Attachment-7-1-3-3-Noise Emission Impact Assessment

1. Introduction

This section addresses the potential impacts of Noise and Vibration arising as a result of the proposed development on the surrounding environment and sensitive receptors. This document details both the receiving environment and a noise emissions impact assessment the noise assessment undertaken determines what the noise receptors are (receiving environment) and thus are interrelated. An assessment of noise emissions was undertaken as part of the Environmental Impact Assessment Report (EIAR) from which the below assessment has been extracted.

Excessive noise and vibration from quarries can have a significant adverse effect on those living in close proximity to such sites. Noise can be generated by a number of sources, including mobile sources such as cars, trucks and excavators, and stationary sources such as process machinery. As acoustic energy spreads through the atmosphere from the source to the receiver, noise levels attenuate (decrease) depending on ground absorption characteristics, atmospheric conditions, and the presence of physical barriers (e.g., quarry faces, walls, building façades, berms). It is considered that the restoration of the quarry by importation of waste (waste recovery) shall encompass similar processes and noise emissions to extraction activities. As the both activities will be carried out in conjunction the noise assessment takes account of both quarrying and waste recovery activities.

The EPA has produced noise guidelines which define noise limit values for sites licensed by it under IPC/IED regulations. Activities occurring on EPA licensed industrial sites shall not give rise to noise levels off-site at any Noise Sensitive Location (NSL) in excess of the following; 55 dB LAr,T during daytime hours, 50 dB LAr,T during evening hours and 45 dB LAr,T during night-time hours. A NSL may be described as follows:

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

This assessment focuses on Noise Impacts on surrounding sensitive receptors associated with the proposed development. A Noise Prediction Model has been developed to ascertain noise levels at sensitive receptors. The quarry will be developed over a number of phases. Noise levels associated with each phase of the development have been considered in this assessment. Construction phase noise and operational phase noise have both been considered under the term development noise in this chapter as they both comprise the same activities given the nature of the development.

2. Methodology

2.1 Overview

For the purpose of this EIA, a Noise Prediction Assessment was conducted to assess the impact of the proposed activities at Noise Sensitive Locations (NSL's) in the vicinity of the site.

At-source Development Noise levels associated with proposed quarry noise sources were determined. Machinery and traffic noise levels associated with the proposed quarrying activity were calculated using methods specified in *BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites*.

The Development Noise levels at NSL's, were predicted in accordance with methodology outlined within *BS 5228-1:2009+A1:2014*, taking into account at-source noise levels of processes/equipment, distance from source to receptor, soft ground attenuation and any noise barrier attenuation.

Predicted Development Noise levels at NSL's, taking into account all influencing factors, were then added to the background noise level at a time when no site processes were occurring, in order to predict Overall Ambient Noise levels at NSL's after the proposed development has taken place. Noise levels at NSL's have been predicted on a worst-case scenario basis; in that the model presumes that, following the proposed development, all noise generating processes/activities, are running at the same time. In practice sequencing of processes/activities and the timing and duration of the processes/activities on any given day may vary.

2.2 Dates of Background Monitoring

Monitoring of background noise at the subject site took place on 28/11/2015.

Table 1: Instrumentation Used

	First Set		
Equipment	Model	Serial Number	Cal cert
SLM	SV1	40395	Yes
Microphone	SV Mic 1	58499	Yes
Calibrator	Cal 2	51431	Yes
Tripod	N/A	N/A	N/A
Windshield	N/A	N/A	N/A
Anemometer	Kestral	N/A	N/A

The noise measurements were 'A' weighted and the time-weighting 'Fast' was applied (to equate to human ear hearing). The SLM was calibrated to 93.7 dB (A) on-site immediately before measurement and reassessed upon completion. No drift in calibration level was recorded.

2.3 Noise Survey Personnel

The noise survey was undertaken by Environmental Efficiency Consultants (Ire) Ltd. The following environmental noise monitoring personal undertook noise monitoring as part of this assessment.

- Ronan Sutcliffe, Dip. Environmental Protection, Cert in Environmental Noise Monitoring (Institute of Acoustics).

2.4 Meteorological Conditions

During noise monitoring, temperature, wind speed and wind direction readings were taken using an anemometer and a compass. Weather condition on days where monitoring took place were considered appropriate i.e. conditions were dry and wind speed was recorded as being less than 5 m/s (requirements for taking noise measurements). In keeping with good practice, the Sound Level Meters used were fitted with windshield to minimize interference from wind.

2.5 Measurement Positions

In accordance with the EPA's NG4 Guidance Note all noise measurements were taken at between:

- 1.2 – 1.5 m height above local ground level
- >3.5 m away from reflective surfaces

3. Receiving Environment

3.1 Overview

The subject site is situated in Ballinrooaun, Screen, Co. Wexford ca. 1.3 km west of Screen and ca. 2 km west of the regional road R741. The site is in a rural location and is mainly surrounded by pastoral farming, namely cattle grazing. The topography of the area is undulating. Access to the site is via a private road, which intersects with the county road L- 7003-1 via a priority junction.

3.2 Sensitive Receptors

One-off housing in the locality is situated south-east, south, west and north-west of the subject site. Agricultural land surrounds the subject site on all sides except on the north-east where the proposed site is bordered by the existing site. Four Noise Sensitive Locations have been considered as part of this assessment. These NSL's are shown in Figure 1 in combination with the application site boundary.

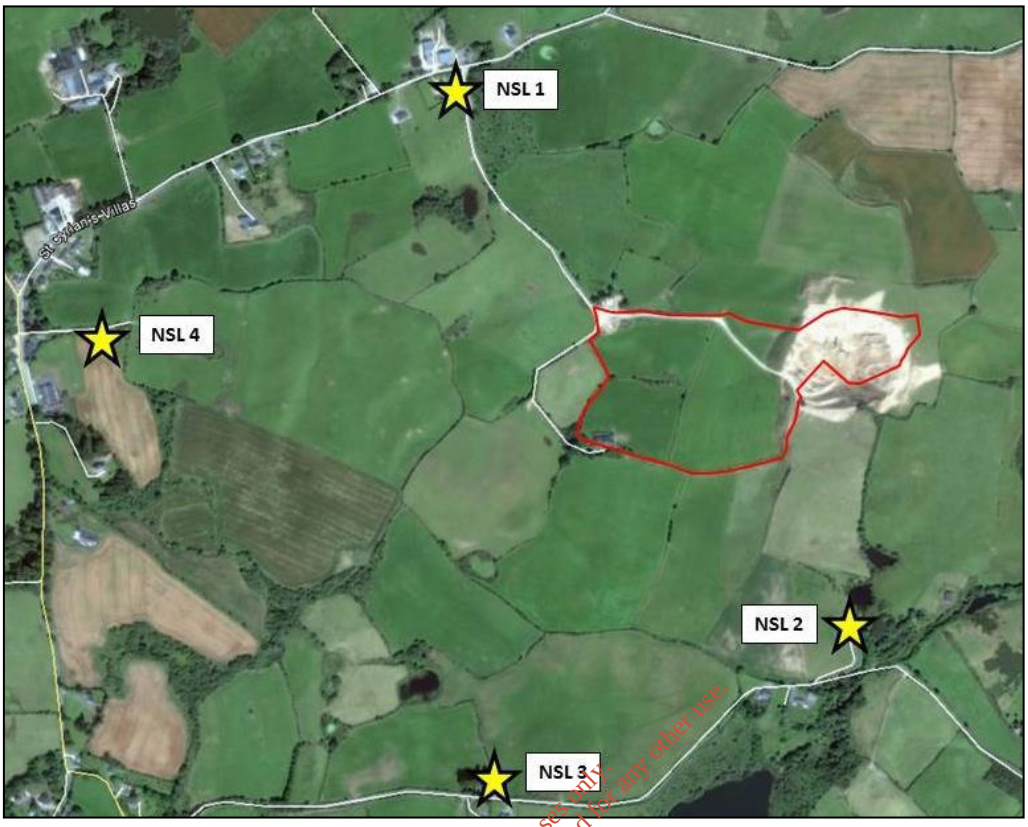

Figure 1: Map showing application site boundary

4. Impact of the Proposed Development

4.1 Characteristics of the Proposed Development

4.1.1 Noise Sources

The following processes/activities which generate noise emissions will be in operations at the subject quarry site following throughout the proposed development

1. Komatsu 210-8 Excavator
2. Powerscreen Chieftain 1400 Material Screening
3. Volvo Loading Shovel L120
4. Vehicle movements along internal haul roads

It is planned that site processes will operate from 08:00 to 18:00 Monday to Friday and 08:00 to 13:00 on Saturdays.

The noise data of the Komatsu and the Volvo loading shovel were obtained from specification sheets. The noise data for the chieftain 1400 was obtained from a third party report on noise monitoring of the machinery.

Noise Barrier Attenuation

The model was assessed without consideration of any noise barrier attenuation. There is no noise barrier attenuation (e.g. noise screens) planned for the site. In addition there is no intervening significant, naturally occurring noise barrier between the subject site and NSL's. In practice, quarry faces will act as noise barrier attenuation throughout the proposed development activity. Attenuation associated with quarry faces has not been considered as part when developing the noise prediction model as it is not feasible to predict noise attenuation. As the progression of each phase of the quarry development occurs the height and location of the quarry faces will adjust and since the time frame, rate and geographical characteristics of the development is unknown it is not possible to predict noise attenuation levels. Assessing noise levels without consideration of quarry face noise attenuation however ensures that worst-case scenario development noise is taken into account.

4.1.2 Noise Monitoring Locations

In determining the potential noise impacts of the proposed development on the surrounding environment it was necessary to identify NSL's. Four NSL were identified during a desktop survey of the site. NSL's were selected based on their proximity to the proposed development and their positions at various cardinal points north-west, south-east, south and west of the proposed development. Details on NSL's are shown in Table 2.

Table 2: NSL Details

Noise Monitoring Location	Description	Coordinates	Nature of intervening ground
NSL1	Residential property north-west of the site	52°24'58.9"N 6°23'53.3"W	Soft ground
NSL2	Residential property south-east of site	52°24'29.9"N 6°23'21.1"W	Soft ground
NSL3	Residential property south of site	52°24'20.4"N 6°23'49.4"W	Soft ground
NSL4	Residential property west of the site	52°24'44.4"N 6°24'24.0"W	Soft ground

4.1.3 Impacts associated with the Proposed Development

The assessment of noise associated with the proposed development consisted of the following steps:

1. Development Noise was determined as follows:

    a. Noise emanating from the Komatsu Excavator and the Volvo Loading Shovel was calculated using the formula detailed in procedure F.2.3.2 from BS 5228-1:2009+A1:2014 with reference to machinery noise specifications.

b. Noise emanating from the Powerscreen Chieftain 1400 was calculated using the formula detailed in procedure F.2.2.2 from BS 5228 BS 5228-1:2009+A1:2014 methodology with reference to a third party report on noise monitoring of this machine.
c. The predictions from the vehicle movements on the haul roads was calculated using the formula detailed in procedure F.2.5.2 from BS 5228 BS 5228-1:2009+A1:2014 considering vehicle movement per hour, average speed, the distance to each NSL and the maximum permissible sound power ratings for lorry type vehicles detailed in the standard.

2. Development phase noise was then propagated for distance over soft ground using *BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites.*

3. Finally, Development phase noise was combined with Background Noise, which was measured in-situ on 28/11/2015, to predict environmental noise at NSL's following the subject development.

4.1.4 Discussion of Method Employed

This noise prediction model considers process machinery as being at a point on-site which is closest to each NSL when predicting noise at each NSL as (i) the locations of equipment are currently unknown and (ii) this considers a worst-scenario. Development noise is assessed in this way for each phase of the quarry development, to assess worst-case noise associated with each phase.

Propagated noise levels emanating from each site process were summed to give an overall result for noise at each receiving location. Results are therefore representative of a worst case scenario as it has been assumed that, for the purposes of this assessment, all process equipment is operating at the same time. In practice process equipment may be operating at various times separate to one another depending on operational requirements and throughput for a given day.

The total sum of noise at each receiving location, arising from all development noise sources, associated with each phase, attenuated for mixed ground (hard/soft) has been determined and is shown in Table 10.3

Background Noise comprises the noise occurring at NSL's surrounding the site without the presence of Proposed Development noise originating from on-site. Background Noise therefore consists of noise originating from off-site noise sources. Monitoring for Background Noise at NSL's surrounding the subject site took place on 28/11/2015. Background Noise recorded has been combined with Development Noise, predicted at NSL's, in order to predict overall noise levels at NSL's (i.e. Ambient Noise) following the proposed development. Noise assessment results are shown in Table 3.

Table 3: Noise Prediction Results

Quarry Development Phase	NSL	Plant operating	Description	Development noise level at NSL (dB)	Background noise (dB)	Development noise level + Background (dB)
1	1	All	Residential House	50.4	40.5	50.8
	2	All	Residential house	50.3	40.5	50.7
	3	All	Residential house	45.7	40.5	46.8
	4	All	Residential house	45.3	40.5	46.5
2	1	All	Residential House	49.4	40.5	49.9
	2	All	Residential house	51.7	40.5	52.0
	3	All	Residential house	47.2	40.5	48.0
	4	All	Residential house	45.4	40.5	46.6
3	1	All	Residential House	47.5	40.5	48.3
	2	All	Residential house	53.9	40.5	54.1
	3	All	Residential house	47.4	40.5	48.2
	4	All	Residential house	45.1	40.5	46.4

4.1.5 Discussion of Results

Predicted overall ambient noise levels (operational phase Development Noise and Background Noise) are in all instances compliant with the EPA day-time noise limit value of 55 dB. These noise results are representative of worst-case scenario results as it is assumed all processes associated with the operational phase are running at the same time and that all noise sources are situated at along the site boundary closest to each NSL, relevant to each phase of the development

The increase in overall ambient noise levels when combining operational phase Development Noise with Background Noise is considered to be insignificant. In no instance, with reference to Table 4 below, is there a 'noticeable' increase in noise levels of (i.e. >3 dB).

Table 4: Difference in Decibel Noise Levels

Decibel change	Energy difference	Human Perception
-3dB	Half the energy	Clearly noticeable
+1dB	1.25 times the energy	Barely noticeable
+3dB	Twice the energy	Noticeable
+5dB	Triple the energy	Easily noticeable
+10dB	Ten times the energy	Twice as loud
+20dB	100 times	Four times as loud
+30dB	1000 times	Eight times as loud

As such the impact of Development Noise, associated with operational phase noise sources, on overall ambient noise is considered to be negligible. Additional mitigation measures are therefore considered unnecessary.

4.1.6 Vibration

As there is no crushing, grading or blasting occurring on site the impact of vibration is not relevant and therefore not discussed. Process machinery associated with the Proposed Development will be the same as what is already situated at the existing site therefore it is not envisaged there will be any difference in vibration due to processing as a result of the Proposed Development.

5. Remedial and Mitigation Measures

It is deemed additional noise reduction techniques are not necessary as predicted noise impacts during the operational phase of the proposed development have a negligible impact on noise characteristics of the local area.

Reduction measures in the form of noise barriers are already proposed however a number of additional measures can be implemented to possibly achieve further reductions in sound pressure levels at noise monitoring locations. Noise should be managed in accordance with BS 5228-1:2009+A1:2014.

Noise levels associated with plant, equipment and other site processes can be reduced through modification or by the application of sound reduction techniques.

Normal site operating hours will be from 07:00 to 18:00, Monday to Friday and from 08:00 to 13:00, Saturdays. Operating activities, with the exception of security and emergency works, will not be undertaken during night-time, on Sundays or outside the defined time periods, without the written permission of the local authority. It should be noted that emergency works can occur outside normal hours of operation and therefore have the potential to cause disturbance.

The following measures can be applied to reduce noise levels associated the operational phase of the development.

- The strategic placement of stockpiles between sources and receivers can reduce noise levels being directed towards sensitive receptors.
- Noise damping to minimize resonant noise associated with plant, equipment, body panels, cover plates etc. can be used. Damping techniques consist of the application of a special resonance damping material to plant surfaces to dissipate vibrational energy before it can build up and radiate as sound.
- Noise caused by vibrating plant components can be reduced by proper balancing, through the use of rubber pads, springs or bellows in mounting plant or equipment. (i.e. vibration isolation) or through the mechanical fixing of plant parts (i.e. tightening of loose components, fixing of resilient support/material between surfaces in contact).
- Noise caused by friction in conveyor rollers can be reduced through the timely application of lubrication.
- Regular visual inspections and maintenance of plant components can reduce noise levels associated with loose, defective or damaged plant or equipment.

6. Residual Impacts

No significant noise impacts are envisaged on the basis of the following:

- Background Noise levels at NSL's are closely similar to Background Noise levels when combined with Development Noise i.e. site noise, occurring at NSL's. There is no significant increase in noise levels as a result of Development Noise contributions.
- Predicted ambient noise levels (i.e. Development and Background noise combined) at NSL's is below the EPA limit of 55 dB. Noise sources will not be operational during evening or night-time hours as defined by the EPA.