Appendix 4

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Noise Assessment

Hensall Quarry – Proposed Western Extension

Broach Road, Hensall, North Yorkshire

MAN.1237.003.NO.R.001

'Experience and expertise working in union'

enzygo.com

Contact Details:

Enzygo Ltd.
Samuel House,
5 Fox Valley Way
Stocksbridge
Sheffield
S36 2AA

tel: 0114 321 5151
email: acoustics@enzygo.com
www: enzygo.com

Noise Assessment
Hensall Quarry – Proposed Western Extension

Project:	MAN.1237.003
For:	Darrington Quarries Limited
Status:	FINAL
Date:	February 2020
Author:	Steven Edwards MSc MIOA
Reviewer:	Darren Lafon-Anthony MSc MIOA FIQ

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Tables & Figures

1 Introduction

1.1 Introduction

Enzygo Limited (Enzygo) has been commissioned by Darrington Quarries Limited to undertake a noise assessment for the proposed excavation of materials from land to the west of the current quarry workings off Broach Road, Goole, North Yorkshire.

The assessment has been undertaken to assess compliance with the relevant standards at the nearest noise-sensitive receptors during the proposed operational hours of the plant and equipment. The assessment will also provide outline mitigation measures where considered necessary.

Details of the assessment methodology employed, together with the results of the baseline surveys, predictions, assessment and conclusions drawn are presented within this report.

1.2 Site Description

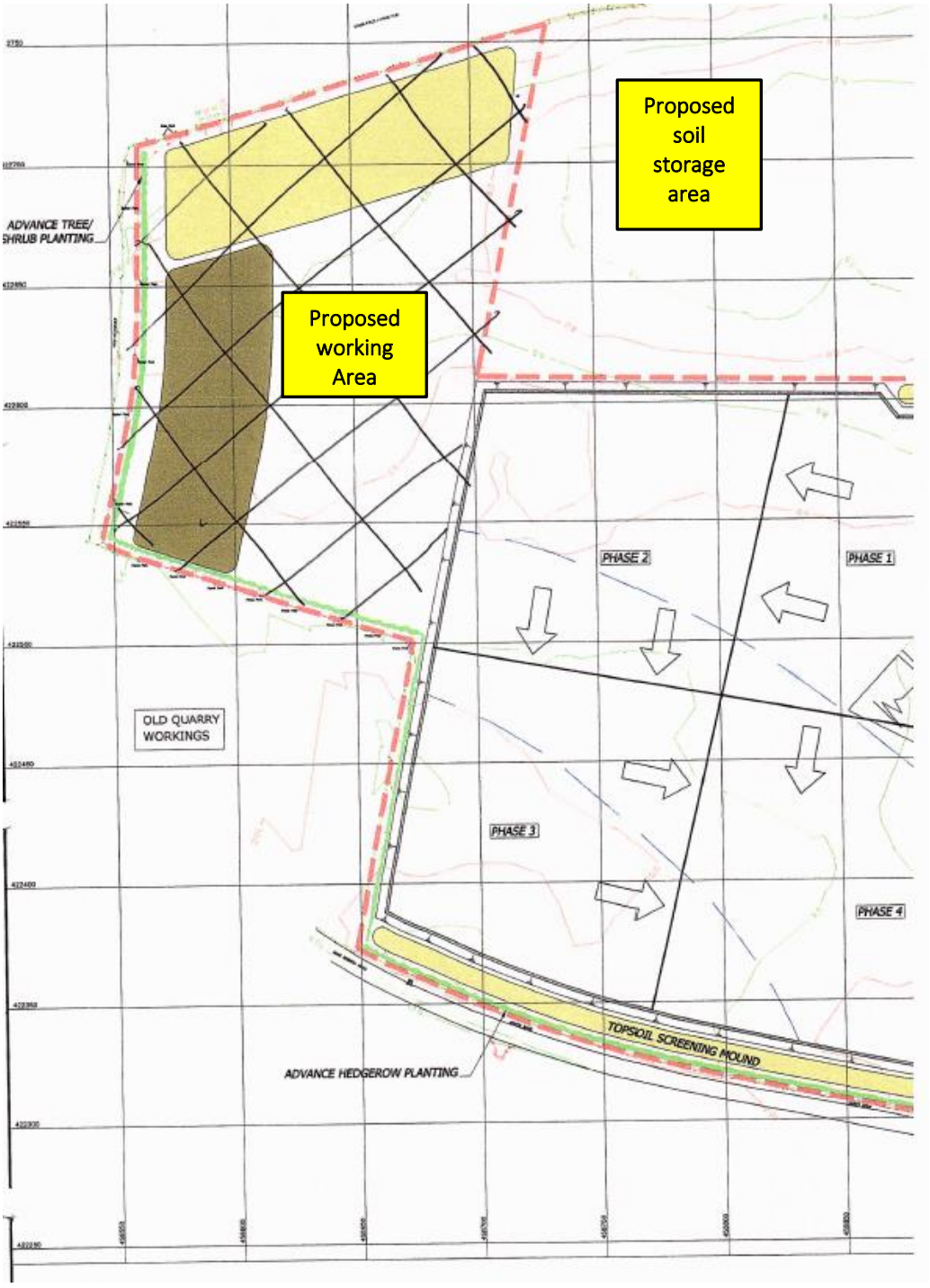
The existing Hensall Quarry development occupies land approximately 500 metres to the south of the village of Hensall, which includes processing areas, which has its own separate planning permissions and does not form part of this application.

1.3 Development Description

The development proposal is to extract sand under an area currently used for soil storage at the western boundary of the site and to relocated the soil storage stockpiles. Noise-sensitive receptor locations which formed the basis for a previous assessment undertaken in 2016 have also been used for this assessment, with an additional location chosen to represent residential properties along Station Road, to the south of the railway line:

- Blue Pines, Broach Road;
- Station View, Station Road;
- Quarry View, Heck Lane;
- Residential Properties, Station Road; and
- Wood Cottage, Broach Road.

Figure 1-1: Proposed Extension Area



1.4 Noise Assessment Methodology

Noise levels generated by operations within the proposed extension area have been predicted to the nearby sensitive receptors identified using the calculation methodologies outlined in British Standard 5228:2009+A1:2014 '*Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*' using the proprietary noise modelling software CadnaA.

The resulting predicted noise levels have been assessed against noise limits derived, based on the measured background noise levels, in accordance with the Planning Practice Guidance for Noise and more specifically with paragraphs 019 to 022 of the Planning Practice Guidance for Minerals (PPGM) outlined on the gov.uk website, and summarised in Section 2 of this report.

Where considered necessary and appropriate, outline mitigation measures have been suggested to ensure that noise levels generated by the proposed development have a minimum impact upon the nearby receptors.

2 Standards and Guidance

2.1 Planning Practice Guidance for Noise

The Planning Practice Guidance for Noise states that the management of noise associated with minerals extraction is considered in the Planning Practice Guidance for Minerals.

2.2 Planning Practice Guidance for Minerals

With respect to noise emissions the Planning Practice Guidance for Minerals (PPGM) states that those making mineral development proposals should carry out a noise impact assessment, which should identify all sources of noise and, for each source, take account of the noise emissions, its characteristics, the proposed operating locations, procedures, schedules and duration of work for the life of the operation, and its likely impact on the surrounding neighbourhood.

The PPGM states in Paragraph 019:

> "*Proposals for the control or mitigation of noise emissions should:*
>
> - *Consider the main characteristics of the production process and its environs, including the location of noise-sensitive properties and sensitive environmental sites;*
> - *Assess the existing acoustic environment around the site of the proposed operations, including background noise levels at the nearby noise-sensitive properties;*
> - *Estimate the likely future noise from the development and its impact on the neighbourhood of the proposed operations;*
> - *Identify proposals to minimise, mitigate or remove noise emissions at source;*
> - *Monitor the resulting noise to check compliance with any proposed or imposed conditions.*

The PPGM goes on to state in Paragraph 020 that:

> "*Mineral planning authorities should take account of the prevailing acoustic environment and in doing so considered whether or not noise from the proposed operation would:*
>
> - *Give rise to a significant adverse effect;*
> - *Give rise to an adverse effect; and*
> - *Enable a good standard of amenity to be achieved.*
>
> *In line with the Explanatory Note for the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure would be above or below the significant observed effect level and the lowest observed adverse effect level of the given situation.*"

Paragraph 021 of the PPGM relates to the establishment of noise limits states:

> "*Mineral planning authorities should aim to establish a noise limit, through a planning condition, at the noise-sensitive property that does not exceed the background noise level (LA90,1h) by more than 10dB(A) during normal working hours. Where it will be difficult not to exceed the background noise level by more than 10dB(A) without imposing unreasonable*

burdens on the mineral operator, the limit set should be as near that level as practicable. In any event, the total noise from operations should not exceed 55dB(A) LAeq, 1h (free field). For operations during the evening (1900-2200) the noise limits should not exceed the background noise level (LA90,1h) by more than 10dB(A) and should not exceed 55dB(A) LAeq, 1h (free field). For any operations during the period 22.00 – 07.00 noise limits should be set to reduce to a minimum any adverse impact, without imposing unreasonable burdens on the mineral operator. In any event the noise limit should not exceed 42dB(A) LAeq,1h (free field).

Where the site noise has a significant tonal element, it may be appropriate to set specific limits to control this aspect. Peak or impulsive noise, which may include some reversing bleepers, may also require separate limits that are independent of background noise (eg Lmax in specific octave or third-octave frequency bands – and that should not be allowed to occur regularly at night.)

Care should be taken, however, to avoid any of these suggested values being implemented as fixed thresholds as specific circumstances may justify some small variation being allowed."

Paragraph 022 of the guidance relates to operations which may give rise to particularly noisy short-term activities and specifies appropriate noise limits for such operations, stating:

"*Activities such as soil-stripping, the construction and removal baffle mounds, soil storage mounds and spoil heaps, construction of new permanent landforms and aspects of site road construction and maintenance.*

Increased temporary daytime noise limits of up to 70dB(A) LAeq 1h (free field) for periods of up to 8 weeks in a year at specified noise sensitive properties should be considered to facilitate essential site preparation and restoration work and construction of baffle mounds where it is clear that this will bring longer-term environmental benefits to the site or its environs.

Where work is likely to take longer than 8 weeks, a lower limit over a longer period should be considered. In some wholly exceptional cases, where there is no viable alternative, a higher limit for a very limited period may be appropriate in order to attain the environmental benefits. Within this framework, the 70 dB(A) LAeq 1h (free field) limit referred to above should be regarded as the normal maximum."

2.4 British Standard 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites

BS5228-1:2009+A1:2014 (BS5228) sets out a methodology for predicting noise levels arising from a wide variety of construction and related activities which are shared with mineral extraction sites. As such, the calculation methodologies it contains can be used to predict noise levels arising from the establishment and operational phases of the proposed development.

BS5228 also contains a number of tables containing typical noise emission levels for general plant and operations which can be found on mineral extraction sites.

Predicted noise levels in this assessment have been determined using the proprietary noise modelling software, CadnaA, and the calulation methologies outlined in the guidance. The sound power levels used as input data for the noise model are those contained within the standard or specified in the plant manufacturer's datasheets.

2.5 Existing Planning Conditions

Condition 12 of the extant planning permission dated February 2017, reference no. C8/2016/0873/CPO states:

"*The equivalent continuous noise level due to operations at the quarry during day time hours (0700-1900) shall not exceed the background noise level (LA90) by more than 10dB(A) at any residential premises. Measurements shall be hourly LAeq measurements and be corrected for the effects of extraneous noise.*"

The quoted condition reflects the requirement of the Planning Practice Guidance for Minerals.

Conditions 14 and 15 of the planning permission granted in 2016, reference C8/38/196/PA related to noise but do not specify any particular noise limits.

3 Baseline Noise Monitoring Survey

3.1 Baseline Noise Survey

To inform the noise assessment, up to date baseline background noise measurements were undertaken at locations representative of the nearest noise-sensitive receptors to the proposed extension and relocated soil stockpile storage areas. The measurements were made on a normal midweek working day, in this case on Monday 16th December 2019.

It should be noted that the consented development area of the quarry was operational at the time of the survey, however quarry processing operations were not audible during the monitoring.

The baseline noise survey was carried out in accordance with the requirements of BS7445:1996 '*Description and measurement of environmental noise*', by a suitably qualified and experienced acoustic consultant. The monitoring locations shown in Table 3-1 and Figure 3-1 below are representative of the nearest residential premises to the proposed extension area.

Baseline monitoring was undertaken for 2-hours at four of the five locations. Monitoring at MP5 had to be halted after 23 minutes due to the onset of constant dog barking and a chainsaw in operation close by. However, it is considered that the background noise data gathered at Blue Pines would be suitable as a representative location

Table 3-1: Noise Monitoring Locations

Location Reference	Grid Ref (NGR)
MP1 – Blue Pines	458493, 422618
MP2 – Station View, Station Road	422618, 422864
MP3 – Quarry View Farm	459240, 422900
MP4 – Residential Properties, Station Road	458429, 422738
MP5 – Wood Cottage	Abandoned

The noise monitoring equipment used during the surveys is shown in Table 3-2 and was set to record the $L_{Aeq,T}$, L_{A90}, L_{A10} and L_{Amax} parameters.

Table 3-2: Noise Monitoring Equipment

Location	Equipment Description	Serial Number	Calibration Date
MP1 & MP4	01dB Solo Class 1 sound level meter	065396	09/03/2018
MP2 & MP3	01dB Solo Class 1 sound level meter	065445	11/01/2018
ALL	Cirrus CR:515 acoustic calibrator	59522	29/01/2019

The sound level meter was field calibrated, using an electronic calibrator, prior to commencement and upon completion of the overall survey, no drift in calibration was observed. The external calibration documentation for the equipment used is available upon request.

Figure 3-1: Noise Monitoring and Assessment Location Plan

3.2 Weather

Weather conditions during the baseline noise surveys were suitable for environmental noise monitoring, being dry with no rain and 50% cloud cover. Wind speeds were below 5.0m/s throughout with temperatures around 5°C throughout.

3.3 Survey Results

The results of the baseline surveys are summarised in Table 3-3 and can be found in full in Appendix A.

Table 3-3: Summary of Baseline Survey Results, dB

Location	$L_{Aeq,T}$	L_{A90}	L_{A10}	L_{Amax}
MP1 – Blue Pines	74	59	77	93
MP2 – Station View, Station Road	61	56	61	84
MP3 – Quarry View Farm	54	50	55	75
MP4 – Properties, Station Road	62	57	63	83
MP5 – Wood Cottage*	70	60	74	83

* monitoring abandoned due to dogs barking and a chainsaw operating at the property.

3.4 Subjective Field Monitoring Notes

MP1 – Blue Pines

The noise climate noted during the monitoring was dominated by noise from the M62 and local traffic along Broach Road. Noise of children playing outside at Hensall Community Primary School was also audible.

MP2 – Station View, Station Road

During the survey at Station View, noise climate was again dominated by road traffic, both from the M62 and local traffic along Station Road. On two occasions, freight train movements, approximately 40m to the south of the monitoring location, were also heard. A ringing noise, possibly industrial in nature, was also heard from the east throughout the monitoring.

MP3 – Quarry View Farm

At Quarry View Farm, the acoustic environment consisted of distant traffic movements along the M62 and train movements along the adjacent railway line to the property. Industrial noise from the farmyard was heard on occasion throughout.

MP4 – Residential Properties, Station Road

The noise climate noted during the baseline survey was dominated by road traffic from the M62 and local traffic along Station Road. In addition, two passing freight trains approximately 130m to the north of the monitoring location were also heard.

MP5 – Wood Cottage

The acoustic environment at Wood Cottage was again dominated by road traffic from the M62 and local traffic along Broach Lane and Long Lane. Monitoring at this location was halted after 25 minutes due to the onset of constant dog barking and a chainsaw in operation. Baseline data from Blue Pines is considered representative of this location.

4 Noise Assessment

4.1 Introduction

This section of the report outlines the derived noise limits which would be applicable at the nearest noise-sensitive receptors to the proposed extension and relocated soil stockpile storage areas, the potential noise levels which would be generated by operational activities within the extension and relocated soil stockpile storage areas and the likelihood of the proposals being granted planning permission based on the findings.

The predictions have been made using the calculation methodology outlined in BS5228-1:2009+A1:2014 and the assessment of potential noise impacts has been made in accordance with the guidelines contained in the Planning Practice Guidance for Minerals (PPGM).

4.2 Noise Limit Derivation

In order to assess the potential impact of the development proposals on nearby noise-sensitive receptors, noise limits have been derived based on the average measured background noise levels at the nearby receptors and the guidance contained in the PPGM.

The absolute limit of 70dB $L_{Aeq,1hr}$ for temporary operations, such as soil stripping, and noise limits for normal operations, subject to the maximum limit of 55dB $L_{Aeq,1hr,}$ in accordance with the guidance, i.e. background +10dB, are considered appropriate for the assessment.

Table 4-1 details the derived noise limits for normal operations at the five nearest sensitive receptors, as presented in Figure 3-1. The noise levels have been rounded to the nearest whole number.

Table 4-1: Derived Noise Limits for Normal Operations, free-field

Location	Average Background Noise Level, dB L_{A90}	Derived Noise Limit, dB $L_{Aeq,1hr}$
AL1 – Blue Pines, Broach Road	59	55
AL2 – Station View, Station Road	56	
AL3 – Quarry View, Heck Lane	50	
AL4 – Residential Properties, Station Road	57	
AL5 – Wood Cottage, Broach Road	60	

4.3 Noise Emissions

The client has supplied the following information with repect to operational activities associated with the development.

- Temporary operations – removal of the existing screening mound, soils stripping and overburden removal and handling operations within the proposed extension area would be undertaken using a hydraulic excavator loading materials directly into articulated dumpers which would transport and tip soils into previously worked out phases. Temporary operations are unlikely to last longer than three weeks.

- Normal, day to day operations – working at depth behind the working face, a wheeled loading shovel will dig and load materials directly into the mobile processing plant. Processed materials would be loaded into road lorries using the same wheeled loading shovel.

The 'normal' operational plant/equipment detailed in Table 4-2 are those currently in use at the site and will be retained for the proposed extension area. The sound power levels quoted are taken either from manufacturers equipment datasheets, sound power level badges on the machines or from the data contained in Annex C of BS8228-1:2009+A1:2014.

Table 4-2: Plant & Equipment

Operation	Activity	Description	Sound Power Level, dB L_{WA}
Temporary*	**Screening mound removal, soil stripping and overburden handling**	CAT325D Hydraulic Excavator	104
		Volvo A30G Articulated Dumper	108
Normal	**Extraction & Processing**	CAT966G Wheeled Loading shovel	108
		Terex Finlay 312 Dryscreen	109
		Powerscreen Commander 510	109
	Haulage	HGV – 32t Rigid Bodied Tipper Lorry	110

* Plant would be bought onto site specifically to undertake temporary operations for 3-weeks

4.4 Noise Modelling Protocols

The noise model was constructed using the proprietary noise modelling software package, CadnaA, utilising web-based mapping and aerial photography, EA/DEFRA topographical and plant utilisation and operational descriptions supplied by the client.

The potential noise impacts at the nearby residential properties have been predicted using the calculation methodology outlined in BS5228-1:2009+A1:2014.

4.5 Modelling Assumptions

The following assumptions have been made during the modelling process:

- All sources have a 80% on-time throughout the 1-hour daytime assessment periods;
- It is assumed that the loading shovel will have a maximum operational speed of 16km/h;
- Wind and temperature gradient assisted sound propagation at all receptors;
- 90% soft ground between the sources and receptors; and
- Ground floor receiver at 1.5m AOD.

4.6 Potential Impact

All normal day to day operations would continue in accordance with the permitted hours, i.e. 07:30 to 17:30 hours Mondays to Fridays and 07:30 to 13:00 hours on Saturdays with no working on Sundays or Bank Holidays. Maintenance hours would also be the same as current permitted, i.e. 07:30 to 17:00 hours Mondays to Fridays and 07:30 to 15:00 hours on Saturdays again with no working on Sundays or Bank Holidays.

The assessment has been undertaken to determine the expected levels of noise from operations within the development proposals at the nearby residential receptor locations. Noise predictions have been to the site facing façade of each property assessed to a height of 1.5m above local ground levels.

Temporary, Short-term Operations

For temporary short-term operations, lasting no longer than three weeks, the predicted noise levels assume that plant/equipment are operating on top of the deposit. The predictions are made to each receptor with the excavator operating at closest approach with dumpers running soils and overburden into the adjacent worked area.

The predicted noise levels have been assessed against the nominal noise limit of 70dB $L_{Aeq,1hr}$, outlined in the Planning Practice Guidance for Minerals, the results are shown in Table 4-3 and have been rounded to the nearest whole number.

Table 4-3: Predicted Noise Levels for Temporary Operations

Description of Operations	Worst-case Predicted Noise Level, dB $L_{Aeq,1hr}$				
	AL1 Blue Pines	AL2 Station View	AL3 Quarry View	AL4 Station Road	AL5 Wood Cottage
Screening Mound Removal, Soil Stripping & Overburden Handling Ops	59	50	44	50	37

Table 4-3 shows that worst-case predicted noise levels for temporary, short-term operation would easily meet the guidance noise level of 70dB $L_{Aeq,1hr}$ specified in the PPGM.

Normal, day to day Operational Noise

The prediction of normal day to day operations is based on plant operating at depth and advancing in a westerly direction behind the working face and, where possible. keeping the working face between the plant and the nearest receptors. It is assumed that the quarry floor is at 2.0m AOD.

The predictions include the attenuation provided by a 2.5m high straw bale barrier located at the western site boundary.

In order to assess a worst-case scenario, it has been assumed that extraction operations are taking place at their closest approaches to the relevant properties. Two scenarios have been modelled, (i) extraction and processing and (ii) processing, loading and haulage off site.

Table 4-4 shows the predicted worst-case operational noise levels when operations are at their most elevated positions and at closest approach to the nearest property. The predicted noise levels have been rounded to the nearest whole number.

Table 4-4: Predicted Noise Levels for Extraction / Processing Operations

Description of Operations	Worst-case Predicted Noise Level, dB $L_{Aeq,1hr}$				
	AL1 Blue Pines	AL2 Station View	AL3 Quarry View	AL4 Station Road	AL5 Wood Cottage
Extraction and Processing Operations	54[4]	54[3]	43[1]	54[3]	39[2]
Processing, Loading and Haulage Ops	54[4]	53[3]	43[1]	54[3]	40[1,2]

[1] Operations being undertaken in the northeast corner of the extension area
[2] Operations being undertaken in the southeast corner of the extension area
[3] Operations being undertaken in the northwest corner of the extension area
[4] Operations being undertaken in the southwest corner of the extension area

Table 4-4 shows that worst-case operational noise levels would not exceed the noise limits derived in accordance with the Planning Practice Guidance for Minerals, based on background noise levels plus 10dB, at all receptor locations assessed.

5 Outline Mitigation & Good Site Practice

Surface mineral extraction operations, by their nature, generate noise due to the use of heavy machinery. During operations associated with the proposed development the risk of noise impacts would vary depending on the activity being carried out and its location.

In addition to the noise mitigation measures incorporated into the site design, i.e. the 2.5m high straw bale boundary screen and carefully phased operations, good site management practices will also provide a degree of mitigation against potential noise impacts, including:

- Good neighbour policy – get to know site neighbours; be concerned about, and try to understand, their issues; hold regular liaison meetings and provide information on planned works; run a tidy and efficient site.
- Ensure that all machinery/equipment operators on site are environmentally aware.
- Set up a 'line of communication' by nominating a point of contact. Keep systematic records of complaints, follow up complaints explaining any remedial actions taken.
- Do not rely on the 'letter of the law', try and be flexible, cooperative and avoid being adversarial.

General

- Activities within the site will be undertaken in locations where noise attenuation from exisiting landforms would maximise benefits to local receptors.
- Internal haul roads will, wherever possible, be routed such that separation distances to all noise sensitive receptors are maximised.
- All internal haul roads will be kept clean and maintained in a good state of repair to avoid unwanted rattle and 'body-slap' from vehicles.
- All mobile plant employed within the site will have noise emission levels that comply with the limiting levels defined in EC Directive 86/662/EEC and any subsequent amendments.
- All plant within the site will be fitted with broadband ('white noise') reverse warning systems.
- All mobile plant and heavy goods vehicles entering the site will move in a circular manner to minimise, as far as is practical and safe, noise from reverse warning systems.
- Plant will be operated in a correct and safe manner with respect to minimising noise emissions. For example, drop heights into dumpers/hoppers should be minimised; no unnecessary revving of engines; traversing haul roads carefully and at reasonable speeds.
- Plant will be subject to regular preventative maintenance. All plant at the site will be fitted with effective exhaust silencers and will be maintained in good working order to meet manufacturers' noise rating levels. Defective silencers, engine covers, etc., will be replaced immediately.
- Plant that is used intermittently would be shut down when not in use.
- Pumps, generators and compressors will be located behind screening mounds wherever possible, would be electrically powered wherever possible and fitted with acoustic covers where necessary. Diesel powered generators will be installed within acoustic enclosures.

6 Conclusion

6.1 Introduction

Enzygo Limited has been commissioned by FFC Environmental to undertake a noise assessment for the proposed excavation of materials from land to the west of the current Hensall Quarry operations at Goole, North Yorkshire.

The assessment has been undertaken to assess compliance with the relevant standards at the nearest noise-sensitive receptors during the proposed operational hours of the plant and equipment.

A baseline survey has been undertaken to determine the prevailing background noise levels at locations representative of the nearest noise-sensitive receptors to the application site and to inform the derivation of noise limits in accordance with the Planning Practice Guidance for Minerals. The assessment is based on the results of a series of noise predictions undertaken in accordance with the calculation methodology contained in BS5228-1:2009+A1:2014 '*Code of practice for noise and vibration control on construction and open sites*'.

6.2 Conclusion

The assessment has considered the potential for worst-case operational noise levels to give rise to impacts at the nearest noise-sensitive receptor locations to the proposed extension and relocated soils stockpile storage areas.

Screen mound removal, soil stripping and soils and overburden handling operations, which would be undertaken for a period of approximately three weeks, would remain well within the 70dB $L_{Aeq,1hr}$ nominal noise limit for temporary operations described in the PPGM.

Day to day operations would be undertaken behind the working face wherever possible. Worst-case predicted noise levels would meet the noise limits derived in accordance with the PPGM, i.e. background plus 10dB, at all receptors assessed.

Based on the operational activities described and the application of good site management practices it is considered that the proposed extension can be worked on without causing significant adverse impacts at the nearby receptors.

Glossary of Terminology

Noise is defined as unwanted sound. The range of audible sound is known to be from 0dB (threshold of hearing) to 140dB (threshold of pain). Examples of typical noise levels relating to 'everyday' occurrences are given in Table G-1 below.

Table G-1: Typical Noise Levels

Source	Sound Pressure Level in dB(A)	Subjective Level
Gun shot	160	Perforation of eardrum
Military Jet take-off	140	Threshold of pain
Jet Aircraft at 100m	120	Very Loud
Rock Concert, front seats	110	Threshold of Sensation
Pneumatic Drill at 5m	100	Very Loud
Heavy goods vehicle from pavement	90	
Traffic at kerb edge	70 – 85	Loud
Vacuum Cleaner, Hair Dryer	70	
Normal conversation at 1m	60	Moderate
Typical Office	50 – 60	
Residential area at night	40	Quiet
Rural area at night, still air	30	
Leaves Rustling	20	
Rubbing together of fingertips	10	
	0	Threshold of hearing

The frequency response of the human ear to noise is usually taken to be around 18Hz (number of oscillations per second) to 18,000Hz. However, the human ear does not respond equally to different frequencies at the same level, it is more sensitive in the mid-frequency range than lower and higher frequencies and, because of this, when undertaking the measurement of noise the low and high frequency components of any given sound are reduced in importance by applying a filtering (weighting) circuit to the noise measuring instrument. The weighting which is widely accepted to correlate best with the subjective nature of human response to noise and is most widely used to quantify this is the A-weighted filter set. This is an internationally accepted standard for noise measurement.

For variable noise sources within an area an increase of 3dB(A) would be the minimum perceptible to the human ear under normal conditions. It is generally accepted that an increase/decrease of 10dB(A) corresponds to a doubling or halving in perceived loudness. The 'loudness' of a noise is a purely subjective parameter, dependant not only upon the sound pressure of the event but also on the dynamics of the listener's ear, the time of the day and the general mood of the person.

With regard to environmental noise levels (in the open air), these are rarely steady but rise and fall according to the activities being undertaken within the surrounding area at any given time. In an attempt to produce a figure that relates this variable nature of noise to human subjective response, a number of statistical noise metrics have been developed. These and other useful terminology and descriptors are presented in Table G-2 below.

Table G-2: Terminology

Term	Definition
Sound	Pressure fluctuations in a fluid medium within the audible range of amplitudes and frequencies which stimulate the organs of hearing.
Noise	Unwanted sound emitted from a source and received by the sensitive receptor.
Decibel (dB)	Unit most often used to describe the sound pressure level. A logarithmic number, it correlates closely to the way in which humans perceive sound. Its wide range of values helps quantify sound pressures from a large variety of magnitudes.
A-Weighting (dB(A))	Human perception of sound is frequency dependant. A-weighting applies a range of corrections at each frequency to provide a 'human-averaged'. Can be frequency band or broadband values.
Frequency (Hz)	The number of cycles per second, for sound this is closely related (and often mistaken for) pitch.
Frequency Spectrum	A more detailed analysis of the frequency components that comprise a sound source.
$L_{A10,T}$	The 10th statistical percentile of a measurement period, i.e. the level that is exceeded for 10% of the measurement duration. Closely correlates with traffic sources, A-weighted.
$L_{A90,T}$	The 90th statistical percentile of a measurement period, i.e. the level that is exceeded for 90% of the measurement duration. Used to describe background sound levels, as this value is affected less by short, transient sound sources, A-weighted.
L_{Amax}	The root mean square (RMS) maximum sound pressure level within a measurement period, A-weighted.
Ambient Sound	The total sound climate of all sources incident at one location, both in the near- and far-field (*The ambient sound comprises the residual sound and the specific sound when present)*.
Ambient Sound Level $L_a = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.
Background Sound Level $L_{A90,T}$	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
Equivalent Continuous A-weighted Sound	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 – t_1$, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

Term	Definition
Pressure Level $L_{Aeq,T}$	$$L_{Aeq,T} = 10lg_{10}\left\{\left(\frac{1}{T}\right)\int_{t1}^{t2}\left[p_A\frac{(t)^2}{{p_0}^2}\right]dt\right\}$$ Where p_0 is the reference sound pressure (20μPA); and $P_A(t)$ is the instantaneous A-weighted sound pressure level at time t.
Measurement Time Interval T_m	Total time over which measurements are taken (*This may consist of the sum of a number of non-contiguous, short-term measurement time intervals)*
Rating level $L_{Ar,Tr}$	Specific sound level plus any adjustment for the characteristic features of the sound, over a period of time, T.
Reference Time Interval, T_r	Specified interval over which the specific sound level is determined (This is 1hr during the day from 07:00 to 23:00 hours and a shorter period of 15-min at night from 23:00 to 07:00 hours).
Residual Sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level $L_r = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the residual sound in a given situation at the assessment location over a given time interval, T.
Sound Pressure Level	The level of fluctuation in air pressure, caused by airborne sound sources. Measured in Pascals (Pa).
Sound Power Level	The rate at which sound is radiated by a source. This parameter is useful as it describes sound energy before environmental or decay factors. Quantified in dB and notated usually as L_w or SWL.
Specific sound level $L_s = L_{Aeq,Tr}$	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given time interval, T.
Specific Sound Source	Sound source being assessed.

Statement of Uncertainty

This report is based upon a range of measurements, a system of calculations and noise predictions. As such, this report attempts to quantify fluctuations in air pressure and is subject to the effects of meteorology, physical and perceived anomalies, tolerances within the measuring and monitoring equipment and accuracy margins within the noise modelling software. In the interests of repeatability, this report must be considered as being affected by common factors involved in the measurement and calculation of noise propagation.

All measurement values, outcomes and assumptions are subject to a margin of uncertainty. This has been quantified and assessed as follows:

- Rounding errors – systemic tolerance of ±1dB;
- Type 1 sound level meter – operational tolerance of ±1.1dB;
- Meteorology – allowance of ±1.9dB; and
- CadnaA noise propagation modelling software – operational accuracy of ±2.1dB

The most influential uncertainty factors for the assessment of noise are deemed to be equipment tolerances, meteorology and software accuracy. A root-sum-square statistical average has been used to provide an overall margin of uncertainty of ±3dB.

Appendix A – Baseline Noise Survey Data

Table A-1: Location MP1, Blue Pines

File	065396_191216_125027000.CMG			
Periods	15m			
Weighting	A			
Data type	L_{Aeq}			
Unit	dB			
Period start	**L_{Aeq}**	**L_{Amax}**	**L_{A90}**	**L_{A10}**
16/12/2019 12:50	73.3	89.7	57.5	76.9
16/12/2019 13:05	72.2	88.0	58.0	75.7
16/12/2019 13:20	73.0	89.6	57.1	76.4
16/12/2019 13:35	74.5	92.7	58.8	77.4
16/12/2019 13:50	73.4	90.3	59.4	76.2
16/12/2019 14:05	73.7	90.4	61.4	77.1
16/12/2019 14:20	73.9	92.6	62.5	76.5
16/12/2019 14:35	74.2	90.9	63.7	76.9
Overall	**73.6**	**92.7**	**59.8**	**76.6**

Table A-2: Location MP2, Station View, Station Road

File	065445_191216_101740000.CMG			
Periods	15m			
Weighting	A			
Data type	L_{Aeq}			
Unit	dB			
Period start	**L_{Aeq}**	**L_{Amax}**	**L_{A90}**	**L_{A10}**
16/12/2019 10:17	61.8	80.8	57.7	61.3
16/12/2019 10:32	61.2	78.1	58.0	61.1
16/12/2019 10:47	59.6	79.2	55.7	59.5
16/12/2019 11:02	61.9	84.0	55.4	60.2
16/12/2019 11:17	60.7	76.9	55.1	60.7
16/12/2019 11:32	62.3	82.2	55.6	63.7
16/12/2019 11:47	60.9	81.6	55.8	60.6
16/12/2019 12:02	59.9	75.5	55.2	60.9
Overall	**61.1**	**84.0**	**56.1**	**61.0**

Table A-3: Location MP3, Quarry View Farm, Heck Lane

File	065445_191216_123835000.CMG			
Periods	15m			
Weighting	A			
Data type	L_{Aeq}			
Unit	dB			
Period start	**L_{Aeq}**	**L_{Amax}**	**L_{A90}**	**L_{A10}**
16/12/2019 12:38	51.5	68.7	48.9	51.9
16/12/2019 12:53	51.2	65.3	48.9	52.3
16/12/2019 13:08	51.6	57.5	49.6	52.9
16/12/2019 13:23	51.5	56.1	50.0	52.6
16/12/2019 13:38	51.7	56.5	50.0	52.9
16/12/2019 13:53	53.7	64.4	51.6	54.7
16/12/2019 14:08	58.5	75.2	51.8	56.8
16/12/2019 14:23	55.7	61.6	53.7	57.0
Overall	**54.0**	**75.2**	**50.6**	**53.9**

Table A-4: Location MP4, Residential Properties,Station Road

File	065396_191216_102606000.CMG			
Periods	15m			
Weighting	A			
Data type	L_{Aeq}			
Unit	dB			
Period start	**L_{Aeq}**	**L_{Amax}**	**L_{A90}**	**L_{A10}**
16/12/2019 10:26	62.2	74.9	60.2	63.1
16/12/2019 10:41	62.3	81.1	59.0	62.2
16/12/2019 10:56	61.3	79.0	58.0	61.4
16/12/2019 11:11	60.7	73.0	57.3	61.7
16/12/2019 11:26	61.9	83.1	56.5	63.4
16/12/2019 11:41	61.0	75.5	58.1	62.0
16/12/2019 11:56	62.4	81.0	57.8	64.6
16/12/2019 12:11	60.1	72.9	56.8	61.0
Overall	**61.6**	**83.1**	**58.0**	**62.4**

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