excavator, with transportation to the existing permitted mineral processing area situated on Site.

It is proposed to extract 118,000 tonnes of mineral from the application Site, which is '*mineral allocated within the Local Development Plan*'. The Site, including the existing operations, would be worked at a maximum rate of 150,000 tonnes per annum and 477,000 tonnes of mineral within the batter slopes of the existing adjacent quarry (*in accordance with the existing planning permission*).

3.2.1. Soil Stripping and Bund Formation

Soil stripping will be carried out in advance of mineral extraction and stored as a peripheral bund around the proposed site, or as part of existing soil bunds around the wider quarry for use in the future restoration of the site. Soil stripping operations will be typically undertaken using an excavator and potential, limited use of dump trucks.

A low peripheral bund will be constructed up to between the extraction area and the footpaths 78/2/D and 78/3 which run along the eastern and southern boundaries of the Site. The bund's soil stores shall be seeded as is practicable in order to prevent the potential for wind-blown dust. The bunds will also act as screening between the Site and surrounding area reducing dispersion of emissions.

3.2.2. Mineral Extraction and Transportation Operations

The extraction of mineral will be conducted over phased workings of the 0.6 ha area. As in the currently permitted area, mineral will continue to be extracted via the use of an excavator and loading shovels before being hauled to the adjacent quarry plant via an internal haul road for processing. The mineral in the extension area will be worked to a depth of between 100mAOD and <90mAOD, with the mineral in the existing quarry batters being worked to the permitted depth of 80mAOD.

The sand and gravel extracted from the site will have a relatively high moisture content which will reduce the potential for dust emission when handling the material. Further dust suppression measures are detailed within Chapter 7.

Vehicle speeds will be limited to 10 mph and haul roads will consist of compacted material in order to minimise dust generation.

3.2.3. Mineral Processing Plant

The permitted mineral processing plant will continue to be utilised. Mineral processing for sand and gravel is a wet operation. The mineral is processed via screens and a sand plant before being stockpiled. Water is used throughout the process, helping to minimise dust emissions. This process

has not been assessed as part of this application as it is an existing activity carried out on the existing Site.

3.2.4. Plant and Equipment

The plant to be used in the proposed extension area includes one excavator and one dumper truck. The plant available in the adjacent quarry include:

- 3 no. loading shovels;
- 3 no. excavators;
- 3 no. Volvo A35c dumper trucks;
- 2 no. telehandlers with various attachments;
- 1 no. McCloskey Mobile Screen Unit (20190); and
- 3 no. power screens / mobile screens.

3.2.5. Working Hours

The hours of working, as specified in the 1998 permission, allow operations to take place between 7.00am and 8.00pm on Mondays to Fridays and 7.00am to 1.00pm on Saturdays. When working at height the hours of working will be reduced to 8.00am to 5.00pm Monday to Friday and 8.00am to 1.00pm on Saturdays. Workings within the extension area will adhere to these working hours.

This report considers the mineral dust impacts from the preparation, mineral extraction, movement of material and restoration activities within the site. The extension application will not result in a change in the number of HGVs entering or exiting the wider site.

4. METHODOLOGY

4.1. Fugitive Dust Emission Assessment

4.1.1. Introduction

There is the potential for fugitive dust emissions to occur as a result of extraction, processing, handling and transportation of extracted materials. Vehicle movements also have the potential to result in the re-suspension of dust from haul roads surfaces. Emissions can vary substantially from day to day, depending on the level of activity, the specific operation being undertaken, and the weather conditions. The scale of these impacts depends on the dust suppression and other mitigation measures applied.

It is inevitable that the activities on mineral sites are likely to cause some disturbance to those nearby. Two potential impacts may occur as a result of fugitive dust emissions:

- **Disamenity impacts** – caused by larger particles that may be visible to the naked eye but are not thought to cause health effects. This may cause disamenity through soiling of property including windows, cars, external paintwork and laundry;
- **Health Impacts** – caused by PM10 which can remain suspended in the air for long periods of time. Particles of this size are fine enough to be inhaled and therefore have the potential to cause health impacts.

These impacts have been assessed in accordance with the methodology set out within the IAQM document 'Guidance on the Assessment of Mineral Dust Impacts for Planning'.

The IAQM guidance is based on the Source-Pathway-Receptor (S-P-R) concept, which is a 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 dust impact at relevant receptors is predicted using this concept.

The methodology used for the assessment of disamenity, and health impacts is detailed below:

Screening

The first stage set out in the IAQM guidance is used to screen out the need for a detailed assessment based on the distance from a mineral site to potentially sensitive receptors. The IAQM guidance states that '*adverse dust impacts from sand and gravel sites are uncommon beyond 250 m and beyond 400 m from hard rock quarries measured from the nearest dust generating activity.*' Therefore, if there are any human or ecological receptors within 250 m (soft rock/sand and gravel) or 400 m (hard rock) of dust generating activities then a disamenity dust impact assessment is required. Additionally, PM₁₀ effects need only be considered if there are sensitive receptors within 1 km of dust generating activities.

If sensitive receptors are not located within 1 km of the operations, then a detailed dust assessment can be screened out.

Site Characteristics and Baseline Conditions

The proposed development and surrounding area is described taking into account the following factors:

- Extent of site including site boundary;
- Existing site operations, including currently consented workings;

- Scale and duration of operations, including phasing;
- Type location of processing activities, including secondary processing (e.g., concrete batching);
- Mineral type and characteristics;
- Production rate;
- Method(s) of working;
- Method(s) of handling;
- Location(s) of storage areas and stockpiles; and
- Location(s) and number of access routes and haul roads.

The assessment should also take into account the principal existing dust sources such as dust from existing mineral operations, agricultural activities and construction activities.

4.1.2. Disamenity Dust Assessment

The Dust Impact Risk (DIR) for each representative receptor is determined by assessing the potential for residual source emissions and the source-pathway effectiveness. These are outlined below.

Estimation of Residual Source Emissions

The scale and nature of the works taking place on mineral extraction sites determines the level of residual dust emissions from fugitive sources. The following activities on site are likely to have the greatest potential for dust emissions:

- Site preparation/restoration (including soil and overburden handling);
- Mineral extraction (e.g., loading onto haul trucks and conveyors);
- On-site transportation;
- Mineral processing (e.g., crushing and screening);
- Stockpiling/exposed surfaces; and
- Off-road transportation (e.g., leading to trackout onto external road network).

Table 3, below, outlines the criteria used to categorise the residual source emissions for these activities.

TABLE 3: DETERMINING RESIDUAL SOURCE EMISSIONS MAGNITUDE

Activity	Magnitude	Criteria
Site Preparation/Restoration	Large	Working area >10ha Bunds >8 m in height >100,000 m ³ material movement >10 heavy plant simultaneously active Bunds unseeded Fine grained and friable material
	Medium	Working area between 2.5 ha and 10ha Bunds between 4 m and 8 m

Activity	Magnitude	Criteria
		<p>Between 20,000 m³ and 100,000 m³ material moved</p> <p>Between 5 and 10 heavy plant simultaneously active</p>
	Small	<p>Working area <2.5ha</p> <p>Bunds <4 m in height</p> <p>< material movement</p> <p><5 heavy plant simultaneously active</p> <p>All bunds seeded</p> <p>Material with a high moisture content</p>
Mineral Extraction	Large	<p>Working area > 100ha</p> <p>Drilling and blasting frequently used</p> <p>Dusty mineral of small particle size and/or high moisture content</p> <p>1,000,000 tonnes per annum (tpa) extraction rate</p>
	Medium	<p>Working area between 20 ha and 100 ha</p> <p>Between 200,000 and 1,000,000 tpa extraction rate</p>
	Small	<p>Working area <2.5ha</p> <p>Bunds <4 m in height</p> <p>< material movement</p> <p><5 heavy plant simultaneously active</p> <p>All bunds seeded</p> <p>Material with a high moisture content</p>
Materials Handling	Large	<p>>10 loading plant within 50 m of site boundary</p>

Activity	Magnitude	Criteria
		Transferring material of a high dust potential and/or low moisture content on dry, poorly surfaced ground
	Medium	Between 5 and 10 loading plant between 50 m and 100 m of site boundary
	Small	<5 loading plant more than 100 m of site boundary within the quarry void or clean hardstanding Transferring material of a low dust potential and/or high moisture content
On-Site Transportation	Large	>250 movements in any one day on unpaved surfaces of potentially dusty material
	Medium	Between 100 and 250 movements in any one day
	Small	Covered conveyors used for the majority of the on-site transportation of material <100 movements of vehicles per day, with surface materials of compacted aggregate <500 m in length, maximum speed of 15 mph
Mineral Processing	Large	Mobile crusher and screener with concrete batching plant on site Processing >1,000,000 tpa of material with a high dust potential and/or low moisture content e.g. hard rock
	Medium	Processing between 200,000 tpa and 1,000,000 tpa
	Small	Fixed screening plant with effective design in dust control, processing <200,000 tpa of material with a low dust potential and/or high moisture content e.g. wet sand and gravel
Stockpiles/Exposed Surfaces	Large	Stockpiles with a total exposed area >10 ha in an area exposed to high winds located <50 m of site boundary
		Daily transfer of material with a high dust material and/or low moisture content

Activity	Magnitude	Criteria
	Medium	Stockpile duration >12 months and quarry production >1,000,000 tpa
		Stockpiles with a total exposed area between 2.5ha and 10 ha located 50 m to 100 m from site boundary Stockpile duration between 1 month and 12 months
	Small	Stockpile duration <1 month with a total area <2.5 ha in an area of low wind speeds, located >100 m from the site boundary Weekly transfers of material with a low dust potential and/or high moisture content Quarry production <200,000 tpa
Off-Site Transportation	Large	Total HDV >200 movements in any one day on unsurfaced site access road >20 m in length with no HDV cleaning facilities No road sweeper available
	Medium	Between 25 and 200 HDV movements in any one day
	Small	<25 HDV movements per day Paved surfaced site access road >50 m in length Effective HDV cleaning facilities and procedures Employment of an effective road sweeper

The guidance recommends that the following additional factors should be taken into consideration when demining the source emission magnitude:

- The likely effectiveness of any control measures incorporated into the design; and
- The meteorological conditions that can either increase the likelihood of dust being raised and blown from the sit or minimise the dust.

Estimation of Pathway Effectiveness

The primary factor influencing the Pathway is the distance between the sensitive receptor and the dust sources. However other factors can cause higher or a lower category to be assigned. These factors include:

- Orientation of receptors relative to the prevailing wind direction; and
- Topography, terrain and physical features.

Table 4 provides the criteria for determining the frequency of potentially dusty winds based on 12 x 30° wind direction sectors.

TABLE 4: CATEGORISATION OF FREQUENCY OF POTENTIAL DUSTY WINDS

Frequency Category	Criteria
Infrequent	Frequency of winds (>5 m/s) from the direction of the dust source on dry days less than 5%
Moderately frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are between 5% and 12%
Frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are between 12% and 20%
Very frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are greater than 20%

Hourly meteorological data records from Sennybridge observation station over the period 2017-2021 were used in the assessment.

The criteria used to categorise the distance from each receptor to the source is provided in Table 5.

TABLE 5: CATEGORISATION OF RECEPTOR DISTANCE FROM SOURCE

Category	Criteria
Distant	Receptor is between 200 m and 400 m from the dust source
Intermediate	Receptor is between 100 m and 200 m from the dust source
Close	Receptor is less than 100 m from the dust source

The Pathway Effectiveness is categorised by combining the frequency of potentially dusty winds (Table 4) with the receptor distance from source (Table 5), as shown in Table 6

TABLE 6: PATHWAY EFFECTIVENESS

Receptor Distance Category	Frequency of Potentially Dusty Winds			
	Infrequent	Moderately Infrequent	Frequent	Very Frequent
Close	Ineffective	Moderately Effective	Highly Effective	Highly Effective
Intermediate	Ineffective	Moderately Effective	Moderately Effective	Highly Effective
Distant	Ineffective	Ineffective	Moderately Effective	Moderately Effective

Estimation of Dust Impact Risk

The residual source emission and source pathway effectiveness are combined to predict the dust impact risk at individual receptor locations, as shown in Table 7.

TABLE 7: ESTIMATION OF DUST IMPACT RISK

Pathway effectiveness	Residual Source Emissions		
	Small	Medium	High
Highly Effective Pathway	Low Risk	Medium Risk	High Risk
Moderately Effective Pathway	Negligible Risk	Low Risk	Medium Risk
Effectiveness Pathway	Negligible Risk	Negligible Risk	Low Risk

The predicted dust impact risk is considered with the sensitivity of the receptor to provide the likely magnitude of effect. Table 8 outlines the criteria for determining sensitivity to dust soiling effects and Table 9 to ecological effects.

TABLE 8: SENSITIVITIES OF PEOPLE TO DUST SOILING EFFECTS

Receptor Sensitivity	Criteria
High Sensitivity Receptor	<p>Users can reasonably expect enjoyment of a high level of amenity; or</p> <p>The appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.</p> <p>Indicative examples include dwellings, medium and long term car parks and car showrooms.</p>
Medium Sensitivity Receptor	<p>Users would expect to enjoy a reasonable level of amenity, but would not reasonable expect to enjoy the same level of amenity as in their home; or</p> <p>The appearance, aesthetics or value of their property could be diminished by soiling; or</p> <p>The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.</p> <p>Indicative examples include parks, and places of work.</p>
Low Sensitivity Receptor	<p>The enjoyment of amenity would not reasonably be expected; or</p> <p>There is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or</p>

Receptor Sensitivity	Criteria
	<p>There is transient exposure, whether people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.</p> <p>Indicative examples include playing fields, farmland (unless commercially –sensitive horticultural), footpaths, short term car parks and roads.</p>

TABLE 9: SENSITIVITIES OF PEOPLE TO ECOLOGICAL EFFECTS

Receptor Sensitivity	Criteria
High	<p>Locations with an international designation and the designated features may be affected by dust soiling</p> <p>Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List for Great Britain</p> <p>An indicative example is a Special Area of Conservation (SAC) designated for acid heathlands adjacent to a minerals development releasing alkaline dusts</p>
Medium	<p>Locations where there is a particularly important plant species where its dust sensitivity is uncertain or unknown;</p> <p>Nationally designated site and the designated features may be affected by dust deposition; or indicative examples include Sites of Special Scientific Interest (SSSIs) or a local wildlife site with very specific sensitivities.</p>
Low	<p>Locations with a local designation where the features may be affected by dust deposition.</p> <p>An indicative example is a local Nature Reserve with dust sensitive features.</p>

The likely impact at each receptor is determined from the dust impact risk in Table 7 and the receptor sensitivity in Table 8 and Table 9, as shown in Table 10.

TABLE 10: DESCRIPTORS FOR MAGNITUDE OF DUST EFFECTS

Dust Impact Risk	Receptor Sensitivity		
	Low	Medium	High
High Risk	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
Medium Risk	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
Low Risk	Negligible Effect	Negligible Effect	Slight Adverse Effect
Negligible Risk	Negligible Effect	Negligible Effect	Negligible Effect

4.1.3. Health Effects Dust Assessment

The main potential effect from mineral sites is disamenity due to deposited dust on surfaces. However, nPPG¹² states that *'if there are residential properties (or other sensitive uses) in close proximity to the source of emission (e.g., haul roads, crushers, stockpiles etc) on the mineral site, then the dust assessment study should additionally consider the concentrations of dust particles suspended in the air (PM10) that can potentially have effects on human health by considering the likelihood of PM10 exceeding the Air Quality Objectives.'*

If receptors are within 1 km from dust generating activities, it is necessary to undertake a PM₁₀ health effect assessment. The assessment involves the following steps:

- Determine the existing background ambient concentration of PM₁₀ in the vicinity of the Site. If the long-term background concentration is less than 17 µg/m³, the IAQM guidance states that *'there is little risk that the Process Contribution (PC) would lead to an exceedance of the annual mean objective.'* Impacts are considered negligible and further assessment is not required;
- If the background concentration is more than 17 µg/m³, it is necessary to estimate the estimated PC of PM₁₀ at the sensitive receptors as a result of the proposed development;
- Estimate the total predicted environmental concentration (PEC) by adding the PC and background PM₁₀ concentration;
- Compare the PEC with the annual mean objective for PM₁₀; and
- Determine the overall PM₁₀ impact on the surrounding area in accordance with the methodology outlined in the IAQM guidance Land-use Planning and Development Control: Planning for Air Quality¹³.

4.1.4. Conclusion on the Significance of Residual Dust Effects

Once separate estimates of the overall disamenity and, where required, the ecological and health effects have been derived, the IAQM guidance states *that 'a conclusion must be reached on the likely significance of the air quality effects collectively.'* The judgment will be either it is 'significant' or 'not significant'.

The PPG advises that it is necessary to consider if *'the proposed development (including mitigation) [will] lead to an unacceptable risk from air pollution, prevent sustained compliance with EU limit values or national objectives for pollutants or fail to comply with the requirements of the Habitats Regulations.'* If the outcome of the assessment is 'not significant', then no further mitigation is required, however, if the outcome is 'significant' additional mitigation will be required. Details of mitigation measures are provided in section 7.

The IAQM guidance recognises that the overall conclusion of the significance of residual dust effects requires professional judgement by a competent, suitably qualified and experienced air quality professional.

¹² Department for Communities and Local Government (2014) National Planning Policy Guidance on Assessing Environmental Impacts from Mineral Extraction, May 2016.

¹³ EPUK/IAQM (2017) Land-Use Planning & Development Control: Planning for Air Quality, January 2017

5. BASELINE ASSESSMENT

5.1. Ceredigion County Council Review and Assessment of Air Quality

CCC has carried out a number of review and assessments throughout the County and as a result has found no exceedances of the NAQOs in locations of relevant exposure.

5.1.1. Monitoring of Particulates

CCC do not undertake any monitoring of PM₁₀ within their county. However, the neighbouring authority, Pembrokeshire County Council, record PM₁₀ concentration at a rural automatic monitoring site in Narberth, approximately 36km to the south southwest. Data from the automatic monitoring site has been obtained from the Pembrokeshire 2022 Annual Progress Report (APR)¹⁴. Details of the site are provided in Table 11 below and PM₁₀ concentrations recorded at the site over the last 5 years are provided in Table 12.

TABLE 11: AUTOMATIC MONITORING SITE NARBETH - PEMBROKESHIRE

Site	Classification	OS Grid Ref	Pollutants Monitored	In AQMA	Distance to kerb of nearest road
Narberth PEMB	Rural	214374, 212774	NO ₂ , O ₃ , PM ₁₀ , PM _{2.5} , SO ₂	No	N/A

TABLE 12: ANNUAL MEAN AND 24-HOUR MEAN PM₁₀ MONITORING RESULTS

Site	Type	Distance to Kerb of Nearest Road	Year				
			2017	2018	2019	2020	2021
Annual Mean PM ₁₀							
Narberth - PEMB	R	N/A	11	12	11	10.5	10.1
24-Hour Mean PM ₁₀							
Narberth -PEMB	R	N/A	0	0	0	1	0

The data set out in Table 12 shows annual mean PM₁₀ concentrations well below the annual mean objective of 40µg/m³ since 2017.

Exceedances of the 24-hour objective have been recorded at the site. However, as the objective allows for up to 35 exceedances in any given year, the objective has not been exceeded at this monitoring location.

The data shows no consistent trend in concentrations with some years showing an increase and others a decrease.

¹⁴ Pembrokeshire County Council (2022), Pembrokeshire County Council 2022 Annual Progress Report, September 2022

5.2. DEFRA Background Maps

Additional information on estimated background pollutant concentrations has been obtained from the DEFRA 2018 background maps provided on UK-AIR, the Air Quality Information Resource (<http://uk-air.defra.gov.uk>). Estimated air pollution concentrations for PM₁₀ has been extracted from the 2018 based background pollution maps for the UK and are set out in Table 13. These maps are available in 1km by 1km grid squares and provide an estimate of concentrations between 2018 and 2030. The average concentrations for the grid square representing the Site and surrounding area (OS 220500, 248500) have been extracted from the 2023 base year and are set out in Table 13.

The data indicates that background concentrations in the vicinity of the Site are expected to comfortably meet the PM₁₀ objectives.

TABLE 13: ANNUAL MEAN BACKGROUND AIR POLLUTION CONCENTRATIONS FROM DEFRA

Pollutant	2023 Quarry Site
PM ₁₀	11.4

5.3. LAQM (TG16) Screening Assessment of Fugitive or Uncontrolled Sources

In undertaking its review and assessments, CCC has followed DEFRA technical guidance LAQM.TG (22), which outlines the process for evaluating source specific emission such as that from quarries. The guidance states that '*dust emissions from a range of fugitive and uncontrolled sources can give rise to elevated PM₁₀ concentrations, as a result of on-site activities; wind-blown dust from stockpiles and dusty surfaces and the passage of vehicles over unpaved ground and along public roads affected by dust and dirt tracked out from dusty areas.*' The methodology to screen fugitive sources of PM₁₀ requires the Local Authority to undertake a further assessment if:

- The source has been identified as of potential concern, either from dust complaints (as single verified complaint may be sufficient to trigger the need for a screening assessment), local knowledge (site inspection) or following an air quality assessment submitted as part of the planning application; and
- There is relevant exposure near the sources of emissions. The distance depends on the local background PM₁₀ concentration.

If there is relevant exposure within 200 m of the source of emissions or up to 1 km if the background PM₁₀ is greater than 28 µg/m³, the local authority is required to undertake monitoring and/or dispersion modelling.

Although there are residential properties within 250 m of a source of dust emission in the site, CCC have not designated any Air Quality Management Areas in the immediate vicinity of the quarry and no Air Quality Management Areas in relation to PM₁₀ have been declared in the county. The most recent LAQM report completed by the Council confirmed '*that there were no new industrial/fugitive or uncontrolled sources/commercial sources of significance in Ceredigion, in 2021, in accordance with the guidance.*'¹⁵

¹⁵ Ceredigion County Council (2022) Section 3.2 Ceredigion County Council, 2022 Air Quality Progress Report, October 2022

5.4. Site Characteristics

The characteristics of the proposed development and site location are summarised in Chapter 3 but is also summarised in Table 14

TABLE 14: SITE CHARACTERISTICS AND BASELINE CONDITIONS

Characteristics	Details
Extent of site including site boundary	See site location plan Figure 1: Application Site and Surrounding Area.
Existing site operation, including currently consented workings	The application area is currently agricultural grazing land but has been identified as 'mineral allocated in the LDP'. The adjacent Penparc Quarry benefits from planning permission – see section 3.2.
Scale and duration of operations, including phasing	Phase 1 – Soil stripping and bund formation Phase 2 – Mineral extraction and transportation operations Phase 3 – restoration Completion date approximately 5 years
Type and location of processing activities, including secondary processing (e.g., concrete batching)	It is proposed to extend the current sand and gravel extraction operations at Penparc Quarry by approximately 0.6 ha (Figure 1). Sand and gravel from the proposed extension will be extracted in accordance with all aspects of the existing planning permissions on the adjacent quarry and no change in operations practice would be required. Mineral would be extracted via an excavator, with transportation to the existing permitted mineral processing area situated on Site.
Mineral type and characteristics	The mineral to be extracted is sand and gravel, classed as 'soft rock' within the IAQM guidance. Wet sand and gravel have a low potential for dust generation.
Production rate	It is proposed to extract 118,000 tonnes of mineral from the site, with a further 477,000 tonnes released from the existing quarry batter slopes.
Method(s) of working	It is proposed to use an excavator in the extension to excavate the mineral.
Method(s) of material handling	The material handling equipment will include an excavator, a loading shovels, Volvo A35c dumper trucks telehandlers with attachments, McCloskey Mobile Screen Unit 2019 and mobile screens., and bowser for dust suppression.
Location(s) of storage areas and stockpiles	The peripheral bund will be constructed up to 4 metres in height and would be located between the site, or as part of existing soil bunds around the wider quarry and the footpaths CE/78/2/D and CE/78/3 which run along the eastern and southern boundaries of the Site.
Location(s) and number of access routes and haul roads	Vehicular access to the site will be off the A487. There will be no additional HGV movements to the Site.

5.5. Meteorology

Weather conditions can have a significant effect on the potential from dust propagation from a mineral site. Wind speed including direction and precipitation are of particular importance carrying dust from a source towards receptors. The areas most consistently affected by dust are influenced by prevailing winds and are generally located downwind of an emission source.

Precipitation is recognised to suppress dust and the IAQM guidance states that 0.2 mm of rainfall per day is considered sufficient to suppress windblown dust for a number of hours.

A review of 6 years meteorological data from the Sennybridge site was undertaken and the frequency of winds from the 12 sectors are set out in Table 15.

TABLE 15: SITE WIND FREQUENCY DATA

Wind Direction (°)	Total Frequency (%)	Total Frequency of Winds >5m/s
0-30 (NNE)	10	0.2
40-60 (NE)	7.5	0.7
70-90 (ENE)	4.6	0.8
100-120 (ESE)	3	0.5
130-150 (SE)	3.9	1.3
160-180 (SSE)	8.2	2.5
190-210 (SSW)	12.0	3.7
220-240 (SW)	22.4	12.1
250-270 (WSW)	11.0	2.3
280-300 (WNW)	5.1	<0.1
310-330 (NW)	6.1	<0.1
340-360 (NNW)	4.6	<0.1

5.6. Sensitive Receptors

5.6.1. Dust Amenity Sensitive Receptors

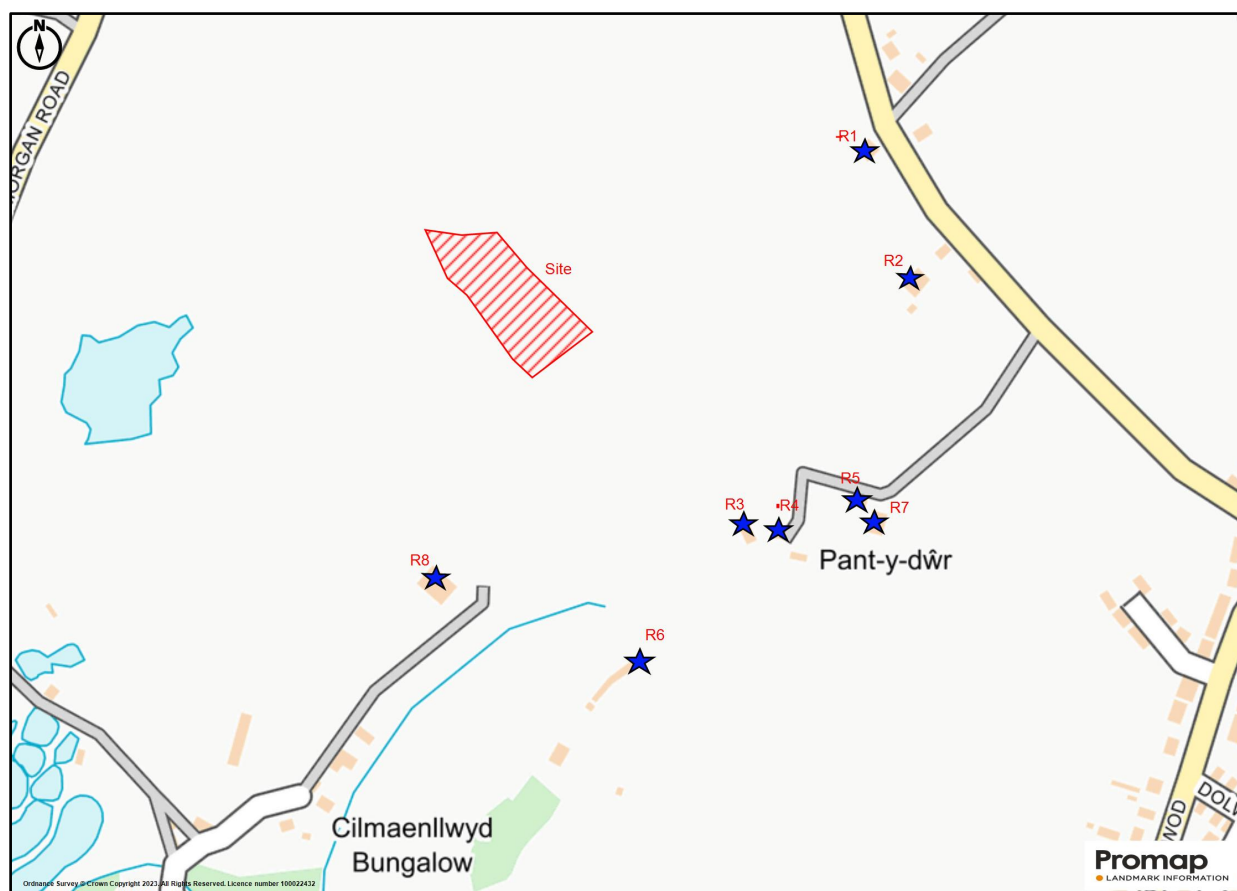
Sensitive receptors were identified from a desktop study of the area up to 250 metres from the Site boundary. The guidance categorises the dust sensitivities of different receptors to disamenity, human health and ecological effects, respectively which are the same categorisations used in the IAQM demolition and construction dust assessment guidance.

A 'human receptor' is defined in the guidance as any location where a person may experience the disamenity effects of dust, or the health effects from exposure to PM₁₀'. The sensitive receptors are detailed in Table 16 and shown in Figure 2, overleaf.

TABLE 16: SENSITIVE HUMAN RECEPTORS

Reference	Receptor Details and Location	OS Grid Ref	Distance from Source (m)	Direction from Source
R1	Brynhaf	220680, 248558	202	ENE
R2	Granny Annexe, Llain	220707, 248430	243	E
R3	Pant-y-dwr	220585, 248272	178	SSE
R4	Annexe, Pant-y-dwr	220615, 248268	204	SSE
R5	Caravan, Tresi Aur	220677, 248288	238	SE
R6	Caraven, Pantydefaid	220509, 248165	232	SSE
R7	Pantydefaid	220691, 248274	206	SE
R8	Household Waste Site	220354, 248232	136	SSW

FIGURE 2: LOCATION OF NEAREST HUMAN RECEPTORS



5.6.2. Human Health Sensitive Receptors

The IAQM guidance states that if the PM₁₀ background concentration is less than 17 µg/m³, there is little risk that emissions from a minerals site would lead to an exceedance of the annual mean objective at locations of relevant exposure. As discussed in Section 5.2, the PM₁₀ concentrations, taken from the DEFRA background maps, in the vicinity of the Site are expected to be below the relevant objective limits (Table 13).

The data indicates background concentrations in the region of 11.6 µg/m³ in the vicinity of the Site. This is below the screening threshold of 17µg/m³. The potential for PM₁₀ emissions to result in significant health effects at nearby sensitive receptors as a result of quarrying activities is therefore deemed to be negligible and health impacts have not been considered any further.

5.6.3. Ecological Receptors

Dust emissions from mineral activities are unlikely to result in significant impacts on ecologically sensitive receptors beyond 400 m from the site boundary.

A review of data held on the DEFRA MAGIC website indicates no such receptors designated within 400 m of the Site.

6. OPERATIONAL IMPACTS

6.1. Fugitive Dust Emission Assessment

The proposed extension to the quarry has the potential to cause fugitive dust emissions as a result of the excavation, processing, sorting, loading and transportation off and onto Site. Potential effects have been determined using the assessment stages set out below.

6.1.1. Screening

Dust Disamenity Sensitive Receptors

The desk study identified several dust disamenity sensitive receptors within 450 m of potential dust generating activities. Therefore, a detailed assessment of potential dust disamenity impacts is required.

PM₁₀ Human Health Sensitive Receptors

As detailed in Section 5.6.2, potential effects of PM₁₀ emissions from the development on human health are predicted to be negligible. Further assessment has therefore been screened out.

6.1.2. Estimation of Dust Risk Impact Risk

The Dust Impact Risk was determined for each of the main operational activities as detailed in Table 17.

TABLE 17: RESIDUAL DUST SOURCE EMISSIONS

Activity	Residual Source Emission	Criteria
Site Preparation and Restoration	Small	Site working area 0.6 ha < 5 heavy plant simultaneously active
Mineral Extraction	Small	Site working area <20 ha Coarse material <2000,000 tpa extraction rate
Materials Handling	Small	< loading plant Material of a low dust potential
On-site transportation	Small	<100 movements of vehicles per day Mineral will be transported from proposed extension area via an internal road on the adjacent quarry site for processing.

Mineral processing	N/A	No screening within the site. Will be transported to screening plant in south of quarry.
Stockpiles/exposed surfaces	Small	The soil from the proposed extension area will be stored as a peripheral bund around the site, or as part of existing soil bunds around the wider quarry for use in the future restoration of the site. The bund will be seeded where practicable to prevent wind blow of dust.
Off-site transportation	N/A	No additional HGV movements

6.1.3. Estimation of Pathway Effectiveness

The site-specific factors considered to determine the Effectiveness of the Pathway were the distance and direction of receptors relative to the prevailing wind directions. There are a small number of receptors within 250 m of the Site and therefore each receptor was considered separately.

For each receptor within 250 m of the site boundary, the wind direction for each was calculated. The frequencies of wind in each direction were then calculated based on meteorological data for five years from Sennybridge meteorological station. The resulting frequencies of winds greater than 5 m/s with the potential to carry airborne dust towards the receptors were then assigned to the categories in Table 4 based on 12 x 30° wind direction sectors. These are shown in Table 18.

TABLE 18: CATEGORISATION OF FREQUENCY OF POTENTIALLY DUSTY WINDS

Receptor	NGR	Wind Sector	Preposition of Time Receptor Downwind from Site (>5m/s) (%)	Frequency
R1 Brynhaf	220680, 248558	50-80 (NE-ENE)	1.5	Infrequent
R2 Granny Annexe, Llain	220707, 248430	80-100 (ENE-ESE)	1.3	Infrequent
R3 Pant-y -dwr	220585, 248272	120-150 (ESE-SE)	1.8	Infrequent
R4 Annexe, Pant-y-dwr	220615, 248268	120-150 (ESE-SE)	1.8	Infrequent
R5 Caravan, Tresi Aur	220677, 248288	100-120 (ESE)	0.5	Infrequent
R6 Caraven, Pantydefaid	220509, 248165	150-170 (SE-SSE)	3.8	Infrequent
R7 Pantydefaid	220691, 248274	100-120 (ESE)	0.5	Infrequent
R8 Household Waste Site	220354, 248232	180-210 (SSE-SSW)	6.2	Moderately Frequent

Each receptor has been categorised according to its distance from the dust source, based on criteria set out in Table 5 and is provided in Table 19.

TABLE 19: CATEGORISATION OF RECEPTOR DISTANCE FROM SOURCE

Receptor	NGR	Distance from Source m	Category
R1 Brynhaf	220680, 248558	202	Distant
R2 Granny Annexe, Llain	220707, 248430	243	Distant
R3 Pant-y -dwr	220585, 248272	178	Intermediate
R4 Annexe, Pant-y-dwr	220615, 248268	204	Distant
R5 Caravan, Tresi Aur	220677, 248288	238	Distant
R6 Caraven, Pantydefaid	220509, 248165	232	Distant
R7 Pantydefaid	220691, 248274	206	Distant
R8 Household Waste Site	220354, 248232	136	Intermediate

The pathway effectiveness has been classified using the frequency of potentially dusty winds from Table 18: Categorisation of Frequency of Potentially Dusty Winds and the receptor distance from source from Table 19 (based on criteria set out in Table 6) and is set out in Table 20.

TABLE 20: PATHWAY EFFECTIVENESS

Receptor	Pathway Effectiveness
R1 Brynhaf	Ineffective
R2 Granny Annexe, Llain	Ineffective
R3 Pant-y -dwr	Ineffective
R4 Annexe, Pant-y-dwr	Ineffective
R5 Caravan, Tresi Aur	Ineffective
R6 Caraven, Pantydefaid	Ineffective
R7 Pantydefaid	Ineffective
R8 Household Waste Site	Moderately Effective

6.1.4. Estimation of Dust Risk Impact

The Residual Source Emissions and the Pathway Effectiveness were combined to predict the Dust Impact Risk as shown in Table 21 .

TABLE 21: ESTIMATION OF DUST IMPACT RISK

Receptor	Dust Impact Risk
R1 Brynhaf	Negligible Risk
R2 Granny Annexe, Llain	Negligible Risk
R3 Pant-y -dwr	Negligible Risk
R4 Annexe, Pant-y-dwr	Negligible Risk
R5 Caravan, Tresi Aur	Negligible Risk
R6 Caraven, Pantydefaid	Negligible Risk
R7 Pantydefaid	Negligible Risk
R8 Household Waste Site	Negligible Risk

6.1.5. Estimation of Likely Magnitude of Disamenity Effects

The likely disamenity effect at each receptor has been determined based on the Dust Impact Risk (Table 21) and the Receptor Sensitivity based on criteria set out in Table 8.

All eight human receptors are considered to be High Sensitivity receptors. The adjacent designated site is considered to be a Medium Sensitive receptor.

TABLE 22: ESTIMATION OF DISAMENITY EFFECTS

Receptor	Disamenity Effect
R1 Brynhaf	Negligible Effect
R2 Granny Annexe, Llain	Negligible Effect
R3 Pant-y -dwr	Negligible Effect
R4 Annexe, Pant-y-dwr	Negligible Effect
R5 Caravan, Tresi Aur	Negligible Effect
R6 Caraven, Pantydefaid	Negligible Effect
R7 Pantydefaid	Negligible Effect
R8 Household Waste Site	Negligible Effect

Overall, there is Negligible risk of disamenity effects occurring at the nearest sensitive receptors as a result of the propose expansion of quarry activities.

7. MITIGATION

Mitigation measures may be divided into two categories:

- a) **Basic good practice mitigation measures** - these should apply to all mineral sites;
- b) **Site-specific mitigation measures** - the dust risk categories for each of the seven categories is used to define appropriate site-specific mitigation measures that should be adopted.

As the assessment has concluded a negligible risk of disamenity effects as a result of the proposed expansion no specific mitigation is considered necessary.

However, the works within the extension area will be undertaken in accordance with the mitigation plan currently in place within the wider quarry to ensure emissions are kept to a minimum and that no significant effects should occur.

8. CONCLUSION

Inacoustic Ltd was commissioned by Carter Jonas, on behalf of the Cardigan Sand and Gravel Company Limited, to carry out an air quality assessment in connection with the proposed Oernant Extension Area at Penparc Quarry, Penparc, Cardigan (the 'Site').

There would be no change in vehicle movements on the surrounding road network as a result of the proposed extension. Impacts on local air quality as a result of operational traffic emissions would therefore be negligible.

The only material that would be extracted within the extension area is sand. There is currently no waste material imported to the Site, although there is an extant permission to import inert waste for restoration, and none would be imported under the application for the Oernant Extension area. The process of sand extraction and handling of sand does not generate any odorous emissions. As this is the only material excavated there will be no odour effects associated with the proposals and any further consideration of odour has been scoped out of this assessment.

The impact of dust emissions from on-site activities has been assessed in accordance with the IAQM guidance on the assessment of mineral dust impacts.

Potential impacts in relation to human health (PM₁₀) have been screened in accordance with the IAQM guidance. Due to local PM₁₀ concentrations falling well below 17 µg/m³, impacts on human health would be negligible.

Dust emissions from on-site activities have been assessed in respect of potential disamenity effects at receptors within 400m of the site boundary and at the adjacent designated SSSI. The source-pathway-receptor approach has determined a negligible risk of effects at the nearest residential and ecological receptors.

Activities carried out within the extension area would be undertaken in accordance with the existing mitigation plan currently in place within the wider quarry to ensure emissions are kept to a minimum and no significant effects occur.

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C5 Business Centre, North Road, Bridgend Industrial Estate, Bridgend, Cymru, CF31 3TP

029 2009 8830 cymru@inacoustic.co.uk

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