

Skimmingdish Lane, Bicester

Noise

Report 15/0240/R1

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Noise

Report 15/0240/R1

Albion Land

The Stables
Holdenby house
Holdenby
Northampton
NN6 8DJ

Issue	Description	Date	Prepared by	Checked by
5	Final	2 June 2015	Ian Yates	Lee Montague

Prepared by

Checked by

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2 June 2015

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Attachments

15/0240/F1

Plan indicating noise measurement positions and assessment positions

15/0240/TH1

Results of unattended noise measurements at MP1

15/0240/SCH1

Results of attended noise measurements

15/0240/SCH2

Activity description

15/0240/SCH3

Archive noise data

15/0240/SCH4

Operational site traffic data

Glossary of Acoustic Terms

Appendix A

Assessment Basis

Appendix B

Noise management plan principles



1 Introduction

- 1.1 This report accompanies an application for outline planning consent for a flexible mix of employment use classes B1c, B2 and B8 (including ancillary Class B1a office use) on land to the north east of Skimmingdish Lane, Bicester.
- 1.2 This report has been prepared in order to consider the implications of the proposals on the amenity of the care home residents. Although it was not specifically requested in the pre-application discussions with Officers, it is of benefit to the determination of this application.
- 1.3 The application is to be submitted with matters of scale, landscaping and appearance reserved for later approval, with the exception of the maximum amount of floorspace and maximum building heights, which are fixed. Approval is also to be sought at outline application stage for the layout or siting of the proposed buildings in the southern portion of the site proposed for development, with the layout of development in the northern part being reserved for later approval.
- 1.4 The entire site is allocated for employment use under draft Policy Bicester 11 of the emerging Cherwell Local Plan. It is also allocated for employment use (in part) under Saved Policy EMP1 of the 1996 Local Plan. It is therefore clear that the principle of development of the site for a flexible mix of employment use has been accepted by Cherwell District Council.
- 1.5 Draft Policy Bicester 11 identifies amenity at the neighbouring care home (which is nearing completion) as requiring particular protection. The scheme has been purposefully designed to protect the amenity of residents of the care home. Furthermore, this report sets out limits to provide appropriate noise amenity for care home residents, together with outline assessments to verify that the limits are achievable.
- 1.6 This report describes the baseline noise climate and sets out a suitable methodology for assessment of potential noise impacts on the care home as a result of the operation of the proposed development.
- 1.7 Within this report guidance is also provided with regard to the sound insulation performance of external building fabric. In addition, noise management principles are set out in an appendix.

2 Site and Development Proposals

- 2.1 The application site covers an area of 14.45 ha. It is located adjacent to the A4421 Skimmingdish Lane and currently comprises agricultural land. The southwest boundary is formed by the A4421, except for a small part, which is formed by land currently being developed to form a residential care home. Beyond the A4421 to the west is a residential area off Boston Road, the closest dwellings of which are located more than 100 m from the proposed development.



- 2.2 The northwest and part of the northeast boundaries are with a glider training airfield, formerly RAF Bicester, parts of the latter being listed as a scheduled monument under the Ancient Monuments and Archaeological Areas Act 1979 as amended. The elements of the monument in the vicinity of the application site comprise bomb stores built in the late 1930's. It is clear from the Historic England list entry that the monument is valued for its historical aviation significance rather than for its amenity or tranquillity. It therefore does not represent a noise sensitive receptor.
- 2.3 The remaining boundaries are with further agricultural land.
- 2.4 Permission is being sought for a flexible mix of B1c, B2 and B8 uses (with ancillary office space) with floorspace totalling up to 48,308 m². The location of two buildings in the southern part of the development is fixed. The locations of remaining buildings are to be reserved for future approval but an illustrative layout and parameters plans have been defined for the purpose of the outline application. As part of the proposals, a green buffer is proposed between the care home currently under construction and the proposed employment floorspace.
- 2.5 Building heights are fixed to a maximum of 16 m from floor to pitch. The orientation of the proposed building closest to the care home is to be fixed. Protection from noise is afforded to the care home through screening provided by the employment building itself.
- 2.6 For the purposes of the outline assessment forming part of this report, the assumption is made that all the proposed units could be B8 use. This represents a likely worst case assessment because distribution facilities normally include a large number of external noise sources (goods vehicle movements etc), noise from which is generally more difficult to control than B2 uses contained within buildings. However provision has also been made within this report for their potential use under class B1(C) or B2.

3 Assessment Methodology

3.1 Receptors

- 3.1.1 A single receptor, AP1, has been identified, which is representative of the two to three storey care home (currently nearing completion) immediately south of the proposed development.
- 3.1.2 The care home is identified by Cherwell District Council as being material in the consideration the development. Notably the development design principles in draft Policy Bicester 11 ask for a green buffer between the proposed development and the care home to protect residential amenity.

3.2 Relevant Local Planning Policy

- 3.2.1 Draft Policy Bicester 11 (employment land at north east Bicester) in the emerging Cherwell Local Plan does not make any mention of noise amenity and neither does draft Policy ESD16 (the character of the built and historic environment), to which Bicester 11 refers. Bicester 11 does however include in the design principles reference to:



“A green buffer with planting immediately adjacent to the Care Home and beyond this, B1a development to surround the Care home in order to protect residential amenity.”

- 3.2.2 Saved Policy EMP1 (allocation of sites for employment generating use) of the 1996 Local Plan does not make any mention of noise amenity.
- 3.2.3 The assessments are therefore to be undertaken with reference to national planning policy and relevant British Standards, as described below, while also taking account of the policy aspiration for a landscape buffer adjacent to the care home.

3.3 Operational Ambient Noise

B1, B2 and B8 Uses

- 3.3.1 Overall limits will be derived for the site as a whole to ensure the impact of the development is acceptable. Those limits will apply to the combined effect of all proposed uses.
- 3.3.2 B8 use includes external sources, noise from which is often more difficult to control than indoor noise sources more commonly associated with B1 and B2 uses. Therefore it is often advantageous to allow B8 use to operate up to the overall limits for the site as a whole and then ensure that noise from B2 use does not cause the overall limits to be exceeded. This would require sub-limits to be derived for B2 use, at a level well below those applying to all uses.
- 3.3.3 All uses can then be controlled through planning conditions requiring reserved matters submissions setting out assessments of the proposed use in each case, together with specifications for external building fabric and other means of noise control (such as acoustic screens) required to meet the limits.

B8 Assessment Basis

- 3.3.4 Assessment of noise from the operation of a logistics facility is carried out on the basis set out in attached Appendix A, which draws from national planning policy and guidance together with relevant British Standards including BS 4142:2014 (Methods for rating and assessing industrial and commercial sound).
- 3.3.5 The methodology involves a comparison of the calculated L_{A,T_r} rating level of noise with the existing background noise levels. This is undertaken over the full period during which the proposed facility is expected to operate. In this case this could be up to 24 hours a day, 7 days a week. Please refer to the attached glossary of acoustic terms for an explanation of the L_{A,T_r} rating level and the reference time interval T_r .
- 3.3.6 It is also necessary to compare the rating level with Planning Policy Guidance (PPG), relevant aspects of which are set out along with an explanation of the NOEL, LOAEL and SOAEL in attached Appendix A.



- 3.3.7 To summarise the assessment basis, where rating noise levels do not exceed 45 dB $L_{Ar, 1 \text{ hour}}$ during the day (07:00-23:00 h) and 40 dB $L_{Ar, 15 \text{ minute}}$ during the night (23:00-07:00 h), further assessment is not required and mitigation is not necessary. Where these levels are exceeded, it is necessary to conduct an assessment in accordance with table TA3 of Appendix A, which sets out various effects and actions dependent upon the difference between the rating noise level and the existing background sound level.
- 3.3.8 Limits set on this basis will apply to all sources on the site, which may include B1, B2 and B8 uses, any of which may include items of fixed plant.

B2/B8 Internal Noise Assessment Basis

- 3.3.9 In cases where noise from within buildings is likely to be significant, calculations will need to be carried out of noise levels at receptors due to the internal noise sources. It will need to be ensured that these noise levels are taken into account, where appropriate, when calculating the total noise level at a receptor due to the combined effect of all onsite operations. Those total noise levels are then to be compared with the limits to be set on the basis described above.
- 3.3.10 It is often helpful to also set guidance limits applying specifically to B2 use and to building services plant associated with B1, B2 or B8 uses. These guidance limits can help to ensure that the contribution from these sources does not cause the overall limits to be exceeded due to the combined effect of all noise sources.

3.4 Noise Events of Short Duration

- 3.4.1 The aim is to ensure that noise levels resulting from the proposed development are in line with those already prevailing, where possible, with an upper limit of 75 dB L_{Amax} in line with planning appeal precedent.
- 3.4.2 This also applies to reversing sounders but in their case only, penalties totalling up to 12 dB (depending on the character of the sounders being considered) are applied to account for the fact that these noise sources are specifically designed to attract attention and they include intermittent and in many cases tonal characteristics. In the case of reversing sounders it is also recommended that the same criterion applies during the day, whereas for general noise events of short duration, it applies during the night only. Again in the case of reversing sounders *only*, a secondary aim, where practicable, is to ensure that they do not give rise to free field noise levels in excess of 57 dB L_{Amax} at any time.

3.5 B2 and Mechanical Services Noise

- 3.5.1 It is often desirable to set limits for B2 use and for fixed plant associated with any of the three uses (B1, B2 and B8) at a level 10 dB below the overall limits. This enables maximum flexibility for B8 use to operate up to the overall limits.



4 Environmental Noise Survey

4.1 Methodology and Instrumentation

- 4.1.1 An unattended noise survey was undertaken on site commencing at 1045 h on 7th May 2015. Measurements continued until 1230 h on 8th May 2015. The location of these unattended measurements was selected to be representative of noise levels at a comparable distance from the A4421 as the furthest extent of the care home currently under construction. Measurements were not made close to the care home due to construction noise from that site (which did not affect measurements made at the selected locations).
- 4.1.2 Short term attended measurements were also taken to ensure the noise climate was suitably quantified.
- 4.1.3 The measurement positions are shown on attached site plan 15/0240/F1 and described below:
- MP1 – Unattended free field location approximately 75 m from the A4421, 1.5 m above ground level.
 - MP2 – Attended free field location at the northern site boundary approximately 330 m from the A4421, 1.5 m above ground level.
- 4.1.4 During the unattended survey at MP1, measurements of the L_{Aeq} , L_{Amax} and L_{A90} indices were taken over consecutive 15 minute periods (see Glossary of Acoustic Terms for an explanation of the noise units used). The attended survey at MP2 was undertaken over a single 15 minute period.
- 4.1.5 The instrumentation used for the survey was as follows:

Item	Manufacturer	Type
Sound Level Analyser	Norsonic	118
Acoustic Calibrator	Norsonic	1251
Weatherproof windshield	Norsonic	1212
Sound Level Analyser	Norsonic	140
Acoustic Calibrator	Norsonic	1251
Weatherproof windshield	Norsonic	1212

T1 Equipment used during noise survey

- 4.1.6 Each system incorporated a wind shield and was calibrated before and after the relevant part of the survey.
- 4.1.7 Weather conditions during the survey were overcast with a light wind (less than 5 ms⁻¹) from the west on the afternoon of 7th May, dropping to nothing or very little thereafter. During the



afternoon of the 7th May there was a rain shower that lasted less than two hours; this has been considered when analysing the results.

- 4.1.8 Weather records from a nearby station ¹ have also been inspected to provide an indication of weather conditions during the unattended parts of the survey. The description of weather conditions above is based upon observations made onsite along with the aforementioned weather records.

4.2 Results

- 4.2.1 The results of the unattended measurements at MP1 are set out in attached figure 15/0240/TH1.
- 4.2.2 The results of the attended measurements at MP2 and MP3 are set out in attached schedule 15/0240/SCH1.
- 4.2.3 The results of the noise survey at MP1 have been analysed in a manner similar to that described in Note 4 under paragraph 8.1.4 of BS 4142:2014. On this basis the following representative background sound levels have been derived:



Period	Representative Background Sound Level dB L_{A90}
Day (07:00 – 23:00 h)	47
Night (23:00 – 07:00 h)	38

T2 Representative Background Sound Levels

- 4.2.4 The daytime background sound levels measured at MP2 are also comparable with the daytime level indicated in the above table. This indicates that there is little variation in background sound levels around the site and the values in the table above are suitably representative of the care home adjacent to the site.
- 4.2.5 Where maximum noise levels at night are concerned, it can be seen from attached figure 15/0240/TH1 that they are generally in the range 57 – 62 dB L_{Amax} . However between 0430 and 0500 h they are dramatically elevated, in all likelihood due to the dawn chorus with birds likely to have been present in the nearby trees. In the remaining two hours of the night period (0500-0700 h) levels are still elevated, though less so, to around 75 dB L_{Amax} , which may be due to morning peak traffic and/or birdsong.

¹ www.wunderground.com Weather Station ID: IENGLAND719, Chesterton, Oxfordshire, Latitude / Longitude: N 51 ° 53 ' 26 " , W 1 ° 11 ' 10 " , Elevation: 253



4.3 Operational Ambient Noise Limits

- 4.3.1 Taking account of the background sound levels in section 4.2 and the assessment methodology summarised in section 3.3, operational ambient noise limits have been derived as set out in the following table:

Period	Operational Noise Limit Rating Level, dB $L_{Ar,Tr}$
Day (07:00 – 23:00 h)	52
Night (23:00 – 07:00 h)	43

T3 Operational Noise Limits

- 4.3.2 The aim is to ensure that these limits are not exceeded wherever practicable. In the event that they are unavoidably exceeded, the aim is to minimise and reduce noise levels as far as is practicable (subject to upper limits corresponding to the SOAEL's set out in attached Appendix A).
- 4.3.3 These limits apply to the total combined operational noise emissions from the proposed development (B2 general industrial noise, B8 distribution noise and building services plant noise associated with both aforementioned uses and B1 business).

4.4 Short Duration Event Noise Limits

- 4.4.1 With reference to the survey data, the aim is to ensure that L_{Amax} noise levels due to the operation of the proposed facility do not significantly exceed 62 dB where possible. In the event that this level is unavoidably exceeded, the aim should be to ensure that levels are minimised; in this case the aim should be to avoid exceeding 75 dB, in line with planning appeal precedent.

4.5 B2 and Mechanical Services Noise Limits

- 4.5.1 To provide maximum flexibility for the potential B8 uses forming part of the facility, it is recommended that noise limits for B2 use and for building services plant associated with all uses are set 10 dB below the overall operational noise limits, as set out in table T4 below.
- 4.5.2 The limits in table T4 would apply to the combined operation of all B2 uses and all building services plant associated with the proposed development. However it must be noted that these limits are guidelines only. The primary limits which should be complied with by the combined operation of all B1, B2, B8 and building services are those set out in table T3.



Period	Plant Noise Limit / B2 Noise Limit Rating Level, dB $L_{Ar,Tr}$
Day (07:00 – 23:00 h)	42
Night (23:00 – 07:00 h)	33

T4 Plant Noise Limit Guidelines / B2 Noise Limit Guidelines

- 4.5.3 Depending on the eventual mix of uses, it is possible for the limits in table T4 to be exceeded by B2 noise while overall noise levels from the site still remain within the overall limits in table T3. It is the overall limits in table T3 which should be adhered to.

5 Outline Assessment

5.1 Ambient Noise Assessment

- 5.1.1 Calculations have been carried out with the aim of verifying that the limits set out in table T3 can be met when a development operates in line with the parameters of the outline application.
- 5.1.2 In order to conduct an assessment of noise from B8 operations it is necessary to define how the facility may be used. The assessment has been simplified for the purposes of the outline application by assuming that the full development capacity will be for B8 use. This is not what is actually anticipated; in fact a proportion will be for B2 use with noise sources located internally rather than externally as in the case of B8 use. This represents a robust worst case assessment of potential ambient noise impacts.
- 5.1.3 The assumptions concerning activities taking place are set out in attached schedule 15/0240/SCH2.
- 5.1.4 A computer model has been constructed, using IMMI noise mapping software, on the basis of the parameters plans showing the maximum building area, height constraints, landscape, access & circulation corridor and the siting of the two buildings on the south part of the site. To be able to conduct an assessment it is necessary to define buildings and noise sources, even in the case of those buildings whose locations are not fixed. This has been done with reference to the illustrative site layout, as is appropriate for an outline application. The proposed landscape buffer is accounted for in the model, as is the orientation of the closest proposed employment building, which will provide screening to the benefit of the care home.
- 5.1.5 Noise sources in the model have been defined on the basis of archive noise data as presented in attached schedule 15/0240/SCH3. The assessment position has been defined in the model as previously identified in this report. Calculations have then been undertaken in accordance with ISO 9613-2 to determine period L_{Aeq} noise levels associated with a single vehicle



movement process. These have then be scaled up to the expected numbers of movements associated with the full development capacity, as provided by the transport consultant and presented in attached schedule 15/0240/SCH4. The total number of movements for all uses has been used but, as indicated above, the worst case assumption has been made that they will all be associated with B8 use (which is not what is expected in reality).

- 5.1.6 The results on this basis indicate that with the projected traffic flows including those at night, the limits in table T3 are not exceeded at the assessment position. This can be achieved without any need to restrict the development any further beyond the layout, landscaping and mounding fixed in the outline planning application. The orientation of the nearest proposed employment building to the care home is such that it provides some screening in relation to B8 related noise sources.

5.2 Maximum Noise Level Assessment

- 5.2.1 Using the same acoustic model, calculations have also been undertaken of maximum noise levels at the receptors. The results indicate noise levels which are less than the 75 dB L_{Amax} upper limits proposed. In most cases noise levels are actually much lower, being comparable with prevailing noise levels.
- 5.2.2 The only noise sources which give rise to levels appreciably above those already prevailing are tugs/tractors disconnecting from trailers at locations which are not very well screened to the receiver by the proposed buildings. However, even these do not give rise to noise levels in excess of the proposed 75 dB L_{Amax} absolute limit. Devising and implementing a noise management plan for each unit, referring to attached Appendix B for guidance, will help to minimise noise emissions from these sources.

5.3 Noise Breakout Assessment

- 5.3.1 Calculations have been undertaken of noise breakout from the closest proposed building to the care home. These have been undertaken on the basis of assumed ambient noise levels within the proposed building which have relatively uniform frequency content and are at the upper action level (85 dB) as defined in the Control of Noise at Work Regulations 2005. The calculations indicate that external building fabric providing a sound insulation performance of R_w 31 dB will suffice to ensure the limits are met. This can easily be achieved using insulated façade systems available from such suppliers as Corus and Kingspan. The actual performance required will depend upon the actual use of the proposed building and the noise levels generated within it. Specification of the external building fabric should therefore be a reserved matter controlled by planning condition.
- 5.3.2 On the above basis it is not necessary to restrict the use of the nearest building to B1a (as the draft Bicester 11 design principles indicate; please refer to 3.2.1 above). Designing the building so that B1a elements (alongside B2 and/or B8) occupy the closest parts of the building to the care home may help to minimise noise levels. However it is stressed that on the basis set out herein this will not be necessary for the development to comply with the noise limits as defined and assessed in this report. B8 or B2 use can also occupy the closest part of the closest



plot to the care home provided that the limits in this report are met. It has been demonstrated that this is possible within the parameters of the outline application for both B8 and B2 uses.

6 Summary

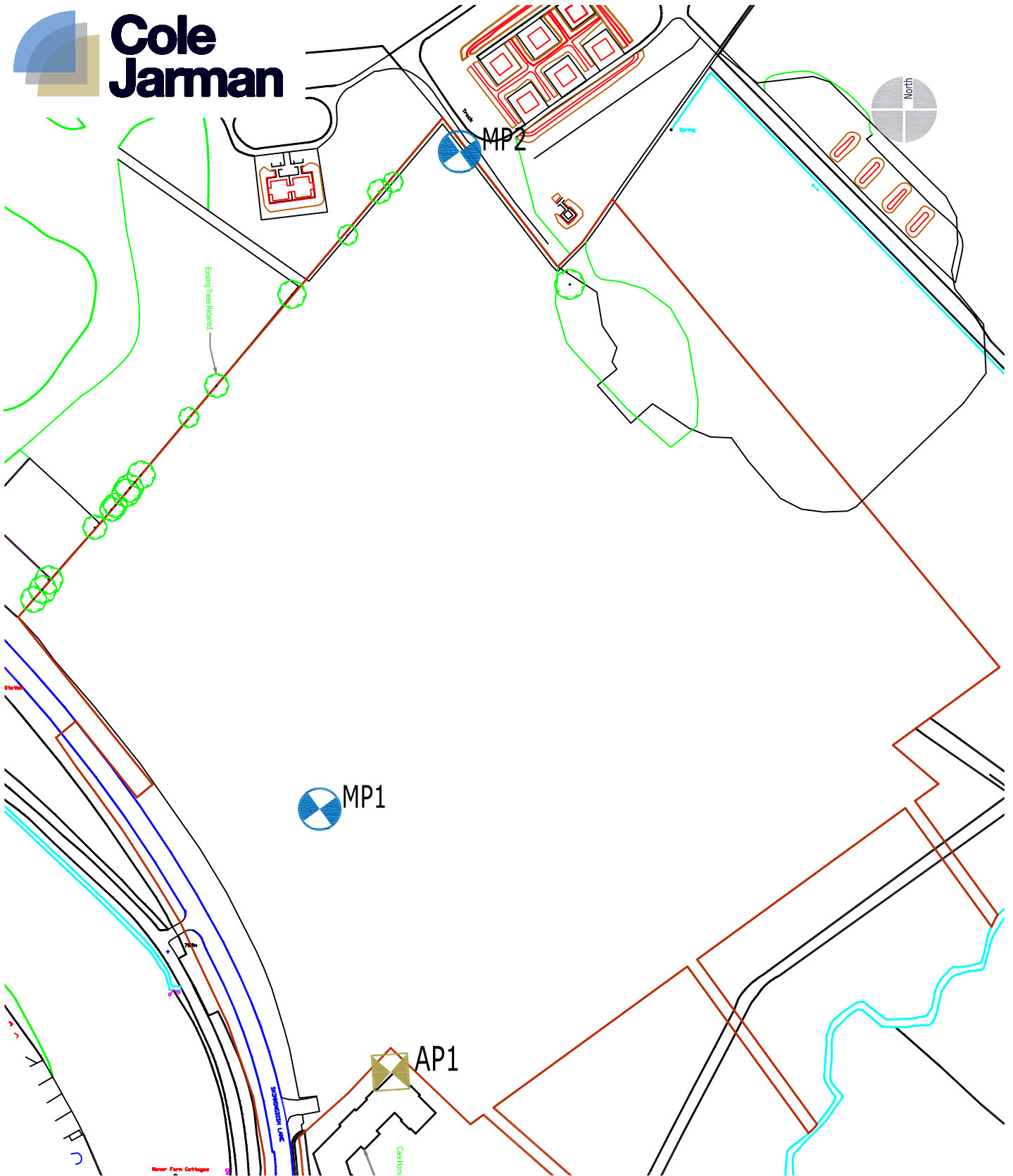
6.1 This report sets out the following information:

- Methodology and results of a survey conducted to establish existing sound levels around the site at locations representative of the nearby care home, which is the only receptor identified in the emerging Cherwell District Council Local Plan.
- Methodology for assessment of noise resulting from the operation of the facility
- Noise limits derived on the basis of the survey data and the assessment methodology
- Outline assessment of ambient noise emissions, which indicates that the noise limits are met
- Outline assessment of maximum noise levels, which indicates that the noise limits are met
- Guidance on external building fabric sound insulation to comply with the limits
- Noise management principles, which can be referred to for guidance when developing and implementing management plans to minimise noise emissions.

6.2 Compliance with the ambient noise limits in this report will ensure that the Lowest Observed Adverse Effect Level is not exceeded in that respect.

6.3 Taking all of the above into account the proposals are appropriate in terms of their noise amenity effects on the care home, and there is no need for any further noise controls beyond the limits set out in this report. Furthermore, on the basis of the assumptions made in this report it is not necessary for "B1a development to surround the care home" as indicated in draft Policy Bicester 11. This report has demonstrated that B2 and B8 uses are also appropriate adjacent to the care home within the parameters of the outline application.

 End of Section



Title: Site plan indicating noise measurement and assessment positions

Figure 15/0240/F1

Project: Skimmingdish Lane, Bicester

Date: June 2015

Revision: 1

Scale: Not to scale

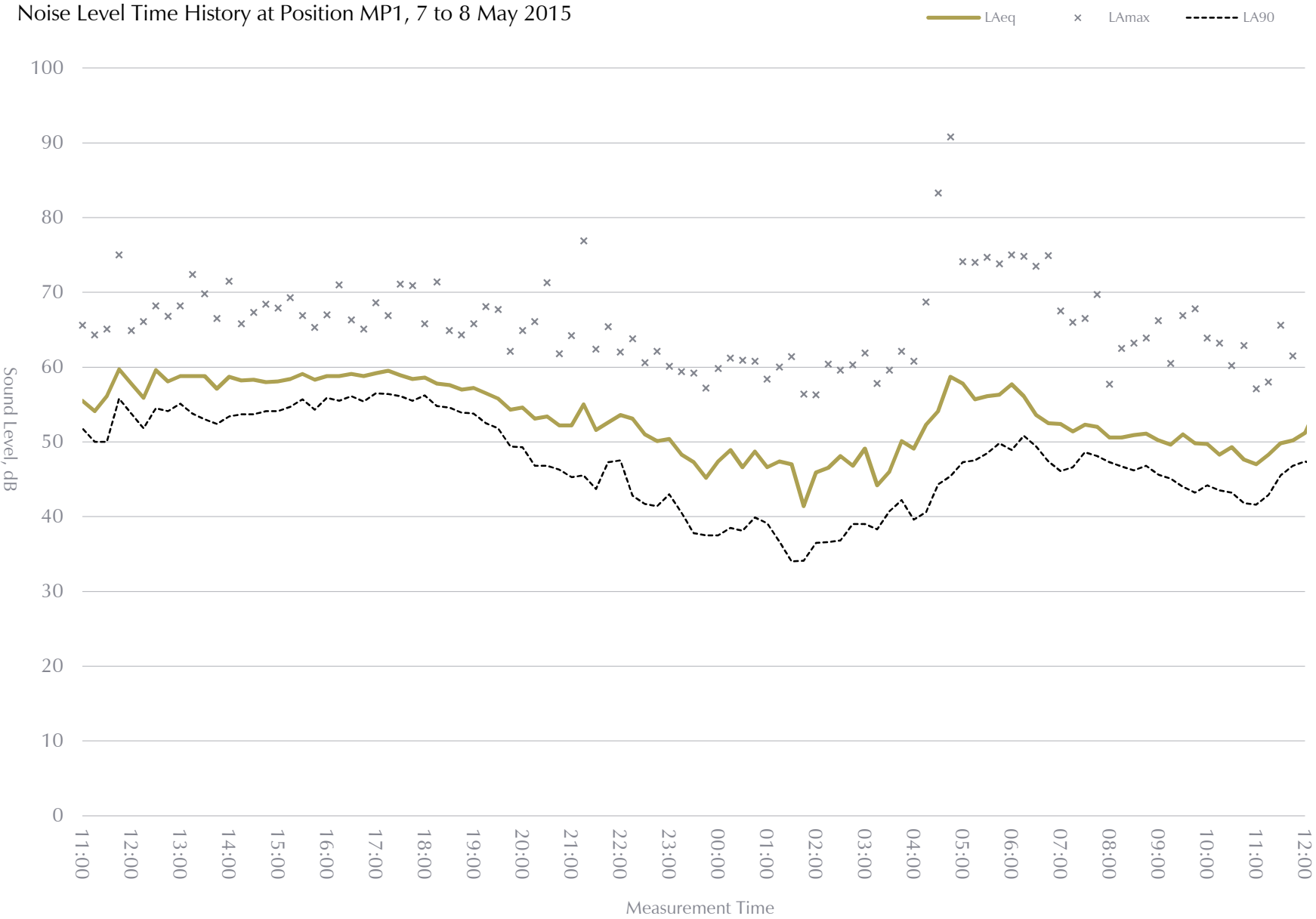
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Figure 15/0240/TH01

Skimmingdish Lane, Bicester





Attended Noise Survey Results

Measurement Position 2 (7th May 2015)

Period	L_{Aeq}	L_{Amax}	L_{A90}
1100-1115	51.8	61.7	48.7



Operational Activity Description

Activity would consist of Heavy Goods Vehicles accessing and leaving the site throughout the 24 hour day, using any of the proposed parking bays. A single event is described as follows, where each bullet point occurs once per event per hour. In the case of the night period, when the assessment is conducted on a 15-minute basis, it is assumed that the activities occurring in an hour are sufficiently evenly spread that the 15-minute noise level will be the same as the 1-hour noise level.

HGV Accessing Site

- HGV arrives onsite, drives to parking bay, reverses into parking bay and releases trailer (including shutting cab door).
- HGV drives to loading bay, cuts engine and connects trailer (including shutting cab door).
- HGV door shutting, engine start, HGV pulling away from bay and HGV driving off site

Loading/unloading

- Trailer is loaded or unloaded and moved by tug/tractor from parking bay to loading bay

Assessment Assumptions

- 50 % of all trailers will have refrigeration packs running

Car Accessing Site

- Car arrives onsite, drives to parking bay, cuts engine and shuts door.

Car Leaving Site

- Car door shutting, engine start and car pulling away from bay and car driving off site



Archive Event Noise Data

Noise Source	Height of Source (m)	$L_{Aeq,1 \text{ hour}}$ (dB) ²	L_{Amax} (dB) ³	BS4142:2014 Characteristic Corrections ¹			
				Tonality	Impulsivity	Other	Intermittency
HGV Pass-by	1.5	60.1	86.5	0	0	0	0
Tug / Tractor Pass-by	1.5	65.1	91.5	0	0	0	0
Refrigeration pack pass-by	1.5	56.1	-	0	0	0	0
Car pass-by	0.5	45.1	-	0	0	0	0
HGV pulling away from Bay	1.5	85.6	113.0	0	0	0	0
HGV reversing into Bay	1.5	80.6	109.0	0	0	0	0
HGV Decouples	1	79.6	115.0	0	3	0	0
Tug reverses & releases trailer	1	89.6	127.0	0	3	0	0
Tug pull away	1.5	75.6	100.0	0	0	0	0
Load/unloading, 30min	2	89.6	120.0	0	3	0	0
Reversing Bleeper	1.5	-	98.0	6	0	0	3
Car Ignition and pull out	0.5	-	-	0	0	0	0
Door slamming	0.5 / 1.5	-	-	0	3	0	0

¹ BS4142:2014 Acoustic character compared to existing background

² Sound Power Level averaged over 1 hour

³ Sound Power Level



Traffic Flows – Total Vehicles

Time Range			Arrivals	Departures	Totals
00:00	-	01:00	8	11	18
01:00	-	02:00	5	5	10
02:00	-	03:00	6	6	12
03:00	-	04:00	7	8	15
04:00	-	05:00	6	6	12
05:00	-	06:00	7	4	11
06:00	-	07:00	7	6	13
07:00	-	08:00	66	29	94
08:00	-	09:00	81	28	109
09:00	-	10:00	46	31	77
10:00	-	11:00	31	29	60
11:00	-	12:00	28	27	55
12:00	-	13:00	34	40	74
13:00	-	14:00	74	48	122
14:00	-	15:00	48	76	125
15:00	-	16:00	43	58	101
16:00	-	17:00	33	70	102
17:00	-	18:00	16	71	88
18:00	-	19:00	13	37	49
19:00	-	20:00	10	10	20
20:00	-	21:00	13	7	19
21:00	-	22:00	9	7	17
22:00	-	23:00	8	7	15
23:00	-	24:00	5	9	14
Total Rates:			600	631	1231



Traffic Flows – Heavy Goods Vehicles

Time Range			Arrivals	Departures	Totals
00:00	-	01:00	4	6	11
01:00	-	02:00	3	3	6
02:00	-	03:00	3	4	7
03:00	-	04:00	4	5	9
04:00	-	05:00	3	3	7
05:00	-	06:00	4	3	6
06:00	-	07:00	4	4	7
07:00	-	08:00	6	6	12
08:00	-	09:00	8	8	16
09:00	-	10:00	10	9	19
10:00	-	11:00	10	8	18
11:00	-	12:00	8	8	16
12:00	-	13:00	8	7	15
13:00	-	14:00	9	6	15
14:00	-	15:00	11	7	18
15:00	-	16:00	10	7	16
16:00	-	17:00	8	5	13
17:00	-	18:00	4	4	9
18:00	-	19:00	3	5	8
19:00	-	20:00	6	6	12
20:00	-	21:00	7	4	11
21:00	-	22:00	5	5	10
22:00	-	23:00	4	4	9
23:00	-	24:00	3	5	8
Total Rates:			144	132	277



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_{A,r,T_r} :

The rating noise level defined in BS 4142:2014. It is the L_{Aeq} produced by a specific sound source at an assessment location over a given reference time interval, T_r , plus potential adjustments for the characteristic features of the sound. T_r is 1 hour for the daytime period (07:00-23:00h) and 15 minutes for the night period (23:00-07:00h).

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: Example Operational Noise Assessment Basis
Project: Skimmingdish Lane, Bicester
Date: May 2015

The following sections set out an overview of noise assessment guidance with respect to development planning in England, including quantification of our interpretation of the effect levels described in the Noise Policy Statement for England and the Planning Practice Guidance on Noise. Section A7 provides a guidance summary.

A1 National Planning Policy Framework

- A1.1 National planning policy in England is contained within the National Planning Policy Framework (NPPF) which was published in March 2012. The specific policies of the NPPF that relate to issues of noise are set out below.
- A1.2 Paragraph 17 states that planning should contribute to conserving and enhancing the natural environment and reducing pollution, seeking to secure high quality design and a good standard of amenity for all existing and future occupants of land.
- A1.3 Paragraph 109 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 noise pollution.
- A1.4 Paragraph 123 states that 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. Decisions should aim to 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. Paragraph 123 recognises that development will often create some noise and existing businesses wanting to develop should not have unreasonable restrictions put on them.
- A1.5 Paragraph 123 refers to the Noise Policy Statement for England, and no other particular standards.



A2 Noise Policy Statement for England

A2.1 The Noise Policy Statement for England (NPSE, which pre-dates and is reflected by the NPPF) does not set quantitative guidelines for the suitability of development in an area depending on the prevailing or expected levels of noise. Absent, therefore, is reference to specific noise thresholds which determine whether noise sensitive or noise generating development is suitable and, if so, whether particular mitigation factors need to be considered. Instead, the NPSE sets out three aims as set out below.

A2.2 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.”

A2.3 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.”

A2.4 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.”

A2.5 Each development site should be judged on its ability to deliver on each of these aims. In this context defining the prevailing noise levels is an essential first step in assessing a given site.

A2.6 The NPSE includes the concept of the Significant Observed Adverse Effect Level (SOAEL) and states:

“It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times.”

A2.7 It is therefore necessary to assess each site and situation on its own merits and establish SOAEL's etc which relate specifically to those circumstances.

A3 Planning Practice Guidance (PPG)

A3.1 The Department for Communities and Local Government ‘Planning Practice Guidance’ (PPG) was published on 06 March 2014. The PPG is intended to be read alongside the NPPF and we set out below the guidance that is most relevant to the consideration of noise.



- A3.2 Part ID30 of the PPG gives guidance on the relevance of noise to a planning decision. Paragraph 003 (ID: 30-003-20140306) states that decision taking should take account of the acoustic environment and in doing so consider the degree of effect associated with the proposal.
- A3.3 Paragraph 006 (ID: 30-006-20140306) states that various factors need to be considered when assessing the relationship between noise levels and the potential impact on those affected. Paragraph 008 (ID: 30-008-20140306) identifies that noise can be mitigated through engineering, layout, planning conditions/obligations and finally through measures at receivers in areas likely to be affected by noise.
- A3.4 The PPG makes reference to the NPSE and states at Paragraphs 003 and 004 (ID: 30-003-20140306 and ID: 30-004-20140306) that the aim is to identify where the overall effect of the noise exposure falls in relation to Significant Observed Adverse Effect Level ¹ (SOAEL), the Lowest Observed Adverse Effect Level ² (LOAEL) and the No Observed Effect Level ³ (NOEL).
- A3.5 Under Paragraph 005 (ID: 30-005-20140306) the guidance then presents a table, which is reproduced as table TA1 overleaf. The implication of the final line of the table is that only the 'noticeable and very disruptive' outcomes are unacceptable and should be prevented. All other outcomes (i.e. all other lines in the table) can be acceptable, depending upon the specific circumstances and factors such as the practicalities of mitigation, although effects corresponding to the penultimate line should be avoided.
- A3.6 Under the topic of further considerations relating to mitigating the impact of noise on residential developments (paragraph 009; ID: 30-009-20140306) the PPG states that the noise impact may be partially off-set if residents of affected dwellings have access to:
- a relatively quiet facade (containing windows to habitable rooms) as part of their dwelling, and/or;
 - a relatively quiet external amenity space for their sole use, (e.g. a garden or balcony). Although the existence of a garden or balcony is generally desirable, the intended benefits will be reduced with increasing noise exposure and could be such that significant adverse effects occur, and/or;
 - a relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings, and/or;
 - a relatively quiet, protected, external publically accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance).

^{A1} The level of noise exposure above which significant adverse effects on health and quality of life occur.

^{A2} The level of noise exposure above which adverse effects on health and quality of life can be detected.

^{A3} The level of noise exposure below which no effect at all on health or quality of life can be detected.



A3.7 This is not to say that access to the above items is mandatory, rather that it can help to offset any noise impacts.

Effect Level (increasing)	Perception	Examples of Outcomes	Action
<i>No Observed Effect</i>	Not noticeable	No Effect	No specific measures required
NOEL (No Observed Effect Level)			
<i>No Observed Adverse Effect</i>	Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No specific measures required
LOAEL (Lowest Observed Adverse Effect Level)			
<i>Observed Adverse Effect</i>	Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Mitigate and reduce to a minimum
SOAEL (Significant Observed Adverse Effect Level)			
<i>Significant Observed Adverse Effect</i>	Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Avoid
<i>Unacceptable Adverse Effect</i>	Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Prevent

TA1 Summary of Noise Exposure Hierarchy (from PPG)



A4 Ambient Noise Levels

A4.1 BS 4142 Assessment

A4.1.1 Regarding noise impact from a distribution centre, BS 4142:2014 provides an assessment methodology and criteria relating to:

- a) sound from industrial and manufacturing processes;
- b) sound from fixed installations which comprise mechanical and electrical plant and equipment;
- c) sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- d) sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

A4.1.2 The application of the standard is detailed below:

“This standard is applicable to the determination of the following levels at outdoor locations:

- a) rating levels for sources of sound of an industrial and/or commercial nature; and*
- b) ambient, background and residual sound levels,*

for the purposes of:

- 1) investigating complaints;*
- 2) assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and*
- 3) assessing sound at proposed new dwellings or premises used for residential purposes.”*

A4.1.3 Therefore, where onsite activity is concerned, the approach taken is in accordance with BS 4142:2014. The rating level of noise from the facility is calculated, over a set time period, at each of the nearest noise sensitive locations. This rating level is then compared with the existing background sound level.

A4.1.4 The standard recommends the following reference time period, T_r , over which the specific sound should be evaluated, for each of the day and night periods:

- $T_r = 1$ hour during the day; and
- $T_r = 15$ minutes during the night.

A4.1.5 The standard states that daytime is typically between 07:00 h and 23:00 h. Accordingly night-time is between 23:00 h and 07:00 h.



A4.1.6 The reason for the shorter night time period is identified in the standard as follows:

“The shorter reference time interval at night means that short duration sounds with an on time of less than 1 h can lead to a greater specific sound level when determined over the reference time interval during the night than when determined during the day.”

A4.1.7 The rating level of noise for the assessment periods, L_{A,r,T_r} is the calculated noise level at the nearest receiver location, adjusted depending on the acoustic characteristic of the noise source. Adjustment factors are based on any tonality, impulsivity, intermittency and other sound characteristics present in the resultant noise level at the receiver position. The level or appropriateness of any penalty will depend both on the type of noise source and the context in which it is perceived. Similarly, in accordance with BS 4142, the period of time for which an individual noise source is active during the relevant reference time period will also be considered in establishing the rating level.

A4.1.8 The rating level, including appropriate correction factors, will be considered and applied to each source and receiver path individually.

A4.1.9 It will also be necessary to consider the existing noise climate and what sound sources contribute to it. For example, where a noise generating activity is proposed adjacent to an existing identical noise generating site, the impact of the new noise source would be less than if it were to be planned in a location where its character and type is different to and more noticeable than any existing noise source nearby.

A4.1.10 With regard to the background sound level against which the rating level is compared, the standard states the following:

“In using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.”

A4.1.11 The periods of interest over a 24 hour day are usually related to day time activities (07:00-23:00 h) and night time (23:00-07:00 h). However the standard makes the following statement:

“Among other considerations, diurnal patterns can have a major influence on background sound levels and, for example, the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night-time period for sleep purposes. Furthermore, in this general context it can also be necessary to separately assess weekends and weekday periods.”

A4.1.12 Therefore, the periods of time which are typically considered ‘waking up’ and ‘falling asleep’ stages, for example 23:00 to 24:00 h and 06:00 to 07:00 h, may need to be considered independently. Alternative periods may also be identified where breakdown beyond the standard day and night time analysis will be necessary, for example where background sound



levels are shown to be regularly elevated. Similarly both weekend and weekday periods may need to be considered separately, with criteria set for both. The requirement to analyse specific time periods will be considered for each site individually.

A4.1.13 Once the rating level at each receptor has been calculated reference can be made to the following commentary on BS 4142 in relation to assessing the impact based on the difference between the rating level of the noise source and the pre-existing background sound level.

a) Typically, the greater this difference [between industrial site noise rating level and baseline background level], the greater the magnitude of the impact.

b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

A4.1.14 In addition to the above, BS 4142 also states:

“For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.

Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.”

A4.1.15 When assessing whether the existing sound levels are low, it is relevant to refer to other standards which provide absolute thresholds for suitable noise levels inside buildings. These are detailed below.

A4.2 Amenity and Sleep Disturbance

A4.2.1 Where existing ambient noise levels in an area are low at night it has been recognised that these noise levels can be increased without significant detriment to residential amenity.

WHO Guidelines 1999

A4.2.2 In 1999 the World Health Organisation (WHO) published its Guidelines for Community Noise. For outdoor amenity area noise levels during the daytime period the recommendation was to not exceed 50 dB $L_{Aeq, 16 \text{ hour}}$ to avoid people being moderately annoyed and 55 dB $L_{Aeq, 16 \text{ hour}}$ to avoid people being seriously annoyed. This latter level may be viewed as the Significant



Observed Adverse Effect Level (SOAEL), above which the noise causes a material change in behaviour and/or attitude, avoiding certain activities during periods of intrusion; quality of life is diminished due to change in acoustic character of the area.

- A4.2.3 For indoor noise levels during the daytime period, the recommendation was to avoid exceeding 35 dB $L_{Aeq, 16 \text{ hour}}$ to ensure the noise does not interfere with normal speech. With open windows, this would correspond to approximately 45 dB $L_{Aeq, 16 \text{ hour}}$ as an external free field noise level. Where there are no other means of ventilation than opening windows, this level can be viewed as the Lowest Observed Adverse Effect Level, below which “noise can be heard but does not cause any change in behaviour or attitude” and above which “noise can be heard and causes small changes in behaviour and/or attitude, e.g. speaking more loudly”.
- A4.2.4 In order to define a level at which effects become unacceptable, it is useful to refer to the Scottish Government Technical Advice Note on Assessment of Noise. Although this advice does not form part of planning policy or guidance in England, it nevertheless contains useful information to put absolute noise levels in context. The advice note indicates at various points that a major adverse impact does not occur in residential areas until daytime noise levels are at least 10 dB above the WHO guideline level of 55 dB $L_{Aeq, 16 \text{ hour}}$. A level of 65 dB $L_{Aeq, 16 \text{ hour}}$ could therefore be viewed as corresponding to an unacceptable observed adverse effect.

WHO Night Noise Guidelines 2009

- A4.2.5 In 2009 the WHO published its Night Noise Guidelines for Europe (NNG), following a draft published in 2007). The abstract includes the following statement:

“These guidelines ... may be considered as an extension to, as well as an update of, the previous WHO Guidelines for community noise (1999).”

- A4.2.6 Table 3 of the executive summary of the NNG sets out effects of different levels of night noise on the population’s health. It indicates that an external level of 30 dB $L_{Aeq, 8 \text{ hour}}$ corresponds to the No Observed Effect Level (NOEL) and that 40 dB $L_{Aeq, 8 \text{ hour}}$ corresponds to the Lowest Observed Adverse Effect Level (LOAEL). Although it does not explicitly specify a level corresponding to the Significant Observed Adverse Effect Level (SOAEL), the indication is that it is likely to occur at 55 dB $L_{Aeq, 8 \text{ hour}}$.

Planning Precedence

- A4.2.7 In dealing with planning appeals for retail superstores there is precedence that night-time service yard operations can be allowed even in the quietest areas, provided that noise levels do not exceed 45 dB $L_{Aeq, 1 \text{ hour}}$ due to operations within the service yard at the façades of the nearest residential properties. This corresponds to the daytime threshold for absolute noise levels stated elsewhere in this appendix. However the proposed night time threshold is lower, to ensure it is as robust as possible and in line with national planning guidance and WHO guidelines.



Absolute Noise Level Assessment Criteria

- A4.2.8 It is worth noting that the WHO guidelines distinguish various types of noise sources including road, rail and air traffic, as well as industry. They do not set industrial noise apart from the others and they do not exclude industrial noise from the sources which can be covered by the guideline values.
- A4.2.9 It should also be noted that the WHO guideline noise levels discussed above are in terms of day and night period noise levels ($L_{Aeq, 16 \text{ hour}}$ and $L_{Aeq, 8 \text{ hour}}$ respectively). BS 4142 uses shorter assessment periods for both the day ($L_{Aeq, 1 \text{ hour}}$) and night ($L_{Aeq, 15 \text{ minute}}$). Comparison of such shorter period noise levels with the WHO guideline values can often result in quite different outcomes than comparison of the full day and night period noise levels. When noise sources are not entirely steady, examination of shorter periods will indicate higher specific noise levels than examination of the full day or night period. Using specific noise levels derived from the shorter assessment periods for comparison with the WHO guidelines therefore represent a more stringent method than using the full day and night periods. Reference should also be made to paragraph A4.1.6 above.
- A4.2.10 In addition, the BS 4142 rating level then includes adjustments for the character of the sound where appropriate. For example if a sound source is highly impulsive, a penalty of 3 dB may be applied if the impulsivity is just perceptible at the receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible. Comparison of a rating level derived in this way with the WHO guideline levels is therefore more stringent than a simple comparison of the specific sound level (without having applied any penalties) with the guideline levels.
- A4.2.11 For the reasons presented in the preceding two paragraphs, comparison of BS 4142 rating levels ($L_{Ar,T}$) with the WHO guideline values represents a robust methodology.
- A4.2.12 Based on the above discussion, absolute ambient noise level thresholds are proposed along with corresponding recommended actions in table TA2 overleaf. It can be seen from the table that where day and night rating levels are equal to or below 45 and 40 dB respectively, no further action or assessment is required. In certain cases a conservative approach has been taken in deriving thresholds; for example it could be argued with reference to the NNG that the SOAEL at night could be 50 or 55 dB $L_{Aeq, 8 \text{ hour}}$ but a conservative level of 45 dB has been used in line with planning appeal precedents.
- A4.2.13 In addition to these lower-level absolute limits it may be necessary to consider alternative absolute or relative criteria where existing baseline sound levels are particularly high (see paragraph A4.1.14 above). These would be considered on a site by site basis.



BS 4142 Rating Level, dB		Equivalent PPG Effect Level	Action
Day	Night		
$L_{Ar,Tr} < 40$	$L_{Ar,Tr} < 30$	No observed effect	No specific measures required
$L_{Ar,Tr} = 40$	$L_{Ar,Tr} = 30$	NOEL	No specific measures required
$40 < L_{Ar,Tr} < 45$	$30 < L_{Ar,Tr} < 40$	No observed adverse effect	No specific measures required
$L_{Ar,Tr} = 45$	$L_{Ar,Tr} = 40$	LOAEL	No specific measures required
$45 < L_{Ar,Tr} < 55$	$40 < L_{Ar,Tr} < 45$	Observed adverse effect	Mitigate and reduce to a minimum
$L_{Ar,Tr} = 55$	$L_{Ar,Tr} = 45$	SOAEL	Mitigate and reduce to a minimum
$55 < L_{Ar,Tr} \leq 65$	$45 < L_{Ar,Tr} \leq 55$	Significant observed adverse effect	Avoid
$L_{Ar,Tr} > 65$	$L_{Ar,Tr} > 55$	Unacceptable observed adverse effect	Prevent

TA2 Proposed BS4142 assessment criteria for absolute noise levels

- A4.2.14 It should be borne in mind that each site should be considered on its own merits and in some cases it may be appropriate to define thresholds at different levels to those in the above table.
- A4.2.15 On the above basis, where day and night rating levels are in excess of 45 and 40 dB respectively, it will be necessary to consider the impact of the proposals with reference to the existing baseline sound level and climate, in accordance with BS 4142. However such an assessment would also be subject to the primary assessment criteria contained in TA2 above, such that there is no need to reduce levels below 45 and 40 dB for the day and night periods respectively, even if the BS 4142 comparative assessment indicates otherwise.
- A4.2.16 In this case the assessment basis presented in table TA3 overleaf is proposed where rating noise levels exceed the thresholds identified above, by correlating the impact descriptions in BS 4142 (paragraph A4.1.13 above) and the effect descriptions in planning policy guidance (table TA1 under paragraph A3.7 above). The table sets out equivalent PPG effect levels and actions required for various relationships between the rating level of the noise source at the receptor ($L_{Ar,Tr}$) and the background sound level at a location representative of the receptor ($L_{A90,T}$).



BS4142 Assessment	Equivalent PPG Effect Level	Action required
$L_{Ar,Tr} < L_{A90,T}$	No observed effect	No specific measures required
$L_{Ar,Tr} = L_{A90,T}$	NOEL	No specific measures required
$L_{A90,T} < L_{Ar,Tr} < L_{A90,T} + 5$	No observed adverse effect	No specific measures required
$L_{Ar,Tr} = L_{A90,T} + 5$	LOAEL	No specific measures required
$L_{A90,T} + 5 < L_{Ar,Tr} < L_{A90,T} + 10$	Observed adverse effect ⁴	Mitigate and reduce to a minimum ⁵
$L_{Ar,Tr} = L_{A90,T} + 10$	SOAEL ⁴	Mitigate and reduce to a minimum ⁵
$L_{Ar,Tr} > L_{A90,T} + 10$	Significant observed adverse effect ⁴	Avoid ⁵

TA3 BS 4142 assessment criteria for comparative noise levels

- A4.2.17 It can be seen from the above table that where the rating level is less than or equal to 5 dB above the background level, no action is required. It should also be noted that the thresholds in table TA2 also apply, such that there is no need to reduce noise levels below 45 and 40 dB $L_{Ar,Tr}$ for the day and night periods respectively.
- A4.2.18 Tables TA2 and TA3 together therefore represent the proposed overall BS 4142 noise assessment methodology in terms of L_{Aeq} (upon which the rating level $L_{Ar,Tr}$ is based).

A5 General Noise Events of Short Duration

- A5.1 BS 4142:2014 only calculates the impact of ambient noise levels generated by industrial activities at the nearest noise sensitive dwellings over periods of 15 minutes at night (when potential sleep disturbance is a factor which often needs to be considered). The standard accounts for the impulsivity of noise sources by including methods for adding a penalty, the

^{A4} Except where $L_{Ar,1hour} \leq 45$ during the day or $L_{Ar,15minute} \leq 40$ dB during the night, in which the effect is equivalent to LOAEL or NOEL.

^{A5} Except where $L_{Ar,1hour} \leq 45$ during the day or $L_{Ar,15minute} \leq 40$ dB during the night, in which case no specific measures are required for noise occurring during the relevant day or night period



magnitude of which depends on the degree to which the impulsivity is perceptible at a given receptor.

- A5.2 However in order to provide adequate protection to people trying to sleep in dwellings at night it is often appropriate to consider noise events of short duration with reference to sources of guidance other than BS 4142.

WHO Guidelines for Community Noise, 1999

- A5.3 Table 1 of the 1999 WHO document provides guideline values for community noise in specific environments. The relevant guideline value in this situation is 60 dB L_{Amax} as a façade incident level outside bedrooms (which corresponds to approximately 57 dB as a free field level) during the night time, and is based upon the requirement to minimise sleep disturbance.

- A5.4 However, this criterion is considered to be an aspirational goal and in many locations is regularly exceeded by common environmental and road traffic noise sources.

WHO Night Noise Guidelines, 2009 (NNG)

- A5.5 The NNG does not propose any new or updated outdoor L_{Amax} criteria beyond those stated in the 1999 Guidelines for Community Noise.

- A5.6 In Table 1 under the heading “Thresholds for Observed Effects” (page XIII) various levels corresponding to the onset of observable effects are cited, from 32 to 42 dB $L_{Amax, inside}$. It is stressed that these correspond to the points at which effects start to become observable. In many cases they may not start to become significant until sound levels are much higher.

- A5.7 However below table 3 on page XVII the following is stated:

“A number of instantaneous effects are connected to threshold levels expressed in L_{Amax} . The health relevance of these effects cannot be easily established. It can be safely assumed, however, that an increase in the number of such events over the baseline may constitute a subclinical adverse health effect by itself leading to significant clinical health outcomes.”

- A5.8 Under the heading “Relation with the Guidelines for Community Noise (1999)” (page XVIII) the following statements are made:

“The thresholds are now known to be lower than L_{Amax} of 45 dB for a number of effects.”

“...to prevent sleep disturbances one should consider the equivalent sound pressure level and the number of sound events. The present guidelines allow responsible authorities and stakeholders to do this. Viewed in this way, the night noise guidelines for Europe are complementary to the 1999 guidelines. This means that the recommendations on government policy framework on noise management elaborated in the 1999 guidelines should be considered valid and relevant for the Member States to achieve the guideline values of this document.”



- A5.9 The phrase “guideline values of this document” refers to the night period ambient noise level guidance ($L_{Aeq, 8 \text{ hour}}$) in the NNG. There are no guideline values expressed in terms of L_{Amax} in the NNG.
- A5.10 Taking the above into account it is considered appropriate to continue to refer to the aspirational guideline L_{Amax} level in the 1999 WHO document, whilst also evaluating the number of occurrences of elevated L_{Amax} levels generated by the new sound source in comparison with pre-existing L_{Amax} noise levels and occurrences. Other guidance should also be referred to, as set out below.

BS 8233:2014 - Sound Insulation and Noise Reduction for Buildings

- A5.11 BS 8233 states the following regarding maximum noise levels within houses:

“Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$ depending on the character and number of events per night.”

- A5.12 The previous edition of BS 8233 included quantitative guidance with respect to night-time L_{Amax} noise levels in bedrooms within dwellings. BS 8233:2014 does not provide such guidance. However in paragraph 7.7.5.1.1 it is noted that the recommendations for ambient noise in hotel bedrooms are similar to those for living accommodation and Table H.3 in Annex H.3 gives example night-time L_{Amax} limits in hotel bedrooms of 45-55 dB. It is noted that night time specifically relates to the period 23:00-07:00 h.

- A5.13 BS 8233:2014 states the following regarding alternative means of ventilation:

“If relying on closed windows to meet the guide values, there needs to be appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.”

- A5.14 Therefore in the case of areas already subject to high existing maximum noise levels it is understood that achieving an internal noise level of 45-55 dB L_{Amax} with windows open is not considered reasonable. This is because the residents will already be used to the high prevailing noise levels and are likely to already be shutting windows, if required. The addition of new maximum noise levels of a similar or lower level would not alter this behaviour.

- A5.15 In relation to free field external noise levels, sound insulation from typical single or double glazed windows can be expected to vary between 25 and 30 dB(A) for road traffic type noise sources. Adding this to the minimum L_{Amax} criterion of 45 dB gives an external criterion of between 70 and 75 dB L_{Amax} .

- A5.16 Finally with respect to BS 8233:2014 it should be noted that in the scope it advises that:

“It is applicable to the design of new buildings, or refurbished buildings undergoing a change of use but does not provide guidance on assessing the effect of changes in the external noise levels to occupants of an existing building.”



Other Guidance

- A5.17 In 1991 HMSO published 'Railway Noise - the report of the committee formed to recommend to the secretary of state for transport, a national noise insulation standard for new railway lines'.
- A5.18 Whilst the document is concerned with railway noise it also reviewed research with respect to sleep disturbance generally. It drew in particular from research by Rice and Morgan, 1982. This noted that in general about 20% of the population have sleeping difficulties that are totally non noise related. They concluded that it was unrealistic to set noise limits to ensure sleep would not be affected in any way by noise. Reviewing various studies they suggested that sleep disturbance is significant when 25% of the population are likely to suffer some disturbance from all causes. Depending upon the noise source, thresholds of 75-85 dB L_{Amax} were proposed. For road traffic noise sources during the night time period 75 dB L_{Amax} was the proposed threshold.
- A5.19 On other projects where noise impacts from similar activities were considered, the following statement has been upheld at planning appeal.
- "Noise levels for short periods should not exceed 75 dB L_{Amax} ."*
- A5.20 In conclusion, there are a number of L_{Amax} criteria relating to external night time noise. The lowest of these, 60 dB from the World Health Organisation, represents an aspirational figure, corresponding to approximately 57 dB as a free field level. Other criteria can be derived varying between 70 and 85 dB.

A6 Reversing Sounders

- A6.1 Reversing sounders represent a different type of noise source again and constitute a special case. The principles set out in this section therefore apply only to reversing sounders and not to any other sound sources.
- A6.2 Reversing sounders are specifically designed to attract attention and they often comprise an intermittent tone. An assessment of L_{Aeq} noise levels is not always appropriate for such an intermittent and distinctive source. Similarly, the previously discussed L_{Amax} criteria may also not be appropriate on their own, due to fact that the noise source is specifically designed to attract attention and has integral tonal and intermittent characteristics.
- A6.3 Although assessment in accordance with BS 4142 can take account of tonality and intermittency (by making allowance for penalties to account for such features), it may result in a misrepresentation of the noise impact where reversing sounders are concerned. Therefore the principle of adding penalties set out in BS 4142 is used alongside consideration of L_{Amax} for



reversing sounders⁶, with reference to the WHO Guidelines for Community Noise, which state:

“If the noise is not continuous, sleep disturbance correlates best with L_{Amax} and effects have been observed at 45 dB or less. This is particularly true if the background level is low. Noise events exceeding 45 dBA should therefore be limited if possible.”

“To prevent sleep disturbances, one should thus consider the equivalent sound pressure level and the number and level of sound events. Mitigation targeted to the first part of the night is believed to be effective for the ability to fall asleep.”

- A6.4 The above quotes indicate that effects can be observed at 45 dB. It does not necessarily indicate that noise levels of this order are likely to give rise to significant adverse effects, just that some effect can be observed. Although the 2009 WHO Night Noise Guidelines state that it is now known that effects can also be observable at lower levels, they do not propose any update to the L_{Amax} guidance in the 1999 Guidelines for Community Noise.
- A6.5 The internal L_{Amax} noise level of 45 dB in the above quote equates to 60 dB as an external façade incident level and to approximately 57 dB as an external free field level.
- A6.6 In addition to taking the above WHO guidance into account, it is reasonable to consider the tonality of reversing sounders. As these tonal sounders are specifically designed to attract attention, notable penalties can be applied in this combination of BS4142 and L_{Amax} assessment. A pessimistic total penalty of 12 dB (comprising 6 dB for highly perceptible tonality, 3 dB for intermittency and 3 dB to account for the fact that the sound is specifically intended to attract attention) can be applied to reversing sounders in accordance with BS4142, in order to give a worst case representation of the impact. These penalties are to be considered at each receptor and, where appropriate, applied to the calculated L_{Amax} levels, for subsequent assessment against the aspirational free field noise limit of 57 dB L_{Amax} .
- A6.7 It should again be borne in mind that each situation should be examined on its own merits and there may be cases where deviation from the above methodology is appropriate (for example in a case where conditions are such that the tonality of a reversing sounder would not be considered as highly perceptible at a given receptor).
- A6.8 It is stressed that the principles set out above are specific to the special case of reversing sounders and are not applicable to other sound sources.

^{A6} It should be noted that an L_{Amax} level from a reversing sounder can be thought of as akin to a short (e.g. 1 second) L_{Aeq} ; the L_{Amax} level is likely to be sustained for the duration for which the sounder actually sounds. This would not normally be the case for other noise sources.



A7 Guidance Summary

A7.1 General Notes

A7.1.1 It is noted that the below refers to external free-field noise levels. It must also be noted that the below is a guideline only; in certain situations assessment criteria may be different.

A7.2 Rating Levels for Site Noise

A7.2.1 Where the rating level of the development at any given receptor is below the Lowest Observable Adverse Effect Level (LOAEL) in absolute terms, no further action or assessment is necessary. The LOAEL is considered to correspond to free field levels of 45 dB $L_{Ar, 1 \text{ hour}}$ during the day and 40 dB $L_{Ar, 15 \text{ minute}}$ during the night.

A7.2.2 It should be noted that this rating level will include all BS 4142 penalties for tonality and distinctive features. Therefore comparison to the noise levels referred to in BS 8233 and WHO guidelines represents a robust assessment.

A7.2.3 Where the rating levels exceed the thresholds identified above, further BS 4142 assessment is carried out with reference to table TA3 under paragraph A4.2.16 above.

Apportionment

A7.2.4 It is the intention that limits derived using the rating level methodology will apply to the total combined noise level from an industrial site. This may include both B2 (general industrial) and B8 (storage or distribution) uses, both of which may include items of fixed building services plant.

A7.2.5 To provide maximum flexibility for B8 uses, it is often desirable to set limits for B2 use and for fixed plant associated with B2 and B8 use at a level 10 dB lower than the overall limits for the site. This allows the B8 use to operate up to the overall site limit.

A7.3 Impulsive Noise

A7.3.1 Where night time impulsive noise is concerned the Lowest Observable Adverse Effect Level (LOAEL) is considered to correspond to a free field level of 57 dB L_{Amax} .

A7.3.2 Therefore where development includes impulsive events giving rise to night time noise levels of 57 dB L_{Amax} or less, no action or mitigation is required.

A7.3.3 Where development gives rise to night time noise levels in excess of 57 dB L_{Amax} mitigation should be implemented to reduce noise levels to 57 dB or less, or as close to 57 dB as reasonably practicable.

A7.3.4 However where existing noise levels already typically exceed 57 dB L_{Amax} it would be reasonable to ensure development noise levels do not exceed existing L_{Amax} noise levels in both level and typical rate of occurrence.



A7.4 **Reversing Sounders**

- A7.4.1 Where development noise events from sources designed specifically to attract attention (such as reversing beepers) are concerned, night time noise levels should again not exceed 57 dB L_{Amax} to ensure the LOAEL is not exceeded. However a penalty of up to 12 dB should be applied to account for the fact that reversing sounders are specifically designed to attract attention and they exhibit tonal and intermittent characteristics.

■ End of Section

Appendix B

Subject: Noise Management Plan Principles
Project: Skimmingdish Lane, Bicester
Date: May 2015

B1 Best Practice Operation

B1.1 Noise Sources

A1.1.1 The main noise sources associated with B8 operations will result from Heavy Goods Vehicle (HGV) movements. The attendant noise issues are stated below, along with recommendations for best practice operation to minimise noise impacts.

B1.2 Vehicle Movements and Engine Noise

B1.2.1 Once onsite, HGV engines should only be switched on when necessary for manoeuvring. At all other times engines should be switched off.

B1.2.2 Unnecessary revving of engines should be avoided.

B1.2.3 HGV horns should not be used onsite at any time, except in emergencies.

B1.2.4 Coupling and uncoupling of trailers should be minimised, through good planning, to avoid unnecessary repeat occurrences.

B1.2.5 Drivers should be encouraged to plan ahead, to avoid unnecessary acceleration, braking and reversing.

B1.3 Reversing Sounders

B1.3.1 Reversing beepers are designed to be noticeable and heard over background noise. They are necessary for health and safety reasons. However noise levels due to reversing sounders are acceptable provided that they are within suitable limits.

B1.3.2 To further minimise noise levels, it is good practice to reverse only when necessary i.e. when manoeuvring into a parking or loading bay.

B1.3.3 "White noise" type reversing sounders are often considered less intrusive than the traditional "beeper" type. Whilst not essential, use of white noise sounders where possible may be beneficial.



B1.4 Loading and Unloading Noise

- B1.4.1 When the trailers are at the dock leveller loading bays, it is important that they are properly docked, to ensure a good connection between the building and trailer, thereby minimising noise emission through any gaps.
- B1.4.2 Where level access loading bays are concerned, the trailers are loaded /unloaded using fork lifts. All fork lifts should be fitted with rubber tyres and should be gas powered, where possible, to minimise engine noise.
- B1.4.3 External fork lift activity should be minimised as far as possible.
- B1.4.4 Public address systems should be installed within the warehouse only, not externally (except if required for emergency use).
- B1.4.5 When bays are not in use, the doors must be closed, to avoid noise break out from the building through an open doorway.
- B1.4.6 All loading and unloading should be undertaken with suitable care and attention, in order to minimise unnecessary noise generation. Activities such as shouting and unnecessary dropping of items within trailers should be avoided.

B1.5 Tugs / Tractors

- B1.5.1 Minimising or eliminating the use of tugs or tractors can help to reduce noise emissions.

■ End of Section

