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## INTRODUCTION

This chapter of the ES considers the potential air quality impacts that may arise as a result of developing the proposed extension (as set out in Chapter 3 above). In particular this chapter describes the scope, relevant legislation, assessment methodology and the baseline conditions currently existing at the quarry. It then considers any potential significant environmental effects the quarry 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.

### Scope

- 11.1 This assessment considers the impact of the small lateral extension to the working area compared to the baseline scenario (which comprises the existing operations consented under permission C16/1164/16/MW).
- 11.2 The scope of the assessment considers the baseline environment and examines the sources of dust emissions from the proposed operations and their impact on local receptors. Potential impacts at sensitive receptors in terms of exposure to dust emissions are assessed, and appropriate mitigation measures are recommended where required. The transportation of slate products has been scoped out of the EIA: as such the requirement for detailed assessment has been screened out and no further consideration is given to vehicle emissions in this assessment.
- 11.3 As noted in Chapter 4 above, the scoping opinion in relation to AQ stated that *“the environmental statement should identify all potential receptors that are most vulnerable to the effects of noise, dust, blast vibration and movement of vehicles/operation of plant machinery within the quarry ... It is considered therefore that Air Quality and Noise cannot be scoped out of the EIA and the applicant should ensure that a thorough assessment of waste tipping and ancillary development on air quality, noise is included in the ES”*.
- 11.4 Given that the proposals have been amended to exclude any changes to the quarry tips then much of the concern raised in the scoping opinion is no longer relevant; the scoping opinion considered that there was the potential for significant effects through the proximity of waste tipping operations close to receptors located in Mynydd Llandygai. In view of this, the assessment presented in the 2016 ROMP ES has been updated to reflect the proposals to extend the quarry workings.

## LEGISLATION, GUIDANCE AND INDUSTRY GOOD PRACTICE

### Air Quality Strategy

- 11.5 The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS) July 2007<sup>1</sup>. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK.
- 11.6 The AQS set standards and objectives for ten priority pollutants. The standards set are for concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. Objectives are policy targets often expressed as maximum concentrations not to be exceeded either without exception or with a limited number of exceedances within a specified timescale.
- 11.7 Many of the objectives in the AQS are made statutory in Wales within the Air Quality (Wales) Regulations 2010<sup>2</sup> for the purpose of Local Air Quality Management (LAQM).
- 11.8 The strategy objectives for the pollutants considered in this chapter are shown in Table 11-1.

**Table 11-1**  
**Relevant Air Quality Strategy Objectives (Wales)**

Pollutant	Standard	Measured as	Allowable exceedences
Particles (PM <sub>10</sub> ) (gravimetric)	40µg/m <sup>3</sup>	Annual Mean	-
	50µg/m <sup>3</sup>	24 Hour Mean	35/year
Nitrogen Dioxide	40µg/m <sup>3</sup>	Annual Mean	-
	200µg/m <sup>3</sup>	1 Hour Mean	18/year
Particles PM <sub>2.5</sub>	25 µg/m <sup>3</sup> (2020 target)	Annual Mean	-

### Planning Policy Wales (PPW) February 2021

- 11.9 As noted in chapter 5 above PPW at paragraph 5.14.42 indicated 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.*
- 11.10 Section 6.7 of PPW considers air quality and soundscape indicating at paragraph 6.7.1 that *“Clean air and an appropriate soundscape, contribute to a positive experience of place as well as being necessary for public health, amenity and well-being. They are indicators of local environmental*

<sup>1</sup> The Air Quality Strategy for England, Scotland, Wales and Northern Ireland - Defra - July 2007

<sup>2</sup> The Air Quality Standards (Wales) Regulations 2010, 2010. No. 1344 (w.126)

*quality and integral qualities of place which should be protected through preventative or proactive action through the planning system. Conversely, air, noise and light pollution can have negative effects on people, biodiversity and the resilience of ecosystems and should be reduced as far as possible”.*

## Minerals Technical Advice Note 1: Aggregates

11.11 Minerals Technical Advice Note 1 (Wales) on Aggregates sets out detailed advice on the mechanisms for delivering the policy for aggregates extraction by Mineral Planning Authorities and the aggregates industry.

11.12 MTAN1 includes guidance to ‘*reduce the impact of aggregates production*’ which includes dust (ref ‘key principle C’). The guidance describes the main sources of dust (para 72) and the main potential effects of dust and dust emissions (para 73). It continues by noting that “*Planning conditions can control certain activities to protect against dust emissions although many of these are controlled under the Environmental Protection Act 1990, and care should be taken to avoid duplication of controls...*”(ref para 76). Subject to this advice (and the similar advice in MPG14), MTAN1 suggests that planning conditions can impose:

- measurable performance requirements – the means of achieving the requirements should be left to the operator;
- an adequate and appropriate monitoring scheme of the environmental consequences of aggregates extraction;
- ameliorative measures to mitigate impacts, such as provision of wheel-wash facilities, road cleansing, speed restrictions, sheeting of vehicles;
- working programmes/site design and layout: location of dust emission sources away from sensitive development, protection of loading/unloading activities and materials storage area, and control of soil handling and overburden stripping including timing to suit weather conditions.

## Local Planning Policy

11.13 At the local level, a number of overarching policies in the Anglesey and Gwynedd Joint Local Development Plan (see Chapter 5 above) seek to protect the amenity of local communities. In particular Policy MWYN 3 states that to be acceptable, proposals for mineral working should demonstrate that “*There is no unacceptable harm to the amenity or health of local residents in terms of visual impact, levels of dust, noise, vibration, and light as a result of the operation itself or the resulting traffic movements;*”.

## General Nuisance Legislation

11.14 Part III of the Environmental Protection Act (EPA) 1990 (as amended by the Noise and Statutory Nuisance Act 1993) 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 as a

potential Statutory Nuisance 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. It also defines as a nuisance accumulation or deposit which is prejudicial to health.

- 11.15 There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist: 'nuisance' is a subjective concept and its perception is highly dependent upon the existing conditions and the change which has occurred.
- 11.16 Dust deposition is not covered within the National Air Quality Strategy as it typically relates to nuisance effects as opposed to potential health effects. When the rate of accumulation of this coarser fraction of dust is sufficiently rapid to cause fouling or discolouration then it is generally considered to introduce a nuisance. The point at which an individual perceives dust deposition as a nuisance and causes a complaint is highly subjective, and there are no statutory numerical limits that define at what level dust becomes a nuisance. However, a custom and practice limit of 200mg/m<sup>2</sup>/day is often used as a guide at which the onset of nuisance might be experienced.

## The Mineral Industry Research Organisation (MIRO)

- 11.17 A 'Good Practice Guide' issued on behalf of the Mineral Industry Research Organisation (MIRO) was released in 2011<sup>3</sup>. The purpose of the Guide is to assist in the identification, control and management of dust arising from the extractive industries.
- 11.18 The guidance provides a useful reference for available methods of mitigation and monitoring.

## EPUK / IAQM Guidance

- 11.19 Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have together published guidance<sup>4</sup> to help ensure that air quality is properly accounted for in the development control process. It clarifies when an air quality assessment should be undertaken, what it should contain, and how impacts should be described and assessed. Importantly, it sets out a recommended approach to assess the significance of impacts.
- 11.20 The guidance also states that best-practice design and operational measures should be recommended and applied to all developments that require an Air Quality Assessment, to reduce emissions and human exposure to poor air quality. Additional measures are also suggested to offset emissions, depending on the nature and scale of the development proposals.
- 11.21 IAQM has published guidance on the Assessment of Mineral Dust Impacts for Planning<sup>5</sup> to assist practitioners to undertake dust assessments for mineral sites. It provides advice on robust and good-practice approaches that can be used to assess the operational-phase dust impacts. For hard rock mineral sites, the IAQM guidance states that '*adverse dust impacts are uncommon beyond a distance of 400m from the nearest dust generating activity*'.

<sup>3</sup> Good practice guide: Control and measurement of nuisance dust and PM10 from the extractive industries. Report to The Mineral Industry Research Organisation (MIRO). February 2011. AEAT/ENV/R3140.

<sup>4</sup> Environmental Protection UK and Institute of Air Quality Management, '*Land-Use Planning and Development Control: Planning for Air Quality*', 2015.

<sup>5</sup> Environmental Protection UK and Institute of Air Quality Management, '*Guidance on the Assessment of Mineral Dust Impacts for Planning*', 2016.

## Current Planning Conditions

11.22 Condition 23 of planning permission C16/1164/16/CM states:

*“For the duration of the development the operator shall continue to monitor dust and meteorological conditions in accordance with the scheme for the control and monitoring of dust emissions approved under condition 20 of planning permission C12/0874/16/MW (Appendix 1). The dust mitigation measures set out in Table 8-10, chapter 8 of the Environmental Statement shall be further implemented. For the avoidance of doubt:*

- 1. the metrological monitoring station shall be operated and maintained in good working order for the duration of the permission to the satisfaction of the mineral planning authority*
- 2. air quality monitoring at the quarry, including metrological recording and monitoring locations shall be implemented in accordance with UK national air quality criteria for particulates to identify any need for improvements or further control. Monitoring report shall be sent to the mineral planning authority throughout the period of operation within 14 days of any written request*
- 3. environmental log of dust complaints to be made available to the mineral planning authority within 14 days of any written request. “*

## ASSESSMENT APPROACH

11.23 Dust arising from quarry operations has the potential to reduce amenity in the local community and damage sensitive ecological receptors due to visible dust plumes and soiling / deposition; these coarse dust particles are referred to as deposited dust.

11.24 Smaller dust particles can remain airborne for longer, potentially increased local ambient concentrations of suspended particulate matter (e.g. PM<sub>10</sub> and to a lesser extent PM<sub>2.5</sub>) associated with health effects. Mineral site impacts are more likely to be associated with coarse particulate matter (PM<sub>10</sub>).

11.25 The IAQM guidance assesses the impacts of both PM<sub>10</sub> and deposited dust on human and ecological receptors and presents a simple distance-based screening process to identify those mineral sites where the dust impacts are likely to be significant and require further assessment. The IAQM guidance uses PM<sub>10</sub> as the health indicator of airborne particles to be consistent with the NPPG for mineral sites.

11.26 Where a more detailed assessment is required, a basic assessment framework is presented which employs the Source – Pathway – Receptor approach to evaluate the risk of dust impacts and effects which incorporates the following elements:

## Air Quality Significance Criteria

11.27 The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 require ‘a description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development’. This has

resulted in the use of *descriptors* for the purposes of summarising impacts. The assessment of significance for dust impacts is undertaken qualitatively and the criteria applied can be 'Insignificant', 'Adverse' or 'Beneficial'. The magnitude will be judged as 'Slight', 'Moderate', 'Substantial', or 'Very Substantial'.

## BASELINE CONDITIONS

### Existing Air Quality

#### *Local Review and Assessment of Air Quality*

- 11.28 Penrhyn Quarry is situated within the administrative area of Gwynedd Council (GC). The Council is required to review and assess their air quality under the Environment Act 1995.
- 11.29 Gwynedd Council have declared no air quality management areas within their area.
- 11.30 As noted in the 2016 ROMP ES, PM<sub>10</sub> and PM<sub>2.5</sub> monitoring has historically been undertaken at Llwybr Main in Mynydd Llandegai. However, the most recent data set available is for 2013 after which monitoring ceased at this location. This data, which is somewhat dated now, showed PM<sub>10</sub> to range from 12.16. µg/m<sup>3</sup> to 15.5 µg/m<sup>3</sup> and PM<sub>2.5</sub> to range between 3.97 µg/m<sup>3</sup> and 6.32 µg/m<sup>3</sup>.
- 11.31 The closest automatic monitor for PM<sub>10</sub> and PM<sub>2.5</sub> that is currently in use is located 12.8km north-west and as such is not considered relevant to the locale of the quarry.

#### *Site Monitoring Data*

- 11.32 As part of planning permissions C12/0874/16/MW a dust monitoring scheme was developed and implemented in vicinity of the quarry. This comprised 12-months of dust deposition monitoring at a location 1km from the Site during 2013 / 2014. Dust deposition rates ranged from 0.7 to 16.8 mg/m<sup>2</sup>/day. The site undertakes particulate matter monitoring onsite using a Turnkey dust monitor located close to the Quarry Managers office. The monitor is set to log concentrations for Total Particulate, PM<sub>10</sub> and PM<sub>2.5</sub> every 15 minutes. Onsite particulate matter monitoring results were presented in Table 8-5 of the 2016 ROMP ES and showed concentration being 'well below' the AQO. In this respect, PM<sub>10</sub> concentrations ranged from 9.9 µg/m<sup>3</sup> to 13.4 µg/m<sup>3</sup> in 2014 and 2015. Subsequent data shows that the PM<sub>10</sub> concentrations ranged from 9.3 µg/m<sup>3</sup> to 12.4 µg/m<sup>3</sup>. It has however, been noted that data capture at this site since 2015 is consistently below 75% and is therefore viewed with caution.

#### *Air Quality Background Maps*

- 11.33 Defra provides background values for concentrations on a 1km x 1km resolution based upon 2018 values and projected forward. They also provide a breakdown of the relative contributions of various sources for PM<sub>10</sub> and PM<sub>2.5</sub>.
- 11.34 The maximum background particulate matter concentrations for the area of Penrhyn Quarry are a maximum based on the 1km grid squares that includes the site. These background values are presented below in Table 11-2.

**Table 11-2**  
**2021 PM Background Concentrations ( $\mu\text{g}/\text{m}^3$ )**

Parameter	PM <sub>10</sub>	PM <sub>2.5</sub>
<b>Total 2021</b>	11.313	6.694
Motorway	0.000	0.000
Trunk A Rd	0.001	0.001
Primary A Rd	0.000	0.000
Minor Rd	0.001	0.001
Brake & Tyre	0.005	0.003
Road Abrasion	0.003	0.001
Industry	0.599	0.512
Domestic	0.035	0.035
Rail	0.000	0.000
Other	0.001	0.001
PM secondary	4.237	3.662
Residual & Salt	6.060	2.129
<b>Point Sources</b>	<b>0.002</b>	<b>0.002</b>

Based on maximum of grid squares (261500,363500)(261500,364500)(261500,365500)(262500,365500)(262500,364500)

- 11.35 From Table 11-2 it can be seen that existing air quality in terms of PM<sub>10</sub> is considered to be good, with concentrations ‘well below’ the annual objective of 40 $\mu\text{g}/\text{m}^3$  and PM<sub>2.5</sub> well below the objective of 25 $\mu\text{g}/\text{m}^3$ .

### Complaints

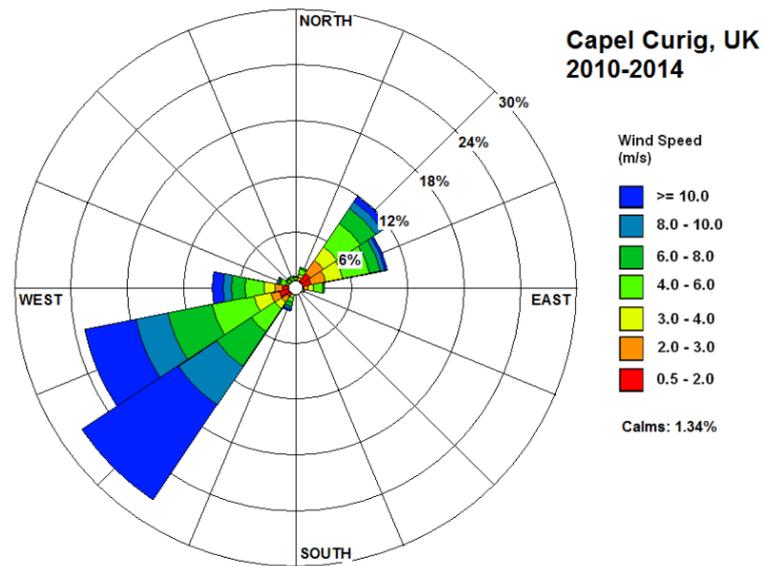
- 11.36 It is understood the last complaint received by the applicant in relation to the operation of the quarry was in March 2012 due to visible dust emissions from the quarry. This was not substantiated as wind speed and direction were not within the direction of the complainant.

## Meteorology – Dispersion of Emissions

For all sources, the creation and subsequent dispersion of dust would be highly dependent on the weather conditions. Wind speed can determine the amount of dust raised, while wind direction determines those areas that may be affected. Higher wind speed increases the potential for the generation of airborne dust due to the suspension and entrainment of particles in airflow; rainfall however, has a suppressive effect on the generation of dust.

### Local Wind Speed and Direction Data

- 11.37 A windrose for the average conditions recorded at Capel Curig located 15km to the east of the Mining Site over a five-year period is presented below in Figure 11-1. It can be seen there is a large south westerly prevailing wind with very few winds from the south east or north west. The south westerly winds are strong with a large proportion greater than 10m/s.



**Figure 11-1**  
**Windrose for Capel Curig Meteorological Station**

### Rainfall Data

11.38 Relevant rainfall data applicable to the site has been obtained from the Meteorological Office website of UK mapped climate averages for 1981-2010. The average annual rainfall >0.2mm/day for the area of the site is 220-240 days per year, comprising 55% of the year.

## Dust Sensitive Receptors

### Human Receptors

- 11.39 A human receptor refers to any location where a person may experience the dis-amenity effects of dust or the health effects from exposure to pollutants over a period of time relevant to the air quality objectives, as defined in the Governments technical guidance for Local Air Quality Management.
- 11.40 Types of locations with a high sensitivity to dust deposition include residential dwellings, vehicle show rooms, food and electronic manufacturers. The sensitivity relates to the level of amenity that can be reasonably expected, with dwellings and schools being more sensitive than industrial units or farms for example.
- 11.41 The village of Bethesda is located to the north of Penrhyn Quarry, with the proposed extension being over 2.7km from the southern edge of the settlement; the northern edge of the extant working area (in the South Quarry, now the main quarry tip) is slightly closer, at 1.5km. The settlement of Mynedd Llyandegai is located around 1.2km from the proposed extension (measured from the end of Gefnan), but the existing working area is closer at 850m. There are no receptors within 400m of the proposed extension.

- 11.42 Referring to the 2016 ROMP ES (Table 8-8) ten receptors were identified around the quarry. In accordance with the IAQM guidance, a selection of representative receptors within a distance of 400m of both extant and proposed operations have been selected for further assessment with regard to potential deposited dust impacts.
- 11.43 The distances and directions of identified receptors from the boundary of the quarry and the proposed extension are detailed in Table 11-3 and are illustrated in **Figure 11-2**.

**Table 11-3**  
**Identified Sensitive Receptors**

Ref No.	Receptor	Location	Distance to Site Boundary (m)	Distance to Extension (m)	Direction from Quarry	Direction from Extension
R7	Weirglodd	261346, 365751	60	1,770	West	North
R8	Tan-y-bryn	261231 , 365287	80	1,290	West	North
R9	14 Gefnan	260930, 365190	360	1,180	West	North

### *Ecological Receptors*

- 11.44 A search of national and international designated sites within 2km of the Mining Site identified Eryri SSSI and Eryri/Snowdonia Special Area of Conservation (SAC) at the boundary of the Mining Site. The Eryri/Snowdonia SAC covers an area of approximately 19,738ha and primarily consists of Bog, Marsh, Dry Grassland and Scree ecosystems.

## **ASSESSMENT OF EFFECTS AND SIGNIFICANCE**

### **Dust Emissions**

- 11.45 The operations within the proposed extension and their potential to generate dust emissions in the absence of mitigation measures are presented in Table 11-4. During the life of the quarry, operations will continue as existing and therefore the sources of dust are not considered to change.
- 11.46 A detailed overview of operations to be carried out as part of this planning application are detailed in Chapter 3 of this volume. In summary, overburden and soil stripping within the extension is undertaken in advance of one years working of slate. Extraction of material is currently undertaken with the southern quarry in benches progressing in a southerly direction. All surplus materials including boulder clay, weathered slate and surplus slate would continue to be taken to tip; either the main tip located within the northern part of the southern quarry or on the north western edge of the South Quarry.
- 11.47 The amount of dust generated by each activity depends on the size of particles and, crucially, upon their moisture content.
- 11.48 The majority of extraction would be undertaken below the height of the surrounding land level and therefore the working face provides a physical barrier to dust movement, by reducing wind speeds and encourage deposition.

11.49 It is considered the operations with the greatest risk of dust generation are from:

- internal vehicle movements, primarily due to re-suspension of loose material on the road surface and erosion of the haul road. Particulate emissions have been found to be higher at greater vehicular speeds<sup>6</sup> and greater vehicle weight<sup>7</sup>;
- handling of material, including unloading of dumpers at the tips (but depends on the timing of operations with respect to meteorological conditions and the characteristics of the material being handled). Unloading of dumpers at the main quarry tip would be screened by the existing tips/topography to a greater extent; and
- soil and overburden removal, considered to be potentially significant<sup>13</sup> but temporary and would vary considerably from day to day, depending on the level of activity, the specific operation, the location of the activity and the prevailing meteorological conditions.

11.50 Generally, the potential for future dust generation associated with the continuation of quarrying is considered to remain unchanged.

**Table 11-4**  
**Potential Dust Sources**

Activity	Potential for Dust Generation (/compared to baseline)	Location
Excavation	Low / Unchanged Operations do not come any closer to properties than currently permitted. Potentially reduced as operations are undertaken at greater depth within the quarry void. Excavation rates and methods of extraction to continue as per consented baseline	Within Southern Quarry moving further south
Blasting	Low / Unchanged Operations do not come any closer to properties than currently permitted. Potentially reduced as operations are undertaken at greater depth within the quarry void	Within Southern Quarry moving further south
Soil and Overburden Removal (including restoration)	Moderate/ Unchanged Temporary, intermittent operation.	Within excavation area and quarry tip
Waste Tipping	Moderate / Unchanged No change to the final profile of the tips and thus no change to the approved scheme. Product storage not considered to change.	Within existing waste tip
Transport – Unpaved internal haulage routes	Low Distance to extraction area increasing as working face moves further south	Haulage routes

<sup>6</sup> Williams, D.S et al., 2008. Particulate matter emissions by a vehicle running on unpaved roads. Atmospheric Environment (2008), doi:10.1016/j.atmosenv.2008.02.003

<sup>7</sup> Gillies, J.A et al. (2004) Effect of Road Vehicle Characteristics on unpaved road dust emissions. Atmospheric Environment (2005) doi:10.1016/j.atmosenv.2004.05.064

## Risk of Impacts

### PM<sub>10</sub>

- 11.51 The IAQM guidance states that if the PM<sub>10</sub> background concentration is less than 17µg/m<sup>3</sup> it is considered unlikely that any process contribution from the development proposals would lead to an exceedance of the annual objective. On the basis of the background concentration (2021) predicted to be a maximum of 11.3µg/m<sup>3</sup>, further assessment of the potential process contribution from the proposed operations have not been undertaken.
- 11.52 The exposure would also be below the benchmark value of 32µg/m<sup>3</sup>, the value provided in LAQM.TG(16) as an indication of the relationship between annual mean concentrations and the risk of the daily PM<sub>10</sub> objective being exceeded. On this basis, the impact on the 24-hour AQO is also considered to be 'not significant'.

### Deposited Dust

- 11.53 The vast majority of particles responsible for annoyance are deposited within 100m – 200m of the source<sup>8</sup>, and hence it is in this zone that the risk of problems from dust is greatest. Coarse dusts (for example greater than 30µm in diameter) will largely deposit within 100m of the source. As per the IAQM guidance, adverse dust impacts from hard rock quarries are uncommon beyond 400m.
- 11.54 The closest receptors to the areas associated with the proposed operations (lateral extension) are those located to the north-west of the site in the village of Mynydd Llandegai. There is a strong prevailing wind from the south-west and therefore receptors to the north-east are considered to be at the greatest risk of impact.
- 11.55 On the basis that all receptors are in excess of 1km from the proposed extension, there is considered to be no significant increase in the potential for dust emissions associated with the proposed extension, providing existing dust control measures are continued. On this basis the potential deposited dust impacts from the proposed extension is considered to be 'not significant'.

### Ecological Receptors

- 11.56 The majority of the research undertaken has focussed on the chemical effects of alkaline dusts. A summary of a review of available research on behalf of the DETR<sup>9</sup> concluded that:
- 'the issue of dust on ecological receptors is largely confined to the associated chemical effect of dust, and particularly the effect of acidic or alkaline dust influencing vegetation through soils.'*
- 11.57 Potential dust generated by operations within the quarry workings is not considered to be significantly alkaline or acidic, or at a significant risk of becoming airborne. Penrhyn Quarry has a

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<sup>8</sup> Based upon research document - DETR, The Environmental Effects of Dust from Surface Mineral Workings (Dec 1995)

<sup>9</sup> Department of the Environment, Transport and the Regions (DETR) 1995: *The Environmental Effects of Dust from Surface Mineral Workings – Volume Two*.

long history of quarrying, and, therefore nearby designated sites have potentially been exposed to dust emissions for a significant period of time. The nearest units of the SAC to the quarry (Unit 50 and Unit 70) have been assessed as requiring no action in terms of management requirements<sup>10</sup>. Unit 50 is downwind of extraction operations. This unit is described as having '*montane heath with a good population of Salix herbacea.*' Conservation management issues associated with this unit are described as: '*it is important that grazing does not damage this habitat*'

- 11.58 With regard to dust deposition an Interim Advice Note (IAN) prepared as a supplement for Volume 11, Section 3, part 1 of the Design Manual for Roads and Bridges (and now incorporated into HA207/07<sup>11</sup>) suggests that only dust deposition levels above 1,000 mg/m<sup>2</sup>/day are likely to affect sensitive ecological receptors. This level of dust deposition is approximately five times greater than the level at which most dust deposition may start to cause a perceptible nuisance to humans. It states that most species appear to be unaffected until dust deposition rates are at levels considerably higher than this<sup>12</sup>. The operations closest to the SAC/SSSI are the extraction operations and soil and overburden removal. Dust emissions from extraction is considered to remain unchanged and therefore do not represent an increase in the potential for dust impact compared to existing operations. Soil and overburden removal would be required from time to time within the lifetime of the development (which has also been undertaken many times historically) and is a temporary short term operation. Dust emissions are not considered to increase with continuation of quarrying and therefore levels of dust deposition or impacts on the Eryri/Snowdonia SAC are not considered to increase. With the continued implementation of mitigation measures the impact is not considered to be significant.

## MITIGATION MEASURES

- 11.59 Operations undertaken in closest proximity to receptors include the internal haul roads (which are part of the extant operations). Monitoring results and complaints record indicate existing mitigation measures onsite are effective. The risk of impact at receptors is considered to be unchanged with an insignificant risk of impact. Focusing mitigation measures on those closest operations to receptors would have the greatest efficacy in reducing dust impact. Mitigation measures are defined on the basis of industry good practice guidance in accordance with IAQM Guidance, MIRO and MTAN 1 and those undertaken onsite.

### Excavation, Blasting and Material Handling

- 11.60 Mitigation measures for excavation and material handling activities include the use of additional water suppressants in the event of dry and windy weather.
- 11.61 Drill rigs used for drilling holes for explosives are fitted with dust collectors/shrouds. This ensures that drilling is undertaken by an air flushed drilling rig which is fitted with a fabric filter bag which removes dust from the air venting from the drilling rig. All filtered dust is then removed from the area prior to blasting. This in combination with avoiding blasting under unfavourable conditions is

<sup>10</sup> Countryside Council for Wales. Core Management Plan for Eryri SAC. 2008

<sup>11</sup> Design Manual for Roads and Bridges. Volume 11, Section 3. Part 1 HA207/07. Annex F.

<sup>12</sup> Guidance for Undertaking Environmental Assessment of Air Quality for Sensitive Ecosystems in Internationally Designated Nature Conservation Sites and SSSI's (Supplement to DMRB 11.3.1), Interim Advice Note 61/04, March 2005

considered to be highly<sup>13</sup> effective. Mobile plant is regularly serviced and equipped with effective exhausts to minimise fume emissions.

- 11.62 The potential for dust emissions during extraction and removal of material from historic waste tips are ameliorated by ensuring drop heights are minimised wherever practicable and that double handling of material is avoided where possible. This extends to all material handling operations. Drop heights can be minimised by matching shovel and dump truck such that the excavator is not physically too big to work with the chosen dump trucks. The correct matching of machines also helps to prevent overloading of dump trucks and hence prevents spillage on haul routes, which is an important source of loose material for potential dust emissions. Loading and unloading of material from the historic waste tips are screened by the peripheral tips and thus relatively sheltered.
- 11.63 This combined with using water sprays when required is considered to be moderately<sup>27</sup> effective at reducing dust emissions.

## Soil Stripping and Overburden Removal and Restoration

- 11.64 The removal of soil and overburden is undertaken in advance of working. This is undertaken in strips, to minimise the extent of exposed surfaces.
- 11.65 With respect to the short term operations involved in the stripping of soils and overburden and restoration works, the two primary control measures considered to have maximum effectiveness are wet suppression and wind speed reduction. Wet suppression methods are applied as required through the watering of the area being worked upon and the subsequent watering during material handling, such as the loading and unloading operations into dump trucks. Handling of soils during adverse weather conditions for dust generation is avoided. Timing should be optimised regarding weather and seeding season. Should operations generate dust emissions which are viewed to go over the site boundary operations cease. The duration of soil stripping and restoration is reduced where possible.

## Haulage Routes

- 11.66 The techniques that are employed to control dust emissions from unpaved haulage roads fall into two groups; vehicle restrictions and surface treatments.
- 11.67 Vehicle restrictions are in place on site such as speed restrictions on vehicles transporting materials around the site. Such traffic controls are expected to generate a moderate reduction in dust emissions<sup>26</sup> compared to no action being taken.
- 11.68 The primary control measures are the surface treatment of the haul roads through the use of watering if required. Watering effectively increases the moisture content of the road surface, thus conglomerating particles and reducing their likelihood to become suspended during the passage of

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<sup>13</sup> AEA The Mineral Industry Research Organisation (MIRO) Good practice guide: control and measurement of nuisance dust and PM10 from the extractive industries. February 2011

vehicles. Maintenance of haul roads by grading also minimises dust emissions due to less erosion of the haul road by passing vehicles.

- 11.69 The effectiveness of watering has been documented to have the capability of reducing dust emissions by over 90%<sup>14</sup>, depending on factors such as the amount of water added during each application, the period of time between applications and the metrological conditions that affect evaporation.

## Restoration

- 11.70 Weather conditions should be used as a factor in the timing of restoration operations, ensuring activities with a high potential for dust emissions such as handling soils and waste materials are not undertaken during high wind speeds. In accordance with conventional practices of soil and overburden handling, the soils would not be moved in extreme wet or dry conditions, in order to avoid damage to the soil structure by smearing or compaction. Double handling of material and drop heights should be minimised where possible.

## Management

- 11.71 The success of dust control measures is dependent on the awareness of site personnel and their willingness to promptly apply these actions when necessary.
- 11.72 There will be a trained and responsible site supervisor / manager on site during working hours to ensure dust emissions are under control. Responsibilities are allocated to specific personnel to ensure dust generation are effectively controlled.
- 11.73 All personnel on site understand their responsibility to ensure the generation of dust emissions are minimised. Each employee is made aware of the importance of dust control and the most effective measures available to minimise such emissions.
- 11.74 Visual assessment of emissions shall be made frequently, with inspections on a daily basis as a minimum whilst the quarry is active.

## Mitigation Measures Summary

- 11.75 The mitigation measures in Table 11-5 outline those that are currently employed on site and would continue to be employed across the proposed extension. These measures are considered to be effective at reducing nuisance and particulate dust emissions, as required by planning conditions, permit and best practice are presented

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<sup>14</sup> Environment Effects of Surface Mineral Workings. DoE, October 1995

**Table 11-5**  
**Summary of Dust Control Measures and Estimate of Effectiveness**

Site Operation	Dust Control Measures	Estimate of Effectiveness
<b>Mineral Extraction/ Handling:</b>	Use of water sprays as and when necessary	High
	Vehicles not overloaded and reduction of drop heights	Moderate
	Use of dust suppression on drill rigs and removal of fine material prior to blasting	High
	Avoid double handling of material	Moderate/Low
<b>Topsoil/overburden removal, storage and Restoration</b>	Water sprays to be used as required	Low
	Minimise the duration of activity	High/Moderate
	Avoid soils handling during adverse weather conditions	High
	Optimise timing regarding weather and seeding season. Seed as soon as possible	High
	Soil bunds & mounds profiled to minimise wind blown dust	Moderate
	Temporary cessation of activities in the event of unacceptable dust emissions in the vicinity of receptor properties	High
<b>Unpaved Haul Roads</b>	Controlled use of fixed haul routes	Moderate/High
	Haul routes to be regularly maintained by grading to minimise dust generation	High
	Speed controls to be implemented and enforced on all haul routes	Moderate
	Water bowsers to be used as required	High
	Mobile plant exhausts will discharge above the horizontal	Moderate

## RESIDUAL EFFECTS

11.76 It is considered that with the mitigation measures effectively employed, the dust impact as a result of the proposed development on surrounding receptors is considered to be insignificant or acceptable.

## CUMULATIVE EFFECTS

11.77 The vast majority of emissions of dust from the operations (extraction, tipping and associated haulage) would be deposited within 100m of the source<sup>15</sup>, although particles of between >10µm and <30µm may travel 250m to 500m. As such the potential for cumulative dust impacts to occur are limited given the lack of other potential sources and limited number of receptors. The assessment has determined that there would not be any significant air quality effects as a result of the proposals.

## CONCLUSIONS

11.78 This assessment has considered the potential air quality effects of extending Penrhyn Quarry. The assessment has considered the relevant legislation, baseline conditions, activities associated with the site including haulage, excavation activities, tipping of mineral waste material and restoration

<sup>15</sup> Based upon research document - DETR, The Environmental Effects of Dust from Surface Mineral Workings (Dec 1995)

of the site. It should be noted that a comprehensive assessment of the effects on air quality for the whole of the quarry (including ancillary operations) was undertaken in 2016 as part of a review under the Environment Act 1995.

- 11.79 The potential impacts of the development have been assessed in terms of potential emissions of particulates (dust). Two assessments have been undertaken; the first to assess the PM<sub>10</sub> fraction for which Air Quality Standards exist, and the second to assess the coarse fraction dust which is typically associated with amenity issues.
- 11.80 An assessment of PM<sub>10</sub> and PM<sub>2.5</sub> was completed following guidance within LAQM.TG(16) considering background particulate matter levels and distance to receptors. Background levels are 'well below' the limit. The proposed development of the extension is not considered to lead to a significant increase in PM<sub>10</sub> and PM<sub>2.5</sub> emissions which would lead to an exceedance of the Air Quality Objective.
- 11.81 A qualitative assessment of deposited dust was undertaken which identified the potential additional sources of dust onsite. The risk of dust impact at residential receptors was assessed as insignificant considering the distance to onsite operations and frequency of exposure. The potential for dust impacts on the surrounding ecological sites is considered to be not significant.
- 11.82 With the continued implementation of mitigation measures undertaken onsite in accordance with best practice, and as required by the current planning conditions, the residual impact is considered to be acceptable or insignificant.
- 11.83 All potential dust impacts from the proposed development are considered to be reversible i.e. the risk of impact will cease on completion of the extraction and restoration activities at the site, with no significant impacts on local air quality on the completion of the development.