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INTRODUCTION

Background

10.1 This chapter of the Environmental Impact Assessment Report (EIAR), prepared by SLR Consulting Ireland, addresses the potential noise and vibration effects of the planned development at Clonard, Co. Kildare.

10.2 The development, within an overall application site area comprises:

- Quarry development and associated processing previously permitted under P. Reg. Ref. No. 99/2042 and ABP Ref. PL09.123207) to include drilling, blasting, crushing and screening of rock; and lateral extension to same, with an overall extraction area of c. 6.2 hectares with no vertical deepening below the existing quarry floor. The appropriate period of planning register reference 99/2042 was extended by order dated 03/02/2017 by P. Reg. Ref. No. 16/1246;
- Importation of up to 35,000 tonnes per annum of processed fine aggregate, principally sand for use in readymix concrete production on site;
- Use of buildings and structures associated with the sand and gravel pit previously granted planning permission under P. Reg. Ref. No. 03/2754 comprising of the crushing, washing and screening plant with associated silt disposal lagoons; readymix concrete batching plant including powerhouse; prefabricated office; weighbridge; workshop building with concrete laboratory and bunded fuel tanks; aggregate storage bays; and one liquid effluent treatment system unit;
- Closure of the existing site entrance with provision of a new site entrance located to the north of the existing entrance; realignment of the main internal site access road from the new site entrance to the central processing area with provision of a new wheelwash system; acoustic fence screening (c.2m in height x 170m in length); and a new screening berm along the western site boundary;
- Restoration of the site lands will be to a combination of beneficial agricultural and ecological after-uses;
- All associated site works within an overall application area of c. 51.7 hectares. The proposed operational period is for 10 years plus 2 years to complete restoration (total duration sought 12 years); and
- Provision is also made for 3 no. sections of road improvements (widening) along the haul route between the site entrance and the R148 regional road. The proposals at the identified locations include for works in the public road and verge that aim to achieve a consistent carriageway width of 6.0m along with provision of verge widening on the inside of the three bends to improve forward visibility and intervisibility for all opposed traffic including traffic generated by the proposed development.

10.3 In order 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 of the EIAR, is provided in **Appendix 10-A**.

Scope of Work

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

- regulatory control framework for noise and vibration;
- methodology used to assess potential impacts and effects from activities at properties (dwellings and farms) and sensitive ecological receptors;
- a description of the receiving environment;
- baseline conditions pertaining to existing background / ambient noise levels around the site, and vibrations levels from blasting;
- prediction of the noise and vibrations 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 vibrations impact;
- a summary of any residual impacts; and
- monitoring proposals.

Consultations / Consultees

10.5 In preparing the Environmental Impact Assessment Report for the previous planning application (P. Ref. 22/83), a pre-planning consultation meeting was held between officials of Kildare County Council and representatives of SLR Consulting Ireland and Kilsaran Concrete on 9-Dec-2021 via the Microsoft Teams platform (ref. **PP5260**). Staff from the planning, roads, environment and water departments of Kildare County Council were also in attendance.

10.6 As this planning application is for development broadly covering the same development as applied for previously under P. Ref. 22/83, albeit over a smaller application area due to the removal of the onsite sand and gravel extraction element, there was no formal pre-planning meeting held with Kildare County Council.

10.7 Following a review of published development plans and a site survey, it was considered that there was no requirement for any further formal external consultations to be carried out in respect of noise and vibration for the purposes of this assessment. There was however significant consultation with other specialist contributors to this EIA Report.

Contributors / Author(s)

10.8 The noise and vibrations impact assessment presented in this Chapter was prepared by SLR Consulting Ireland. The lead consultants for the study was Aldona Binchy MSc. Eng PIEMA Environmental Engineering and Michelle Dawson MSc. MOIA.

Limitations / Difficulties Encountered

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

REGULATORY CONTROL FRAMEWORK: NOISE

10.10 The following sections address the statutory planning / policy requirements and regulatory control of noise and vibration generated by development activity. Currently, there is no national or regional legislation which specifically addresses noise and vibration generated by mineral extraction and

production of aggregates and construction materials. However, there are a number of guidance documents that are relevant in the context of both noise and vibration action planning.

Planning Policy and Development Control

10.11 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.

10.12 National Planning Framework Objective 65 addresses noise related impact of development and identifies a requirement for Planning Authorities to :

"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."

10.13 There are no specific policies in relation to noise emissions in the NPF for mineral extraction or production of construction aggregates and materials. The stated general development objective is to facilitate the development while at the same time protect the environment.

Local Planning Policy – Kildare County Development Plan 2023-2029

10.14 The current Kildare County Development Plan includes a number of policies and objectives for the planning and sustainable development of the County from 2023 to 2029.

10.15 Section 6.8.2 relates to noise.

"Noise, which is continuous, repeated, and / or loud can have significant impacts on our quality of life. The Kildare Noise Action Plan 2019-2023, and subsequent next edition, Round 4, seeks to avoid, prevent, and reduce where necessary the harmful effects of long-term exposure to environmental noise. It primarily considers the long-term environmental noise impact from 'Major Road' and 'Major Rail' traffic noise sources (which are mapped) and sets out an approach to review noise impact levels. Environmental noise from major infrastructure (i.e., roads, railways, and airports) is governed by the EU's Environmental Noise Directive as transposed into Irish Law as S.I. No. 549/2018 – European Communities (Environmental Noise) Regulations 2018."

- Policy IN P8

"Implement the provisions of EU and National legislation on air, noise, and light pollution and other relevant legislative requirements, as appropriate."

- Objective IN O63

"Implement the relevant spatial planning recommendations and actions of the Kildare Noise Action Plan 2019-2023 (and any subsequent update)".

- Objective IN O64

"Ensure that future developments are designed and constructed to minimise noise disturbance and consider the multi-functional uses of streets including movement and recreation, as detailed in the Urban Design Manual (2009) and the Design Manual for Urban Roads and Streets (2013)."

- Objective IN O65

"Ensure that noise levels caused by new and existing developments throughout the county do not exceed normally accepted standards."

- Objective IN O66

"Enforce and comply with European Communities (Environmental Noise) Regulations 2018 by:

- *Regulating and controlling activities likely to give rise to excessive noise (other than those activities which require regulation by the EPA)*
- *Requiring new developments and / or activities likely to give rise to excessive noise to install noise mitigation measures and monitors."*

- Objective IN O67

"Ensure noise sensitive development in proximity to national and other roads provides a noise impact assessment / Acoustic Design Statement to the requirements set out in the Noise Action Plan and Local Planning Advice Notes as may issue and includes appropriate spatial consideration in the design phase and, where necessary physical mitigation measures, such as noise barriers, set back landscaping and / or buffer zones between areas of land where development is proposed and existing / proposed national or other roads.."

EPA Environmental Management Guidelines for Environmental Management in the Extractive Industry

10.16 The EPA publication *Environmental Management Guidelines for Environmental Management in the Extractive Industry (Non-Scheduled Minerals)*[1] recommends the following in respect of noise:

In relation to quarry developments and ancillary activities, it is recommended that noise from the activities on site shall not exceed the following noise ELVs at the nearest noise-sensitive receptor:

Daytime : 08:00–20:00 h L_{Aeq} (1h) = 55 dBA

Night-time : 20:00–08:00 h L_{Aeq} (1h) = 45 dBA

***Note**: 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.)*

10.17 The DoEHLG (2004) Guidelines for Planning Authorities (*Quarries and Ancillary Activities: Guidelines for Planning Authorities*[2]*)* recommends similar limit values.

Planning Practice Guidance 2014

10.18 The web-based Planning Practice Guidance (PPG) sets out the Government's planning policies for England and has a specific category for mineral developments.

10.19 With respect to noise, it requires those making mineral development proposals to carry out a noise impact assessment which should identify all sources of noise and, for each source, take into account the emission level, its characteristics, proposed operating location, on-time and its potential impact at the nearby noise-sensitive receptors.

10.20 The guidelines provide advice on noise from temporary activities at mineral extraction sites, the recommended derivation of free-field criteria for normal daytime operations, and the absolute criterion of 70dB LAeq,1hr for temporary operations.

[1] https://www.epa.ie/pubs/advice/general/EPA_management_extractive_industry.pdf
[2] https://www.epa.ie/pubs/advice/general/EPA_management_extractive_industry.pdf

British Standard 5228-1:2009+A1:2014

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

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

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

AQTAG09 - Guidance on Effects of Industrial Noise on Wildlife

10.23 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.

10.24 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 10-1**, it is considered unlikely that it will have an adverse impact on designated species. Where noise levels are exceeded, a more detailed noise assessment will be required.

Table 10-1
Specific Noise Levels at Habitat / Nest Site

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

Site Specific Emission Limits for Noise

10.25 Condition No. 7 of P. Ref. No. **99/2042** previously imposed the following condition for the quarry development:

The equivalent continuous sound level (Leq)attributable to on-site operations (other than blasting) associated with the proposed development shall, when measured outside any dwelling / house that is located in the vicinity of the site and it is not owned by the developer , not exceed 50 dB(A) over any continuous 15-minute period between 0800 hours and 1800 hours on Monday to Fridays, inclusive, or over the period 0800 hours to 1600 hours on Saturdays. At other times it shall not exceed 45 dB(A) over any continuous 15-minute period.

There should be no clearly audible tonal component or impulsive component in the noise emissions from the activity at any noise sensitive location.

10.26 Condition No. 9 of P. Ref No. **03/2754** imposes the following condition for the sand and gravel pit development:

During the operational phase of the proposed development, the noise level from within the premises, measured at noise sensitive locations in the vicinity(at the boundary of the site), shall not exceed –

(a) *an $L_{Aeq,\ T}$ value of 55 dB(A) during the period 0800 to 1800 hours from Monday to Friday (inclusive), and during the period 0800 to 1400 hours on Saturdays.*

(b) *an $L_{Aeq,\ T}$ value of 45 dB(A) at any other time.*

REGULATORY CONTROL FRAMEWORK: VIBRATION

10.27 There is currently no legislation regulating or controlling ground-borne vibration from rock blasting and extractive activity more generally. A number of guidance documents which are relevant in the context of vibration action planning for the proposed development are referenced below.

Quarries and Ancillary Activities

10.28 The EPA publication Environmental Management Guidelines for Environmental Management in the Extractive Industry (Non-Scheduled Minerals)[3] recommends the following limit values for ground-borne vibrations and air overpressure:

Ground-borne 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., 11:00-17:00 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.

10.29 The DoEHLG (2004) Guidelines for Planning Authorities (Quarries and Ancillary Activities: Guidelines for Planning Authorities[4]) recommends similar limit values.

British Standard 7385-2:1993

10.30 British Standard 7385-2:1993 Evaluation and Measurement for Vibration in Buildings – Part 2: Guide to Damage Levels from Ground-borne Vibration gives guidance on vibration limits to prevent building damage. It is applicable to blasting associated with rock extraction.

10.31 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 indicated in **Table 10-2** below.

[3] https://www.epa.ie/pubs/advice/general/EPA_management_extractive_industry.pdf
[4] https://www.epa.ie/pubs/advice/general/EPA_management_extractive_industry.pdf

Table 10-2
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.

10.32 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 a peak component particle velocity of 12.5mm/sec.

British Standard 6472-2:2008

10.33 British Standard 6472:2008 gives guidance on human exposure to blast-induced vibration in buildings and is primarily applicable to blasting operations associated with mineral extraction.

10.34 BS6472 advises on the maximum satisfactory magnitudes of vibration for residential properties. **Table 10-3** details the maximum satisfactory levels of vibration for the daytime period, note a lower limit (compared to the Environmental Management Guidelines) of between 6 to 10 PPV mm/s is quoted.

Table 10-3
Maximum Satisfactory Magnitude of Vibration with Respect to Human Response for up to Three Blast Vibration Events per day

Place	Time	Satisfactory Magnitude[2], PPV (mm/s)
Residential dwellings	08:00 to 18:00 hrs Monday to Friday 08:00 to 13:00 hrs Saturday	6.0 to 10.0
Offices	Any time	14.0
Workshops	Any time	14.0
Note 1 – Critical working areas where delicate tasks impose more stringent criteria than human comfort are outside the scope of this standard. **Note 2** – The satisfactory magnitudes are the same for the working day and the rest day unless otherwise stated		

10.35 As BS6472 is concerned with human response within the buildings, the external levels are set to achieve satisfactory internal levels.

10.36 BS6472 also sets out how such limits should be reduced if blasting occurs on more than three occasions per day by detailing a formula based on the number of blasts, the duration of the vibration and a constant which is governed by the type of floor and duration.

10.37 Finally, BS6472 details a method of predicting vibration at nearby vibration-sensitive receptors from previously measured blasting events such as test blasts or historical blasting data gathered as part of a blast vibration monitoring scheme.

10.38 As part of this assessment data has been requested to allow a calculation to determine the Maximum Instantaneous Charge Weight permissible to prevent a limit of 12 mm/s being exceeded at the Receptors near to the Site.

Site Specific Emission Limits for Vibration

10.39 Condition No. 8 of the previous quarry permission P. Ref. No. 99/2042 and ABP.09.123207 imposed the following condition:

(1) 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 planning authority and to the occupants of all properties located within 500 metres of the location of such blasting operations.

(2) Advance warning signals indicating that blasting operations are about to commence and "all clear" signals indicating that the blasting operations have been completed shall be given (by means of sirens or other audible devices operated by the developer) to members of the public within 500 metres of the location of such blasting operations. The signalling arrangements shall be as agreed between the developer and the planning authority.

(3) The transmitted ground vibration arising from any blast carried out on the site shall, when measured on the foundations of the dwellinghouse that is nearest the location of the blast and is not owned by the developer or on a part of the dwellinghouse in close contact with the foundations, not exceed a peak particle velocity of 12 millimetres per second in any one of three mutually orthogonal planes.

(4) The air overpressure arising from any blast carried out on the site shall, when measured outside the dwellinghouse that is nearest the location of the blast and is not owned by the developer, not exceed 125 dB (linear) at frequencies of 2 Hertz or over.

METHODOLOGY

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

- the noise impact;
- the noise effect; and
- the significance of the effect.

Impact

Quarry Noise

10.41 In this assessment the impact of operational quarry noise upon residential receptors is determined with reference to the EPA publication Environmental Management Guidelines for Environmental Management in the Extractive Industry (Non-Scheduled Minerals), and AQTAG. Both these documents recommend a daytime (08:00–20:00) limit of $L_{Aeq\ (1h)}$ of 55 dBA. This limit is also referenced in AQTAG for ecological receptors.

10.42 Based on the above the impact of operational noise upon residential and ecological receptors is as detailed in **Table 10-4**.

Table 10-4
Operational Noise Residential Receptors – Impact Magnitude

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

HGV Noise

10.43 Idling and additional HGVs may increase the ambient noise level. To determine the impact of any change in the ambient noise level, the classification of impacts used in short-term traffic noise assessments presented in the *Design Manual for Roads and Bridges LA111: Noise and Vibration (rev 2)* will be used. The impact scale to be used in this Assessment is shown in **Table 10-5**.

Table 10-5
Change in Noise Level - Noise Impact

Noise Impact	Change in Noise Level, dB
None	No Change
Negligible	Less than 1.0
Minor	1.0 – 2.9
Moderate	3.0 – 4.9
Major	Greater than or Equal to 5.0

10.44 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 minimum perceptible change and doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

10.45 The idling HGVs may increase the ambient noise level to a level above an absolute noise level that is considered acceptable. In this assessment the following absolute limits will be referred to:

- Night-Time: Internal limit of 30 dB(A).

10.46 The impact scale to be used in this assessment is shown in **Table 10-6**.

Table 10-6
Absolute Noise Level - Noise Impact

Noise Impact	$L_{Aeq,T}$ dB Noise Change
None	No Change
Negligible	Less than 1dB increase in the absolute noise level, or the existing absolute noise level increases but is equal to or less than the guideline value
Minor	The existing absolute noise level is above the guideline value and increases by between 1.0 and 2.9dB(A)
Moderate	The existing absolute noise level is above the guideline value and increases by between 3.0 and 4.9dB(A)
Major	The existing absolute noise level is above the guideline value and increases by 5.0+dB(A)

10.47 Noise from idling HGVs will be calculated with reference to ISO 9613-2:1996 *Acoustics – Attenuation of Sound during Propagation Outdoors– Part 2: General Method of Calculation* detailed below.

Quarry Vibration

10.48 To determine the overall vibration impact, the magnitude and sensitivity Noise Effects Descriptors are presented in **Table 10-7**. The threshold value is a PPV limit of 6mm/s.

Table 10-7
Vibration Impact

Magnitude	Increase in the mms^{-1} Vibration Level
Major	Threshold value exceeded by 10.0mms-1 or more
Moderate	Threshold value exceeded between 1.0 to 9.9mms-1
Minor	Threshold value exceeded between 0.3 to 0.9mms-1
Negligible	Threshold value exceeded up to 0.3 mms-1
None	Threshold Value Not Exceeded

Effect

10.49 Generic noise effects are detailed in the Guidelines. Where an adverse impact is identified the guidelines present the following generic relationship between noise impact and noise effect:

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

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

The Significance of the Effect

10.50 The significance of the noise and vibration effect will depend on the receptor type and its sensitivity to the noise impact. The sensitivity of the receiving environment is shown in **Table 10-8**.

Table 10-8
Sensitivity Criteria for Acoustic Receptors

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

10.51 The sensitivity of the receiving environment together with the magnitude of impact defines the level of effect as shown in **Table 10-9**.

Table 10-9
Level of Effect Matrix

Magnitude	Sensitivity			
	Very High	High	Medium	Low
Major	**Major**	**Major**	**Major**	Moderate
Moderate	**Major**	Moderate	Moderate	Minor
Minor	Moderate	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible
None	None	None	None	None

10.52 In the context of the EIA Regulations, where the purpose of the assessment is to identify 'significant effects', a 'Major' effect in **Table 10-9** is considered to be significant.

RECEIVING ENVIRONMENT

Study Area

10.53 The proposed development is located near Clonard, within the townlands of Kilrainy and Kilrathmurry, Co. Kildare. The overall land interest is located on the eastern side, and with access onto the L5002 local road. The site entrance is approximately 380m southeast of the River Boyne which delineates the boundary between counties Kildare and Meath. The R401 regional road connecting Edenderry (Co. Offaly) to Kinnegad (Co. Westmeath) is southwest of the site entrance, whilst the M4 motorway and R148 regional road (former N4 national route) are to the northeast.

10.54 The existing site entrance, the proposed new site entrance and the existing sand & gravel pit and associated processing, manufacturing and ancillary facilities are all located within the townland of Kilrathmurry, while the existing quarry site is located within the townland of Kilrany.

10.55 The lands surrounding the application site predominantly comprise farm fields and forestry. The application site is not subject to any statutory or non-statutory nature conservation designations. Dwellings in the vicinity of application site are generally located along the local road network and comprise farmsteads or isolated on-off residences, with some occasional small clusters. The nearest dwellings to the application site boundary are shown in **Figure 10-1** at the end of the report and within **Plate 10-2** below.

Sensitive Receptors

10.56 Sensitive locations are those where people and wildlife may be exposed to noise from the existing or planned activities. The closest receptors to the application site have been identified and assessed on the basis of their distance from the application site boundary. This is a cautious approach, as noise generating activities are often located at greater distances within the site. The relevant receptors are listed in **Table 10-10** and their locations are shown in **Figure 10-4**.

10.57 25 residential and 1 ecological receptor sensitive receptors were identified within 500m of the application site to represent the closest noise sensitive receptors to the site. A list of these closest sensitive receptors (within 1km) in each direction surrounding the site and their distance from at its closest point are outlined in **Table 10-10** below.

Table 10-10
Noise Sensitive Receptors within 500m / 1Km of Site Boundary

Receptor Reference	Receptor	Sensitivity	Distance (m) / Direction from Site Boundary (approx.) i.e. Red line application area
R1	Residential	Medium	110 (W)
R2	Residential	Medium	85 (W)
R3	Residential	Medium	20 (W)
R4	Residential	Medium	40 (N)
R5	Residential/Commercial	Medium	450 (N)
R6	Residential	Medium	485 (E)
R7	Residential	Medium	455 (E)
R8	Residential	Medium	475 (E)
R9	Residential	Medium	490 (E)
R10	Residential	Medium	510 (E)
R11	Residential	Medium	370 (SE)
R12	Residential	Medium	500 (SE)
R13	Residential	Medium	190 (SE)
R14	Residential	Medium	40 (S)
R15	Residential	Medium	250 (S)

Receptor Reference	Receptor	Sensitivity	Distance (m) / Direction from Site Boundary (approx.) i.e. Red line application area
R16	Residential	Medium	240 (S)
R17	Residential	Medium	245 (S)
R18	Residential	Medium	180 (S)
R19	Residential	Medium	110 (S)
R20	Residential	Medium	55 (SW)
R21	Residential	Medium	40 (SW)
R22	Residential	Medium	110 (SW)
R23	Residential	Medium	100 (SW)
R24	Residential	Medium	465 (SW)
R25	Residential	Medium	475 (SW)
R26	Residential	Medium	515 (SW)
R27	Residential	Medium	550 (SW)
R28	Residential	Medium	630 (SW)
R29	Residential	Medium	850 (SW)
R30	Residential	Medium	880 (SW)
R31	Residential	Medium	685 (N)
R32	Residential	Medium	850 (N)
R33	Residential	Medium	860 (N)
R34	Residential	Medium	885 (N)
R35	Residential	Medium	915 (N)
R36	Residential	Medium	960 (N)
R37	Residential	Medium	850 (N)
R38	Residential	Medium	1000 (NE)
R39	Residential	Medium	975 (NE)
R40	Residential	Medium	995 (NE)
R41	Residential	Medium	850 (NE)
R42	Residential	Medium	770 (NE)
R43	Residential	Medium	820 (NE)
R44	Residential	Medium	910 (NE)
R45	Residential	Medium	615 (SE)
R46	Residential	Medium	880 (SE)
R47	Residential	Medium	770 (S)

Receptor Reference	Receptor	Sensitivity	Distance (m) / Direction from Site Boundary (approx.) i.e. Red line application area
R48	Residential	Medium	700 (S)
R49	Residential	Medium	830 (S)
R50	Residential	Medium	950 (S)
R51	Equestrian Centre	Medium	310 (E)

Sources of Information

10.58 A desk study was carried out to gather all relevant information relating to noise conditions around the application site. Further information was gathered through a site visit and technical assessments consistent with current standard methodologies and published best practice guidelines. This yielded the data required to allow an assessment of likely significant effects of the proposed development on sensitive receptors within its zone of influence.

BASELINE STUDY NOISE

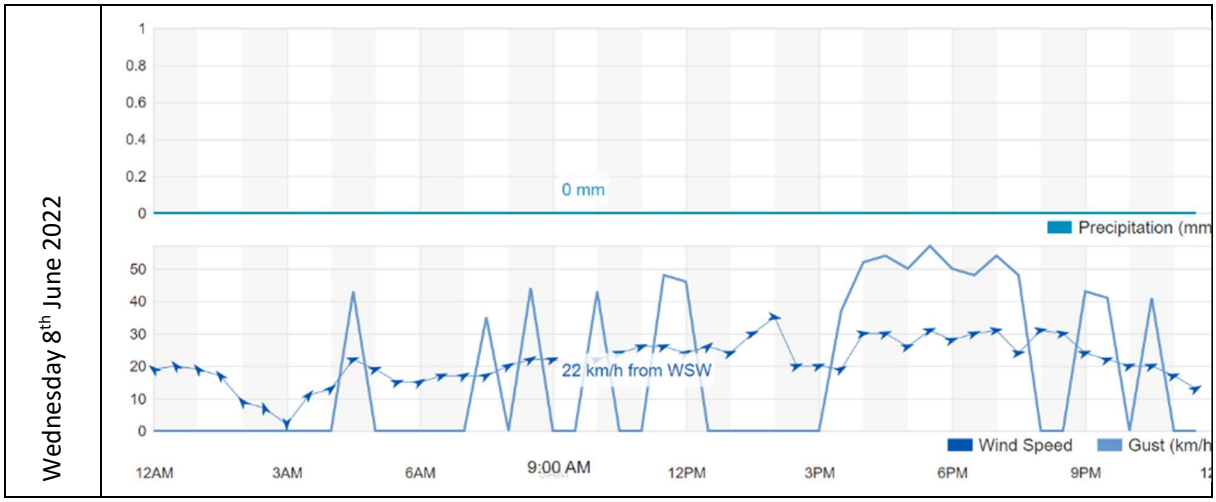
10.59 To determine baseline sound levels in the vicinity of the Quarry, a noise survey was undertaken at six locations in June 2022. The measurements were made during typical daytime hours.

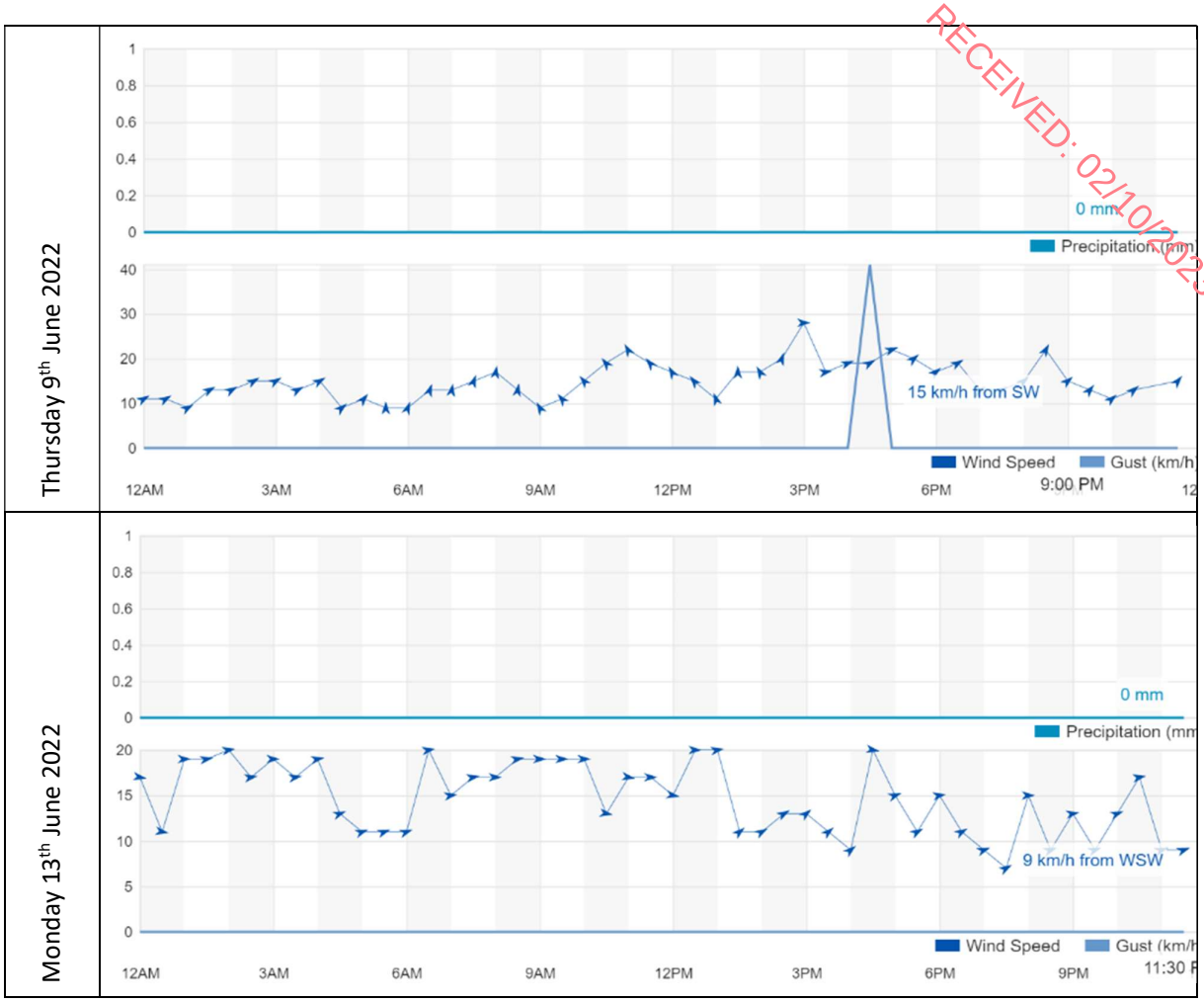
Weather Conditions – 2022

10.60 During the June 2022 survey, weather conditions were generally suitable for noise monitoring, being dry and with a wind speed of less than 5m/s.

10.61 The site engineers' notes indicate that local weather conditions during the survey were warm, free of rain, and wind speeds were consistently low, circa 1.5 to 1.7 ms^{-1}. The forecast is shown in **Plate 10-1.**

Plate 10-1
Weather Forecast -2022





Equipment

10.62 The noise survey equipment used during the survey is detailed in **Table 10-11**. All measurement instrumentation was calibrated before and after the measurements. No significant drift was observed. The calibration chain is traceable via the United Kingdom Accreditation Service to National Standards held at the National Physical Laboratory.

Table 10-11
Survey Equipment

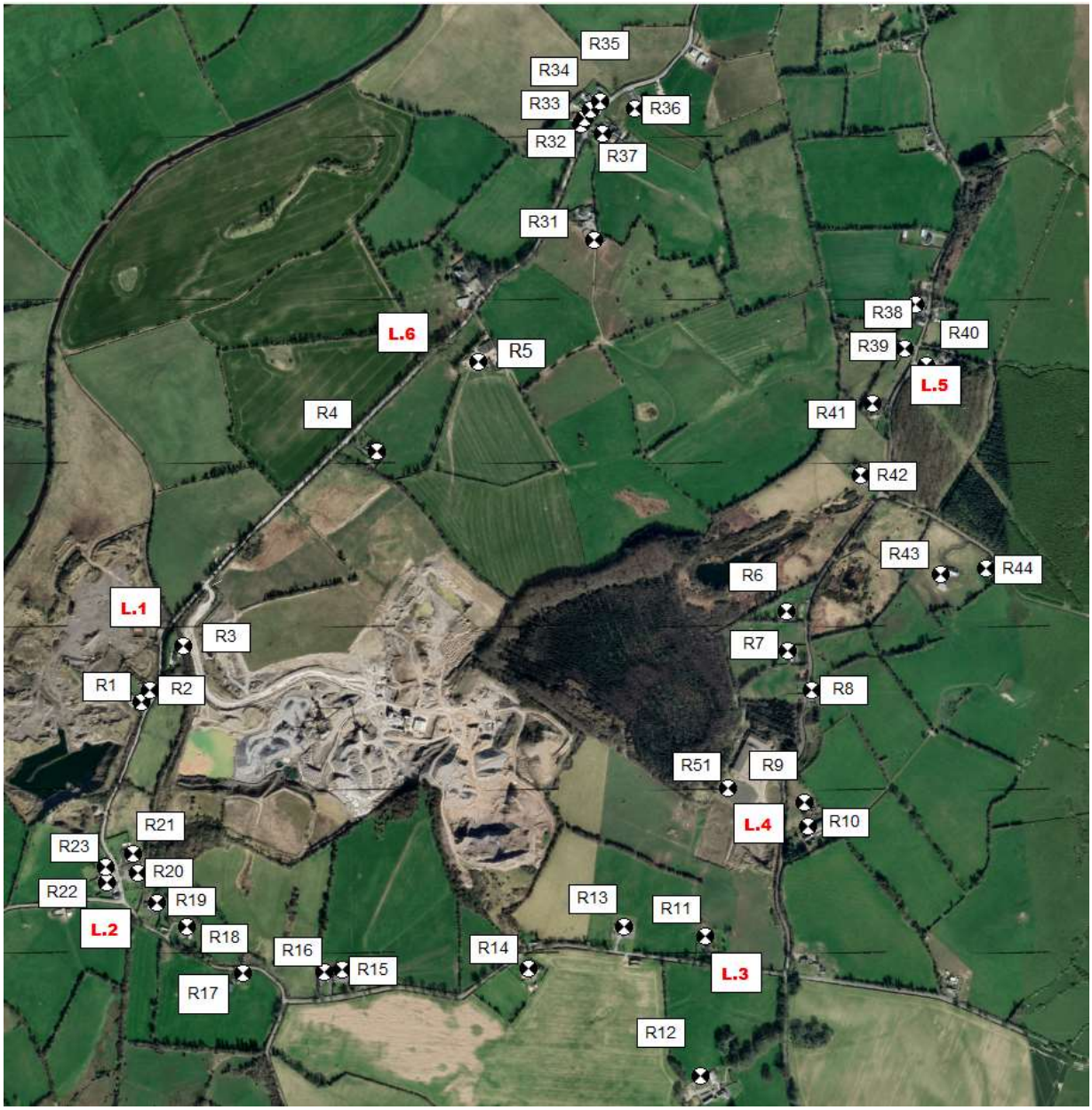
Year	Location	Equipment	Serial Number
2022	1, 3, 5, 6	Larson Davis 377B02 Sound Level Meter	123131
		Larson Davis CAL200 Calibrator	6970
	2, 4	Larson Davis 831 Sound Level Meter	0002582
		Larson Davis CAL200 Calibrator	6970

Survey Locations

10.63 The measurement locations for the assessment are presented in **Figure 10-1** (blue circles L1-L6) at the end of the chapter and in **Plate 10-2**, with the data presented in **Appendix 10-B**.

10.64 Additional compliance noise monitoring is also undertaken at the site on a monthly basis. The measurement locations are presented in **Figure 10-1** (orange circles N1-N5) at the end of the chapter with the data presented in **Appendix 10-C**.

Plate 10-2
Monitoring and NSR Locations



10.65 At the survey locations, the microphone was placed 1.5m above the local ground level in free-field conditions, i.e. at least 3.5m from the nearest vertical, reflecting surface. The following noise level indices were recorded:

- $L_{Aeq,T}$: The A-weighted equivalent continuous noise level over the measurement period, *T*.
- L_{A90}: The A-weighted noise level exceeded for 90% of the measurement period. This parameter is often used to describe background noise.
- L_{A10}: The A-weighted noise level exceeded for 10% of the measurement period. This parameter is often used to describe road traffic noise.
- L_{Amax}: The maximum A-weighted noise level during the measurement period.

10.66 At each position four fifteen measurements were completed to cover the time that the Quarry would operate in 2022. During the survey the Quarry was either not operational or was not audible at the monitoring position.

10.67 In 2022 at Location L1 an additional hour of measurement was completed between 06:00 and 07:00.

Baseline Sound Level Results

10.68 The survey results at each Location are shown in **Table 10-12**.

Table 10-12
Measured Sound Levels, free field

Monitoring Location	Receptors	Date	Time, *T*	$L_{Aeq,T}$, dB	L_{Amax} dB	Median L_{A10}, dB	Median L_{A90}, dB
L1	1, 2 and 3	13/06/2022	06:00 – 07:00	63.2	91.3	55.8	43.1
		08/06/2022	08:20 – 08:35	66.2	85.9	55.8	47.5
		08/06/2022	08:36 – 08:51	60.3	83.3	53.4	45.8
		08/06/2022	08:53 – 09:08	58.1	81.2	52.3	45.2
		08/06/2022	09:09 – 09:24	55.8	82.7	55.5	45.3
L2	15,16, 17, 18, 19, 20, 21,22 and 23	08/06/2022	09:31 – 09:46	55.7	77.4	54.4	44.3
		08/06/2022	09:48 – 10:03	55.8	76.6	54.9	46.6
		08/06/2022	10:04 – 10:19	54.7	75.2	54.0	42.8
		08/06/2022	10:21 – 10:36	53.8	74.4	51.1	42.7
L3	11, 12, 13 and 14	08/06/2022	10:36 – 10:51	57.9	73.3	56.3	47.0
		08/06/2022	10:51 – 11:06	64.6	96.0	59.7	48.5
		08/06/2022	11:07 – 11:22	60.3	89.1	49.4	43.9
		08/06/2022	11:23 – 11:38	53.9	78.1	51.0	44.8
L4	6, 7, 8, 9, 10 and 51	08/06/2022	11:20 – 11:35	57.4	73.5	55.6	48.5
		09/06/2022	09:25 – 09:40	49.4	73.2	46.2	38.9
		09/06/2022	09:41 – 09:56	44.0	60.1	46.3	39.3
		09/06/2022	09:58 – 10:13	54.2	78.0	55.3	39.2
L5		08/06/2022	12:24 – 12:39	58.4	75.3	59.8	53.7
		08/06/2022	12:39 – 12:54	58.2	82.3	57.1	49.3

	38, 39, 40, 41, 42, 43 and 44	08/06/2022	12:55 – 13:10	52.7	71.9	54.9	47.6
		08/06/2022	13:11 – 13:26	58.9	82.5	59.0	50.5
L6	4, 5, 31, 32, 33, 34, 35, 36 and 37	09/06/2022	10:30 – 10:45	61.9	79.1	57.7	45.3
		09/06/2022	10:48 – 11:03	59.2	81.0	53.1	44.4
		09/06/2022	11:04 – 11:19	58.8	96.3	38.9	28.0
		09/06/2022	11:32 – 11:47	62.5	84.0	53.1	48.6

10.69 The general noise climate across all locations was dominated by road traffic noise and general environmental noise i.e. low-level wind noise and bird song etc. Occasional noise from the quarry was audible at locations L1 and L4 but was not audible at the other locations.

HGV Noise Survey

10.70 Noise measurements of the following noise sources were completed on the access road:

- HGV Idling.
- HGV pass by.

10.71 For the idling HGV, measurements were completed at 1m from the HGV directly in front, behind, and adjacent to the side of the vehicle. At each position 5 no. one-minute measurements were completed. The results of the measurements are presented in **Table 10-13**.

Table 10-13
HGV Noise Levels

Position	Distance	$L_{Aeq,T}$, dB	L_{Amax}, dB	Median L_{A10}, dB	Median L_{A90}, dB
Front of Idling HGV	1m	65.5	69.2	66.6	64.3
Rear of Idling HGV	1m	69.2	75.6	70.2	68.2
Side A of Idling HGV	1m	72.5	82.7	74.5	69.1
Side B of Idling HGV	1m	65.9	70.8	66.8	64.7

BASELINE STUDY VIBRATION

10.72 At the existing quarry, vibration monitoring was previously carried out for all blasting events. All monitoring results are routinely recorded and filed as part of the Environmental Management System (EMS) which is in operation at the site.

10.73 For all blasting events at the quarry both Ground Vibration and Air Blast (Air Overpressure) were monitored at a minimum at one sensitive location (i.e., the location nearest to the blast).

Field Monitoring: Vibration

10.74 Historical blasting operations at the site have been monitored at neighbouring residences by the Applicant's independent blasting and shot firing team (Irish Industrial Explosives). The blast monitoring locations are shown on **Figure 10-1** and are described as follows:

- B1 located at Residence (R14); Hughes
- B2 located at Residence (R13); and Revier

- B3 Located at Residence (R6)

10.75 Blast monitoring results for the period 2013 to 2022 (February) when the quarry planning permission expired are provided in **Table 10-14**.

Table 10-14
Blast Monitoring Results

Date	Location of Seismograph	Distance (m)	Air Overpressure dB(L)	Peak Particle Velocity (mm/sec)		
				Horizontal	Vert	Transverse
17/10/2013	B2	300	110.0	8.5	6	5.5
18/07/2014	B2	250	115.4	3.1	2.3	5
06/05/2015	B2	430	123.9	2.7	1.5	1.7
06/05/2015	B1	300	119.1	3.9	2.5	4
11/11/2015	B1	300	114.2	3.23	4	8.63
11/11/2015	B2	315	113.8	2.09	1.2	1.71
07/03/2017	B1	N/A	N/A	N/A	N/A	N/A
07/03/2017	B2	420	105.5	2.03	2.03	2.03
26/06/2018	B1	273	108.0	7.17	7.11	5.65
26/06/2018	B2	316	111.0	3.68	6.03	3.49
01/02/2019	B1	380	115.7	3.11	1.20	2.28
01/02/2019	B2	330	109.9	2.85	2.15	1.77
01/03/2019	B1	253	115.0	5.33	3.61	2.34
01/03/2019	B2	302	112.0	4.12	4.95	4.19
01/05/2019	B1	235	124.0	4.50	6.50	2.70
01/05/2019	B2	330	124.3	3.11	1.96	2.03
03/07/2019	B1	300	108.4	3.42	3.36	3.87
03/07/2019	B2	280	110.2	8.19	3.93	3.87
14/11/2019	B1	310	102.8	3.49	3.42	2.34
14/11/2019	B2	330	112.3	4.76	2.28	2.73
14/11/2019	B3	810	No AOP	<0.5	<0.5	<0.5
11/06/2020	B1	230	88.0	6.10	4.26	2.79
11/06/2020	B2	230	108.0	4.13	5.33	3.37
11/03/2021	B1	290	117.0	3.37	2.16	4.38
11/03/2021	B2	200	96.0	4.13	2.16	2.03
19/05/2021	B1	320	102.0	2.16	1.27	2.41
19/05/2021	B2	290	108.0	3.68	2.48	3.05
22/07/2021	B1	360	118.0	1.72	1.21	1.40
22/07/2021	B2	400	114.0	2.03	1.46	1.65
23/09/2021	B1	340	107.0	2.79	1.33	2.22
23/09/2021	B2	360	107.0	2.79	1.33	2.22
21/10/2021	B1	220	115.0	8.89	5.21	2.99

Date	Location of Seismograph	Distance (m)	Air Overpressure dB(L)	Peak Particle Velocity (mm/sec)		
				Horizontal	Vert	Transverse
21/10/2021	B2	270	103.0	5.65	3.11	3.30
11/11/2021	B1	270	110.0	3.37	2.16	3.05
11/11/2021	B2	270	102.0	4.00	2.35	1.46
25/11/2021	B1	480	121.7	2.92	1.59	1.78
25/11/2021	B2	440	118.5	5.46	1.84	3.30
13/01/2022	B1	240	115.0	4.76	2.73	5.59
13/01/2022	B2	250	109.0	5.65	3.49	3.05
27/01/2022	B1	220	113.0	5.46	2.35	4.51
27/01/2022	B2	210	111.0	6.10	2.54	4.32

10.76 All the vibrations levels recorded are within recognised threshold and planning compliance limits.

NOISE IMPACT ASSESSMENT

Rock Extraction

10.77 To determine the noise impact generated by the quarry operations, SLR Consulting Ireland carried out a noise prediction assessment, whereby the levels of noise were calculated at the nearest noise sensitive receptors (residences and ecological receptor), as identified in **Figure 10-1**.

10.78 The predictions in the noise model have been undertaken using a proprietary software-based noise model, CadnaA, which implements a range of calculation methods. The calculation algorithms set out in British Standard 5228:2009+A1:2014 Code of Practice for noise and vibration control on construction and open sites, Part 1: Noise have been used and the model assumes:

- A ground absorption factor of 1.
- Order of Reflections of 2.
- A daytime receiver height of 1.8m.
- Ground contour data.

10.79 In the first instance SLR have developed the following three noise models.

- **Model A**: Existing Quarry operations with plant movements between the quarry and the existing processing plant area included.
- **Model B**: HGV movements on the relocated Site Access.
- **Model C**: Processing plant area.

10.80 Noise from the following three Scenarios, presented in **Table 10-15**, would then be compared to the measured baseline sound levels. The noise model maps are provided in **Appendix 10-D**.

Table 10-15
Scenarios Assessed

Period	Models Included in Scenario
Normal Ops. Whole Site	**Model A**: Existing Quarry operations with plant movements between the quarry and the existing processing plant area included. **Model B**: HGV movements on the relocated Site Access. **Model C**: Processing plant area.

10.81 The plant that will be included in each Scenario to be assessed is included in **Table 10-16**.

Table 10-16
Plant Complement

Operation / Model	Plant	Location	Sound Power Level LWA dB(A)	No. of Plant	Movements per Hour	Noise Level Source
Model A: Existing Quarry	Excavator 37t	Within the Existing Quarry with the Dump Truck moving crushed aggregate to Plant Processing Area for Storage	107.7	1	N/A (100% on-time)	BS5228 C10 Row 1
	Excavator 37t with Breaker		116.8	1	N/A (50% on-time)	BS5228 C9 Row 12
	Loading Shovel		112.2	1	N/A (50% on-time)	BS5228 C10 Row 10
	Mobile Crusher		118.1	1	N/A (50% on-time)	Library Data
	Dump Truck		107.2	1	20	BS5228 C2 Row 30
Model B: HGV Movements on Relocated Site Access	Road HGV	Relocated Site Access	108.1[5]	1	14	BS5228 C2 Row 34
	Wheel Wash	Relocated Site Access	90.0	1	N/A (50% on-time)	SLR measured
Model C: Processing Plant Area Operation / Model[6]	Loading Shovel	Plant Processing Area with HGV moving to Site entrance	112.9	1	N/A (50% on-time)	BS5228 C10 Row 10
	TERAX Wash plant		118.0	1	N/A (100% on-time)	TERAX
	Excavator		107.7	1	N/A (100% on-time)	BS5228 C10 Row 1
	Mobile Screen		110 Aldona calcs	1	N/A (100% on time)	SLR measured

[5] LAFmax of pass-by

Noise Model Results

10.82 Predicted levels for Each Model Scenario are presented in **Table 10-17**. The receptors which did not fall within the limits of the noise model are not included within this assessment tables below (R24-R30 and R41-R45).

Table 10-17
Predicted Noise Level for Each Scenario, $L_{Aeq,T}$ dB

Receptor	Model A Existing Quarry, dB	Model B HGV Movements on Relocated Access Area, dB	Model C Processing Plant Area, dB
R1	35.4	36.8	48.9
R2	34.5	35.2	47.3
R3	35.0	36.7	51.3
R4	39.9	45.4	49.8
R5	42.3	40.1	47.8
R6	34.9	20.1	36.2
R7	36.0	20.3	36.8
R8	34.8	20.6	36.8
R9	35.7	20.8	32.7
R10	35.5	20.2	32.9
R11	33.7	24.0	33.6
R12	29.3	16.8	32.6
R13	36.2	21.4	34.3
R14	40.3	24.1	41.6
R15	37.4	30.9	48.5
R16	36.8	28.2	44.8
R17	35.0	30.9	46.4
R18	34.4	29.8	45.1
R19	35.0	31.2	47.9
R20	34.2	29.7	45.8
R21	33.0	26.7	43.3
R22	32.5	26.7	43.0
R23	32.9	27.9	42.0
R31	32.3	32.4	44.8
R32	31.3	25.8	38.8
R33	31.9	25.8	38.7
R34	31.5	25.6	38.6
R35	28.9	25.1	38.1
R36	30.7	23.9	36.4
R37	30.6	21.1	35.9
R38	27.5	23.5	37.7

Receptor	Model A Existing Quarry, dB	Model B HGV Movements on Relocated Access Area, dB	Model C Processing Plant Area, dB
R39	28.1	23.4	30.1
R40	27.9	22.6	30.0
R41	28.8	19.0	30.5
R42	29.6	21.6	32.1
R43	31.7	18.2	33.1
R44	30.9	17.4	32.2
R51	37.5	21.7	33.7

10.83 In this assessment the impact of operational quarry noise upon residential receptors is determined with reference to the EPA publication Environmental Management Guidelines for Environmental Management in the Extractive Industry (Non-Scheduled Minerals), and AQTAG. Both these documents recommend a daytime (08:00–20:00) limit of $L_{Aeq\ (1h)}$ of 55 dBA. This limit is also referenced in AQTAG for ecological receptors.

10.84 The resultant $L_{Ar,\ 1hr}$ noise prediction for each receptor location is presented below. The tables also show the comparison between the predicted operational $L_{Aeq,\ 1hr}$ noise level and noise limit of 55dB(A) adopted at each receptor.

Noise Assessment

10.85 This assessment includes:

- **Model A**: Existing Quarry operations with plant movements between the quarry and the existing processing plant area included.
- **Model B**: HGV movements on the relocated Site Access.
- **Model C**: Processing plant area.

Table 10-18
Normal Operations (Whole Site) Assessment

Receptor	Normal Operations (Whole Site) $L_{Aeq,T}$, dB	Limit, dB	Difference, dB
R1	48	55	-7
R2	52	55	-3
R3	51	55	-4
R4	49	55	-6
R5	39	55	-16
R6	39	55	-16
R7	39	55	-16
R8	38	55	-17
R9	37	55	-18
R10	37	55	-18
R11	34	55	-21

Receptor	Normal Operations (Whole Site) $L_{Aeq,T}$, dB	Limit, dB	Difference, dB
R12	38	55	-17
R13	44	55	-11
R14	49	55	-6
R15	46	55	-9
R16	47	55	-8
R17	46	55	-9
R18	48	55	-7
R19	46	55	-9
R20	44	55	-11
R21	43	55	-12
R22	43	55	-12
R23	45	55	-10
R31	40	55	-15
R32	40	55	-15
R33	40	55	-15
R34	39	55	-16
R35	38	55	-17
R36	37	55	-18
R37	38	55	-17
R38	33	55	-22
R39	33	55	-22
R40	33	55	-22
R41	34	55	-21
R42	36	55	-19
R43	35	55	-20
R44	39	55	-16
R51	48	55	-7

10.86 It can be seen from **Table 10-18** that during Normal Operations the noise limit of 55dB(A) is met at all Receptors. With reference to **Table 10-4** and **Table 10-9**, the impact is None with no Effect.

HGV Traffic

10.87 For the purposes of assessment, it is assumed that the total volume of traffic generated in the future by all extraction, importation and production activities at Clonard (including production of aggregates and concrete) will be on average 14 movements per hour. The volume of product transported from a quarry site is commercially driven and accordingly the rate of production and extraction can fluctuate throughout the year resulting in a variance of approximately ±15 trips per day to address certain demands when required.

Noise Assessment of Site Queuing Traffic

10.88 To assess the potential impact of queuing traffic on the internal Site Road from the Site entrance to the internal barrier, SLR has referred to the measured baseline data at the monitoring locations representative of Noise Sensitive Receptors (NSRs) 1, 2, 3, and 4. Specifically the measurement data covering the period 06:00 to 07:00 when it is assumed that HGVs may be queuing within the Site.

10.89 The measured baseline noise level between the period 06:00 0 07:00 is detailed in **Table 10-19**.

Table 10-19
Baseline Noise Level at Site Access Between 06:00 and 07:00 Hours

Monitoring Location	Date	Time, *T*	$L_{Aeq,T}$, dB	L_{Amax}, dB	Median L_{A10}, dB	Median L_{A90}, dB
L1	13/06/2022	06:00 – 07:00	63.2	91.3	55.8	43.1

10.90 The logarithmic average of the measurements completed of an idling HGV at the Site (measured by SLR) are shown in **Table 10-20**. The logarithmic average $L_{Aeq,T}$, from all locations around the vehicle has been used in the assessment.

Table 10-20
HGV Noise Levels – Sound Power dB(A)

Position	L_{WA}, dB	L_{Amax}, dB
Front of Idling HGV	83.0	86.7
Rear of Idling HGV	86.7	93.1
Side A of Idling HGV	90.0	100.2
Side B of Idling HGV	83.4	88.4
Logarithmic Average Value	**86.7**	**95.3**

10.91 A model has been developed that includes the noise level of idling HGV as a point source at a height of 1.5m. This model includes five idling HGVs within the Site on the Access Road leading to the internal noise barrier. Calculations have been completed in accordance with IS0 9613 Part 2. In addition to the idling HGVS a wheel wash has been included. The wheel wash has a sound power level of 90dB(A).

Noise Level of an Idling HGV and Wheel Wash

10.92 The calculated ambient sound level of five idling HGVS and a wheel wash outside each Receptor is shown in **Table 10-21**.

Table 10-21
Ambient Sound Level of Five Idling HGVs and a Wheel Wash – dB $L_{Aeq,1hr}$

Sensitive Receptor	Idling HGV $L_{Aeq,1hr}$, dB
R1	34.4
R2	36.8
R3	31.4
R4	39.0

Change in the Ambient Noise Level Assessment

10.93 In view of the existing and recently expired permitted levels of quarry and sand & gravel output 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 proposed development activity can be deemed 'negligible' in terms of traffic and that no further assessment is necessary.

10.94 To determine the increase in the ambient noise level at each receptor, it is necessary to logarithmically add the calculated noise level of the idling HGVs, to the baseline ambient noise ($L_{Aeq,T}$) during 06:00 to 07:00.

10.95 The results of this calculation and the difference between the cumulative ambient noise level, the baseline ambient noise level, and the impact are shown in **Table 10-22**.

Table 10-22
Change in the Ambient Noise Level

Location	Time	Base $L_{Aeq,T}$ Noise Level, dB	Calculated $L_{Aeq,T}$ of Two Idling HGVs, dB	Cumulative $L_{Aeq,T}$ Noise Level, dB	Increase in the $L_{Aeq,T}$ Noise Level, dB	Impact
R1	06:00 – 07:00	63.2	34.4	63.2	0	Negligible
R2	06:00 – 07:00	63.2	36.8	63.2	0	Negligible
R3	06:00 – 07:00	63.2	31.4	63.2	0	Negligible
R4	06:00 – 07:00	63.2	39.0	63.2	0	Negligible

10.96 **Table 10-22** above demonstrates that the overall increase in ambient (L_{Aeq}) noise level would be zero at each receptor location. To that end, the resultant impact would be Negligible in accordance with the criteria.

Absolute Noise Level Assessment

10.97 The absolute ambient noise level at each receptor is the cumulative $L_{Aeq,T}$ noise level presented in **Table 10-23**.

10.98 The limit referred to is an external $L_{Aeq,T}$ level of 45 dB(A). Assuming a partially open window will reduce external noise levels by 15 dB(A), an external $L_{Aeq,T}$ noise level of 45 dB(A) or less would meet the internal $L_{Aeq,T}$ noise level limit of 30 dB(A).

Table 10-23
Absolute Noise Level Assessment

Receptor	Time	Base $L_{Aeq,T}$ Noise Level, dB	Calculated $L_{Aeq,T}$ of Additional HGVs, dB	Cumulative $L_{Aeq,T}$ Noise Level, dB	External $L_{Aeq,T}$ Limit, dB
R1	06:00 – 07:00	63.2	34.4	63.2	45
R2	06:00 – 07:00	63.2	36.8	63.2	45
R3	06:00 – 07:00	63.2	31.4	63.2	45
R4	06:00 - 07:00	63.2	39.0	63.2	45

10.99 **Table 10-23** above indicates that, the baseline ambient sound level in the area (the existing noise level) already exceeds the external noise limit. The assessment further demonstrates that the additional HGVs will not cause a significant increase in ambient noise levels and would not, in of

themselves, cause an exceedance of the limit of limit of 45dB(A). The impact of queuing HGVs is not therefore considered to be significant.

Noise Assessment of Traffic (Haul Route)

Baseline Noise Level

10.100 To assess the potential impact of additional traffic on the road leading to the Site Access, SLR has referred to the measured baseline data.

10.101 The measured baseline noise level is detailed in **Table 10-12**. The $L_{Aeq,1hour}$ baseline ambient noise level at each monitoring location is shown in **Table 10-24** below. The data is the logarithmic average of the measurements completed at each location in 2022.

Table 10-24
Baseline Ambient Noise Level

Monitoring Location	Receptors	$L_{Aeq,1hr}$, dB
1	1, 2, 3	61.9
2	15,16, 17, 18, 19, 20, 21,22 and 23	55.1
3	11, 12, 13 and 14	60.8
4	6, 7, 8, 9, 10 and 51	53.6
5	38, 39, 40, 41, 42, 43 and 44	57.6
6	4, 5, 31, 32, 33, 34, 35, 36 and 37	60.9

Noise from Additional HGVs

10.102 A sound power level for a road lorry of 98dB(A)7was used in a model has been developed that includes the noise level of an HGV at 32km/hr as a moving point source at a height of 1.5m. This model includes for 14 movements per hour.

Noise Level of HGV

10.103 The calculated ambient sound level of 14 HGVs per hour at each Receptor is shown in **Table 10-25**.

Table 10-25
Ambient Sound Level of 14 Additional HGVs – dB $L_{Aeq,1hr}$

Receptor	HGV Noise Level $L_{Aeq,T}$
R1	51.1
R2	50.9
R3	44.0
R4	22.5
R5	19.9
R6	17.9

[7] BS5228 Table D7 Row 121

Receptor	HGV Noise Level $L_{Aeq,T}$
R7	18.1
R8	17.8
R9	18.3
R10	18.2
R11	20.7
R12	21.9
R13	20.2
R14	28.2
R15	34.3
R16	37.0
R17	53.8
R18	41.1
R19	41.9
R20	38.6
R21	36.4
R22	48.7
R23	50.7
R31	17.0
R32	15.3
R33	15.2
R34	15.0
R35	14.7
R36	13.9
R37	14.9
R38	12.1
R39	13.9
R40	13.6
R41	14.2
R42	15.8
R43	15.6
R44	13.9
R51	18.7

Change in the Ambient Noise Level Assessment

10.104 To determine the increase in the ambient noise level at each receptor, it is necessary to logarithmically add the calculated ambient sound level of additional HGV movements, to the baseline ambient noise level at each Receptor.

10.105 The results of this calculation and the difference between the cumulative ambient noise level, the baseline ambient noise level, and the impact are shown in **Table 10-26**.

Table 10-26
Change in the Ambient Noise Level

Location	Base $L_{Aeq,T}$ Noise Level, dB	Calculated $L_{Aeq,T}$ of Additional HGVs, dB	Cumulative $L_{Aeq,T}$ Noise Level, dB	Increase in the $L_{Aeq,T}$ Noise Level, dB	Impact
R1	61.9	51.1	62.2	+ 0.3	Negligible
R2	61.9	50.9	62.2	+ 0.3	Negligible
R3	61.9	44.0	62.0	+ 0.1	Negligible
R4	60.9	22.5	60.9	0.0	None
R5	60.9	19.9	60.9	0.0	None
R6	53.6	17.9	53.6	0.0	None
R7	53.6	18.1	53.6	0.0	None
R8	53.6	17.8	53.6	0.0	None
R9	53.6	18.3	53.6	0.0	None
R10	53.6	18.2	53.6	0.0	None
R11	60.8	20.7	60.8	0.0	None
R12	60.8	21.9	60.8	0.0	None
R13	60.8	20.2	60.8	0.0	None
R14	60.8	28.2	60.8	0.0	None
R15	55.1	34.3	55.1	0.0	None
R16	55.1	37.0	55.2	+ 0.1	Negligible
R17	55.1	53.8	57.5	+ 2.4	Minor
R18	55.1	41.1	55.3	+ 0.2	Negligible
R19	55.1	41.9	55.3	+ 0.2	Negligible
R20	55.1	38.6	55.2	+ 0.1	Negligible
R21	55.1	36.4	55.2	+ 0.1	Negligible
R22	55.1	48.7	56.0	+ 0.9	Negligible
R23	55.1	50.7	56.4	+ 1.3	Minor
R31	60.9	17.0	60.9	0.0	None
R32	60.9	15.3	60.9	0.0	None
R33	60.9	15.2	60.9	0.0	None
R34	60.9	15.0	60.9	0.0	None
R35	60.9	14.7	60.9	0.0	None
R36	60.9	13.9	60.9	0.0	None
R37	60.9	14.9	60.9	0.0	None
R38	57.6	12.1	57.6	0.0	None
R39	57.6	13.9	57.6	0.0	None
R40	57.6	13.6	57.6	0.0	None
R41	57.6	14.2	57.6	0.0	None
R42	57.6	15.8	57.6	0.0	None

Location	Base $L_{Aeq,T}$ Noise Level, dB	Calculated $L_{Aeq,T}$ of Additional HGVs, dB	Cumulative $L_{Aeq,T}$ Noise Level, dB	Increase in the $L_{Aeq,T}$ Noise Level, dB	Impact
R43	57.6	15.6	57.6	0.0	None
R44	57.6	13.9	57.6	0.0	None
R51	53.6	18.7	53.6	0.0	None

10.106 For the majority of receptors considered, the increase in cumulative noise levels would be None to Negligible, with a small number of Minor increases.

10.107 The assessment presented in **Table 10-26** demonstrates that, for the majority of receptors, the change in ambient noise level would be None to Minor.

Vehicle Noise Discussion

10.108 In view of the existing and previously permitted levels of quarry and sand & gravel output 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 proposed development activity can be deemed 'negligible' in terms of traffic and that no further assessment is necessary.

VIBRATION IMPACT ASSESSMENT

Blast-Induced Vibration Sensitive Receptors and Monitoring Locations

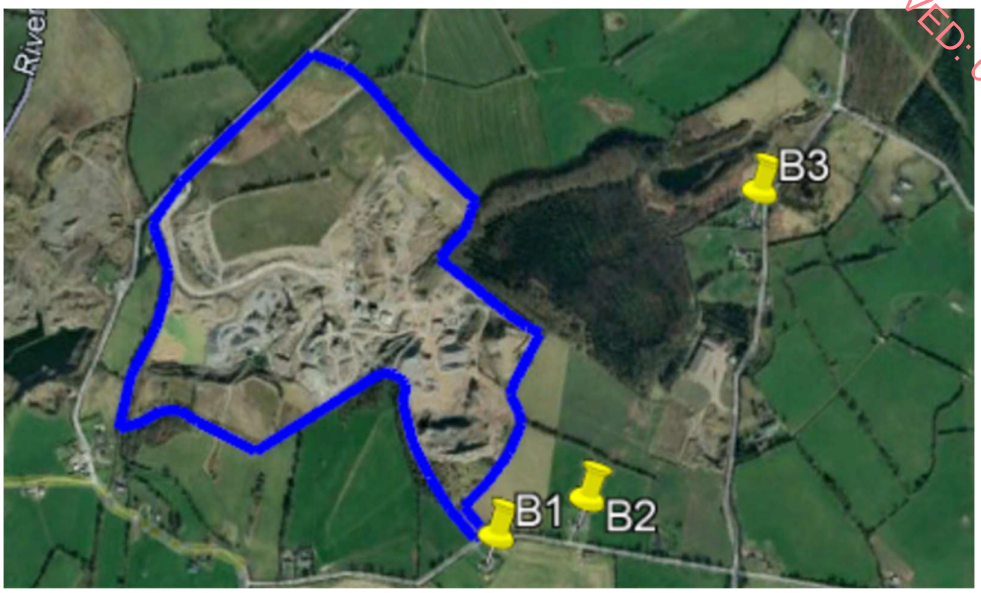
10.109 Rock extraction at Clonard Quarry will be carried out by blasting and blasted rock materials will be removed for further processing (crushing) by mechanical excavators.

10.110 Vibration predictions have been made to the nearest vibration sensitive receptors (VSRs) to the existing and proposed extraction area. In this respect, the assessment has considered the location in the quarry where blasting of rock would occur closest to the receptor, taking into consideration that the overburden overlying the rock would be excavated (and not blasted).

10.111 The location of the VSRs are shown in **Figure 10-1** at the end of this document.

10.112 As part of this assessment data has been requested to allow a calculation to be completed to determine the Maximum Instantaneous Charge Weight permissible to prevent a limit of 6mm/s being exceeded at each Receptor. Data has been provided from measurements obtained at the three Blast Monitoring Locations shown on **Figure 10-1** and on **Plate 10-3** below.

Plate 10-3
Blast Monitoring Locations

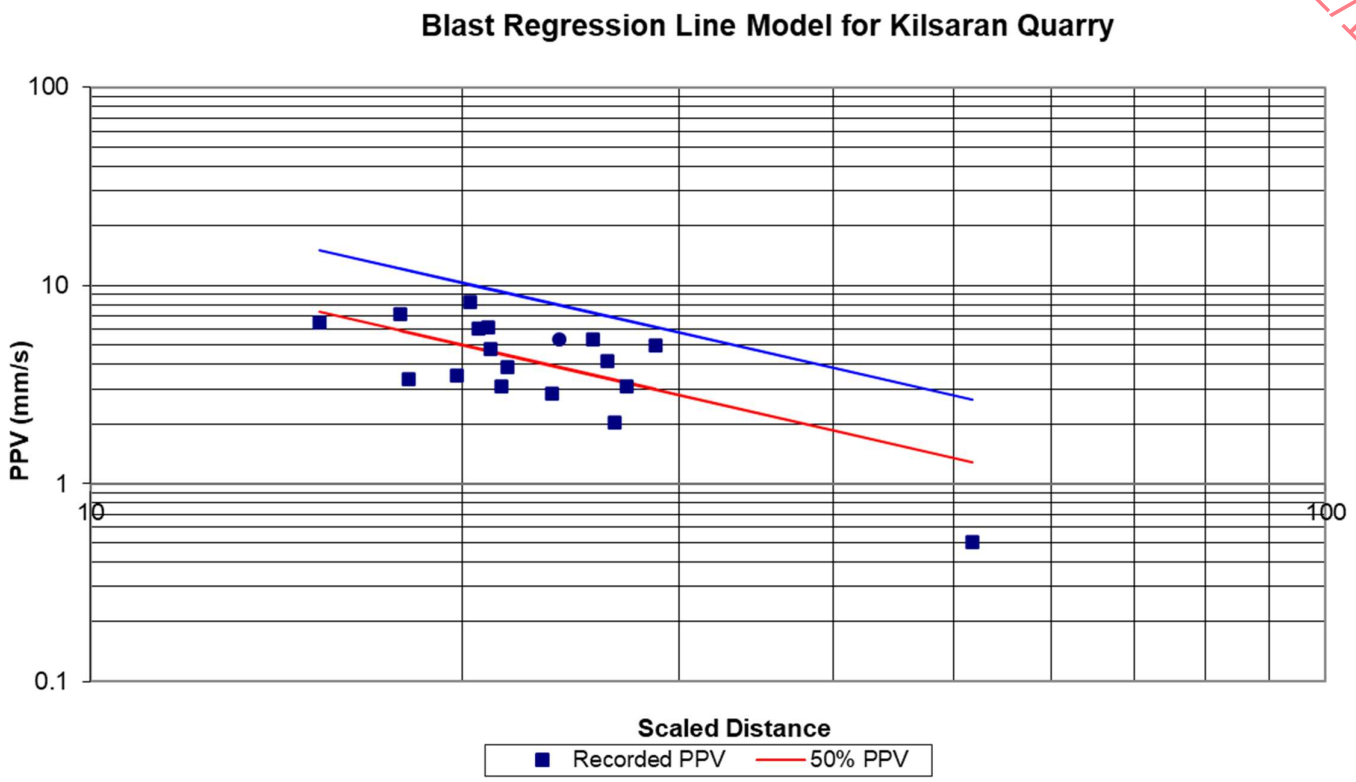


10.113 Analysis of the recorded vibration data from the quarry has been used to create a regression line, showing both the 50% and the 95% confidence limit and is shown in **Plate 10-4**. The regression line plot shows that the corresponding scaled distance value for a vibration criterion of 6.0mm/s PPV at 95% confidence level is 29.2 $mkg^{-1/2}$. **Table 10-27** shows the allowable maximum instantaneous charge weight to comply with this criterion at given separation distances.

Table 10-27
Allowable maximum instantaneous charge weights

Blast/receiver separation distance (m)	Allowable maximum instantaneous explosive charge weight to comply with 6mm/s criterion (kg)
50	2.93
75	6.58
100	11.70
125	18.29
150	26.34
175	35.85
200	46.82
225	59.25
250	73.15
275	88.52

Plate 10-4
Blasting Regression Line Model



10.114 **Table 10-28** shows the predicted MIC that could be implemented at the nearest blast location for each VSR to ensure that the relevant criterion at 95% confidence level is adhered to.

Table 10-28
Predicted MIC at the nearest blast location for each VSR

Vibration Sensitive Receptor	Approximate Distance from Nearest Blast Location	Predicted Maximum Instantaneous Charge Weight, kg to comply with 6 mms^{-1} at 95% confidence level
R1 [A]	610	435.53
R2 [A]	590	407.44
R3 [A]	560	367.06
R4 [A]	635	471.96
R5 [A]	975	1112.68
R6 [A]	630	464.56
R7 [A]	600	421.37
R8 [A]	615	442.70
R9 [A]	525	322.61
R10 [A]	525	322.61
R11 [A]	385	173.49
R12 [A]	600	421.37
R13 [A]	210	51.62
R14 [A]	160	29.96
R15 [A]	320	119.86
R16 [A]	360	151.69
R17 [A]	505	298.50
R18 [A]	585	400.56
R19 [A]	635	471.96
R20 [A]	660	509.86
R21 [A]	625	457.21
R22 [A]	670	525.42
R23 [A]	685	549.21
R31 [A]	1,115	1455.15
R32 [A]	1,320	2039.42
R33 [A]	1,350	2133.18
R34 [A]	1,370	2196.85
R35 [A]	1,395	2277.76
R36 [A]	1,395	2277.76
R37 [A]	1,310	2008.64
R38 [A]	1,240	1799.71
R39 [A]	1,170	1602.25

Vibration Sensitive Receptor	Approximate Distance from Nearest Blast Location	Predicted Maximum Instantaneous Charge Weight, kg to comply with 6 mms^{-1} at 95% confidence level
R40 [A]	1,190	1657.50
R41	1,015	1205.84
R42	910	969.26
R43	965	1089.97
R44	1,055	1302.76
R51	380	169.02
[A] **Residential receptor, 6 mm/s permissible vibration limit**		

10.115 The values presented in **Table 10-28** are reasonable estimates based on the worst-case scenario that the blasts would be conducted at the nearest blast location to the VSRs. Higher charge weights can be used at greater distances in accordance with the information shown in **Table 8-28**. It should be noted that each blast is specifically designed to ensure compliance with the planning conditions.

10.116 If deemed necessary to reduce the MIC, one method of achieving such a reduction is to 'deck' the explosives within the borehole. This technique splits the column of explosives in two (or more) decks, separated by inert material. If blasting is required at closer distances than that where double decking would be a successful strategy, other charge reduction methods would be employed. These could be more complex decking strategies or changes to the blast geometry and / or the use of smaller diameter boreholes. As such, the MIC stated in the paragraph above **Table 10-28** is a guide and should not be taken as an absolute limit.

10.117 These are matters for the operator as part of the detailed design of individual blasts and adherence to blast vibration limits, rather than for the imposition by planning condition of prescriptive blast design requirements.

Ecological Receptors

10.118 The impact from blasting activities for ecological receptors largely comprises disturbance (including noise, vibration, and visual disturbance). Increases in human disturbance, including noise and visual disturbance from human activity, can have a range of impacts on an ecological receptor depending upon its sensitivity and the nature and duration of the disturbance and its timing.

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

10.120 Any future blasting operations at the quarry area will be undertaken subject to the emission limit values recommend by the EPA and DoEHLG guidance and set by existing planning conditions (maximum peak particle velocity of 12mm/sec and maximum air overpressure of 125dB with a 95% confidence limit). Ground borne vibration is likely to be limited in extent to the area immediately around the quarry.

10.121 At a distance of >2km of the quarry any potential SAC/SPA site is considered to be sufficiently distant that no changes in baseline disturbance levels are predicted to occur within its boundaries which would affect any of its Annex II qualifying species.

Unplanned Events

10.122 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 by Kilsaran. 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 quarry activities.

10.123 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.

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

- equipment malfunction;
- vehicle collision.

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

10.126 Considering the proposed development, there is no need to use any warning sirens or warning sounds in relation to unplanned events in relation to noise impact events.

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

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

10.128 The following blasting management (vibration suppression) measures will continue to be implemented at Clonard Quarry to avoid unplanned events:

- Blasting will be carried out between the hours of 09:00 hrs to 18:00 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.
- There will be no blasting carried out on Saturdays, Sundays or public holidays.
- Blast notification will be provided by pre and post siren warnings. An exclusion zone will be erected during blasts.
- All blasting operations will be carried out by qualified personnel in accordance with the relevant health and safety regulations.
- The optimum blast ratio will be maintained, and the maximum instantaneous charge will be optimised.

10.129 In relation to 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

Noise and Vibrations

10.130 In essence, cumulative impacts are those which result from incremental changes caused by other past, present or reasonably foreseeable actions together with those generated by the proposed development. Therefore, the potential impacts of the proposed development cannot be considered in isolation but must be considered in addition to impacts already arising from existing or planned development.

10.131 This noise impact assessment indicates that the planned development activities will not contribute to a significant increase in noise levels within the surrounding environment nor will it give rise to any damaging ground-borne vibration.

10.132 A former sand and gravel pit c. 400m to the east of the existing site on the opposite side of the woodland area in Kilrainy which is not under the ownership of the applicant has been worked out. Planning history of this site indicates that remediation works to restore the site were submitted for planning (ref. 07/1675) and granted in 2009. An extension of duration was sought in 2014 (ref. 14/543) and refused.

10.133 A nearby equestrian centre, c. 1km from the application site was granted permission (ref. 08/910) to construct a new grassed outdoor jumping area in August 2008.

10.134 Approximate 950m southwest of the application site in the townland of Brackagh is a greenfield site, for which Kilsaran Concrete recently received a notification decision to grant permission for sand and gravel extraction (dry working) for a period of 9 years (ref. 20/1409). This decision was appealed to An Bord Pleanála and a final decision to grant was issued in August 2023 by ABP.

10.135 To the east of the Kilsaran site at Brackagh and c. 850m to the southwest of the Clonard site is a former sand and gravel site for which permission was sought and refused in 2015 (ref. 15/696) for "remediation works to worked out gravel pit consisting of levelling of existing material already on site and the importation of approximately 45,000 cubic metres of inert subsoil and top soil over a period of 2 years to return the site to agricultural use".

10.136 All other planning history in the vicinity of the application site is housing dating from 2004-2008. There are no new planning applications for residential development within the last five years.

10.137 The above reference Kilsaran site at Brackagh is considered too far removed from the application site at Clonard and the cumulative impact on noise on the surrounding area of the proposed developments is therefore classified as insignificant.

'Do-nothing Scenario'

10.138 If the proposed quarry development area is not permitted, the site will be restored to a mainly ecological after-use.

10.139 At present, the noise environment within the study area is dominated by road traffic noise generated by cars and occasional HGV traffic along the local road network (some of it from existing operations at Clonard Quarry). Some natural sounds such as farmyard animals or barking dogs are also audible.

10.140 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 a gradual increase in ambient and background noise levels.

Interaction with Other Impacts

10.141 The potential impact of noise generated by the proposed development on sensitive receptors including local residents and sensitive ecological receptors and the vibrations 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

10.142 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.

10.143 Notwithstanding the findings of the impact assessment presented above, which determined that the proposed development and activities at Clonard will have negligible noise impact, and in line with best operating practice, the following measures will be implemented wherever practicable across the application site to minimise the potential noise impacts of on-site activities:

Screening :-

- inclusion of acoustic fencing – to the northern side of proposed new access road from the site entrance for a distance of 170m;
- an additional screening berm will be constructed along the western site boundary in place of the existing wheelwash and access road to screen the nearby residences;
- existing perimeter hedge planting will be retained along the boundary of the existing site;
- additional woodland planting is proposed in the vicinity of the new entrance and access road; and
- screening berms will be inspected on a regular basis and maintained as necessary.

Plant :-

- all mobile crushing will take place on the quarry floor, behind newly exposed quarry faces where possible;
- where required, particularly at initial construction stage, mobile crushing will take place behind temporary stockpiles;
- 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); and
- 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.

Traffic :-

- any deliveries to the site will be programmed to arrive during daytime hours only;
- care will be taken when loading / unloading vehicles to reduce or minimise potential noise disturbance to 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 site will be prohibited from leaving their engines running and there will be no unnecessary revving of engines; and
- provision of a traffic barrier within the new internal haul road to prevent trucks queuing in the morning on the public road. If queuing occurs in front of the internal barrier, the proposed acoustic screen fence will mitigate noise impact on the adjoining NSL as demonstrated by the noise assessment carried out as part of this EIAR.

10.144 Experience from other sites has shown that by implementing these measures, ambient noise levels from site activities and operations can be reduced by up to 5dB(A).

Vibration

10.145 Historical blast monitoring results indicate that the air overpressure levels and the ground-borne vibration levels (i.e., measured peak particle velocity) complied with recognised DoEHLG (2004) / EPA (2006) limit values for the extractive sector.

10.146 The blast design and blasting methodology for the site operations carried out at the quarry have, and will continue to be, optimised to ensure that any resulting ground borne vibration levels are comfortably within the prescribed limits.

10.147 The following measures shall be implemented at the application site to minimise disturbances due to any future blasting operations. These mitigation measures are in accordance with the 'best practice / mitigation' measures described in Section 3.2 of the DoEHLG (2004) guidelines:

- Blasting will be restricted to between 09.00 hours and 18.00 hours Monday to Friday;
- Blasting shall not be carried out on Saturdays, Sundays or public holidays;
- Notification of each blast shall be given in writing or by other means 48 hours in advance of each blast to all residences and farms within 500m radius of the quarry extraction area;
- Blast notifications shall be provided by pre-blast and post-blast siren warnings;
- All blasting operations shall be carried out by a certified 'shotfirer' in accordance with the relevant health and safety regulations;
- The optimum blast ratio shall be maintained, and the maximum instantaneous charge shall be optimised;
- The blast design and blasting methodology uses the monitoring results to optimise and ensure consistent blast designs;
- Blast dates and time are scheduled and agreed between the quarry manager, blast engineer, explosives supervisor and Gardaí.

10.148 Efficient blasts use as much of the explosive energy as possible for rock fragmentation. By implication therefore, any energy dissipated through ground vibration and air overpressure is inefficient use of

energy which would otherwise be used to fragment rock. It is therefore in the Applicant's economic interest to ensure that there is continual, ongoing optimisation of blast design to ensure efficient and effective blasting. The added benefit in optimising blast design is that it also minimises potential environmental impacts.

10.149 To avoid any risk of damage to properties in the vicinity of the application site, the ground-borne vibration levels from blasting will be limited to a peak particle velocity of 12mm/sec. To minimise impact on local residences a blasting protocol shall be implemented which will include best practice mitigation measures described in Section 3.2 of the DoEHLG (2004) guidelines. Regard will also be had to relevant Health and Safety guidance.

RESIDUAL IMPACT ASSESSMENT

Noise

10.150 Based on the proven past performance at the sand and gravel pit and quarry and available historical noise results, it is concluded that further extraction and processing operations carried out within the application site will not have any residual impact on nearby sensitive receptor.

Vibration

10.151 Based on the proven past performance at the quarry and available historical blasting results, it is concluded that blasting operations carried out within the application site (hard rock quarry only) will not have any residual impact on nearby sensitive receptors.

MONITORING

Noise

10.152 Noise monitoring will continue to be undertaken at the application site for the duration of extraction activities at the site (in accordance with EPA and DoEHLG guidelines). Noise monitoring will be undertaken at the existing monitoring locations established under the current planning permissions (**N1-N5**) as shown in **Figure 10-1**.

10.153 Noise monitoring locations shall be reviewed and revised where and as / when necessary. The results of the noise monitoring shall be submitted to Kildare County Council on a regular basis for review and record purposes.

Vibration

10.154 All future blasts carried out at the quarry will be monitored to confirm vibration and air overpressure is within the acceptable range for extractive activities and comply with planning conditions. The vibration monitoring will continue to be undertaken at the three designated locations around the quarry footprint (**B1-B3**), as indicated in **Figure 10-1**. An additional monitoring station (**B4**) was requested as part of the further information response to the previous planning application P. Ref 22/83 and will be implemented should planning permission be granted. Additional monitoring locations can also be established periodically off-site at adjoining residential properties at the request of their owners.

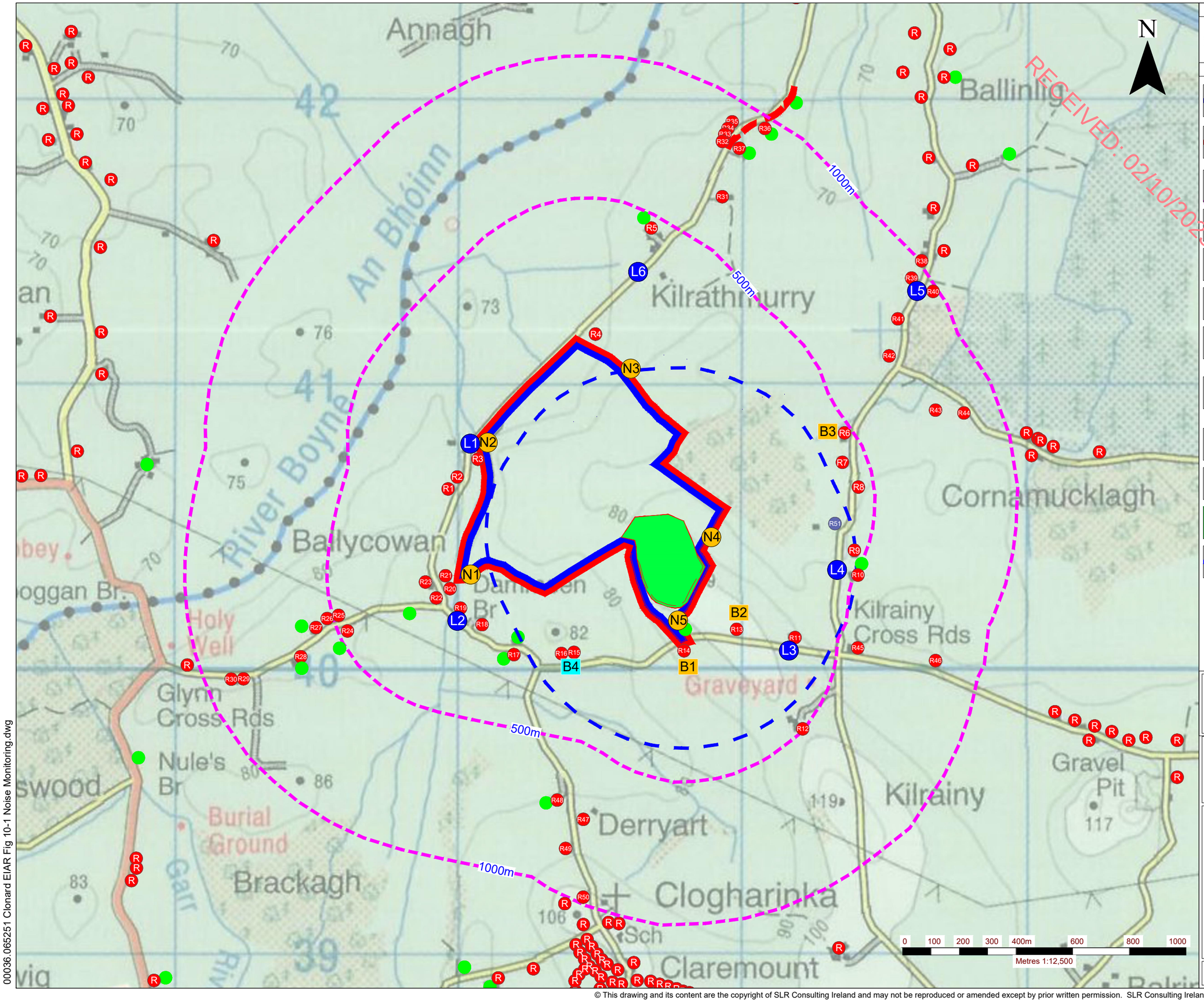
10.155 Ground-borne vibration and air overpressure will be measured utilising portable seismographs, located at nearby residences (subject to the owner's agreement). Air overpressure will be measured

utilising a calibrated microphone, incorporated into the seismograph. Each seismograph shall be calibrated in accordance with the manufacture's requirements.

10.156 Vibration monitoring locations shall be reviewed and revised where and as / when necessary. The results of the vibration monitoring shall be submitted to Kildare County Council on a regular basis for review and record purposes.

FIGURES

Figure 10-1
Receptors and Noise / Blast Monitoring Locations (Existing and Proposed)



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NOTES

1. EXTRACT FROM 1:50,000 O.S DISCOVERY MAPS NO. 49

2. ORDNANCE SURVEY IRELAND LICENCE NO. CYAL50316488 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND

- APPLICANTS LAND INTEREST BOUNDARY (c. 51.6 ha)
- SITE APPLICATION AREA c.51.6 ha TOTAL APPLICATION AREA c.51.7 ha (Site & Road Works)
- 500m — DISTANCE OFF-SET FROM PLANNING APPLICATION (RED LINE) BOUNDARY
- R18 — RESIDENCE RECEPTOR LOCATIONS
- R51 — NON-RESIDENCE RECEPTOR LOCATIONS
- AGRICULTURAL BUILDINGS
- N1 — NOISE MONITORING LOCATIONS (**N1-N5**) AT SITE BOUNDARY FOR PLANNING COMPLIANCE
- L1 — NOISE MONITORING LOCATIONS (**L1-L6**) FOR MODELLING: REPRESENTATIVE OF NEAREST SENSITIVE RECEPTORS
- B1 — **EXISTING** BASELINE BLAST MONITORING LOCATIONS (B1 - B3)
- B4 — **PROPOSED** ADDITIONAL BLAST MONITORING LOCATION (B4)
- QUARRY EXTRACTION AREA
- 500M OFF-SET FROM **QUARRY EXTRACTION FOOTPRINT**

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ENVIROMENTAL IMPACT ASSESSMENT REPORT

QUARRY DEVELOPMENT AT
KILRATHMURRY & KILRAINY
TOWNLANDS, CO. KILDARE

NOISE & BLAST MONITORING LOCATIONS

FIGURE 10-1

Scale	Date
1:12,500 @ A3	SEPTEMBER 2023

00036.065251 Clonard EIAR Fig 10-1 Noise Monitoring.dwg

APPENDICES

Appendix 10-A
Glossary of Terminology

Appendix 10-B
Baseline Noise Survey Data from June 2022 (Locations L1-L6)

Appendix 10-C
Compliance Noise Survey Data (Locations N1-N5)

Appendix 10-D
Noise Maps

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-1
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} 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} 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

Baseline Noise Survey Data from June 2022 (Locations N1-N6)

Location L1

Date	Start Time	$L_{Aeq,1min}$ (dB)	L_{AFmax} (dB)	$L_{AF10,1min}$ (dB)	$L_{AF90,1min}$ (dB)
2022-06-08	08:20	58.3	80.6	55.7	47.7
2022-06-08	08:21	77.1	85.9	80.6	58.1
2022-06-08	08:22	58.5	67.1	62.2	52.0
2022-06-08	08:23	53.4	66.5	55.8	49.1
2022-06-08	08:24	49.4	61.0	52.0	46.2
2022-06-08	08:25	47.8	63.1	49.6	43.7
2022-06-08	08:26	48.7	56.0	50.7	46.0
2022-06-08	08:27	50.9	58.9	54.9	46.1
2022-06-08	08:28	65.2	84.0	61.9	46.2
2022-06-08	08:29	65.0	82.7	63.5	47.3
2022-06-08	08:30	57.6	65.7	62.6	48.2
2022-06-08	08:31	55.2	66.3	60.0	48.1
2022-06-08	08:32	49.7	55.5	51.5	47.0
2022-06-08	08:33	67.5	79.9	70.5	45.7
2022-06-08	08:34	51.6	60.0	53.1	48.8
2022-06-08	08:35	54.0	57.1	55.1	53.6
2022-06-08	08:36	50.7	57.1	53.1	47.5
2022-06-08	08:37	50.0	57.4	52.0	46.7
2022-06-08	08:38	49.8	55.7	51.8	47.0
2022-06-08	08:39	49.2	58.3	51.5	45.7
2022-06-08	08:40	50.8	64.9	51.9	43.0
2022-06-08	08:41	47.6	53.3	50.1	44.2
2022-06-08	08:42	46.5	59.1	47.5	43.8
2022-06-08	08:43	57.9	68.1	64.1	44.6
2022-06-08	08:44	65.2	75.8	71.6	43.4
2022-06-08	08:45	48.4	56.5	52.0	41.4
2022-06-08	08:46	68.0	83.3	70.8	48.4
2022-06-08	08:47	55.1	66.9	60.1	44.8

2022-06-08	08:48	57.5	68.8	61.2	45.9
2022-06-08	08:49	63.9	80.2	59.7	49.7
2022-06-08	08:50	64.4	81.6	60.1	46.9
2022-06-08	08:51	51.9	55.4	53.7	48.5
2022-06-08	08:53	62.5	81.2	55.9	46.5
2022-06-08	08:54	50.4	62.3	51.9	45.9
2022-06-08	08:55	61.0	79.4	56.9	43.7
2022-06-08	08:56	49.5	60.2	50.4	45.2
2022-06-08	08:57	48.5	66.1	49.5	41.8
2022-06-08	08:58	47.3	57.9	49.8	42.8
2022-06-08	08:59	62.3	81.1	56.4	42.5
2022-06-08	09:00	59.9	77.2	54.7	44.1
2022-06-08	09:01	60.9	79.6	54.6	43.9
2022-06-08	09:02	45.8	52.2	48.2	42.3
2022-06-08	09:03	49.3	54.8	52.7	45.6
2022-06-08	09:04	52.3	66.1	55.6	46.3
2022-06-08	09:05	64.0	76.0	68.4	47.9
2022-06-08	09:06	49.5	58.6	51.7	45.9
2022-06-08	09:07	48.7	57.2	51.0	45.2
2022-06-08	09:08	49.5	52.5	50.0	47.6
2022-06-08	09:09	49.4	69.4	49.6	43.6
2022-06-08	09:10	47.1	55.4	49.2	44.1
2022-06-08	09:11	53.0	59.7	56.5	46.9
2022-06-08	09:12	54.3	62.3	58.2	48.6
2022-06-08	09:13	52.1	60.7	56.4	44.8
2022-06-08	09:14	50.3	59.4	54.6	42.9
2022-06-08	09:15	51.2	60.1	55.2	45.8
2022-06-08	09:16	53.4	61.2	56.8	48.7
2022-06-08	09:17	63.6	82.7	59.3	46.9
2022-06-08	09:18	51.1	61.3	56.0	42.2
2022-06-08	09:19	51.1	60.4	55.7	43.8
2022-06-08	09:20	51.5	60.3	55.0	47.0
2022-06-08	09:21	49.6	58.7	53.2	43.4
2022-06-08	09:22	48.2	64.8	50.4	43.7
2022-06-08	09:23	62.8	71.3	68.1	49.3

2022-06-08	09:24	50.2	51.5	51.4	46.5
2022-06-13	05:59	60.0	79.2	52.8	43.0
2022-06-13	06:00	61.9	81.0	62.2	45.1
2022-06-13	06:01	58.8	77.4	55.8	44.1
2022-06-13	06:02	47.1	57.3	49.3	43.8
2022-06-13	06:03	61.9	80.7	60.2	45.6
2022-06-13	06:04	45.2	51.2	46.7	43.5
2022-06-13	06:05	44.9	52.8	46.5	43.1
2022-06-13	06:06	52.3	62.8	56.1	43.9
2022-06-13	06:07	45.1	49.4	46.5	43.6
2022-06-13	06:08	45.0	51.3	46.7	43.2
2022-06-13	06:09	44.5	48.9	46.1	43.1
2022-06-13	06:10	66.9	83.9	63.7	43.6
2022-06-13	06:11	46.1	58.0	48.3	42.9
2022-06-13	06:12	44.8	52.1	46.2	42.9
2022-06-13	06:13	44.5	51.3	46.2	42.5
2022-06-13	06:14	45.2	53.2	47.7	42.3
2022-06-13	06:15	45.4	54.5	47.8	42.4
2022-06-13	06:16	68.7	87.0	63.9	48.7
2022-06-13	06:17	53.1	66.6	54.4	49.3
2022-06-13	06:18	64.4	83.8	58.6	43.4
2022-06-13	06:19	45.9	53.0	48.9	42.5
2022-06-13	06:20	66.4	82.9	64.5	41.7
2022-06-13	06:21	47.9	61.1	50.8	42.7
2022-06-13	06:22	46.7	55.6	49.3	43.1
2022-06-13	06:23	49.1	58.3	52.7	43.2
2022-06-13	06:24	46.4	54.7	50.2	42.9
2022-06-13	06:25	66.1	83.4	63.7	44.6
2022-06-13	06:26	51.8	62.4	56.2	41.5
2022-06-13	06:27	54.0	64.5	58.4	45.5
2022-06-13	06:28	63.9	82.9	60.5	45.5
2022-06-13	06:29	46.3	54.8	50.0	41.7
2022-06-13	06:30	56.2	66.0	61.1	42.4
2022-06-13	06:31	72.3	91.3	74.7	48.6
2022-06-13	06:32	48.7	56.6	51.7	43.7

2022-06-13	06:33	49.1	58.0	53.3	43.6
2022-06-13	06:34	47.6	57.2	52.3	42.5
2022-06-13	06:35	47.5	57.7	52.3	41.8
2022-06-13	06:36	66.6	86.5	60.1	45.9
2022-06-13	06:37	51.5	61.3	57.5	42.0
2022-06-13	06:38	70.2	86.9	68.6	43.7
2022-06-13	06:39	46.0	58.6	48.7	42.4
2022-06-13	06:40	66.9	86.7	62.8	43.7
2022-06-13	06:41	67.5	86.3	61.0	44.5
2022-06-13	06:42	67.1	87.4	59.0	43.2
2022-06-13	06:43	43.9	49.1	45.5	42.4
2022-06-13	06:44	44.3	54.2	45.1	42.5
2022-06-13	06:45	69.7	89.3	62.0	45.1
2022-06-13	06:46	54.5	65.9	59.7	42.8
2022-06-13	06:47	66.0	85.8	61.5	46.8
2022-06-13	06:48	51.7	65.4	55.4	43.1
2022-06-13	06:49	54.3	63.4	58.5	44.8
2022-06-13	06:50	71.3	86.2	74.9	49.8
2022-06-13	06:51	63.7	82.8	62.9	44.2
2022-06-13	06:52	47.0	57.9	52.0	40.3
2022-06-13	06:53	53.2	73.1	56.5	40.2
2022-06-13	06:54	68.6	85.4	70.2	41.0
2022-06-13	06:55	53.8	62.1	58.8	41.6
2022-06-13	06:56	60.6	73.0	66.4	41.5
2022-06-13	06:57	68.7	86.8	67.7	40.0
2022-06-13	06:58	46.1	63.3	48.9	39.4
2022-06-13	06:59	39.2	39.5	39.5	39.1

Location L2

Date	Start Time	$L_{Aeq,1min}$ (dB)	L_{AFmax} (dB)	$L_{AF10,1min}$ (dB)	$L_{AF90,1min}$ (dB)
2022-06-08	09:31	58.3	73.2	59.4	47.3
2022-06-08	09:32	60.7	76.6	60.4	46.3
2022-06-08	09:33	53.2	65.4	57.2	45.5
2022-06-08	09:34	50.0	67.0	53.0	44.5
2022-06-08	09:35	51.5	62.5	56.9	40.8
2022-06-08	09:36	49.3	59.2	53.7	42.4

2022-06-08	09:37	47.3	59.0	50.5	41.6
2022-06-08	09:38	50.3	61.0	55.0	40.0
2022-06-08	09:39	61.1	77.4	60.4	47.6
2022-06-08	09:40	56.6	70.5	59.0	42.4
2022-06-08	09:41	49.1	56.2	53.8	44.2
2022-06-08	09:42	60.5	75.9	62.6	46.7
2022-06-08	09:43	50.7	61.1	52.3	44.1
2022-06-08	09:44	49.4	62.7	51.3	42.1
2022-06-08	09:45	50.1	63.8	51.3	44.4
2022-06-08	09:46	51.4	55.1	53.4	44.5
2022-06-08	09:48	46.6	60.7	49.3	42.6
2022-06-08	09:49	61.5	76.6	60.5	41.5
2022-06-08	09:50	61.1	76.1	59.8	44.4
2022-06-08	09:51	50.6	55.9	53.0	47.2
2022-06-08	09:52	50.2	55.4	52.7	47.1
2022-06-08	09:53	46.0	57.7	48.6	40.1
2022-06-08	09:54	47.7	61.0	48.6	43.0
2022-06-08	09:55	50.9	55.3	53.8	47.0
2022-06-08	09:56	48.5	54.6	50.5	46.1
2022-06-08	09:57	49.5	53.6	51.4	45.8
2022-06-08	09:58	52.2	61.1	56.2	44.3
2022-06-08	09:59	53.1	59.7	56.0	48.7
2022-06-08	10:00	55.3	60.2	57.7	51.2
2022-06-08	10:01	55.0	70.2	57.3	51.5
2022-06-08	10:02	60.4	73.1	63.5	52.4
2022-06-08	10:03	57.9	62.5	60.2	54.6
2022-06-08	10:04	55.7	67.2	58.9	51.4
2022-06-08	10:05	59.0	74.0	58.3	48.4
2022-06-08	10:06	62.0	75.2	66.0	44.9
2022-06-08	10:07	46.9	61.1	50.1	41.6
2022-06-08	10:08	50.4	61.4	54.5	40.8
2022-06-08	10:09	48.8	58.9	51.6	43.0
2022-06-08	10:10	47.6	58.5	51.2	41.3
2022-06-08	10:11	44.8	54.6	48.2	39.8
2022-06-08	10:12	44.8	54.8	48.5	37.7

2022-06-08	10:13	49.2	59.2	53.0	42.2
2022-06-08	10:14	57.4	70.8	58.9	44.8
2022-06-08	10:15	50.3	61.1	53.8	42.6
2022-06-08	10:16	50.0	60.1	54.2	41.4
2022-06-08	10:17	52.5	66.1	56.0	44.9
2022-06-08	10:18	57.0	71.3	58.8	44.3
2022-06-08	10:19	49.4	52.4	51.0	48.0
2022-06-08	10:21	51.1	61.7	55.0	44.0
2022-06-08	10:22	46.9	59.3	48.6	41.1
2022-06-08	10:23	44.5	50.6	46.5	41.9
2022-06-08	10:24	45.4	54.9	47.0	43.0
2022-06-08	10:25	46.0	54.9	48.1	42.4
2022-06-08	10:26	46.2	53.1	48.2	43.5
2022-06-08	10:27	44.5	55.9	46.8	40.9
2022-06-08	10:28	49.3	56.5	53.5	43.3
2022-06-08	10:29	51.4	60.1	54.9	46.0
2022-06-08	10:30	52.2	59.9	56.2	46.7
2022-06-08	10:31	59.0	73.7	60.3	43.2
2022-06-08	10:32	61.4	74.4	67.0	41.7
2022-06-08	10:33	51.4	67.3	54.2	44.1
2022-06-08	10:34	44.0	53.3	46.1	41.0
2022-06-08	10:35	58.8	72.2	61.0	40.0
2022-06-08	10:36	44.7	52.9	47.1	39.2

Location L3

Date	Start Time	$L_{Aeq,1min}$ (dB)	L_{AFmax} (dB)	$L_{AF10,1min}$ (dB)	$L_{AF90,1min}$ (dB)
2022-06-08	10:36	56.5	73.3	59.1	48.0
2022-06-08	10:37	55.6	65.8	59.0	51.1
2022-06-08	10:38	53.4	65.8	54.7	48.8
2022-06-08	10:39	53.1	62.4	56.0	46.9
2022-06-08	10:40	55.4	62.9	58.3	49.5
2022-06-08	10:41	53.1	59.9	56.5	47.9
2022-06-08	10:42	51.2	63.6	54.7	46.4
2022-06-08	10:43	54.0	68.5	53.1	44.3
2022-06-08	10:44	55.7	67.6	59.1	44.7

2022-06-08	10:45	54.8	64.4	58.4	47.1
2022-06-08	10:46	47.6	52.9	50.7	43.4
2022-06-08	10:47	46.6	56.3	49.1	43.7
2022-06-08	10:48	53.7	64.7	58.8	46.2
2022-06-08	10:49	49.8	56.2	53.1	43.7
2022-06-08	10:50	53.1	66.4	55.7	48.4
2022-06-08	10:51	68.0	70.0	69.9	61.9
2022-06-08	10:51	68.2	85.7	71.5	49.8
2022-06-08	10:52	51.9	63.3	56.5	46.2
2022-06-08	10:53	49.9	57.0	53.0	46.1
2022-06-08	10:54	54.6	61.8	57.8	49.5
2022-06-08	10:55	53.5	61.7	56.8	48.0
2022-06-08	10:56	58.9	63.1	61.5	52.3
2022-06-08	10:57	51.4	56.2	53.7	48.5
2022-06-08	10:58	50.9	57.0	53.5	47.2
2022-06-08	10:59	51.7	61.1	53.9	48.4
2022-06-08	11:00	71.2	96.0	63.4	47.2
2022-06-08	11:01	66.9	75.9	70.9	53.3
2022-06-08	11:02	68.5	76.3	70.9	61.9
2022-06-08	11:03	67.1	82.5	69.7	52.7
2022-06-08	11:04	66.6	84.6	70.0	53.0
2022-06-08	11:05	64.5	71.8	67.9	46.9
2022-06-08	11:06	48.1	48.9	48.6	45.7
2022-06-08	11:07	69.1	86.9	70.1	61.9
2022-06-08	11:08	67.0	85.8	70.9	47.6
2022-06-08	11:09	64.8	89.1	54.5	47.3
2022-06-08	11:10	47.2	51.0	49.0	44.4
2022-06-08	11:11	45.3	50.4	46.7	43.3
2022-06-08	11:12	43.9	51.9	45.0	41.8
2022-06-08	11:13	43.1	51.9	44.5	40.5
2022-06-08	11:14	45.0	50.5	47.2	42.7
2022-06-08	11:15	50.3	58.7	52.5	46.7
2022-06-08	11:16	51.2	68.6	55.2	39.3
2022-06-08	11:17	42.7	50.3	44.2	40.3
2022-06-08	11:18	42.2	48.9	43.6	40.7

2022-06-08	11:19	44.5	52.9	46.4	41.7
2022-06-08	11:20	50.9	61.3	51.1	45.2
2022-06-08	11:21	55.4	79.6	52.8	44.8
2022-06-08	11:22	48.8	50.0	49.7	47.8
2022-06-08	11:23	55.3	68.2	58.4	48.6
2022-06-08	11:24	53.6	57.6	55.5	51.3
2022-06-08	11:25	49.4	54.7	50.7	47.2
2022-06-08	11:26	49.3	54.9	51.1	46.9
2022-06-08	11:27	49.0	52.4	50.6	46.7
2022-06-08	11:28	49.7	55.0	52.5	46.2
2022-06-08	11:29	48.1	54.1	49.8	45.4
2022-06-08	11:30	48.6	57.0	50.8	46.0
2022-06-08	11:31	46.4	56.3	47.8	43.7
2022-06-08	11:32	55.2	67.2	60.7	42.8
2022-06-08	11:33	47.8	53.0	50.7	44.1
2022-06-08	11:34	45.8	55.7	48.3	42.2
2022-06-08	11:35	47.6	58.8	51.4	41.6
2022-06-08	11:36	61.4	78.1	57.8	42.2
2022-06-08	11:37	59.6	73.3	64.0	43.6
2022-06-08	11:38	43.9	45.5	45.3	42.7

Location L4

Date	Start Time	$L_{Aeq,1min}$ (dB)	L_{AFmax} (dB)	$L_{AF10,1min}$ (dB)	$L_{AF90,1min}$ (dB)
2022-06-08	11:20	47.4	53.8	49.8	43.7
2022-06-08	11:21	46.5	56.3	49.2	42.8
2022-06-08	11:22	57.2	73.5	54.4	44.5
2022-06-08	11:23	52.7	57.1	55.4	47.0
2022-06-08	11:24	46.5	55.1	48.7	43.5
2022-06-08	11:25	49.8	55.0	52.5	46.5
2022-06-08	11:26	50.4	56.0	53.1	46.6
2022-06-08	11:27	50.3	59.7	53.3	44.4
2022-06-08	11:28	56.1	69.6	58.5	51.4
2022-06-08	11:29	61.0	73.1	62.4	55.0
2022-06-08	11:30	58.5	64.3	61.6	53.8
2022-06-08	11:31	59.5	73.5	58.1	53.2

2022-06-08	11:32	53.6	57.9	53.8	50.0
2022-06-08	11:33	56.8	64.8	59.4	53.3
2022-06-08	11:34	62.7	71.9	64.1	60.3
2022-06-08	11:35	62.3	70.3	63.9	59.6
2022-06-09	09:25	47.9	72.0	45.0	40.0
2022-06-09	09:26	48.1	72.6	45.5	40.1
2022-06-09	09:27	40.9	49.3	43.3	38.6
2022-06-09	09:28	42.7	50.6	46.3	38.7
2022-06-09	09:29	43.8	53.5	46.7	39.0
2022-06-09	09:30	43.0	53.6	46.6	38.8
2022-06-09	09:31	43.5	55.1	47.0	38.5
2022-06-09	09:32	45.6	57.2	48.1	39.0
2022-06-09	09:33	43.9	54.4	45.8	40.3
2022-06-09	09:34	55.7	67.4	60.9	41.2
2022-06-09	09:35	53.1	68.7	54.2	38.0
2022-06-09	09:36	42.9	47.0	44.7	39.1
2022-06-09	09:37	41.8	49.9	45.0	37.7
2022-06-09	09:38	41.4	48.6	44.1	37.4
2022-06-09	09:39	56.5	73.2	49.0	37.3
2022-06-09	09:40	43.2	49.2	46.0	39.2
2022-06-09	09:41	45.2	53.2	47.3	41.5
2022-06-09	09:42	43.9	54.9	46.7	39.7
2022-06-09	09:43	43.8	51.2	46.1	39.4
2022-06-09	09:44	41.6	49.0	44.1	38.9
2022-06-09	09:45	45.6	55.4	49.1	37.8
2022-06-09	09:46	42.2	51.2	45.7	38.4
2022-06-09	09:47	43.1	53.4	46.1	37.2
2022-06-09	09:48	45.7	55.6	49.7	39.7
2022-06-09	09:49	44.5	53.4	48.1	39.2
2022-06-09	09:50	44.5	51.5	47.9	40.3
2022-06-09	09:51	43.3	50.0	46.1	39.1
2022-06-09	09:52	42.6	54.2	44.7	38.5
2022-06-09	09:53	41.4	47.2	43.9	38.8
2022-06-09	09:54	45.7	60.1	47.2	39.6
2022-06-09	09:55	43.9	53.2	46.4	39.9

2022-06-09	09:56	43.2	47.5	45.7	40.5
2022-06-09	09:58	43.2	59.2	45.3	39.5
2022-06-09	09:59	50.6	64.2	51.9	39.1
2022-06-09	10:00	57.3	67.0	62.8	40.2
2022-06-09	10:01	61.7	78.0	64.6	40.0
2022-06-09	10:02	53.2	66.6	50.7	39.4
2022-06-09	10:03	42.4	53.8	46.0	38.4
2022-06-09	10:04	43.3	52.7	47.1	38.5
2022-06-09	10:05	59.9	76.6	51.6	38.2
2022-06-09	10:06	52.8	65.1	58.4	40.5
2022-06-09	10:07	49.5	58.5	55.1	39.1
2022-06-09	10:08	50.0	58.6	55.5	39.7
2022-06-09	10:09	49.4	58.1	55.6	38.5
2022-06-09	10:10	49.7	57.8	55.5	39.2
2022-06-09	10:11	49.9	58.5	55.6	39.5
2022-06-09	10:12	49.7	58.6	55.9	37.9
2022-06-09	10:13	51.2	73.6	54.1	38.4

Location L5

Date	Start Time	$L_{Aeq,1min}$ (dB)	L_{AFmax} (dB)	$L_{AF10,1min}$ (dB)	$L_{AF90,1min}$ (dB)
2022-06-08	12:24	46.8	51.1	48.8	44.4
2022-06-08	12:25	49.5	54.3	51.6	46.0
2022-06-08	12:26	52.3	55.5	53.7	50.4
2022-06-08	12:27	52.8	57.8	55.4	49.5
2022-06-08	12:28	55.7	64.1	59.0	50.1
2022-06-08	12:29	57.3	64.5	60.0	53.0
2022-06-08	12:30	56.7	63.3	59.0	52.2
2022-06-08	12:31	62.2	68.2	64.9	58.1
2022-06-08	12:32	59.9	73.5	61.8	55.8
2022-06-08	12:33	57.4	62.0	59.5	54.5
2022-06-08	12:34	60.2	73.2	62.8	55.5
2022-06-08	12:35	61.9	68.8	64.2	58.8
2022-06-08	12:36	59.9	68.6	62.6	54.4
2022-06-08	12:37	58.9	64.6	61.5	53.9
2022-06-08	12:38	61.4	75.3	66.3	53.5

2022-06-08	12:39	54.3	54.6	54.5	53.9
2022-06-08	12:39	54.8	70.1	58.7	48.8
2022-06-08	12:40	50.3	54.9	52.0	48.2
2022-06-08	12:41	53.8	62.5	55.8	51.0
2022-06-08	12:42	53.6	63.8	56.8	49.0
2022-06-08	12:43	52.4	57.4	54.9	49.2
2022-06-08	12:44	54.1	59.0	57.3	49.3
2022-06-08	12:45	52.0	57.2	54.0	49.7
2022-06-08	12:46	49.6	56.1	51.6	47.2
2022-06-08	12:47	62.9	80.4	57.8	49.1
2022-06-08	12:48	56.2	64.5	60.1	51.6
2022-06-08	12:49	54.9	59.9	57.4	52.3
2022-06-08	12:50	50.3	54.1	51.8	48.0
2022-06-08	12:51	52.3	58.6	54.7	48.6
2022-06-08	12:52	63.8	74.8	66.4	56.4
2022-06-08	12:53	64.9	82.3	66.9	57.5
2022-06-08	12:54	57.4	60.8	60.0	57.3
2022-06-08	12:55	53.8	70.5	56.4	48.4
2022-06-08	12:56	51.8	62.2	55.3	45.3
2022-06-08	12:57	50.6	62.1	52.5	45.9
2022-06-08	12:58	51.3	57.5	54.8	47.2
2022-06-08	12:59	49.1	55.5	51.1	45.5
2022-06-08	13:00	54.4	68.3	56.9	47.8
2022-06-08	13:01	56.3	70.5	59.8	50.6
2022-06-08	13:02	52.3	57.6	54.9	48.2
2022-06-08	13:03	50.2	56.9	53.6	46.1
2022-06-08	13:04	53.8	64.2	56.6	49.5
2022-06-08	13:05	52.4	56.3	53.8	50.3
2022-06-08	13:06	49.6	55.4	51.1	47.1
2022-06-08	13:07	53.7	60.7	57.9	47.3
2022-06-08	13:08	51.7	57.0	54.9	48.0
2022-06-08	13:09	55.6	71.9	59.0	49.9
2022-06-08	13:10	46.2	47.2	46.7	45.6
2022-06-08	13:11	56.2	72.0	58.7	51.9
2022-06-08	13:12	58.9	72.9	61.4	51.5

2022-06-08	13:13	54.1	66.9	57.7	47.6
2022-06-08	13:14	52.8	58.3	55.4	49.7
2022-06-08	13:15	59.6	70.9	63.9	50.6
2022-06-08	13:16	55.7	61.2	58.7	52.4
2022-06-08	13:17	59.8	71.4	62.7	54.9
2022-06-08	13:18	51.6	60.7	55.3	47.7
2022-06-08	13:19	55.0	67.1	58.4	49.6
2022-06-08	13:20	64.3	81.4	63.9	46.9
2022-06-08	13:21	56.2	64.3	59.2	50.5
2022-06-08	13:22	51.0	62.3	53.4	47.4
2022-06-08	13:23	65.5	82.5	64.6	51.3
2022-06-08	13:24	56.2	64.8	60.5	50.4
2022-06-08	13:25	58.5	68.2	62.3	53.2
2022-06-08	13:26	53.8	70.8	56.3	46.9

Location L6

Date	Start Time	$L_{Aeq,1min}$ (dB)	L_{AFmax} (dB)	$L_{AF10,1min}$ (dB)	$L_{AF90,1min}$ (dB)
2022-06-09	10:30	50.0	63.9	54.2	41.1
2022-06-09	10:31	60.5	75.5	57.2	43.6
2022-06-09	10:32	51.4	64.4	53.3	45.7
2022-06-09	10:33	66.5	77.9	73.3	45.4
2022-06-09	10:34	48.7	59.6	51.3	43.0
2022-06-09	10:35	62.4	73.7	69.2	45.5
2022-06-09	10:36	61.1	75.5	57.8	45.7
2022-06-09	10:37	66.6	79.1	72.0	47.1
2022-06-09	10:38	51.5	61.2	54.4	46.8
2022-06-09	10:39	59.0	72.9	58.9	46.0
2022-06-09	10:40	49.6	60.0	52.7	45.1
2022-06-09	10:41	66.3	78.2	72.7	44.5
2022-06-09	10:42	61.2	77.1	57.5	44.5
2022-06-09	10:43	65.4	77.9	70.2	45.1
2022-06-09	10:44	57.4	72.1	56.7	43.5
2022-06-09	10:45	56.9	69.3	60.3	47.3
2022-06-09	10:48	63.2	77.2	67.4	50.5
2022-06-09	10:49	61.0	77.5	64.4	50.6

2022-06-09	10:50	67.1	81.0	69.3	45.0
2022-06-09	10:51	57.3	71.2	57.5	44.3
2022-06-09	10:52	47.8	57.8	49.8	44.8
2022-06-09	10:53	46.3	56.4	48.6	42.1
2022-06-09	10:54	48.0	63.3	50.5	43.2
2022-06-09	10:55	49.9	61.3	53.9	43.3
2022-06-09	10:56	48.0	57.7	49.8	44.9
2022-06-09	10:57	61.1	77.2	57.5	44.0
2022-06-09	10:58	49.5	62.9	52.5	44.3
2022-06-09	10:59	48.5	56.9	51.4	44.8
2022-06-09	11:00	49.9	63.0	53.2	44.4
2022-06-09	11:01	63.2	76.5	65.4	45.1
2022-06-09	11:02	47.1	52.3	49.0	44.0
2022-06-09	11:03	49.7	60.8	52.9	43.9
2022-06-09	11:04	70.4	96.3	54.2	37.8
2022-06-09	11:05	34.2	48.1	36.1	29.4
2022-06-09	11:06	51.6	68.4	52.4	28.9
2022-06-09	11:07	30.3	39.5	32.5	27.6
2022-06-09	11:08	52.3	70.0	49.4	28.1
2022-06-09	11:09	31.3	50.2	32.6	27.4
2022-06-09	11:10	29.0	35.9	31.2	26.4
2022-06-09	11:11	31.3	49.7	32.8	26.6
2022-06-09	11:12	58.7	74.7	56.3	29.3
2022-06-09	11:13	28.8	42.1	30.1	25.7
2022-06-09	11:14	45.0	62.6	44.3	25.8
2022-06-09	11:15	47.6	66.5	40.0	27.8
2022-06-09	11:16	30.5	43.3	32.5	27.0
2022-06-09	11:17	34.0	43.0	37.7	28.2
2022-06-09	11:18	49.7	68.1	43.6	28.4
2022-06-09	11:19	38.7	52.5	42.1	30.5
2022-06-09	11:32	66.3	80.5	64.9	49.0
2022-06-09	11:33	50.4	58.8	51.7	49.1
2022-06-09	11:34	67.0	83.7	59.6	49.6
2022-06-09	11:35	50.4	59.6	51.7	48.9
2022-06-09	11:36	51.7	61.8	52.9	48.8

2022-06-09	11:37	51.2	63.5	52.7	48.9
2022-06-09	11:38	67.2	81.4	67.5	49.4
2022-06-09	11:39	50.8	60.7	53.2	47.8
2022-06-09	11:40	50.0	61.0	50.2	48.0
2022-06-09	11:41	65.6	80.1	67.0	48.2
2022-06-09	11:42	49.6	53.8	52.0	47.5
2022-06-09	11:43	49.5	52.3	50.8	48.4
2022-06-09	11:44	64.5	81.4	59.1	47.9
2022-06-09	11:45	67.9	84.0	60.9	49.2
2022-06-09	11:46	49.0	53.9	49.9	47.8
2022-06-09	11:47	51.5	59.4	54.8	47.4

HGV Noise Levels

Date	Star Time	Duration, T	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)	L_{AF10},T (dB)	L_{AF90},T (dB)
2022-06-09	12:58	1 min	65.5	69.2	66.6	64.3
2022-06-09	13:00	2 min	69.2	75.6	70.2	68.2
2022-06-09	13:02	1 min	72.5	82.7	74.5	69.1
2022-06-09	13:05	1 min	65.9	70.8	66.8	64.7
2022-06-09	13:11	1 min	66.2	67.7	66.8	65.5
2022-06-09	13:16	1 min	65.4	67.5	66.4	64.5

APPENDIX 10-C

Planning Compliance Noise Survey Data (Locations N1-N5)

Date	Time of day for noise measurement	Location	$L_{AEQ,T}$(dB)	$L_{A10,T}$(dB)	$L_{A90,T}$(dB)
08/01/2019	12:09-12:24	N1	36	35	29
07/02/2019	08:52-09:07	N1	45	46	42
06/03/2019	13:12-13:27	N1	41	41	31
04/04/2019	13:29-13:44	N1	42	50	40
01/05/2019	14:15-14:30	N1	46	45	45
07/06/2019	12:07-12:22	N1	38	38	33
02/07/2019	14:25-14:40	N1	41	42	36
07/08/2019	12:08-12:23	N1	40	41	32
04/09/2019	14:06-14:21	N1	42	43	37
02/10/2019	12:06-12:21	N1	45	39	33
08/11/2019	12:10-12:25	N1	49	45	45
03/12/2019	09:15-09:30	N1	44	44	41
08/01/2020	09:25-09:40	N1	52	55	41
04/02/2020	09:45-10:00	N1	49	34	29
04/03/2020	09:05-09:20	N1	41	36	25
Covid-19	-	N1	-	-	-
26/05/2020	13:46-14:01	N1	47	51	40
19/06/2020	11:58-12:13	N1	49	51	43
14/07/2020	09:36-09:51	N1	46	48	41
10/08/2020	11:28-11:43	N1	46	47	42
08/09/2020	14:28-14:43	N1	44	46	39
08/10/2020	14:01-14:16	N1	47	49	42
10/11/2020	14:33-14:48	N1	42	45	36
07/12/2020	13:20-13:35	N1	50	51	49
14/01/2021	11:44-11:59	N1	47	50	43
05/02/2021	11:28-11:43	N1	50	53	44
04/03/2021	13:04-13:19	N1	44	48	36
09/04/2021	12:37-12:52	N1	49	51	45
07/05/2021	10:30-10:45	N1	45	47	40
03/06/2021	12:32-12:47	N1	49	52	45
09/07/2021	13:08-13:23	N1	42	44	38

Date	Time of day for noise measurement	Location	$L_{AEQ,T}$(dB)	$L_{A10,T}$(dB)	$L_{A90,T}$(dB)
06/08/2021	12:53-13:08	N1	46	48	39
06/09/2021	12:40-12:55	N1	41	45	31
08/10/2021	10:56-11:11	N1	43	46	38
05/11/2021	10:39-10:54	N1	45	48	38
03/12/2021	10:56-11:11	N1	45	47	41
10/01/2022	11:07-11:22	N1	44	46	39
03/02/2022	13:50-14:05	N1	47	50	40
04/03/2022	10:51-11:06	N1	46	48	42
07/04/2022	11:29-11:44	N1	49	52	42
05/05/2022	12:23-12:38	N1	45	47	38
07/06/2022	12:23-12:38	N1	46	48	40
12/07/2022	11:21-11:36	N1	44	44	37
05/08/2022	10:20-10:35	N1	41	45	34
07/09/2022	13:17-13:32	N1	43	46	36
07/10/2022	10:41-10:56	N1	43	46	35
04/11/2022	10:53-11:08	N1	46	48	43
06/12/2022	10:21-10:36	N1	48	49	48
11/01/2023	11:19-11:34	N1	47	51	39
10/02/2023	11:20-11:35	N1	43	46	37
08/03/2023	11:15-11:30	N1	46	49	39
06/04/2023	13:36-13:51	N1	52	55	43
05/05/2023	15 min	N1	47	50	41
02/06/2023	15 min	N1	51	53	47
07/07/2023	15 min	N1	46	48	39
09/08/2023	15 min	N1	39	43	28
08/01/2019	12:36-12:51	N2	54	56	33
07/02/2019	08:59-09:14	N2	50	53	43
06/03/2019	13:30-13:45	N2	39	42	33
04/04/2019	13:04-13:19	N2	47	49	40
01/05/2019	13:40-13:55	N2	49	50	45
07/06/2019	12:24-12:39	N2	49	50	35
02/07/2019	13:47-14:02	N2	51	50	35
07/08/2019	12:37-12:52	N2	52	40	37
04/09/2019	13:40-13:55	N2	54	57	50
02/10/2019	12:30-12:45	N2	48	47	38
08/11/2019	11:45-12:00	N2	40	42	29

Date	Time of day for noise measurement	Location	$L_{AEQ,T}$(dB)	$L_{A10,T}$(dB)	$L_{A90,T}$(dB)
03/12/2019	09:10-09:25	N2	47	48	36
08/01/2020	09:05-09:20	N2	49	50	38
04/02/2020	09:40-09:55	N2	50	51	48
04/03/2020	08:40-08:55	N2	50	54	35
Covid-19	-	N2	-	-	-
26/05/2020	14:15-14:30	N2	58	61	40
19/06/2020	12:27-12:42	N2	58	60	38
14/07/2020	10:03-10:18	N2	54	57	36
10/08/2020	10:39-10:54	N2	50	47	34
08/09/2020	13:31-13:46	N2	56	56	40
08/10/2020	13:11-13:26	N2	54	51	37
10/11/2020	12:38-12:53	N2	58	59	38
07/12/2020	12:24-12:39	N2	57	58	45
14/01/2021	11:31-11:46	N2	46	46	40
05/02/2021	10:30-10:45	N2	54	52	38
04/03/2021	12:20-12:35	N2	55	57	38
09/04/2021	11:44-11:59	N2	52	52	49
07/05/2021	09:37-09:52	N2	54	57	38
03/06/2021	10:43-10:58	N2	58	59	47
09/07/2021	12:05-12:20	N2	54	53	42
06/08/2021	12:06-12:21	N2	53	50	35
06/09/2021	11:45-12:00	N2	51	45	27
08/10/2021	09:23-09:38	N2	60	64	39
05/11/2021	09:05-09:15	N2	63	67	42
03/12/2021	08:57-09:12	N2	53	54	42
10/01/2022	09:36-09:51	N2	58	61	39
03/02/2022	12:14-12:29	N2	58	63	43
04/03/2022	09:22-09:37	N2	53	53	45
07/04/2022	09:53-10:08	N2	58	56	48
05/05/2022	11:37-11:52	N2	57	59	36
07/06/2022	09:35-09:50	N2	54	57	35
12/07/2022	09:35-09:50	N2	51	52	40
05/08/2022	08:57-09:12	N2	54	50	33
07/09/2022	11:52-12:07	N2	58[8]	57	40
07/10/2022	09:19-09:34	N2	52	52	38

[8] BHP Noise Report comment "Some traffic noise from public at 50-60dBA"

Date	Time of day for noise measurement	Location	$L_{AEQ,T}$(dB)	$L_{A10,T}$(dB)	$L_{A90,T}$(dB)
04/11/2022	09:15-09:30	N2	47	48	42
06/12/2022	08:59-09:14	N2	56[9]	59	49
11/01/2023	09:50-10:05	N2	53	54	38
10/02/2023	09:33-09:48	N2	48	51	38
08/03/2023	09:51-10:06	N2	51	52	39
06/04/2023	12:20-12:35	N2	50	50	37
05/05/2023	15 min	N2	54	54	45
02/06/2023	15 min	N2	52	54	47
07/07/2023	15 min	N2	52	53	42
09/08/2023	15 min	N2	47	47	28
08/01/2019	12:34-12:49	N3	50	47	28
07/02/2019	08:21-08:36	N3	48	47	39
06/03/2019	12:46-13:01	N3	52	53	36
04/04/2019	13:00-13:15	N3	49	52	41
01/05/2019	13:27-13:42	N3	53	53	46
07/06/2019	11:59-12:14	N3	43	44	31
02/07/2019	13:30-13:45	N3	53	47	34
07/08/2019	11:58-12:13	N3	48	46	44
04/09/2019	14:30-14:45	N3	55	55	45
02/10/2019	11:35-11:50	N3	42	45	38
08/11/2019	13:00-13:15	N3	53	54	46
03/12/2019	10:23-10:38	N3	51	52	46
08/01/2020	09:00-09:15	N3	51	53	45
04/02/2020	09:20-09:35	N3	54	58	51
04/03/2020	08:45-09:00	N3	47	50	39
Covid-19	--	N3	-	-	-
26/05/2020	14:40-14:55	N3	44	46	37
19/06/2020	12:47-13:02	N3	48	50	41
14/07/2020	10:25-10:40	N3	47	48	42
10/08/2020	10:19-10:34	N3	45	47	33
08/09/2020	13:14-13:29	N3	50	52	46
08/10/2020	12:53-13:08	N3	45	46	39
10/11/2020	12:20-12:35	N3	48	50	42
07/12/2020	12:06-12:21	N3	45	46	41

[9] BHP Noise Report comment "No quarry noise audible. Some traffic noise from local public road at 50-60 dBA"

Date	Time of day for noise measurement	Location	$L_{AEQ,T}$(dB)	$L_{A10,T}$(dB)	$L_{A90,T}$(dB)
14/01/2021	11:50-12:05	N3	46	48	41
05/02/2021	10:11-10:26	N3	49	50	38
04/03/2021	12:02-12:17	N3	44	45	37
09/04/2021	11:20-11:35	N3	44	45	36
07/05/2021	09:16-09:31	N3	50	52	42
03/06/2021	10:21-10:36	N3	54	56	52
09/07/2021	12:10-12:25	N3	51	54	47
06/08/2021	11:38-11:53	N3	55	56	49
06/09/2021	11:48-12:03	N3	43	46	44
08/10/2021	09:04-09:19	N3	46	48	41
05/11/2021	08:44-08:49	N3	48	51	44
03/12/2021	08:39-08:54	N3	45	48	41
10/01/2022	09:17-09:32	N3	49	52	43
03/02/2022	11:53-12:08	N3	53	55	50
04/03/2022	09:04-09:19	N3	48	49	43
07/04/2022	09:31-09:46	N3	53	55	48
05/05/2022	11:18-11:33	N3	48	51	41
07/06/2022	09:18-09:33	N3	48	52	38
12/07/2022	09:45-10:00	N3	52	54	49
05/08/2022	08:40-08:55	N3	44	47	35
07/09/2022	11:34-11:49	N3	50	54	41
07/10/2022	09:02-09:17	N3	44	46	36
04/11/2022	08:50-09:05	N3	46	50	44
06/12/2022	08:41-08:56	N3	51	51	48
11/01/2023	09:33-09:48	N3	49	47	38
10/02/2023	09:14-09:29	N3	47	49	41
08/03/2023	09:34-09:49	N3	47	49	41
06/04/2023	12:01-12:16	N3	45	48	38
05/05/2023	15 min	N3	54	56	50
02/06/2023	15 min	N3	49	52	41
07/07/2023	15 min	N3	52	54	47
09/08/2023	15 min	N3	48	50	30
08/01/2019	13:15-13:30	N4	46	46	27
07/02/2019	09:28-09:43	N4	41	42	37
06/03/2019	14:15-14:30	N4	41	42	37
04/04/2019	14:04-14:19	N4	45	47	38

Date	Time of day for noise measurement	Location	$L_{AEQ,T}$(dB)	$L_{A10,T}$(dB)	$L_{A90,T}$(dB)
01/05/2019	14:31-14:44	N4	48	48	45
07/06/2019	12:49-13:04	N4	38	39	36
02/07/2019	15:01-15:16	N4	53	47	34
07/08/2019	13:16-13:31	N4	36	37	28
04/09/2019	13:15-13:30	N4	49	52	43
02/10/2019	12:53-13:08	N4	40	41	38
08/11/2019	13:25-13:40	N4	46	46	45
03/12/2019	10:05-10:20	N4	37	37	30
08/01/2020	09:50-10:05	N4	40	40	36
04/02/2020	09:55-10:10	N4	50	55	44
04/03/2020	09:35-09:50	N4	40	42	29
Covid-19	-	N4	-	-	-
26/05/2020	13:31-13:46	N4	48	52	40
19/06/2020	11:26-11:41	N4	50	52	47
14/07/2020	09:11-09:26	N4	51	53	49
10/08/2020	11:03-11:18	N4	38	40	35
08/09/2020	14:05-14:20	N4	46	47	41
08/10/2020	13:35-13:50	N4	51	53	47
10/11/2020	13:04-13:19	N4	37	38	32
07/12/2020	12:50-13:05	N4	45	46	43
14/01/2021	12:26-12:41	N4	52	54	48
05/02/2021	11:00-11:15	N4	50	53	45
04/03/2021	12:45-13:00	N4	44	48	36
09/04/2021	12:03-12:18	N4	50	52	45
07/05/2021	10:00-10:15	N4	48	52	27
06/06/2021	12:05-12:20	N4	47	49	44
09/07/2021	12:38-12:53	N4	40	43	35
06/08/2021	12:26-12:41	N4	51	54	44
06/09/2021	12:11-12:26	N4	40	41	33
08/10/2021	09:52-10:07	N4	44	47	31
05/11/2021	09:35-09:50	N4	51	53	46
03/12/2021	09:52-10:07	N4	40	42	34
10/01/2022	10:01-10:16	N4	37	39	32
03/02/2022	12:41-12:56	N4	51	52	46
04/03/2022	09:45-10:00	N4	45	45	32
07/04/2022	10:25-10:40	N4	52	55	44
05/05/2022	12:08-12:23	N4	49	51	46

Date	Time of day for noise measurement	Location	$L_{AEQ,T}$(dB)	$L_{A10,T}$(dB)	$L_{A90,T}$(dB)
07/06/2022	09:57-10:13	N4	45	49	30
12/07/2022	10:18-10:33	N4	51	53	36
05/08/2022	09:21-09:36	N4	42	45	36
07/09/2022	12:13-12:28	N4	41	44	35
07/10/2022	09:41-09:56	N4	46	49	39
04/11/2022	09:44-09:59	N4	44	46	39
06/12/2022	09:18-09:33	N4	51	52	49
11/01/2023	10:13-10:28	N4	56	54	43
10/02/2023	09:55-10:10	N4	40	41	36
08/03/2023	10:12-10:27	N4	47	50	39
06/04/2023	12:40-12:55	N4	47	49	43
05/05/2023	15 min	N4	44	46	40
02/06/2023	15 min	N4	49	49	39
07/07/2023	15 min	N4	45	47	41
09/08/2023	15 min	N4	38	41	31
08/01/2019	13:20-13:35	N5	43	35	29
07/02/2019	09:23-09:38	N5	46	42	37
06/03/2019	14:05-14:20	N5	43	46	39
04/04/2019	14:10-14:25	N5	49	48	38
01/05/2019	14:43-14:58	N5	46	50	31
07/06/2019	12:55-13:10	N5	40	41	35
02/07/2019	14:50-15:05	N5	33	33	30
07/08/2019	13:21-13:36	N5	47	45	44
04/09/2019	12:40-12:55	N5	47	50	46
02/10/2019	12:58-13:13	N5	42	44	39
08/11/2019	13:20-13:35	N5	36	39	26
03/12/2019	10:00-10:15	N5	37	39	32
08/01/2020	09:45-10:00	N5	45	45	32
04/02/2020	10:00-10:15	N5	43	44	39
04/03/2020	09:30-09:45	N5	44	46	27
Covid-19	--	N5	-	-	-
26/05/2020	15:10-15:25	N5	45	49	32
19/06/2020	13:38-13:53	N5	46	49	38
14/07/2020	10:48-11:03	N5	48	51	45
10/08/2020	11:54-12:09	N5	38	39	26
08/09/2020	14:55-15:10	N5	47	47	41

Date	Time of day for noise measurement	Location	$L_{AEQ,T}$(dB)	$L_{A10,T}$(dB)	$L_{A90,T}$(dB)
08/10/2020	14:28-14:43	N5	49	51	45
10/11/2020	14:28-14:43	N5	38	41	32
07/12/2020	13:50-14:05	N5	43	44	41
14/01/2021	12:57-13:12	N5	46	48	43
05/02/2021	11:56-12:11	N5	46	49	41
04/03/2021	11:56-12:11	N5	45	44	29
09/04/2021	12:56-13:11	N5	48	49	41
07/05/2021	10:58-11:13	N5	51	53	31
03/06/2021	13:00-13:15	N5	49	52	40
09/07/2021	13:32-13:47	N5	41	43	31
06/08/2021	13:14-13:29	N5	47	49	40
06/09/2021	13:03-13:18	N5	41	44	30
08/10/2021	11:17-11:32	N5	47	49	43
05/11/2021	11:13-11:28	N5	40	41	34
03/12/2021	11:17-11:32	N5	40	43	36
10/01/2022	11:35-11:50	N5	34	38	41
03/02/2022	14:14-14:29	N5	47	49	43
04/03/2022	14:14-14:29	N5	49	50	42
07/04/2022	11:57-12:12	N5	49	51	45
05/05/2022	13:44-13:59	N5	45	48	34
07/06/2022	11:41-11:56	N5	44	47	30
12/07/2022	11:41-11:56	N5	38	41	31
05/08/2022	10:44-10:59	N5	38	40	34
07/09/2022	13:38-13:53	N5	44	46	35
07/10/2022	11:02-11:17	N5	43	46	37
04/11/2022	11:18-11:33	N5	43	46	40
06/12/2022	10:46-11:01	N5	46	47	43
11/01/2023	11:43-11:55	N5	45	47	41
10/02/2023	11:25-11:40	N5	40	42	34
08/03/2023	11:39-11:54	N5	44	46	36
06/04/2023	13:59-14:14	N5	48	51	40
05/05/2023	15 min	N5	50	54	40
02/06/2023	15 min	N5	46	49	33
07/07/2023	15 min	N5	51	51	44
09/08/2023	15 min	N5	36	38	27

APPENDIX 10-D

Noise Maps