

Seagull Lane Emsworth PO10 7QH



Construction Noise and Vibration Management Plan Report 28390.NMP.01

Nytimber Management Ltd

Report 28390.NMP.01			
Revision History			
First Issue Date: 22/05/2024			
A		D	
B		E	
C		F	
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1.0 INTRODUCTION

KP Acoustics Ltd have been commissioned to compile a noise and vibration assessment and management plan for the proposed works at Seagull Lane, Emsworth PO10 7HQ.

The works include demolition of the existing buildings, concrete slabs and foundations and construction of new steel framed and clad light industrial units.

This report presents all information gathered from relevant documentation and the steps which should be adopted regarding noise and vibration, to be submitted to the Local Authority prior to works taking place with regard to the following condition:

“Condition 4.

No development hereby permitted, nor any related site clearance, shall commence until an assessment of potential noise and vibration arising during construction has been prepared in accordance with BS 5528: Parts 1 and Part 2, 2009 and A1:2014 - Noise and Vibration Control on Construction and Open Sites, and has been submitted to and approved in writing by the Local Planning Authority. The assessment shall also include details of any piling methods to be used. All the above works shall thereafter be carried out in accordance with the approved assessment.

Reason: To minimise disturbance to all nearby sensitive receptors, and to ensure the amenities of nearby residential properties are not impacted upon by any external noise levels and having due regard to policies CS16 and DM10 of the Havant Borough Local Plan (Core Strategy) 2011 and the National Planning Policy Framework”

We understand no piling is to be used as the condition references.

This study has therefore been informed by the following legislation and guidance:

- Local Authority requirements (planning condition 4);
- *Control of Pollution Act 1974 Section 61 “Prior consent for work on construction sites.”;*
- *BS5228:2009 “Code of practice for noise and vibration control on construction and open sites” (Part 1 Noise & Part 2 Vibration).*

2.0 NOISE AND VIBRATION ASSESSMENT GUIDANCE

The following factors are typically considered when assessing the potential for disturbance caused by noise and vibration-generating activities:

Site Location: The proximity of a site to places sensitive to noise or vibration plays a crucial role. Closer proximity to such areas increases the likelihood of complaints due to noise and vibration emitted from the site.

Duration of Site Operations: Generally, the longer a site operates, the higher the likelihood of noise or vibration being a concern. Establishing good public relations is essential in this regard. If local residents understand the source and duration of operations, they may be more accepting of the noise and vibration.

Hours of Work: Certain times of the day are more sensitive to noise, particularly for noise-sensitive premises. For instance, noise levels acceptable during the day might be intrusive during the night. Operations outside normal weekday working hours, especially for dwellings, require special consideration.

Attitude Towards the Operator: People's perception of noise is often influenced by their opinion of the source itself. Residents are more likely to tolerate noise and vibration from a site if they believe the operator is taking effective measures to minimize unnecessary noise.

Characteristics of Noise and Vibration: The specific qualities of noise and vibration can impact people's perception and reaction. For example, high-amplitude impulsive noise accompanied by vibration may lead to a more negative assessment, requiring adjustments in evaluation methods such as applying penalties to signals.

Criteria for noise

With regards to noise levels, BS5228-1:2009 'Code of Practice for noise and vibration control on construction and open sites' dictates the following:

'Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut. The noise can be measured with a simple sound level meter, as we hear it, in A-weighted decibels (dB(A))- see note below. Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:

- *70 decibels (dBA) in rural, suburban and urban areas away from main road traffic and industrial noise;*
- *75 decibels (dBA) in urban areas near main roads in heavy industrial areas.'*

Based on the above, the daily noise limit from all on-site operations should therefore not exceed 70dB(A) at the closest noise sensitive receiver.

3.0 NOISE MANAGEMENT PLAN

Deviation from approved method statements will be permitted only with prior approval from relevant parties. This will be facilitated by formal review before any deviation is undertaken.

Site Personnel

All operatives on site will be trained to ensure that noise minimisation and best practicable means (BPM) are always implemented. Works will be checked regularly by Site Engineers to ensure that BPM are being undertaken and where necessary corrective actions implemented.

Employees must show consideration to the sensitive receptors, including residential neighbours, and must not generate unnecessary noise when walking to and from the site, or when leaving and arriving at work.

General Noise and Vibration Control Measures

The Best Practicable Means (BPM) (as defined in Section 72 of the Control of Pollution Act 1974) will be used to reduce noise and vibration levels at all times. Where practicable the control measures set out in BS5228-1:2009+A1:2014, Section 8 will also be implemented.

Recommended noise and vibration control measures include:

- Choice of methodology/technique for operations (including site layout) will be considered in order to eliminate or reduce emissions at sensitive locations.
- Fixed items of construction plant will be electrically powered in preference to diesel or petrol driven.
- If any specialised fabrication is required, this will be undertaken off-site if possible.
- Noisy plant will be kept as far away as possible from sensitive areas.
- Each item of plant used will comply with the noise limits quoted in the relevant European Commission Directive 2000/14/EC/United Kingdom Statutory Instrument (SI) 2001/1701 [3] where reasonably available.

- Equipment will be well-maintained and will be used in the mode of operation that minimises noise and shut down when not in use.
- Vehicles shall not wait or queue on the public highway with engines running (unless the engine is required to power the operation of the vehicle e.g. concrete wagon)
- Where possible deliveries will be arranged on a just-in-time basis in order to prevent vehicles queuing outside site.
- All materials will be handled in a manner that minimises noise.

4.0 NOISE ASSESSMENT

Typical noise data has been sourced from the relevant manufacturers where possible to reflect the activities and equipment proposed.

Levels stated in BS5228 have been used where no manufacturer's data is available.

Predicted noise levels of site operations have been undertaken with regard to the nearest sensitive receptors indicated in the attached site plan 28390.SP1.

Expected operating hours of the site are as follows:

- Mon – Fri (0800 – 1800)
- Sat (0800 – 1300)
- No working on Sundays or Bank / Public Holidays

The results of the predictions are summarised in Table 5.1 below, with full calculation detail provided in Appendix B.

Please note that all calculations, have been conducted according to the methodology specified in BS5228.

The resulting noise levels have been determined, taking into consideration the operating hours of the activity/machinery, with reference to a 10-hour working day and adjusting for *"Time on (%)"*.

Distance corrections and screening has been applied considering the area the activity is to take place as typically expected, although as site access allows, these will be positioned to maximise screening and distance from the receptors as far as possible.

Activity	Description	Equipment	Predicted Airborne Noise Level, dB $L_{Aeq,10h}$ (at the nearest sensitive facade)
1	Site Setup hoarding erection and general power tool use	Powered Hand tools	69
2	Crushing of existing buildings	Tracked semi mobile Crusher 90T	71
3	Debris Clearance	Mini digger and dumper	65
4	Debris Clearance	20t Tracked excavator	67
5	Delivery and site maintenance	Hiab for deliveries. forklift for distribution	69
6	Site clearance and groundwork preparation	Mini digger and dumper	61
7	Demolition	30T machine	67
8	Demolition and Groundworks	Dumper	68
9	Construction deliveries via crane vehicle	DAF CF65 FA CF 65.220 Crane Vehicle	70
10	Concrete pouring	8 wheel ready mix concrete truck	68
11	Pumping concrete	Concrete Pump 59kW	66
12	Deliveries	Wheeled Loader 15t	70

Table 5.1 Predicted noise levels of site operations

As shown in Appendix B and Table 5.1, transmission of noise to the nearest residential windows due to the works on site would meet the noise emissions criterion outlined in BS5228, with exception of Activity 2, which is predicted to exceed the requirements by 1dB. We understand best practice is to be followed for this activity with consideration of location and duration works are undertaken as outlined in this report. Additionally, it is understood mitigation via screening is to be applied onsite with respect of NSR3 in particular, blocking line of site to the nearest receptors.

Please note that noisy operations should be undertaken internally where appropriate. If this is not practical, a portable acoustic screen should be employed, blocking line of sight to nearby receptors where practical, in order to reduce transmission to the adjacent properties.

As a proactive approach to controlling noisy site operations, it would be recommended that noise monitoring is undertaken throughout the works to alert site staff when noise emissions criteria are being approached in order to reduce operations accordingly.

5.0 VIBRATION ASSESSMENT

This section presents an assessment of the potential risk regarding vibration generated by the construction works detailed in this document, and the associated adverse effects on the surrounding area.

Guidance Vibration Limits

Estimated vibration levels have been evaluated against guidance presented in relevant British Standards in order to assess the likelihood of both structural damage to neighbouring buildings and the human response of the occupants.

Building Damage

According to BS7385-2:1993 for residential or light commercial buildings, the threshold for the onset of potential cosmetic damage (i.e. formation of hairline cracks on drywall surfaces or the growth of existing cracks in plaster or drywall surfaces) to buildings varies with frequency. This ranges from a PPV of 15 mm/s at 4Hz, rising to 20mm/s at 15 Hz, and to 50 mm/s at and above 40Hz for transient vibration. BS7385 also states that the probability of building damage tends towards zero at 12.5 mm/s peak component particle velocity.

Line (see Figure 6.1)	Type of Building	Peak component particle velocity in frequency range of predominant pulse	
		4Hz to 15Hz	15Hz and above
1	Reinforced or framed structures. Industrial and heavy commercial buildings	50mm/s at 4Hz and above	
2	Unreinforced or light framed structures. Residential or light commercial type buildings	15mm/s at 4Hz increasing to 20mm/s at 15Hz	20mm/s at 15Hz increasing to 50mm/s at 40Hz and above
Note 1: Values referred to are at the base of the building			
Note 2: For Line 2, at frequencies below 4Hz, a maximum displacement of 0.6mm (zero to peak) should not be exceeded			

Table 6.1 Transient vibration guide values for cosmetic damage (from BS7385-2:1993)

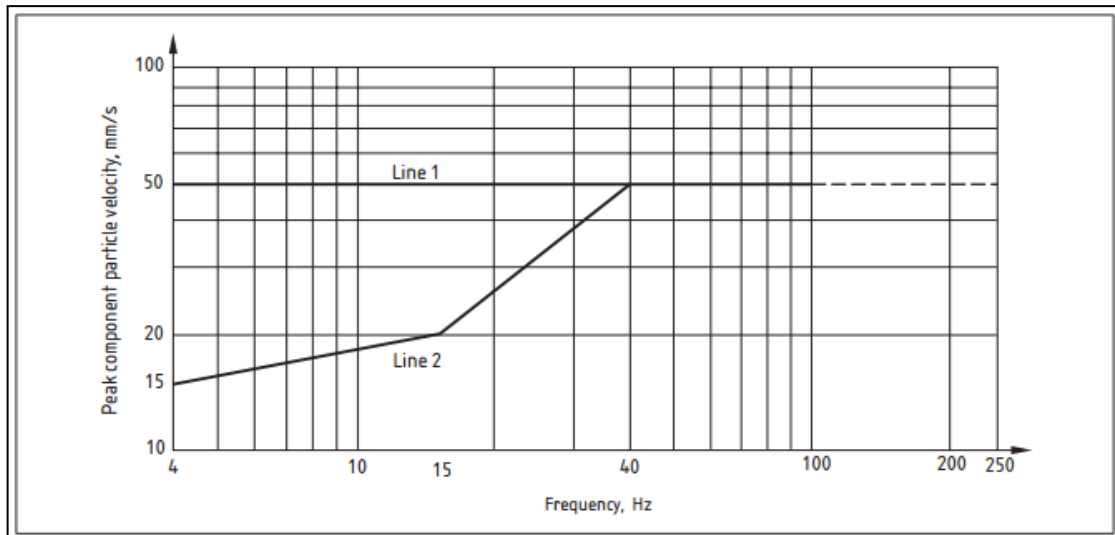


Figure 6.1 Summary of damage thresholds for transient vibration on domestic structures

Subjective response

According to guidance provided in BS5228-2:2009+A1:2014, the threshold of vibration perceptible to humans lies around 0.14 to 0.3 mm/s. The Standard also indicates that a PPVs of around 1 mm/s in residential environments, as a first estimate, are likely to cause complaints, but can be tolerable provided prior warning and explanation of the works is given to residents; whilst, vibration magnitudes of around 10 mm/s are likely to be intolerable for more than a very brief exposure to this level.

Based on Local Authority requirements, vibration criteria are outlined below:

- 3mm/s p.p.v. Stop and review works and methodology; reduce work periods before recommencement
- 5mm/s p.p.v. Stop works, review incident, look at work programme, and agree with Noise & Nuisance Team on a revised methodology where available before recommencing work

We also advise the following limit for structural security.

- 10 mm/s p.p.v. 'hard' limit; when exceeded, the contractor should stop work. Works should only continue after a thorough structural examination of the adjacent property, subsequent consultation with the local residents, and then with extreme caution. Should significant damage be identified, alternative methods of land remediation operations should be adopted.

6.0 CONCLUSION

KP Acoustics has been commissioned to undertake an assessment of noise levels from all site operations at the site bonded by Seagull Lane, Emsworth, in order to provide initial advice on the control of noise and vibration on site.

Information on good practice steps have been provided, while a realistic approach has been adopted regarding the maximum noise and vibration levels which should be met on site.

Noise predictions of on-site operations have been calculated as the closest noise sensitive receivers as indicated in this report.

Predictions indicate that noise levels generally meet the limits stipulated in BS5228 guidance. Note that due to the nature on construction noise, levels could rise above the threshold stipulated in BS5228, and therefore continuous reviews should be undertaken to ensure noise from site activity as detailed are controlled.

Guidelines provided within this report are provided to ensure that any disturbance caused by noise or vibration will be minimised as much as is practically possible.

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq} . The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for no more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise.

L_{90}

This is the level exceeded for no more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPLIED ACOUSTIC TERMINOLOGY

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than a single source and 4 sources produce a 6dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Hearing perception is highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

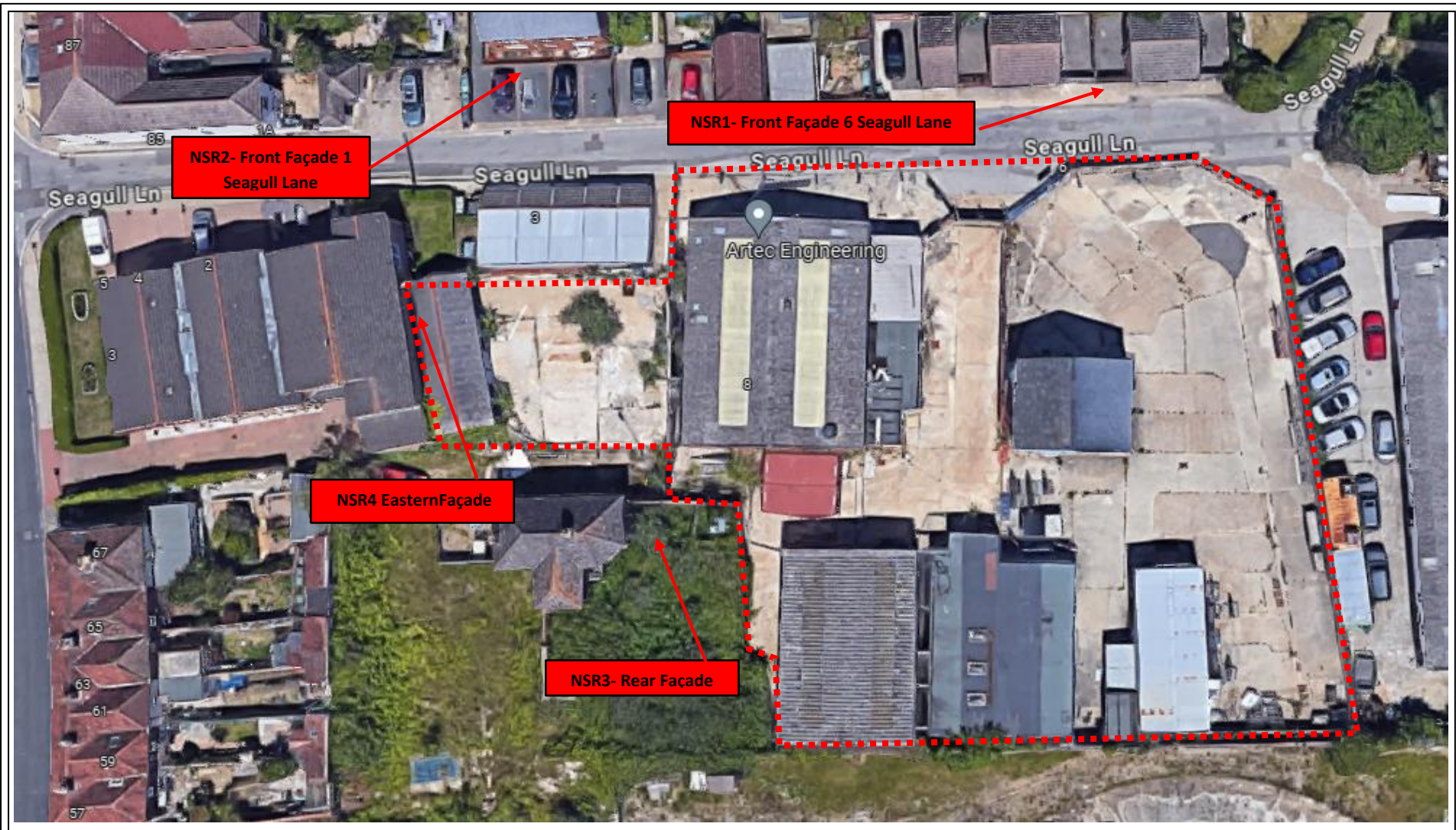
Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.

APPENDIX B – EQUIPMENT SCHEDULE

Ref	Construction activity	Equipment	Data Source*	SWL per item. (dB)	Time on (%)	Time corr (dB)	NSR	Distance (m)	Distance Loss (dB)	Screening (dB)	Total at Receptor (L _{Aeq,10hrs})
1	Site Setup hoarding erection and general power tool use	Powered Hand tools	MAN	105	30%	-5	NSR3	10	-31	0	69
2	Crushing of existing buildings	Tracked semi mobile Crusher 90T	C.9.14	121	10%	-10	NSR3	15	-35	-5	71
3	Debris Clearance	Mini digger and dumper	C.2.25	100	100%	0	NSR3	15	-35	0	65
4	Debris Clearance	20t Tracked excavator	C.2.21	102	100%	0	NSR3	15	-35	0	67
5	Delivery and site maintenance	Hiab for deliveries. forklift for distribution	D.7.93	100	100%	0	NSR1	15	-35	0	69
6	Site clearance and groundwork preparation	Mini digger and dumper	C.2.25	106	100%	0	NSR1	25	-39	0	61
7	Demolition	30T machine	C.2.16	107	100%	0	NSR4	25	-39	0	67
8	Demolition and Groundworks	Dumper	C.4.3	107	100%	0	NSR4	25	-39	0	68
9	Construction deliveries via crane vehicle	DAF CF65 FA CF 65.220 Crane Vehicle	C.4.5	106	100%	0	NSR4	20	-37	0	70
10	Concrete pouring	8 wheel ready mix concrete truck	C.4.18	106	100%	0	NSR4	12	-33	-5	68
11	Pumping concrete	Concrete Pump 59kW	C.2.29	110	50%	-3	NSR3	15	-35	-5	66
12	Deliveries	Wheeled Loader 15t	C.3.25	105	30%	-5	NSR1	20	-37	0	70

Key: *Example equipment used, or BS5228 reference (X.0.00)



Title:

Seagull Lane Development- Construction Noise Assessment
(28390)

Date: May 2024

FIGURE 28390.SP1

