

Carrington Playing Fields (Barnsley Housing Development)

Noise Impact Assessment
07 July 2014



Quality Management

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1. Introduction

A new housing development is proposed on a piece of land owned by Barnsley College.

This noise impact assessment report has been prepared to provide information regarding the noise environment surrounding the proposed development and the implications to achieve an acceptable noise climate for the future occupiers.

The existing levels of noise have been quantified through a noise measurement survey which has subsequently been used to predict the noise levels at the location of the dwellings and gardens areas using noise modelling software.

The results of the assessments have been compared to relevant national guidance and LPA requirements for residential developments, with an indication of typical mitigation measures which may be required. Detailed housing layouts are not available at this stage.

To assist in the understanding of technical aspects referred to in this report, a glossary of acoustic terms can be found in Appendix A.

2. Assessment Criteria

2.1 National Policy Guidance

2.1.1 National Planning Policy Framework (NPPF)

The NPPF came into force in March 2012 and replaced the majority of planning policy. Paragraph 109 of the NPPF states that:

“the planning system should contribute to and enhance the natural and local environment by:preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability”

Paragraph 123 of the NPPF states that planning policy 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 placed on them because of changes in nearby land uses since they were established, and*
- *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason*

The National Planning Policy Framework also refers to the Noise Policy Statement for England¹.

2.1.2 Noise Policy Statement for England (NPSE)

This document was published by DEFRA in 2010 and states three policy aims:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life.”*

The first two points require that significant adverse impact should not occur and that, where a noise level falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect:

¹ Department for Environment, Food and Rural Affairs (DEFRA), 2010. Noise Policy Statement for England.

“... all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur.”

2.2 World Health Organisation ‘Guidelines for Community Noise’

Table 1 of the WHO document *Guidelines for Community Noise*² recommends the following limits when assessed in or near to a dwelling:

- i) 50-55 dB $L_{Aeq,(16\text{ Hour})}$ in outdoor living environments during day and evening periods;
- ii) 35 dB $L_{Aeq,(16\text{ Hour})}$ in indoor living areas during day and evening periods;
- iii) 30 dB $L_{Aeq,(8\text{ Hour})}$ in bedrooms during the night time period.

Note that with reference to the third criterion above, the guidelines state “At night-time, outside sound levels about 1m from facades of living spaces should not exceed 45 dB L_{Aeq} , so that people may sleep with bedroom windows open. This value was obtained by assuming that the noise reduction from outside to inside with the window open is 15 dB.”

2.3 British Standard 8233: 2014

BS8233 provides guidance on internal ambient levels that should be achieved within different spaces, of dwellings for day and night-time. These largely agree with the noise level recommended by the WHO above. An extract from BS8233 is provided in Table 1.

Table 1: BS8233:2014 – Indoor ambient noise levels for dwellings

Activity	Location	Day time 07:00 to 23:00 hours	Night-time 23:00 to 07:00 hours
Resting	Living room	35 dB $L_{Aeq,16h}$	-
Dining	Dining Room / area	40 dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$

2.4 Consultation and criteria used within this assessment

The Environmental Health Department at Barnsley MBC was contacted to discuss suitable criteria for the development scheme. It was agreed that the development should aim to achieve the following criteria:

² Berglund et al. (1999) - *Guidelines for Community Noise*. Geneva, World Health Organisation (WHO)

Table 2: Assessment criteria

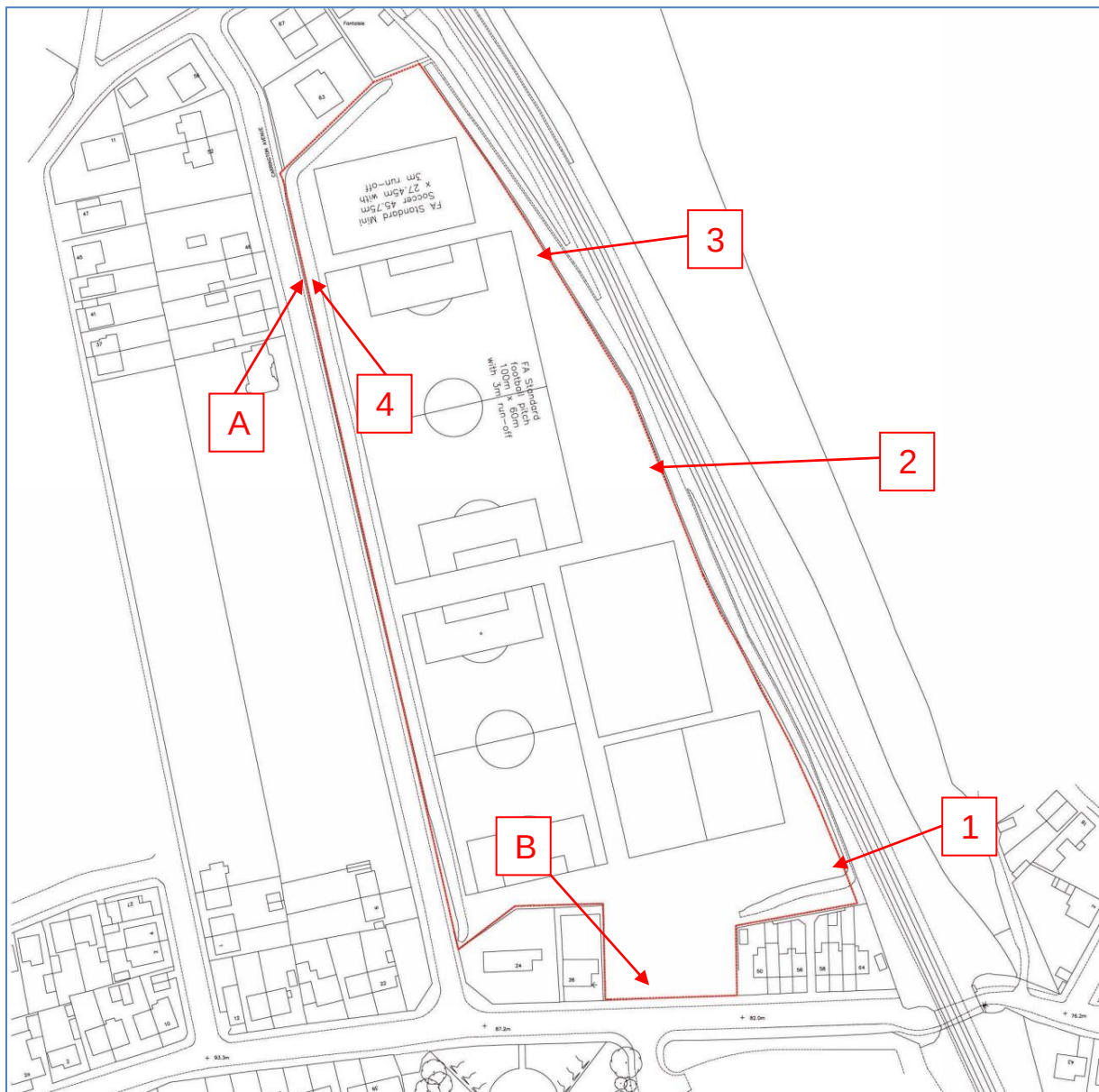
Area	Day time 07:00 to 23:00 hours	Night-time 23:00 to 07:00 hours
Bedrooms	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$
Living Rooms	35 dB $L_{Aeq,16h}$	-
External areas	55 dB $L_{Aeq,16h}$	-

3. Environmental Noise Survey

3.1 Survey Details

A short-term baseline environmental noise survey has been carried out on 6 June 2014 from 05:45 to 12:30 using the equipment listed in Table 3 at the locations shown in Figure 1 in order to determine the typical noise climate across the site.

Figure 1 Monitoring Positions



The noise monitoring positions were all approximately 1.2m above local ground level and are described as follows:

Location	Description
A	At top of bank to west of site, approximately 5 metres from Carrington Avenue
B	At boundary to south of site, approximately 7 metres from Honeywell Lane
1	Near southeastern corner of site, approximately 11 metres from rail line
2	Near eastern boundary of site, approximately 7 metres from rail line
3	Near northeastern corner of site, approximately 8 metres from rail line
4	At bottom of bank to west of site adjacent to Position A

Weather conditions were warm and dry with occasional light winds. The conditions were considered suitable for the noise survey.

The baseline noise survey was carried out using the following equipment:

Table 3: Survey Equipment

Equipment	Manufacturer	Model	Serial Number
Sound Level Meter (Position A)	Rion	NL-52	00821377
Sound Level Meter (Position B)	Rion	NL-52	00821129
Sound Level Meter (Positions 1 – 4)	Rion	NL-52	00821130
Calibrator	Larson Davis	CAL200	1046

The calibration of the sound level meters was checked before and after the survey period, with no significant change in sensitivity observed.

3.2 Site description

The site is currently occupied by playing fields which we understand are occasionally used at weekends. It is bounded by the Hallam rail line to the east, local roads (Carrington Avenue to the west and Honeywell Lane to the south), and existing houses to the north.

3.3 Description of noise climate

During the noise survey, Carrington Avenue and Honeywell Lane both carried occasional traffic, which dominated noise levels to the south and west of the site. Cars idled for short periods on Honeywell Lane approaching a traffic light at the railway bridge.

The Hallam rail line carries 6 – 8 trains per hour during the daytime, with some early morning trains starting at approximately 05:20 hours and evening trains until approximately midnight.

Railway noise dominates the noise climate to the east of the site. Network Rail has confirmed that no freight trains use this line³.

Between vehicle/train movements, distant noise from the M1 motorway and A635 (Huddersfield Road) was audible.

3.4 Measured Noise Levels

The following noise levels were measured during the noise survey:

Table 4: Measured Noise Levels at Positions A and B

Start time (hh:mm)	Duration (mins)	Measured Noise Levels, dB			
		Position A		Position B	
		L _{Aeq,T}	L _{Amax}	L _{Aeq,T}	L _{Amax}
05:45	15	46	60	-	-
06:00	60	40	82	49	75
07:00	60	45	82	39	75
08:00	60	46	82	46	77
09:00	60	42	82	48	79
10:00	60	45	79	52	76
11:00	60	43	82	42	79

Table 5: Measured Noise Levels at Positions 1 – 4

Position	Start time	Measured Noise Levels, dB	
		L _{Aeq(30 min)}	L _{Amax}
1	10:49	41	89
2	11:21	46	86
3	11:55	44	85
4	12:26	43	66

³ Email correspondence, Capita and Network Rail – 18 June 2014

4. Noise Model

Based on the noise levels measured, noise levels across the site have been modelled using Cadna/A Environmental Noise Modelling Software, version 4.4 which uses methodology given in ISO 9613. These predicted noise levels across the site are shown in Figure 2 and Figure 3 below.

Figure 2: Predicted free field equivalent daytime $L_{Aeq,T}$ at proposed development site



Figure 3: Predicted free field equivalent night-time (06:00-07:00) $L_{Aeq,T}$ at proposed development site



5. Assessment

5.1 External Noise Levels

Our noise model shows that L_{Aeq} noise levels across the majority of the site are typically well below WHO external noise guidelines for day- and night-time.

5.2 Internal Noise Levels

Based on the external noise levels, internal L_{Aeq} levels of 30 dB during night-time hours and 35 dB during the day will be met by typical constructions and will not require any additional noise mitigation.

However, L_{Amax} levels from road and rail traffic were typically measured at around 82 – 85 dB at positions adjacent to Carrington Avenue and the Hallam rail line with one L_{Amax} level reaching 89 dB adjacent to the Hallam rail line. Trains are scheduled between approximately 05:45 and 00:00 and therefore these L_{Amax} levels are anticipated to only occur in the first hour and last 75 minutes of the night-time period.

L_{Amax} levels were typically around 75 – 78 dB towards the south of the site adjacent to Honeywell Lane.

Bedrooms along Carrington Avenue and the rail line would therefore require some noise mitigation measures in order to protect against occasional internal L_{Amax} levels above 45 dB during night-time hours, including some or all of the following:

- Positioning houses further back from these noise sources, for example by placing garden areas adjacent to the road and rail.
- Placing bedroom windows and ventilation openings only on non-critical facades, i.e. not facing Carrington Avenue or the rail line. This could include a single-aspect design for these rows of houses
- Up-rated double glazing and attenuated natural ventilation

By incorporating these measures, the WHO recommendation of 45 dB L_{Amax} should be met for the majority of bedrooms along these critical boundaries.

6. Conclusions

A new housing development is proposed on playing fields off Carrington Avenue, Barnsley. This report describes the results of a baseline environmental noise level survey at the proposed site and mitigation measures required to houses along Carrington Avenue and the Hallam rail line in order to meet internal noise levels discussed with Barnsley EHO.

Noise levels from local roads and the Hallam rail line are indicated to meet the proposed external noise criterion for private gardens in all areas.

No noise-related constraints have been identified that would justify the refusal of this planning application.

Appendix A Glossary of Terms

DECIBEL

The ratio of sound pressures which we can hear is a ratio of $10^6:1$ (one million:one). For convenience, therefore, a logarithmic measurement scale is used. The resulting parameter is called the 'sound pressure level' (L_p) and the associated measurement unit is the decibel (dB). As the decibel is a logarithmic ratio, the laws of logarithmic addition and subtraction apply.

FREQUENCY

The repetition rate of a sound wave. The subjective equivalent in music is pitch. The unit of frequency is the Hertz (Hz), which is identical to cycles per second. A thousand hertz is often denoted kHz, e.g. 2 kHz = 2000 Hz. Human hearing ranges approximately from 20 Hz to 20 kHz. For design purposes, the octave bands between 63 Hz to 8 kHz are generally used. The most commonly used frequency bands are octave bands, in which the mid frequency of each band is twice that of the band below it.

NOISE INDICES

Noise indices recorded during a survey that are of relevance to BB93 include the following:

$L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.

$L_{Amax,T(F,S)}$ The A-weighted maximum sound pressure level over period of time T, with fast or slow time weighting.

$L_{A1,T}$ The arithmetic mean of the A-weighted sound pressure level exceeded for 1% of the measurement period, T. Indicative of the maximum noise levels.

L_{A10} The arithmetic mean of the A-weighted sound pressure level exceeded for 10% of the measurement period, T. L_{A10} is the index generally adopted to assess traffic noise.

$L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period, T. L_{A90} is widely accepted as indicative of the background noise level.

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

REVERBERATION TIME ($RT_{60, Tmf}$)

Reverberation time is the time taken in seconds for the sound level within a space to decay by 60 dB and an important indicator of the subjective acoustic quality within a room. Reverberation time can be measured using the procedures set out in BS EN ISO 3382:2001 Acoustics – Measurement of the reverberation time of rooms with reference to other acoustical parameters.

SOUND ABSORPTION AND SOUND ABSORPTION COEFFICIENT

When sound waves strike a material, some of the sound energy is absorbed and the remaining energy is reflected. The ability of a material to absorb sound is expressed in terms of sound absorption coefficient. The sound absorption coefficient (α) is the percentage of sound absorbed by the material. If a material has $\alpha = 0.8$ at 500 Hz it means that 80% of the sound is absorbed at this frequency. Sound absorption can be measured using the procedures set out in BS EN 20354 Acoustics – Measurement of sound absorption in a reverberation room. Single figure descriptors include the practical sound absorption coefficient (α_p) and weighted sound absorption coefficient (α_w) as defined in BS EN ISO 11654:1997 Acoustics – Sound absorbers for use in buildings - Rating of sound absorption. Other commonly used terms (in the USA) are NRC (Noise Reduction Coefficient) which is the arithmetic average of α at 250 Hz, 500 Hz, 1 kHz and 2 kHz rounded to the nearest 5%.

AIRBORNE SOUND

Sound in the air is generated by a material vibrating which in turn causes air molecules to vibrate and create a sound wave. For example, sound produced by a loudspeaker in a room can be classified as 'airborne' sound.

AIRBORNE SOUND INSULATION

Airborne sound insulation is the ability of a material or room to contain sound within it, or exclude sound from it.

This is commonly measured in terms of sound reduction index, being the ratio of sound transmitted by the material to that incident upon it. Airborne sound insulation can be measured using the procedures set out in BS EN ISO 140-3:1995 Acoustics – Laboratory measurement of airborne sound insulation of building elements and BS EN ISO 140-4:1998 Acoustics – Field measurements of airborne sound insulation between rooms.

SOUND LEVEL DIFFERENCE (D)

The sound insulation required between two spaces may be determined by the sound level difference (D) between them. Single figure descriptors include the weighted sound level difference (D_w) and the normalised weighted sound level difference (D_{nT_w}) as defined in BS EN ISO 717-1:1997 Acoustics – Rating of sound insulation in buildings and of building elements. Part 1. Airborne sound insulation. In the context of BB93 the sound level difference is normalised to the recommended reverberation time (T_{mf}) of the room, and expressed $D_{nT(T_{mf,max}),w}$.

SOUND REDUCTION INDEX (R)

The sound reduction index, R, (or transmission loss) of a building element is a measure of the loss of sound through the material, i.e. its attenuation properties. It is a property of the component, unlike the sound level difference which is affected by the common area between the rooms and the acoustic of the receiving room. Airborne sound insulation can be measured using the procedures set out in BS EN ISO 140-3:1995 Acoustics – Laboratory measurement of airborne sound insulation of building elements.

WEIGHTED SOUND REDUCTION INDEX (R_w) AND APPARENT WEIGHTED SOUND REDUCTION INDEX (R'_w)

The weighted sound reduction index, R_w , is a single figure description of sound reduction index which is defined in BS EN ISO 717-1: 1997. The R_w is calculated from measurements in an acoustic laboratory to BS EN ISO 140-3:1997 and ratings to BS EN ISO 717-1:1997. Sound insulation ratings derived from site (which are invariably lower than the laboratory figures) are referred to as the R'_w ratings and measured to BS EN ISO 140-4:1998.

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