CONTENTS

INTRODUCTION

Background

10.1 This chapter of the Environmental Impact Assessment Report (EIAR), prepared by SLR Consulting Ireland, provides supporting information to accompany a planning application to Cavan County Council by P&S Civil Works Ltd. It primarily addresses potential noise and vibration related impacts from the proposed quarry extension at Mullymagowan, Stradone, Co. Cavan.

10.2 The proposed development being applied for under this planning application comprises of:

- Quarry extension development for rock extraction and associated processing over an area of c. 4 hectares within an overall planning application area of c. 4.9 hectares as previously permitted under P. Ref. 12/101 (P. Ref. 17/383) and never commenced;
- A time period of 15 years is being sought to allow the previously permitted extraction be completed plus 2 years to complete restoration works (total duration sought 17 years);
- The development proposed seeks to utilise existing ancillary buildings and facilities including weighbridge, wheelwash, portacabin office/canteen/toilet, waste water treatment system, processing plant, site entrance and all other associated site works, and ancillary activities as currently permitted by P. Ref. 07/827; and
- Final restoration of the worked out quarry to a permanent water body and naturally regenerated wildlife habitat area.

10.3 Further information on the site infrastructure, operations, environmental management systems, and controls at the existing and established quarry site (permitted under P. Ref. 07/827) is provided in Chapter 2 of this EIAR.

10.4 The development will provide for extraction of up to 250,000 tonnes of material per year and will use the existing established traffic routes.

10.5 The noise impact assessment presented herein describes and assesses the existing noise baseline characteristics of the local area. The anticipated effects of the proposed development are then applied to these baseline conditions and the resulting noise impacts assessed. Mitigation measures are identified to eliminate or minimise adverse impacts, insofar as practical.

10.6 An operational vibration assessment has also been undertaken as part of this study.

10.7 To assist the understanding of acoustic terminology and the relative change in noise, a glossary of terms and phrases, which specifically relate to this chapter, is provided in **Appendix 10-A**.

Scope of Work

10.8 The following sections of this chapter describe the potential noise impacts associated with the proposed development. The following issues are addressed separately:

- methodology used to assess potential noise and vibration impacts from activities at properties (dwellings and farms) and sensitive ecological receptors;
- baseline conditions pertaining to existing background and ambient noise levels around the project site;
- noise and vibration impact evaluation criteria;

- prediction of the noise and vibration levels and identification of potential impacts;
- assessment of severity of impacts, with reference to the evaluation criteria;
- description of mitigation measures that will be incorporated into the design and operation of the scheme to eliminate or minimise the potential for noise and vibration impact;
- a summary of any residual impacts; and
- monitoring proposals.

Consultations / Consultees

10.9 No specific external consultations were undertaken in the preparation of this Chapter of the EIAR.

10.10 A formal pre-planning consultation was held between planning staff of Cavan County Council and representatives of SLR Consulting Ireland and P&S Civil Works Ltd. on 10 August 2022. Other consultations and informal discussions held by contributors in undertaking their environmental impact assessments are detailed in the specialist environmental sections of the EIAR where relevant, together with details of relevant archives and documentation held by state agencies and organisations.

Contributors / Author(s)

10.11 SLR Consulting Ireland undertook the impact assessment presented in this chapter on behalf of P&S Civil Works Ltd. The lead consultant for the study was Aldona Binchy MSc. Eng PIEMA Environmental Engineering and Conor Hughes MSc. Energy Science.

Limitations / Difficulties Encountered

10.12 This assessment is compiled based on published guidance documents, and site-specific field surveys. No difficulties were encountered in compiling the required information.

REGULATORY BACKGROUND

10.13 The following sections describe the main legislative policy requirements in respect of noise and vibrations associated with the proposed development.

10.14 Currently, there is no national or regional legislation which specifically addresses noise and vibration for the mineral extraction and production of aggregates. However, there are several guidance documents that are relevant in the context of noise and vibration action planning.

Noise

Planning Policy and Development Control

National Planning Framework – Project Ireland 2040

10.15 The National Planning Framework (NPF) 2040 (published in February 2018) is a national planning framework for Ireland. The framework provides the policies for all regional and local plans. In the framework, the extractive industries are recognised as important for the supply of aggregates and construction materials to a variety of sectors. It emphasises that the planning process will play a key role in realising the potential of the extractive industries and protecting reserves of aggregates

and minerals. Aggregates and mineral extraction will continue to be enabled where this is compatible with protection of the environment.

10.16 There are no specific policies in relation to noise emissions and vibration levels in the NPF for construction aggregates. The general objective is to facilitate the development while at the same time protect the environment.

10.17 The Project Ireland 2040 National Planning Framework does refer to noise in general terms under section 9.4 *Creating a Clean Environment for a Healthy Society* in acknowledging that noise is unwanted sound but is an inevitable consequence of everyday life and it becomes a problem when it occurs in the incorrect place or at the incorrect time or on a frequent or recurring basis. The National Planning Framework aims to support the following measures:

- Noise Management and Action Planning

  Measures to avoid, mitigate, and minimise or promote the pro-active management of noise, where it is likely to have significant adverse impacts on health and quality of life, through strategic noise mapping, noise action plans and suitable planning conditions.

- Noise, Amenity and Privacy

  This includes but is not limited to, good acoustic design in new developments, in particular residential development, through a variety of measures such as setbacks and separation between noise sources and receptors, good acoustic design of buildings, building orientation, layout, building materials and noise barriers and buffer zones between various uses and thoroughfares.

- Quiet Areas

  The further enjoyment of natural resources, such as our green spaces and sea frontage, through the preservation of low sound levels or a reduction in undesirably high sound levels, is particularly important for providing respite from high levels of urban noise. As part of noise action plans, an extra value placed on these areas, in terms of environmental quality and the consequential positive impact on quality of life and health, due to low sound levels and the absence of noise, can assist in achieving this.

10.18 National Planning Framework Objective 65 on noise states:

"Promote the pro-active management of noise where it is likely to have significant adverse impacts on health and quality of life and support the aims of the Environmental Noise Regulations through national planning guidance and Noise Action Plans."

10.19 There are no specific policies relating to noise emissions in the National Planning Framework for extractive industry or related production activities.

Local Planning Policy - Cavan County Development Plan 2022-2028

10.20 The current Cavan County Development Plan 2022-2028 (CDP) was adopted in July 2022. The Development Plan Noise Pollution Policy Objectives are detailed below.

- N01: Support the implementation of the Noise Directive 2002/49/EC and associated Environmental Noise Regulations 2006.
- N02: Require all developments to be designed and operated in a manner that will minimise and contain noise levels, having regard to relevant national guidelines and in the absence of national guidelines, to relevant international standards, where appropriate. Seek identification

and implementation of noise mitigation measures, where warranted, for developments proposed in the vicinity of existing or proposed national roads.

British Standard 5228: 2009+A1:2014

10.21 British Standard 5228-1:2009+A:2014 Noise and vibration control on construction and open sites, Part 1: Noise (BS5228) sets out a methodology for predicting noise levels arising from a wide variety of construction and related activities. It can be used to predict noise levels arising from the operations of proposed minerals extraction sites. BS5228 also sets out tables of sound power levels generated by a wide variety of mobile equipment.

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

- 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; and
- any reflections of noise due to the presence of hard vertical faces (i.e., walls).

Guidelines for Noise Impact Assessment (IEMA)

10.23 The Guidelines for Noise Impact Assessment produced by the Institute of Environmental Management and Assessment (IEMA) are generally recognised as established good practice standards for scope, content, and methodology of noise impact assessment.

10.24 These guidelines address the key principles of noise impact assessment and are applicable to all development proposals where noise effects are likely to occur. These guidelines state that for any assessment, the noise level threshold and significance should be determined by the assessor, based upon the specific evidence and likely subjective response to noise. An example impact scale offered by the IEMA guidelines is shown in **Table 10-1**.

Table 10-1
Example Impact Scale from the Change in Sound Levels (IEMA)

Long-Term Impact Classification	Short-Term Impact Classification	Sound Level Change dB L_{pAeqT} (+ive or -ive) T = either 16hr day or 8hr night
Negligible	Negligible	≥ 0 dB and < 1 dB
	Minor	≥ 1 dB and < 3 dB
Minor	Moderate	≥ 3.0 dB and < 5 dB
Moderate	Major	≥ 5.0 dB and < 10 dB
Major		≥ 10.0

10.25 The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3dB is generally considered to be the smallest change in environmental noise that is perceptible

to the human ear under most normal conditions. A 10dB change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

10.26 To determine the overall noise impact, the magnitude and sensitivity Noise Effects Descriptors are presented in **Table 10-2**.

Table 10-2
Noise Effects Descriptors (IEMA)

Very Substantial	Greater than 10 dB L_{Aeq} change in sound level perceived at a highly sensitive noise receptor
Substantial	Greater than 5 dB L_{Aeq} change in sound level at a noise-sensitive receptor, or a 5 to 9.9 dB L_{Aeq} change in sound level at a highly sensitive noise receptor
Moderate	A to 4.9 dB L_{Aeq} change in a sound level at a sensitive or highly sensitive noise receptor, or a greater than 5 dB L_{Aeq} change in sound level at a receptor of some sensitivity
Slight	A 3 to 2.9 dB L_{Aeq} change in a sound level at a receptor of some sensitivity
None / Not significant	Less than 2.9 dB L_{Aeq} change in sound level and/or all receptors of negligible sensitivity to noise or marginal to the zone of the influence of the proposed development

10.27 As recognised in the IEMA guidance, there are however many factors which affect people's perception and their responses to noise. Guidance on assessment of the magnitude of noise impact and the significance of the effects are presented in **Table 10-3**.

Table 10-3
Relationship between Noise Impact, Effect and Significance (IEMA)

Magnitude (Nature of Impact)		Description of Effect (on a specific sensitive receptor)	Significance
Substantial	Beneficial	Receptor Perception = Marked Change Causes a material change in behaviour and/ or attitude, e.g., individuals begin to engage in activities previously avoided due to preceding environmental noise conditions. Quality of life enhanced due to change in character of the area.	More Likely to be Significant (Greater justification needed- based on impact magnitude and receptor sensitivities- to justify a non-significant effect) ↕ (Greater justification needed- based on impact magnitude and receptor sensitivities- to justify a significant effect) Less Likely to be Significant
Moderate		Receptor Perception = Noticeable Improvement Improved noise climate resulting in small change in behaviour and/or attitude, e.g., turning down volume of television; speaking more quietly; opening windows. Affects the character of the area such that there is a perceived change in the quality of life.	
Slight		Receptor Perception = Just Noticeable Improvement Noise impact can be heard but does not result in any change in behaviour or attitude. Can slightly affect character of the area but not such that there is a perceived change in quality of life.	
Negligible		N/A = no discernible effect on receptor	Not Significant
Slight	Adverse	Receptor Perception = Non-intrusive	

		Noise impact can be heard, but does not cause change in behaviour or attitude, e.g., turning up volume of television, speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Less Likely to be Significant Greater justification needed- based on impact magnitude and receptor sensitivities- to justify a significant effect) ↕ Greater justification needed- based on impact magnitude and receptor sensitivities- to justify a non-significant effect) More Likely to be Significant
Moderate		Receptor Perception = Intrusive 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-awaking sleep disturbance. Affects the character of area such that there is a perceived change in the quality of life.	
Substantial		Receptor perception = Disruptive Causes material change in behaviour and /or attitude, e.g., avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in getting to sleep, premature awakening, and difficulty in getting back to sleep. Quality of life diminished due to change in character of area.	
Severe		Receptor Perception = Physically Harmful Significant Changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or psychological effects, e.g., regular sleep deprivation / awakening; loss of appetite, significant, medically definable harm, e.g., auditory and non-auditory.	Significant

Design Manual for Roads and Bridges

10.28 The Design Manual for Roads and Bridges DMRB (LA 111) considers the following criterion to understand the need for further assessment:

- is the project likely cause change in the baseline noise levels of 1dB $L_{A10,18hr}$ in the do -minimum year compared to do- something opening year;
- is the project likely cause change in the baseline noise levels of 3 dB $L_{A10,18hr}$ in the do – something future year compared to do- minimum opening year;
- does the project involve construction of new road links within 600m of noise sensitive receptors;
- would there be a reasonable stakeholder's expectation that an assessment is undertaken.

AQTAG09 - Guidance on Effects of Industrial Noise on Wildlife

10.29 AQTAG09 (Air Quality Technical Advisory Group 09) guidance provides guidance to assist planning and/or licensing officials handling pollution prevention and control applications for industrial installations on relevant noise emissions and relates these to the requirements of the Habitats Regulations.

10.30 The Habitats Directive (92/43/EEC) specifies that, where specific noise from industry, measured at the habitat / nest site is below the levels in **Table 10-4**, it is considered unlikely that it will have an adverse impact on designated species. Where noise levels are exceeded further, an assessment that is more detailed will be required.

Table 10-4
Specific Noise Levels at Habitat / Nest Site

Parameter	Noise Level, dB
$L_{Amax,F}$	80
$L_{Aeq,1hr}$	55

Noise and Human Health

10.31 Environmental noise exposure response relationships and thresholds for health endpoints for industry are not available at European or Irish level in legislation or guidelines.

WHO Environmental Noise Guidelines

10.32 World Health Organisation (WHO) Europe have produced the WHO Environmental Noise Guidelines 2018 for the European Region as a regional update to the WHO Community Noise Guidelines. The Guidelines include a review of evidence on the health effects of environmental noise to incorporate significant research carried out in recent years. The guidelines provide recommendation for protecting human health from exposure to environmental noise from various sources. The guidelines assess several environmental noise sources such as aircraft, rail, road, wind turbines and leisure noise.

10.33 The 2002 EU Directive introduced annual average indicators of noise exposure (L_{den} and L_{night}) as long-term exposure indicators, which differ from those used in the earlier WHO Guidelines for Community Noise (1999).

Vibration

British Standard 6472:2008

10.34 British Standard 6472:2008 *Guide to Evaluation of Human Exposure to Vibration in Buildings* gives guidance on human exposure to blasting induced vibration in buildings. It is applicable to blasting associated with rock extraction.

10.35 BS6472 gives details of the maximum satisfactory magnitudes of vibration for residential properties for quarries that carry out up to three blasting events per day; which is shown in **Table 10-5**. This table relates to the magnitude of vibration below which the probability of adverse comment is low.

Table 10-5
Maximum Satisfactory Magnitudes of Vibrations with Respect to Human Response for Up to Three Blasting Events per Day

Place	Time		Satisfactory Magnitude (Peak Particle Velocity, mm/sec)
Residential	Day	(08.00 – 18.00 M to F) (08.00 – 13.00 Sat)	6.0 to 10.0
	Night		2.0
	Other Times		4.5
Offices	Any Time		14.0
Workshops	Any Time		14.0

British Standard 7385-2:1990

10.36 British Standard 7385-2:1990 *Evaluation and Measurement for Vibration in Buildings – Part 2: Guide to Damage Levels from Groundborne Vibration* gives guidance on vibration limits to prevent building damage. It is applicable to blasting associated with rock extraction.

10.37 The damage threshold criteria provided in BS7385 are based on systematic studies using a carefully controlled vibration source in the vicinity of buildings. Vibration limits for transient vibrations (such as those associated with blasting operations) above which cosmetic damage could occur are provided in **Table 10-6** below.

Table 10-6
Transient Vibration Guide Values for Cosmetic Damage

Type of Building	PPV (mm/sec) 4 to 15 Hz	PPV (mm/sec) 15 Hz and Above
Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/sec	50 mm/sec
Unreinforced or light framed structures Residential or light commercial buildings.	15 mm/sec at 4Hz increasing to 20 mm/sec at 15 Hz	20 mm/sec at 15Hz increasing to 50 mm/sec at 40 Hz and above.

10.38 The definition of "cosmetic damage" is the formation of hairline cracks or the growth of existing cracks in plaster, dry wall surfaces, or mortar joints. BS7385-2 notes that the probability of damage tends towards zero at 12.5mm/sec peak component particle velocity.

Quarries and Ancillary Activities

10.39 EPA Guidance on Quarries and Ancillary Activities suggest limit values for groundborne vibrations and air overpressure:

Groundborne vibration

Peak particle velocity = 12 mm per second, measured in any of the three mutually orthogonal directions at the receiving location (for vibration with a frequency of less than 40 hertz).

Air overpressure

125 dB (Linear maximum peak value), with a 95 % confidence limit. Any blasting will be restricted to normal hours (e.g., 10:00 -17:00 hrs Monday to Friday). Advance notification of blasting will be provided to nearby residents within 600m through use of written notes, signage at site entrance, telephone, or warning sirens or a combination of these methods.

10.40 The DoEHLG (2004) Guidelines for Planning Authorities (Quarries and Ancillary Activities: Guidelines for Planning Authorities, DoEHLG 2004) suggest similar limit values.

Site Specific Emission Limit Values

Noise

10.41 Condition No. 8 of previous planning permission P. Ref. 12/101 for the application site states:

'(a) Noise emanating from the development measured at the facing elevation (outside) of any dwelling in the area shall not exceed, during the hours 0800 - 2000 55 dB(A) (Lacq)(1h) and during

the hours (and Sundays) 2000 - 0800 45 dB(A) (LaeqX1h). 95% of all noise levels shall comply with the specified limit value(s). No noise level shall exceed the limit value by more than 2dB(A).

(b) There shall be clearly no tonal component or impulsive component in the noise emission measured at any residence.

(c) There shall be no testing or use of alarms or sirens outdoors between 2200 - 0800 hours or on Sundays or public holidays.'

10.42 Condition No. 6 and No. 7 of extant planning permission P. Ref 07/827 for the adjacent quarry site within the landholding states:

Condition 6:

'Noise emanating from the development measured at the facing elevation (outside) of any dwelling in the area shall not exceed, during the hours 0800-2000 55 dB(A) (Lacq)(1h) and during the hours (and Sundays) 2000-0800 45 dB(A) (Lacq) (1h). 95% of all noise levels shall comply with the specified limit value(s). No noise level shall exceed the limit value by more than 2dB (A).

In the interests of public health and amenity.'

Condition 7:

'There shall be clearly no tonal component or impulsive component in the noise emission measured at any residence. In the interests of public health and amenity.

There shall be no testing or use of alarms or sirens outdoors between 2200-0800 hours or on Sundays or public holidays.

In the interests of public health and amenity.

At least two days advance notice of the date and time of any blasting operations to be carried out on the site shall be given to the occupants of properties locating within 300 metres of the location of such blasting operations.

In the interests of public health and amenity.'

Vibration

10.43 Condition No.8 of previous planning permission P. Ref. 12/101 for the application site states:

'(d) At least two days advance notice of the date and time of any blasting operations to be carried out on the site shall be given to the occupants of properties locating within 300 metres of the location of such blasting operations.

(e) No blasting shall be allowed between the hours of 1900-0800 or on Sundays or public holidays.

(f) The transmitted ground vibration arising from any blast carried out on the site shall, when measured on the foundations of the dwelling house nearest to the location of the blast or on part of the dwelling house in close contact with the foundations not exceed a peak particle velocity of 12.0 millimetres per second.

(g) The air pressure arising from any blast carried out on the site shall, when measured immediately outside the elevation facing the blast of any dwelling house in the general area, not exceed 125 dB (linear) (max. peak) with a 95% confidence limit.

(h) Details of the frequency, instrumentation, means to be used and the method of measurement of noise, vibration and dust emissions, shall be submitted to and agreed with the Planning Authority. A full set of test results shall be submitted every twelve months from the date of this Notice to the

Planning Authority for scrutiny if the Planning Authority deems it necessary. In the interests of public health and amenities.'

10.44 Condition No. 7 and No. 17 of extant planning permission P. Ref 07/827 for the adjacent quarry site within the landholding states:

Condition 7:

'The transmitted ground vibration arising from any blast carried out on the site shall, when measured on the foundations of the dwelling house nearest to the location of the blast or on part of the dwelling house in close contact with the foundations not exceeding a peak particle velocity of 12.0 millimetres per second.

In the interests of public health and amenity.'

Condition 17:

The air pressure arising from any blast carried out on the site shall, when measured immediately outside the elevation facing the blast of any dwelling house in the general area, not exceed 125 dB (linear) (max. peak) with a 95% confidence limit.

In the interests of public health and amenity.

Details of the frequency, instrumentation. means to be used and the method of measurement of noise, vibration, and dust emissions, shall be submitted to and agreed with the Planning Authority. A full set of test results shall be submitted every twelve months from the date of this Notice to the Planning Authority for scrutiny.

In the interests of public health and amenity.'

RECEIVING ENVIRONMENT

Study Area

10.45 The overall quarry site is in a rural area in the central part of Co. Cavan, c. 1.25km east of the N3 (National Primary Road), which links Dublin and Cavan, c. 4.5km south of the village of Stradone and c. 10km southeast of Cavan town. The site location is shown in EIAR Chapter 1, **Figure 1-1**. Access to the application site is gained by taking the R165 regional road southbound off the N3 National Primary route. A dedicated access to the existing quarry site is provided off the R165, which traverses a local road (L3500) which connects the local rural communities with the R165.

10.46 The nearest dwellings to the site boundary are identified on **Figure 10-1**.

Baseline Study Methodology

Noise

10.47 Noise monitoring surveys have been carried out at Mullymagowan Quarry by SLR Consulting. The methodology of the surveys and the results are set out below. The weather conditions during the survey periods were acceptable for noise monitoring, being generally dry with little or no wind.

10.48 The noise measurements were taken using a Type 1 sound level meter. The sound level meter was calibrated before the measurements, and its calibration checked after by the operator. No calibration drifts were found to have occurred during surveys. All noise equipment had been calibrated to a traceable standard by UKAS (United Kingdom Accreditation Service) accredited laboratories within 12 months preceding the surveys.

10.49 At the measurement positions, the following noise level indices were recorded:

- LAeq,T is the A-weighted equivalent continuous noise level over the measurement period, and effectively represents an "average" value.
- LA90,T is the A-weighted noise level exceeded for 90% of the measurement period. This parameter is often used to describe the background noise.
- LA10,T is the A-weighted noise level exceeded for 10% of the measurement period. This parameter is often used to describe traffic noise.

10.50 The monitoring periods chosen are considered to give representative daytime noise levels at the nearest noise sensitive receptors.

10.51 During the surveys, the sound level meter was located in free-field conditions (i.e., at least 3.5m from the nearest vertical reflecting surface, with the microphone approximately 1.5m above ground level).

10.52 All noise levels are recorded in 'A-weighted' decibels, dB(A). A-weighting is the process by which noise levels are corrected to account for the non-linear frequency response of the human ear. All noise levels are quoted in dB(A) relative to a sound pressure of 20 Pa.

Vibration

10.53 Blasting operations at the established quarry have been monitored at neighbouring residences by Irish Industrial Explosives. Groundborne vibration and air overpressure levels have been and are measured and recorded for each blast. The blast monitoring locations are shown on **Figure 10-1.**

Sources of Information

10.54 Baseline information was gathered through a combination of desk-based study and technical assessments consistent with current standard methodologies and published best practice guidelines, to provide relevant data to allow an assessment of likely significant effects of the proposed development on sensitive receptors within the zone of influence.

Field Survey / Monitoring

Noise

10.55 The noise monitoring location used for the purposes of the baseline noise survey, shown in **Figure 10-1**, comprise the following:

- N1 – northeast of the application area on L3500 road;
- N2 – east of the application area on L3500 road;
- N3 – south of the application area on L7503 road;
- N4 – northwest of the application area on L7503 road; and
- N5 – northeast of the application area on R165 road.

10.56 Noise monitoring results are provided in **Table 10-7**; summary of the measured levels and the relevant receptors are provided in **Table 10-8**.

10.57 The noise monitoring at the noise sensitive receptors confirm compliance with the existing noise emission limits, with the monitoring results presented in **Table 10-7**.

Table 10-7
Summary of Measured Noise Levels, Free Field dB

Date	Location	LAeq	L10	L90
02/11/2022	N1	47.5	42.3	36.5
02/11/2022	N2	59.5	45.2	35.1
02/11/2022	N3	51.2	47.6	39.1
02/11/2022	N4	43.2	46.2	35.5
02/11/2022	N5	45.5	45.2	37.9

Table 10-8
Summary of Measured Noise Levels and Relevant Receptors, Free Field dB

Location	Period	Receptors	L_{Aeq}
N1	Daytime	R8, R9, R10, R11, R12, R13	47.5
N2	Daytime	R14	59.5
N3	Daytime	R3, R4, R5, R6, R7	51.2
N4	Daytime	R1, R2	43.2
N5	Daytime	R33, R34, R35	45.5

Vibration

10.58 Ground vibration and air overpressure are measured for each blast. The blast monitoring locations are shown on **Figure 10-1** and described as follows:

- V1 – residence R3
- V2 – at quarry weighbridge

10.59 **Table 10-9** details blast monitoring results at the quarry. The monitoring was carried out using a mobile vibrograph unit.

Table 10- 9
Blast Monitoring Results

Date	Position	Location	PPV			AOP	Resultant
			(L)	(V)	(T)	(dB)	mm/s
07/10/2008	V1	Residence R3	2.07	3.24	4.22	117	5.04
25/11/2008	V2	Quarry Weighbridge	1.40	2.07	1.80	113	2.34
25/11/2008	V1	Residence R3	0.97	1.17	1.21	113	1.44
16/02/2009	V	Residence R3	2.19	2.77	2.30	110	3.75
10/06/2009	V1	Residence R3	4.19	3.99	4.25	111	6.40
14/08/2009	V1	Residence R3	3.32	3.67	6.06	100	6.65

Date	Position	Location	PPV			AOP	Resultant
			(L)	(V)	(T)	(dB)	mm/s
17/11/2009	V1	Residence R3	6.18	4.61	7.51	116	7.90
10/12/2009	V1	Residence R3	4.10	5.55	2.85	123	5.67
08/02/2010	V1	Residence R3	1.87	3.13	1.25	121	3.20

10.60 All blasts are monitored, with records kept detailing the results of vibration, air over pressure, and the blast design as part of the environmental monitoring programme implemented at the quarry.

10.61 The blast monitoring results indicate that blasting operations have complied with condition limits imposed on the existing quarry, and the recommended limits for the industry.

Sensitive Receptors

Human Receptors

10.62 Sensitive locations are those where people may be exposed to noise from the existing or planned activities. The closest receptors to the application site boundary have been identified (refer to **Figure 10-1**). This is a cautious approach, as noise generating activities are located at greater distances within the site. The relevant receptors are listed in **Table 10-10** and their locations are shown in **Figure 10-1**.

10.63 There are 17 sensitive receptors identified for this assessment. A summary of the closest sensitive receptors in each direction surrounding the planning application area and used in the assessment are presented in **Table 10-10** below.

Table 10-10
Noise Sensitive Receptors

Receptor Reference	Receptor	Noise Sensitivity	Distance from red line application boundary (m) (approx.)
R1	Residential (Applicant)	Medium	26 W
R2	Residential	Medium	180 NW
R3	Residential	Medium	235 S
R4	Residential	Medium	430 S
R5	Residential	Medium	445 S
R6	Residential	Medium	440 S
R7	Residential	Medium	420 SW
R8	Residential	Medium	425 N
R9	Residential	Medium	425 N
R10	Residential	Medium	495 N
R11	Residential	Medium	415 NE
R12	Residential	Medium	375 NE

Receptor Reference	Receptor	Noise Sensitivity	Distance from red line application boundary (m) (approx.)
R13	Residential	Medium	290 NE
R14	Residential	Medium	315 E
R33	Residential	Medium	750 NE
R34	Residential	Medium	750 NE
R35	Residential	Medium	750 NE

Ecological Receptors

10.64 The application site is not subject to any statutory nature conservation designation. Ecological receptors of concern are those areas designated under EU Habitats Directive (92/43/EEC).

10.65 Based on the nature, size, and scale of the planned development, it is considered that the maximum distance for which the project should be evaluated in terms of Natura 2000 or designated sites is up to a maximum radius of 2km from the application site unless there are any potential source-pathway-receptor links between the proposed development at Mullymagowan and any Natura 2000 or designated site(s) beyond this distance.

IMPACT ASSESSMENT

Noise

Impact Assessment Methodology

10.66 To determine the noise impact at the site, SLR Consulting Ireland carried out a noise prediction assessment, whereby the levels of noise were calculated at the nearest noise sensitive receptors (residences) shown on **Figure 10-1**. The operational LAr, 1hr noise predictions at each receptor location are based on the prediction protocol for assessment methodology based on BS5228: Part 1 (2009) + A1:2014 "Code of Practice for Noise and Vibration Control on Construction and Open Sites''.

10.67 The DoEHLG (2004) suggest noise limit values are 70dB LAeq, 1hr for daytime temporary activities from minerals extraction sites.

10.68 The following noise sources have been considered in the noise assessment for overburden stripping:

- excavator;
- HGV.

10.69 For the purposes of the overburden stripping assessment no noise reduction is applied on account of no screening berms having yet been constructed and operations carried out at ground level. In addition, for the purposes of this noise assessment, it is assumed that all of the noise sources are active for 100% of the time, at the distances stated/closest to the sensitive receptors during the working hours of the development. The distances to the receptors are calculated from the application site boundary (red line boundary) to the sensitive receptor. On this basis, it is considered that the noise assessment is very conservative and represents a worst-case scenario.

10.70 The EPA Guidance on Quarries and Ancillary Activities suggest noise limit values are 55dB LAeq, 1hr for daytime normal operations.

10.71 The following noise sources have been considered in the noise assessment for the rock extraction within the planning application area:

- drilling rig;
- excavator;
- HGV;
- processing/screening plant;
- crushing plant.

10.72 For the purposes of this assessment, a reduction of -20 dB(A) for full noise screening by berms and the quarry face has been adopted. In addition, for the purposes of this noise assessment, it is assumed that all of the noise sources are active for 100% of the time, at the distances stated/closest to the sensitive receptors during the working hours of the development. The distances to the receptors are calculated from the application site boundary (red line boundary) to the sensitive receptor. The residence locations and distances to the existing quarry are shown on **Figure 10-1.**

Impact Assessment

10.73 The noise prediction / assessment was undertaken to calculate the level of noise arising from the site activity at the nearest sensitive receptors shown on **Figure 10-1**. Detailed noise assessment calculations are provided in **Appendix 10-B**.

Table 10-11
Operational Noise Levels

Activity	Receptor	Period	Criterion	Specific* $L_{Ar, 1hr}$ dB(A)	Difference
Overburden stripping	R1	Derelict (in ownership of applicant)			
	R2	Daytime	70.0	56	-14
	R3	Daytime	70.0	54	-16
	R4	Daytime	70.0	49	-21
	R5	Daytime	70.0	49	-21
	R6	Daytime	70.0	49	-21
	R7	Daytime	70.0	49	-21
	R8	Daytime	70.0	49	-21
	R9	Daytime	70.0	49	-21
	R10	Daytime	70.0	48	-22
	R11	Daytime	70.0	49	-21
	R12	Daytime	70.0	50	-20
	R13	Daytime	70.0	52	-18
	R14	Daytime	70.0	52	-18

	R33	Daytime	70.0	44	-26
	R34	Daytime	70.0	44	-26
	R35	Daytime	70.0	44	-26
Extraction	R1	Derelict (in ownership of applicant)			
	R2	Daytime	55.0	47	-8
	R3	Daytime	55.0	45	-10
	R4	Daytime	55.0	40	-15
	R5	Daytime	55.0	40	-15
	R6	Daytime	55.0	40	-15
	R7	Daytime	55.0	40	-15
	R8	Daytime	55.0	40	-15
	R9	Daytime	55.0	40	-15
	R10	Daytime	55.0	39	-16
	R11	Daytime	55.0	40	-15
	R12	Daytime	55.0	41	-14
	R13	Daytime	55.0	43	-12
	R14	Daytime	55.0	43	-12
	R33	Daytime	55.0	35	-20
	R34	Daytime	55.0	35	-20
	R35	Daytime	55.0	35	-20

*Specific Noise Level= Predicted Noise Level

10.74 It can be seen from the figures in **Table 10-11** that the noise criterion limits (70dB(A)) for temporary stripping activities and quarry restoration are met at all the noise sensitive locations.

10.75 It can be seen from the above figures that the noise criterion limits for daytime operations (extraction, processing, and haulage) within the application area were met at the nearest noise sensitive locations.

10.76 To identify the potential impact of continuous (full-time) activity at the proposed quarry development, predicted specific LAeq, 1hr dB(A) noise levels have been logarithmically added to existing ambient noise levels. The cumulative levels have been compared to the existing ambient noise levels for each time-period. The cumulative assessment is shown in **Table 10-12** below.

10.77 As previously noted, the existing quarry and the application site are not subject to any statutory nature conservation designation and the nearest designated nature site (SPA) is located at approximately 14.4 km, at its closest point.

Table 10-12
Cumulative Operational Noise Levels

Activity	Location	Receptor	Period	Baseline $L_{Aeq\ AVGE\ 1hr}$ dB(A)	Specific $L_{Ar,\ 1hr}$ dB(A)*	Cumulative $L_{Aeq,\ 1hr}$ dB(A)*	Difference	Short term Impact	Long term Impact
Extraction	N4	R1	Derelict (in ownership of applicant)						
	N4	R2	Daytime	43	47	49	6	Moderate	Major
	N3	R3	Daytime	51	45	52	1	Minor	Negligible
	N3	R4	Daytime	51	40	52	0	Negligible	Negligible
	N3	R5	Daytime	51	40	51	0	Negligible	Negligible
	N3	R6	Daytime	51	40	51	0	Negligible	Negligible
	N3	R7	Daytime	51	40	52	0	Negligible	Negligible
	N1	R8	Daytime	48	40	48	1	Minor	Negligible
	N1	R9	Daytime	48	40	48	1	Minor	Negligible
	N1	R10	Daytime	48	39	48	1	Minor	Negligible
	N1	R11	Daytime	48	40	48	1	Minor	Negligible
	N1	R12	Daytime	48	41	48	1	Minor	Negligible
	N1	R13	Daytime	48	43	49	1	Minor	Negligible
	N2	R14	Daytime	59	43	60	0	Negligible	Negligible
	N5	R33	Daytime	46	35	46	0	Negligible	Negligible
	N5	R34	Daytime	46	35	46	0	Negligible	Negligible
	N5	R35	Daytime	46	35	46	0	Negligible	Negligible

*Specific Noise Level= Predicted Noise Level

10.78 With reference to the Guidelines for Noise Impact Assessment produced by the Institute of Environmental Management and Assessment (IEMA), the cumulative short-term noise impact within the application area from plant associated with the extraction at the nearest receptors is Minor at R3, R8, R9, R10, R11, R12, and R13 and Moderate at R2.

10.79 With reference to the Guidelines for Noise Impact Assessment produced by the Institute of Environmental Management and Assessment (IEMA), the cumulative long-term noise impact within the application area from plant associated with the extraction at the nearest receptors is Negligible at all but R2, which is Major.

10.80 In view of the above findings, it is considered that mitigation measures to reduce the noise impacts of plant associated with the planned development are to be implemented at this development.

Traffic

10.81 In view of the existing permitted levels of quarry output within the wider landholding and associated HGV traffic movements across the local road network it is considered that the extent of any change

and the likely impact of the quarry continuance of use activity can be deemed 'negligible' in terms of traffic and that no further assessment is necessary.

Vibration

10.82 The number of blasts carried out at the quarry depends on market demand for construction materials. Blasting at Mullymagowan is currently carried out as necessary. The duration of a blast in terms of noise is of short duration, similar to a clap of thunder.

10.83 Blast-induced vibration is of short duration and transient in nature. A typical blast consists of several drilled holes into which are placed explosive charges. The charged holes are detonated individually by use of detonators each with different delays.

10.84 Previous blast monitoring results confirm that the blasting operations at the site have complied with quarry limits, the DoEHLG (2004) and the EPA (2006) recommended threshold limit values for groundborne vibration (12 mm/sec peak particle velocity) and air overpressure (125 dBL Linear max peak with a 95% confidence limit).

10.85 The comprehensive environmental monitoring programme implemented at the quarry confirms that the quarry has operated within the recommended blasting emission limit values set out in the best practice guidelines for the sector.

10.86 Drilling of holes for blasting will involve the use of a mobile rig to drill holes through the upper rock surface parallel to the active face. The duration of drilling prior to each blast will vary with the number and depth of charge holes required. Drilling of holes will be carried out during permitted operational hours.

Residences

10.87 The closest vibration sensitive receptors to the blasting activities within the application area are located within 500m distance. Vibration attenuation increases with distance; thus, vibration impacts at any receptors located further away from the site boundary would be lesser.

10.88 Blasting-induced vibration is of short duration and transient in nature. A typical blast consists of several drilled holes into which are placed explosive charges. The charged holes are detonated individually by use of detonators each with different delays.

10.89 The main reason for complaints from blast-induced vibration is usually attributed to the fear of damage and/or nuisance rather than actual damage or nuisance itself. The human body is very sensitive to vibration; this can result in concerns being raised at vibration levels well below the threshold of cosmetic damage to buildings or the levels stated in the previous planning conditions.

10.90 In general terms a person will become aware of blast-induced vibration at levels of around 0.3 mm/second peak particle velocity (ppv). However, people are very poor at determining relative magnitudes of vibration, for example, the difference between 4.0 mm/sec ppv and 6.0 mm/sec ppv is unlikely to be distinguishable by an individual person. Even though vibration levels between 0.6 mm/sec ppv and 50.0 mm/sec ppv are routinely experienced in everyday life within a property and are considered wholly safe, when similar levels are experienced through blasting operations, it is not unusual for such a level to give rise to subjective concern.

10.91 **Table 10-13** gives examples of vibration levels routinely generated in a property.

Table 10-13
Vibration Levels Generated by Everyday Activities

Activity	Vibration Level (Peak Particle Velocity, mm/sec)
Walking, measured on a wooden floor	1.0 to 2.5
Door slam, measured on a wooden floor	2.0 to 5.0
Door slam, measured over the doorway	12.0 to 35.0
Foot stamps, measured on a wooden floor	5.0 to 50.0

10.92 Regarding physical damage to properties, extensive research has been carried out around the world, the most prominent being undertaken by the United States Bureau of Mines (USBM). Damage to a structure could occur if the dynamic stresses induced in a structure exceed the allowable design stress for the specific building material. Classifications of building damage range from very fine plaster cracking up to major cracking of structural elements.

10.93 When defining damage to buildings, the following classification is used:

- cosmetic – the formation of hairline cracks or the growth of existing cracks in plaster, dry wall surfaces, or mortar joints;
- minor – the formation of large cracks or loosening or falling of plaster on dry wall surfaces, or cracks through bricks/concrete blocks;
- major or structural – damage to structural elements of the building.

10.94 Studies by USBM concluded that vibration levels in excess of 50 mm/sec ppv are required to cause structural damage. The onset of cosmetic damage can be associated with lower levels. Vibration levels between 19 mm/sec ppv and 50 mm/sec ppv are generally considered safe. It should be noted that these limits are for the worst-case structure conditions and that they are independent of the number of blasting events and their durations.

10.95 British Standard 7385-2:1990 Evaluation and Measurement for Vibration in Buildings – Part 2: Guide to Damage Levels from Groundborne Vibration gives guidance on vibration limits to prevent building damage. It is applicable to blasting associated with mineral extraction.

10.96 The damage threshold criteria provided in BS7385 are based on systematic studies using carefully controlled vibration sources in the vicinity of buildings. Vibration limits for transient vibrations (such as those associated with blasting operations) above which cosmetic damage could occur are provided in **Table 10-6**. BS7385-2 notes that the probability of damage tends towards zero at 12.5 mm/sec peak component particle velocity.

10.97 Historical blast monitoring results at the existing quarry confirm that the blasting operations at the quarry have complied with the DoEHLG (2004) and EPA (2006) recommended threshold limit values for groundborne vibration (12 mm/sec peak particle velocity) and air overpressure (125 dBL Linear max peak with a 95% confidence limit).

10.98 The comprehensive environmental monitoring programme implemented at the quarry confirms that the quarry has operated within the recommended blasting emission limit values set out in the best practice guidelines for the sector.

10.99 Based on the above, it is concluded that blasting operations within the application site will not have a significant impact on any sensitive receptors from vibrations.

Ecological Receptors

10.100 The impact from blasting activities for ecological receptors would consist of disturbance (including noise, vibration, and visual disturbance).

10.101 The impact from the rock extraction and processing activities in terms of noise for ecological receptors would consist of disturbance (including noise and visual disturbance).

10.102 Increases in human disturbance including noise and visual disturbance from human activity can have a range of impacts depending upon the sensitivity of the ecological receptor, the nature, and duration of the disturbance and its timing.

10.103 The response of individual species to increased levels of human disturbance will depend upon several factors including the sensitivity, reproductive status, previous exposure to human disturbance, behaviour during the event, species tolerance to disturbance, location in relation to the source, availability of alternative nearby habitat, and environmental factors (i.e., topography, vegetation and atmospheric conditions which can influence noise levels).

10.104 The level of disturbance will also be dependent upon the existing ambient noise levels and maximum noise levels.

10.105 Any blasting operations at the quarry will be carried out in accordance with emission limit values recommend by the EPA and DoEHLG of 12mm/second (peak particle velocity) and for air overpressure of 125dB with a 95% confidence limit with any ground vibration limited in its extent around the quarry site.

10.106 There will be no likely exposure to hazard and no effects predicted on any designated or Natura 2000 sites.

10.107 The noise criterion recommended by AQTAG09 for Natura 2000 and designated sites define two noise impact categories:

- 'negligible impact' is implied when average noise emission levels are below LAeq 55dB and maximum noise emission levels are below LAmax 80dB;
- 'possible adverse impact' is implied when average noise emission levels are above LAeq 55dB or maximum noise emission levels are above LAmax 80dB.

10.108 Due to the distance of the ecological receptors (SPA) noise levels from the operational activities at the SPA boundary will not exceed the AQTAG09 noise guidance limits for "negligible" impact.

Unplanned Events (i.e., Accidents)

10.109 Accidents, malfunctions, and unplanned events refers to events or upset conditions that are not part of any activity or normal operation of the proposed extraction as has been planned. 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 continuation of use of the existing quarry activities.

10.110 Many accidents, malfunctions, and unplanned events are preventable and can be readily addressed or prevented by good planning, design, emergency response planning, and mitigation.

10.111 Considering the proposed development there will be no need to use any warning sirens or warning sounds in relation to unplanned events in relation to noise impact events.

10.112 In terms of noise impacts the following unplanned events could have an effect on the local area:

- equipment malfunction;

- vehicle collision.

10.113 In relation to noise, impacts of any unplanned events are considered to be negligible, as they have no potential to increase noise levels at sensitive receptors.

10.114 In terms of blasting the following unplanned events could have an effect on the local area:

- fly rock;
- premature blast;
- misfires;
- blast induced seismicity.

10.115 The following blast management (vibration suppression) measures are, and will continue to be implemented at the proposed development to avoid unplanned events:

- blasting to be carried out between the hours of 10:00 hrs to 17:00 hrs from Monday to Friday (except in emergencies or for health and safety reasons beyond the control of the operator). A blast must be carried out on site on the specified day, as concerns over security does not allow for explosives to be stored on site.
- no blasting to be carried out on Saturdays, Sundays, or public holidays.
- blast notification provided by pre and post siren warnings as well as formal pre-blast notification to local residents. Exclusion zone is erected during blasts.
- all blasting operations carried out by qualified personnel in accordance with the relevant health and safety regulations.
- the optimum blast ratio is maintained, and the maximum instantaneous charge is optimised.

10.116 Blasting impacts of any unplanned events, are considered to be negligible, as they have no potential to increase vibration levels at sensitive receptors.

Cumulative Impacts

10.117 This noise impact assessment shows that the proposed development long-term cumulative noise impact from the proposed operations at receptors is determined to be NEGLIGIBLE with the mitigation measures.

10.118 Noise levels arising from proposed activities will not have the potential to increase the existing ambient noise levels in the vicinity of proposed development.

10.119 Cumulative noise impact arising from the application site was assessed, the cumulative assessment was based on measured noise levels of current activities on site and off site in the quarry area. Local existing and planned developments were reviewed as part of this assessment.

10.120 A search of the myplan.ie and An Bord Pleanála online planning portal searches was carried out to determine if there were any other planned developments in the vicinity (c. 1km radius) of the application site that have recently been granted permission or are currently under consideration and which have the potential to have a significant adverse cumulative impact on the local environment.

10.121 There are no other significant sources of noise emissions within close proximity to the site, either existing or planned, and therefore no potential for significant cumulative impacts has been identified.

10.122 It is considered in light of the available assessments that the proposed development will not have any significant adverse cumulative effect on noise and vibration.

10.123 Beyond 1km, there is an existing quarry located c. 1.4 km southwest of the application site. The quarry is located at Carricknaveddan (Quarry Ref: QY31). At a distance of c. 1.4 km, the quarry is considered too far removed from the application site at Mullymagowan and the cumulative impact on air quality of the surrounding area by the developments is therefore considered to be insignificant.

'Do-nothing Scenario'

10.124 At present, the noise environment within the study area is dominated by road traffic noise emanating from the local roads, natural sounds such as farmyard animals or barking dogs are also audible.

10.125 Over time, it is anticipated that the volume of road traffic in general, will increase as economic activity increases and that this in turn is likely to lead to an increase in ambient and background noise levels.

Interaction with Other Impacts

10.126 The potential impact of noise and vibration generated by the proposed development 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'.

MITIGATION MEASURES

Noise

10.127 Where necessary, the three established strategies for impact mitigation are avoidance, reduction, and remedy. Where it is not possible or practical to mitigate all impacts, then the residual impacts must be clearly described in accordance with the system for impact description set out in the EPA Guidelines. The adoption of Best Practicable Means is generally considered to be the most effective means of controlling noise emissions.

10.128 Notwithstanding the findings of the impact assessment presented above, which determined that the proposed activities at Mullymagowan will have negligible to minor long-term noise impact, and in line with practice, the following best practice measures will be implemented wherever practicable at the site to minimise the potential noise impact of on-site activities:

10.129 **Screening:-**

- Existing and new perimeter berms and hedge planting screening surrounding the site will be retained.

10.130 **Plant:-**

- all mobile plant used at the development will have noise emission levels that comply with the limiting levels defined in EC Directive 86/662/EEC and any subsequent amendments;
- all plant items will be properly and regularly maintained and operated according to the manufacturers' recommendations, in such a manner as to avoid causing excessive noise (i.e.,

all moving parts are kept well lubricated, all cutting edges are kept sharpened, the integrity of silencers and acoustic hoods are maintained);

- all plant will be fitted with effective exhaust silencers which are maintained in good working order to meet manufacturers' noise rating levels. Any defective silencers will be replaced immediately.

10.131 **Traffic:-**

- all operations on site will be programmed to be carried out during daytime hours only;
- care will be taken when loading vehicles to reduce or minimise potential disturbance to local residents;
- access / internal haul roads will be kept clean and maintained in a good state of repair, i.e., any potholes are filled, and large bumps removed, to avoid unwanted rattle and "body-slap" from heavy goods vehicles;
- vehicles waiting within the quarry will be prohibited from leaving their engines running and there should be no unnecessary revving of engines.

10.132 Experience from other sites has shown that by implementing these measures, typical noise levels from construction works can bring about a reduction of 5dB(A) or more in ambient noise levels.

Vibration

10.133 The blast design and blasting methodology for the site operations carried out within the planning application area have been and will be optimised to ensure that the levels have been and are within existing site emission limits.

10.134 The following measures have been and are implemented at the planning application area to minimise disturbances due to blasting operations. These mitigation measures are in accordance with the 'best practice / mitigation' measures:

- blasting to be carried out between the hours of 10:00 hrs to 17:00 hrs from Monday to Friday (except in emergencies or for health and safety reasons beyond the control of the operator). A blast must be carried out on site on the specified day, as concerns over security does not allow for explosives to be stored on site;
- no blasting to be carried out on Saturdays, Sundays or public holidays;
- blast notifications to be provided for residences within the vicinity of the quarry and by pre and post siren warnings;
- all blasting operations to be carried out by a certified 'shotfirer' in accordance with the relevant health and safety regulations;
- the optimum blast ratio is maintained, and the maximum instantaneous charge is optimised.
- to avoid any risk of damage to properties in the vicinity of the site, the groundborne vibration levels from blasting does not exceed a peak particle velocity of 12 mm/sec.

RESIDUAL IMPACT ASSESSMENT

10.135 The worst-case scenario noise assessment has shown that in accordance with the scale in the Guidelines for Noise Impact Assessment produced by the Institute of Environmental Management

and Assessment (IEMA) the cumulative noise impact from plant associated with the development was determined to be NEGLIGIBLE with implementation of mitigation.

10.136 **Table 10-14** summarise the impacts, mitigation measures and residual impact for operational plant noise at each of the noise sensitive receptor considered.

10.137 Based on the historical blasting results, it is concluded that blasting operations carried out within the application area will not have residual impacts on any sensitive receptors.

Table 10-14
Operational Noise Summary Table

Receptors	Increase in operational noise $L_{aeq, 1hr}$ db(a)	Impact without mitigation measures		Mitigation	Reduction in noise from mitigation $L_{aeq, 1hr}$ db(a)	Increase in operational noise $L_{aeq, 1hr}$db(a)	Residual Short-term impact	Residual Long-term impact
		Short Term	Long Term					
Extraction								
R1	Derelict (in ownership of applicant)							
R2	6	Moderate	Major	Required	-5	1	Minor	Negligible
R3	1	Minor	Negligible	Short-term Required	-5	0	Negligible	Negligible
R4	0	Negligible	Negligible	Not- required	-5	0	Negligible	Negligible
R5	0	Negligible	Negligible	Not- required	-5	0	Negligible	Negligible
R6	0	Negligible	Negligible	Not- required	-5	0	Negligible	Negligible
R7	0	Negligible	Negligible	Not- required	-5	0	Negligible	Negligible
R8	1	Minor	Negligible	Short-term Required	-5	0	Negligible	Negligible
R9	1	Minor	Negligible	Short-term Required	-5	0	Negligible	Negligible
R10	1	Minor	Negligible	Short-term Required	-5	0	Negligible	Negligible
R11	1	Minor	Negligible	Short-term Required	-5	0	Negligible	Negligible
R12	1	Minor	Negligible	Short-term Required	-5	0	Negligible	Negligible
R13	1	Minor	Negligible	Short-term Required	-5	0	Negligible	Negligible
R14	0	Negligible	Negligible	Not- required	-5	0	Negligible	Negligible
R33	0	Negligible	Negligible	Not- required	-5	0	Negligible	Negligible

Receptors	Increase in operational noise $L_{aeq, 1hr}$ db(a)	Impact without mitigation measures		Mitigation	Reduction in noise from mitigation $L_{aeq, 1hr}$ db(a)	Increase in operational noise $L_{aeq, 1hr}$ db(a)	Residual Short-term impact	Residual Long-term impact
		Short Term	Long Term					
R34	0	Negligible	Negligible	Not- required	-5	0	Negligible	Negligible
R35	0	Negligible	Negligible	Not- required	-5	0	Negligible	Negligible

MONITORING

Noise

10.138 Noise monitoring will continue to be undertaken around the application site. Noise monitoring locations will be reviewed and revised where and as/when necessary. The results of the noise monitoring will be submitted to Cavan County Council on a regular basis for review and record purposes.

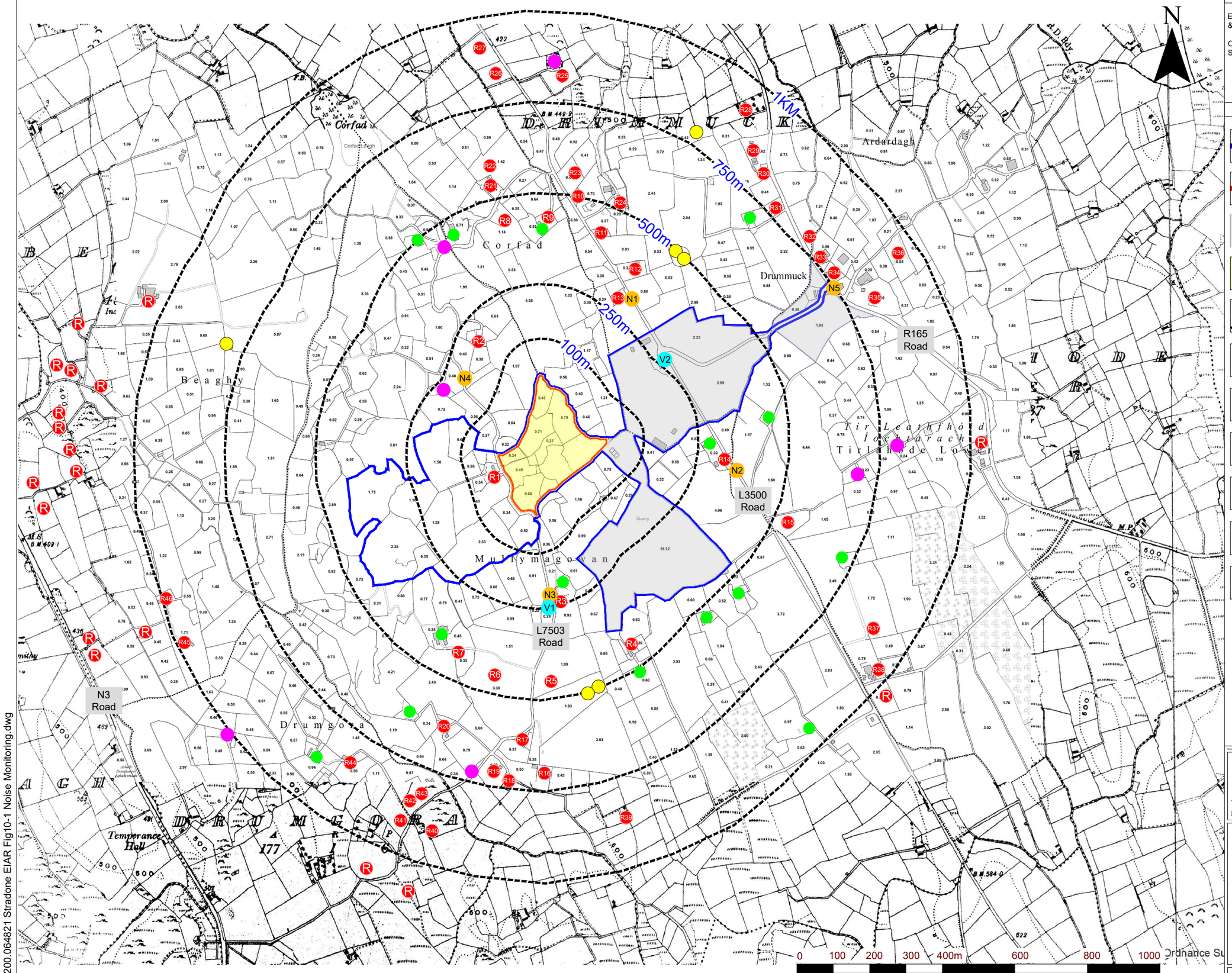
10.139 Noise monitoring will continue to be carried out on a regular basis at location N1 to N5 as shown on **Figure 10-1**.

Vibration

10.140 Monitoring of blasts (both for groundborne vibration and air overpressure) has been and will continue to be carried out at the site. The blast monitoring results will continue to be submitted on a regular basis to Cavan County Council for record purposes.

FIGURES

Figure 10-1
Receptors and Noise /Vibration Monitoring Locations



NOTES

Extract from Ordnance Survey Ireland 1:5,000 mapping sheets 1818 & 1819.

LEGEND

- APPLICANTS LAND INTEREST BOUNDARY (c. 39.7 ha.)
- APPLICATION AREA (c. 4.9 ha.)
- EXISTING PLANNING PERMISSION P. REF. 07/827
- PLANNING PERMISSION AREA P. REF. 12/101
- 500m — DISTANCE OFF-SET FROM PLANNING APPLICATION BOUNDARY
- R — RESIDENCE LOCATIONS
- DERELICT HOUSE
- AGRICULTURAL BUILDINGS
- ARCAEOLOGY SITES & MONUMENTS
- N — EXISTING BASELINE ENVIRONMENTAL MONITORING LOCATIONS FOR **NOISE**
- V — PREVIOUSL ENVIRONMENTAL MONITORING LOCATIONS FOR **BLASTING VIBRATION**

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QUARRY AT MULLYMAGOWAN, STRADONE, CO. CAVAN

NOISE / VIBRATION MONITORING LOCATIONS & RECEPTORS

FIGURE 10-1

Scale: 1:10,000 @ A3

Date: FEBRUARY 2023

904200.064821 Stradone EIAR Fig10-1 Noise Monitoring.dwg

APPENDICES

APPENDIX 10-A
Glossary of Terminology

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 10.A
Noise 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 one metre away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

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 10-B Noise Assessment

SOILS STRIPPING NOISE ASSESSMENT

Activity	Receptor	Activity LAeq (dB) at 10m Distance		Reflection	Screening	Activity Distance (m)	Activity Distance (m)	Noise Attenuated with Distance dB(A)	Noise Attenuated with Distance dB(A)	Noise Levels dB(A)		Operational Noise Levels dB(A)
		Excavator	Dumper	dB(A)	dB(A)					Excavator	Dumper	
Soils Stripping												
	R2	75	76	3	0	180	180	-25	-25	53	54	56
	R3	75	76	3	0	235	235	-27	-27	51	52	54
	R4	75	76	3	0	430	430	-33	-33	45	46	49
	R5	75	76	3	0	445	445	-33	-33	45	46	49
	R6	75	76	3	0	440	440	-33	-33	45	46	49
	R7	75	76	3	0	420	420	-32	-32	46	47	49
	R8	75	76	3	0	425	425	-33	-33	45	46	49
	R9	75	76	3	0	425	425	-33	-33	45	46	49
	R10	75	76	3	0	495	495	-34	-34	44	45	48
	R11	75	76	3	0	415	415	-32	-32	46	47	49
	R12	75	76	3	0	375	375	-31	-31	47	48	50
	R13	75	76	3	0	290	290	-29	-29	49	50	52
	R14	75	76	3	0	315	315	-30	-30	48	49	52
	R33	75	76	3	0	750	750	-38	-38	40	41	44
	R34	75	76	3	0	750	750	-38	-38	40	41	44
	R35	75	76	3	0	750	750	-38	-38	40	41	44

ROCK EXTRACTION NOISE ASSESSMENT

Activity	Receptor	Activity L_{Aeq} (dB) at 10m Distance					Reflection dB(A)	Screening dB(A)	Activity Distance (m)					Noise Attenuated with Distance dB(A)					Activity L_{Aeq} (dB)					Operational Noise Levels dB(A)
		Drilling Rig	Excavator	HGV	Processing Plant	Crushing Plant			Drilling Rig	Excavator	HGV	Processing Plant	Crushing Plant	Drilling Rig	Excavator	HGV	Processing Plant	Crushing Plant	Drilling Rig	Excavator	HGV	Processing Plant	Crushing Plant	
Stone Extraction	R2	83	76	75	85	85	3	-20	180	180	180	180	180	-25	-25	-25	-25	-25	41	34	33	43	43	47
	R3	83	76	75	85	85	3	-20	235	235	235	235	235	-27	-27	-27	-27	-27	39	32	31	41	41	45
	R4	83	76	75	85	85	3	-20	430	430	430	430	430	-33	-33	-33	-33	-33	33	26	25	35	35	40
	R5	83	76	75	85	85	3	-20	445	445	445	445	445	-33	-33	-33	-33	-33	33	26	25	35	35	40
	R6	83	76	75	85	85	3	-20	440	440	440	440	440	-33	-33	-33	-33	-33	33	26	25	35	35	40
	R7	83	76	75	85	85	3	-20	420	420	420	420	420	-32	-32	-32	-32	-32	34	27	26	36	36	40
	R8	83	76	75	85	85	3	-20	425	425	425	425	425	-33	-33	-33	-33	-33	33	26	25	35	35	40
	R9	83	76	75	85	85	3	-20	425	425	425	425	425	-33	-33	-33	-33	-33	33	26	25	35	35	40
	R10	83	76	75	85	85	3	-20	495	495	495	495	495	-34	-34	-34	-34	-34	32	25	24	34	34	39
	R11	83	76	75	85	85	3	-20	415	415	415	415	415	-32	-32	-32	-32	-32	34	27	26	36	36	40
	R12	83	76	75	85	85	3	-20	375	375	375	375	375	-31	-31	-31	-31	-31	35	28	27	37	37	41
	R13	83	76	75	85	85	3	-20	290	290	290	290	290	-29	-29	-29	-29	-29	37	30	29	39	39	43
	R14	83	76	75	85	85	3	-20	315	315	315	315	315	-30	-30	-30	-30	-30	36	29	28	38	38	43
	R33	83	76	75	85	85	3	-20	750	750	750	750	750	-38	-38	-38	-38	-38	28	21	20	30	30	35
	R34	83	76	75	85	85	3	-20	750	750	750	750	750	-38	-38	-38	-38	-38	28	21	20	30	30	35
	R35	83	76	75	85	85	3	-20	750	750	750	750	750	-38	-38	-38	-38	-38	28	21	20	30	30	35