# Denbigh Quarry

## Quarry Extension - Noise Assessment

### Breedon Trading Ltd

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# 1.0 Noise

## Introduction

1.1 This chapter of the ES addendum considers the potential for an extension at Denbigh Quarry to impact upon the noise environment in the vicinity of the proposed site. This chapter describes the scope, relevant legislation, assessment methodology, and the baseline conditions existing at the site and their surroundings. It considers any potential significant environmental effects the proposed development would have on this baseline environment; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed. A cumulative assessment of existing operations alongside the proposed operations has also been undertaken.

## Methodology

1.2 This assessment considers the potential impact of operational noise resultant from the proposed development upon nearby existing sensitive receptors. It has been completed in accordance with the legislation and guidance detailed in the following sections of this chapter.

### Legislation and Planning Policy Guidance – Noise

#### The Guidelines for Environmental Noise Impact Assessment

1.3 This assessment has been conducted in accordance with The Guidelines for Environmental Noise Impact Assessment, produced by the Institute of Environmental Management and Assessment, and published in October 2014.

1.4 The guidelines address the key principles of noise impact assessment and are applicable to all development proposals where noise effects are likely to occur. The guidelines provide specific support on how noise impact assessments fit within the Environmental Impact Assessment (EIA) process. They cover:

- How to scope a noise assessment.
- Issues to be considered when defining the baseline noise environment.
- Prediction of changes in noise levels as a result of implementing development proposals.
- Definition and evaluation of the significance of the effect of changes in noise levels.

1.5 The guidelines offer advice on how to establish the baseline noise level and suggest that “it is good practice to measure over short time periods even though the required assessment indictor is to be averaged over a longer period”.

1.6 The guidelines also state that monitoring should be avoided when the wind speed exceeds 5 $ms^{-1}$, unusual temperature conditions, or when there is significant precipitation unless these are normal conditions for the area.

1.7 In terms of cumulative effects, these are defined as:

*"those that result from additive impacts caused by other past, present or reasonably foreseeable actions together with the plan, programme or project itself and synergistic effects (in combination) which arise from the reaction between impacts of a development plan, programme or project on different aspects of the environment."*

## Planning Policy Wales

1.8 Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. PPW, the TANs, MTANs and policy clarification letters comprise national planning policy.

1.9 PPW advises that development plans should set out the criteria that will be applied to minerals proposals to ensure that they do not have an unacceptable adverse impact on the environment and the amenity of nearby residents, including noise in terms of limits.

## Minerals Technical Advice Note (Wales) 1: Aggregates

1.10 Minerals Technical Advice Note (Wales) 1: Aggregates (MTAN1) provides the latest advice on planning controls and good practice methods for minerals extraction sites in Wales. It also provides guidance on keeping noise emissions from mineral extraction sites to acceptable levels including advice on noise level limits for various operational stages on mineral developments during specific times of the day.

1.11 The guidance suggests that operators should take all reasonable steps, through the use of BATNEEC (best available techniques not entailing excessive cost), to minimise noise emissions and maintain the highest possible environmental standards.

1.12 In paragraph 88 of the guidance, MTAN1 states:

*"Noise limits should relate to the background noise levels, subject to a maximum daytime noise limit of 55 dB(A) where background noise levels exceed 45 dB(A). 55 dB(A) is the lower limit of the daytime noise level where serious annoyance is caused. Where background noise is less than 45 dB(A), noise limits should be defined as background noise levels plus 10 dB(A). Night-time working limits*

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

## British Standard 5228-1:2009+A1:2014

1.13 Operational noise levels have been calculated in accordance with BS5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise. This standard sets out a methodology for predicting noise levels arising from a wide variety of open site activities and contains tables of sound power levels generated by a wide variety of mobile and fixed plant equipment.

1.14 Noise levels generated by open site operations and experienced at local receptors will depend upon several variables, the most significant of which are likely to be:

- The amount of noise generated by plant and equipment being used at the development site, generally expressed as a sound power level.
- The periods of operation of the plant at the development site, known as the "on-time".
- The distance between the noise source and the receptor, known as the "stand-off".
- The attenuation due to ground absorption or barrier screening effects.
- Reflections of noise due to the presence of hard vertical faces such as walls.

## Denbighshire County Council Local Development Plan

1.15 The Denbighshire County Council Local Development Plan was adopted in June 2013 and has been consulted to determine the Council's approach to noise associated with mineral extraction sites. Policy PSE 17 – Future mineral extraction states:

*"Applications for the extraction of aggregate minerals will only be permitted where it is necessary to maintain stocks of permitted reserves having regard to the Regional Aggregate Working Party apportionment figures, or, where no figure exists, the demonstrated need of the industry concerned."*

*"Applications for the extraction of up to 1 million tonnes of sand and gravel will be permitted in Preferred Areas (identified on the proposals maps); taking into account the above criteria."*

*"Applications that accord with the above criteria will be permitted provided that all the following criteria are met:*

- *An appropriate buffer is included, within which no mineral working, or sensitive development will be allowed;*
- *Noise is kept to an acceptable level;*
- *Suitable blasting controls are implemented;"*

1.16 The Policy then goes on to reference Planning Policy Wales: Minerals Planning Policy Wales and Technical Advice Notes Minerals Technical Advice Note 1: Aggregates.

## Scoping Assessment

1.17 SLR submitted a formal scoping request to Denbighshire County Council (DCC) via Flintshire County Council (FCC). In this correspondence it was stated that an updated Noise Impact Assessment (NIA) would include:

- An updated baseline sound survey, which will consist of measuring baseline sound levels for a period of at least 1-hour at each of the identified Noise Sensitive Receptors (NSR's) located closest to the Site. It was outlined that the survey would be completed at six locations representative of the closest NSR's and the survey would be undertaken over a minimum 96-hour period to include a weekend at times where the existing quarry is not operating.
- A list of operational plant for each phase of the development.
- An assessment of operations being undertaken simultaneously (existing and proposed).
- An assessment of the importation of inert materials for restoration and associated restoration operations.

1.18 A response to the scoping, which was emailed on 9th June 2023, has not yet been received, however the assessment has been undertaken in response to comments received from DCC on the original Noise and Vibration Assessment undertaken by Pleydell Smithyman Limited in February 2022. This updated NIA takes into account the comments from DCC in the absence of a scoping response.

## Significance Criteria

1.19 The Guidelines for Environmental Noise Impact Assessment address the key principles of noise impact assessment and are applicable to all development proposals where noise effects are likely to occur. In accordance with the guidelines the following must be determined:

- the noise impacts;
- the noise effects; and
- the significance of the effects.

### Operational Impact

1.20 The impact of operational noise upon residential receptors is determined with reference to MTAN1.

1.21 In accordance with MTAN1:

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

1.22 Based on the above, the impact magnitude of operational noise upon residential receptors has been detailed in Table 1.1.

**Table 1.1: Operational Noise at Residential Receptors – Impact Magnitude**

| Magnitude | Description |
|---|---|
| Major | Limit value exceeded by more than 5dB |
| Moderate | Limit value exceeded between 3.0 and 4.9dB |
| Minor | Limit value exceeded between 1.0 and 2.9dB |
| Negligible | Limit value exceeded between 0.1 and 0.9dB |
| None | Limit value not exceeded |

## Effect

1.23 Generic noise effects are detailed in Table 1.2 from the guidelines. Where an adverse impact is identified, the guidelines present the following generic relationship between noise impact and noise effect:

- Negligible Impact Noise Effect: *"Noise impacts can be heard, but do not cause any change in behaviour or attitude, e.g. turning up volume on television; speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is perceived change in the quality of life";*
- Minor Impact Noise Effect: *"Noise impact can be heard and causes small changes in behaviour and/ or attitude, e.g. turning up volume of television; speaking more loudly; closing windows. Potential for non-awakening sleep disturbance. Affects the character of the area such that there is a perceived change in the quality of life"*;
- Moderate Impact Noise Effect: *"Causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in character of the area"*; and

- Major Impact Noise Effect: *"Significant changes in behaviour and/or inability to mitigate effect of noise leading to psychological stress or physiological effects e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory".*

### The Significance of the Effect

1.24 The significance of the noise effect will depend on the receptor type and its sensitivity to the noise impact. The sensitivity of the receiving environment is shown in Table 1.2

**Table 1.2: Sensitivity Criteria for Acoustic Receptors**

| Sensitivity | Description |
|---|---|
| Very High | Residential properties (night-time), Schools and healthcare building (daytime) |
| High | Residential properties (daytime), Special Areas of Conservation, Special Protection Areas, Sites of Special Scientific Interest (or similar areas of special interest) |
| Medium | Offices and other non-noise producing employment areas |
| Low | Industrial areas |

1.25 The sensitivity of the receiving environment together with the magnitude of impact defines the level of effect as shown in Table 1.3.

**Table 1.3: Level of Effect Matrix**

| Magnitude | Sensitivity | | | |
|---|---|---|---|---|
| | Very High | High | Medium | Low |
| Major | Major | Major | Major | Moderate |
| Moderate | Major | Moderate | Moderate | Minor |
| Minor | Moderate | Minor | Minor | Negligible |
| Negligible | Negligible | Negligible | Negligible | Negligible |
| None | None | None | None | None |

## Site Description

1.26 The proposed development is situated in Denbigh, north Wales, located approximately 568m north of Denbigh Town Centre.

1.27 There are a number of existing NSR's which surround the Proposed Development which are illustrated on Figure 1.1

**Figure 1.1: Existing Noise Sensitive Receptor Locations**


## Baseline Conditions

### Baseline Sound Environment

1.28 Baseline sound monitoring locations were identified to establish baseline conditions at the nearest noise sensitive properties to the proposed extension. The monitoring locations, respective receptor locations and the indicative red line boundary for the proposed extension are shown in Figure 1.2.

**Figure 1.2: Baseline Sound Monitoring Locations**


1.29 The sound monitoring equipment used during the survey is detailed in Appendix B. All measurement instrumentation was calibrated before and after the measurements. The calibration chain is traceable via the United Kingdom Accreditation Service to National Standards held at the National Physical Laboratory. No significant drift was observed.

1.30 The environmental sound surveys were carried out between Thursday 15th June and Monday 19th June 2023. The weather during the survey period was conducive for noise monitoring with wind speeds less than 5ms$^{-1}$ and with little rain during the survey. Temperatures during the survey period varied between 13°C and 28°C, comfortably within the operating range of the meter. The full weather data is shown in Appendix C.

1.31 The microphones associated with each sound level meter was placed between 1.2m and 1.5m above the ground in free-field conditions, i.e., at least 3.5m from the nearest vertical, reflecting surface.

1.32 The baseline sound levels measured at Monitoring Locations 1 to 6 have been considered representative of the following noise sensitive receptors identified in Figure 1.1 and shown in Table 1.4.

**Table 1.4: Noise Sensitive Receptors and Representative Monitoring Locations**

| Receptor Location | Representative Monitoring Location |
|---|---|
| Bryn Neffyd | Location 1 |
| Coppi Farm | Location 2 |
| 101 Bryn Seion | Location 3 |
| 47 Barker's Well Lane | Location 4 |
| Graig Farm | Location 5 |
| Plas Clough | Location 6 |
| Plas Chambres Farm | Location 6 |
| Tyddyn Uchaf | Location 1 |

## Measurement Protocol

1.33 The measurement protocol consisted of continuous monitoring with the following sound levels logged every 15-minutes.

- $L_{Aeq,T}$ – The A-weighted equivalent continuous noise level over the measurement period.
- $L_{A90}$ – The A-weighted noise level exceeded for 90% of the measurement period.
- $L_{A10}$ – The A-weighted noise level exceeded for 10% of the measurement period.
- $L_{Amax}$ – The maximum A-weighted noise level during the measurement period.

## Environmental Sound Survey Results

1.34 The results of the sound survey are presented graphically in Appendix B and are summarised in Table 1.5 below. For the purposes of the assessment, the weekend daytime noise levels have been used for Locations 1-5 as operations associated with the existing quarry were not being undertaken during this period. Location 6 was only measured on Thursday and Monday daytime, and so these levels have been used for this location.

**Table 1.5: Summary of Measured Baseline Sound Levels**

| Location | Date | Time Period | $L_{Aeq,T}$ | $L_{A90,\ 15\ min}$ (median) | $L_{A10,\ 15\ min}$ (median) | $L_{Amax}$ |
|---|---|---|---|---|---|---|
| 1 | 17/06/23-18/06/2023 | Daytime (07:00-23:00) | 62.9 | 30.0 | 59.5 | 95.6 |
| 2 | 17/06/23-18/06/2023 | Daytime (07:00-23:00) | 46.4 | 33.0 | 47.6 | 83.3 |
| 3 | 17/06/23-18/06/2023 | Daytime (07:00-23:00) | 46.7 | 35.0 | 44.4 | 86.9 |
| 4 | 17/06/23 | Daytime (07:00-15:45) | 47.7 | 37.0 | 49.4 | 78.4 |
| 5 | 17/06/23-18/06/2023 | Daytime (07:00-23:00) | 51.6 | 38.0 | 54.3 | 82.8 |
| 6 | 15/06/23 & 19/06/2023 | Daytime (16:00-22:45) | 56.6 | 44.0 | 55.5 | 99.8 |

## Sound Climate Description

1.35 The prevailing sound climate at each of the monitoring locations have been described as follows:

- Location 1 – Road traffic noise from B5382, sheep in the field and birdsong.
- Location 2 – Road traffic noise from B5382 the dominant source, with birdsong also audible.
- Location 3 – Birdsong and distant road traffic noise.
- Location 4 – Road traffic noise from Barker's Well Lane, cars around the back of the property and birdsong.
- Location 5 – Road traffic noise from Ffordd Y Graig and birdsong, noise from lawnmower audible on collection.
- Location 6 – Road traffic noise from Ffordd Y Graig, sheep in the field and birdsong.

1.36 It has been noted from the site survey that noise from the existing quarry was not audible at the measurement positions during equipment installation and collection; however as previously stated to provide a robust assessment the baseline sound levels measured during the weekend periods at locations 1-5 have been utilised as the quarry operations were not taking place during these periods.

1.37 At location 6 the measurements taken during the midweek periods have been utilised as the basis of the assessment; however as stated above quarry operations were not audible at this location during the equipment installation and collection.

1.38 With reference to all of the above it is considered that the measured background sound levels are representative of the prevailing acoustic environment at the closest noise-sensitive receptors.

## Noise Limits

1.39 The following noise limits for the proposed quarry extension have been established from the baseline sound survey data, with reference to MTAN1 which states that the noise emissions should be no more than 10 dB above the background sound level (as far as practicable) or in any event not exceeding 55 dB $L_{Aeq,1\ hour}$. For the temporary operations, the limit of 67 dB $L_{Aeq,1\ hour}$ for temporary works has been considered appropriate. For the purposes of this assessment, Phase 1 is considered to represent temporary operations as this phase will include soil stripping and bund construction.

**Table 1.6: Noise Limits, free-field, dB**

| Receptor | Representative survey position | Representative background sound level, $L_{A90,T}$ | Permanent Limit $L_{Aeq,1hour}$ | Temporary Limit $L_{Aeq,1hour}$ |
|---|---|---|---|---|
| Bryn Neffyd | Location 1 | 30.0 | 40.0 | 67.0 |
| Coppi Farm | Location 2 | 33.0 | 43.0 | 67.0 |
| 101 Bryn Seion | Location 3 | 35.0 | 45.0 | 67.0 |
| 47 Barker's Well Lane | Location 4 | 37.0 | 47.0 | 67.0 |
| Graig Farm | Location 5 | 38.0 | 48.0 | 67.0 |
| Plas Clough | Location 6 | 44.0 | 54.0 | 67.0 |
| Plas Chambres Farm | Location 6 | 44.0 | 54.0 | 67.0 |
| Tyddyn Uchaf | Location 1 | 30.0 | 40.0 | 67.0 |

# Assessment of Effects

## Operational Phase Noise Effects

1.40 The sound predictions for the operational assessment have been undertaken using a proprietary software-based noise model, CadnaA®, which implements the full range of UK calculation methods. The calculation algorithms set out in BS5228-1:2009+A1:2014 have been used and the model assumes:

- A ground absorption factor of 1.
- A reflection factor of 2.
- A daytime receiver height of 1.5m.
- Downwind propagation between the source and the receiver.
- A temperature of 10°C.
- Relative humidity of 70%.

1.41 The proposed operations would continue to follow the approved operating hours of the existing quarry.

1.42 Table 1.7 details the five operational "Phases" of the Extension.

**Table 1.7: Phases of Extension Operations and Scenarios that will be Assessed**

| Phase | Scenarios to Model |
|---|---|
| Temporary Operations | • Permitted reserves will have been extracted and the crushing and screening operations will continue to take place within the base of the existing quarry;<br>• Prior to the extension area being stripped of soils, Public Footpath 6 across the extension area will be stopped up and diverted around the perimeter of the extension area to meet Footpath 5. |

| Phase | Scenarios to Model |
|---|---|
| | • The stripped soils from the extension area will be retained on the site and used to create a low level perimeter bund with gentle 1:3 outer slopes to reduce the noise/visual impacts of the development.<br>• The perimeter bund will be seeded with grass to stabilize the soil and planted with woodland and shrubs apart from a small area near the northern limit of the extension that could be left open to allow views across the Site (as requested by the footpath officer). |
| 1 | • Drilling and blasting will take place initially, at the northern end of the extension, progressing eastwards and south. This phase will release 781,000 tonnes of mineral.<br>• As the drill rig approaches the southern boundary, on the uppermost working surface, additional mitigation measures will be employed to ensure that noise limits are met.<br>• Inert waste material produced from the permitted reserves and initial extraction of the extension area will be placed to widen the access route at the southern end of the existing quarry and to start the restoration landform along the eastern edge of the quarry. |
| 2 | • Each bench height is approximately 15m and, by the commencement of Phase 2, there will be four active benches at 1m, 16m, 31m and 46m below the original ground level. This phase will release 1,130,000 tonnes of mineral.<br>• The lowest platform will, by this time, have breached the water table and consequently there will be a requirement for a sump in the base of the quarry with pumping of groundwater to the east to allow natural soak away to occur.<br>• The quality of the deposit varies over the extension area and so it may be necessary, depending on the product end-use, to blend rock which has been sourced from different areas of the quarry.<br>• Haul roads will be extended on to the upper benches and part of the historic overburden located along the southern boundary will be removed to facilitate the extension. The overburden material will be stored on the quarry floor for use within the final restoration landform. The retained overburden and woodland along the southern boundary of the extension area will act as a noise barrier.<br>• Inert waste material produced from the extraction of the extension area will be placed at the northern and eastern margins of the quarry to form part of the restoration landform. |
| 3 | • By the end of phase 3 the upper bench has been completed and the lower benches will progress westwards. This phase will release 737,000 tonnes of mineral.<br>• Pumping of groundwater will continue within the lower quarry void.<br>• Inert waste material generated from the extraction and processing of the mineral within the extension area will expand into the centre of the quarry void to form part of the restoration landform. In addition, inert material will be imported at a rate of up to 50,000 tonnes per annum. The rate of import may be less and will be influenced by the |



| Phase | Scenarios to Model |
|---|---|
| | amount of waste generated from the processing of the extracted material.<br>• Once the landform has reached final restored levels at the northern end of the quarry, works to prepare the area for restoration will take place, dozers will be used to ensure the gradients allow for run off and localized water collection and ponding is prevented. Stored soils and overburden will be transported and placed using the loose tipping method and following best practice. Once the seedbed has been properly prepared the area will be seeded. |
| 4 | • By the end of phase 4, all benches will have progressed to their full extent with 10m wide benches. This phase will release 1,400,000 tonnes of mineral.<br>• As above, the lowest platform will have breached the water table and consequently there will be a requirement for a sump in the base of the quarry with pumping of groundwater to the east to allow natural soak away to occur.<br>• Inert waste material generated from the extraction and processing of the mineral within the extension area will expand into the centre of the quarry void to form part of the restoration landform. In addition, inert material will be imported at a rate of up to 100,000 tonnes per annum. The rate of import may be less and will be influenced by the amount of waste generated from the processing of the extracted material. |
| 5 | • During the final phase of extraction, all benches within the extension area will be reduced to a 5m width with the base of the quarry extending in footprint by 15m around the perimeter. This phase will release 870,000 tonnes of mineral.<br>• Inert waste material generated from the extraction and processing of the mineral within the extension area will continue to expand into the centre of the quarry void to form part of the restoration landform. In addition, inert material will be imported at a rate of up to 100,000 tonnes per annum. The rate of import may be less and will be influenced by the amount of waste generated from the processing of the extracted material. |

1.43 The assessment includes the benefits of a low-level perimeter bund along the southern boundary of the extension, which will be constructed during the Temporary Operations Phase.

1.44 A list of operational plant which is currently used on site and will be used for the proposed extension is provided in Table 1.8. It is understood that each Phase will utilise the same operational plant. For the purposes of the assessment, all plant is assumed to be operating simultaneously.

1.45 It is understood there are currently 369 return trips undertaken by the dumper for current operations within a monthly period, which would increase to 479 with the proposed extension. Therefore, there will be an additional 110 movements associated with the extension per month. To ensure a robust, worst-case assessment, 5 movements per hour for the dumper truck and HGV have been assessed.

1.46 The identified plant, vehicle movements and approach to the assessment has been scoped and agreed with the operator.

**Table 1.8: Extraction/Processing and Restoration Plant Details**

| Plant | No. of Plant | On-time | Source Type | Sound Power Level $L_{WA}$ dB(A) | BS5228:2009+A1:2014 Data Source for $L_{WA}$ / or other source |
|---|---|---|---|---|---|
| **Extraction/Processing** | | | | | |
| Excavator | 1 | 100% | Point Source | 108.0 | Cat 349 Hydraulic Excavator Specification Data |
| Wheeled Loader | 1 | 100% | Point Source | 109.0 | Cat 972 Wheeled Loader Specification Data |
| Crusher | 1 | 100% | Point Source | 110.0 | Terex Pegson XA400 measured data by ERM |
| Crusher and Screener | 1 | 100% | Point Source | 110.0 | Metso Lokotrak LT200 Specification Data |
| Generator | 1 | 100% | Point Source | 102.0 | Table D7 Item 53 |
| Rock Drill Rig | 1 | 100% | Point Source | 119.0 | SLR measured data |
| Dump Truck | 1 | 5 movements per hour | Line Source | 112.0 | Table C10 Item 18 |
| HGV on Access Road | 1 | 5 movements per hour | Line Source | 94.7 | SLR measured data |
| **Restoration** | | | | | |
| Dozer | 1 | 5 movements per hour | Line Source | 115.0 | Cat D6R Specification Data |
| HGV on Access Road | 1 | 5 movements per hour | Line Source | 94.7 | SLR measured data |

## Temporary and Proposed Extraction Operations

### Results

1.47 Free-field sound predictions have been made at the worst affected boundary of the receptor locations assessed. The results of the assessment are shown in Tables 1.9 and 1.10.

1.48 For each of the phases, the assessment of predicted operational sound levels against the limits as specified in Table 1.6 are shown in Table 1.9 and 1.10. This table also shows the calculated worst-case difference between the predicted sound level at each receptor. Figure 1.3 illustratively shows predicted noise levels at the closest receptors associated with the worst-case Phase along with the plant locations as confirmed with the operator.

1.49 It must be noted that the predictions also include the noise levels being generated by all associated material processing operations at the Site.

1.50 The limits implemented within the assessment are derived in accordance with limits identified in MTAN1: *"Noise limits should relate to the background noise levels, subject to a maximum daytime noise limit of 55 dB(A) where background noise levels exceed 45 dB(A). 55 dB(A) is the lower limit of the daytime noise level where serious annoyance is caused. Where background noise is less than 45 dB(A), noise limits should be defined as background noise levels plus 10 dB(A). Night-time working limits should not exceed 42 dB(A) at noise sensitive properties. Daytime working is defined as 0700-1900 hours and night-time as 1900-0700 hours. Noise limits should be set in terms of $L_{Aeq,T}$ over a 1-hour measuring period. $L_{Aeq}$ is the noise index used to describe the "average" level of noise that varies with time (T) and should be measured "free-field" that is, at least 3.5 metres away from a façade to prevent reflection of noise by any façade that faces the source. During temporary and short-term operations higher levels may reasonable but should not exceed 67 dB(A) for periods of up to 8 weeks in a year at specified noise sensitive properties."*

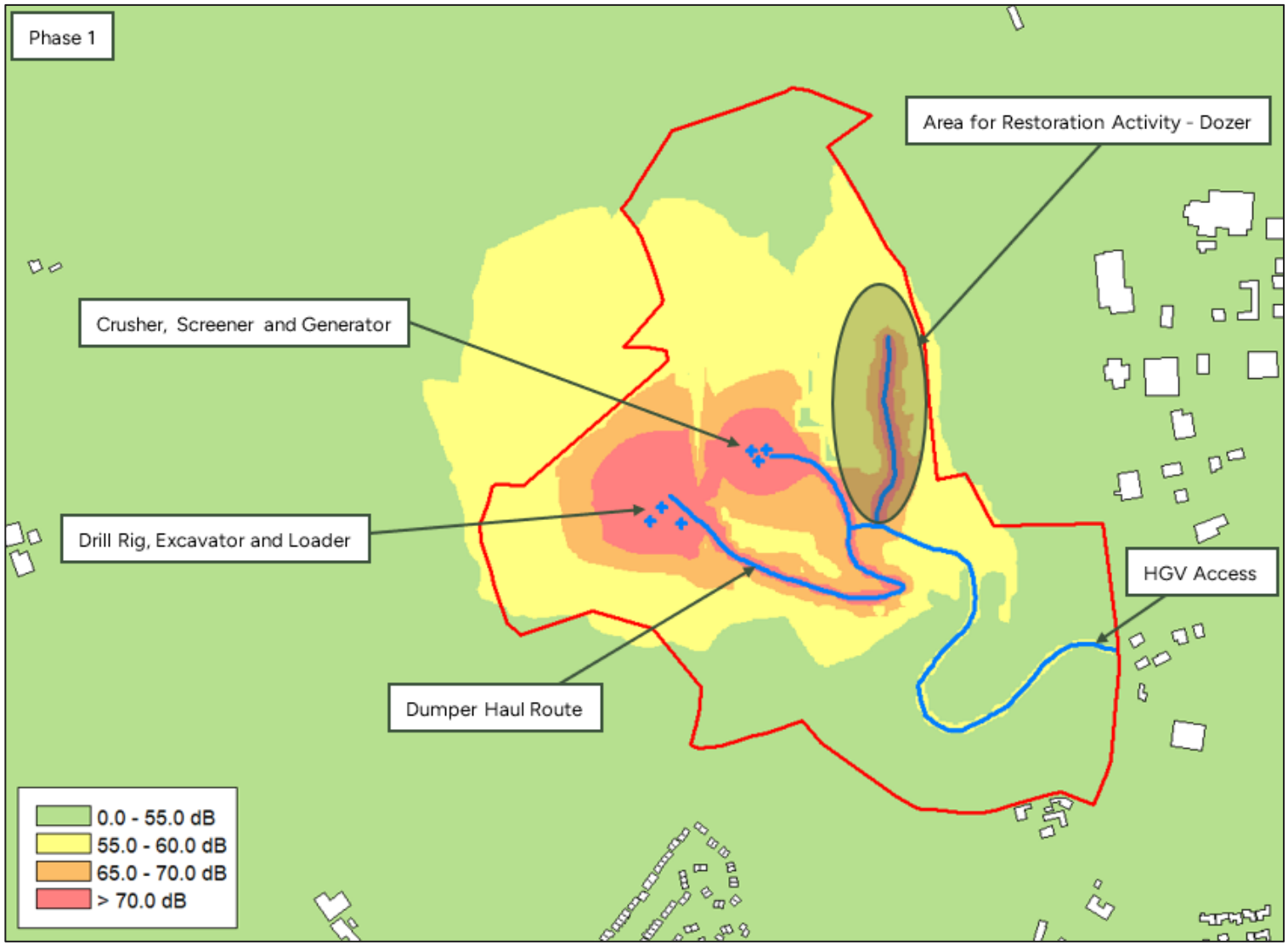
**Table 1.9: Predicted Operational Noise Effects – Proposed Temporary Operations (inc. Material Processing)**

| Receptor | Predicted Sound Level $L_{Aeq,1hour}$ dB | | |
|---|---|---|---|
| | Temporary Operations | Noise Limit | Difference |
| Bryn Neffyd | 47.2 | 67.0 | -19.8 |
| Coppi Farm | 40.4 | 67.0 | -26.6 |
| 101 Bryn Seion | 50.4 | 67.0 | -16.6 |
| 47 Barker's Well Lane | 36.1 | 67.0 | -30.9 |
| Graig Farm | 34.6 | 67.0 | -32.4 |
| Plas Clough | 34.5 | 67.0 | -32.5 |
| Plas Chambres Farm | 32.3 | 67.0 | -34.7 |
| Tyddyn Uchaf | 34.1 | 67.0 | -32.9 |

**Table 1.10: Predicted Operational Noise Effects – Proposed Extraction Operations and Restoration Activities (inc. Material Processing)**

| Receptor | Predicted Sound Level $L_{Aeq,1hour}$ dB | | | | | | |
|---|---|---|---|---|---|---|---|
| | Phase 1 | Phase 2 | Phase 3 | Phase 4 | Phase 5 | Noise Limit | Worst-case Difference |
| Bryn Neffyd | 41.3 | 34.4 | 35.4 | 37.1 | 35.9 | 40.0 | +1.3 |
| Coppi Farm | 37.8 | 33.2 | 33.8 | 34.9 | 33.8 | 43.0 | -5.2 |
| 101 Bryn Seion | 44.5 | 38.2 | 37.8 | 40.7 | 39.6 | 45.0 | -0.5 |
| 47 Barker's Well Lane | 34.6 | 32.2 | 32.4 | 34.7 | 34.3 | 47.0 | -12.3 |
| Graig Farm | 33.9 | 32.3 | 31.7 | 34.2 | 33.4 | 48.0 | -13.8 |
| Plas Clough | 33.6 | 33.0 | 31.6 | 31.7 | 31.8 | 54.0 | -20.4 |
| Plas Chambres Farm | 30.8 | 29.5 | 27.8 | 28.6 | 28.9 | 54.0 | -23.2 |
| Tyddyn Uchaf | 33.7 | 31.6 | 32.2 | 33.2 | 33.1 | 40.0 | -6.3 |

**Figure 1.3: Predicted Operational Noise Effects Noise Contour Plot – Proposed Extraction Operations and Restoration Activities (inc. Material Processing) for Phase 1**



1.51 It can be seen from Table 1.9 that:

- The predicted noise emissions for proposed temporary operations do not exceed the recommended limit of 67 dB.

1.52 With reference to the above and Tables 1.1, 1.2 and 1.3, Table 1.11 below defines the impact magnitude and significance of effect at the noise sensitive receptors considered.

**Table 1.11: Impact Magnitude and Significance of Effect for Temporary Operations**

| Receptor | Impact Magnitude | Sensitivity of Receptor | Worst-case Significance of Effect | Mitigation Measures Required Y/N |
|---|---|---|---|---|
| Bryn Neffyd | None | High | None | N |
| Coppi Farm | None | | None | N |
| 101 Bryn Seion | None | | None | N |
| 47 Barker's Well Lane | None | | None | N |
| Graig Farm | None | | None | N |
| Plas Clough | None | | None | N |
| Plas Chambres Farm | None | | None | N |
| Tyddyn Uchaf | None | | None | N |

1.53 It can be seen from Table 1.11 that the **'Significance of Effect'** from temporary operations is defined as **'None'** at all the receptors considered and therefore no site-specific mitigation measures are required.

1.54 It can be seen from Table 1.10 that:

- The predicted noise emissions for proposed extraction operations and restoration activities do not exceed the recommended limit of + 10 dB above the representative background sound level during all phases with the exception of at Bryn Neffyd during Phase 1, where there is a slight exceedance of +1.3dB.
- Reasonable mitigation has been adopted by the mineral operator, in the scheme of perimeter earth bunding along the southern boundary of the extended area.

1.55 With reference to the above and Tables 1.1, 1.2 and 1.3, Table 1.12 overleaf defines the impact magnitude and significance of effect at the noise sensitive receptors considered.

**Table 1.12: Impact Magnitude and Significance of Effect for Proposed Extraction and Restoration Operations (inc. Material Processing)**

| Receptor | Impact Magnitude | Sensitivity of Receptor | Worst -case Significance of Effect | Mitigation Measures Required Y/N |
|---|---|---|---|---|
| Bryn Neffyd | Minor | High | Minor | N |
| Coppi Farm | None | | None | N |
| 101 Bryn Seion | None | | None | N |
| 47 Barker's Well Lane | None | | None | N |
| Graig Farm | None | | None | N |
| Plas Clough | None | | None | N |
| Plas Chambres Farm | None | | None | N |
| Tyddyn Uchaf | None | | None | N |

1.56 It can be seen from Table 1.12 that the **'Significance of Effect'** from proposed extraction and restoration operations is defined as **'None'** all the receptors considered with the exception of at Bryn Neffyd and therefore no site-specific mitigation measures are required.

1.57 It can be seen from Table 1.12 that the **'Significance of Effect'** from proposed extraction and restoration operations at Bryn Neffyd is defined as **'Minor.'** This effect is associated with the start of Phase 1, at which operations would be located at worst-case elevations with respect to direct line of sight to Bryn Neffyd. As operations progress, activities will be further shielded, shown by the noise levels associated with Phases 2-5, where noise levels will fall below the noise limit.

1.58 It also should be noted that the assessment has assumed a worst-case scenario where all plant is operating 100% of the time, in reality, this will not be the case as certain items of plant will not operate for periods within the working day.

1.59 An exceedance in the noise limit of approximately 1dB would also not cause an audible change at the receptor locations as it is considered that the minimum decibel change audible to the human ear is +/-3dB.

1.60 Based on the above it is considered that this effect is not significant.

## Cumulative Assessment

1.61 A cumulative assessment of proposed extraction operations and restorations activities taking place simultaneously with existing extracting operations has also been undertaken, to ensure a robust, worst-case assessment. The assessment is presented in Table 1.13 and Table 1.14. Figure 1.4 illustratively shows predicted noise levels at the closest receptors associated with the worst-case Phase along with the plant locations as confirmed with the operator.

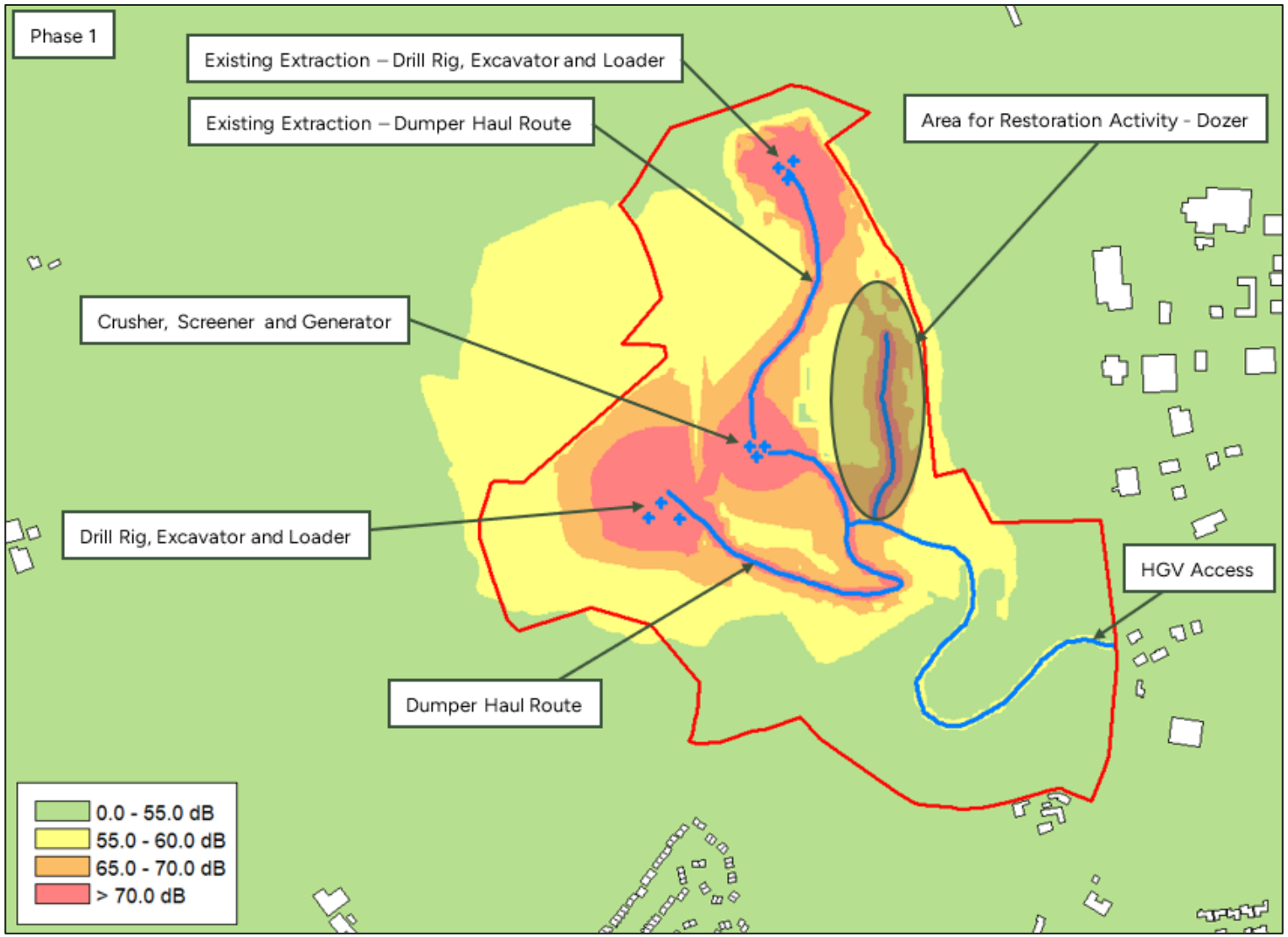
**Table 1.13: Predicted Operational Noise Effects – Existing Extraction and Proposed Temporary Operations (inc. Material Processing)**

| Receptor | Predicted Sound Level $L_{Aeq,1hour}$ dB | | |
|---|---|---|---|
| | Proposed Temporary and Existing Extraction Operations | Noise Limit | Difference |
| Bryn Neffyd | 47.2 | 67.0 | -19.8 |
| Coppi Farm | 40.5 | 67.0 | -26.5 |
| 101 Bryn Seion | 50.5 | 67.0 | -16.5 |
| 47 Barker's Well Lane | 36.7 | 67.0 | -30.3 |
| Graig Farm | 35.9 | 67.0 | -31.1 |
| Plas Clough | 36.4 | 67.0 | -30.6 |
| Plas Chambres Farm | 33.0 | 67.0 | -34.0 |
| Tyddyn Uchaf | 34.4 | 67.0 | -32.6 |

**Table 1.14: Predicted Operational Noise Effects – Existing and Proposed Extraction Operations and Restoration Activities (inc. Material Processing)**

| Receptor | Predicted Sound Level $L_{Aeq,1hour}$ dB | | | | | | |
|---|---|---|---|---|---|---|---|
| | Phase 1 | Phase 2 | Phase 3 | Phase 4 | Phase 5 | Noise Limit | Worst-case Difference |
| Bryn Neffyd | 41.3 | 35.1 | 36.8 | 38.5 | 37.5 | 40.0 | +1.3 |
| Coppi Farm | 37.9 | 34.3 | 34.7 | 35.8 | 35.0 | 43.0 | -5.1 |
| 101 Bryn Seion | 44.6 | 39.3 | 39.1 | 41.6 | 40.7 | 45.0 | -0.4 |
| 47 Barker's Well Lane | 35.5 | 33.7 | 34.2 | 35.9 | 35.5 | 47.0 | -11.1 |
| Graig Farm | 35.4 | 34.9 | 34.0 | 35.8 | 35.2 | 48.0 | -12.2 |
| Plas Clough | 35.9 | 34.7 | 33.9 | 34.2 | 34.2 | 54.0 | -18.1 |
| Plas Chambres Farm | 31.8 | 30.9 | 29.7 | 30.4 | 30.4 | 54.0 | -22.2 |
| Tyddyn Uchaf | 34.0 | 32.6 | 33.7 | 34.7 | 34.5 | 40.0 | -5.3 |

**Figure 1.4: Predicted Operational Noise Effects Noise Contour Plot – Proposed and Existing Extraction Operations and Restoration Activities (inc. Material Processing) for Phase 1**



1.62 It can be seen from Table 1.13 that:

- The predicted noise emissions for proposed temporary and existing extraction operations do not exceed the recommended limit of 67 dB.

1.63 With reference to the above and Tables 1.1, 1.2 and 1.3, Table 1.15 below defines the impact magnitude and significance of effect at the noise sensitive receptors considered.

**Table 1.15: Impact Magnitude and Significance of Effect for Proposed Temporary and Existing Extraction Operations and Restoration Activities (inc. Material Processing)**

| Receptor | Impact Magnitude | Sensitivity of Receptor | Worst-case Significance of Effect | Mitigation Measures Required Y/N |
|---|---|---|---|---|
| Bryn Neffyd | None | High | None | N |
| Coppi Farm | None | | None | N |
| 101 Bryn Seion | None | | None | N |
| 47 Barker's Well Lane | None | | None | N |
| Graig Farm | None | | None | N |
| Plas Clough | None | | None | N |
| Plas Chambres Farm | None | | None | N |
| Tyddyn Uchaf | None | | None | N |

1.64 It can be seen from Table 1.15 that the **'Significance of Effect'** from proposed temporary and existing extraction operations is defined as **'None'** at all the receptors considered and therefore no site-specific mitigation measures are required.

1.65 It can be seen from Table 1.14 that:

- The predicted noise emissions for proposed extraction operations and restoration activities do not exceed the recommended limit of + 10 dB above the representative background sound level during all phases with the exception of at Bryn Neffyd during Phase 1, where there is a slight exceedance of +1.3dB.
- Reasonable mitigation has been adopted by the mineral operator, in the scheme of perimeter earth bunding along the southern boundary of the extended area.

1.66 With reference to the above and Tables 1.1, 1.2 and 1.3, Table 1.16 overleaf defines the impact magnitude and significance of effect at the noise sensitive receptors considered

**Table 1.16: Impact Magnitude and Significance of Effect for Existing and Proposed Extraction Operations and Restoration Operations (inc. Material Processing)**

| Receptor | Impact Magnitude | Sensitivity of Receptor | Worst-case Significance of Effect | Mitigation Measures Required Y/N |
|---|---|---|---|---|
| Bryn Neffyd | Minor | High | Minor | N |
| Coppi Farm | None | | None | N |
| 101 Bryn Seion | None | | None | N |
| 47 Barker's Well Lane | None | | None | N |
| Graig Farm | None | | None | N |
| Plas Clough | None | | None | N |
| Plas Chambres Farm | None | | None | N |
| Tyddyn Uchaf | None | | None | N |

1.67 It can be seen from Table 1.16 that the **'Significance of Effect'** from proposed extraction and restoration operations is defined as **'None'** all the receptors considered with the exception of at Bryn Neffyd and therefore no site-specific mitigation measures are required.

1.68 It can also be seen from Table 1.16 that the **'Significance of Effect'** from proposed extraction and restoration operations at Bryn Neffyd is defined as **'Minor.'** This effect is associated with the start of Phase 1, at which operations would be located at worst-case elevations with respect to direct line of sight to Bryn Neffyd. As operations progress, activities will be further shielded, shown by the noise levels associated with Phases 2-5, where noise levels will fall below the noise limit.

1.69 It also should be noted that the assessment has assumed a worst-case scenario where all plant is operating 100% of the time, in reality, this will not be the case as certain items of plant will not operate for periods within the working day.

1.70 An exceedance in the noise limit of approximately 1dB would also not cause an audible change at the receptor locations as it is considered that the minimum decibel change audible to the human ear is +/-3dB.

1.71 Based on the above it is considered that this effect is not significant

## Mitigation Measures

1.72 The assessment has shown that site specific mitigation measures are not required; however, a number of best practice measures are provided below to further reduce the potential for adverse noise impacts at the Site.

## Operational Noise – General Quarry Plant Operations

1.73 As a minimum the Site should adhere to the general mitigation measures and procedures outlined below.

1.74 Surface minerals extraction sites, by their nature, generate noise due to the use of heavy machinery. During the continued operations the potential risk of noise impacting on the nearby noise-sensitive receptors would vary depending on the type of activities being undertaken at the time and the effectiveness of any noise control measures that are in place.

1.75 With regard to the operation of the mobile plant within the quarry operations the mitigation measures outlined below are examples of the procedures designed to alleviate any adverse impacts:

- activities within the site would be undertaken in locations where noise attenuation from existing landforms would maximise the benefit to the noise-sensitive properties; avoid unnecessary revving of engines and switch off equipment when not required;
- internal haul routes would, wherever possible, be routed such that separation distances to the noise sensitive properties is maximised;
- use rubber linings in, for example, chutes and dumpers to reduce impact noise;
- all haul roads would be kept clean and maintained in a good state of repair to avoid unwanted rattle and "body slap" from vehicles;
- start-up plant and vehicles sequentially rather than all together;
- all mobile plant used at the proposed extension would have noise emission levels that comply with the limiting levels defined in EC Directive 86/662/EEC and any subsequent amendments;
- all mobile plant and heavy goods vehicles entering the site will move in a circular pattern to minimise, as far as is practical and safe, noise from reverse warning systems;
- plant would be operated in a proper manner with respect to minimising noise emissions, for example, minimisation of drop heights and no unnecessary engine revving;
- plant would be subject to regular maintenance.
- all plant at the site would be fitted with effective exhaust silencers and would be maintained in good working order to meet manufacturers' noise rating levels. Defective silencers would be replaced immediately;
- plant that is used intermittently, would be shut down when not in use; and
- pumps, generators and compressors would be located behind existing screening mounds or landform, would be electrically powered and fitted with an acoustic covers where necessary. Diesel powered pumps, generators and compressors, if used, will be installed within acoustic enclosures

1.76 At the beginning of the working day it is recommended that a soft-start is implemented to ensure that all plant and vehicles are started up sequentially rather than all together. Further to this it would be prudent to delay the operation of the processing plant (crusher and screener) until later in the morning hours, and avoid Saturday mornings, if practicable.

## Residual Effects

1.77 The Operational Phase Noise Assessment has shown that suitable limits are predicted to be met at the majority of all the receptors assessed and include the provision of phased perimeter earth bunding to provide acoustic screening, therefore a residual assessment is not applicable.

1.78 Noise levels at Bryn Neffyd are predicted to be marginally exceeded during the start of Phase 1 but will be met during all remaining phases. However, this exceedance is not considered significant for the following reasons:

- the noise limit is based upon the worst-case weekend background noise level, and it is unlikely that operations would take place during this period.
- The exceedance is associated with the start of Phase 1, at which operations would be located at worst-case elevations with respect to direct line of sight to Bryn Neffyd. As operations progress, activities will be further shielded, shown by the noise levels associated with Phases 2-5, where noise levels will fall below the noise limit.
- The assessment has assumed a worst-case scenario where all the fixed plant is operating 100% of the time, in reality this will not be the case as certain items of plant will not operate for periods within the working day, therefore the predicted noise levels are likely to be lower.

## Conclusion

1.79 This chapter has considered the potential for the proposed development to impact upon the noise environment near the application site, at the identified noise sensitive locations. This chapter has described the scope, relevant legislation, assessment methodology and the baseline conditions existing at the site and its surroundings. It has considered any potential significant environmental effects the proposed development would have on this baseline environment.

1.80 The noise assessment has been based on a baseline sound survey undertaken over midweek and weekend periods at locations considered representative of the nearest noise-sensitive receptors to the development site.

1.81 The assessment has considered the potential noise impacts of the operation of the proposed development and has been undertaken in-line with the guidance presented in MTAN1.

1.82 All sound prediction has been undertaken using the proprietary noise modelling software Cadna/A which incorporates all the relevant calculation algorithms within BS 5228:2009+A1:2014.

1.83 It has been shown from the results tables that the predicted noise emissions will not exceed the recommended limits for the various Phases of operation at all of the identified noise sensitive locations with the exception of at Bryn Neffyd.



1.84 From the guidelines for environmental noise impact assessment, and based on a 'Highly Sensitive Receptor', the 'Impact' at all the receptors with the exception of Bryn Neffyd, during all phases has been considered '**None with No Effect'**. Noise from the proposed operations will 'Not be Significant'.

1.85 From the guidelines for environmental noise impact assessment, and based on a 'Highly Sensitive Receptor', the 'Impact' for Bryn Neffyd during Phase 1 extractions has been considered **'Minor with No Effect'**. Noise from the proposed operations will 'Not be Significant'.

1.86 For the cumulative assessment of operational noise from both existing and proposed operations and based on a 'Highly Sensitive Receptor', the 'Impact' at all of the receptors with the exception of Bryn Neffyd for during all phases has been considered '**None with No Effect'.** Noise from the proposed operations will 'Not be Significant'.

1.87 From the guidelines for environmental noise impact assessment, and based on a 'Highly Sensitive Receptor', the 'Impact' for Bryn Neffyd during Phase 1 extractions has been considered **'Minor with No Effect'**. Noise from the proposed operations will 'Not be Significant'.

1.88 It has therefore been considered that the predicted operational noise generated by the proposed and existing quarrying operations would not have a significant at the nearest NSR's considered and noise should not pose a material constrain for the development proposals.

1.89 A summary of the assessment findings can be seen in Table 1.17. The worst-case (highest predicted) operational Phase has been used for each location.

**Table 1.17: Noise Summary Table**

| Receptor | Sensitivity of Receptor | Impact Magnitude | Worst-case Potential Significance and Nature of Effect | Additional Mitigation | Residual Impact Magnitude | Residual Significance and Nature of Effect |
|---|---|---|---|---|---|---|
| Bryn Neffyd | High | Minor | Minor | *Not applicable. Reasonable mitigation measures have been considered by the developer, in the form of perimeter earth bunding to create acoustic screening and following best practice measures.* | | |
| Coppi Farm | | None | None | | | |
| 101 Bryn Seion | | None | None | | | |
| 47 Barker's Well Lane | | None | None | | | |
| Graig Farm | | None | None | | | |
| Plas Clough | | None | None | | | |
| Plas Chambres Farm | | None | None | | | |
| Tyddyn Uchaf | | None | None | | | |

# Appendix A Glossary of Terminology

## Denbigh Quarry

Quarry Extension

**Breedon Trading Ltd**

SLR Project No.: 403.064944.0001

2 August 2023

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0dB (the threshold of hearing) to over 120dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

**Table A.1: Sound Levels Commonly Found in the Environment**

| Sound Level | Location |
|---|---|
| 0dB(A) | Threshold of hearing |
| 20 to 30dB(A) | Quiet bedroom at night |
| 30 to 40dB(A) | Living room during the day |
| 40 to 50dB(A) | Typical office |
| 50 to 60dB(A) | Inside a car |
| 60 to 70dB(A) | Typical high street |
| 70 to 90dB(A) | Inside factory |
| 100 to 110dB(A) | Burglar alarm at 1m away |
| 110 to 130dB(A) | Jet aircraft on take off |
| 140dB(A) | Threshold of Pain |

### A.1.1 Acoustic Terminology

dB (decibel) — The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10-5 Pa).

dB(A) — A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

$L_{Aeq}$ — $L_{Aeq}$ is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.

$L_{10}$ & $L_{90}$ — If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The $L_n$ indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence $L_{10}$ is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, $L_{90}$ is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the $L_{10}$ index to describe traffic noise.

$L_{Amax}$ — $L_{Amax}$ is the maximum A - weighted sound pressure level recorded over the period stated. $L_{Amax}$ is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall $L_{eq}$ noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response

# Appendix B Baseline Noise Survey Data

## Denbigh Quarry

Quarry Extension

**Breedon Trading Ltd**

SLR Project No.: 403.064944.0001

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Six logging sound level meters were used to take unattended measurements over sequential 15-minute periods.

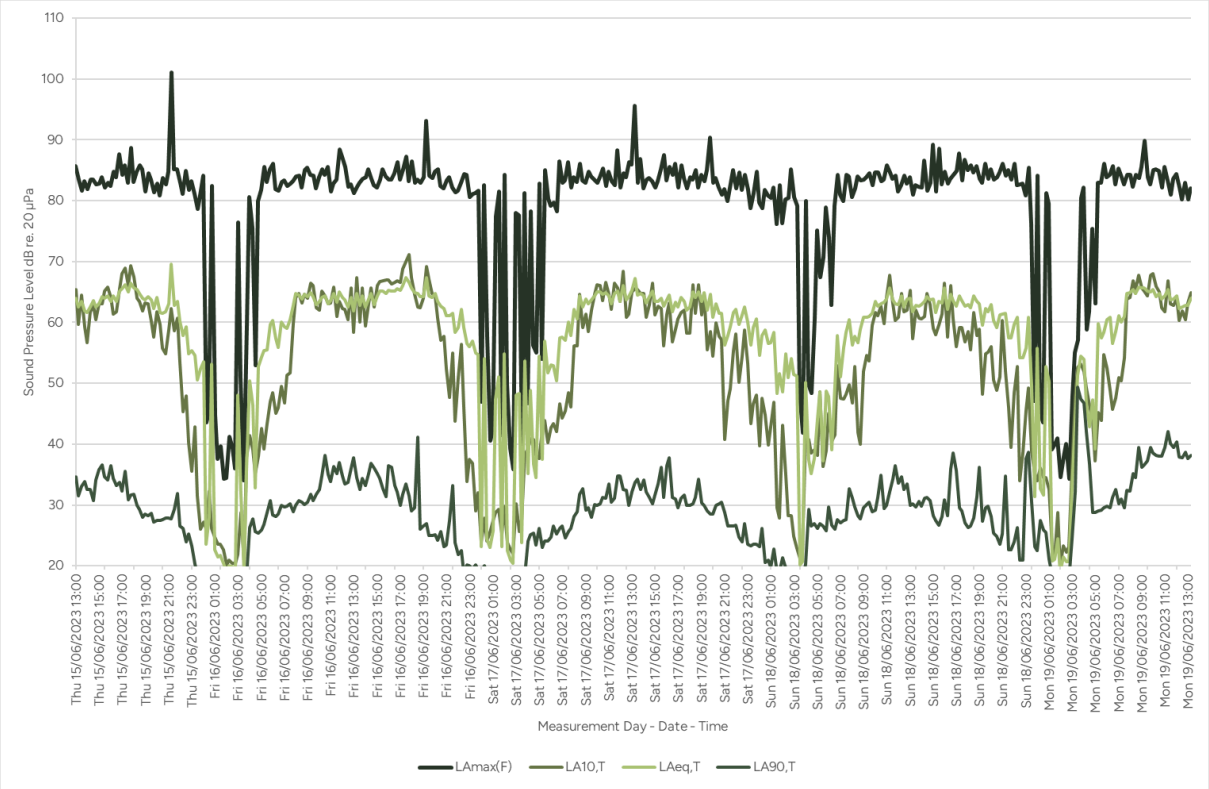
The sound monitoring equipment used during the survey is detailed in Table B-1 to Class 1 acoustic accuracy for sound level meters and matched calibrators.

All measurement instrumentation was calibrated before and after the measurements. No significant drift was observed with calibration offsets of ≤ -0.69dB. The calibration chain is traceable via the United Kingdom Accreditation Service to National Standards held at the National Physical Laboratory.

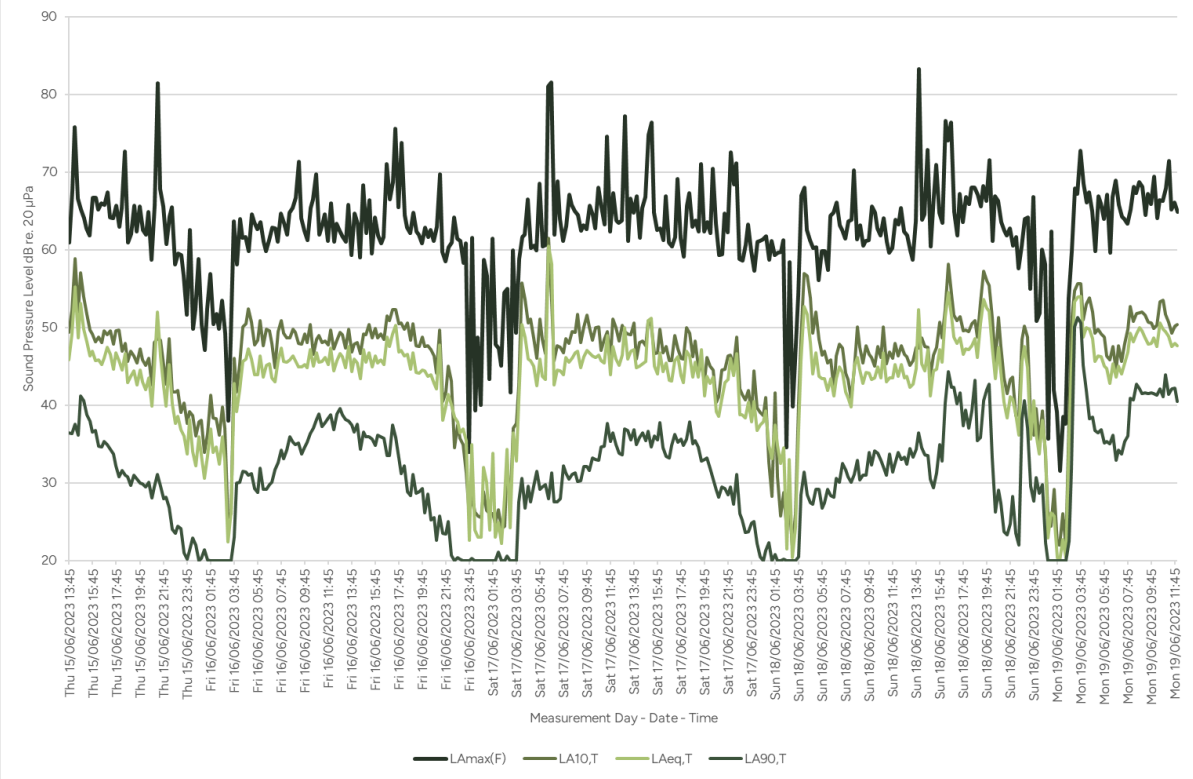
**Table B.1: Sound Monitoring Equipment**

| Location | Description | Serial No. |
|---|---|---|
| Location 1 – Bryn Neffyd | Norsonic Nor140 Class 1 Sound Level Meter | 1403010 |
| | Norsonic 1251 Acoustic Calibrator | 31875 |
| Location 2 – Coppi Farm | Cirrus CR:171B Class 1 Sound Level Meter | G400059 |
| | Cirrus CR:515 Acoustic Calibrator | 99960 |
| Location 3 – 101 Bryn Seion | Cirrus CR:171B Class 1 Sound Level Meter | G068726 |
| | Cirrus CR:515 Acoustic Calibrator | 60608 |
| Location 4 – 47 Barker's Well Lane | Cirrus CR:171B Class 1 Sound Level Meter | G061094 |
| | Cirrus CR:515 Acoustic Calibrator | 72210 |
| Location 5 – Graig Farm | Cirrus CR:171B Class 1 Sound Level Meter | G400055 |
| | Cirrus CR:515 Acoustic Calibrator | 99952 |
| Location 6 – Plas Clough | Cirrus CR:171B Class 1 Sound Level Meter | G080284 |
| | Cirrus CR:515 Acoustic Calibrator | 59336 |

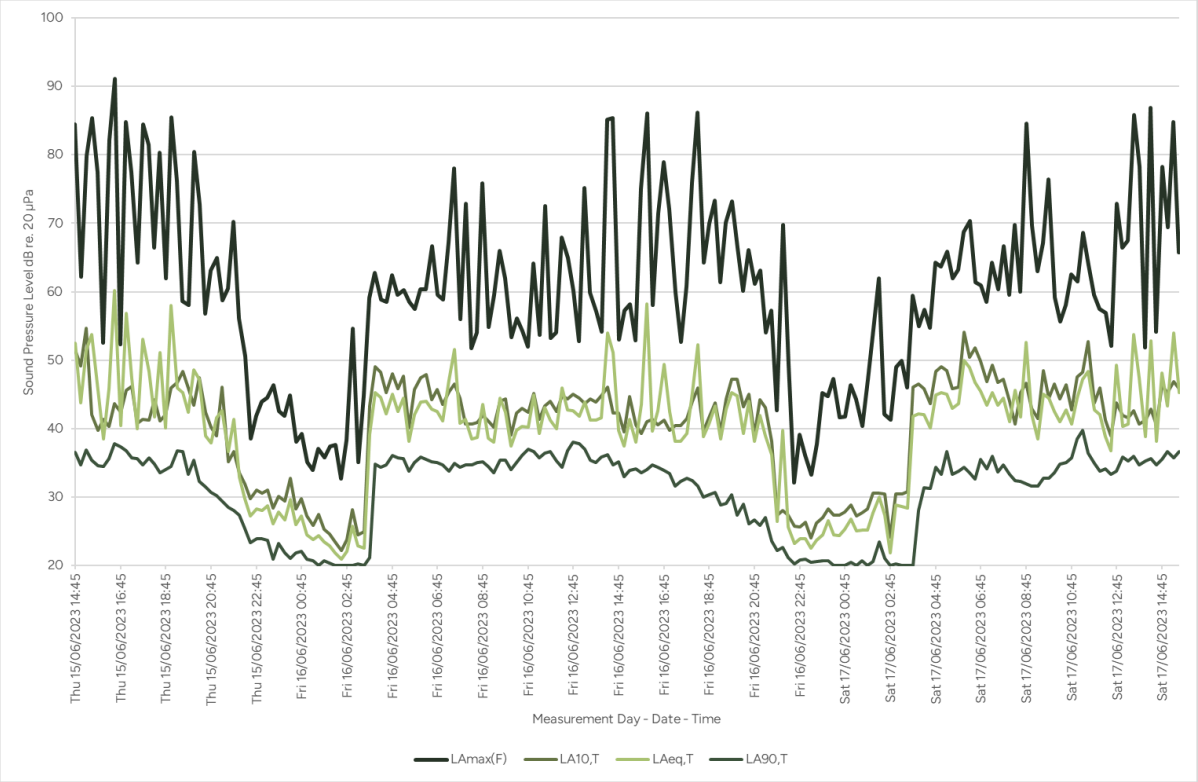
## Figure B.1: Time History Graph – Location 1, dB



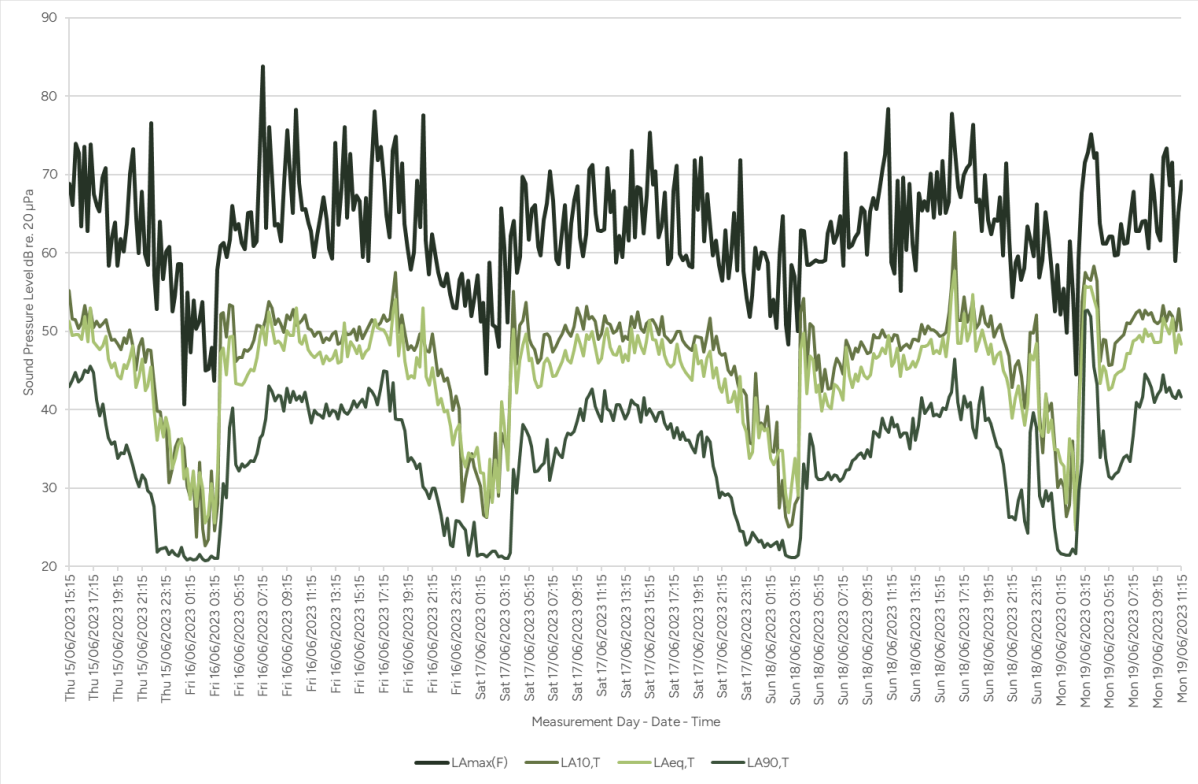

## Figure B.2: Time History Graph – Location 2, dB



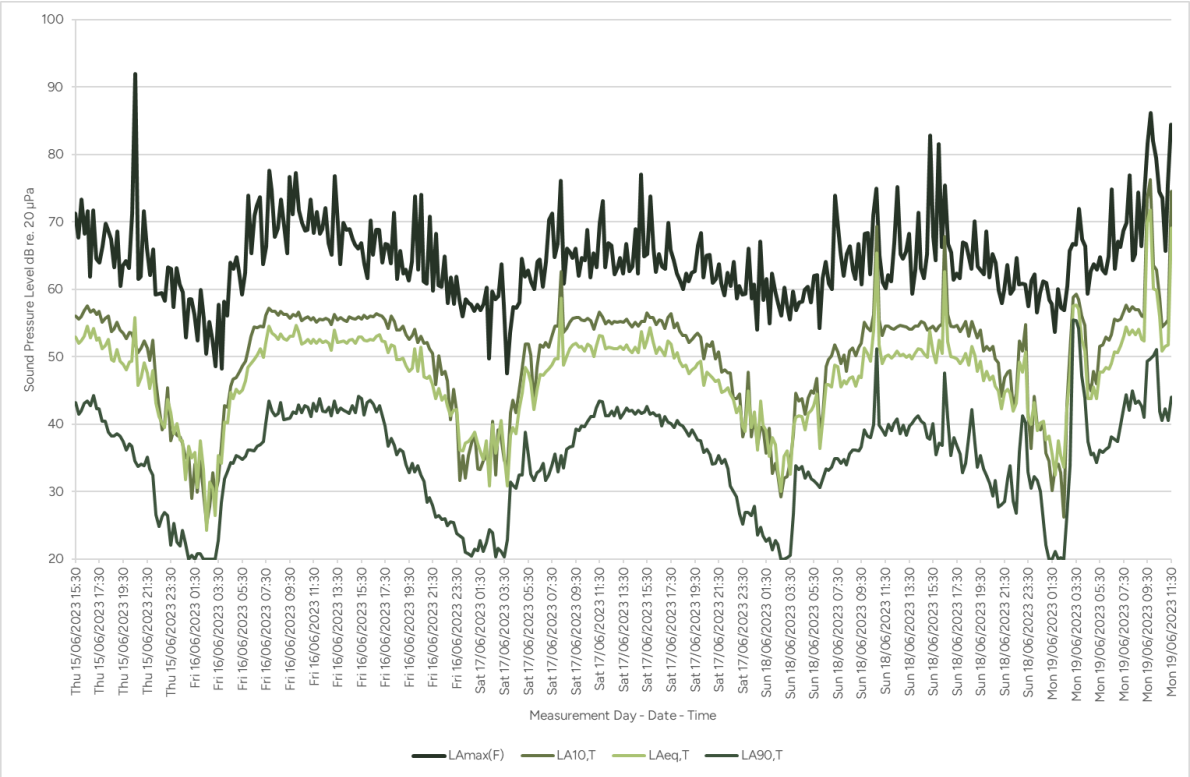
## Figure B.3: Time History Graph – Location 3, dB



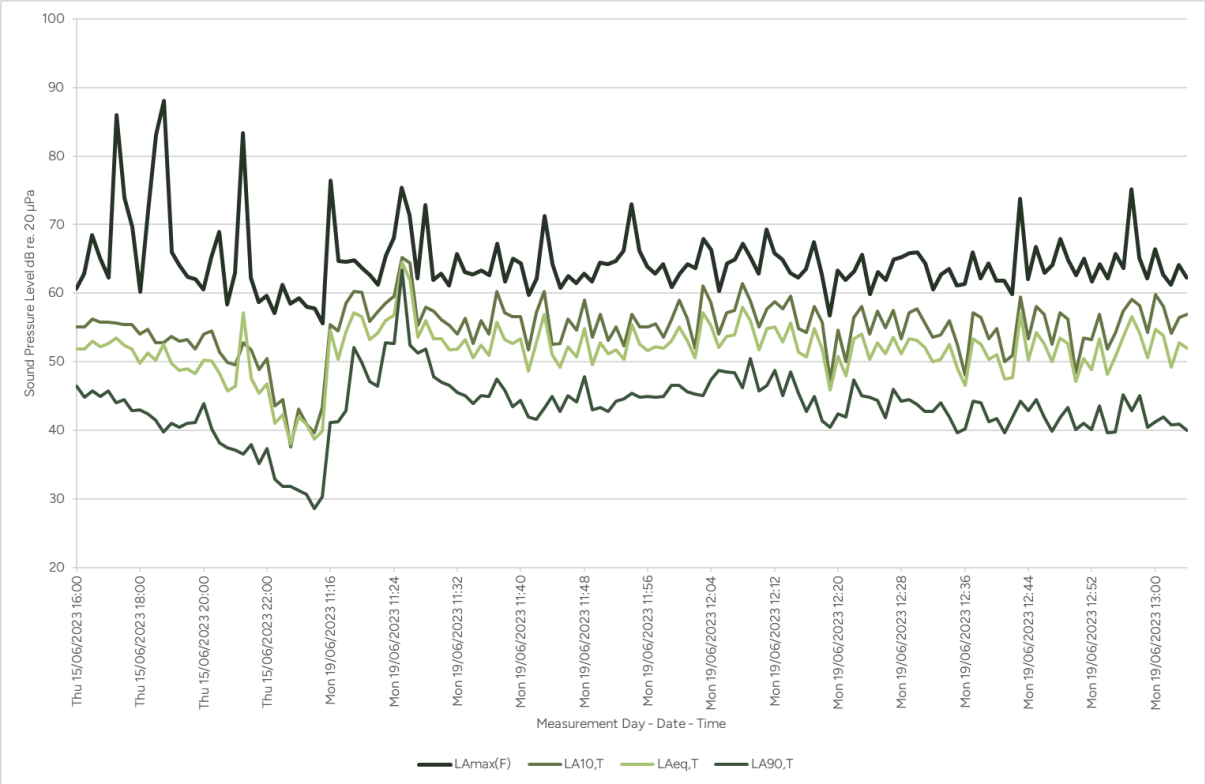

## Figure B.4: Time History Graph – Location 4, dB



## Figure B.5: Time History Graph – Location 5, dB




## Figure B.6: Time History Graph – Location 6, dB



# Appendix C Weather Survey Data

## Denbigh Quarry

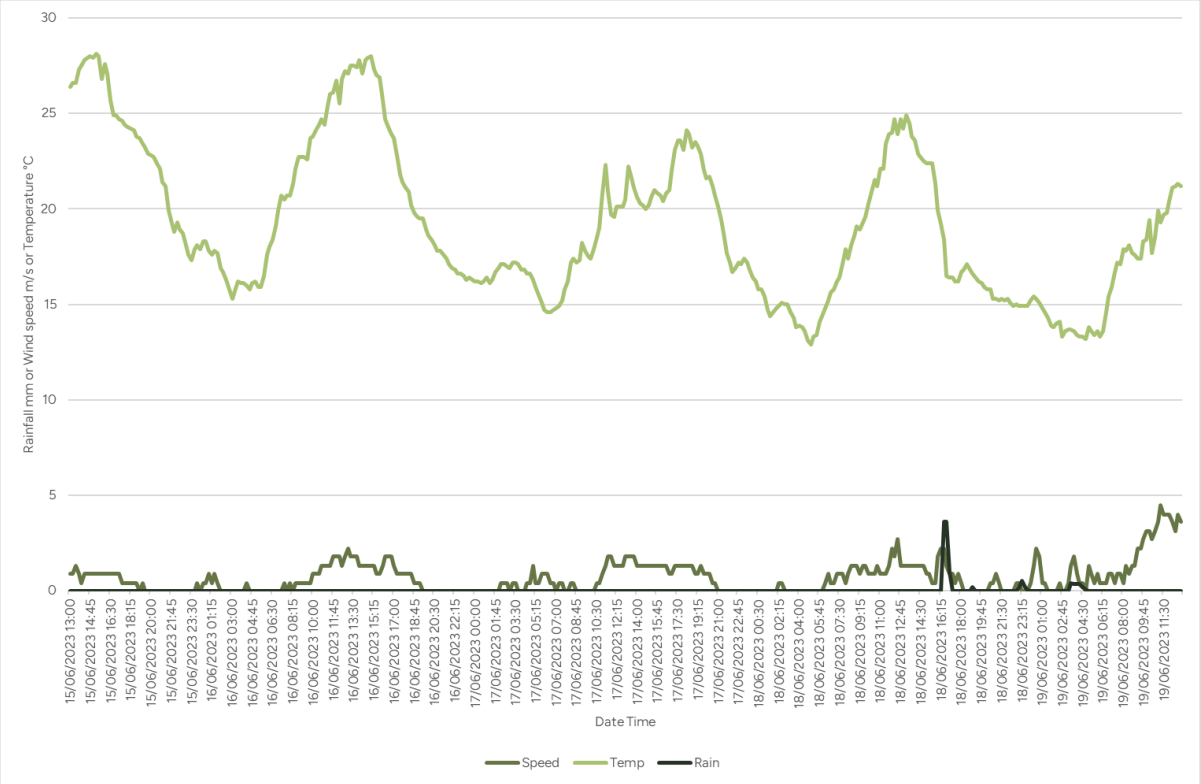
Quarry Extension

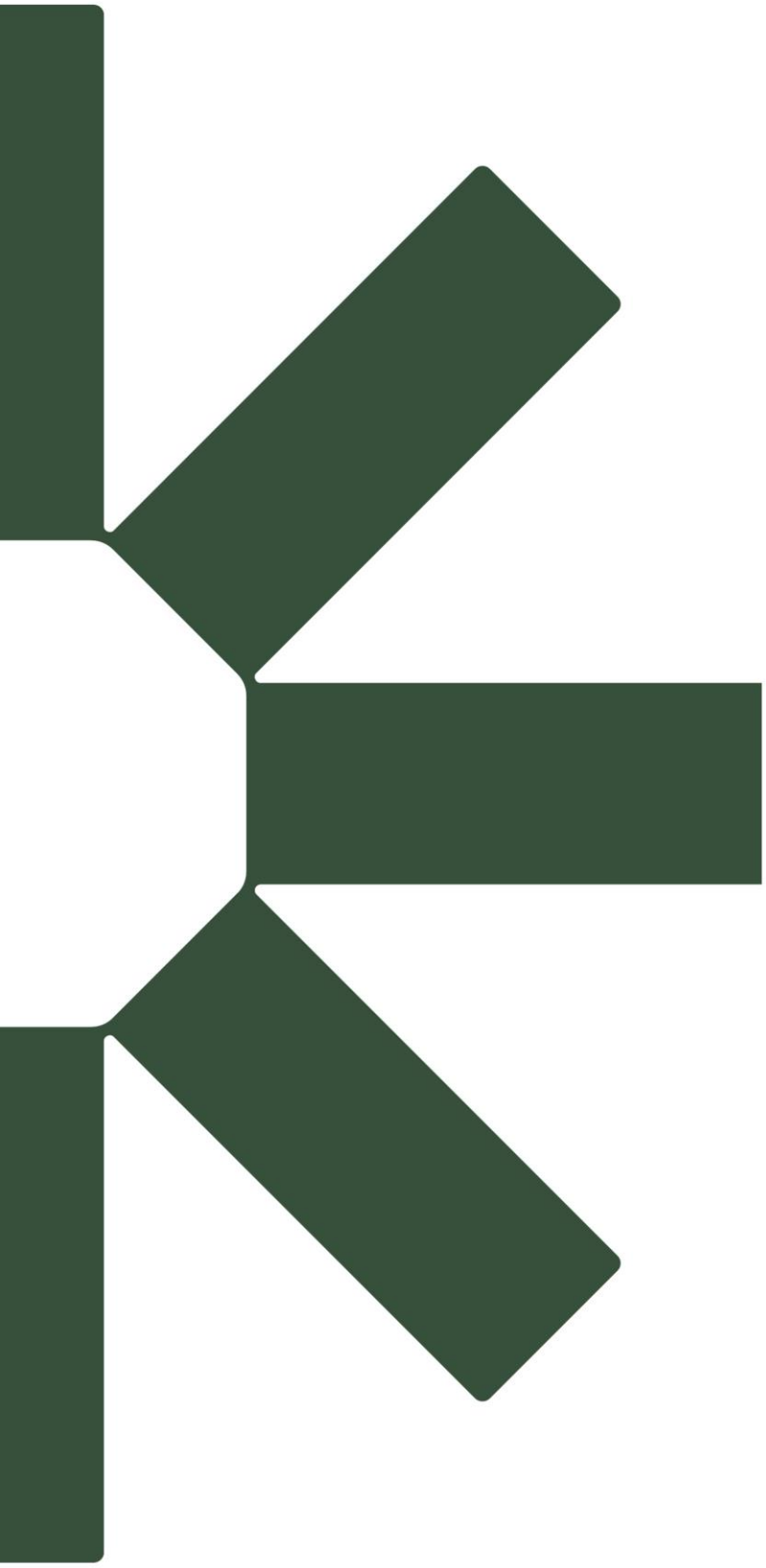
**Breedon Trading Ltd**

SLR Project No.: 403.064944.0001

2 August 2023

## Figure C.1: Weather Time History Graph





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