Cole Jarman

Dearne Hall Road, Barnsley

Planning Noise Assessment

Report 13/0190/R1 // REVISION 3

Dearne Hall Road, Barnsley

Planning Noise Assessment

Report 13/0190/R1 // REVISION 3

Commercial Estates Projects

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Station Parade
Harrogate
HG1 1TS

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Issue	Description	Date	Prepared by	Checked by
1	1st Issue	22 February 2013	Matthew Heyes	Tom Zarebski
2	Revision 1	13 March 2013	Matthew Heyes	
3	Revision 2	13 March 2013	Matthew Heyes	
4	Revision 3	13 March 2013	Matthew Heyes	

Prepared by

Checked by

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1 Introduction

1.1 It is proposed to develop the land at Dearne Hall Road, Barnsely into a new residential development. The site is located next to an existing electrical substation, an industrial estate, a railway line and local roads.

1.2 Cole Jarman have been asked to conduct a noise survey at the site in order to establish the existing noise levels.

1.3 This report provides details of the noise survey conducted at the site and provides suitable guidance on the assessment of low frequency noise generated by the substation. The report then calculates the low frequency noise levels within the proposed houses and compares them to suitable standards to see if the low frequency noise should be considered to be an issue.

1.4 The report has also assessed the noise impact from other noise sources which are audible around the site and follows guidance provided in the NPPF and BS8233 to establish suitable internal noise limits. Performance requirements for the glazing and ventilation have been specified which will allow the noise requirements to be achieved.

2 Site Description and Proposed Development

2.1 General

2.1.1 The proposed development site comprises approximately 10ha of arable land located to the south east of Dearne Hall Road, Barnsley.

2.1.2 To the north west of the site are existing residential properties located on Dearne Hall Road (B6428). Running along the eastern boundary of the site is a railway line and beyond that is more farm land.

2.1.3 To the south east of the site is an electrical substation. To the south is an industrial area which includes a distribution centre, MOT garage and car sales yard. To the west of the site are residential dwellings located on the A637.

2.2 Existing Noise Sources

2.2.1 The general noise climate across the site is dominated by road traffic noise from cars on local roads. Noise from the industrial area is noticeable close to the southern boundary of the site, and occasional trains influence noise levels on the eastern boundary of the site.

2.2.2 Low frequency noise from the electrical substation is also clearly audible within the south eastern section of the proposed development site.

2.3 Proposed Development

2.3.1 It is proposed to build on around 5ha of the overall site. The development will be located primarily towards the north and western side of the site with dedicated habitat and open space along the railway line on the eastern boundary of the site.

3 Planning and Noise

3.1 National Planning Policy Framework

3.1.1 The recently published National Planning Policy Framework (NPPF) replaces much of what previously existed with regard to planning guidance, including PPG24: Planning and Noise. The NPPF is now the relevant document for defining the national policy toward noise sensitive development. It refers to the Noise Policy Statement for England (NPSE).

3.1.2 PPG24 permitted noise sensitive development in areas subject to low levels of environmental noise while discouraging noise sensitive development in areas subject to high levels of environmental noise. The current policy on sustainable development can be considered as subtly altering the emphasis. The development of a quiet, rural site is by most measures less sustainable than the development of a busy, urban site and the rating of development sites based on prevailing noise levels should now reflect this.

3.1.3 Specifically on the subject of noise, paragraph 123 of NPPF 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 business 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, 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.

3.1.4 Paragraph 123 references to the Noise Policy Statement for England, and no other particular standards.

3.1.5 On the general issue of amenity, paragraph 17 states that planning should:

Always seek to secure high quality design and a good standard of amenity for all existing and future occupants of land and buildings

3.2 Noise Policy Statement for England

3.2.1 This document does not set quantitative guidelines for the suitability of noise sensitive development in an area depending on the prevailing levels of noise. Absent, therefore, is reference to specific noise thresholds (e.g. the Noise Exposure Categories as defined in PPG 24) which determine whether noise sensitive development is suitable and, if so, whether particular mitigation factors need to be considered.

3.2.2 Instead, the NPSE sets out three aims:

The first aim of the Noise Policy Statement for England

Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

The second aim of the Noise Policy Statement for England

Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

The third aim of the Noise Policy Statement for England

Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

3.2.3 In essence, therefore, each development site must be judged on its ability to deliver on each of these aims, and while rating the prevailing noise against predefined thresholds is no longer necessary, defining the prevailing noise levels is an essential first step in assessing a given site under the current regime.

3.3 Planning Guidance PPG24 (Revoked)

3.3.1 As noted above, DoE document Planning Policy Guidance 24: Planning and Noise is no longer used to determine the suitability or otherwise of a given site for noise sensitive development.

3.3.2 However, reference documents cited in PPG 24 do have some relevance in developing policies for local authorities. We refer to these below

3.3.3 In PPG 24 there were certain sound level thresholds above which it was recommended that planning permission be refused for residential use. These thresholds were derived on the basis that it is necessary to achieve acceptable internal noise levels, together with a fundamental assumption was that there existed a maximum level of sound insulation which was achievable against external noise.

3.3.4 The maximum level of sound insulation that was applied to derive the external noise thresholds set out in PPG 24 was based on the technology then available for upgrading existing properties. Even at the time of its publication, new properties that incorporated higher standards of insulation were able to be developed. In addition, since then there have been developments in sound insulating products, meaning that it is feasible to design buildings that achieve good standards of internal amenity even when external noise levels are high.

3.4 Internal Noise

3.4.1 Buildings can be designed to achieve specific levels of insulation against external noise. It is reasonable, therefore, to set specific internal noise standards as the test of whether a development satisfies the requirements of the NPPF and the aims of the NPSE. In essence, these require a high quality design that achieves a good standard of amenity.

3.4.2 In Annex 6 to PPG 24 it states:

Guidance on suitable internal noise levels can be found in BS8233:1987.

3.4.3 This standard was updated in 1999, guidance in respect of indoor ambient noise levels is contained in Table 5 of the standard and tabulated below.

Typical situations	**Design Range $L_{Aeq,T}$ dB**	
	Good	**Reasonable**
Living rooms	30	40
Bedrooms[a]	30	35

T2 Target design indoor ambient noise levels for new dwellings

[a] For a reasonable standard in bedrooms at night, individual noise events (measured with F time weighting) should not normally exceed 45dBL_{Amax}.

3.4.4 The above design standards apply to the time period appropriate for the activity involved. The WHO document[1] on which the standards are based, identifies that the daytime noise standard applies to a normal 16 hour day while the night time noise standard applies to an 8 hour night. In BS8233 the night time period is classified as between 23h00 to 07h00.

[1] World Health Organisation: Guidelines for Community Noise, Berglund et al. 1999

3.4.5 A high quality design that achieves a good standard of internal amenity will ensure that night time noise levels inside bedrooms with windows closed will not exceed 30dB $L_{Aeq,8h}$. The level of sound insulation achieved by the building shall be determined accordingly.

3.4.6 With respect to night-time L_{Amax} noise levels, a High Court Ruling in 1996 on an appeal against the Secretary of State for the Environment clarified the point that "several times in any hour" should be interpreted as "more than two in any hour". The WHO study derived the 45dB $L_{Amax,F}$ night time noise standard on the basis of 10 to15 occurrences per night.

3.4.7 On this basis the aim shall be to ensure that $L_{Amax,F}$ values for **typical** intermittent noise events, rather than occasional or one-off noise events, shall not exceed 45dB in bedrooms.

3.4.8 To achieve 'good' internal noise levels as set out in BS8233 would require designing to the same average noise levels of 30dB $L_{Aeq,T}$ in both the daytime and night time periods. Clearly people are more sensitive to noise intrusion during the night time than the daytime. For this reason the following noise limits are proposed:

Daytime $L_{Aeq,16h}$ to all habitable rooms no greater than 35 dB.
Night time $L_{Aeq,8h}$ to all bedrooms no greater than 30 dB.
Night time typical L_{Amax} to all bedrooms not normally greater than 45 dB (excluding atypical events).
These noise levels represent 'good' night time noise levels, and a sensible compromise between 'good' and 'reasonable' during the daytime.

3.5 DEFRA NANR 45: Procedure for Assessment of Low Frequency Noise

3.5.1 Attached Appendix A outlines a procedure for assessment of low frequency noise, as set out under contract number NANR 45 for the Department of Environment, Food and Rural Affairs (DEFRA). The procedure is intended for use where complaints have been received about an existing low frequency noise, in order to identify whether the noise is present within a dwelling at a level that could reasonably give rise to disturbance to some individuals. It does not necessarily follow that the presence of the noise at such a level will in fact give rise to disturbance.

3.5.2 Although the DEFRA document states that the procedure would not be reliable if used to predict the likelihood of complaints at the planning stage, when the noise source and receptors are often not yet present, we believe that it represent a good means of indicating whether a low frequency problem may exist

3.5.3 The DEFRA standard is only applicable to internal noise levels within dwellings. Due to this the performance of the building façade and ventilation system can be used to reduce the noise levels to below the DEFRA curve.

3.5.4 We have therefore applied the procedure in the case of the existing electrical substation and proposed residences, in order to provide some guidance on whether low frequency noise is likely to be present at a level which could disturb some individuals. Although not specifically designed for this use we consider the DEFRA guidance to provide the best guidance to fully

take the low frequency content of the substation into account. We have therefore based our advice on a cautious but informative interpretation of the results.

3.5.5 The procedure includes a criterion curve, which can be relaxed for the daytime period and for steady noise sources. The existing substation falls within the definition of a steady noise source, as set out in Appendix A. The criterion curves for steady noise sources have therefore been used. This results in an internal criterion of 48 dB during the day and 43 dB at night (for the 100 Hz one-third octave band, which is the dominant frequency where the electrical substation is concerned).

3.6 External Noise Criteria

3.6.1 External areas cannot, by definition, be contained or benefit from the levels of noise mitigation that are available to internal spaces within buildings. As a consequence, design standards for external noise cannot be considered as thresholds that determine whether a high quality design has been implemented and a good level of amenity achieved. Rather, the external noise standards should be used to establish whether mitigation is appropriate as a means of minimising the adverse impacts of environmental noise.

3.6.2 Paragraph 7.6.1.2 of BS8233:1999 indicates that in external amenity spaces the steady noise levels should not exceed 50dB $L_{Aeq,T}$ and 55dB $L_{Aeq,T}$ should be regarded as an upper limit.

3.6.3 Therefore, when designing a dwelling or other noise sensitive development that incorporates gardens or other external amenity areas, the intent shall be to provide an area (or some areas) in which the noise levels are consistent with these standards. Where these standards cannot be achieved, then reasonable measures shall be employed to provide screening or other forms of mitigation so as to minimise the noise levels in the external amenity areas.

3.6.4 It is important to note that a Building Research Establishment study showed that, in their sample, 56% of existing homes in Britain were exposed to external noise levels above 55dB $L_{Aeq,T.}$ This demonstrates that this aim can only be considered to be an aspirational goal.

3.6.5 An important principle here is that sustainable development sites will often be exposed to relatively high levels of environmental noise, and while means are available to insulate internal spaces, they are not always available to protect external spaces. Strict adherence to the enforcement of such external noise criteria would preclude development in the majority of areas considered for development in urban environments or in areas in the vicinity of transportation noise sources.

3.6.6 This is why the external standards shall be viewed as targets or triggers of mitigation measures rather than thresholds not to be exceeded in all circumstances.

3.7 Summary

3.7.1 The noise levels from local roads, the railway and the industrial noise sources shall be compared to the internal noise requirements stated within BS8233 in order to establish the suitability of the site.

3.7.2 Where low frequency noise from the substation is concerned the best guidance available is DEFRA NANR 45: Procedure for Assessment of Low Frequency Noise. This is because the standard adequately takes account of the impact of low frequency noise from the substation within the nearest residential dwellings.

4 Environmental Noise Survey

4.1 **Methodology and Equipment**

4.1.1 An unattended noise survey was conducted from Sunday 3rd February to Thursday 7th February 2013 in order to establish the existing noise levels at the site.

4.1.2 Noise monitors were setup at three positions as shown in attached site plan 13/0190/SP1 and described below:

- L1 – Free field measurement position located 1.5m above ground level in the northern most corner of the proposed residential area of the site. Noise levels at this position were dominated by road traffic noise from local roads and the maximum noise levels were affected by occasional trains. The trains were noted to generally be small 2-3 carriage commuter trains.
- L2 – Free field measurement position located 4m above ground level in the south eastern corner of the site. The measurement position was selected to be representative of the noise levels at the nearest proposed residential façade to the substation. Noise levels at this position were dominated by noise from the substation. Train pass-bys and road traffic noise were also audible at this position.
- L3 - Free field measurement positions located 1.5m above ground level in the southern boundary of the site. This position was selected to the representative of the nearest proposed residential façade to the industrial area located on the southern boundary of the site. Noise levels at this location were dominated by road traffic noise from local roads. Maximum noise levels from within the industrial area were also recorded.

4.1.3 Attended measurements were also taken over three consecutive 1 hour periods at MP1 during the day on the 7th February. This was a free field position located 1.5m above ground level in the north western corner of the site. Noise levels at this location were dominated by road traffic noise.

4.1.4 Additional short-term attended measurements were taken on the 7th February in a selection of free field locations, each at 1.5m above ground level as shown on attached site plan 13/0190/SP1. These were used to establish the noise impact of the electrical substations at various locations. Some of these were located close to the substation to establish the noise level generated by the substation. Others were located around logging position L2 and close to the southern boundary of the site where the nearest proposed facades are to be located.

4.1.5 All measurements were made in terms of L_{Aeq}, L_{Amax} and $L_{A90.}$ The attended and unattended measurements were made over 30 seconds and 15 minute periods respectively.

4.1.6 The instrumentation used for the noise measurements is detailed in table T3.

Item	Manufacturer	Type
Sound Level Analyser x2	Norsonic	140
Sound Level Analyser	Norsonic	118
Acoustic Calibrator	Norsonic	1251

T3 Equipment used during noise surveys.

4.1.7 The sound level analysers were fitted with windshields. Calibration was carried out before and after the survey and no significant drift was noted to have occurred.

4.1.8 Weather conditions when setting up the unattended noise monitors were dry, cold and overcast and with occasional high wind speeds. Publically available weather data obtained from www.wunderground.com shows that rain fell on Monday night and during the day on Tuesday.

4.1.9 Weather during the attended survey was dry and cool with clear skies and a light breeze.

4.1.10 Due to the adverse weather conditions at the beginning of the survey the noise measurements results for use in the assessment have been taken from a 24 hour period starting from Wednesday 6th 2013.

4.2 Measurement Results

4.2.1 The noise climate, during the attended survey and when setting up the noise loggers, varies across the site. Road traffic noise, from local roads, is audible across the whole site with noise levels in the south eastern corner being dominated by low frequency noise generated within the electrical substation.

4.2.2 Occasionally trains are audible across the site and bangs and thuds from the industrial area are audible to the south of the site.

4.2.3 Noise measurement results from logging positions L1-L3 are shown in attached time histories 13/0190/TH01-TH03 respectively.

4.2.4 The daytime and night time L_{Aeq} noise levels at each of the measurement positions during our noise survey are shown in the table below:

Location	Daytime 0700-2300, $L_{Aeq, 16h}$	Night time 2300-0700, $L_{Aeq, 8h}$
L1	55	49
L2	54	50
L3	54	49
MP1	53	-

T4 Day and night time L_{Aeq} measured noise levels

DEFRA NANR 45

4.2.5 Figure 13/0190/F1 shows the worst case Third octave band spectrum of the substation compared to the steady day and night time DEFRA curves. It can be seen from the graph that the night time DEFRA curve is exceeded between 50-125 Hz with the highest exceedance being at 100 Hz. This shows that the 100 Hz one-third octave band is entirely dominant and the others are insignificant in comparison. The DEFRA curves are included on this figure simply to illustrate that it is the 100 Hz band that is of importance in this case. The curves are intended to apply to internal noise levels within dwellings, not to this measurement location close to the transformers.

4.2.6 The 100 Hz noise levels at the attended measurement positions are shown on attached site plan 13/0190/SP2. Observations onsite indicated that noise levels in the 100 Hz band vary significantly with location. The reduction in noise level with distance from the substation is not always as great as might be expected. This is likely to be due to constructive interference of the sound waves from the two transformers at the substation. Care was therefore taken to undertake measurements at locations where such an effect was present, representing the worst cases. At many other locations, the apparent constructive interference was not present. Furthermore at many other locations, apparent destructive interference was present, leading to dramatically reduced noise levels.

4.2.7 In order to ensure that our assessment is based on a worse case position we have based our calculations on measurements where constructive interference is present. This means that where new residential facades are built in locations where constructive interference is not present the noise levels will be lower than predicted.

5 BS8233 Assessment

5.1 Day Time

5.1.1 The measured noise levels across the site shown in table T4 in the noise measurement results section above shows that the noise levels within proposed worst case gardens across the site will be below 55 dB$L_{Aeq,\ 16h}$ and are deemed acceptable.

5.1.2 Where gardens are located near the middle of the proposed site the surrounding houses will provide screening from the existing noise sources. In these areas the noise levels within gardens are expected to be below 50 dB $L_{Aeq,16h}$.

5.1.3 Day time noise levels of 35 dB $L_{Aeq,16h}$ within the proposed residential dwellings will be achievable with typical thermal double glazing and acoustically treated trickle vents. The full specification for the glazing and vents are provided within section 7 below.

5.2 Night Time

5.2.1 The free field $L_{Aeq,\ 8h}$ noise levels across the site at night as measured at the logging positions varies between 49-50 dB. A '*good*' internal ambient noise level is achievable using typical thermal double glazing. To reduce the need to open the windows alternative means of ventilation will also need to be provided. The full specification for the glazing and vents are provided within the section 7 below.

5.2.2 The measured $L_{Amax,F}$ maximum noise levels that are typical of intermittent events during the night time are in the order of:

L1: 64 dB(A)
L2: 67 dB(A)
L3: 64 dB(A)

5.2.3 To control noise from the industrial area within proposed houses near to monitoring position L3 it will be necessary to increase the performance of the ventilation system. Details of the required vent performance are provided within section 7 below.

6 Low Frequency Noise Assessment

6.1 Assessment

6.1.1 The highest 100 Hz one-third octave band noise level measured in line with the proposed residential facades has been used within our assessment to ensure a worst case assessment. The calculations and assessments have been undertaken solely in the 100 Hz one-third octave band, since the detailed observations and measurements onsite indicate that this frequency is entirely dominant and others are insignificant in comparison.

6.1.2 The highest 100 Hz noise level at the nearest proposed façade is 63 dB.

6.1.3 An assessment of noise break-in has been carried out against the DEFRA low frequency noise curves, as discussed in section 3.5 above and contained in the attached Appendix A.

6.1.4 The assessment considers noise within dwellings and has been used to specify glazing requirements in order to avoid breaching the DEFRA curve.

6.1.5 It is assumed that the proposed dwellings will be of cavity masonry construction. Taking this into account our, calculations show that the glazing to rooms which have an "acoustic view" of the transformers must have a sound reduction performance as below;

- **24 dB at 100Hz 1/3 octave band centre frequency, as installed**

6.1.6 We expect that this can be achieved by installing high performance thermal double glazing (such as Pilkington R_w45), but it is essential the glazing selected is tested in a laboratory in its complete condition, including any integral trickle vents and the acoustic performance of the system proposed demonstrated to the satisfaction of the consultant.

6.1.7 The exact locations and performance of the higher rated glazing will need to be checked when the housing layout master plan has been fully developed.

6.1.8 To minimise the need to open habitable room windows, alternative means of ventilation should be provided. The requirements for the passive ventilation system is provided in section 7.

6.1.9 The layout of the proposed houses will have a large impact on the impact from the electrical substation. Where possible habitable rooms should be placed on the façade facing away from the substation. Planning the house locations so that the gardens are screened from the substation by the house itself will help to minimise the effect of low frequency noise within external garden spaces.

6.2 Room Modes

Mechanism

6.2.1 The phenomenon of room modes is a complex one, which has the potential to affect noise levels within any room in a dwelling.

6.2.2 Room modes arise when unobstructed sound waves reflecting off room surfaces interact with each other. The interaction of the waves can give rise to sound levels that differ substantially from those in the absence of the particular room mode that may be evident. This effect works both ways, with sound levels at some locations potentially being higher and some lower than those in the absence of the mode.

6.2.3 The presence of room modes and the frequencies at which they occur is dependent upon the dimensions of the space and the materials in it.

Axial Modes

6.2.4 The simplest room modes are axial modes, which can occur when sound waves reflecting perpendicularly off two parallel and opposite surfaces interact.

6.2.5 Axial modes are the strongest of the mode types and are therefore of primary concern.

Tangential Modes

6.2.6 Tangential modes can occur when sound waves reflecting off four room surfaces interact. Tangential modes are weaker than axial modes and are therefore of less concern.

Oblique modes

6.2.7 Oblique modes can occur when sound waves reflecting off all six surfaces in a room interact. These are the weakest of the three types of room mode and are therefore of least concern.

Required Assessment

6.1 It will be necessary to conduct an assessment of room modes within the rooms with a view of the substation in order to ensure that they do not occur around the 100 Hz frequency. This will need to be done when the design of the proposed rooms is advanced to a stage where the exact room dimensions and locations are known.

7 Required Mitigation Measures

7.1.1 An overview of the required mitigation measures which will need to be installed around at the site is provided below. This is based on the BS8233 and DEFRA NANR 45 assessments detailed in sections 5 and 6 above.

7.1.2 The following table details the minimum sound reduction requirements of all the glazing within the proposed development. The requirements have been based on typical room dimensions and a cavity masonry façade construction:

Insertion Loss Required	**Octave Band Centre Frequency (Hz)**				
	125	**250**	**500**	**1k**	**2k**
Glazing Type 1 (Typical of 6/16/4mm glazing)	22	22	28	39	39
Glazing Type 2* (Typical of R_W 45mm glazing)	24	22	28	39	39

T5 Recommended standard and higher performance glazing insertion losses

*In addition to the octave band requirements shown in the table the manufacture must demonstrate that the system as a whole achieved a minimum sound reduction of 24 dB at 100Hz 1/3 octave band centre frequency.

- Glazing Type 1 is to be installed within all facades which have a minimum of line of sight screening to the substation. This screening is to be provided by other houses within the development.
- Glazing Type 2 is to be installed within all facades which are unscreened from the substation.

7.1.3 It is essential the any glazing selected is tested in a laboratory in its complete condition, and the acoustic performance of the system proposed demonstrated to the satisfaction of the consultant.

7.1.4 It will also be necessary to include acoustically attenuated passive ventilation in order to achieve suitable ventilation rates along with the internal noise levels. The required performance of all vents are shown in the table below:

$D_{n,e,w}$ required	Octave Band Centre Frequency (Hz)				
	125	250	500	1k	2k
Ventilation Type A (Passivent Fresh 100 dB)	40	38	39	41	50
Ventilation Type B (Typical of $D_{n,e,w}$ 31 dB vents)	19	22	25	33	41

T6 Recommended ventilation losses

- Ventilation Type A is to be installed to ventilate rooms which are unscreened from either the industrial area on the eastern boundary of the site or the electrical substation.
- Ventilation Type B is to be installed to ventilate all other rooms.

8 Conclusion

8.1 It is proposed to develop the land at Dearne Hall Road, Barnsley into a new residential development. The site is located next to an existing electrical substation, an industrial estate, railway line and local roads. This report has shown that the site is suitable for development for residential use in relation to the existing noise levels at the site.

8.2 An outline of the guidance which has been used to establish internal noise limits within the rooms from local noise sources has been provided within this report. Guidance on Low frequency noise from the substation has also been provided.

8.3 The report has shown that suitable internal noise levels can be achieved in all of the proposed residential dwellings using a mixture of typical thermal double glazing and Rw 45 glazing with acoustically treated trickle ventilation to reduce the requirements to open windows.

8.4 With the specified glazing and trickle vents installed noise levels within the proposed residences will be controlled to within suitable levels on all parts of the proposed development area on the site.

End of Section



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Figure 13/0190/SP1

Title:

Site plan showing noise monitoring positions

L# Long Term Monitoring Position

MP# Attended Position

Project:

Dearne Hall Road, Barnsley

Date: March 2013

Revision: 1

Scale: Not to scale

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Figure 13/0190/SP2

Title:

Site plan showing 100Hz attended noise measurement results

dB Measured 100Hz level

Project:

Dearne Hall Road, Barnsley

Date: March 2013

Revision: 1

Scale: Not to scale

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Noise Survey Results

Measurement Position MP1

Period	L_{Aeq}	L_{Amax}	L_{A90}
07/02/2013 10:15	54	69	50
07/02/2013 10:30	54	69	50
07/02/2013 10:45	53	68	50
07/02/2013 11:00	54	70	49
07/02/2013 11:15	52	65	50
07/02/2013 11:30	52	62	49
07/02/2013 11:45	55	71	50
07/02/2013 12:00	56	76	50
07/02/2013 12:15	54	71	51
07/02/2013 12:30	52	62	50
07/02/2013 12:45	52	65	50

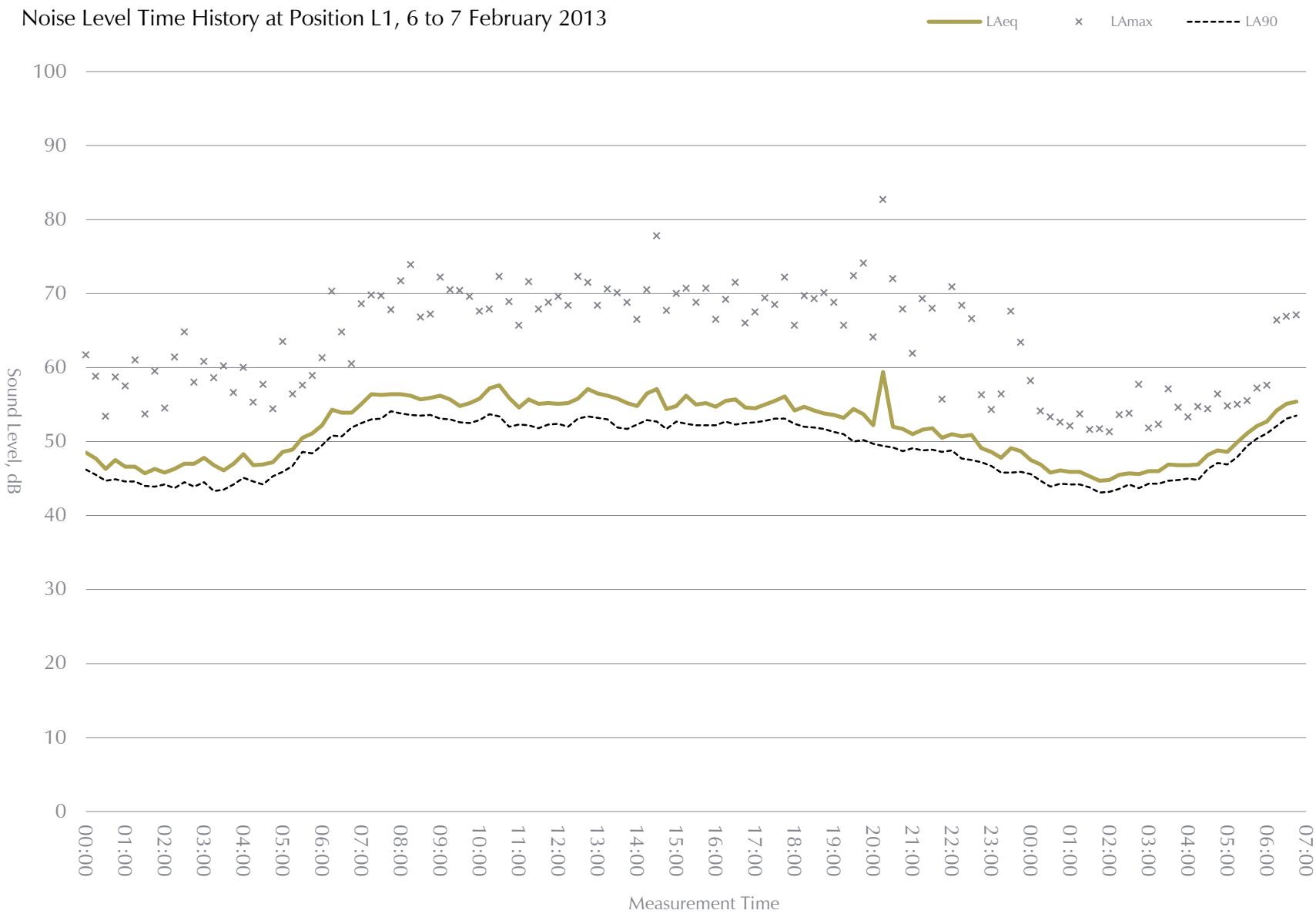


Figure 13/0190/TH01

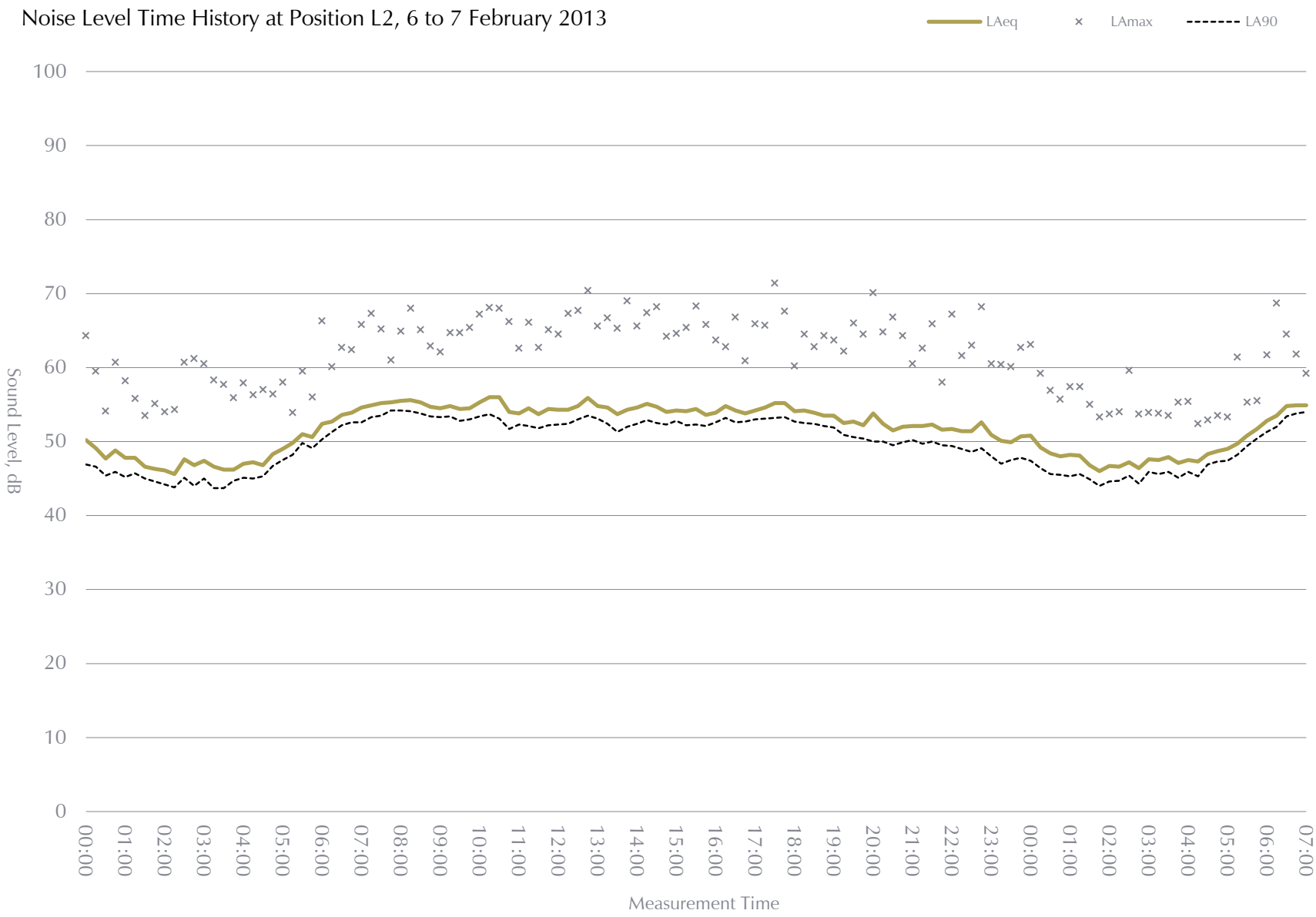


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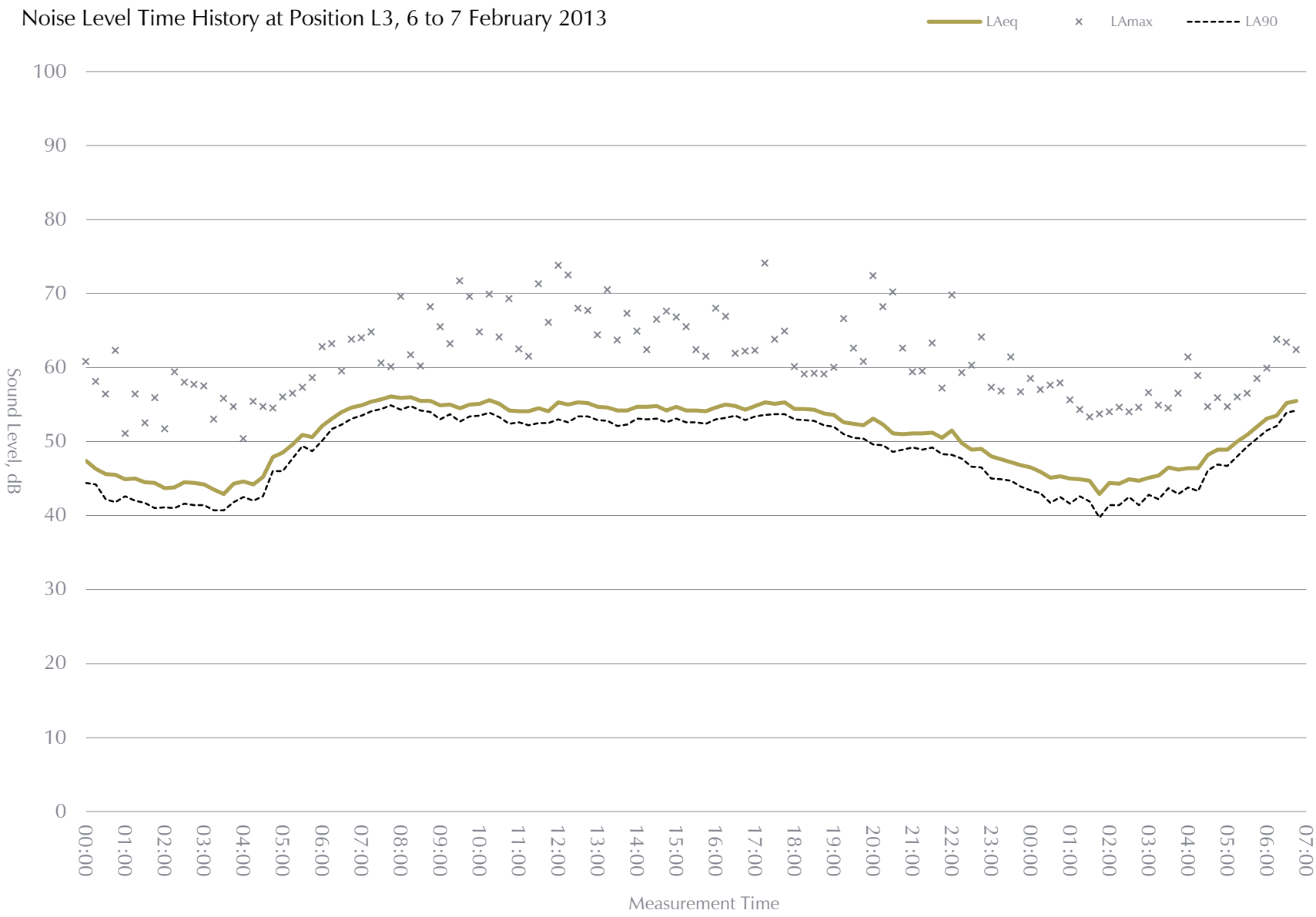


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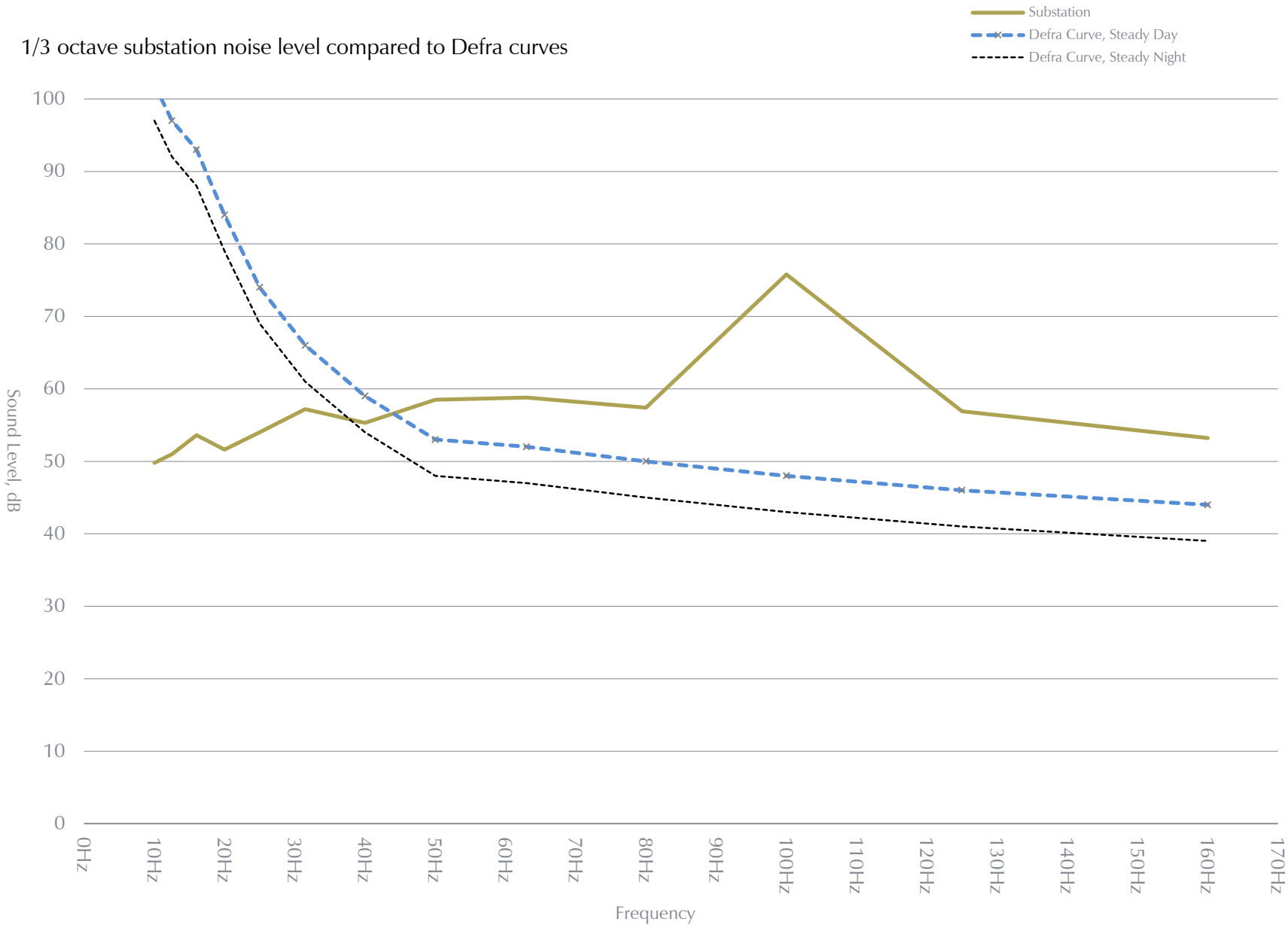


Figure 13/0190/F1

Glossary of Acoustic Terms

L_{Aeq}:

The notional steady sound level (in dB) which over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measurement over that period. Values are sometimes written using the alternative expression dB(A) L_{eq}.

L_{Amax}:

The maximum A-weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise when occasional loud noises occur, which may have little effect on the L_{Aeq} noise level. Unless described otherwise, L_{Amax} is measured using the "fast" sound level meter response.

L_{A10} & L_{A90}:

If non-steady noise is to be described, it is necessary to know both its level and degree of fluctuation. The L_{An} indices are used for this purpose. The term refers to the A-weighted level (in dB) exceeded for n% of the time specified. L_{A10} is the level exceeded for 10% of the time and as such gives an indication of the upper limit of fluctuating noise. Similarly L_{A90} gives an indication of the lower levels of fluctuating noise. It is often used to define the background noise.

L_{A10} is commonly used to describe traffic noise. Values of dB L_{An} are sometimes written using the alternative expression dB(A) L_n.

L_{AX}, L_{AE} or SEL

The single event noise exposure level which, when maintained for 1 second, contains the same quantity of sound energy as the actual time varying level of one noise event. L_{AX} values for contributing noise sources can be considered as individual building blocks in the construction of a calculated value of L_{Aeq} for the total noise. The L_{AX} term can sometimes be referred to as Exposure Level (L_{AE}) or Single Event Level (SEL).

Appendix A

Subject:	**DEFRA NANR 45:** **Procedure for the assessment of low frequency noise complaints**
Project:	**Dearne Hall Road, Barnsley**
Date:	**February 2013**

A1 Objective and Scope

A1.1 The DEFRA *Procedure for the Assessment of Low Frequency Noise Complaints* (with contract reference NANR45) is intended to aid the evaluation of existing cases by determining whether a low frequency environmental noise exists that could be the cause of complaints.

A1.2 The document makes clear that the procedure set out is not intended as a means of predicting when disturbance might occur. It states that the procedure would not be reliable if used in such contexts, for example at the planning stage.

A1.3 The procedure is not intended to provide a prescriptive indicator of nuisance.

A1.4 Also excluded from the scope of the procedure is the assessment of noise from traffic and from entertainment.

A1.5 The procedural document was published in February 2005 and refers to a larger NANR 45 document entitled *Proposed Criteria for the Assessment of Low Frequency Noise Disturbance*, which was published shortly beforehand.

A1.6 It also refers to a Review of Published Research on Low Frequency Noise and its Effects carried out for DEFRA and published in May 2003.

A2 Assessment Basis

A2.1 The procedural document presents a criterion curve, against which measured environmental noise can be assessed in terms of L_{eq}. The document states that if the noise occurs during the day only then a 5 dB relaxation may be applied to the criterion at each 1/3-octave band centre frequency. The criterion curve for each of the day and night periods are set out in the table below.

Period	One Third Octave Band Centre Frequency (Hz)												
	10	**12.5**	**16**	**20**	**25**	**31.5**	**40**	**50**	**63**	**80**	**100**	**125**	**160**
Night	92	87	83	74	64	56	49	43	42	40	38	36	34
Day	97	82	88	79	69	61	54	48	47	45	43	41	39

BT1 Criteria for fluctuating sounds

A2.2 The procedure indicates that a noise with an L_{eq} exceeding the criterion at any 1/3-octave band centre frequency has the potential to give rise to complaints (but will not necessarily do so). The intention is then that the measured time variation of the L_{eq} is plotted for the 1/3-octave band which exceeds the criterion curve by the greatest margin.

A2.3 The document also states that the criterion curve should be relaxed by 5 dB for steady sounds, to take account of the fact that such sounds are usually less disturbing than those that vary with time. The larger research document (*Proposed Criteria for the Assessment of Low Frequency Noise Disturbance)* defines a steady sound as one exhibiting either of the following characteristics in the 1/3-octave band which exceeds the reference curve values by the greatest margin:

- a difference of less than 5 dB between the L_{10} and L_{90} parameters relating to that sound; or
- the rate of change of sound pressure level (fast time weighting) is less than 10 dB per second.

A2.4 Based upon the above we set out criterion curves for steady sounds in the table below.

Period	One Third Octave Band Centre Frequency (Hz)												
	10	**12.5**	**16**	**20**	**25**	**31.5**	**40**	**50**	**63**	**80**	**100**	**125**	**160**
Night	97	82	88	79	69	61	54	48	47	45	43	41	39
Day	102	97	93	84	74	66	59	53	52	50	48	46	44

BT2 Criteria for steady sounds

End of Section

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