

Skimmingdish Lane, Bicester

Noise Impact Assessment

Report 15/0240/R3

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Noise Impact Assessment

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■ End of Section



Noise Impact Assessment

1 Introduction

- 1.1 It is proposed to develop a distribution centre to the north-east of Skimmingdish Lane, Bicester, for B1(c), B2 and B8 employment uses, for either ancillary offices, general industrial or as a distribution centre respectively. Outline planning permission has been granted for the overall plot of land (application reference: 15/01012/OUT) for development of up to 48,308m² of employment floor space along with reserved matters for Zones 2 and 3 (reference: 17/01712/REM & 17/01289/REM respectively).
- 1.2 This report is submitted to satisfy condition 23 of the outline planning permission, which requires a noise assessment to be carried out to confirm the specification of the temporary acoustic measures required to mitigate noise impacts until development comes forward at Zone 1, at which time a permanent solution on the adjacent boundary will be agreed. The condition is presented in section 3.
- 1.3 This report sets out the assessment methodology adopted and evaluates the results of the operational noise relative to the acoustic design criteria, determining as appropriate where any noise mitigation measures may be required.

2 Site Description

2.1 General

- 2.1.1 The site is located to the north-east of Bicester, to the north-east of Skimmingdish Lane (A4421), which bounds the site. Agricultural fields and grassland bound the remainder of the site to the north-west, north-east and south-east.

2.2 Noise Sensitivities

- 2.2.1 A three-storey residential care home is located to the south-east of the site. This is the only receiver identified in the associated planning condition for the site (as detailed in section 3 below)The location of the assessment position is shown in the attached figure 15/0240/F2.

2.3 Proposed Development

- 2.3.1 A single building is proposed and has consent to operate as two units, with a service yard at the south-eastern side of the unit building. The proposed layout is shown on the attached figure 15/0240/F1.

3 Planning Requirements

- 3.1 As part of the outline planning permission for the overall scheme (application reference: 15/01012/OUT), conditions were set which require to be adhered to as part of the development.



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3.2 Condition 23 relates to noise and is as follows:

Prior to the occupation of the development hereby approved details of the acoustic screening to be provided between the development and the existing care home on the south western edge of the development site shall be first submitted and approved in writing with the Local Planning Authority. The approved scheme shall be implemented prior to the occupation of the development.

3.3 The criteria in order to satisfy the requirements of planning condition 23 are discussed in section 4.2 below. Suitable mitigation through acoustic screening will be determined from the assessment to mitigate noise levels at the care home.

4 Assessment of Operational Ambient Noise

4.1 Assessment Locations

4.1.1 One assessment position has been considered, as noted in planning condition 23; and is shown on the attached figure 15/0240/F2. The assessment position represents the care home to the south-west, set at third storey level; the most potentially exposed level when considering effects of barriers.

4.2 Methodology

4.2.1 Assessment of noise from the site has been carried out on the basis set out in the attached Appendix A. This methodology represents a robust way of assessing the potential noise impact of developments such as this. It has been used successfully for many similar developments, albeit noting that in this instance planning permission has already been approved and hence the Appendix acts more as a reference document to how the technical methodology has been determined.

4.2.2 The methodology involves a comparison of calculated total $L_{Aeq, 1hr}$ rating noise levels during the day and $L_{Aeq, 15min}$ rating noise levels at night with the existing background noise levels. This is undertaken over the full period during which the facility is proposing to operate. In this case the application is for 24 hours a day, 7 days a week service yard operation.

4.2.3 Where the noise rating level of the development from an absolute level is concerned, the Lowest Observable Adverse Effect Level (LOAEL) as set out in the PPG is considered to correspond to a rating level range of 40-45 dB $L_{Ar,T}$ where T is 1 hour during daytime hours and 15 minutes at night. In achieving this we would expect the requirements of planning condition 23 to be satisfied.

4.3 Assessment of Noise Events of Short Duration

4.3.1 Maximum noise levels (L_{Amax}) for non-reversing sound sources shall be limited to either 57 dB(A) or within the existing range of maximum noise levels in absence of the development at all residential assessment positions. Noise levels due to reversing sounds should not exceed



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45 dB L_{Amax} so that when the relevant penalties for this noise source are applied, as described in Appendix A, the noise rating level does not exceed 57 dB(A).

5 Environmental Noise Survey

- 5.1 A noise survey was previously undertaken in May 2015 and is detailed in our previous noise assessment report (ref. 15/0240/R1 revision 8). Unattended measurements were undertaken in positions considered representative of the assessment positions. Short term attended measurements were also taken to ensure the noise climate was suitably quantified.
- 5.2 The measurement positions are shown on the attached site plan 15/0240/F2, with the results of the unattended measurements at MP1 shown on the attached time history graph 15/0250/TH01 and the results of the attended measurements at MP2 shown in the attached schedule 15/0250/SCH1.
- 5.3 The results of the noise survey at MP1 have been analysed in accordance with BS 4142:2014. On the basis the following representative background sound levels were derived:

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

T1 Representative background sound levels

- 5.4 The maximum noise levels are generally in the range 57 – 62 dB L_{Amax} . Between 04h30 and 05h00 they are dramatically elevated, in all likelihood due to the dawn chorus with birds likely to have been present in the nearby trees. Noise levels between 05h00 and 07h00 are still elevated to around 75 dB L_{Amax} , which may be due to morning peak traffic and/or birdsong.

6 Operational Noise Limits

- 6.1 Taking account of the background sound levels in section 5 and the assessment methodology detailed in Appendix A, operational ambient noise limits have been derived as set out in the following table:



Noise Impact Assessment

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

T2 Operational noise limits

- 6.2 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).
- 6.3 Where the levels within the schedule are exceeded, the aim is then to mitigate and reduce to a minimum the noise levels resulting from the proposed operation.
- 6.4 Maximum noise levels (L_{Amax}) shall be limited to 57 dB(A) or, where existing free field L_{Amax} levels are higher than this level, limited to within the existing typical L_{Amax} range.
- 6.5 Noise levels due to reversing sounders, including any applicable penalties for this specific noise source as detailed in Appendix A, shall be limited to 57 dB L_{Amax} .

7 Noise Impact Assessment

7.1 Overview

- 7.1.1 In order to demonstrate that the noise limits shown in section 6 above can be achieved, a noise impact assessment has been conducted based on our understanding of the use of the site.

7.2 Traffic Flow

- 7.2.1 The number of HGVs and total traffic numbers accessing and leaving the site on an hourly basis has been provided by the traffic consultant for the overall three phase development as part of the outline application and are set out in the attached activity schedule 15/0250/SCH2.
- 7.2.2 Due to the low numbers in some hours, these total numbers have been used in this assessment, assumed to apply to this building alone. This can be considered a worst case scenario.



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7.3 Noise Rating Levels

7.3.1 In order to calculate the noise rating level at the receiver position it is necessary to assess any acoustic characteristics present in the noise source compared to the existing noise climate and if any penalties should be applied to the noise source in order to take this into account.

7.3.2 BS 4142:2014 provides the following guidance for subjectively applying penalty corrections to noise sources:

“Tonality

For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.

Impulsivity

A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.

Other sound characteristics

Where the specific features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

NOTE 2 Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant then it might be appropriate to apply a single correction. Where both features are likely to affect perception and response, the corrections ought normally to be added in a linear fashion.

Intermittency

When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.”

7.3.3 Attached schedule 15/0250/SCH3 shows the acoustic character penalty added to each noise source within the acoustic model.



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7.3.4 It is important to note that this character is dependent on the existing noise climate. For example, the existing noise climate is dominated by road traffic on the A4421. No character corrections are therefore deemed necessary for HGV and car movements to the unit(s) as the current noise climate already contains noise sources of this type.

7.4 Acoustic Model

7.4.1 An acoustic model has been created using a computer based noise prediction program (Wölfel IMMI version 2016). This has been used to determine the free field noise levels, at the assessment position, generated by the onsite HGV and car movements and activities. Sound propagation is calculated taking account of factors such as divergence, screening and ground absorption.

7.4.2 It should be noted that the assessment has been conducted at the assessment position under free field conditions, for direct comparison with the measured and derived free field noise levels.

7.4.3 The model has been based upon electronic drawings showing the area around the site, as well as the proposed site layout. We have assumed for our model that the site and surrounding area has a relatively flat topography.

7.4.4 The noise sources have been defined based upon archive measurement data, as set out in the attached schedule 15/0250/SCH3.

7.4.5 For the purposes of the model, a single unit of activity has been defined as set out in the attached schedule 15/0250/SCH4. To summarise, a single unit of activity is defined as a complete HGV departure and return cycle, whereby one HGV enters the site, loads or unloads and parks *and* one HGV starts up and leaves the site, all within the same hour.

7.5 Assessment Assumptions

7.5.1 It is considered that the assessment assumptions stated below represent operational activity in excess of what could typically be expected to occur at the site. In the unlikely event that a very atypical operational is expected at the site it may then be necessary for the operational noise impact assessment to be revised accordingly.

7.5.2 A number of assumptions have been made to build a representative acoustic model of potential operations as follows:

- We have evaluated the site as B8 distribution centre use, as the noise sources are predominantly external.
- The activities described in schedule 15/0250/SCH4 are assumed to be evenly distributed across the parking spaces, in proportion to the number of spaces for HGVs.
- No refrigerated HGVs are expected to operate at the site (or otherwise fridge packs are turned off prior to entering the site).



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- No HGV tug units are expected to operate at the site.

8 Mitigation

- 8.1 To mitigate noise levels to the care home, an acoustic barrier is required to screen noise from the external service yard of Zone 3; in this case an earth bund is proposed to act as this screen. The location and required height of the bund is shown in the attached figure 15/0240/F3. The height has been set based upon the output of the acoustic model.
- 8.2 The installation of the temporary bund will satisfy planning condition 23 as detailed in section 3. It is intended for the bund to be temporary as another building is proposed to the south-east as part of the overall scheme, of which it will be expected for the future warehouse building as well as future permanent boundary barriers to suitably screen noise from the rest of the overall development.

9 Assessment Results

9.1 **BS 4142 Assessment**

- 9.1.1 The resultant noise rating levels for the proposed operations of the unit at the assessment position for operations detailed previously have been calculated and are presented in the attached schedule 15/0250/SCH5.
- 9.1.2 The resultant noise rating level at the assessment position has been calculated at third storey floor level. The results set out in the attached schedule provide a single rating level in each hour.
- 9.1.3 The schedule shows that the predicted noise rating levels are below the criteria throughout the 24-hour period with the specified mitigation measures in place and so are considered to be within or below the criteria as detailed in section 6 above.
- 9.1.4 In addition to assessing the unit with the proposed traffic movements, we have assessed the worst case number of HGVs that could operate within each hour, as presented in the attached schedule 15/0250/SCH6. These numbers have been capped at 25 movements per hour as a realistic notional maximum throughput of HGVs per hour.

9.2 **Assessment of Noise Events of Short Duration**

- 9.2.1 Calculations of night time (23:00 – 07:00h) L_{Amax} noise levels at the assessment position due to onsite activity have been undertaken on a similar basis to that described for ambient noise in section 7 above. L_{Amax} are only particularly relevant during these night time hours. However, it is worth noting that as the noise characteristics associated with the site would not change between day and night time hours, the maximum L_{Amax} levels detailed for night time hours would also apply during the daytime.



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- 9.2.2 All possible types of activity at all possible locations have been considered and the maximum expected L_{Amax} noise levels evaluated at the assessment position. It must be stressed, therefore, that the results represent the absolute upper limit of L_{Amax} noise levels expected to be experienced at the assessment position, being representative of the worst possible case activity.
- 9.2.3 It should be noted that the assessment has been undertaken under free field conditions, in line with the ambient noise assessment and the noise survey measurements.
- 9.2.4 The predicted highest L_{Amax} level at each assessment position is shown in the table below:

Calculated and Existing L_{Amax} levels	
AP1	
Highest Operational L_{Amax}	60
Existing L_{Amax} Range	57-62

T3 Resultant L_{Amax} levels

- 9.2.5 The table above shows that the calculated L_{Amax} noise level at the assessment position falls within the existing range of typical night time L_{Amax} levels.
- 9.2.6 The predicted highest L_{Amax} level at the assessment position due to reversing sounders is shown in the table below:

Calculated Reversing Sounder L_{Amax} levels	
AP1	
Highest Reversing Sounders L_{Amax}	38

T4 Resultant reversing sounder levels

- 9.2.7 The maximum noise level set out in table T4 above are given without any character corrections. As can be seen, even with application of the maximum 12 dB penalty for reversing sounders, as detailed in Appendix A, the resultant rating level at the assessment position is below 57 dB(A).

10 Conclusion

- 10.1 It is proposed to develop a business park to the north-east of Skimmingdish Lane, Bicester, for B1(c), B2 and B8 employment uses, with ancillary offices. Outline planning permission (along with reserved matters for Zones 2 and 3) has been granted and conditions imposed relating to noise emissions.



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- 10.2 This report has provided noise limits at the care home to the south-east based on a noise survey conducted at the site along with the requirements of BS 4142:2014 and other relevant guidance.
- 10.3 An assessment has been conducted of noise levels generated by operations on the site. The noise levels generated by the site have been predicted at the care home.
- 10.4 The assessment has shown that an acoustic bund would be required at the location and with the height shown in the attached figure 15/0240/F3.
- 10.5 The assessment has demonstrated that operational noise associated with the above noted building of the development with the mitigation measures and operational assumptions made would be considered to be at or below the recommended criteria in order to satisfy planning condition 23. Therefore, with the provision of the proposed bund, planning condition 23 can be discharged.
- 10.6 To note, this condition would need to be re-addressed when development comes forward at Zone 1, when permanent acoustic barriers will be provided at the boundary as necessary.

 End of Section



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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 .

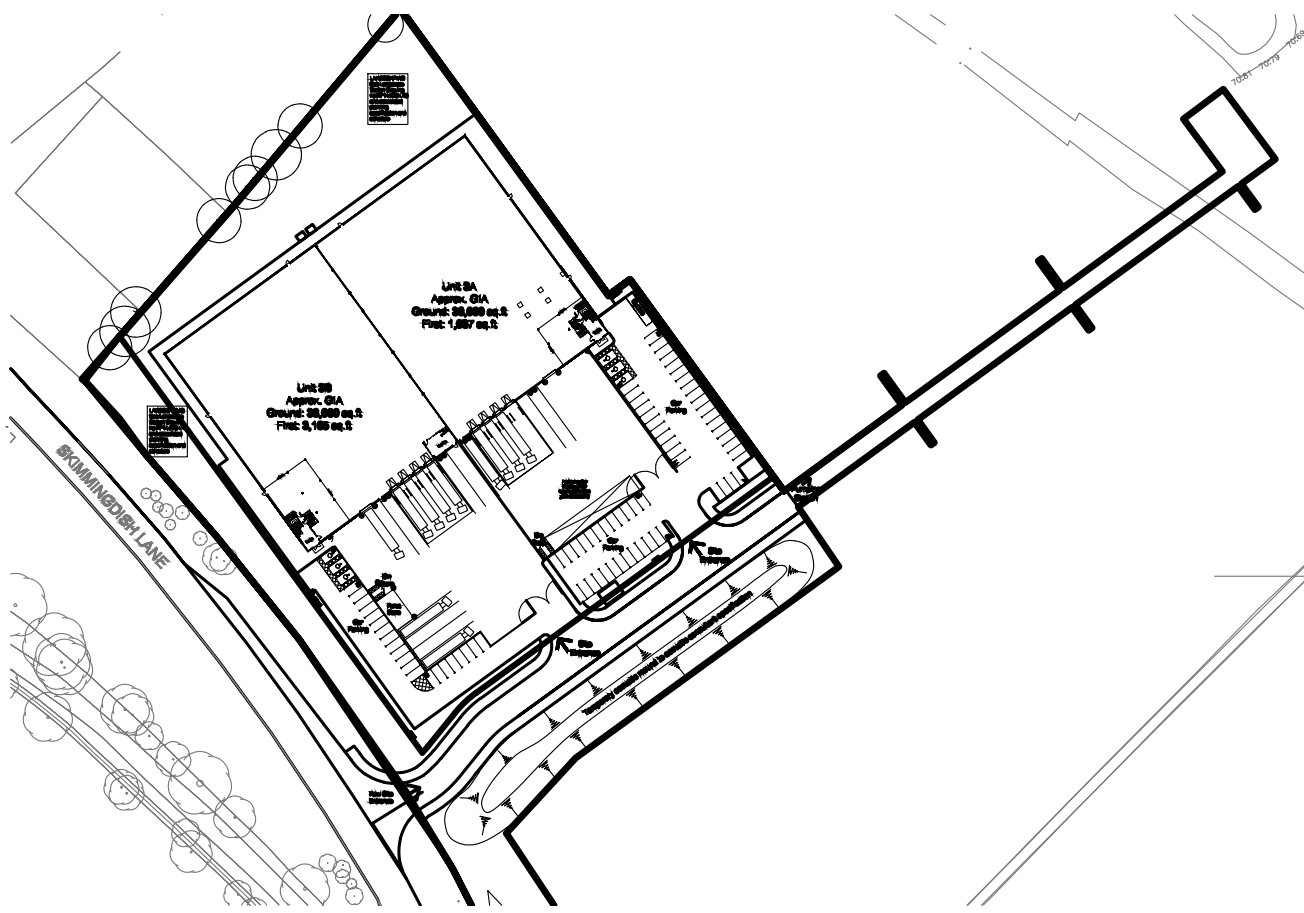
L_{AX} , L_{AE} or SEL

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).

■ End of Section

Figure 15/0240/F1

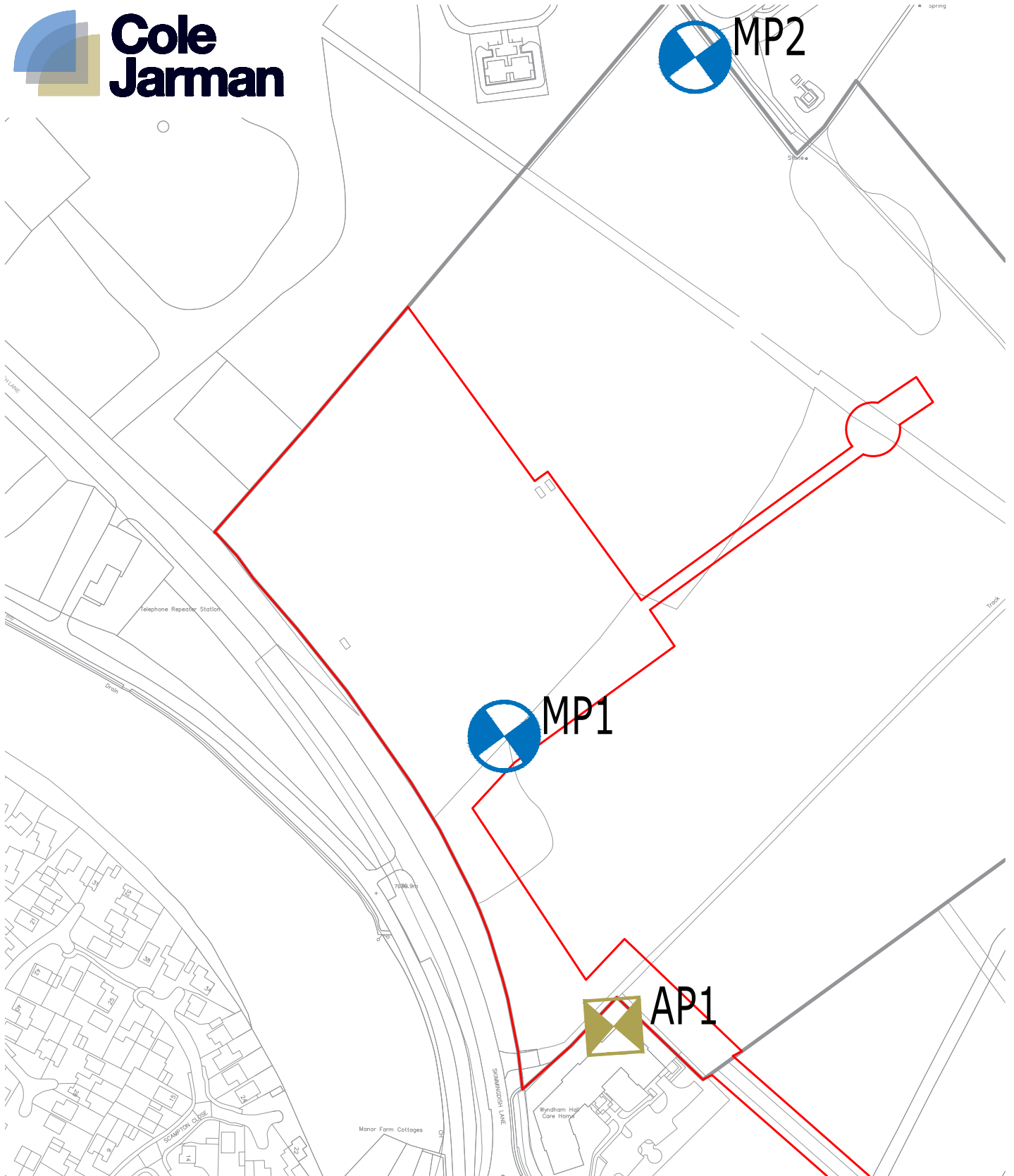
Title: Site plan showing the approved scheme



Project: Skimmingdish Lane, Bicester

Date: December 2017

Scale: Not to scale



Title: Site plan showing measurement and assessment positions

Figure 15/0240/F2

Project: Skimmingdish Lane, Bicester

Date: December 2017

Revision: -

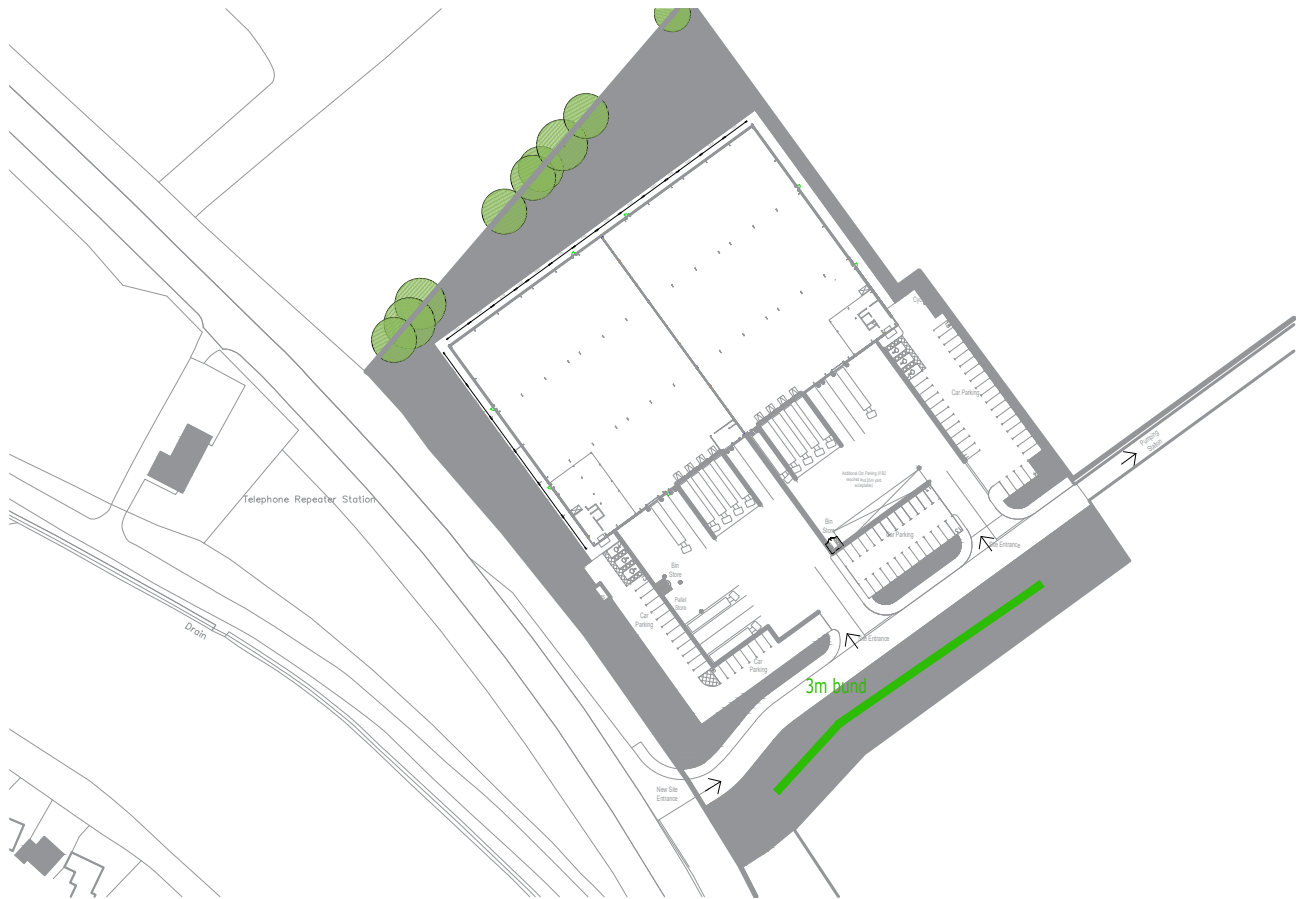
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Figure 15/0240/F3

Title: Site plan showing the bund location and height



Project: Skimmingdish Lane, Bicester

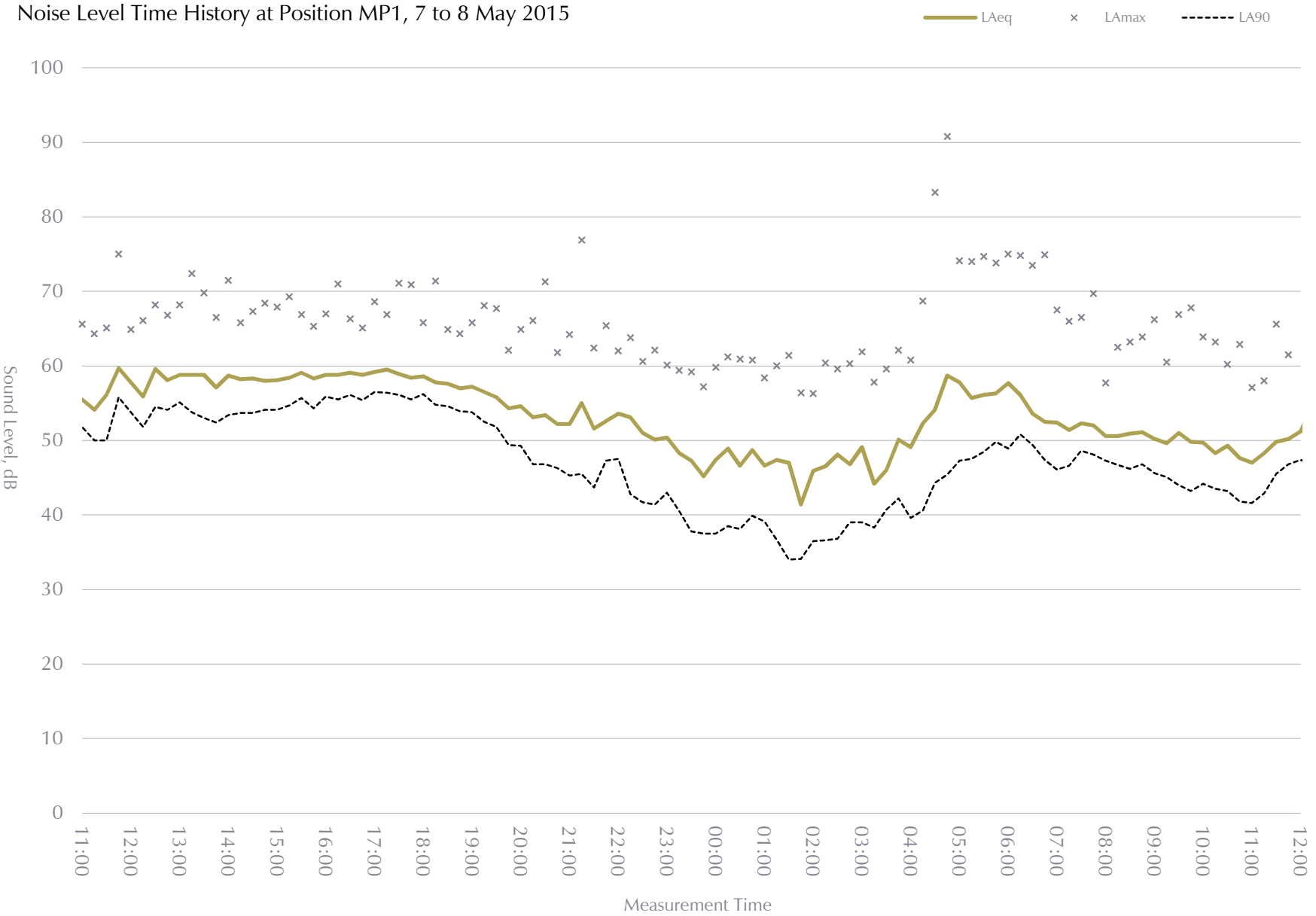
Date: December 2017

Scale: Not to scale



Figure 15/0240/TH01

Skimmingdish Lane, Bicester





Schedule

15/0240/SCH1

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



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



Archive Noise Source Levels



BS 4142:2014 Characteristic Corrections¹

Noise Source	Height of Source (m)	$L_{Aeq,1\text{ hour}}$ (dB) ²	L_{Amax} (dB) ³	Tonality	Impulsivity	Other	Intermittency
HGV Pass-by	1.5	60	87	0	0	0	0
Tug Pass-by	1.5	65	92	0	0	0	0
Car Pass-by	0.5	45	-	0	0	0	0
Fridge Pass-by, HGV	3.5	56	-	2	0	0	3
Pulling away from Bay	1.5	86	113	0	0	0	0
Reversing into Bay	1.5	81	109	0	0	0	0
HGV Decouples	1.0	80	115	0	3	0	0
Loading / Unloading, 30min dock leveller	2.0	90	120	0	3	0	0
Refrigeration Unit, 30 min	3.5	95	-	2	0	0	3
Reversing Bleeper	1.5	-	98	-	-	-	-
Tug Reverses and Release Trailer	1.0	90	-	0	3	0	0
Tug Pull Away	1.5	76	100	0	0	0	0



¹ BS4142:2014 Acoustic character compared to existing background

² Sound Power Level averaged over 1 hour

³ Sound Power Level

**BS 4142:2014 Characteristic Corrections¹**

Noise Source	Height of Source (m)	$L_{Aeq,1\text{ hour}}$ (dB)²	L_{Amax} (dB)³	Tonality	Impulsivity	Other	Intermittency
Unload 20 Pallets, Load Empties	2.0	93	120	0	3	0	0
Car Ignition and pull out	0.5	65	-	0	0	0	0
Door slamming, Car	0.5	57	-	0	3	0	0
Door Slamming, HGV	1.5	57	-	0	3	0	0

The archive noise data has been taken from Cole Jarman's extensive library of source data, as measured on existing operational sites.



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.

HGV Accessing Site

- HGV arrives onsite, drives to parking bay, reverses into parking bay, cuts engine and shuts door.
- HGV drives to loading bay, loads/unloads.

HGV Leaving Site

- HGV door shutting, engine start and HGV pulling away from bay and HGV driving off site.

Assessment Assumptions

- 0% of HGV movements will be refrigerated.
- 0% of trailers are moved around the site with the use of tug units.

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.



Assessment Results

Operational Noise Rating Level (dB $L_{Aeq,1h}$)

Period	Results AP1
0000 - 0100	42
0100 - 0200	41
0200 - 0300	41
0300 - 0400	42
0400 - 0500	41
0500 - 0600	41
0600 - 0700	42
0700 - 0800	44
0800 - 0900	45
0900 - 1000	45
1000 - 1100	45
1100 - 1200	45
1200 - 1300	45
1300 - 1400	45
1400 - 1500	45
1500 - 1600	45
1600 - 1700	44
1700 - 1800	42
1800 - 1900	42
1900 - 2000	44
2000 - 2100	44
2100 - 2200	42
2200 - 2300	42
2300 - 2400	42

- I. Assessment based on traffic data provided by the traffic consultant and presented in schedule 15/0240/SCH2.
- II. 0% refrigerated HGVs.
- III. 0% HGV movements via tug.



Maximum Permissible Number of HGV Movements

Maximum Possible HGV Journeys

Period	Results¹ Maximum HGV Journeys
0000 - 0100	5
0100 - 0200	5
0200 - 0300	5
0300 - 0400	5
0400 - 0500	5
0500 - 0600	5
0600 - 0700	5
0700 - 0800	>25 ²
0800 - 0900	>25
0900 - 1000	>25
1000 - 1100	>25
1100 - 1200	>25
1200 - 1300	>25
1300 - 1400	>25
1400 - 1500	>25
1500 - 1600	>25
1600 - 1700	>25
1700 - 1800	>25
1800 - 1900	>25
1900 - 2000	>25
2000 - 2100	>25
2100 - 2200	>25
2200 - 2300	>25
2300 - 2400	5

The maximum permissible HGV movements have been calculated to meet compliance with the acoustic design criteria.

¹ A single movement is as defined in schedule 15/0240/SCH4

² >25 represents a cut-off value which equates to there being essentially no constraints in movements to meet the noise criteria

Appendix A

Subject: Operational Noise Assessment Basis
Project: Skimmingdish Lane, Bicester
Date: December 2017

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 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, $L_{A,T,r}$ 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 06:00 to 07:00 h and 23:00 to 24:00 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, 6 dB where it is clearly perceptible and 9 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 ($L_{Ar,Tf}$) 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 It should be noted that the SOAEL, significant observed adverse effects, and unacceptable observed adverse effects related to absolute noise levels in table TA2 overleaf are relevant when background noise levels are relatively low. Once background noise levels approach or exceed the absolute noise levels in the table, a comparative assessment (table TA3) can be more appropriate.
- A4.2.14 In addition to these lower-level absolute limits it may be necessary to consider alternative absolute or relative criteria where existing background 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

- A4.2.15 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.
- A4.2.16 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 background 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.
- A4.2.17 In this case the assessment basis presented in table TA3 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

- A4.2.18 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.
- A4.2.19 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 sounders ⁶, 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.

⁶ 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 should be noted that the following refers to external free-field noise levels. It must also be noted that it 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 A4.2.17 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 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

