NOISE IMPACT ASSESSMENT

Kilsaran Concrete,
Tullykane,
Kilmessan,
Co. Meath

Noise Impact Assessment

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1.0 Introduction

RME Environmental has been retained to undertake a noise impact assessment of the proposed Quarry restoration project at Tullykane, Kilmessan, Co Meath.

The proposed development is for the restoration of an aggregates quarry at Tullykane, Kilmessan, Co Meath. Planning permission is sought for the importation of inert soil and stone materials over a 14-year period (a rate of approximately 400,000 tonnes per annum) to reinstate the lands to the original levels prior to commencement of extraction for use as agricultural land.

This noise report assesses the potential noise impacts associated with the restoration project.

1.1 Report structure

- Establish the existing noise environment
- Determine applicable noise limits
- Description of the noise aspects of the proposal
- Predict potential noise impacts associated with the proposal
- Suggest mitigating measures
- Establish residual noise impacts

2.0 Existing Noise Environment

The existing Kilmessan Quarry is located in Tullykane, Kilmessan, Co Meath. The area is rural in nature and there is a dispersed mix of single dwelling houses and farms. The site is accessed directly from Local Road L2206 which lies on the southern boundary of the site. The site is generally set within an agrarian landscape and is for the most part bounded by mature trees and hedgerow on all sides. The surrounding landscape features a gently undulating terrain marked by woodland and pastureland. The quarry is substantially screened from views from the adjoining road network. Local Road L2206 connects the villages of Kilmessan and Dunsany.

Fig 1.0 Site location Map

This study focuses predominantly on the noise impact generated from the facility during previous operations which were paused in 2012. No new noise monitoring was carried out. The study will assess the impacts on noise as monitored via the established Environmental Monitoring programme and assess whether the proposed development or any significant changes to the existing environment would lead to any new impacts with respect to the commencement of the proposed development.

A select number of representative noise sensitive locations have been identified previously and monitored and they are documented below in figure 2.0

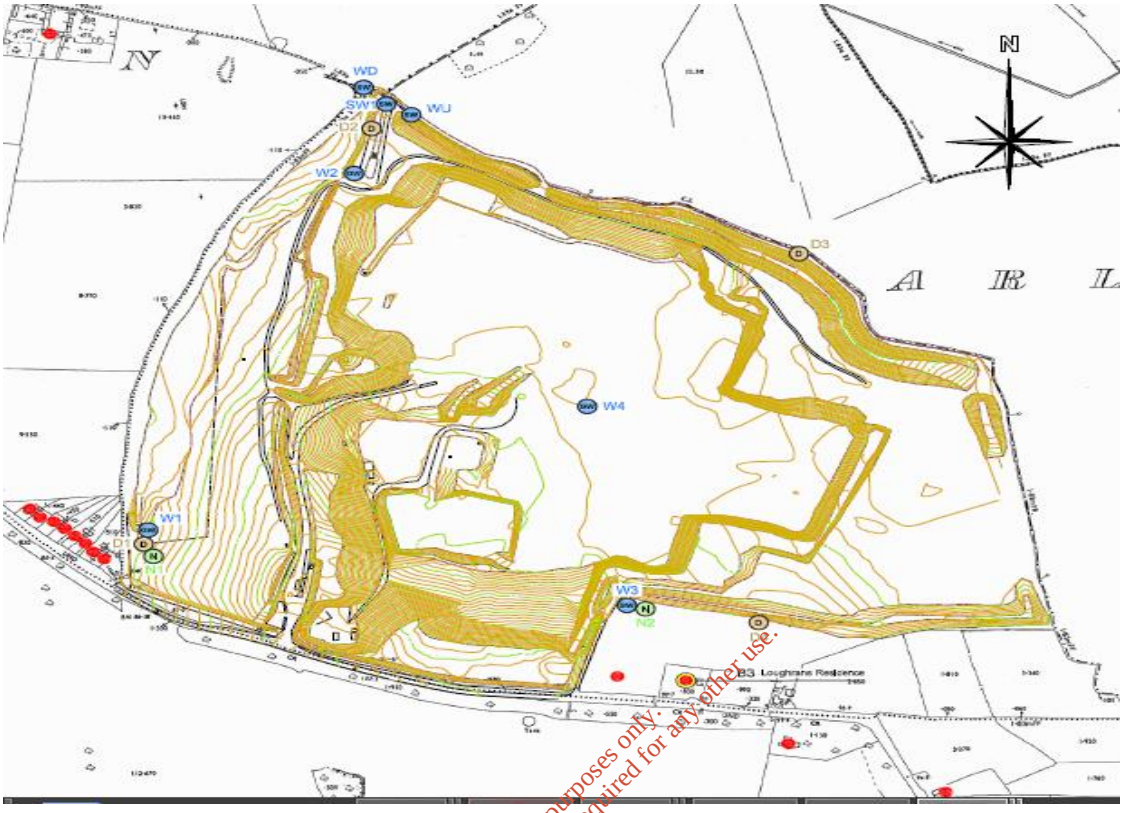

Fig 2.0 Environmental Monitoring Programme Noise Monitoring Locations

Table 1.0 Representative Noise Sensitive Receptors (NSRs)

Id	Address	Eastings	Northings
N1	LOCATED AT THE SOUTH WEST OF THE SITE ADJACENT TO THE NEAREST OF THE 8 COTTAGES	289831	257004
N 2	LOACTED AT THE SOUTHERN CENTRAL BOUNDARY OF THE SITE PROXIMATE TO 2 RESIDENCES ONE NAMED LOUGHRAN RESIDENCE	290306	256946

2.1 Defining the existing Noise Environment

The procedure detailed in the EPA guidance document NG4 has been followed in assessing the existing noise environment.

According to *NG4* a four step process should be followed to determine appropriate noise criteria for a potential development.

Step 1 – Quiet Area Screening of the Development Location

Step 2 – Baseline Environmental Noise Survey

Step 3 – Screen for Areas of Low Background Noise

Step 4 – Determine Appropriate Noise Criteria

2.1.1 Quiet area screening of the development location

It was determined at the preliminary screening stage that the proposed site does not meet the necessary criteria and is therefore not considered to be a quiet area as per the EPA definition.

2.1.2 Noise Survey Results

The existing ambient (LAeq) and background noise (LA90) levels in the areas of the proposed development was established during a period of continuous monitoring at two representative locations.

Noise monitoring was undertaken over the period January to April 2012 at two locations:

Table 2 Noise monitoring locations

Id	Address	Eastings	Northings
N1	LOCATED AT THE SOUTH WEST OF THE SITE ADJACENT TO THE NEAREST OF THE 8 COTTAGES	289831	257004
N 2	LOACTED AT THE SOUTHERN CENTRAL BOUNDARY OF THE SITE PROXIMATE TO 2 RESIDENCES ONE NAMED LOUGHRAN RESIDENCE	290306	256946

The noise monitoring equipment was positioned proximal to NSRs correctly located at 1.5m above ground level and away from reflecting surfaces.

2.1.3 Results of Noise Survey

The existing ambient and background noise levels in the area of the proposed development were measured at representative noise sensitive receptors.

- Noise monitoring was undertaken over a continuous period at two locations

Monitoring Date	Location	Duration (hr:mins)	LAeq (dBA)	L10	L90	Wind Speed	Wind Direction
10/01/2012	N1	00:15	45.5	49.3	33.5	0.9	Non direc
	N1	00:15	43.5	46.6	33.6	0.7	Non-direc
	N1	00:15	44.1	40.1	34.3	0.6	WSW
	N1	00:15	43.7	38.9	33.9	0.7	SW
	N2	00:15	47.0	47.1	38.5	0.3	W
09/02/2012	N1	00:15	45.7	46.1	42.1	0.9	SW
	N2	00:15	41.7	42.5	28.8	0.3	SSW
08/03/2012	N1	00:15	44.6	46.3	38.9	1.6	SW
	N2	00:15	48.2	41.1	38.1	1.9	S
16/04/2012	N1	00:15	46.6	46.0	35.5	0.3	WSW
	N2	00:15	43.5	40.6	34.8	0.3	SW

2.3.1 **Noise Limits** during the Operational Phase

The sites falls outside the category of "Area of Low Background Noise" therefore based on the findings in section 2 above the following noise limits are deemed appropriate for the site:

- Daytime 55 dBA
- Evening 50 dBA
- Night 45 dBA

Additional noise conditions:

- There shall be no clearly audible tonal component in the noise emission from any activity at any noise sensitive location'.
- Operational sirens and similar, in routine use on-site shall be modified and maintained so as not to be audible at any noise sensitive location.

It is recommended that theses limits be set at the Nearest Noise Sensitive Receptor and not at the site boundary.

3.0 Characteristics of Proposal

The development within the application area is for a period of 14 years and will consist of the cessation in the use of the permitted development and the backfilling of the quarry void with soil and stone under a waste licence from the Environmental Protection Agency. The weighbridges, truck wheelwash bay, floodlighting, oil and fuel storage tanks and water storage tanks the paved entrance avenue and the existing splayed entrance will remain to facilitate the proposed development. In total it is proposed to import 400,000t per annum of material to the site.

Hours of Operation

The current grant of permission requires that normal quarry operations (i.e. extraction and processing) shall not commence before 08.00hrs and shall not continue after 18.00hrs Monday - Friday, and 14.00hrs on Saturday. Loading of vehicles shall not take place before 07.00hrs. No work takes place on Sunday or Bank Holidays. The proposed hours of operation are 07.00 am to 18.00hrs Monday - Friday, and 07:00 to 14.00hrs on Saturday.

Proposed activities

- Importation of approximately 5.6 million tonnes of inert material to reinstate the volumes of material previously extracted. Re-use the volumes of existing overburden on site
- Landscaping works to reinstate the land to the original use as agricultural tillage land.
- Associated site works
- Establishment of a public amenity park to enhance the local amenity value via the provision of a sports field, 1. Km of walkway, a biodiversity area, a children's playground and a sensory park..

Noise Aspects of the project

- Road traffic – importation of reinstatement materials
- Onsite placement of imported materials

3.1 Road traffic impacts

As stated earlier existing road traffic bears a significant influence on the ambient and background noise levels in the environs of the quarry site.

Access to and from the site shall be from the existing site access onto the L2206 Kilmessan – Dunsany.

A traffic impact assessment has been completed for the proposed development the following information has been referenced from that report.

1. Site operations will be limited to 50 weeks per year at 5.5 days per week
2. The original planning permission 2011 allows for 150 inbound and outbound truck journeys per day
3. The proposed restoration activity assumes 72 inbound and outbound journeys daily

Increases in noise levels can be accurately calculated when the percentage increase in traffic flow is known (Ref. HMSO Calculation of Road Traffic Noise, 1988).

There is a logarithmic relationship between noise levels and traffic volume and the higher the existing traffic volume the greater the traffic increase required to produce a perceptible noise change.

Typically, doubling the traffic flow produces a 3 dB (A) change in noise level and commensurately reducing the traffic by 52% will predictably result in a 3dB(A) change in the noise level.

Critically the proposed development will result in a 52% reduced traffic volume and therefore the resultant noise levels will be lower than currently permitted.

3.2 Quarry activity and Reinstatement

Noise emissions will be associated with mobile plant and machinery

Table 6 presents typical noise levels and numbers of mobile plant for the proposed construction jobs.

These noise levels have been sourced from measurements of noise sources at other construction sites. The levels are based on measurements taken at 20m from the geometric centre of activity when the equipment was in continuous operating mode.

Table 6 Typical quarry plant and associated noise levels

Type	Number	Typical Noise level dB(A) Leq @ 20 meters
Excavator – Tracked 25 Tonne	1	76
Bulldozer	1	82

- Maximum potential cumulative noise levels from quarry activity would be 84 dB(A) at 20 metres.

4.0 Noise Prediction methodology

Predicted noise levels at the nearest noise sensitive receptor can be determined according to formula 1 or 2 below:

Formula 1 **$Lp2 = Lp1 + \Delta L\psi - \Sigma\Delta L$ where,**

Lp2 = Sound Pressure level in decibels at Receptor.

Lp1 = Sound pressure level in decibels at known distance.

$\Delta L\psi$ = correction for direction effects in a horizontal plane,

$\Sigma\Delta L = \Delta Ld + \Delta La + \Delta Lr + \Delta Ls + \Delta Lv + \Delta Lg + \Delta Lw$, and where,

ΔLd = geometric spreading

$\Delta Ld = 20 \log_{10} (d1/d2)$, where, d1 is the receptor distance, while d2 is the distance from the source (metres.

ΔLa = air absorption
ΔLr = reflection and diffraction
ΔLs = screening
ΔLv = vegetation
ΔLg = ground absorption
ΔLw = wind gradients

Formula 2

$$\textbf{Predicted level} = LW + D - (A_{geo} + A_{atm} + A_{gr} + A_{br} + A_{mis})$$

A_{geo} –Geometric Spreading

Geometric (spherical) spreading from a simple free-field point source results in attenuation over distance according to:

$$Lp = Lw - (20 \log R + 11)$$

Where:

Lp = sound pressure level

Lw = sound power level

R = distance from the turbine to the receiver

A_{gr} - Ground Effects

A_{bar}-Barrier Attenuation

A_{atm} - Atmospheric Absorption

A_{misc} – Miscellaneous Other Effects

5.0 Potential Noise Impacts

5.1 Predicted noise levels - Operational Phase

Table 7 Predicted operational noise levels

Id	Address	Predicted noise level without mitigation, LAeq, dB[2]	Predicted noise level, taking account of mitigation LAeq, dB[3]
N1	LOCATED AT THE SOUTH WEST OF THE SITE ADJACENT TO THE NEAREST OF THE 8 COTTAGES	49	48
N 2	LOACTED AT THE SOUTHERN CENTRAL BOUNDARY OF THE SITE PROXIMATE TO 2 RESIDENCES ONE NAMED LOUGHRAN RESIDENCE	49	48

Based on the cumulative impact of all plant operational simultaneously, it is predicted that the cumulative noise levels at the closest noise sensitive receptor, NSR 1, and NSR 2 could be no greater than 49 dBA.

6.0 Mitigating Measures

6.1 Controlling the spread of noise

Screening

For maximum benefit, acoustic screens should be close either to the source of noise (as with stationary plant) or to the listener.
Careful positioning of noise barriers, such as bunds or noise screens, can bring about significant reductions in noise levels,

The topography of the site lends itself to providing a barrier between the centre of activity and noise sensitive receptors.

The quarry floor is surrounded by high embankments (see attached photos below) and surrounded by earthen berms. These provide natural barriers and result in reduced noise levels in the order of up to 10 decibels.

6.2 Reduction at source

The movement of plant onto and around the site should have regard to the normal operating hours of the site and the location of any NSRs as far as is reasonably practicable.

The use of conventional audible reversing alarms may cause problems and alternatives are available.
Audible reversing warning systems on mobile plant and vehicles should be of a type which, whilst ensuring that they give proper warning, have a minimum noise impact on persons outside sites.

Maintenance
Regular and effective maintenance by trained personnel is essential and will do much to reduce noise from plant and machinery.

- Noise caused by vibrating machinery having rotating parts can be reduced by attention to proper balancing.
- Noises caused by friction in machines can be reduced by proper lubrication.

6.3 Training

Workers should be trained to employ appropriate techniques to keep site noise to a minimum, and should be effectively supervised to ensure that best working practice in respect of noise reduction is followed.

Good practice includes:

- the proper use and maintenance of tools and equipment;
- the positioning of machinery on site to reduce the emission of noise to the neighbourhood and to site personnel
- the avoidance of unnecessary noise when carrying out manual operations and when operating plant and equipment
- avoid unnecessary revving of engines and switch off equipment when not required;

7.0 Residual noise impact [accounting for mitigation measures]

Table 8 Predicted operational noise levels

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8.0 Recommendations

- The planning authority should attach noise conditions to the permission to ensure that the facility is so operated and maintained as to ensure that it avoids causing noise nuisance
- It is recommended that such noise limits/condition be set at the nearest noise sensitive receptors rather that at the site boundary.

9.0 Conclusions

- It has been determined that the site of the proposed development is not by definition an "Area of Low Background Noise".
- The proposed development will result in a reduced traffic volume and therefore the resultant noise levels will be lower than the current expectations for the current Planning Permission.
- During normal operation of the facility there should be a negligible noise impact at all nearby residents.
- Noise emissions should contain no clearly audible tones and should not be impulsive in nature.
- Predicted noise emissions should be well within recommended criteria levels if mitigation measures are implemented.

REFERENCES

(1) Noise Control on Construction and Open Sites - Part 1. Code of Practice for Basic Information and Procedures for Noise Control)
(2) BS 5228: Part 1: 2009, Noise and Vibration Control on Construction and Open Sites
(3) ISO 1996/1Acoustics – Description and Measurement of environmental noise- Part 1: Basic quantities and procedures
(4) ISO 1996-2: Acoustics – Description and Measurement of environmental noise Part 2: Acquisition of data pertinent to land use
(5) ISO 1996-3: Acoustics- Description and Measurement of environmental noise Part 3: Application to noise limits
(6) Calculation of Road Traffic Noise, Department of Welsh Office, 1988 HMSO
(7) EPA guidance Note NG4
(8) The National Roads Authority (NRA), Guidelines for the Treatment of Noise and Vibration in National Roads Schemes (2004)
(9) BS 5228: Noise Control on Construction and Open Sites Part 1: Code of Practice for Basic Information and Procedures for Noise Control (2009)

Appendix 1 Noise Monitoring Data

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