



ARCUS

TANKERSLEY NOISE MODELLING

KPP ARCHITECTS

MAY 2016

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1 INTRODUCTION

Arcus Consultancy Services Ltd (Arcus) has been commissioned by KPP Architects to undertake noise modelling of the Wentworth Park Industrial Estate, Tankersley.

This report follows a previous assessment undertaken by Arcus¹, which included a background sound survey at the site, and provided recommended noise limits based on the results of the survey.

2 AIM

In order to predict the absolute noise levels at the nearest property from the site when in operation, the number of deliveries as well as the location and sound power levels of fixed plant items would be required. As the future occupiers of the site are currently unknown, it is not possible to accurately predict the level of noise likely at the nearest noise sensitive properties at this time.

Therefore, the aim of this report is to establish the level of noise reduction achieved by a bund/fence combination that runs along the boundary of the site closest to the properties on Carr Lane and Colliery Yard. The modelling will also provide an indication of the likely maximum noise levels the development can make when in operation, although it should be noted that these levels are an indication only, and should not be used to limit noise from the site. The recommended noise limits provided in the previous Arcus report allow for noise to be controlled in the event of a complaint.

Please note that this report is limited to noise from delivery movements and fixed plant assumed to be installed on the façade of Unit 1. It does not include an assessment of any noise from within the units that may occur once occupied.

3 CONSULTATION

Consultation was undertaken with the Pollution Prevention and Control Officer at Barnsley Metropolitan Borough Council to agree a methodology, and outline the limitations of the modelling.

It was agreed that the modelling would be undertaken to determine the likely noise reduction achieved by the noise barrier. It was also agreed that a prediction of absolute levels at the nearest residential properties would not be required.

It was also confirmed that the main noise sources likely from the Development would be deliveries to and from the site, and fixed plant (such as extractor exhaust) on the industrial units themselves.

4 METHODOLOGY

In order to determine the level of noise reduction achieved by the bund/fence, and provide an indication of the maximum noise levels that the development can make while in operation, a noise model of the site using SoundPlan 3.0 software has been undertaken.

The noise model has been run under two different scenarios, the first including the bund/fence combination to determine the maximum allowable noise level from the Development, and the second without the bund/fence to show what the noise level would be without mitigation.

¹ Wentworth Way Noise Impact Assessment, Arcus Consultancy Services, December 2015.

4.1 Identified Receptor

The closest identified property to the Development has been identified as 33 Carr Lane (as shown on Figures 1 & 2 in Appendix 1 of this report), located approximately 90 m from the façade of Unit 1. All modelling has therefore been undertaken based on the noise levels at this location.

4.2 Assumed Noise Sources

The position of Unit 1 is such that the structure itself will act as an acoustic barrier to noisy operations from Units 2-4. This effect, combined with the greater separation distances of Units 2-4 to the closest dwelling, will result from these units having a lower impact. As such, assumed noise sources have been modelled at Unit 1 only.

4.2.1 Fixed Plant

It is assumed that fixed plant will be required to extract air from each of the Units. As a worst case assumption, fixed plant has been modelled located on the façade of Unit 1 directly facing the nearest residential property. This noise source has been modelled using a typical sound spectrum taken from the SoundPlan noise library, and at a height of 6 m above ground level.

4.2.2 Deliveries

Noise from the deliveries has been modelled at a height of 2 m above ground level, which is assumed to be the average height of a lorry engine and exhaust. The noise source has been modelled in front of Unit 1, at the location of the turning circle. Again, a typical sound spectrum for a lorry has been sourced from the SoundPlan noise library.

4.3 Modelling Methodology

The noise modelling has been calculated in SoundPlan software, using the environmental noise propagation model ISO 9613-2:1996 – Acoustics; Attenuation of sound during propagation outdoors – Part 2: General method of calculation.

The ISO 9612-2 method is used to predict the noise at different locations by taking the octave-band sound power level spectrum of the source, and applying a number of attenuation factors that determine the resulting sound pressure level (the specific noise level). The following parameters were used in the prediction model and are considered to provide conservative prediction of the noise levels likely to be experienced in practice:

- Atmospheric conditions of 10°C and 70% relative humidity;
- A ground factor of $G=1$ (reflective ground) in the tarmac area surrounding each unit, and $G=0.5$ (mixed ground) in all other areas along the propagation path; and
- A receiver height of 1.5 m.

5 RESULTS

5.1 Predicted Development Noise Source Levels

Table 1 shows the results of the modelling to calculate the maximum likely level from the deliveries and plant during both daytime and night-time periods, based on achieving 1 dB below the recommended limits at the nearest property of 50 dB L_{Aeq} and 45 dB L_{Aeq} respectively.

The location of the mitigation included in the modelling has been sourced from drawing number 1979-210-P1. The height of the bund was set at 3m, while the fence was set at 1 m in the area adjacent the main yard. It was advised that the mitigation could be up to a maximum of 4.5 m, however it was found that there was no additional benefit from increasing the height above 4 m.

Table 1: Calculated Source Sound Power Level

	Daytime		Night-time	
	Calculated Sound Power Level, dBA	Noise limit at Nearest property, L_{Aeq}	Calculated Sound Power Level, dBA	Noise limit at Nearest property, L_{Aeq}
Deliveries	101	49	96	44
Fixed Plant	101	49	96	44

As can be seen from the above table, the maximum source noise level from the deliveries and fixed plant would have to be 101 dB in order to be 1 dB below the recommended daytime noise limit at the nearest noise sensitive receptor.

Figure 1 in Appendix 1 shows this modelling as a noise contour chart for Daytime as these show the worst case noise levels.

5.2 Noise Reduction Achieved from Bund/Fence

In order to determine what the level of noise at the nearest receptor would be without mitigation, the model has been run again without the bund/barrier included.

Table 2 below shows the level of noise at the nearest property without mitigation.

Table 2: Calculated Source Levels

	Daytime			Night-time		
	Level at Property with Barrier, L_{Aeq}	Level at Property without Barrier, L_{Aeq}	Difference, dB	Level at Property with Barrier, L_{Aeq}	Level at Property without Barrier, L_{Aeq}	Difference, dB
Deliveries	49	55	+6	44	50	+6
Fixed Plant	49	55	+6	44	50	+6

As can be seen from Table 2 above the barrier will achieve a 6 dB reduction in noise levels.

Figure 2 in Appendix 1 shows the difference made by the barrier in the form of a noise contour chart.

6 DISCUSSION

With regards to the calculation of the levels required from the Development to achieve the recommended noise limits at the nearest residential property, the both the fixed plant and deliveries would have to emit sound power levels of 101 dBA during daytime, and 95 dBA during night time hours.

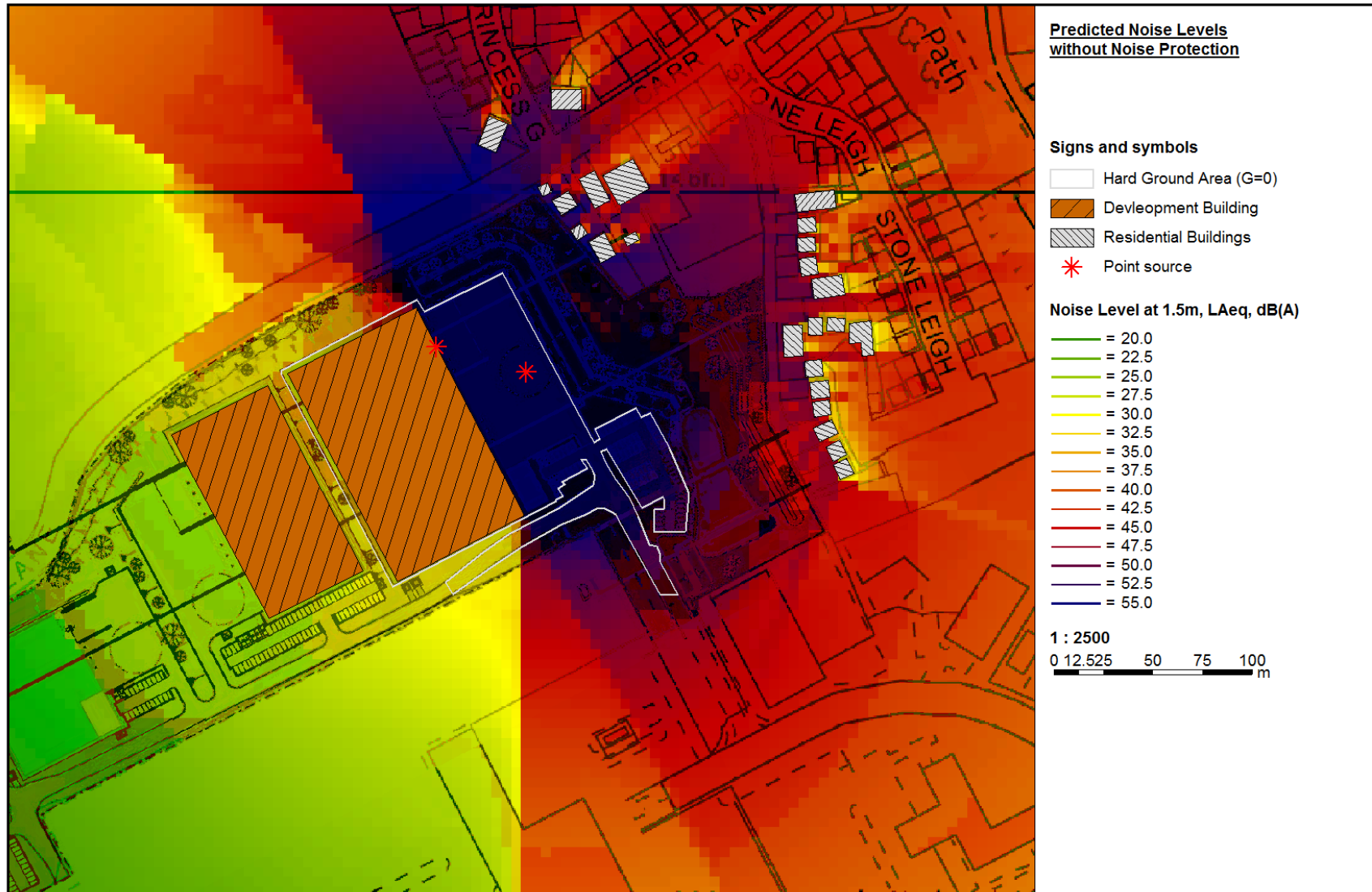
Based on our experience of noise at similar developments, a level of 101 dBA from fixed plant is considered high, and in practice is likely to be lower than this. In addition, if necessary, noise from fixed plant could be mitigated further with the installation of in-line acoustic silencers and acoustic enclosures. It is also recommended that any plant is located on the far side of the units, away from the nearest properties.

With regards to the deliveries, the noise model was calculated based on a constant noise source in front of the façade of Unit 1. In reality, lorries will be moving to and from site, and for a significant part of the day there will be no lorry movements in front of Unit 1.

The bund and fence achieves a reduction of 6 dB at the nearest property. As a rule of thumb, barriers that block the line of sight between a noise source and receiver achieve a 10 dB reduction in noise. However in this case the topography of the area between the Development and the nearest receptor already acts a barrier, reducing noise from the site before the inclusion of a barrier. This was verified in the noise model by removing the topography data, which was found to increase the noise level at the receptor by approximately 3 dB. Please note that there was no improvement in noise reduction by increasing the height of the bund/fence further.

It has been demonstrated that an acoustic bund and fence will reduce noise from the Development at the nearest residential receptors. In addition, it is considered that the levels required to exceed the noise limit from the Development are high, and in practice are likely to be less than those calculated in Table 1.

7 FIGURE 1 – PREDICTED NOISE LEVELS WITHOUT MITIGATION



8 FIGURE 2 – PREDICTED NOISE LEVELS WITH MITIGATION

