

Northburn Acoustics PO Box 122 Cramlington NE23 3WX

t 01670 739294

# Acoustic Report

Noise assessment of proposed residential development at Cavalier View, Hebburn, Tyne & Wear.

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Prepared for:

Mr. J. Elves, 22 The Fellside, Newcastle. NE3 4LJ

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AREA PLANNING

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Author:	M Johnson BEng (hons) MSc CEng MCIBSE MIOA	Checked by:	H Parkinson
Signature:	mJohn	Signature:	K Pali
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# **Executive Summary**

An assessment of external ambient noise has been carried out at the proposed residential development at Cavalier View, Hebburn, in accordance with the guidance given in BS8233:2014.

The assessment shows that a noise level of 35 dB  $L_{Aeq,07:0-23:00}$ , 30 dB  $L_{Aeq,23:00-07:00}$ , and 45 dB  $L_{Aemax,23:00-07:00}$  would not be exceeded provided that:

 All habitable rooms are fitted with double glazing, minimum 4/12/4 (when closed) and non-acoustic trickle vents (when open).

The assessment also shows that gardens would be subjected to noise levels that are within BS8233:2014 guidelines for outdoor spaces.

In my professional view I can see no reason to reject the application with regard to noise.

### 1 Introduction

This report has been prepared for the sole benefit, use and information of Mr. J. Elves, for the purposes set out in the report or instructions commissioning it. The liability of Northburn Acoustics in respect of the information contained in the report will not extend to any third party.

The proposed development has been assessed in accordance with the national guidelines, and in particular, BS8233:2014.

The report has been compiled by Mr. M. Johnson, who has over 20 years experience in acoustics. His academic and professional qualifications include:

- MSc in Acoustics, vibration and noise control from Heriot-Watt University.
- BEng (hons) in Building Services Engineering from Newcastle Polytechnic (which is now the University of Northumbria).
- Corporate membership of the Institute if Acoustics.
- Corporate membership of the Chartered Institution of Building Services Engineers.
- Registered with the Engineering Council as a Chartered Engineer.

### 2 Site

The proposed development site lies at the end of Cavalier View, Hebburn. It consists of an area of grass land which is adjacent to A & P Engineering (a ship repair yard with dry dock facilities). The development proposal is to construct one, two, or three residential dwellings on the land. The final layout of the site and dwellings has yet to be confirmed. It is understood that the dwellings will not protrude above the existing boundary wall at the eastern edge of the site. The site is highlighted in red in Figure 1.

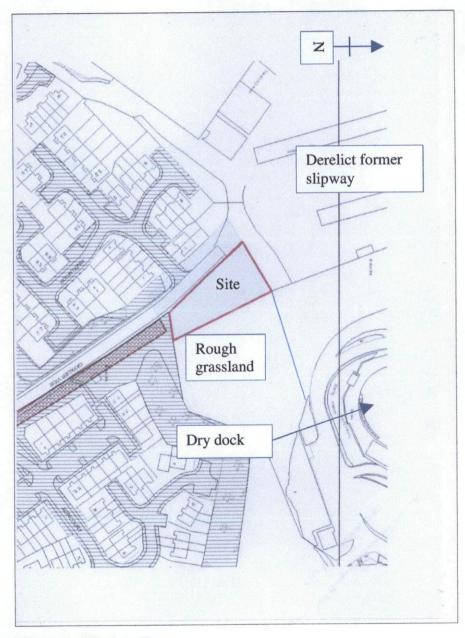


Figure 1: Site location

### 3 Basis of assessment

The proposed development has been assessed in accordance with the National Planning Policy Framework (NPPF) guidelines.

The relevant section of NPPF as applicable to noise is paragraph 123 which states:

"Planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established;
- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational amenity value for this reason."

The first bullet point is applicable to this proposed residential development. The others would only be applicable to developments that would be likely to create noise post construction.

#### 3.1 BS8233:2014i

There are several sources of national and international guidance which can be used to assess the impact of external noise sources on a residential development. At this stage there does not appear to be any specific requirements laid down by South Tyneside Council as such. Therefore, it has been assumed that the proposed development should be assessed in accordance with BS8233:2014.

This standard suggests that for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values given in Table 1.

<sup>&</sup>lt;sup>1</sup> BS8233:2014 "Guidance on sound insulation and noise reduction for buildings"

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB L <sub>Aeq,16hour</sub>	-
Dining	Dining room/area	40 dB L <sub>Aeq,16hour</sub>	-
Sleeping	Bedroom	35 dB L <sub>Aeq,16hour</sub>	30 dB L <sub>Aeq,8hour</sub>

Table 1: Indoor ambient noise levels for dwellings

The standard also suggests that where regular individual noise events could cause sleep disturbance a guideline value in terms of  $L_{AFmax}$  may be set. I would therefore suggest that the  $L_{AFmax}$  should be limited to 45 dB in accordance with World Health Organisation (WHO) guidelines.

The standard also suggests that "where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal noise levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved". This implies a design range as shown in Table 2

		Desirable		Reasonable	
Activity	Location	07:00 to 23:00 L <sub>Aeq,16hour</sub>	23:00 to 07:00 LAeg,16hour	07:00 to 23:00 L <sub>Aeq,16hour</sub>	23:00 to 07:00 L <sub>Aeq,16hour</sub>
Resting	Living room	35 dB	-	40 dB	-
Dining	Dining room/area	40 dB	1-	45 dB	-
Sleeping	Bedroom	35 dB	30 dB	40 dB	35 dB

Table 2: Indoor ambient noise level range according to BS8233

I would suggest that the aim should be to achieve "desirable" but "reasonable" should be accepted if local conditions dictate.

To assess the site in accordance with the above requirements, noise surveys have been carried out to cover both day and night time periods.

# 4 Acoustic survey

Acoustic surveys were conducted on 24<sup>th</sup> and 25<sup>th</sup> March, 2015, in accordance with BS7445-1:2003 "Description and measurement of environmental noise". Sound levels were measured using a Svantek 948 type 1 sound analyser, fitted with a 1/3 octave filter set. The instrument was calibrated before and after use and on each occasion was within acceptable limits. During all measurement periods weather conditions were calm and dry.

External noise levels were measured at 1.5m above ground level in free-field conditions (i.e. at least 3.5m from any reflecting plane other than the ground).

The sound analyser was positioned in the approximate locations shown in Figure 2. The measurement location is partly screened due to a boundary wall which runs along the eastern side of the site.

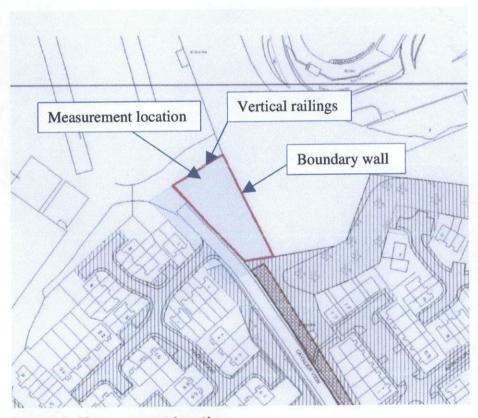


Figure 2: Measurement location

Measurements of  $L_{Amax}$ ,  $L_{Amin}$ , and  $L_{Aeq}$  were recorded every 10 minutes over the period between 15:26 and 17:26 during daytime, and every 10 minutes over the period between 00:52 and 01:52 during night-time.



Figure 3: Location of microphone

During both survey periods work was being carried out on a ship in the dry dock, see Figure 4. The work seemed to be taking place day and night. It was noted that a diesel engine (presumably the ships generator) was operating continuously.



Figure 4: Ship in dry dock viewed from above boundary wall.

A further survey was carried out at the same location over a 75 minute period between 16:09 and 17:24 on 8<sup>th</sup> April, 2014. The sound analyser was set to measure a similar set of parameters, logged every 15 minutes. During this period the ship shown in Figure 4 had been replaced by another ship.

No activity was observed at the former slipway site to the north of the proposed development and the site appeared to be unoccupied. Unfortunately it is not possible to predict what the noise levels would be (if any) due to any future use of the land, or whether the noise levels due to the dry dock would increase. It is true to say that the noise levels presented in the following chapter represent the levels prevailing at the time of the survey. It was noted that residential properties have been erected fairly recently in close proximity to the derelict slipway and the dry dock.

# Results

The survey results are shown in Table 3, Table 4, and Table 5.

24 <sup>th</sup> March	L <sub>A,max</sub> (dB)	L <sub>A,min</sub> (dB)	L <sub>A,eq</sub> (dB)
Time			
15:26-15:36	61.6	43.6	52.5
15:36-15:46	59.2	43.1	48.5
15:46-15:56	64.5	43.0	49.6
15:56-16:06	56.7	43.1	48.1
16:06-16:16	56.0	42.4	47.5
16:16-16:26	62.7	43.8	49.5
16:26-16:36	63.2	42.4	50.3
16:36-16:46	60.7	42.7	47.9
16:46-16:56	63.1	42.5	51.0
16:56-17:06	62.3	41.2	49.7
17:06-17:16	56.6	41.8	47.7
17:16-17:26	62.1	40.5	49.9
Mean	1		49.6

Table 3: Daytime noise measurements (24th March)

25 <sup>th</sup> March	L <sub>A,max</sub> (dB)	L <sub>A,min</sub> (dB)	L <sub>A,eq</sub> (dB)
Time			
00:52-01:02	58.7	38.5	40.8
01:02-01:12	45.7	38.8	40.8
01:12-01:22	44.4	39.1	40.9
01:22-01:32	52.4	39.5	41.5
01:32-01:42	59.3	38.5	44.5
01:42-01:52	56.9	38.4	43.9
Mean	1	1	42.4

Table 4: Night-time noise measurements (25th March)

8 <sup>th</sup> April	L <sub>A,max</sub> (dB)	L <sub>A,min</sub> (dB)	L <sub>A,eq</sub> (dB)
Time			
16:09-16:24	73.1	42.1	48.8
16:24-16:39	71.2	41.6	51.9
16:39-16:54	65.9	41.5	47.3
16:54-17:09	54.4	40.8	45.2
17:09-17:24	58.8	42.9	47.3
Mean	1		48.7

Table 5: Daytime measurements (8th April)

#### 6 Assessment

#### 6.1 Introduction

The development has been assessed with reference to BS8233:2014 as described in chapter 3.

### 6.2 Assessing the building envelope for internal noise targets (day)

From a subjective viewpoint, the noise level at the site during daytime was fairly low. The proposed site is adjacent to an industrial area and there were occasional bangs and clunks being emitted from the dry dock, and the generator could just be heard above the background noise level.

The measurements indicate that the daytime ambient noise level was 49.6 dB  $L_{Aeq}$  measured over a two-hour period. Based upon the activity level that existed at the time of measurement it would be reasonable to assume that the ambient noise level for the site would remain unchanged for the entire 16-hour period from 07:00 until 23:00. The daytime noise level affecting the site has been taken to be 49.6 dB  $L_{Aeq,07:00-23:00}$ .

In simplistic terms, a minimum acoustic insulation value of 14.6 dB  $R_{A,tr}$  would be required by the façade to ensure that the internal noise level does not exceed 35 dB  $L_{Aeq,07:00-23:00}$  during day time. This level of insulation would be achieved using standard cavity masonry or timber frame construction, together a double-glazed window system such as 4/12/4 (4mm glass, 12mm air gap, 4mm glass).

However, there is also a need for ventilation, which must have similar acoustic insulation values. A window that is open on the first security catch would provide an attenuation value of 10-15 dB. Internal noise levels within rooms would therefore be in within the range of 35 – 40 dB L<sub>Aeq</sub> during daytime. Whilst this would be within the range recommended by BS8233 for "desirable" and "reasonable" levels, it would not be guaranteed to achieve the "desirable" level. Standard non-acoustic trickle vents would provide attenuation values of 15-20 dB when open thereby allowing the "desirable" internal noise level to be achieved. Windows can be openable for purge ventilation, or at the occupant's choice.

Paragraph 8.4.5.4 of BS8233:2014 concurs with this view stating:

"The Building Regulations supporting documents on ventilation [48, 49, 50] recommend that habitable rooms in dwellings have background ventilation. Where openable windows cannot be relied upon for this ventilation, trickle vents can be used and sound attenuating types are available. However, windows may remain openable for rapid or purge ventilation, or at the occupants choice."

### 6.3 Assessing the building envelope for internal noise targets (Night)

External night time noise levels are much lower compared to daytime levels. This is due to a reduction in general noise, including distant road traffic, at night.

Consequently the equivalent continuous noise level was much lower. This was measured as 42.4 dB over the one-hour period and is a good indication of the 8-hour noise level between 23:00 and 07:00.

In simplistic terms, a minimum acoustic insulation value of 12.4 dB  $R_{A,tr}$  would be required by the façade to ensure that the internal noise level at night does not exceed 30 dB  $L_{Aeq,23:00-07:00}$ . The façade specification described in paragraph 6.2 would also be sufficient to ensure that night-time noise levels within bedrooms would not exceed 30 dB  $L_{Aeq,23:00-07:00}$ .

Maximum night-time noise levels should also be considered to ensure that internal noise levels within bedrooms do not exceed 45 dB L<sub>Amax</sub>. According to the measurements presented in Table 4, the maximum night-time noise level was recorded as 59.3 dB L<sub>Amax</sub>. Therefore to ensure that the internal noise level does not exceed 45 dB L<sub>Amax</sub>, the façade must be capable of providing a sound insulation value of 14.3 dB R<sub>A,tr</sub>. The façade specification described in paragraph 6.2 would also be sufficient to ensure that night-time noise levels within bedrooms would not exceed 45 dB L<sub>Amax,23:00-07:00</sub>.

This recommendation is limited to the acoustic performance only, and does not address the suitability of trickle vents for ventilation purposes.

#### 6.4 Assessing external areas

BS8233:2014 provides the following guidance on outdoor living areas. Paragraph 7.7.3.2 states:

"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB L<sub>Aeq,T</sub>, with an upper guideline value of 55 dB L<sub>Aeq,T</sub> which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, developments should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."

The front and rear gardens would be subjected to daytime noise levels of 49.6 dB L<sub>Aeq,16hour</sub>, which is within the guideline values given in BS8233:2014 for outdoor areas. This is also aligned with the guidance given by the World Health Organisation which recommends that external areas should not be subjected to noise levels of more than 55 dBA.

## 7 Conclusion

An assessment of external noise has been carried out at the proposed residential development at land adjacent to Cavalier View, Hebburn.

The assessment shows that a noise level of 35 dB  $L_{Aeq,07:0-23:00}$ , 30 dB  $L_{Aeq,23:00-07:00}$ , and 45 dB  $L_{Amax,23:00-07:00}$  would not be exceeded provided that:

 All habitable rooms are fitted with double glazing, minimum 4/12/4 (when closed) and non-acoustic trickle vents (when open).

The assessment also shows that gardens would be subjected to noise levels that are within BS8233:2014 guidelines for outdoor spaces.

In my professional view I can see no reason to reject the application with regard to noise.

# Appendix - Glossary of acoustic terms

### Sound Pressure Level (Lp)

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20  $\mu$ Pa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

 $L_p = 20 \log 10(p/p_0)$ 

Where Lp = sound pressure level in dB; p = rms sound pressure in Pa; and  $p_0 = reference$  sound pressure (20  $\mu$ Pa).

#### **A-weighting Network**

A frequency filtering system, which approximates the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

#### Equivalent continuous A-weighted sound pressure level, L Aeq, T

The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T, has the same mean-square sound pressure as a sound that varies with time.

#### L AN. T

The A-weighted sound pressure level in decibels exceeded for N% of the measurement period, T.

#### L AF max

The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

#### Background noise level L A90. T

The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T.  $L_{A90}$  is typically taken as representative of background noise.

#### Specific noise level L Aeg. Tr

The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.

#### Rating level L Ar. Tr

The specific noise level plus any adjustment for the characteristic features of the noise