CHAPTER 11

NOISE AND VIBRATION

FEBRUARY 2025

QUARRY CONSULTING

Table of Contents

CHAPTER 11: NOISE AND VIBRATION

Introduction

11.1 This chapter describes the potential noise and vibration impact of the Proposed Development.

11.2 The proposed development comprises the following:

- Continued use of the existing quarry to the permitted depth of minus 5 mOD, including drilling, blasting, crushing, processing, stockpiling of materials, associated roads and ancillary services (granted under Planning Ref. File No.: 09/1958 and ABP Ref.: PL07.235821);
- Continued use of open storage areas;
- Continued use of existing permitted concrete manufacturing facility (granted under Planning Ref. File No. 09230 and 19/517: ABP-304769-19);
- Continued use of the existing office (granted under Planning Ref. File No.: 09/1958 and ABP Ref.: PL07.235821);
- Continued use of the existing maintenance shed (granted under Planning Ref. File No. 09610);
- Continued use of the existing water management system (including settlement lagoons), weighbridge and wheelwash;
- Lateral extension of the existing permitted quarry area over a previously permitted extraction area (granted under Planning Ref. File No. 06/4125) of c.4.6 ha. area to a final floor level of minus 5 mOD. The total quarry extraction area will be c. 13 Ha.;
- Restoration of the application area to natural habitat after uses following completion of extraction.

11.3 The proposed development is within an overall application area of c. 27.5 hectares and is for a total period of 22 years (comprising an operational period of 20 years followed by 2 years for restoration).

11.4 A full description of the development can be found in Chapter 3 (Description). The construction and operational phases in relation to noise and vibration have been assessed.

11.5 Appendix 11-1 presents a glossary of acoustic terms used throughout this chapter.

Statement of Authority

11.6 This chapter was prepared Mike Simms, Principal Acoustic Consultant at AWN who holds a BE and MEngSc in Mechanical Engineering and is a member of the Institute of Acoustics and of the Institution of Engineering and Technology. Mike has worked in the field of acoustics for more than 20 years. He has extensive experience in all aspects of environmental surveying, noise modelling and impact assessment for various sectors including, energy, industrial, commercial, and residential.

Limitations / Difficulties Encountered

11.7 This assessment was compiled on the basis of published guidance documents, and site-specific field surveys. No difficulties were encountered in compiling the required information.

Legislative and Policy Context

11.8 The site currently operations under planning permission reference 091958. The planning conditions include limits on noise at noise-sensitive locations due to operations at the site. These are discussed in detail in paragraph 11.9.

Assessment Methodology and Significance Criteria

Construction Phase – Noise

11.9 The proposed development does not involve the construction of any new structures or quarry plant therefore it is not considered that the project includes construction phase. As such no noise or vibration criteria are set for the construction of the proposed development.

Operational Phase – On-site Activities

11.10 The Department of Environment, **Quarries and Ancillary Activities, Guidelines for Planning Authorities** (2004) and the EPA **Environmental Management Guidelines Environmental Management in the Extractive Industry (Non-Scheduled Minerals)** (2006) notes the following in relation to recommended Emission Limit Values (ELV's) for quarry sites:

> *In relation to quarry developments and ancillary activities, it is recommended that noise from the activities on site shall not exceed the following ELV's at the nearest noise sensitive receptor.*
>
> - *Daytime (08:00hrs to 20:00hrs) 55dB $L_{Aeq,(1\ hour)}$*
> - *Night-time (20:00hrs to 08:00hrs) 45dB $L_{Aeq,(1\ hour)}$*

11.11 This document also states that 95% of all noise levels shall comply with the specified limit value(s). No noise level shall exceed the limit value by more than 2 dBA. This Guidance acknowledges the variability of operational intensity from time to time.

Operational Phase – Additional Vehicular Traffic on Public Roads

11.12 In order to assist with the interpretation of the noise associated with vehicular traffic on public roads, Table 11-1 offers guidance as to the likely impact associated with any particular change in traffic noise level based on the United Kingdom Highways England (now National Highways) (UKHE) **Design Manual for Roads and Bridges (DMRB) Sustainability & Environment Appraisal LA 111 Noise and Vibration Revision 2** (UKHE, 2020) and the EPA document **Guidelines on the Information to be contained in Environmental Impact Assessment Reports** (EPA, 2022).

Table 11-1: Classification of magnitude of traffic noise changes in the long term

Change in Sound Level (dB)	Subjective Reaction	DMRB Magnitude of Impact (Long-term)	EPA Significance of Effect
0.0 – 0.9	Inaudible	Negligible	Imperceptible
1.0 – 2.9	Barely Perceptible	Not Significant	
3 – 4.9	Perceptible	Minor	Slight, Moderate

5 – 9.9	Up to a doubling of loudness	Moderate	Significant
10+	Doubling of loudness and above	Major	Very Significant

Operational Phase - Vibration

11.13 Currently, blasting is undertaken periodically at the site within the extraction area. This practice will continue for the proposed extraction phases. Blasting has the potential to generate ground and air borne vibrations, measured as peak particle velocity and air overpressure. Both are managed by setting vibration limits designed to minimise nuisance and prevent structural damage.

Assessment of Historical Planning Conditions:

Peak Particle Velocity

11.14 Peak Particle Velocity is defined as a measure of the velocity of vibration displacement in terms of millimetres per second (mm/s). Under the quarry's current permission, a vibration limit of 12 mm/s PPV at the nearest sensitive building applies to blasting. This limit is in line with that set out in the DoEHLG and EPA Guidelines for the industry.

11.15 The planning authority previously imposed conditions related to blasting activities at the quarry under Plan File Ref. No. 09/1958; ABP PL07.235821.

11.16 Condition 15(a) stipulated that vibration levels from blasting shall not exceed a peak particle velocity of **12 mm/s**, when measured in any three mutually orthogonal directions at any sensitive location, for blasting occurring no more than once in seven continuous days. Where blasting operations are more frequent, the limit was reduced to **8 mm/s**.

11.17 Under the 2023 permission (Plan File Ref. No. 20/499; ABP-308549-20), the imposed vibration limit was **6 mm/s** at nearby sensitive locations, including dwellings.

11.18 While these measures were likely aimed at mitigating potential impacts on nearby sensitive receptors, the justification provided for these specific limits is inadequate. Notably, the reason for imposing the condition is ambiguous and contains typographical errors, stating: "In the interests of protection of residential ministries have joined properties and to ensure public safety and Environmental Protection."

11.19 Furthermore, the condition's vibration limit of 6 mm/s deviates from established guidelines in the previous planning permission, the **EPA Environmental Management Guidelines (2006)** and **BS 5228-2:2009+A1:2014**, which allow higher thresholds under normal circumstances. The BS 5228-2 guidelines recommend a peak particle velocity (PPV) of up to **12 mm/s** at sensitive locations for residential properties and similar structures. Additionally, the standard outlines a reduction in vibration thresholds where blasting occurs more than once per week, which the imposed condition fails to address.

11.20 A 6 mm/s blast restriction would significantly impact operational efficiency by limiting the scale and intensity of blasting, thereby reducing the volume of rock that can be effectively extracted and processed in a single blast, which increases operational costs and prolongs the timeline for resource extraction.

11.21 In light of these inconsistencies, it is recommended that future blasting activities align with the 2009 permission and recognised standards, such as BS 5228-2 and EPA guidelines. These standards provide a more scientifically robust framework for managing and mitigating noise and vibration impacts, ensuring both environmental protection and operational feasibility.

Air Overpressure

11.22 Air overpressure (AOP) is the pressure wave in the atmosphere produced by the detonation of explosives. This consists of both audible (noise) and inaudible (concussion) energy. It is generally expressed as dB (Lin). Under the quarry's current permission, an AOP limit of 125dB Lin with a 95% confidence limit at the nearest sensitive building applies to blasting. This limit is in line with that set out in in the DoEHLG and EPA Guidelines.

Forecasting Methods

11.23 Noise prediction calculations for construction phases have been conducted in accordance with BS 5228: 2009+A1:2014: *Code of practice for noise control on construction and open sites - Noise*.

11.24 Proprietary noise calculation software has been used for the purposes of modelling operational noise. The selected software, DGMR iNoise, calculates noise levels in accordance with ISO 9613:2024 *Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation*, 2024.

11.25 Changes in road traffic noise on the local road network have been considered using prediction guidance contained within Calculation of Road Traffic Noise (CRTN) issued by the UK Department of Transport in 1988.

Baseline Conditions

Noise-sensitive Locations

11.26 In the first instance it is considered appropriate to define a noise sensitive location. In this context, it is considered prudent to give consideration to adopt the definition supplied by the Environmental Protection Agency (EPA) which states the following in NG4 Appendix I:

> *NSL – any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.*

11.27 A representative set of the nearest noise sensitive locations to the site are highlighted on Figure 11-1, all of which are residential houses except for NSR13 which represents Scoil Naomh Mhuire in Lisheenkyle.

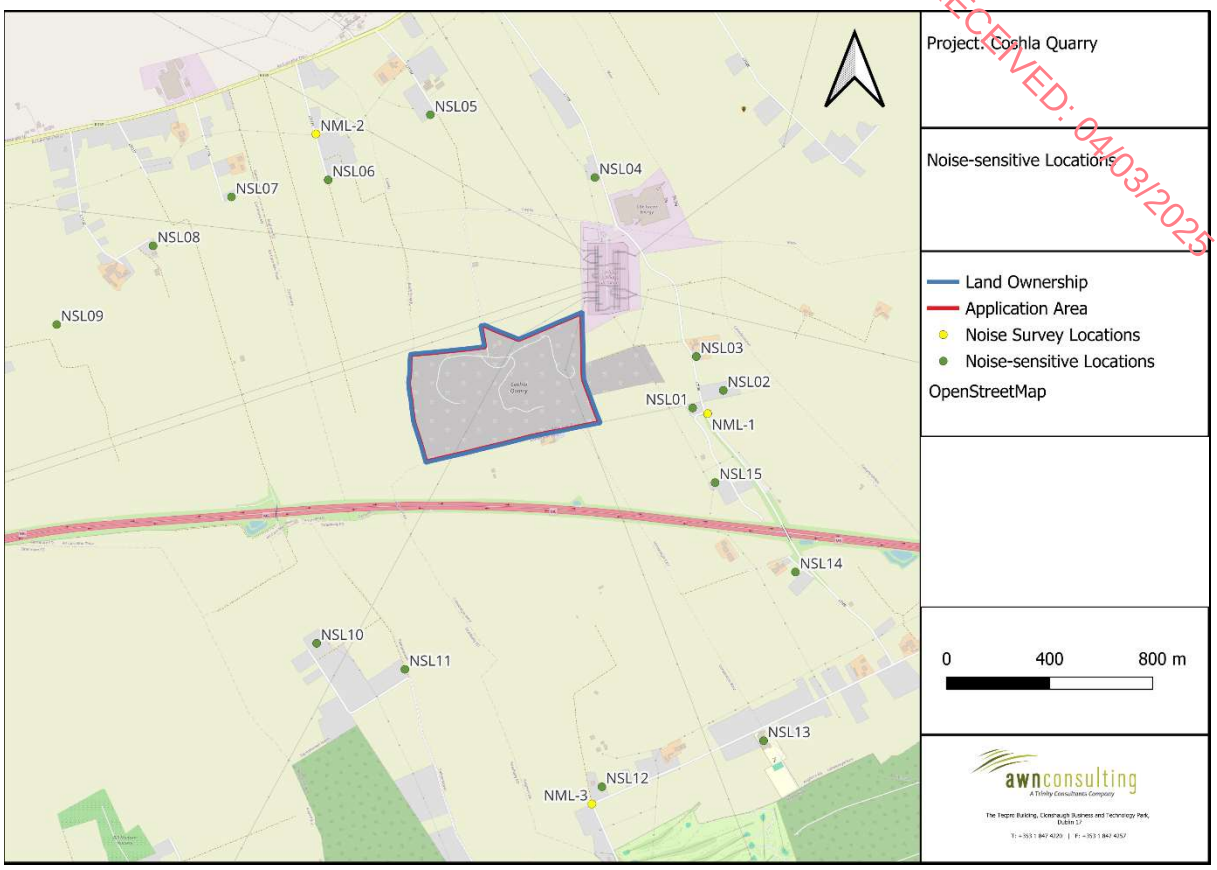

Figure 11-1: Noise-sensitive locations and noise-measurement locations

Measurement Locations

11.28 Three measurement locations were selected; each is described in Table 11-2 and shown on Figure 11-1. The locations were selected to obtain representative baseline noise levels at noise sensitive locations, in this case houses, in the vicinity of the Proposed Development area.

Table 11-2: Noise Monitoring Locations

Location Reference	Receptors of Relevance	Description
NML 1	NSL01, NLS02, NLS03, NSL014 and NSL15	In the vicinity of residential properties to the east of the site.
NML 2	NNLS04, NLS05, NSL06, NSL07, NSL08 and NSL09	North east of the site at a location representative of noise sensitive locations within this area.
NML 3	NSL10, NSL11, NSL12 and NSL13	South of the proposed site at noise sensitive locations in the vicinity of Lisheenkyle.

Survey Periods

11.29 An attended noise survey was undertaken to obtain typical baseline noise levels at noise sensitive locations surrounding the site on the 12th November 2024 between 10:36hrs and 15:01hrs.

11.30 Measurements were carried out on a cyclical basis with measurement durations of 15-minute periods, over three rotations.

Instrumentation and Setup

11.31 The measurements were made using a Rion NL-52 Logging integrating Sound Level Meter. This instrument is a Class 1 instrument in accordance with IEC 651 regulations. The Time Weighting used was Fast and the Frequency Weighting was A-weighted as per IEC 651.

11.32 The instrument was calibrated with a Larson Davis CAL200 calibrator prior to and after the measurement period. The microphone was protected using a proprietary Bruel and Kjaer windshield. The sound level meter was mounted on a tripod approximately 1.5 metres above ground level and at least 3 metres away from any reflective surfaces.

11.33 The laboratory calibration certificate for the noise level meter is presented in Appendix 11-2 of this report. The survey results were noted onto a Survey Record Sheet immediately following each sample and were also saved to the instrument memory for later analysis. Survey personnel noted the primary sources contributing to noise build-up during the survey.

Measurement Parameters

11.34 Several parameters were measured in order to characterise the noise environment. These included the following:

L_{Aeq} *This is the equivalent continuous A weighted sound pressure level. It is an average of the total sound energy (noise) measured over a specified time period.*

L_{A90} *Noise level exceeded for 90% of measurement period (steady underlying noise level).*

L_{A10} *Noise level exceeded for 10 % of measurement period. It is typically a descriptor of traffic noise.*

L_{Amax} *Maximum A weighted noise level measured.*

11.35 The "A" suffix denotes that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. The "F" suffix denotes that the parameter has been measured with 'Fast' time-weighting applied. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pascal (Pa).

Meteorological Conditions

11.36 Weather conditions during the survey period were dry and bright with winds below 5 m/s and temperatures in the region of 5°C.

Results of Baseline Survey

11.37 The results of the baseline noise survey are described in the following sections.

Noise Monitoring Location 1 (NML 1)

11.38 Table 11-3 presents a summary of the baseline noise levels measured at NML 1.

Table 11-3: Noise Survey Results NML 1

Start Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			
	$L_{Aeq,15\ min}$	L_{Amax}	$L_{A10,\ 15\ min}$	$L_{A90,\ 15min}$

10:58	58	83	46	36
13:22	58	80	44	36
14:26	61	83	57	40

11.39 During the baseline measurements, the main noise sources observed at this location were road traffic (both distant traffic on the M6 and on local roads), birdsong, and wind rustle. A faint low-frequency hum and intermittent muffled metallic noises, possibly originating from the distant quarry located over 400 metres away, were barely perceptible and not significant contributors to the measured noise levels. The recorded noise levels ranged from 58 dB to 61 dB L_{Aeq} and 36 dB to 40 dB L_{A90}, which are attributable to the dominant sources identified above. No significant source of vibration was noted at this location.

Noise Monitoring Location 2 (NML 2)

11.40 Table 11-4 presents a summary of the baseline noise levels measured at NML 2.

Table 11-4: Noise Survey Results NML 2

Start Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			
	$L_{Aeq,15\ min}$	L_{Amax}	$L_{A10,\ 15\ min}$	$L_{A90,\ 15min}$
11:18	39	65	39	33
13:41	57	85	48	33
14:46	41	63	44	33

11.41 During the baseline measurements, the main noise sources observed at this location were occasional vehicles on the local roads past the measurement point during the second and third measurements. Distant road traffic and birdsong were audible during all measurements. A dog was barking intermittently during the second measurement. Quarry noise was not audible at this location during the survey. Noise levels were in the range of 39 dB to 51 dB L_{Aeq} and were 33dB L_{A90}. No significant source of vibration was noted at this location.

Noise Monitoring Location 3 (NML 3)

11.42 Table 11-5 presents a summary of the baseline noise levels measured at NML 3.

Table 11-5: Noise Survey Results NML 3

Start Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			
	$L_{Aeq,15\ min}$	L_{Amax}	$L_{A10,\ 15\ min}$	$L_{A90,\ 15min}$
10:36	57	77	62	37
11:42	55	75	60	36
14:07	59	78	62	33

11.43 During the baseline measurements, the main noise sources observed at this location were vehicles passing along the nearby road. Distant road traffic and birdsong were audible during

all measurements. Noise levels were in the range of 39 dB to 51 dB L_{Aeq} and were 33dB L_{A90}. No significant source of vibration was noted at this location.

Historical Compliance Noise Surveys

11.44 BHP Ltd has been commissioned by Coshla Quarries Ltd to undertake quarterly noise surveys at their quarry facility at Coshla, Co. Galway. The relevant conditions of planning permission for the facility place a daytime noise limit of 55dB(A) at the nearest sensitive receptors. Noise monitoring is required for a period of 60 minutes at each of these locations and is carried out on a quarterly basis.

11.45 Results of previous surveys have been provided by Coshla Quarries Ltd. for information purposed and the results of a selection of historic surveys (for the period 2024) are presented in Appendix 11-3.

Potential Effects

Operational Phase

On-site Activities – Mobile Plant

11.46 The main sources of noise are extraction, processing of rock through processing (crushing and screening) on the quarry floor, the transport of material along the haul routes, the use of processed stone in the existing concrete manufacturing facility and then the export of product (aggregates and concrete) off site.

11.47 Processing plant and mobile equipment will be located close to the working face of the quarry when used within the site. The existing primary crushing and screening plant will be on the quarry floor below surrounding ground levels.

11.48 Potential noise impacts are associated with the following:

- Drilling and blasting of rock;
- Breaking of oversize rock;
- Crushing plant;
- Screening of crushed rock into various aggregate sizes;
- Stockpiling of product;
- Loading of product and transport off-site;
- Additional traffic along public roads;
- Concrete production (batching plant).

11.49 Quarry activities are assessed as on-site activities and off-site activities. The on-site activities generally refer to the processing of extracted rock with the quarry bounds and off-site activities refers to the transport of processed product to customers. Both activities are assessed separately in the following sections.

11.50 Over the course of the different extraction phases, the location of on-site activities will vary, resulting in a range of noise levels at the nearest noise-sensitive locations. Currently, quarrying activities occur within the quarry void and at some locations at original ground levels. The proposed extension will involve similar operations within previously disturbed ground. At the

start of each extraction area, noise levels are expected to be highest. As extraction progresses further into the quarry void, the quarry face will provide increased shielding, reducing noise levels at adjacent properties. Therefore, the proposed extraction activities are predicted to result in noise emissions that are comparable to, or lower than, those associated with the existing quarry operations

On-site Activities – Fixed Plant

11.51 The plant items and machinery expected at the concrete batching plant are as follows:

- Dump Trucks;
- Feed Hopper;
- Conveyors;
- Concrete Mixer Unit; and
- Concrete Trucks (Loading of product and transport off-site).

Noise Model

11.52 In order to assess the potential noise impacts associated with the proposed phases within the Planning Application Area, a noise model of the site has been developed. The model has been developed using DGMR acoustic modelling software (iNoise, version 2024). This is a quality-assured acoustic modelling package for computing noise levels in the vicinity of different types of noise sources. For the quarry model, the calculation standard used is the ISO 9613 (1996) Standard Acoustics: Attenuation of Sound during Propagation Outdoors. Part 2: General Method of Calculation.

11.53 The model takes account of the various factors affecting the propagation of sound in accordance with the standard, including:

- The magnitude of the noise source in terms of sound power;
- The distance between the source and receiver;
- The presence of obstacles such as screens or barriers in the propagation path;
- The presence of reflecting surfaces;
- The hardness of the ground between the source and receiver;
- The attenuation due to atmospheric absorption; Meteorological effects such as wind gradient, temperature gradient and humidity (these have significant impact at distances greater than approximately 400m).

11.54 Source data for operating quarry plant items have been obtained from on-site measurements and BS 5228: Part 1 -Noise. This document provides sound power data per octave band which can be used for individual source items. Table 11-6 summaries the noise source data used in the model with all source data is corrected to 10m. The dominant noise sources identified on site were used for modelling purposes.

Table 11-6: Noise Source Data used for Noise Model

Site Activity	Noise Level at 10m [dB(A)]	Source Reference data
Concrete Batching Plant	78	BS5228 D6.10

2 Loading silo/hopper	69	BS5228 C10.22
Excavator Mounted Rock Breaker	93	BS5228 C9.11
Loaders	85	BS5228 C9.23
Transformer	39	Bies&Hansen, 10.16 [A]
Crushers (2 no.)	90	BS5228 C9.14
Screeners (3 no)	81	BS5228 C10.14
HGV Movement	79	BS5228 C2.30
Dozer	79	BS5228 C2.11
Tracked Excavator	71	BS5228 C2.21
Drill Rig	90	BS5228 C.9.1

Note A Bies, Hansen and Howard: Engineering Noise Control, 5th Ed, 2018.

Results

11.55 The results of the noise propagation models are presented in Table 11-7. Equipment items modelled on the quarry floor include a tracked semi mobile crushing and screening plant, drill rig, excavator mounted rock breaker and front shovel loader.

11.56 The model takes account of the existing landscaping berms. Please refer to Chapter 3 of the EIAR for further details on the existing boundary treatments.

11.57 A noise contour plot calculated to a height of 1.5m is presented in Appendix 11-5.

11.58 The specific noise levels calculated at the nearest noise sensitive locations for each of the assessed phases are summarised in Table 11-7. The results are calculated to a height of 4 m, representing that of a typical first-floor window.

Table 11-7: Calculated noise levels due to continued quarry operations

Location	Predicted Daytime Noise Levels from proposed Extraction Activities (dB $L_{Aeq,T}$)
NSR 1	51
NSR 2	49
NSR 3	49
NSR 4	50
NSR 5	44

NSR 6	44
NSR 7	43
NSR 8	36
NSR 9	39
NSR 10	43
NSR 11	42
NSR 12	39
NSR 13	43
NSR 14	46
NSR 15	49

11.59 On review of the modelling results presented in Table 11-7, the operational noise levels associated with the proposed extraction works as part of this planning application are within the operation noise criterion of 55 dB L_{Aeq} at all NSLs.

11.60 A discussion on best practice noise mitigation measures and practices to prevent negative noise impacts at the NSLs are included in paragraphs 11.63 to 11.64.

Significance of effects

11.61 The expected operational phase noise effects at the nearest NSR's to the site are expected to be negative, not significant and long-term.

Off Site Activities (Traffic)

11.62 There will be additional traffic along public roads as a result of the proposed development. Please refer to Chapter 13 for full details in relation the traffic assessments prepared for the development. Based on traffic flow values presented therein for the Existing Development and Proposed Development scenarios, the changes in traffic noise levels have been calculated for the opening year 2025 and the design year 2040 and are shown in Table 11-8:

Table 11-8: Predicted changes in traffic noise level

Year	Change in traffic flow (%)	Change in noise level dB(A)	EPA Significance of Effect
2025	34.58%	1.8	Not Significant
2030	30.72%	1.6	Not Significant

2040	27.25%	1.4	Not Significant

Significance of effects

11.63 The expected noise and noise effects in relation to off-site activities can be summarised as follows: Negative quality, Not Significant and of Long-Term duration.

Vibration

11.64 As part of the continuation operations, blasting will be undertaken periodically at the site within the proposed extraction areas. As noted in paragraph 11.13 the existing quarry has been significantly quarried historically using blast techniques. There is no change proposed to the current blasting procedure associated with the proposed continuation operations and future extraction. In line with the current best practice operations and conditions of planning at the site, all blasts will be designed to ensure the PPV limit of 12mm/s and AOP of 125dB Lin is not exceeded at the nearest sensitive dwellings.

Significance of effects

11.65 The expected operational phase vibration effects at the nearest NSLs to the site are summarised as follows: negative quality, slight and of brief duration.

Impact on Designated Sites

11.66 In respect of environmental noise and vibration, no Special Area of Conservation (SAC) or Special Protected Areas (SPA) is affected by the proposed development.

11.67 The nearest SPA Is the Inner Galway Bay SPA at a distance of approximately 5.7 km at the closest point.

11.68 The nearest SACs are Galway Bay Complex SAC at 3.88 km distance and Lough Corrib SAC at 3.93 km distance.

Ecological Receptors Sensitive to Noise and Vibration

11.69 Key Species: Peregrine falcon (a bird protected under European law) has been nesting on a quarry ledge since 2016 (refer to Chapter 6: Biodiversity).

Potential Impacts (Disturbance from Noise, Vibration, and People):

11.70 Quarry work can create noise and vibration from blasting. Although wildlife can gradually get used to regular sounds, special care is needed for sensitive birds like peregrine falcons during breeding season.

Mitigation Measures (Safeguards for Peregrine Falcons):

11.71 A buffer area (an untouched zone) of around 125 meters is kept when the falcons are nesting each spring, avoiding loud blasts in that zone.

11.72 Quarry operations (including blasting) will continue follow a plan that respects peregrine breeding times (refer to Chapter 6: Biodiversity: Table 6.10).

Mitigation and Management (and/or Monitoring)

Operational Phase Noise

11.73 This noise impact assessment has been carried out using worst case scenario assumptions. As mentioned earlier the noise emissions from the quarry will vary depending on the intensity of quarry operations and there will be times when the noise emissions predicted herein will be lower.

11.74 The calculated noise levels at the nearest noise sensitive locations to the quarry do not exceed the recommended operational criterion adopted for the quarry. Notwithstanding this, best practice noise mitigation measures will form part of site management practices to ensure noise from on-site operations do not cause a noise nuisance at the nearest NSR, the following measures are recommended:

- Existing screening banks and screening / planting around the facility will be retained to act as acoustic barriers. Existing / temporary berms should be inspected on a regular basis and maintained as necessary.
- Regular maintenance of items of plant to ensure that they are operating efficiently;
- Location of noisy items of plant at the lowest part of the working quarry floor and as close to the quarry face as possible to provide optimum noise screening;
- Design of internal haul roads with as low a gradient as possible to minimise excessive revving of vehicle engines travelling on-site.
- Regular maintenance of haul routes to avoid potholes and uneven surfaces;
- Avoiding unnecessary revving of engines, reducing speed of vehicle movement and keeping lorry tailgates closed where possible;
- All mobile equipment is throttled down or switched off when not in use;
- Use of rubber linings in chutes, dumpers, transfer points etc. to reduce the noise of rock falling on metal surfaces;
- Using rubber mats around screening and crushing plants;
- Enclosing pumps, covering conveyors, cladding the plant and keeping noise control hoods closed when machines are in use;
- Within the constraints of efficient production, limiting the use of particularly noisy plant, limiting the number of items in use at any one time, starting plants one-by-one and switching off when not in use, and;
- Pointing directional noise away from sensitive areas where possible.

Operational Phase Vibration

11.75 Review of historical vibration monitoring during blasting operations has confirmed that the relevant vibration limits applied for this activity can be complied with. As noted above, ongoing blasts will be designed to ensure these limits are not exceeded for future blasts. In line with best practice measures, the following will form part of the blast design process:

- Laser profiling will be conducted to establish an accurate geometry of the quarry face, thereby enabling the optimum burden and spacing to be applied for the blast;
- Ensure that the optimum blast ratio is maintained and the maximum amount of explosive on any one delay, the 'maximum instantaneous charge' is optimised so that the ground vibration levels are kept below those specified;

- Explosive charges are properly and adequately confined by using a sufficient quality of aggregates for stemming;
- No blasting is carried out at weekends or public holidays;
- All blasts are measured (ground vibration & air overpressure) in the area of at least two sensitive receptors to ensure compliance with the appropriate limits;
- Notice of all blasts given to local residents prior to the blast taking place;
- Continue to adapt the monitoring requirements during blasting in line with existing conditions.
- All monitoring equipment calibrated regularly to ensure that peak particle velocity and air overpressure generated from each blast is accurately measured; and,
- Blasting is carried out by professionally trained blast engineers.

'Do-Nothing' Scenario

11.76 In the 'do nothing' scenario, where the proposed development does not proceed, noise and vibration levels at the site would gradually decline over time as quarrying operations cease due to the depletion of reserves. This would result in the cessation of extraction activities, blasting, and associated on-site processing, significantly reducing operational noise emissions and eliminating vibration events.

11.77 While the cessation of quarry-related traffic would slightly reduce localised noise along the haul routes, its contribution to the overall traffic noise environment is minimal, and no noticeable change in the broader traffic noise levels in the area is anticipated. However, given the strategic importance of high-quality limestone resources in the region (refer to EIAR Chapter 7: Land, Soils & Geology), there is a strong likelihood that new proposals for quarrying operations in the local area may emerge to meet ongoing demand, potentially reintroducing noise and vibration impacts associated with quarrying in the future.

Unplanned Events (i.e. Accidents)

11.78 Accidents, malfunctions and unplanned events refer to events or upset conditions that are not part of any activity or normal operation of the proposed development as has been planned by Coshla Quarries Ltd. Even with the best planning and the implementation of preventative measures, the potential exists for accidents, malfunctions or unplanned events to occur during the proposed backfilling and recovery activities.

11.79 Many accidents, malfunctions and unplanned events are, however, preventable and can be readily addressed or prevented by good planning, design, emergency response planning, and mitigation. Considering the backfilling activities, there is no need to use any warning sirens or warning sounds in relation to unplanned events. In terms of noise impacts, the following unplanned events may arise :

- equipment malfunction;
- vehicle collision.

11.80 In relation to noise, the impacts of any unplanned events are considered to be negligible and have no potential to increase noise levels at sensitive receptors.

Cumulative Effects

11.81 The baseline noise survey measured existing noise levels at noise sensitive locations, in this case houses, in the vicinity of the quarry extraction area. This survey included noise generated by existing businesses and activities in the vicinity of the quarry. Therefore, noise from existing activities is considered cumulatively throughout this chapter.

11.82 Construction activity at the proposed battery storage facility and at the quarry reclamation project site will also require plant items which will generate some additional noise. These activities will result in short term, slight, negative effects on noise. There will be no significant cumulative effects between the proposed development and the construction phase of the proposed battery storage facility.

Interaction with Other Impacts

11.83 The potential impact of noise generated by the proposed development activity on sensitive receptors including sensitive ecological receptors and people living in the area has been assessed in this Chapter of the EIAR. The impact of the proposed development activity on these receptors is further considered in Chapter 4 'Population and Human Health' and Chapter 5 'Biodiversity'.

Residual Effects

11.84 The residual extraction phase impacts associated with the proposed extraction works are not predicted to increase above existing noise and vibration levels.

11.85 The expected noise and vibration effects for the operational phase can be summarised as follows negative quality, not Significant and of long-Term duration.

Difficulties Encountered

No difficulties were encountered in the preparation of this chapter.

References

- British Standard Institute (BSI) BS 5228-1:2009 +A1:2014 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise (BSI, 2014)
- British Standard Institute (BSI) BS 5228-2:2009+A:2014 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration (BSI, 2014)
- United Kingdom Highways England (now National Highways) (UKHE) Design Manual for Roads and Bridges (DMRB) Sustainability & Environment Appraisal LA 111 Noise and Vibration Revision 2 (UKHE, 2020)
- Environmental Protection Agency (EPA) Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022)
- Environmental Protection Agency (EPA) Environmental Management Guidelines Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (EPA, 2006)
- British Standard Institute (BSI) BS 7385: 1993 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration (BSI, 1993)
- International Organization for Standardization (ISO) ISO 1996: 2017: Acoustics – Description, measurement, and assessment of environmental noise (ISO, 2017)
- International Organization for Standardization (ISO) *ISO 9613-2:2024 Acoustics – Attenuation of sound during propagation outdoors - Part 2: General method of calculation* (ISO, 2024)

APPENDICES

Appendix 11.1 – Glossary of Acoustic Terms

Ambient noise	The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far.
Background noise	The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T (LAF90,T).
Decibel	The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 μ Pa).
dB(A)	An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. 'A'–weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Hertz (Hz)	The unit of sound frequency in cycles per second.
$L_{Aeq,T}$	This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T). The closer the LAeq value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.
L_{AFN}	The A-weighted noise level exceeded for N% of the sampling interval. Measured using the "Fast" time weighting.
L_{AF90}	Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level. Measured using the "Fast" time weighting.
L_{AF10}	Refers to those A-weighted noise levels in the upper 10 percentile of the sampling interval; it is the level which is exceeded for 10% of the measurement period. It is typically representative of traffic noise levels. Measured using the "Fast" time weighting.
L_{AFmax}	is the instantaneous fast time weighted maximum sound level measured during the sample period.
L_{AFmin}	is the instantaneous fast time weighted minimum sound level measured during the sample period.
Octave band	A frequency interval, the upper limit of which is twice that of the lower limit. For example, the 1,000Hz octave band contains

	acoustical energy between 707Hz and 1,414Hz. The centre frequencies used for the designation of octave bands are defined in ISO and ANSI standards.
Peak Particle Velocity (PPV)	a measure of the maximum instantaneous velocity at which particles in a medium (e.g., soil, rock, or structural materials) move as a result of vibrational energy.

Appendix 11.2 – Calibration Certificates

ANV MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

ilac-MRA UKAS CALIBRATION 0653

Date of Issue: 29 September 2023 **Certificate Number: UCRT23/2264**

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Approved Signatory

K. Mistry

Customer	AWN Consulting The Tecpro Building 17 Clonshaugh Business & Technology Park Dublin
Order No.	AWN200923
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification	*Manufacturer*	*Instrument*	*Type*	*Serial No. / Version*
	Rion	Sound Level Meter	NL-52	00764925
	Rion	Firmware		2.0
	Rion	Pre Amplifier	NH-25	65051
	Rion	Microphone	UC-59	09853
	Rion	Calibrator	NC-75	34334830
		Calibrator adaptor type if applicable		NC-75-022

Performance Class	1
Test Procedure	TP 10. SLM 61672-3:2013 *Procedures from IEC 61672-3:2013 were used to perform the periodic tests.*
Type Approved to IEC 61672-1:2013	Yes *If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013*
Date Received	28 September 2023 ANV Job No. UKAS23/09669
Date Calibrated	29 September 2023

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	09 September 2021	UCRT21/2107	0653

CERTIFICATE OF CALIBRATION

0653

Date of Issue: 03 July 2024

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Certificate Number: UCRT24/1924

Page 1 of 2 Pages

Approved Signatory

K. Mistry

CUSTOMER	AWN Consulting Ltd. The Tecpro Building IDA Business and Technology Park Clonshaugh Dublin D17 XD90
ORDER No	2412 Job No UKAS24/07478
DATE OF RECEIPT	02 July 2024
PROCEDURE	Procedure TP 1 Calibration of Sound Calibrators
IDENTIFICATION	Sound Calibrator Larson Davis type CAL200 serial number 2371 with half-inch housing
CALIBRATED ON	03 July 2024
PREVIOUS CALIBRATION	Calibrated on 26 May 2023, Certificate No. UCRT23/1710 issued by this laboratory.

Appendix 11.3 – Historical Noise Measurements

BHP Ltd was commissioned by Coshla Quarries Ltd to undertake quarterly noise surveys at their quarry facility at Coshla, Co. Galway. The relevant conditions of planning permission for the facility place a daytime noise limit of 55dB(A) at the nearest sensitive receptors. Noise monitoring is required for a period of 15 minutes at each of these locations on a quarterly basis.

Results of previous surveys have been provided by Coshla Quarries Ltd for information purposed and the results of a selection of recent noise monitoring results are presented in Table A3.1.

Table A3.1 Summary of Previous Compliance Noise Survey Results

Location	Measured Noise Levels [dB re. $2x10^{-5}$ Pa]							
	2024 Q1		2024 Q2		2024 Q3		2024 Q4	
	L_{Aeq}	L_{A90}	L_{Aeq}	L_{A90}	L_{Aeq}	L_{A90}	L_{Aeq}	L_{A90}
A	45	42	47	37	49	46	50	47
D	54	46	54	43	52	43	55	45
E	46	43	45	34	43	40	40	44

Observations documented in the compliance reports identify background traffic and quarry noise as significant contributors to the noise levels at Location A. At Locations D and F activity at the quarry was audible to a lesser degree. HGV movements to and from the site were noted.

There is some variability across the measured noise levels. This reflects the variability of noise emissions from the site. The discussion within all compliance reports prepared for the development for the previous four years has concluded that the quarry was operating within the relevant daytime noise criterion of 55 dB $L_{Aeq,1\text{-}hour}$. No measured or audible tonal content was reported at any location.

Appendix 11.4 – Historical Vibration Measurements

Vibration and Air Overpressure measurements have been carried out periodically at two locations: at a commercial premises to the northeast of Coshla Substation, and a residential location some 500 m to the east of the quarry.

Date	Location	Peak Vibration, mm/s in axis			Air Overpressure, dB Linear
		Horizontal	Transverse	Vertical	
28 Mar 2024	Residential	4	3.49	2.35	111.5
28 Mar 2024	Commercial	3.3	1.59	2.29	110.6
15 Mar 2024	Residential	0.76	1.02	0.57	120.6
15 Mar 2024	Commercial	0.64	0.51	0.51	121.2
01 Mar 2024	Residential	1.4	1.65	0.89	115.6
01 Mar 2024	Commercial	1.27	1.4	2.79	113.8
16 May 2024	Residential	1.14	0.89	0.76	120.2
16 May 2024	Commercial	1.08	1.46	0.76	114.8
28 May 2024	Residential	3.81	3.24	2.79	116.6
28 May 2024	Commercial	1.65	3.05	1.65	112.6
30 Jan 2024	Residential	1.52	1.4	2.16	113.3
30 Jan 2024	Commercial	2.79	1.84	2.1	116.4

Appendix 11.5 – Noise Contour