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*Consultants in Acoustics, Noise & Vibration*

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# Proposed cinema, The Alhambra

## *Environmental noise survey report*


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# Summary

Sandy Brown Associates LLP (SBA) has been commissioned by Savills to provide acoustic advice in relation to the proposed cinema development at The Alhambra shopping mall, Barnsley.

An environmental noise survey has been carried out with a view to determining the existing background noise levels in the area to set appropriate plant noise limits. The results of the survey will also be used to provide design advice in relation to facade sound insulation.

The noise survey was performed between 15:15 on 11 July 2014 and 15:50 on 14 July 2014.

The lowest background noise levels measured during the survey were $L_{A90,5min}$ 48 dB during the daytime and $L_{A90,5min}$ 35 dB at night.

Based on the results of the noise survey, it is recommended that all plant be designed such that the cumulative noise level at 1 m from the worst affected windows of the nearby noise sensitive premises does not exceed $L_{Aeq}$ 38 dB during the daytime, and $L_{Aeq}$ 35 dB during the night. It is also recommended that plant noise egress be controlled so that is does not exceed $L_{Aeq}$ 55 dB in external areas that are accessible to the public.

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# 1 Introduction

Sandy Brown Associates LLP (SBA) has been commissioned by Savills to provide acoustic advice in relation to the proposed cinema development at The Alhambra shopping mall, Barnsley.

An environmental noise survey has been carried out at the site, the purpose of which was to establish the existing background and ambient noise levels in the vicinity of the site and the nearby noise sensitive premises.

The background noise levels measured enable appropriate limits to be set regarding noise emission from proposed building services plant and amplified sound.

The ambient noise levels measured at the site will also be used to inform an assessment of the building envelope sound insulation performance requirements in due course.

This report presents the survey method, results of the environmental noise survey, and a discussion of acceptable limits for noise emission from building services plant and limits for amplified sound egress.

# 2 Site description

## 2.1 The site and its surroundings

The site location in relation to its surroundings is shown in Figure 1.

Attended measurements were undertaken at locations around the site which are denoted on Figure 1 as locations 1 to 4. Unattended measurements were also undertaken at the site for which the location is denoted by the letter 'L'.

The main road passing The Alhambra shopping centre is West Way, to the south of the shopping centre. West way is connected to New Street, to the west of the shopping centre and by other roads leading onto the roundabout to the east of the shopping centre. There are a number of infrequently used roads branching off New Street, including Albert Street and Hayes Croft.

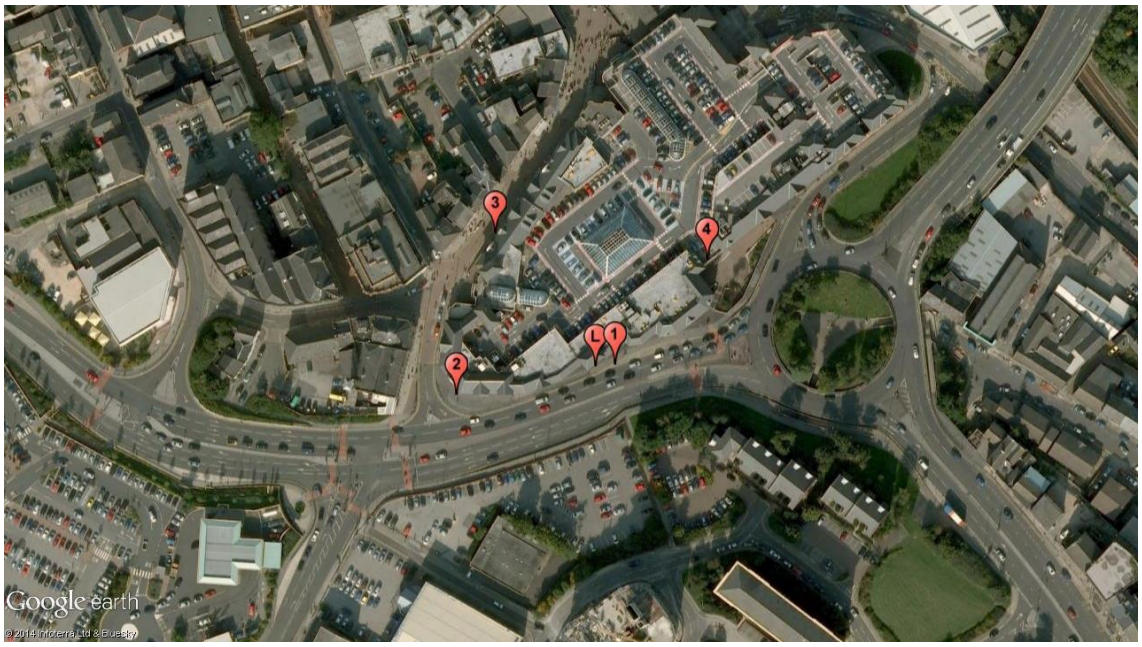



Figure 1 Overview of site and measurement locations, courtesy of Google Earth Pro

## 2.2 Adjacent premises

New Street, to the west of the shopping centre is lined with commercial and retail establishments. An NHS clinic is located to the south west of the roundabout.

There are no existing residential premises within the immediate vicinity of the development. The closest existing residential premises to the site are on Copper Closer approximately 190 metres to the south of the site. However, the structure of a building set to be developed into residential accommodation the future is located approximately 90 metres to the south of the site.

# 3 Method

## 3.1 Unattended measurements

A 4 day unattended continuous noise logging survey was undertaken at the site to determine the existing background noise levels in the vicinity of nearby noise sensitive premises.

The unattended measurements were performed over 5 minute periods between 15:15 on 11 July 2014 and 15:50 on 14 July 2014.

The measurement position used during the survey is indicated in Figure 1, denoted by the letter 'L'. A photograph showing the measurement location is provided in Figure 2. This location was chosen to be reasonably representative of the noise levels experienced by the nearest noise sensitive premises.



Figure 2 Unattended noise logging location

## 3.2 Attended measurements

Attended sample measurements were performed at a number of different locations around The Alhambra shopping centre. These are indicated in Figure 1 as positions 1 to 4.

The attended measurements were carried out on 14 July 2014, over 5 minute periods, with the purpose of determining the existing noise levels from road traffic, pedestrians and other significant noise sources in the area.

In each case the microphone was mounted on a tripod approximately 1.5 m above the ground level and at least 1 m from any other reflective surface.

## 3.3 Equipment

A Rion NL-52 sound level meter was used to undertake the unattended measurements. The attended measurements were carried out using a Norsonic 118 sound level meter.

The calibration data for the equipment used during the survey is provided in Appendix A to this report.

The sound level meters and microphones were calibrated at the beginning and end of the measurements using their respective sound level calibrators.

No significant deviation in calibration occurred.

## 3.4 Noise indices

The equipment was set to record a continuous series of broadband sound pressure levels. Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{Amax,T}$ The A-weighted maximum sound pressure level that occurred during a given period. Measured using the fast time weighting in accordance with the requirements of BS 8233 : 1999.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background noise level.

The $L_{A90}$ is considered most representative of the background noise level for the purposes of complying with any local authority requirements.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg $L_{A90}$) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures.*

## 3.5 Weather Conditions

During the attended measurements carried out on 14 July 2014, the weather was generally clear and dry and no rain occurred. Wind speeds varied between approximately 1 m/s and 4 m/s.

During the unattended noise measurements between 10 July 2014 and 14 July 2014, weather reports for the area indicated that temperatures varied between 10°C at night and 23°C during the day, and the wind speed was less than 10 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

# 4 Measurement results

## 4.1 Observations

The dominant noise sources observed at the site during the survey consisted of road traffic noise from West Way. Less significant noise sources included pedestrians.

## 4.2 Unattended measurement results

The results of the unattended noise measurements performed at the site are summarised in the following tables.

A graph showing the results of the unattended measurements is provided in Appendix B of this report.

The day and night time ambient noise levels measured during the unattended survey are presented in Table 1.

Table 1 Ambient noise levels measured during the survey

| Date | Daytime (07:00 – 23:00) $L_{Aeq,16h}$ (dB) | Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB) |
|---|---|---|
| Thursday 10 July 2014 | - | 66 |
| Friday 11 July 2014 | 72 | 66 |
| Saturday 12 July 2014 | 72 | 68 |
| Sunday 13 July 2014 | 72 | 65 |
| Monday 14 July 2014 | 72* | - |
| Average | 72 | 66 |

*Measurement not made over full period due to monitoring start and end time; not included in the average

The minimum background noise levels measured during the unattended survey are given in Table 2.

Table 2 Minimum background noise levels measured during the survey

| Date | Daytime (07:00 – 23:00) $L_{A90,5min}$ (dB) | Night (23:00 – 07:00) $L_{A90,5min}$ (dB) |
|---|---|---|
| Thursday 10 July 2014 | 50* | 35 |
| Friday 11 July 2014 | 53 | 40 |
| Saturday 12 July 2014 | 51 | 42 |
| Sunday 13 July 2014 | 48 | 38 |
| Monday 14 July 2014 | 61* | - |

*Measurement not made over full period due to monitoring start and end time

The lowest background noise levels measured during the survey were $L_{A90,5min}$ 48 dB during the daytime and $L_{A90,5min}$ 35 dB at night. The octave band sound pressure levels from these measurements are provided in

Table 3 Minimum background noise level measured $L_{A90}$ (dB) in octave bands

| | Minimum background noise level, $L_{90,5min}$ (dB) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time of day | Octave band centre frequency (Hz) | | | | | | | A-weighted level |
| | 63 | 125 | 250 | 500 | 1k | 2k | 4k | $L_{A90}$ |
| Daytime (07:00 – 23:00) | 53 | 46 | 44 | 42 | 44 | 39 | 38 | 48 |
| Night-time (23:00 – 07:00) | 48 | 39 | 38 | 34 | 26 | 21 | 16 | 35 |

## 4.3 Attended measurement results

Attended measurements were performed at a number of different locations around the site on 14 July 2014. The sound pressure levels recorded during these measurements are summarised in Table 4 in terms of the most notable parameters.

The dominant noise sources noted during the measurements are also described in Table 4.

Table 4 Sound pressure levels from attended measurements

| Position | Start time | Sound pressure levels (dB) | | | Noise sources |
|---|---|---|---|---|---|
| | | $L_{Aeq,5min}$ | $L_{Amax,5min}$ | $L_{A90,5min}$ | |
| 1 | 14:11 | 71 | 81 | 65 | Road traffic on West Way |
| 1 | 14:20 | 71 | 93 | 65 | Road traffic on West Way, pedestrians, car horn |
| 1 | 14:26 | 71 | 93 | 66 | Road traffic on West Way, car horn |
| 2 | 14:35 | 69 | 76 | 62 | Road traffic on West Way |
| 2 | 14:50 | 70 | 80 | 58 | Road traffic on West Way and occasionally on New Street |
| 2 | 14:55 | 68 | 75 | 61 | Road traffic on West Way, pedestrians |
| 3 | 15:05 | 54 | 63 | 50 | Road traffic on West Way, pedestrians |
| 3 | 15:10 | 55 | 73 | 50 | Road traffic on West Way and occasionally on New Street and Albert Street, amplified music on Cheapside, pedestrians |
| 3 | 15:15 | 55 | 70 | 50 | Road traffic on West Way and occasionally on New Street and Albert Street, pedestrians |
| 4 | 15:30 | 63 | 75 | 61 | Road traffic at roundabout, pedestrians in centre of roundabout/outside of shopping centre, plant noise on roof |
| 4 | 15:35 | 64 | 79 | 61 | Road traffic at roundabout, pedestrians in centre of roundabout/outside of shopping centre, plant noise on roof |
| 4 | 15:40 | 63 | 72 | 61 | Road traffic at roundabout, pedestrians in centre of roundabout/outside of shopping centre, plant noise on roof |

# 5 Noise egress assessment

## 5.1 Building services noise

### *5.1.1 Standard guidance*

Standard guidance for noise emission from proposed new items of building services plant is given in BS4142: 1997 '*Method for rating industrial noise affecting mixed residential and industrial areas*'.

BS4142 provides a method for assessing noise from items such as building services plant against the existing background noise levels at the nearest noise sensitive receptors to assess the risk of complaints occurring.

BS4142 suggests that if the noise level is 10 dB or more higher than the existing background noise level, complaints are likely. If the level is 5 dB above the existing background noise level, it is considered of marginal significance. If the level is 10 dB or more below the existing background noise level, this is considered a positive indication that complaints are unlikely.

If the noise contains 'attention catching features' such as tones, bangs etc, a penalty is applied which effectively reduces these limits by a further 5 dB.

### *5.1.2 Plant noise limits*

Based on the above criteria and the measurement results, the cumulative noise level resulting from the operation of all new plant at 1 m from the most affected windows of the nearest noise sensitive premises should not exceed 10 dB below the minimum external noise level during the daytime.

BS4142 states:

*'The method is not suitable for assessing the noise measured inside buildings or when the background and rating noise levels are both very low.*
*NOTE. For the purposes of this standard, background noise levels below about 30 dB and rating levels below about 35 dB are considered to be very low.'*

As a result, to avoid making the noise limits very onerous during the night-time, it is recommended that the cumulative noise level resulting from the operation of all new plant at 1 m from the most affected windows of the nearest noise sensitive premises should not exceed the existing minimum background noise level, ie, 35 dB.

These limits are set out in Table 5.

Table 5 Plant noise limits at 1 m from the nearest noise sensitive premises

| Time of day | Maximum sound pressure level at 1 m from noise sensitive premises (dB) |
|---|---|
| Daytime (07:00-23:00) | 38 |
| Night-time (23:00-07:00) | 35 |

If the proposed plant noise contains attention catching features (such as tonal elements, whines, whistles, bangs etc), the plant should be designed to achieve a limit 5 dB below those set out above.

In addition to the above, it is recommended that plant noise egress be controlled to achieve a maximum limit of $L_{Aeq}$ 55 dB in external areas accessible by the public.

## 5.2 Amplified sound

It is recommended that amplified sound egress from the proposed development be limited to be at least 10 dB below the minimum background noise level $L_{A90}$ (dB) in octave bands outside the nearest noise sensitive premises. The recommended limits are set out in Table 6.

Table 6 Amplified sound egress criteria

| | Octave band centre frequencies (Hz) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 63 | 125 | 250 | 500 | 1k | 2k | 4k |
| $L_{eq,5min}$ (dB) daytime (07:00-23:00) | 43 | 36 | 34 | 32 | 34 | 29 | 28 |
| $L_{eq,5min}$ (dB) night-time (23:00-07:00) | 38 | 29 | 28 | 24 | 16 | 11 | 6 |

# 6 Conclusion

A noise survey has been carried out to determine the existing background noise levels in the vicinity of the site and surrounding noise sensitive premises. The minimum measured background noise levels were $L_{A90,5min}$ 48 dB during the day, and $L_{A90,5min}$ 35 during the night.

The recommended plant noise limits at the worst affected existing noise sensitive premises would be $L_{Aeq}$ 38 dB during the day, and $L_{Aeq}$ 35 dB during the night, and $L_{Aeq}$ 55 dB in external areas that are accessible to the public. These limits are cumulative, and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features, the limits will be 5 dB more stringent than those set out above.

Limits have also been recommended for amplified sound egress from the development.

The amplified sound egress limits and the ambient noise levels measured around the site will be used to inform an assessment of the building envelope sound insulation requirements in due course.

# Appendix A

## Equipment calibration information

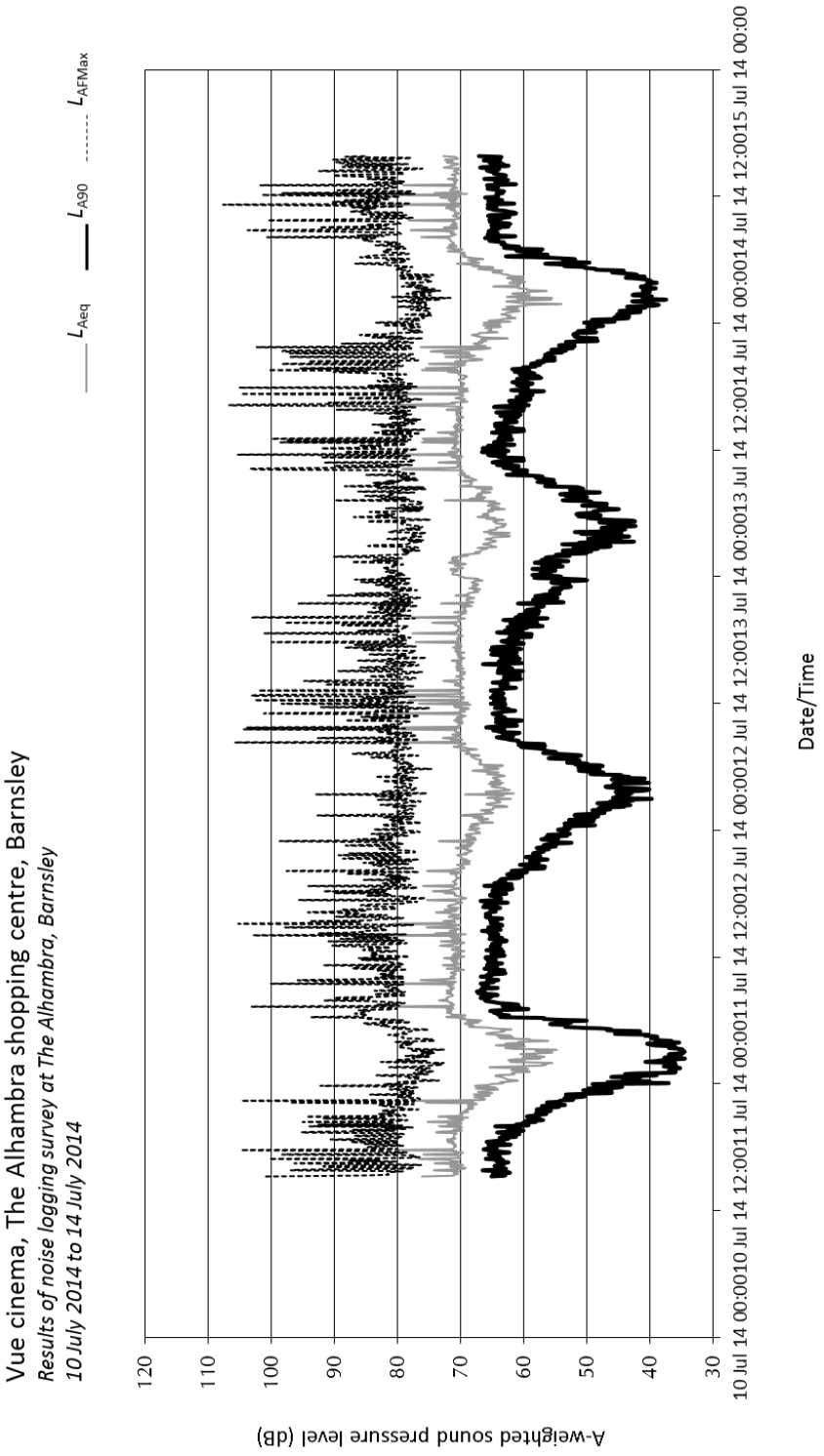
Table A1 Equipment calibration data

| Equipment description | Type/serial number | Manufacturer | Calibration expiry | Calibration certification number |
|---|---|---|---|---|
| Sound level meter | Nor118/31754 | Norsonic | 24 June 16 | 1407344 |
| Microphone | 40AF/62396 | Gras | 24 June 16 | 1407344 |
| Calibrator | 1251/31322 | Norsonic | 24 June 16 | 1406330 |
| Sound level meter | NL-52/00242704 | Rion | 20 May 16 | 1405274 |
| Microphone | UC-59/06187 | Rion | 20 May 16 | 1405274 |
| Calibrator | CAL200/4501 | Larson Davis | 20 May 16 | 1405270 |

Calibration of the sound level meters used for the tests is traceable to national standards. The calibration certificates for the sound level meter(s) used in this survey are available upon request.

# Appendix B

## Results of unattended measurements at Location 'L'


Vue cinema, The Alhambra shopping centre, Barnsley
Results of noise logging survey at The Alhambra, Barnsley
10 July 2014 to 14 July 2014
$L_{Aeq}$
$L_{A90}$
$L_{AFMax}$
A-weighted sound pressure level (dB)
120
110
100
90
80
70
60
50
40
30
10 Jul 14 00:00
10 Jul 14 12:00
11 Jul 14 00:00
11 Jul 14 12:00
12 Jul 14 00:00
12 Jul 14 12:00
13 Jul 14 00:00
13 Jul 14 12:00
14 Jul 14 00:00
14 Jul 14 12:00
15 Jul 14 00:00
Date/Time