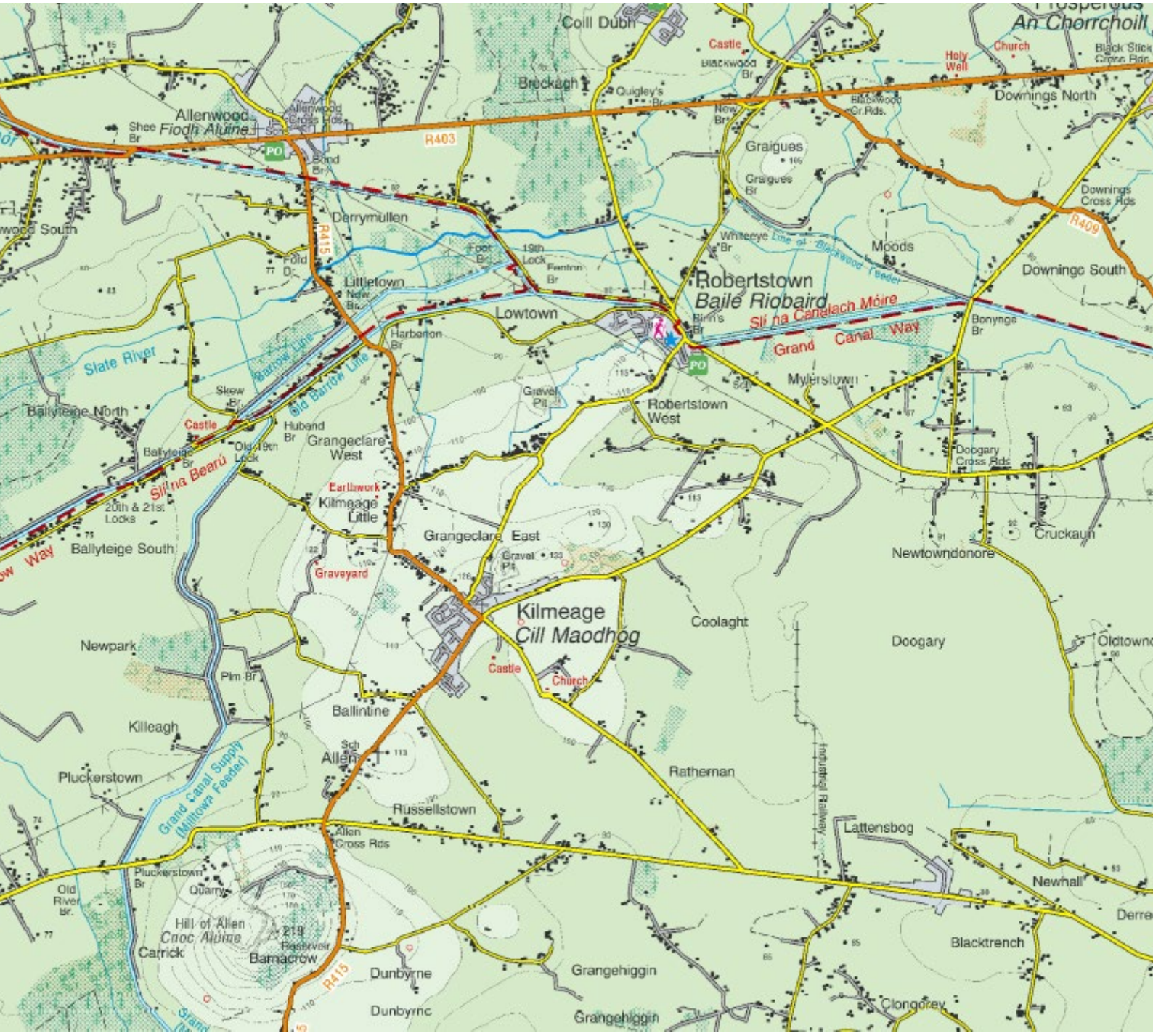
CHAPTER 11

NOISE AND VIBRATION



QUARRY CONSULTING

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CHAPTER 11: Noise and Vibration

Introduction

11.1 This chapter describes the potential noise and vibration impact of the Proposed Development. The Proposed Development will involve the development of a sand & gravel pit and soil recovery facility. The development will facilitate the extraction of sand and gravel on a phased basis from an area of c.8.65 ha to a final floor level of 95mOD. A full description of the development can be found in chapter 3 (Description). The construction and operational phases in relation to noise and vibration have been assessed.

11.2 Appendix 9-1 presents a glossary of acoustic terms used throughout this chapter.

Statement of Authority

11.3 This chapter was prepared by Dominic Wright, Acoustic Consultant in AWN Consulting. Dominic holds a Diploma in Music Technology and has completed the Institute of Acoustics Diploma in Acoustics and Noise Control. He has previous knowledge and experience in the world of audio engineering and has amassed experience in both noise modelling and environmental noise surveying and reporting over a variety of residential and infrastructure projects. The chapter has been reviewed by Mike Simms, Prinicpal Acoustic Consultant at AWN who holds a BE and MEngSc in Mechanical Engineering and is a member of the Institute of Acoustics and of the Institution of Engineering and Technology. Mike has worked in the field of acoustics for more than 20 years. He has extensive experience in all aspects of environmental surveying, noise modelling and impact assessment for various sectors including, energy, industrial, commercial, and residential.

The Proposed Development

11.4 The site is located in the townland of Coolaght, Kilmeague, Co. Kildare, situated approximately 900m northeast of the centre of Kilmeague village. The site is 8.8km north of Newbridge and 11km northwest of Naas (see Planning Drawing 1).

11.5 The Proposed Development involves the following works:

- The removal of woodland, vegetation and overlying soils & subsoils;
- the extraction of sand and gravel on a phased basis from an area of c. 8.65 ha to a final floor level at 95m above OD (Ordnance Datum);
- the infilling of the lands using inert waste on a phased basis ongoing during the extraction of sand and gravel;
- the restoration of the lands back to original ground level and the establishment of native woodland planting;
- all related ancillary development and associated site works including processing (crushing, screening and washing) and stockpiling of materials; installation of infrastructure for the management of water on site and all other related activities.

Methodology

11.6 The scope and methodology of this noise and vibration assessment was defined by the most relevant best-practice guidance documents. These primarily included:

- Department of Environment, Quarries and Ancillary Activities, Guidelines for Planning Authorities 2004. (DEHLG);
- Transport Infrastructure Ireland (TII) (previously National Roads Authority (NRA) Guidelines for the Treatment of Noise and Vibration in National Road Schemes;
- EPA Environmental Management Guidelines (2006): Environmental Management in the Extractive Industry (Non-Scheduled Activities);
- IEMA Guidelines for Environmental Noise Impact Assessment, 2014;
- ISO 1996 – Acoustics Description, Measurement and Assessment of Environmental Noise, Part 1 (2016) & Part 2 (2017);
- BS 5228: 2009 & A1 2014 – Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise;
- BS 5228: 2009 & A1 2014 – Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration;
- UK Highways Agency (UKHA) Design Manual for Roads and Bridges (DMRB) LA 111 Sustainability and Environmental Appraisal LA 111 Noise and Vibration Revision 2;
- EPA (2016) Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4); and
- Guidelines on the information to be contained in Environmental Impact Assessment Reports, May 2022.

11.7 In general, the following methodology was followed:

- Measurement of baseline noise information and identification of nearest Noise Sensitive Receptors (NSRs);
- Identification of existing and proposed noise sources;
- Prediction of the likely impact on the nearest noise sensitive receptors for the proposed phases;
- Rating of the predicted impact and comparison against relevant assessment criteria; and
- Recommendation of mitigation measures and on-going monitoring, if required.

11.8 This outline methodology is described in more detail in the following sections.

Baseline Noise Survey

11.9 The Proposed Development will operate during daytime hours only, i.e. 07:00 hrs to 19:00 hrs. Baseline noise monitoring was carried out during representative daytime periods at selected noise sensitive receptors in proximity to the development. A description of measurement locations is presented in the following sections.

Measurement Locations

11.10 Four measurement locations were selected; each is described in Table 9-1 and shown on Figure 9 - 1. The locations were selected to obtain a representative baseline noise levels at noise sensitive locations, in this case houses, in the vicinity of the Proposed Development area.

Table 9-1: Noise Monitoring Locations

Location Reference	Description
NML 1	Across the road from residential properties to the south of the proposed site.
NML 2	North East of the proposed site at a location representative of noise sensitive locations within this area.
NML 3	North of the proposed site at noise sensitive locations in the vicinity of Robertstown Holiday Village.
NML 4	West of the proposed site at a representative location of noise sensitive locations at Preston Heights.

Figure 9 - 1: Noise Monitoring Locations

Survey Periods

11.11 An attended noise survey was undertaken to obtain typical baseline noise levels at noise sensitive locations surrounding the site on the 19th April 2023 between 09:28hrs and 13:57hrs.

11.12 Measurements were carried out on a cyclical basis with measurement durations of 15-minute periods, as recommended in NG4, over three rotations.

Instrumentation and Setup

11.13 The measurements were made using a Brüel & Kjaer type 2250 Light Logging integrating Sound Level Meter. This instrument is a Class 1 instrument in accordance with IEC 651 regulations. The Time Weighting used was Fast and the Frequency Weighting was A-weighted as per IEC 651.

11.14 The instrument was calibrated with a Brüel & Kjaer Type 4231 calibrator prior to and after the measurement period. The microphone was protected using a proprietary Bruel and Kjaer windshield. The sound level meter was mounted on a tripod approximately 1.5 metres above ground level and at least 3 metres away from any reflective surfaces.

11.15 The laboratory calibration certificate for the noise level meter is presented in Appendix 9-2 of this report. The survey results were noted onto a Survey Record Sheet immediately following each sample and were also saved to the instrument memory for later analysis. Survey personnel noted the primary sources contributing to noise build-up during the survey.

Measurement Parameters

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

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

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

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

L_{Amax} Maximum A weighted noise level measured.

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

Meteorological Conditions

11.18 Weather conditions during the survey period were dry and bright with winds below 5 m/s and temperatures in the region of 10°C.

Assessment Criteria

Construction Phase – Noise

11.19 There are no mandatory noise limits for construction noise in Ireland. Account must be taken of the technical feasibility of the proposed project, and the trade-off between the noise level, and the duration of the noise exposure when setting criteria for construction noise. The following guidance was consulted:

- Construction Noise: Transport Infrastructure Ireland "Guidelines for the Treatment of Noise and Vibration in National Road Schemes, October 2004" (Formally NRA Noise Guidelines).
- BS 5228-1&2:2009 & A1 2014 Parts 1 & 2, Code of Practice for noise and vibration control construction and open sites.
- EPA Environmental Management Guidelines (2006): Environmental Management in the Extractive Industry (Non-Scheduled Activities).

11.20 The noise limit thresholds adopted for the purpose of this assessment are outlined in BS5228 and presented in Table 9-2.

Table 9-2: Threshold of Significance at Dwellings

Assessment Category and Threshold Value Period (L_{Aeq})	Threshold value in decibels (dB)		
	Category A	Category B	Category C
Night-time (23:00-07:00)	45	50	55
Evening and Weekends	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75

Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as Category A values.

Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are greater than Category A values.

11.21 The table can be used as follows: for the appropriate period (night, evening/weekends or day), the ambient noise level is determined and rounded to the nearest 5 dB. This is then compared with the total noise level, including construction. If the total noise level exceeds the appropriate category value, then a potential significant effect is deemed to occur, depending on context. Given the setting of the existing site, it is considered appropriate to adopt the L_{Aeq} noise limit threshold value from Category A, of 65dB(A).

11.22 It should be noted that temporary works associated with the construction will be permitted to generate noise levels typically 10 to 15dB(A) above the standard operational noise limit due to their temporary nature. This is acknowledged in the EPA Environmental Management Guidelines (2006): *Environmental Management in the Extractive Industry* where it states:

> *"It is also appropriate to permit higher noise ELV's (Environmental Limit Values) for short-term temporary activities such as construction of screening bunds, etc., where these activities will result in a considerable environmental benefit."*

Demolition and Construction Phase – Vibration

11.23 There is no published Irish guidance relating to vibration during construction activities. Common practice in Ireland has been to use guidance from internationally recognised standards. Vibration standards come in two varieties: those dealing with human comfort and those dealing with

cosmetic or structural damage to buildings. In both instances, the magnitude of vibration is expressed in terms of Peak Particle Velocity (PPV) in millimetres per second (mm/s).

11.24 Transport Infrastructure Ireland (TII) recommends that vibration from road construction activities be limited to the values set out in Table 9-3 in order to ensure that there is no potential for vibration damage during construction. These values have been derived through consideration of the various standards discussed above; compliance with this guidance should ensure that there is little to no risk of even cosmetic damage to buildings.

Table 9-3: Allowable vibration In order to minimise the risk of building damage

Allowable vibration velocity (Peak Particle Velocity) at the closest part of any sensitive property to the source of vibration, at a frequency of		
Less than 10Hz	10 to 50 Hz	50 to 100Hz (and above)
8 mm/s	12.5 mm/s	20 mm/s

11.25 Vibration is perceptible at around 0.5mm/s and may become disturbing or annoying at higher magnitudes in the case of nominally continuous sources of vibration such as traffic. However, higher levels of vibration are typically tolerated for single events or events of short duration.

11.26 No significant vibration is anticipated from the demolition or construction phase of the development, given the distances to sensitive receptors.

Extraction, Infilling and Restoration

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

11.28 In relation to quarry developments and ancillary activities, it is recommended that noise from the activities on site shall not exceed the following ELV's at the nearest noise sensitive receptor.

Daytime	(08:00hrs to 20:00hrs)	55dB $L_{Aeq,(1\ hour)}$
Night-time	(20:00hrs to 08:00hrs)	45dB $L_{Aeq,\ (1\ hour)}$

11.29 This document also states that 95% of all noise levels shall comply with the specified limit value(s). No noise level shall exceed the limit value by more than 2 dBA.

11.30 This Guidance acknowledges the variability of operational intensity from time to time.

Additional Vehicular Activity on Public Roads

11.31 There are no specific guidelines or limits relating to traffic related sources along the local or surrounding roads. Given that traffic from the development will make use of existing roads already carrying traffic volumes, it is appropriate to assess the calculated change in traffic noise levels that will arise as a result of vehicular movements associated with the Proposed Development. To assist with the interpretation of the noise associated with additional vehicular traffic on public roads, it is proposed to adopt guidance from UK Highways Agency (UKHA) Design Manual for Roads and

Bridges (DMRB) LA 111 Sustainability and Environmental Appraisal: Noise and Vibration Revision 2 , 2020.

11.32 Table 9-4 taken from Section 3.54 of DMRB presents guidance as to the likely impact associated with any long-term change in the traffic noise level ($L_{A10,18hr}$) at a noise sensitive receiver.

Table 9-4: Likely Impact Associated with Change In Traffic Noise Level (Source DMRB, 2020)

nge in Sound Level (dB)	Subjective Reaction	DMRB Magnitude of Impact (Long-term)	EPA Significance of Effect
0	Inaudible	No Change	Neutral
0.1 – 2.9	Barely Perceptible	Negligible	Imperceptible
3 – 4.9	Perceptible	Minor	Slight
5 – 9.9	Up to a doubling of loudness	Moderate	Moderate
10+	Doubling of loudness and above	Major	Significant

11.33 The DMRB guidance outlined above will be used to assess the predicted increases in traffic levels on public roads associated with the Proposed Development and comment on the likely impacts.

Existing Environment

11.34 The site is set in a rural location along the L7081 Mylserstown Road in the townland of Coolaght, Kilmeague, Co. Kildare.

11.35 The baseline noise survey was conducted on the 19 April 2023 between 09:28hrs and 13:57hrs. The period chosen was selected to provide a typical snapshot of the existing noise. The full survey details are laid out in section 11.8.

Results of Baseline Survey

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

Noise Monitoring Location 1 (NML 1)

11.37 Table 9-5 presents a summary of the baseline noise levels measured at NML 1.

Table 9-5: Noise Survey Results NML 1

Start Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			
	$L_{Aeq,15\ min}$	L_{Amax}	$L_{A10,\ 15\ min}$	$L_{A90,\ 15min}$
10:43	55	71	59	45
12:13	57	73	60	41
13:42	58	73	62	48

11.38 During the baseline measurements, the main noise sources observed at this location were road traffic on the L7081 , birdsong and wind rustle. Noise levels were in the range of 55 dB to 58 dB L_{Aeq} and in the range of 45 to 48 dB L_{A90}. No significant source of vibration was noted at this location.

Noise Monitoring Location 2 (NML 2)

11.39 Table 9-6 presents a summary of the baseline noise levels measured at NML 2.

Table 9-6: Noise Survey Results NML 2

Start Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			
	$L_{Aeq,15\ min}$	L_{Amax}	$L_{A10,\ 15\ min}$	$L_{A90,\ 15min}$
09:28	46	67	47	38
11:07	50	71	50	42
12:36	45	69	49	37

11.40 During the baseline measurements, the main noise sources observed at this location were occasional vehicles on the local roads past the measurement point and birdsong. A tractor was noted to be operational in a nearby field during the second measurement. Noise levels were in the range of 46 dB to 50 dB L_{Aeq} and in the range of 38 to 42dB L_{A90}. No significant source of vibration was noted at this location.

Noise Monitoring Location 3 (NML 3)

11.41 Table 9-7 presents a summary of the baseline noise levels measured at NML 3.

Table 9-7: Noise Survey Results NML 3

Start Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			
	$L_{Aeq,15\ min}$	L_{Amax}	$L_{A10,\ 15\ min}$	$L_{A90,\ 15min}$
09:53	50	67	53	41
11:30	52	71	54	41
12:58	52	67	56	43

11.42 During the baseline measurements, the main noise sources observed at this location were occasional heavy goods vehicles on the local roads past the measurement point, noise from livestock and occasional wind rustle. Noise levels were in the range of 50 dB to 52 dB L_{Aeq} and in the range of 41 to 43dB L_{A90}. No significant source of vibration was noted at this location.

Noise Monitoring Location 4 (NML 4)

11.43 Table 9-8 presents a summary of the baseline noise levels measured at NML 4.

Table 9-8: Noise Survey Results NML 4

Start Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)			
	$L_{Aeq,15\ min}$	L_{Amax}	$L_{A10,\ 15\ min}$	$L_{A90,\ 15min}$
10:19	49	69	51	43
11:52	49	63	53	41
13:21	51	67	54	43

11.44 During the baseline measurements, the main noise source in this location was in relation to the existing N&C sand and gravel pit the noise related to general site works as well heavy goods vehicles movements. Noise levels were in the range of 49 dB to 51 dB L_{Aeq} and in the range of 41 to 43dB L_{A90}. No significant source of vibration was noted at this location.

Potential Effects of The Proposed Development

11.45 This section describes and assesses the potential noise and vibration impact from the construction and operation of the Proposed Development. The main noise sources associated with the Proposed Development are identified and their impact at the nearest residential receptors is assessed. The noise emission values are compared against existing noise levels and the noise limit criteria as described in the methodology section of this report.

Construction Phase Noise – Site Clearance (Woodland & Vegetation Removal)

11.46 Construction activities in relation to the sand pit will mainly relate to the clearance of vegetation in certain areas of the site.

11.47 Table 9-9 outlines noise source data, for typical site clearance plant, taken from a combination of onsite measurements within comparable sites and British Standard BS 5228 – 1:2009 (+A1 2014): Code of Practice for Noise and Vibration Control on Construction and Open Sites: Noise.

Table 9-9: Noise Source Data Used Data Used for Impact Assessment of Construction Phase

Site Activity	Sound Power (Lw(A))
Tracked Excavator	99 dB
Wheel Wash	106 dB
Lorry	109 dB
Chainsaw	114 dB

11.48 The construction noise plant will move around within the site as the work progresses. Indicative noise levels at various NSLs from the plant items are presented in

11.49 Table 9-10. The calculations assume that the equipment will operate for 66% of the 12-hour working day (i.e. 8 hours). The identified NSLs for the assessment presented within Figure 9 - 2.

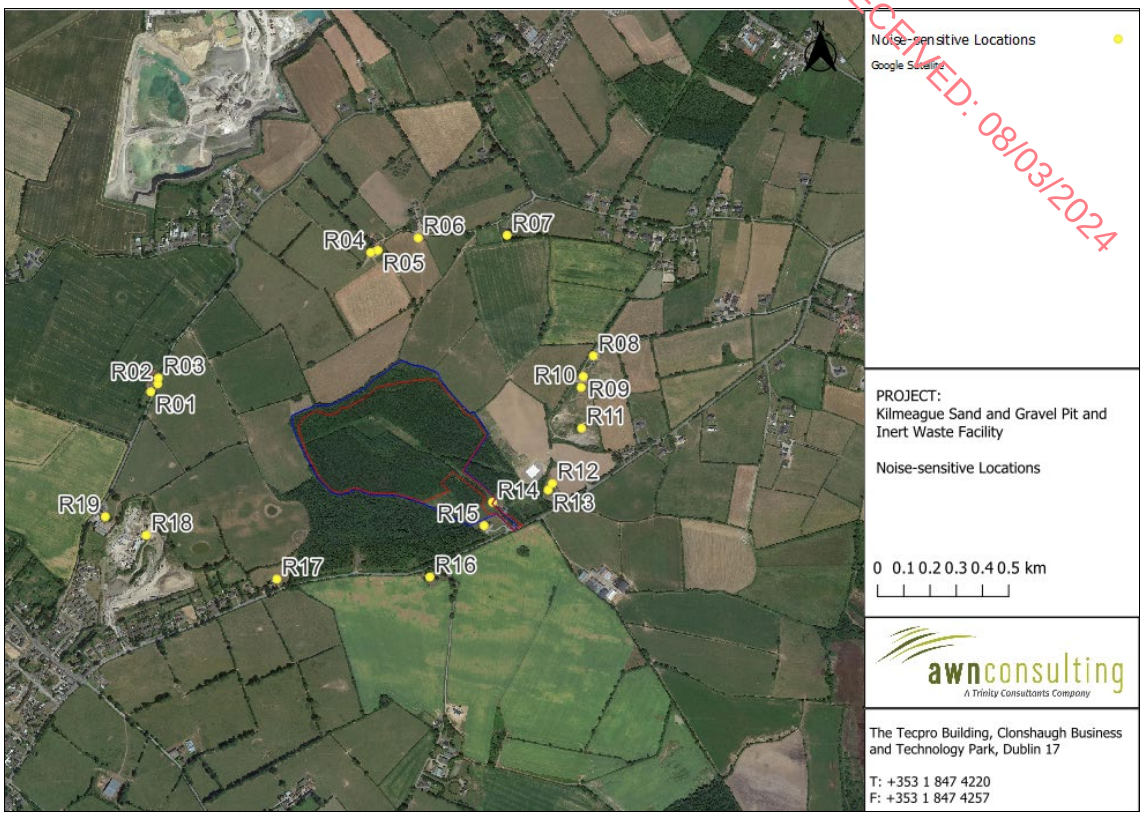

Figure 9 - 2 - Identified NSLs for Noise Assessment

Table 9-10: Predicted Construction Noise Levels at Various NSLs

NSL	Predicted Construction Noise Level dB ($L_{Aeq,12hr}$)
R01	43
R02	43
R03	43
R04	45
R05	45
R06	44
R07	43
R08	43
R09	44
R10	44
R11	46
R12	46
R13	46
R14	52
R15	47

NSL	Predicted Construction Noise Level dB ($L_{Aeq,12hr}$)
R16	46
R17	38
R18	42
R19	41

11.50 Noise levels are below the criteria presented in Table 9-2. The significance of effects pre–mitigation in relation to construction noise can be described as follows:

Quality	*Significance*	*Duration*
Negative	Not significant	Temporary

Construction Phase Vibration

11.51 Significant vibrations are not expected from the types of equipment to be used, i.e. tracked excavator or lorries. There will be no significant vibration associated with the construction phase.

11.52 The significance of effects pre–mitigation related to construction vibration are neutral, imperceptible, and temporary.

Operational Phase Noise

11.53 The proposed development will implement the extraction of sand and gravel from an area of c.8.65 ha to a final floor level at 95mOD during its lifecycle. The nature of the work will require the operation of machinery and HGV movements in and around the proposed site. A 34-year permission is being sought; the extraction and processing period is expected to last some 20 years and the remaining 14 years will consist of restoration activities.

On Site Activities

11.54 In order to evaluate the noise impact of the sand and gravel extraction a list of plant has been derived from British Standard BS 5228 – 1:2009 (+A1 2014) and onsite measurements at comparable sites.

Table 9-11: Noise Source Data used for Operational Impact Assessment

Site Activity	Sound Power (L_{WA})
Tracked Excavator	99
Dozer	102
Screening	109
Crusher	109
Wheel Wash	106
Washing Plant	106
Front Loading	108

Dump Truck	106
Diesel Generator	93

Operational Phase Noise – Extraction, Infilling and Restoration

Similarly to the construction noise plant, operational plant will move around within the site as the work progresses. Indicative noise levels at various distances from the plant items are presented in Table 9-12 and

11.55 . The calculations take into account that the equipment will operate for 66% of the working day and that the land contours surrounding the sand pit, along with proposed screening berms, will afford a degree of line-of-sight screening to off-site locations.

Table 9-12: Predicted Operational Noise Levels

NSL	Predicted Operational Noise Level dB ($L_{Aeq,12hr}$)
R01	39
R02	40
R03	40
R04	47
R05	47
R06	47
R07	46
R08	47
R09	48
R10	48
R11	48
R12	47
R13	47
R14	52
R15	45
R16	42
R17	35
R18	37
R19	36

11.56 The noise criterion adopted in relation to the extraction, infilling and restoration during the operational phases is a limit of 55dB $L_{Aeq,1hr}$. At all assessed NSLs this criterion is met.

11.57 The predicted levels indicate that the significance of effects pre–mitigation related to operational extraction and infilling are likely to be as follows.

Quality	*Significance*	*Duration*
Negative	Not significant	Medium-term

Operational Phase Noise - HGV movements on Site Roads

11.58 The potential noise impact of vehicles accessing the voids is assessed through consideration of the cumulative noise level associated with a series of individual events. The noise level associated with an event of short duration, such as a vehicle drive-by, may be expressed in terms of its Sound Exposure Level (LAx). The SEL can be used to calculate the contribution of an event or series of events to the overall noise level in a given period. The appropriate formula is as follows.

$$L_{Aeq,T} = L_{Ax} + 10\log_{10}(N) - 10\log_{10}(T) - 10\log_{10}(r_2/r_1)\ dB$$

Where:

$L_{Aeq,T}$ is the equivalent continuous sound level over the time period T (s);

L_{Ax} is the "A-weighted" Sound Exposure Level of the event under consideration (dB);

N is the number of events over the course of time period T.

r_2 is the distance from the edge of the entrance road to the facade of nearest property

r_1 is the distance from vehicle to the point of original measurement

11.59 The mean value of Sound Exposure Level for a HGV at low speeds is of the order of 85dB L_{Ax} at a distance of 5m from the edge of the road. That for a car or light vehicle is of the order of 72 dB Lax at the same distance. These figures are based on a series of measurements conducted under controlled conditions.

11.60 Chapter 13 Traffic and Transport presents the number of vehicle movements generated by the operation of the facility.

11.61 All HGV traffic will be directed across a proposed weighbridge. The nearest noise-sensitive location to the route is R15 to the southwest at a distance of 30m from the route. Using the equation above, and assuming 22 light vehicles and 54 HGVs per 12-hour day, the average predicted noise level at the house is 48dB $L_{Aeq,1hr}$.

11.62 The predicted noise level at the location mentioned above is below the criteria of 55 dB $L_{Aeq,1hr}$ for daytime noise. There will be no HGV movements associated with the site during night-time hours.

11.63 The predicted levels indicate that the significance of effects pre-mitigation related to additional HGV movements on site are likely to be negative, not significant, and medium-term.

Operational Phase Noise – Additional vehicular traffic on public roads

11.64 There will be a small amount additional traffic along public roads as a result of the proposed development. Based on traffic flow values provided by PMCE, for the Existing Development and Proposed Development scenarios, the changes in traffic noise levels have been calculated for the years 2024, 2029 and 2039 and are shown Table 9-14.

Table 9-13: Predicted Change In traffic noise level

Junction	Arm	Change in noise level, dB(A) for Year		
		2024	2029	2039
R415 & L7085/L7081 Crossroads	R415 (West)	+0.2	+0.2	+0.1
	R415 (North)	+0.1	+0.1	0
	L7081	+0.5	+0.3	+0.3
	L7085	+0.1	0	+0.1
R409 & L7081 Crossroads	L7081 (West)	+0.5	+0.4	+0.3
	R409 (North)	+0.2	+0.1	+0.2
	L7081 (East)	+0.4	+0.3	+0.3
	R409 (South)	+0.2	+0.2	+0.2
L7081 & the site access	L7081 (West)	+0.5	+0.5	+0.4
	L7081 (East)	+0.5	+0.5	+0.4

11.65 Following the guidance in Table 9-4, changes in traffic are such that the impact is negligible..

11.66 The expected significance of effects in relation to operational traffic noise are as follows:

Quality	*Significance*	*Duration*
Negative	Not significant	Medium-term

Operational Phase Vibration

11.67 There is no significant source of vibration associated with the operational phase of the development.

11.68 The effects related to operational phase vibration are described as follows:

Quality	*Significance*	*Duration*
Neutral	Imperceptible	Medium-term

Mitigation and Management (and/or Monitoring)

Construction Phase Noise

11.69 As demonstrated within the construction phase section the impact of the construction is not predicted to be significant. Best practice will still be taken in accordance with BS5228, as listed in the Operational Noise section below.

Construction Phase Vibration

11.70 There will be no significant vibration from the construction phase, therefore no mitigation measures are required.

Operational Phase Noise

11.71 As mentioned above the noise levels at noise sensitive locations will vary with distance between operational works and noise sensitive locations. The mitigation measures highlighted above within the construction phase noise mitigation will also be applicable to operational phase works. Best practice noise mitigation measures will form part of site management practices to ensure noise from on-site operations do not cause a noise nuisance at the nearest NSLs. The following measures are recommended:

- Provision of landscaped screening berms;
- Regular maintenance of items of plant to ensure that they are operating efficiently;
- Location of noisy items of plant at the lowest part of the working pit floor and as close to the pit face as possible to provide optimum noise screening;
- Design of internal haul roads with as low a gradient (1:10) as possible to minimise excessive revving of vehicle engines travelling on-site.
- Regular maintenance of haul routes to avoid potholes and uneven surfaces;
- Avoiding unnecessary revving of engines, reducing speed of vehicle movement and keeping lorry tailgates closed where possible;
- All mobile equipment is throttled down or switched off when not in use;
- Orienting directional noise away from sensitive areas where possible.

11.72 Periodic monitoring of noise levels will be carried out in accordance with the guidance in EPA Environmental Management Guidelines (2006): *Environmental Management in the Extractive Industry*.

Operational Phase Vibration

11.73 There will be no significant vibration during the operational phase of the development therefore no mitigation measures are required.

'Do-Nothing' Scenario

11.74 In the absence of the proposed development being constructed, the noise environment at the nearest noise sensitive locations and within the development site will remain largely unchanged resulting in effects described as follows:

Quality	*Significance*	*Duration*
Neutral	Imperceptible	Medium-term

Cumulative Effects

11.75 To account for cumulative impacts is its necessary to consider the operation of the soil recovery facility in conjunction with the currently operating N&C Enterprises quarry to the west of the proposed site.

11.76 In respect of the currently operating N&C Enterprises sand pit (currently being restored), it was noted in the baseline survey that activities at the existing pit were not audible at NML 1 to NML 3. It is therefore considered that no cumulative impact is likely at noise sensitive locations surrounding these noise monitoring locations. Activity noise from N&C was noted at NML 4, however the cumulative effect is deemed negligible due to the distance from the proposed sand pit and existing noise sensitive locations in the area.

11.77 In respect of the other sand pit site to the north, the distances between the current application and this site is such that no cumulative impact is likely.

Residual Effects

11.78 Following implementation of mitigation measures as outlined above, the expected noise and vibration effects for the operational phase can be summarised as follows:

Quality	*Significance*	*Duration*
Negative	Not significant	Medium-term

Difficulties Encountered

No difficulties were encountered in the preparation of this chapter.

References

- BS 5228: 2009 & A1 2014 – Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise.
- BS 5228: 2014 & A1 2014 – Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration.
- EPA (2016) Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).
- EPA Environmental Management Guidelines (2006): Environmental Management in the Extractive Industry (Non-Scheduled Activities).
- IEMA Guidelines for Environmental Noise Impact Assessment, 2014.
- ISO 1996: 2003 – Acoustics Description, Measurement and Assessment of Environmental Noise.
- Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports, August 2017.

APPENDICES

Appendix 9-1 Glossary of Acoustic Terms

Ambient noise	The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far.
Background noise	The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T ($L_{AF90,T}$).
dB	Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 μ Pa).
dB(A)	An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. 'A'–weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Hertz (Hz)	The unit of sound frequency in cycles per second.
$L_{Aeq,T}$	This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T).The closer the LAeq value is to either the LAF10 or LAF90 value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.
L_{AFN}	The A-weighted noise level exceeded for N% of the sampling interval. Measured using the "Fast" time weighting.
L_{AF90}	Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level. Measured using the "Fast" time weighting.
L_{AF10}	Refers to those A-weighted noise levels in the upper 10 percentile of the sampling interval; it is the level which is exceeded for 10% of the measurement period. It is typically representative of traffic noise levels. Measured using the "Fast" time weighting.
L_{AFmax}	is the instantaneous fast time weighted maximum sound level measured during the sample period.
L_{AFmin}	is the instantaneous fast time weighted minimum sound level measured during the sample period.

Appendix 9-2 Calibration Certificate

ANV MEASUREMENT SYSTEMS

CERTIFICATE OF CALIBRATION

ilac-MRA UKAS CALIBRATION 0653

Date of Issue: 04 November 2021

Certificate Number: UCRT21/2361

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

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Approved Signatory

K. Mistry

CUSTOMER	AWN Consulting Limited The Tecpro Building IDA Business and Technology Park Clonshaugh Dublin D17 XD90
ORDER No	DOD/21/Cal037 Job No UKAS21/11719
DATE OF RECEIPT	02 November 2021
PROCEDURE	Calibration Engineer's Handbook, section 25: periodic testing of sound level meters to IEC 61672-3:2006 (BS EN 61672-3:2006) as modified by UKAS TPS 49 Edition 2:June 2009
IDENTIFICATION	Sound level meter Brüel & Kjær type 2250-L serial No 3008402 connected via a preamplifier type ZC 0032 serial No 28933 to a half-inch microphone type 4950 serial No 3016830.
CALIBRATED ON	04 November 2021
PREVIOUS CALIBRATION	Calibrated on 04 November 2019, Certificate No. UCRT19/2218 issued by this laboratory.