

## 11 Noise and Vibration

### 11.1 Introduction

- 11.1.1 The assessment of noise and vibration effects from the proposal is contained within chapter 11 of the Environmental Statement (ES), dated September 2007.
- 11.1.2 There has since been a revision to the scheme resulting in a change in the site layout and a reduction in the overall floor-space of the warehouse units - as reflected in the revised Parameters Plans contained within this Supplemental Environmental Statement (SES). This SES chapter contains an assessment of the noise impact of this scheme change. This chapter also provides a response to issues raised in a noise and vibration report prepared by RBA Acoustics (RBA) for the local planning authority and provides details and results of a further noise survey undertaken to supplement the survey results presented in the original ES.
- 11.1.3 This SES has been set out using the same section headings and paragraph numbering as the ES. Wherever paragraphs within this SES chapter supersede those within the original ES chapter, this has been noted. Otherwise, the information within this SES supplements that within the host ES.

### 11.2 Policy Context

- 11.2.1 Paragraph 11.2.1 of the ES lists documents employed within the assessment.
- NPL report*
- 11.2.2 In addition to the documents listed it is appropriate to consider the provisions of the National Physical Laboratory (NPL) report CMAM 16, commissioned by the DETR, entitled "Health effect based noise assessment methods: a review and feasibility study", 1998.
- 11.2.3 Both the ES and RBA have employed assessment threshold levels which are the same as the "guideline values" recommended within World Health Organisation "Guidelines for Community Noise", 2000.
- 11.2.4 RBA states that "...it is proposed to compare the resultant levels of noise that are expected to be generated against threshold levels at which annoyance or disturbance of everyday activities is likely to occur" (RBA report paragraph 3.2) (emphasis added).
- 11.2.5 Extracts from the NPL are attached as SES appendix 11.1. It can be seen from these that the NPL has advised a department of the government (the now defunct DETR) that the WHO guideline values are levels below which effects can be assumed to be negligible and that "exceedances of the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees

of noise exposure are reached". This information supplements the information contained in the ES.

#### *IOA/IEMA Assessment of Environmental Noise*

- 11.2.6 The ES states that one of the relevant Guidance documents that were used within the assessment was: "Noise Change - Institute of Acoustics and Environmental Impact Assessment working group" (ES paragraph 11.2).
- 11.2.7 It is clear from a table of "Semantic Scale for Rating of Noise Effects" (ES Table 11.3) that the document to which the ES refers is the Institute of Acoustics and Institute of Environmental Management and Assessment "Consultation Draft" of "Guidelines for Noise Impact", 10<sup>th</sup> April 2002.
- 11.2.8 RBA state that it has also "assessed [the impact from the change in noise level] using the significance rating given in the Institute of Acoustics and the Institute of Environmental Assessment and Management's (sic) draft guidance on the Assessment of Environmental Noise" (RBA report paragraph 3.2).
- 11.2.9 However, this 2002 draft guidance was superseded by a revised paper released in December 2005. In this revision, the semantic scale used in the ES and by RBA, showing change in noise level and resultant impact has been omitted from the guidance.
- 11.2.10 This information supersedes that within the ES, paragraph 11.2.

#### *BS 5228*

- 11.2.11 One of the Standards to which the ES refers is "BS 5228. Parts 1, 2 and 4. Noise and Vibration Control on Construction and Open Sites" (ES paragraph 11.2). This is the same Standard to which RBA refer in its report of March 2009.
- 11.2.12 Since the release of the ES, this Standard has been superseded as BS 5228-2008 (which came into force on 1<sup>st</sup> January 2009). This information supersedes that within the ES, paragraph 11.2. However, the assessment of impact from construction noise is not affected.

### **11.3 Methodology and Assessment Criteria**

- 11.3.1 The "Semantic Scale for rating of Noise Effects", ES table 11.3, is no longer current guidance and should be ignored. This information supersedes that within the ES, paragraph 11.3.
- 11.3.2 The only advice in relation to the effect of changes in noise level is that within the Glossary of PPG 24. This states that "A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds to roughly to halving or doubling the loudness of a sound". The IOA/IEMA semantic scale was withdrawn because it was at variance with this PPG 24 advice. This information supplements that within the ES.

## 11.4 Baseline Conditions

- 11.4.1 There is a difference between the surveyed noise levels presented within the Environmental Statement (at table 11.7 and appendix 11.4) and the levels recorded by RBA Acoustics. In particular, the prevailing differences between the day and night noise levels, shown in the Environmental Statement, are lower than surveyed by RBA.
- 11.4.2 In order to seek to explain such a discrepancy, a further survey was undertaken during June 2009 at two selected locations on the appeal site. The details of this survey are set out at SES appendix 11.2 and are summarised below. These findings supplement the survey results provided in the ES (at table 11.7 and appendix 11.4).
- 11.4.3 The survey was undertaken at Barty Farm and Woodcut Farm at the locations shown on the plan at SES appendix 11.3.
- 11.4.4 The noise levels recorded during the night period (2300 to 0700 hours) are most pertinent because it is in this period when impact would be greatest.
- 11.4.5 The WHO guideline values are set in terms of  $L_{AeqT}$  where “T” is 16 hours for day (0700 to 2300 hours) and 8 hours for night (2300 to 0700 hours).
- 11.4.6 BS 4142 requires that background noise levels are displayed using the index  $L_{A90}$  and such levels must be “typical” and “representative”. At a recent inquiry into a comparable scheme (Radlett) this subject was debated at length and it was decided by the inspector that the average background noise level over the day or night period best represents the objectives of BS 4142.
- 11.4.7 Accordingly, the survey results presented at appendix 11.2 are set out in hourly periods and in terms of the averages over the day and night (logarithmic average for  $L_{AeqT}$  and arithmetic average for  $L_{A90}$ ).
- 11.4.8 Tables 1 and 2, below, summarise these levels over the survey period:

*Table 1 – Barty Farm*

	Day _ Night	Log average	Average
		$L_{Aeq,time}$	LAF,90
2 <sup>nd</sup> , June, (Tuesday)	Day	54.9	50.6
	Night	54.2	47.6
3 <sup>rd</sup> , June, (Wednesday)	Day	58.1	52.6
	Night	51.5	45.4
4 <sup>th</sup> , June, (Thursday)	Day	53.8	48.6
	Night	52.3	46.2
5 <sup>th</sup> , June, (Friday)	Day	55.3	50.0
	Night	53.0	47.9

6 <sup>th</sup> , June, (Saturday)	Day	57.9	54.4
	Night	50.9	45.6
7 <sup>th</sup> , June, (Sunday)	Day	50.7	44.7
	Night	52.5	45.2
8 <sup>th</sup> , June, (Monday)	Day	54.2	49.0

Table 2 – Woodcut Farm

	Day _ Night	Log average	Average
		L <sub>Aeq,time</sub>	LAF,90
2 <sup>nd</sup> , June, (Tuesday)	Day	61.3	57.7
	Night	61.0	54.2
3 <sup>rd</sup> , June, (Wednesday)	Day	62.8	59.5
	Night	61.1	54.7
4 <sup>th</sup> , June, (Thursday)	Day	61.8	57.8
	Night	59.6	53.7
5 <sup>th</sup> , June, (Friday)	Day	61.8	58.7
	Night	58.1	52.4
6 <sup>th</sup> , June, (Saturday)	Day	63.1	60.0
	Night	56.4	49.6
7 <sup>th</sup> , June, (Sunday)	Day	57.6	53.7
	Night	59.9	53.3
8 <sup>th</sup> , June, (Monday)	Day	62.2	59.1

- 11.4.9 It can be seen that the background and ambient noise levels during the night-time are reasonably steady at around L<sub>A90</sub> = 45 to 48 dB and L<sub>Aeq8hr</sub> = 51 to 54 dB for Barty Farm and L<sub>A90</sub> = 50 to 55 dB and L<sub>Aeq8hr</sub> = 56 to 61 dB at Woodcut Farm.
- 11.4.10 Both the background and ambient noise levels at these locations were dominated by noise from motorway traffic. This is a line source and, so, noise levels would be expected to decay relatively little with distance from the motorway (there is a 3 dB reduction for a doubling of distance from a line source; to this reduction, must be added ground absorption effects). Such a reduction is seen between the levels recorded at Barty Farm and Woodcut Farm.
- 11.4.11 The levels surveyed are generally lower than those recorded by RBA Acoustics at comparable locations. It is probable that this is due to the different wind directions during the two sets of surveys. The wind direction during RBA's survey is not stated. The wind direction during the Sharps Acoustics survey was predominantly from the south or east.
- 11.4.12 This information supplements that contained within the ES.

## 11.5 Assessment of Noise and Vibration – Construction Effects

11.5.1 There are no amendments or additions to be made in respect of this section of the original ES.

## 11.6 Assessment of Operational Effects – Noise

11.6.1 Since the submission of the ES, an assessment of noise and vibration effects from the proposal has been undertaken by RBA. Its findings in relation to on-site road and rail impacts are as follows:

*“In addition, noise impacts as a result of on site road traffic were identified at Chestnuts, Hunters Lodge (Woodcut Lane) and Crismill Road and noise barriers 3.5m high were suggested as possible mitigation measures. Unlike the enclosure of the Western Sidings, the specific locations of these barriers are not included on any site plan, with only a written description included. As such the barrier attenuation is not included in the impact table below, however it is possible that a barrier could reduce noise levels by 5 to 10 dB and as such reduce the impact of on site road traffic at these locations to ‘slight’. Noise barrier development should appropriately conditioned in any approval” (RBA report, paragraph 6.2) (emphasis added).*

11.6.2 This SES provides specific detail of these barriers as well as their acoustic performance.

11.6.3 RBA Acoustics’ calculations of noise emission levels from site activity also ignore ground effects (otherwise known as ground absorption). This SES discusses such ground effects and factors the RBA Acoustics’ calculated noise emission levels to accommodate them.

11.6.4 The supplementary assessment of operational effects, within this SES, adopts RBA Acoustics’ predicted noise emission levels from site activity whilst factoring these for the attenuation provided by the proposed barriers.

11.6.5 This information on barrier and ground effects, set out below, has been prompted by the RBA report and supplements information in “Assessment of operational effects – noise”, section 11.6 of the ES.

### *Barrier effects*

11.6.6 RBA’s appendix, Tables 2863/TX30 and 2863/TX31, provide predicted noise emission levels from “contributing noise sources” (intermodal, rail and road) and “cumulative noise sources”. Noise levels are shown at various assessment receptors. The receptors at Chestnuts, Woodcut Lane and Crismill Road are dictated by on-site road traffic (see SES appendix 11.3 for these assessment locations). The day and night road traffic emission levels, and the “threshold limits”, determined by RBA, are summarised in table 3 below.

Table 3

Location	L <sub>Aeqday</sub>	L <sub>Aeqnight</sub>
Chestnuts	58 dB	56 dB
Woodcut Lane	57 dB	54 dB
Crismill Road	49 dB	46 dB
Threshold Limit	55 dB	45 dB

11.6.7 In relation to Chestnuts, the ES notes that a 3.5 metre high noise barrier will be provided “at the boundary around ‘Chestnuts’ Ashford Road” (ES, paragraph 11.18.19, last bullet point). Such a high screen would result in a substantial reduction of noise from the on-site road traffic noise levels shown in the table (some 15 dB) to the extent that on-site traffic noise emission levels would fall well below (within) RBA’s threshold limits of 55 dB (day) and 45 dB (night).

11.6.8 In relation to the Woodcut Lane and Crismill Road assessment receptors there is considerable scope to provide screening on site by the use of custom designed earth mounds and landforms. The detailed section plans attached at SES appendix 11.4 show the provisions for screening along the on-site road adjacent to Woodcut Lane and Crismill Road.

11.6.9 The attached spreadsheet calculation sheets (SES appendix 11.5) show that the expected insertion losses for these screens would be in excess of 10 dB. This landform screening and the barriers around Chestnuts would reduce the on-site road traffic noise emission levels, determined by RBA, to those shown in table 4 below:

Table 4

Location	L <sub>Aeqday</sub>	L <sub>Aeqnight</sub>
Chestnuts	43 dB <sup>1</sup>	41 dB <sup>1</sup>
Woodcut Lane	47 dB <sup>2</sup>	44 dB <sup>2</sup>
Crismill Road	39 dB <sup>2</sup>	36 dB <sup>2</sup>
Threshold Limit	55 dB	45 dB

Notes: 1 A barrier insertion loss of 15 dB has been assumed.

2 A barrier insertion loss of 10 dB has been assumed.

#### Ground effects

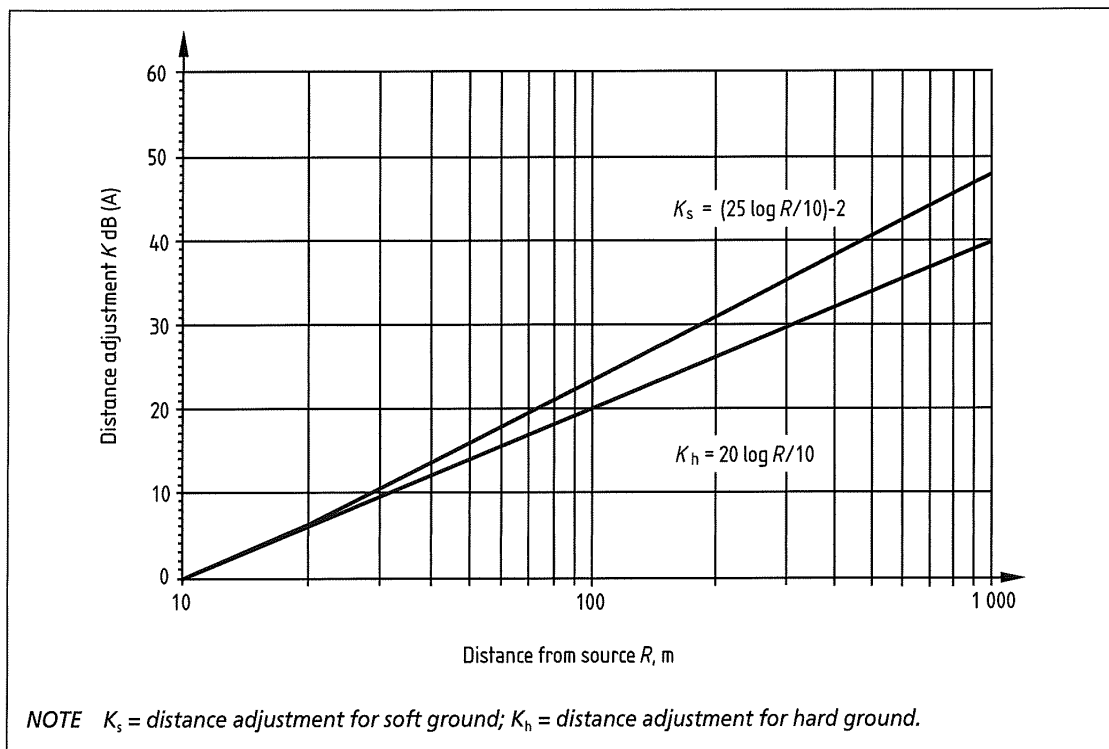
11.6.10 RBA has also assessed the noise emission levels at Fremilns Road and Roundwell. The cumulative noise levels at these assessment locations are shown to be dictated by both on-

site road traffic and activity at the intermodal terminal (see RBA appendix. tables 2863/TX 30 and 31). It is believed that “Fremlins Road should read “Mallings Drive” since this road is closer to the intermodal terminal. For continuity, this receptor has continued to be termed Fremlins Road, below.

- 11.6.11 RBA Acoustics has calculated the noise emission level from intermodal terminal activity and traffic in this area without making due allowance for either the partial screening and reduced angle of view provided by warehouse buildings or the attenuation provided by (mostly soft) ground effects.
- 11.6.12 In practice, there will be attenuation from either screening or ground effects. One or the other attenuation effects should have been factored into RBA’s calculated noise emission levels. In this respect it is notable that the prediction of noise at such distances is conventionally undertaken using the provisions of ISO 9613 or BS 5228 – both these Standards require that attenuation be taken for screening or for ground effects.
- 11.6.13 The attenuation of noise, due to ground effects, over a distance of some 370 metres (Fremlins Drive) and 400 metres (Roundwell) is considerable.
- 11.6.14 Figure F2, from BS 5228.2009, is reproduced as table 5 below.

Table 5

Figure F2 Distance adjustment  $K$  for activity  $L_{Aeq}$  method



- 11.6.15 It can be seen from this table, and the associated equations for soft and hard ground effects, that the attenuation due to ground effect is 5.8 dB at 370 metres. This effect increases with

increased distance. A loss of 5 dB has been taken in this instance irrespective of the distance greater than 370 metres.

16.6.16 The principal assessment figures in RBA's appendix table 2863/TX30 and 31 have been summarised below, whilst correcting the figures for the minimum attenuation that will result from barrier or ground effects (discussed above). The resultant cumulative noise emission levels from site activity, the change in noise level that would result from the appeal proposal and the impact are displayed in tables 6 and 7, below:

*Table 6 - day*

Location	Cumulative Noise level (dB)	Baseline (existing) noise level (dB)	Cumulative + baseline (dB)	Resultant change dB	Impact
Chestnuts	43.4	51	Below threshold (55 dB)		None <sup>1</sup>
Woodcut Lane	47.6	53	Below threshold (55 dB)		None <sup>1</sup>
Crismill Road	41.7	51	Below threshold (55 dB)		None <sup>1</sup>
Fremlins Road <sup>3</sup>	44.7	52	Below threshold (55 dB)		None <sup>1</sup>
Roundwell	42.9	45	Below threshold (55 dB)		None <sup>1</sup>

*Table 7 - night*

Location	Cumulative noise level (dB)	Baseline (existing) noise level (dB)	Cumulative + base line (dB)	Resultant Change (dB)	Impact
Chestnuts	41.6	45	Below threshold (45 dB)		None <sup>1</sup>
Woodcut Lane	45.2	46	48.6	2.6	Slight <sup>2</sup>
Crismill Road	40.4	45	Below threshold (45 dB)		None <sup>1</sup>
Fremlins Road <sup>3</sup>	44.2	45	Below threshold (45 dB)		None <sup>1</sup>
Roundwell	41.9	38	Below threshold (45 dB)		None <sup>1</sup>

Notes: 1 RBA conclude that there would be no impact if the "cumulative noise level" from the scheme falls below the 55 dB (day) and 45 dB (night) threshold levels.

2 A "slight" impact would be concluded only when using RBA criteria. PPG 24 advises that a change in noise level of less than 3 dB would be imperceptible and using this criterion it is considered that there would be no impact in this case.

3 This should read Mallings Drive - Fremlins Road is much further from the Intermodal Terminal.

16.6.17 The scheme changes reflected in the Parameters Plans affect the size and orientation of units on part of the site (two units have been reduced in size and incorporated within one unit. Moreover, the traffic data used in this assessment do not account for a revised reduction in floor space of approximately one sixth. Traffic flows associated with the development are therefore likely to be lower than stated in the ES. Therefore, the noise impacts presented in this assessment are likely to overestimate the effect of the development.

## 11.7 Assessment of Vibration – Operational Effects

11.7.1 There are no amendments or additions to be made in respect of this section of the original ES.

## 11.8 Mitigation

11.8.1 There are no amendments or additions to be made in respect of this section of the original ES.

## 11.9 Summary of Residual Effects

11.9.1 The following comments supplement those set out at section 11.9 of the ES.

11.9.2 When appropriate attenuation losses are taken for barriers then the road traffic noise levels shown in RBA Acoustics' appendix, tables 2863/TX30 and 31, reduce to an extent that impact from the cumulative sources within the appeal scheme would be at worst "slight" at the most affected assessment receptors.

11.9.3 This is a conclusion that RBA stated that they thought was possible in their report.

11.9.4 Similarly, when appropriate losses are taken for ground effects then the components of noise from the intermodal terminal and unscreened site roads reduce to an extent that cumulative impacts at receptors where noise emission levels are dictated by these sources reduce to, at worst, "slight" (using RBS's assessment criteria).

11.9.5 If the advice in PPG 24 is followed, that changes in noise levels of less than 3 dB are not perceptible under normal conditions, then this impact reduce to "none".

11.9.6 There are safety margins within these assessment findings because a) the baseline noise levels surveyed by RBA Acoustics are low (consequently, changes as a result of the scheme may be overstated), and b) the revisions to the scheme would likely result in lower traffic flows than assumed within the ES.

11.9.7 In conclusion, when RBA Acoustics' assessed noise emission levels are factored for mitigation measures adopted or for natural ground effects then it can be seen that, because of the mitigation measures built into the scheme, the resultant, residual noise impacts would be low.