Noise Assessment:
Denby Dale, Remedial Works

February 2024






Experts in noise and vibration assessment and management

Document Control

Client	Urban Developments (York) Ltd	**Principal Contact**	Nick Gould (Managing Director)

Job Number	13073C-20

Report Prepared By:	Sam Norris (Consultant) & Becki Edwards (Senior Consultant)

Document Status and Review Schedule

Report No.	Date	Status	Reviewed by
13073C-20-R01-01	16 February 2024	Final	Jon Sims (Associate Director)

Noise Consultants Ltd operates a formal Quality Management System, which is certified to ISO 9001:2015 and a formal Environmental Management System, which is certified to ISO 14001:2015. NCL are an Associate Member of the Association of Noise Consultants (ANC).

When printed by Noise Consultants Ltd, this report will be on Evolve Office, 100% Recycled paper.

Noise Consultants Ltd
First Floor, Patten House, Moulders Lane, Warrington WA1 2BA Tel: 01925 937 195
24 Greville Street, Farringdon, London EC1N 8SS Tel: 0203 873 4780
contact@noiseconsultants.co.uk

Registered Office: 23 Coldharbour Road, Bristol, BS6 7JT
Companies House Registration No: 10853764

Contents

Tables

Figures

1 Introduction

1.1 Noise Consultants Limited (NCL) have been commissioned to undertake a construction noise assessment for the proposed remedial works at Cliff Hill, Denby Dale, Huddersfield (the 'site'). This report describes the potential impact of noise upon existing noise sensitive receptors (NSRs) and appropriate mitigation to be included in the Construction Environmental Management Plan (CEMP).

1.2 The construction noise assessment presented in this report utilises the findings of the baseline noise survey carried out in May 2022. The baseline noise survey was intended the establish the existing ambient noise climate at the site to inform a Site Suitability Assessment (NCL Report No. 13073B-20-R02-01-F, June 2023) which was submitted to Kirklees Council (KC) in July 2023 (planning reference 2023/92191). The baseline survey results have been used to establish construction noise criteria appropriate to the site and surrounding noise sensitive receptors with reference to British Standard 5228-1: 2009+A1: 2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise and Planning Practice Guidance – Minerals (PPGM).

Local Authority - Consultation

1.3 In response to the planning application, a Technical Officer in the Pollution and Noise Control team at KC provided the following comment:

*"**AQ and Noise Reports in Relation to Remedial Operations:** Whilst lower that [sic] the previous application, I understand very shallow coal (approximately 6000t) is proposed to be extracted before drilling and grouting works. The AQ and Noise reports, however, do not appear to have included the implications of these remedial works. Could you please provide clarification on how this translates into traffic movements? Additionally, we seek confirmation from the AQ and Noise consultant that their conclusions in the reports provided remain unaffected by the remedial operations proposed."*

1.4 This report presents the noise assessment for the remedial works, independent of the Site Suitability Assessment which has already been submitted in support of the planning application.

1.5 NCL have attempted to contact the Officer to discuss the assessment methodology, however, a response was not received prior to the issue of this document.

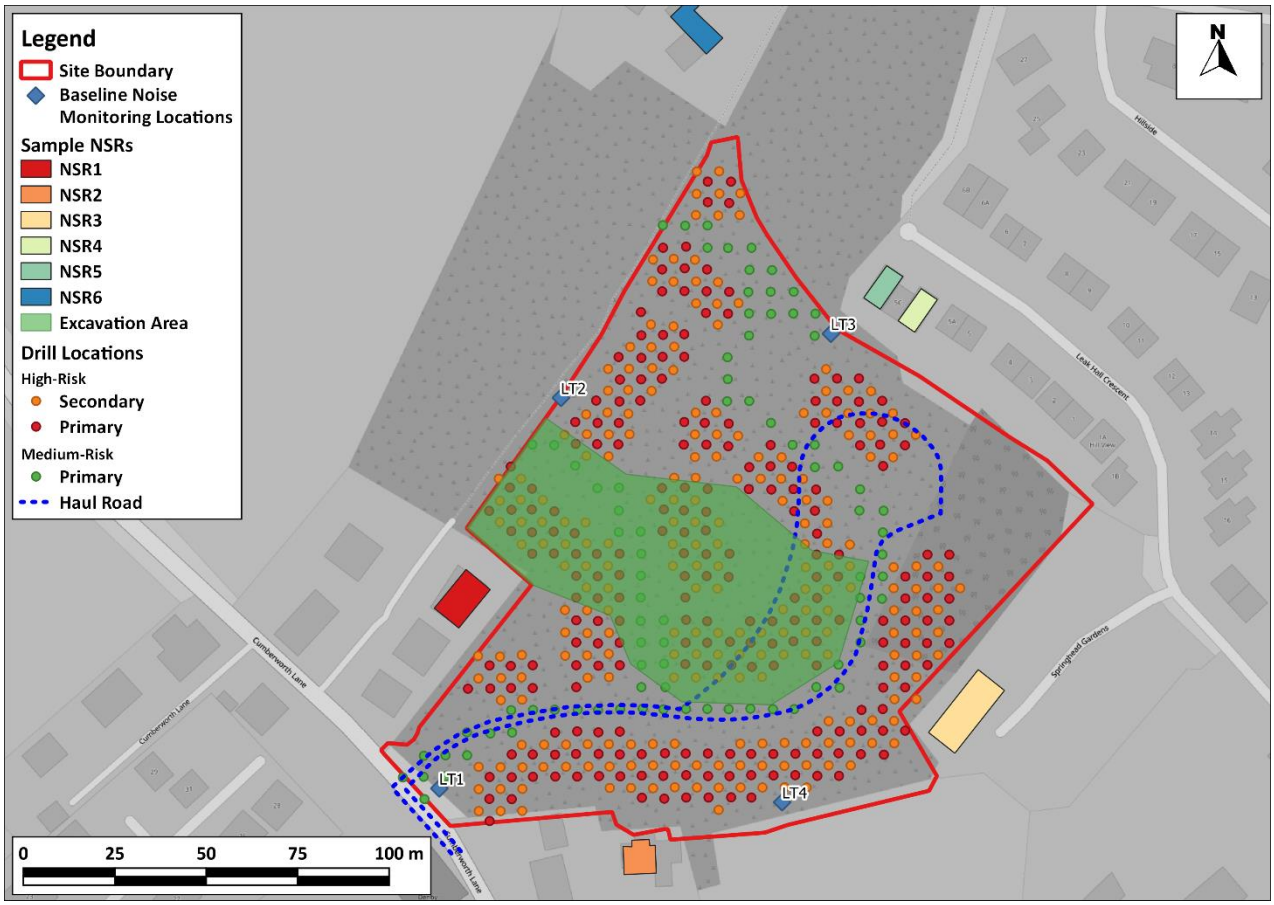
2 Description of the Remedial Works

2.1 Due to the recorded presence of shallow mine workings relating to coal and fireclay, drilling and pressure grouting of the workings will be required to mitigate the risk of unstable workings and spontaneous combustion to the Development above the mine area. The works will comprise of an excavation area (approx. 4500m^2) to remove a section of coal, and drilling and grouting works at approx. 545 locations.

2.2 It is anticipated that the use of tracked excavators to extract the remaining coal material will likely take fewer than 8 weeks. During the drilling phases, a worst-case day will consist of 3 drilling rigs accompanied by 3 material deliveries by heavy goods vehicles (HGV) and operation of an associated wheel wash.

2.3 **Figure 2.1** presents the site location within Denby Dale. The A636 Wakefield Road is located approximately 90m to the south of the site. Immediately to the west of the site is Cumberworth Lane. The site is located within a predominantly residential area with farmland to the northwest.

Figure 2.1: Site Location, Baseline Noise Monitoring Locations, Sample NSRs and Remedial Works



3 Assessment Approach

Scope

3.1 For the proposed remedial works, the scope of this report includes an assessment of the following potential noise impacts at nearby NSRs:

- Ground Excavation;
- Ground Stabilisation - Drill and grouting; and
- HGV movements.

3.2 The assessment has been carried out at a sample number of residential NSRs bounding the site which are considered to be most exposed to any noise from the remedial works.

3.3 An assessment of noise impact on local roads from changes in site-generated road traffic has not been undertaken. However, trips associated with the delivery of material along the site haul road have been included in the assessment of construction noise.

Baseline Conditions

3.4 To quantify existing levels of noise around the site, an environmental noise survey was carried out in May 2022 to support the Site Suitability Assessment (dated June 2023). The baseline noise levels have been used to:

- Determine existing environmental exposure levels at the sample NSRs; and
- Establish guideline construction noise level limits.

Assessment Methodology and Criteria

3.5 Assessment criteria have been selected in accordance with the National legislation, policies and guidance by reference to appropriate British and International standards outlined in **Appendix A1** and summarised below.

Construction Noise

3.6 Based on the remedial works plant, a number of assumptions have been made with regards to the number, type, and duty of plant utilised during the remedial works. The estimated quantity and percentage on-time of each item of plant has been determined by NCL based on experience of similar projects.

3.7 The assumptions that underpin the assessment are discussed below and the predicted results are presented in **Table 5.1**. The modelling assumes the activities will be carried out sequentially.

3.8 NCL understand that drilling and grouting operations will be required to undertake appropriate ground stabilisation works. Approximately 545, 20m deep treatment holes are required. For the purposes of this assessment, NCL have assumed that drilling and grouting will be undertaken by machinery with equivalent sound power levels to:

- Mini-piling rig (BS 5228-1 Table C.3.17); and
- Grout mixer and pump (BS 5228-1 Table C.4.28).

3.9 The sound power levels for each item of plant have been derived from BS 5228-1 and are summarised in **Table A.2.1**. The number of plant items, their modelled source height, and on-time as a percentage of the 11h working day (07:30 – 18:30hrs) is also summarised, based on NCL experience of comparable projects.

3.10 HGV movements have been modelled as moving point sources along the site access road with the attributed emission calculated from an L_{max} level.

3.11 Noise from construction activities has been calculated using computer noise modelling in accordance with the methodologies in Annex F of BS 5228-1. Noise emissions have been calculated using 1/1 octave band source noise levels, where available.

3.12 All predicted noise levels at the NSRs are façade noise levels.

3.13 The modelling results are then compared to the thresholds for potential significant effects, and the final noise impact determined through contextual consideration.

Assessment Criteria

3.14 In accordance with the policies, standards and guidance outlined in **Appendix A1**, assessment criteria have been selected.

3.15 Based on the description of works outlined in **Section 2**, the duration of excavation works associated with the extraction of extant material satisfies the requirements of a ‘short-term activity’ according to planning practice guidance found in the Ministry of Housing, Communities & Local Government ‘Minerals’ policy (PPGM). As such the PPGM guidance on temporary daytime works has been used to set the upper limit (Significant Observed Adverse Effect Level, SOAEL), and the threshold for potential significant effects for construction noise (Lowest Observed Adverse Effect Level, LOAEL) has been established using the BS 5228-1 ABC method, as shown in **Table A.1.2**.

Selection of LOAEL and SOAEL

3.16 For the purposes of this assessment, LOAEL and SOAEL for demolition and construction noise are set out in **Table 3.1**.

Table 3.1: Demolition and Construction Assessment Criteria

Effect threshold (residential)	Threshold value, 1m in front of the relevant façade
LOAEL	65 dB $L_{Aeq,12hr}$
SOAEL	73 dB $L_{Aeq,1hr}$
[#] PPGM provides free-field noise criteria, a façade correction of +3dB has been applied.	

Assessment Locations

3.17 For the purposes of this assessment, façade noise levels have been calculated and assessed at the sample NSRs. These levels have been predicted at a height of 1.5m, except where otherwise indicated.

Table 3.2: Assessment Locations and Associated Baseline Monitoring Locations

NSR Reference	NSR Type	NSR Location (Easting, Northing)	Height of NSR (m, above local ground)	Existing Representative Baseline Noise Levels Measurement Location
NSR1	Residential	422799, 408703	1.5m (ground floor / external amenity)	**LT1**
NSR2	Residential	422848, 408631		
NSR3	Residential	422935, 408671	4.0m (first floor)[#]	**LT4**
NSR4	Residential	422923, 408780	1.5m (ground floor / external amenity)	**LT3**
NSR5	Residential	422913, 408787		**LT2**
NSR6	Residential	422865, 408857		
[#] Due to the topography of the site and surroundings, site level is at grade with first floor habitable rooms at NSR3.				

4 Survey Results

4.1 To quantify current levels of ambient noise on the site, a noise survey comprising unattended measurements was conducted between Thursday 12th May and Friday 13th May 2022. The survey was designed to capture noise during the daytime (07:00 – 23:00hrs) and night-time (23:00 – 07:00hrs) periods.

4.2 **Figure 2.1** presents the noise survey locations, which are described in **Table 4.1** below. The noise monitoring locations were chosen to capture noise conditions across the site, primarily relating to road traffic noise from Cumberworth Lane and noise at the closest receptors.

4.3 The measurements were taken under free-field conditions at LT1, LT2, LT3 and LT4. Monitoring was supplemented by daytime observations of the noise climate at each monitoring location during the survey.

Survey Observations

4.4 Observations of the noise climate at the survey locations are summarised in **Table 4.1**.

Table 4.1: Summary of Survey Locations

Location	Description	Date and Time
LT1	Unattended, free-field measurement approximately 1 m to the north-east of Cumberworth Lane at a height of 1.2 m above ground level on the site and approximately 2.5 m above road level.	12:00 12th May 2022 – 14:00 13th May 2022
LT2	Unattended, free-field measurement approximately 1 m to the south-east of a Public Right of Way (PRoW) at a height of 1.2 m above ground level.	13:00 12th May 2022 – 14:15 13th May 2022
LT3	Unattended, free-field measurement approximately 4 m to the south-west of the houses on Leak Hall Crescent at a height of 1.2 m above ground level.	13:30 12th May 2022 – 14:30 13th May 2022
LT4	Unattended, free-field measurement along the southern boundary of the site away from any building at a height of 1.2 m above ground level. This location was approximately 95 m to the north of the A636 Wakefield Road.	14:00 12th May 2022 – 15:00 13th May 2022

Measured Baseline Noise Levels

4.5 Results of the noise survey at each of the monitoring locations are summarised in **Table 4.2**, rounded to the nearest decibel.

Table 4.2: Summary of Measured Levels – Unattended Locations

Location	Period of Representation	$L_{Aeq,T}$ (dB)
LT1	Daytime (07:00 – 19:00)	62
LT2		50
LT3		52
LT4		49

4.6 As all of the measured ambient noise levels are less than the values in the ABC Method Category A, when rounded to the nearest 5 dB(A), the threshold of potential significant effect is determined by Category A. The threshold of potential significant effect is therefore 65 dB $L_{Aeq,T}$ as shown in **Table 3.1.**

5 Noise Modelling and Assessment

5.1 Sound levels at the sample NSRs due to the remedial works have been predicted through noise modelling undertaken using Stapelfeldt's LimA®/Predictor® computational noise modelling software (v2022), which accounts for variances in propagation due to barrier and ground effects, such as those due to existing buildings and local topography.

5.2 The calculation methodology is summarised in **Section 3**.

5.3 Ground elevations of the existing terrain have been determined through analysis of LiDAR Digital Terrain Model (DTM). LiDAR DTM data describes ground terrain elevations at 0.25m vertical resolution[1]. The following noise modelling parameters used;

- Order of reflections = 1
- Ground absorption, G = 0.5 (mixed ground)
- Building heights determined from DSM and DTM data[1].
- Fetching Radius = 500 m

Construction Noise

Embedded Mitigation

5.4 In order to secure a reasonable degree of amenity for nearby residents, use of effective acoustic screening around the site and drill locations is required.

5.5 As advocated in BS 5228-1, if there is a barrier or topographic feature between the source and receptor, a 5 dB attenuation can be assumed if the plant is 'just visible' at the receiver; and 10 dB attenuation when the noise source is completely screened. As such, where feasible to do so, site hoardings should be erected to reduce noise levels at the nearest receptors.

5.6 Specifically, during the short-term excavation works it is proposed that a minimum 2.2 m high proprietary acoustic screen/fence, is deployed along the site boundary fronting NSR1 when operating in this area. Site noise levels at NSRs for the remaining works are anticipated to be <65 dB $L_{Aeq,12hr}$.

5.7 During ground stabilisation, it is proposed a minimum 2.2 m high proprietary acoustic screen/fence, is deployed no more than 2.5 m from the drill locations and will maintain this standoff distance as drills traverse the site. Screening must achieve the following specifications:

- is 2.2 m high, relative to ground level on site;
- be imperforate (i.e. have no holes or gaps);

[1] LIDAR DSM and DTM data for the site and wider area was obtained from the Defra Data Services Platform

- sealed gaps at the base of the fence;
- achieve a surface mass of at least 12 kg/m^2 and be at least 18 mm thick; and,
- be well maintained for the life of its use to maintain its efficacy.

Results

5.8 The results of the computer noise modelling for the locations nearest each sample NSR are summarised in **Table 5.1**.

Table 5.1: Adopted Construction Noise Criteria and Calculated Construction Activity Noise

	NSR1	NSR2	NSR3	NSR4	NSR5	NSR6
Relevant Baseline Monitoring Location	**LT1**		**LT3**	**LT4**	**LT2**	
Existing $L_{Aeq,12hr}$	**62**		**52**	**49**	**50**	
LOAEL – BS 5228-1 ABC Construction Noise Threshold Value, dB $L_{Aeq,T}$	**65**					
SOAEL - PPGM Short-term Criteria, dB $L_{Aeq,T}$	**73**					
Activity Description	**NSR1**	**NSR2**	**NSR3**	**NSR4**	**NSR5**	**NSR6**
Excavation	63	62	58	61	60	56
Drill and Grout	59	59	61	63	64	55

Assessment

5.9 The calculations indicate that the construction noise thresholds established using the objective criteria provided in PPGM and BS 5228-1 ABC method for potential significant effects is met.

5.10 In any event, wide ranging guidance on minimising noise impact from construction sites are contained with BS 5228-1, and Best Practicable Means (BPM) should be employed where required.

6 Conclusion

6.1 Noise Consultants Limited (NCL) have been commissioned to undertake a noise assessment for the proposed remedial works associated with ground stabilisation at Cliff Hill, Denby Dale, Huddersfield (the 'site').

6.2 The works consist of an excavation area of approx. 4500 m^2, and ground stabilisation works by drilling and grouting at approx. 545 locations to 20m depth. This report considers the existing noise climate in the area based on measurements undertaken in May 2022 submitted as part of the planning application for the Development.

6.3 Full details of the likely construction methods required during the works have not yet been fully established. Therefore, guideline construction noise thresholds have been derived and construction activity noise levels calculated for several locations based on an assumed plant list using information and data from BS 5228-1. Embedded mitigation, typically site hoardings and localised acoustic screening, has been established for the works. The assessment, incorporating the embedded mitigation, indicates that site noise levels will not exceed the relevant thresholds at all NSRs. Therefore, it is considered that significant noise impacts should not occur at existing NSRs for the phases included in the noise modelling exercise.

6.4 In order to minimise the impact of construction noise, a CEMP should also be produced by the contractor, which should include specific mitigation measures according to BPM that the contractor will take to control noise impacts. In particular, the following BPM would be appropriate:

- Installing site hoardings to provide acoustic screening during excavation works (detailed in **Section 5**);
- Implementing acoustic screening around mobile plant (detailed in **Section 5**);
- Limiting the noisiest activity to less-sensitive times of day; and / or
- Using quieter equipment and methods of construction where feasible.

6.5 Therefore, it is considered that with appropriate noise mitigation and control measures in place, the construction phases of the proposed works should not give rise to unacceptable noise impacts at nearby existing NSRs.

7 Glossary

dB	Decibel. The logarithmically scaled measurement unit of sound.
A-weighting	Frequency weighting applied to measured sound in order to account for the relative loudness perceived by the human ear.
$L_{Aeq,T}$	A-weighted equivalent continuous sound level over a given time period. It is the sound level of a steady sound that has the same energy as a fluctuating sound over the same time period.
$L_{A10,T}$	The A-weighted sound level exceeded for 10% of the measurement period. It is widely used as a descriptor of road traffic noise.
$L_{A90,T}$	The A-weighted sound level exceeded for 90% of the measurement period. Often referred to as the background sound level.
L_{Amax}	The A-weighted maximum recorded noise level during a measurement period.
R_w	The weighted Sound Reduction Index which characterises the airborne sound insulation of a building element over a range of frequencies with a single number quantity.
C and C_{tr}	Spectrum adaption terms that uses a standard reference curves to determine the weighted value of airborne sound insulation. C and C_{tr} take into account different source spectra, where C considers the A-weighted pink noise spectrum and C_{tr} considers the A-weighted urban traffic noise spectrum.

8 Appendices

A1 Relevant Policy and Guidance

National Noise Policy

Planning Practice Guidance – Minerals (PPGM, 2014)

A1.1 Specific planning practice guidance in relation to noise from minerals development such as the Cliff Hill coal mine is found in the Ministry of Housing, Communities & Local Government 'Minerals' policy (PPGM). PPGM contains both qualitative and specific objective guidance for mineral extraction sites (such as the extraction of coal) and states that noise is a principal issue needed to be addressed during the planning process.

A1.2 Individual applications should be considered on their own merits and "*should not take account of hypothetical future activities for which consent has not yet been sought, since the further appraisal and production phases will be subject to separate planning applications and assessments*".

A1.3 PPGM states that "*those making mineral development proposals, including those for related similar processes such as aggregates recycling and disposal of construction waste, should carry out a noise impact assessment, which should identify all sources of noise and, for each source take account of the noise emission, 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. 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 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."*

A1.4 During the planning process, the prevailing acoustic environment should be considered and whether or not noise from the proposed operations would:

- *"give rise to a significant adverse effect [i.e. dB ≥ SOAEL];*
- *give rise to an adverse effect [i.e. dB ≥ LOAEL]; and*
- *enable a good standard of amenity to be achieved."*

A1.5 In line with the Explanatory Note of the NPSE, there is the need to determine whether the overall effect of the noise exposure would be above or below the SOAEL and the LOAEL (where noise starts to give rise to changes in behaviours and attitude) for the given situation.

A1.6 A set of objective criteria are provided in PPGM for short-term activities and normal operations in the daytime, evening and at night and are reproduced in **Table A.1.1**.

Table A.1.1: Planning Practice Guidance – Minerals – Noise Criteria

Period	Short-term activities	Normal operations
Daytime 07:00 – 19:00	≤70dB $L_{Aeq,1hr,free\text{-}field}$	≤$L_{A90,1hr}$+10, but ≤55dB $L_{Aeq,1hr,free\text{-}field}$
Evening 19:00 – 22:00	-	≤$L_{A90,1hr}$+10, but ≤55dB $L_{Aeq,1hr,free\text{-}field}$
Night-time 22:00 – 23:00	-	Reduce adverse effects to minimum and ≤42dB $L_{Aeq,1hr,free\text{-}field}$

A1.7 Where it will be difficult not to exceed the background 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.

Short-term Activities

A1.8 To facilitate site preparation, restoration, the construction of baffle mounds, and for a period of no more than 8 weeks, a normal maximum noise level limit of up to 70dB $L_{Aeq,1hr}$ should be considered. A lower limit for a longer period should be considered where this work is to take longer than 8 weeks.

Normal Operations

A1.9 For the daytime and evening, PPGM clearly requires a noise to be controlled to a level relative to background noise level ($L_{A90,1hr}$ + 10dB) subject to an upper limit of 55dB $L_{Aeq,1h,free\text{-}field}$.

A1.10 At night, adverse effects of noise are required to be minimised and, in any case, should be no more than 42dB $L_{Aeq,1hr,free\text{-}field}$ – a limit that is not intended to be applied by default. The night-time noise level limit is not strictly based on an exceedance relative to background, but due consideration of the prevailing background noise levels at noise-sensitive receptors it is clearly needed to first consider if the overall effect of the noise exposure could give rise to an adverse impact. It follows that the application of the upper limit would be more appropriate where the accepted background noise level is lower than the upper limit (55dB $L_{Aeq,1hr,free\text{-}field}$), the requirement to reduce adverse effect to a minimum (and therefore to be <LOAEL) is crucial.

Guidance

British Standard 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' (BS 5228)

A1.11 BS 5228-1 provides a method for predicting noise from demolition and construction activity or equipment, and is the accepted Standard employed for the assessment of construction noise. The Standard also provides a framework for good working practice and guidance on the mitigation of noise by, for example, the selection of plant or use of screens and enclosures.

A1.12 The assessment has used the ABC Method described in Annex E BS 5228-1 to establish thresholds of potential significant effect at the nearest noise sensitive receptors (**Table A.1.2**). Additionally, plant noise assumptions have been determined using the data tables presented in Annex C of Bs 5228-1. Finally, the noise modelling predictions have used the methodologies presented in Annex F of BS 5228-1.

Table A.1.2: Threshold of potential significant effect at dwellings according to the ABC method in BS 5228-1:2009+A1:2014

Assessment category and threshold value period	Threshold value, dB(A)		
	Category A	Category B	Category C
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
Night-time (23:00 – 07:00)	45	50	55
Other: Weekday evenings (19:00 – 23:00) Saturdays (13:00 – 23:00) Sundays (07:00 – 23:00)	55	60	65
Category A: threshold value to use when ambient noise levels (rounded to the nearest 5dB) are less than these values. Category B: threshold value to use when ambient noise levels (rounded to the nearest 5dB) are the same as Category A values. Category C: threshold value to use when ambient noise levels (rounded to the nearest 5dB) are higher than Category A values.			

A1.13 The adverse effect threshold has been determined at a dwelling using the existing ambient noise level, rounded to the nearest 5 decibels (dB). This has then been used to determine the assessment category: A, B or C, which defines the adverse noise effect threshold. The predicted construction noise level is then compared to the appropriate noise effect threshold level. If the L_{Aeq} construction noise level exceeds the appropriate noise effect threshold level shown in **Table A.1.2** an adverse effect with the potential to cause a significant effect is identified.

A1.14 Having established if there is a potentially significant effect using the ABC Method, the final assessment of significance is made using professional judgement. This evaluation by considering

various other factors, such as the expected duration of the activity, number of exposed receptors etc.

A1.15 For non-residential receptors, significant effects would be evaluated on a receptor-by-receptor basis, using established noise impact criteria for the type of receptor and professional judgement.

A2 Construction Phase Assumptions

Table A.2.1: Construction Plant Sound Emission Data

Plant Item	BS5228 Ref.	Quant.	% on-time	Height (m)	Lw dBA
Ground Extraction - Tracked Excavator, 107 kW – 22t	C2.21	1	75	1.5	99
Loading Lorries – Tracked Excavator 75 kW 15t	C2.29	1	10	1.5	107
Mini Piling rig, 29 kW – 5.4t / auger	C3.17	3	90	1	98[1]
Mixer truck & Pump	C4.28	1	50	1.5	103
Lorry, 4-axle wagon	C2.34	3	-	1.5	108[2]
Wheel Wash	C4.88	1	5	1.5	97

[1] Emission adjusted for similar activity from another project.

[2] L_{max} noise level, HGV movements modelled as a moving point source.