

**CONTENTS**

<b>7.1</b>	<b>INTRODUCTION .....</b>	<b>2</b>
<b>7.2</b>	<b>ASSESSMENT METHODOLOGY .....</b>	<b>3</b>
	Scope .....	3
	Data sources .....	3
	Assessment approach .....	3
	Significance criteria.....	10
<b>7.3</b>	<b>RELEVANT POLICY .....</b>	<b>11</b>
	National Planning Policy Framework (March 2012) .....	11
<b>7.4</b>	<b>BASELINE CONDITIONS .....</b>	<b>12</b>
	The projected future baseline.....	15
<b>7.5</b>	<b>POTENTIAL EFFECTS .....</b>	<b>16</b>
	Construction stage .....	16
	Post-completion stage .....	16
	<i>Road Traffic Noise and Sensitive Receptors .....</i>	<i>16</i>
	<i>Proposed Sensitive Receptors and Noise.....</i>	<i>17</i>
<b>7.6</b>	<b>MITIGATION MEASURES .....</b>	<b>21</b>
	<i>Road Traffic Noise and Sensitive Receptors .....</i>	<i>21</i>
	<i>Proposed Sensitive Receptors and Noise.....</i>	<i>21</i>
<b>7.7</b>	<b>RESIDUAL EFFECTS .....</b>	<b>26</b>
	Construction stage .....	26
	Post-completion stage .....	26
	Summary of effects .....	26
<b>7.8</b>	<b>CUMULATIVE EFFECTS.....</b>	<b>27</b>

## **7.1 INTRODUCTION**

7.1.1 This addendum chapter has been prepared by Wardell Armstrong LLP and considers any changes to the potential effects on noise and vibration as reported in the ES (November 2014) resulting from amendments to the Proposed Development and provides an update to the assessment incorporating additional traffic modelling.

## **7.2 ASSESSMENT METHODOLOGY**

### **Scope**

7.2.1 The scope of the development remains as stated in the original ES chapter.

### **Data sources**

7.2.2 The following sources of information have been used in the preparation of this report:

- National Planning Policy Framework (NPPF), published March 2012;
- Noise Policy Statement for England, 2010;
- Planning Policy Guidance (Noise) 2014;
- British Standard 5228-1:2009+A1:2014 “Code of Practice for noise and vibration control on construction and open sites – Part 1: Noise” (BS5228-1);
- British Standard 5228-2:2009+A1:2014 “Code of Practice for noise and vibration control on construction and open sites – Part 2: Vibration” (BS5228-2)
- British Standard BS6472: 2008 “Guide to Evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting” (BS6472-1);
- The World Health Organisation’s “Guidelines for Community Noise”, 1999 (WHO 1999);
- British Standard BS4142: 2014 Methods for rating and assessing industrial and commercial sound (BS4142);
- Department of Transport’s memorandum, “Calculation of Road Traffic Noise” (CRTN), 1988;
- Building Bulletin 93: Acoustic Design in Schools” (BB93);
- Acoustic design of schools: performance standards (December 2014) (Ref. 12.12); and
- Traffic flow information, provided by Jubb Consulting Engineers Limited.

### **Assessment approach**

#### **Construction Phase Assessment**

##### *Noise from Earthworks and Construction Phase Activities*

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7.2.3 The activities associated with the earthworks and construction phase of the Proposed Development will have the potential to generate noise and create an impact on the surrounding area.

7.2.4 Guidance on the prediction and assessment of noise from development sites is given in British Standard 5228 -1:2009+A1:2014 "Code of Practice for noise and vibration control on construction and open sites – Part 1: Noise" (BS5228-1).

### ***Operational Phase Assessment***

#### *Road Traffic Noise and Existing Sensitive Receptors*

7.2.5 The operational phase of the development will generate additional traffic movements on the existing road network. These additional vehicle movements have the potential to increase road traffic noise levels at existing receptors located adjacent to the main routes to and from the development.

7.2.6 The current and future traffic noise levels at a number of sensitive receptors; both with and without the development in place, have been predicted using the computer modelling software SoundPLAN Version 7.4. The computer modelling methodology conforms to the calculation procedures set out in the Department of Transport's memorandum, "Calculation of Road Traffic Noise" (CRTN), 1988. The memorandum was prepared to enable entitlement under the Noise Insulation Regulations 1975 to be determined; but it is stated in the document, that the guidance is equally appropriate for the calculation of traffic noise for land use planning purposes.

7.2.7 The procedures outlined in CRTN assume typical traffic and noise propagation conditions that are consistent with moderately adverse wind velocities and directions during specified periods. In CRTN, all noise levels can be expressed in terms of the index  $L_{10(18\text{ hour})}$  dB(A).

7.2.8 The data used in the road traffic noise assessment is detailed in the Transport Assessment (TA) produced by provided by Jubb Consulting Engineers Limited, the traffic and transportation consultant for the proposed development. Further details of

the TA are contained in Chapter 5 of the original ES and Appendix 3 and 3a to this further information submission.

- 7.2.9 The noise assessment requires 18-hour traffic flows for the routes likely to be affected by development traffic. The traffic information has been derived from traffic counts and has been provided as 18 hour AAWT flows and HGV percentages. The flows used in the noise assessment are included in Appendix 6a
- 7.2.10 Development proposal include a site access road which links into the site access road for another development, (Land West of White Post Road, Banbury, promoted by Gladman Developments Limited (GDL)) to the east of the development site. The site access roads therefore form a link between White Post Road, and Bloxham Road.
- 7.2.11 Therefore, road traffic flows have been provided without the development; with the development (Do Something 1); with and without the link road; and, with the link road, the development, and the GDL development (Do Something 3).
- 7.2.12 In summary, CRTN has been used to determine the noise levels at each existing sensitive receptor, for a total of 5 scenarios:
- Scenario 1: 2014 Baseline
  - Scenario 2: 2031 Do Minimum no Link Road (DMnoLR)
  - Scenario 3: 2031 Do Something 1 no Link Road (DS1noLR)
  - Scenario 4: 2031 Do Something 1 with Link Road (DS1+LR)
  - Scenario 5: Do Something 3 with Link Road (DS3+LR)
- 7.2.13 Details of the sensitive receptor locations for the road traffic assessment are given in Table 7.2 and shown on Figure 7.2 provided in Appendix 6b.

**Table 7.2: Existing Noise Sensitive Receptor Locations Considered for CRTN Predictions**

CRTN Receptor Number	Address	Approximate Grid Reference	
		X	Y
CRTN1	2 Crouch Cottages	444173.00	238753.00
CRTN2	2 Lansdown Close	444525.00	239099.00
CRTN3	123 Bloxham Road	444963.00	239543.00
CRTN4	The Bungalow, Bloxham Road	444005.00	238378.00

7.2.14 Impacts will also be felt at receptors adjacent to and beyond those listed above. However, impacts at these receptors will be equal to or less than the listed receptors.

*Existing Sensitive Receptors and Vibration*

7.2.15 It is considered that the operational phase of the development is unlikely to produce any significant groundborne vibration. Vibration from the operation of the completed development has not therefore been considered.

*Proposed Sensitive Receptors (Wykham Park Farm) and Noise*

7.2.16 In addition to assessing the noise impact of the development at existing receptors, an assessment is required to consider any potentially noise sensitive areas of the Proposed Development. These areas, i.e. residential dwellings and school site, will be subjected to noise from existing and proposed sources.

7.2.17 The dominant existing source of noise at the Proposed Development is road traffic from vehicles travelling along Bloxham Road (A361), adjacent to the Site. There will also be some additional noise from traffic generated by the development itself. To determine the existing noise levels, at the proposed sensitive areas of the development, attended noise surveys have been carried out. Details of the noise survey are summarised in Section 7.4 of this chapter and set out in full in Appendix 6b.

7.2.18 Once operational, the Proposed Development Site will generate additional traffic movements on the local road network. These additional vehicle movements have the potential to increase road traffic noise at the proposed residential areas of the Site. The future traffic noise levels across the Site; both with and without the development in place, have been predicted using the computer modelling software SoundPLAN version 7.4. The computer modelling methodology conforms to the calculation procedures set out in CRTN.

7.2.19 Daytime noise levels at the proposed residential areas have been calculated from the LA10,18h in accordance with the prediction method detailed in the report prepared by TRL Limited. The calculations in the TRL document have been reproduced below for clarity;

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For non-motorways, the following equations apply;

For daytime noise  $L_{Aeq,16hour} = 0.95 \times L_{A10,18Hour} + 1.44$

For night-time noise  $L_{Aeq,8Hour} = 0.90 \times L_{A10,18Hour} - 3.77$

7.2.20 The noise assessment for the operational phase therefore details existing and future noise levels across the proposed development. These noise levels have been assessed, and, where necessary, mitigation measures have been recommended to ensure that the required external and internal noise levels are met.

World Health Organisation Guidelines for Community Noise, 1999

7.2.21 The World Health Organisation's "Guidelines for Community Noise", 1999 (WHO 1999) suggest appropriate criteria and noise limits for outdoor living areas and habitable rooms of residential dwellings. In accordance with the requirements of the WHO 1999, the following external and internal noise limits, for noise from external sources, will need to be met within sensitive areas of the residential dwellings:

- 55dB  $L_{Aeq(16\text{ hour})}$  during the daytime in outdoor living areas;
- 35dB  $L_{Aeq(16\text{ hour})}$  during the daytime in noise sensitive rooms other than bedrooms;
- 30dB  $L_{Aeq(8\text{ hour})}$  during the night-time in bedroom areas.
- 45dB  $L_{Amax}$  should not be exceeded during the night-time in bedroom areas.

British Standard 4142:2014 (BS4142), Method for rating and assessing industrial and commercial sound

7.2.22 BS4142 is used to rate and assess sound of an industrial and/or commercial nature including:

- sound from industrial and manufacturing processes;
- sound from fixed installations which comprise mechanical and electrical plant and equipment;
- sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- 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.

7.2.23 The standard is applicable to the determination of the following levels at outdoor locations:

- rating levels for sources of sound of an industrial and/or commercial nature; and
- 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.

7.2.24 The purpose of the BS4142 assessment procedure is to assess the significance of sound of an industrial and/or commercial nature.

7.2.25 BS4142 refers to noise from the industrial source as the 'specific noise' and this is the term used in this report to refer to noise which is predicted to occur due to equipment associated with proposed sources of industrial noise. Proposed sources of industrial noise will be limited to reduce the potential for a noise impact.

7.2.26 BS4142 assesses the significance of impacts by comparing the specific noise level to the background noise level ( $L_{A90}$ ). Appendix 6b. provides details of the background noise survey undertaken.

7.2.27 Certain acoustic features can increase the significance of impacts over that expected from a simple comparison between the specific noise level and the background noise level. In particular BS4142 identifies that the absolute level of sound, the character, and the residual sound and the sensitivity of receptor should all be taken into consideration. BS4142 includes allowances for a rating penalty to be added if it is found that the specific noise source contains a tone, impulse and/or other characteristic, or is expected to be present. The specific noise level along with any applicable correction is referred to as the 'rating level'.

7.2.28 The greater the difference between the rating level over the background noise level, the greater the magnitude of the impact. The assessment criteria given by BS4142 are as follows:



- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- 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.

7.2.29 During the daytime, BS4142 requires that noise levels are assessed over 1-hour periods. However, during the night-time, noise levels are required to be assessed over 15-minute periods.

7.2.30 Where the initial estimate of the impact needs to be modified due to context, BS4142 states that all pertinent factors should be taken into consideration, including:

- The absolute level of sound;
- The character and level of the residual sound compared to the character and level of the specific sound; and
- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

#### ***Proposed Primary School Site***

7.2.31 Where a new school or educational institute is proposed, the internal and external noise levels, including a number of parameters for internal acoustics must be assessed in relation to BB93. Department for Education (DfE) presents a revision to Section 1 of BB93 dated February 2015, providing revised parameters for the internal acoustics.

7.2.32 For new school developments, BB93 recommends that the following daytime noise levels should be achieved:

An upper limit of 60 dB  $L_{Aeq}$  (30 minutes) at the boundary of external premises used for teaching and recreation.

55 dB  $L_{Aeq}$  (30 minutes) in unoccupied playgrounds, playing fields and other outdoor areas.

50 dB  $L_{Aeq}$  (30 minutes) in at least one area of the unoccupied playgrounds, playing fields and other outdoor areas, to ensure suitable noise levels for outdoor teaching.

Indoor ambient noise limits in schools of between 30 and 40 dB  $L_{Aeq}$  (30 minutes) depending on the use of the room.

### ***Proposed Sensitive Receptors and Vibration***

7.2.33 It is considered that the levels of vibration will not significantly affect the proposed sensitive areas of the development. Vibration from the operation of the completed development has not therefore been considered.

### **Significance criteria**

The assessment of significance criteria remains as reported in the original ES.

### **7.3 RELEVANT POLICY**

#### **National Planning Policy Framework (March 2012)**

7.3.1 National Planning Policy remains as reported in the original ES chapter.

#### **Cherwell Local Plan 2011-2013 Part 1 – Adopted July 2015**

7.3.2 The Cherwell Local Plan 2011-2031 Part 1 was adopted in July 2015. Draft Cherwell Local Plan 2011 – 2031 Part 2 is currently in preparation. Land at Wykham Park Farm is allocated as part of the Strategic Development of South West Banbury through Policy Banbury 16 and Policy Banbury 17. There are no specific policies that relate to the noise and development, however, implicit in the objectives of the Plan is a strategic objective to build sustainable communities. New housing needs to be provided in such a way that it minimises environmental impact, including through the elimination and control of pollution and the effective and efficient use of natural resources. Planning decisions can have an effect on travel to work, schools, noise and air quality, access to services, climate change and social networks which can all contribute to health and well-being.

**7.4 BASELINE CONDITIONS****Baseline Road Traffic Noise Levels at Sensitive Receptors**

7.4.1 In accordance with the method specified in CRTN, noise modelling has been carried out for the 4 receptors identified in Table 7.5 and shown on Figure 7.2 provided in Appendix 6b. (i.e. CRTN1 to CRTN4). The noise modelling indicates the baseline noise levels at the façade of each receptor, in 2014. The noise modelling results are shown in Table 7.9.

**Table 7.9: Results of the Predicted Baseline Road Traffic Noise Levels**

<b>CRTN Receptor Number</b>	<b>Predicted L10 18hour dB(A) at the façade of the Receptor – 2014 (Scenario 1)</b>
CRTN1- 2 Crouch Cottages	70
CRTN2 - 2 Lansdown Close	68
CRTN3 - 123 Bloxham Road	68
CRTN4 - The Bungalow, Bloxham Road	67

7.4.2 In accordance with CRTN, the predicted level of road traffic noise at the façade of the existing receptors has been determined based on the number and composition of vehicles travelling along the local road links (i.e. the number and proportion of HGVs and LGVs), together with the speed of vehicles, distance of the receptor from the edge of the carriageway and angle of view of the road link.

**Baseline Survey Information**

7.4.3 In September 2012, Wardell Armstrong LLP carried out a noise survey to assess the noise levels across the proposed Wykham Park Farm development Site and at existing sensitive receptor locations. It is generally accepted by Local Authorities that a noise survey within the last 3 years would be acceptable. Furthermore the baseline data within this assessment has only been used to for the assessment of the construction phase. The impact of road traffic has been determined through the use of future year traffic data within the noise models. Therefore it is deemed that the existing noise survey, undertaken in September 2012, is still robust.

7.4.4 Noise measurements were carried out at 5 monitoring locations, considered to be representative of the existing and proposed residential receptors in the immediate vicinity of the proposed Wykham Park Farm development.

7.4.5 Monitoring locations 1 to 5 are also relevant to the Wykham Farm Park assessment of construction noise. The monitoring locations are shown on Drawing Number 7.1 and are provided at Appendix 7.3 to the original ES.

- Monitoring Location 1: Located approximately 10m from the carriageway of the A361 (Bloxham Road). This monitoring location is also used for Crouch Cottages for the construction phase assessment;
- Monitoring Location 2: In the northwestern part of the Proposed Development Site. This on-site monitoring location is considered to be representative of the existing Banbury School north of the saltway for the construction phase assessment;
- Monitoring Location 3: In the northeastern part of the Proposed Development Site. This on-site monitoring location is considered to be representative of the existing properties in the residential area to the northeast for the construction phase assessment;
- Monitoring Location 4: In the southeastern part of the Proposed Development Site. This on-site monitoring location is considered to be representative of the existing residential receptor, Wykham Farm Cottage, for the construction phase assessment;
- Monitoring Location 5: In the southwestern part of the Proposed Development site. This on-site monitoring location is considered to be representative of the existing residential receptor, Wykham Park Farm Cottage, for the construction phase assessment.

7.4.6 The full results and details of the monitoring are included in Appendix 6b

7.4.7 The daytime and night-time noise measurements have been arithmetically averaged to give a single daytime and night-time level for each location and these are shown in Table 7.10. In accordance with the shortened measurement procedures specified in CRTN, the measured daytime noise level at monitoring location 1 i.e. in the immediate vicinity of the A361, has been adjusted to predict the daytime level of road traffic noise at this location.

**Table 7.10: Average Daytime and Night-time Noise Monitoring Results (Figures in dB L<sub>Aeq</sub>)**

Monitoring Location	Time	Average Measured Noise Levels
1	0700-2300	59.0*
	2300-0700	51.6
2	0700-2300	48.0
	2300-0700	33.3
3	0700-2300	47.7
	2300-0700	32.8
4	0700-2300	45.1
	2300-0700	33.5
5	0700-2300	48.0
	2300-0700	37.3

\*Daytime noise levels calculated in accordance with the shortened measurement procedure in CRTN 1988.

7.4.8 In addition to the average daytime and night-time noise levels, the range of maximum noise level recorded during each measurement period of the night-time survey, at monitoring locations 1 to 5, are summarised in Table 7.11.

**Table 7.11: Maximum Night-time Noise Levels**

Monitoring Location	Range of Maximum Measured Noise Levels (Figures in dB L <sub>Amax</sub> )
1	66.6 – 68.8
2	49.1 – 67.0
3	53.2 – 60.6
4	47.3 – 66.1
5	49.5 – 61.5

7.4.9 Table 7.10 shows that the noise levels in the western part of the site, located nearest to the A361, exceed the required daytime noise limit of 55dB  $L_{Aeq\ 16\ hour}$ . The existing noise levels at the Proposed Development should not be a determining factor in granting planning permission; however, mitigation measures need to be considered to achieve the noise levels required in garden areas and noise sensitive rooms in this part of the site.

#### **The projected future baseline**

7.4.10 In addition to the noise survey, noise modelling has been carried out to determine the daytime levels of road traffic noise across the site for the future year 2031, i.e. with the development, link road, committed development traffic in place, and the GDL development. The results of the SoundPLAN daytime noise modelling are shown on Figures 7.11, 7.12 and 7.13 provided in Appendix 6b. The results of the noise modelling indicate that the noise levels in the western part of the site, located nearest to the A361, exceed the required daytime noise limit of 55dB  $L_{Aeq\ 16\ hour}$ . Therefore, mitigation measures will need to be considered to achieve the noise levels required in garden areas and noise sensitive rooms in this part of the site.

## **7.5 POTENTIAL EFFECTS**

### **Construction stage**

- 7.5.1 Potential effects arising from the construction stage remain as reported in the original ES.

### **Post-completion stage**

#### ***Road Traffic Noise and Sensitive Receptors***

- 7.5.2 CRTN predictions have been carried out to assess any potential changes in road traffic noise at existing and proposed receptor locations during the operational phase of the development.
- 7.5.3 The changes in noise levels at each of the receptors considered have been assessed by comparing the noise levels predicted for the scenarios detailed in the Methodology Section of this chapter and include baseline, and future years scenarios with and without committed developments, the development, and the link road.
- 7.5.4 The Proposed Development includes additional road traffic flows on existing roads, but it also includes the development of new roads associated with the Site.
- 7.5.5 The results are shown in Table 7.13. Graphical representation of the predicted noise propagation for each scenario can be found within Figures 7.3 to 7.7 provided in Appendix 6b.



**Table 7.13: CRTN Predictions for the 2022 “Without Development” and “With Development Plus Committed Development” Scenarios and Changes in Predicted Road Traffic Noise Levels**

Existing Sensitive Receptor Number	Predicted L <sub>10 18hour</sub> dB(A) at the façade of the Receptor					Change in Predicted Road Traffic Noise Levels Between Scenario 2 and 3 (Figures in dB(A))	Change in Predicted Road Traffic Noise Levels Between Scenario 2 and 4 (Figures in dB(A))
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5		
CRTN1	70	69	63	62	63	-7	-7
CRTN2	68	68	69	68	69	1	0
CRTN3	68	69	70	70	70	1	1
CRTN4	67	67	67	67	67	0	0

7.5.6 The changes in noise levels have been assessed against the significance criteria contained in Table 7.6. The results show that at each of the existing sensitive receptor locations, the noise impact due to changes in road traffic is **Negligible**. Therefore, noise from changes in road traffic levels need not be a consideration during the planning process. Graphical representation of the predicted change in noise propagation for each of the predicted years can be found within Figure 7.8, 7.9 and 7.10 provided in Appendix 6b.

### **Proposed Sensitive Receptors and Noise**

#### *Road Traffic Noise at Proposed Residential Properties*

7.5.7 Noise modelling has also been carried out to determine the future levels of road traffic noise at the residential areas of the proposed development, with the committed development traffic and the Proposed Development traffic in place. The results of

the SoundPLAN daytime noise modelling for 2031 (with the committed development and Proposed Development traffic in place, i.e. Scenario 5) are shown in Figures 7.11, 7.12 and 7.14 provided in Appendix 6b.

#### External Daytime Noise Levels

- 7.5.8 The Land Use Plan (reference JJG043-035 P) indicates that residential properties are proposed in the vicinity of the major road link adjacent to the Proposed Development i.e. the A361.
- 7.5.9 The results of the noise modelling 2031 shown in Figure 7.11 provided in Appendix 6b, with the development and committed development in place, indicates that the level of road traffic noise at the proposed residential areas, located nearest to, and with a direct line of sight of the A361 and link road, will range between 45dB  $L_{Aeq, 16hour}$  and 60dB  $L_{Aeq, 16hour}$ . The impact due to road traffic noise at proposed receptors is moderate.
- 7.5.10 Mitigation measures will therefore need to be incorporated into the design of the Proposed Development to ensure that the guidance external level of 55dB  $L_{Aeq, 16-hour}$  is achieved in outdoor living areas, nearest to, and with a direct line of sight of, the A361 and link road during the daytime.
- 7.5.11 Mitigation measures are discussed later within this noise and vibration chapter.

#### Internal Daytime Noise Levels

- 7.5.12 In accordance with the requirements of the WHO 1999, the daytime noise levels, from external sources, in living rooms, should not exceed 35dB  $L_{Aeq, 16hour}$ .
- 7.5.13 Before internal noise levels can be calculated 2.5dB(A) must be added to the calculated levels using SoundPLAN to allow for the reflection of noise from the proposed housing façades when the buildings are in place.
- 7.5.14 The noise modelling for the future year 2031 shown in Figure 7.12 provided in appendix 6b, with the development in place, indicates that the level of road traffic noise at the proposed building facades of the residential areas, located nearest to, and with a direct line of sight of the A361 and link road, will range between 50dB  $L_{Aeq}$

<sup>16hour</sup> and 65dB LAeq <sup>16hour</sup>. The impact due to road traffic noise changes at proposed receptors is moderate.

7.5.15 In turn, the level of noise attenuation that these facades, will need to provide to achieve the guidance internal noise level of 35dB LAeq 16-hour, during the daytime period (as required by WHO 1999) will be between 15dB(A) and 30dB(A).

7.5.16 Mitigation measures are discussed later within this noise and vibration chapter.

#### Internal Night-time Noise Levels

7.5.17 In accordance with the requirements of the WHO Guidelines, the night-time noise levels from external sources, in bedrooms, should not exceed 30dB LAeq 8 hour and 45dB LAmax.

7.5.18 Before internal noise levels can be calculated 2.5dB(A) must be added to the predicted noise levels to allow for the reflection of noise from the proposed housing facades when the buildings are in place.

7.5.19 The noise modelling for the future year 2031 shown in Figure 7.13 (appendix 6b), with the development in place, indicates that the level of road traffic noise at the proposed building facades of the residential areas during the night-time, located nearest to, and with a direct line of sight of the A361 and link road, will range between 45dB LAeq <sup>16hour</sup> and 55dB LAeq <sup>8hour</sup>.

7.5.20 The maximum noise levels measured at ESR1, which presents a representative location for the facades of the proposed residential dwellings facing the A361 and link road, will be 69dB LAmax.

7.5.21 Therefore, the level of noise attenuation required by the façades, to achieve the required internal noise levels of 30dB LAeq 8-hour and 45dB LAmax, during the night-time period, will be between 10dB(A) and 25dB(A).

7.5.22 Mitigation measures are discussed later within this noise and vibration chapter.

Road Traffic Noise at the Proposed Primary School Sites

7.5.23 The Land Use Plan (reference JJG043-035 P) indicates that the development will include a school site, located in the northern, central part of the site.

7.5.24 In accordance with the requirements of BB93, the following daytime noise levels should be achieved:

- An upper limit of 60 dB  $L_{Aeq}$  (30 minutes) at the boundary of external premises used for teaching and recreation.
- 55 dB  $L_{Aeq}$  (30 minutes) in unoccupied playgrounds, playing fields and other outdoor areas.
- 50 dB  $L_{Aeq}$  (30 minutes) in at least one area of the unoccupied playgrounds, playing fields and other outdoor areas, to ensure suitable noise levels for outdoor teaching.
- Indoor ambient noise limits in schools of between 30 and 40 dB  $L_{Aeq}$  (30 minutes) depending on the use of the room.

*External Daytime Levels*

7.5.25 The results of the noise modelling indicate that the external daytime levels of road traffic noise at the proposed school is 49dB  $L_{Aeq}$  16-hour. Therefore, mitigation measure will not be required to achieve the required external noise limits.

*Internal daytime limits*

7.5.26 In accordance with the requirements of BB93, the daytime Indoor ambient noise limits in schools range of between 30 and 40 dB  $L_{Aeq}$  (30 minutes) depending on the use of the room. The impact of road traffic noise changes at receptors is moderate.

7.5.27 Before internal noise levels can be calculated 2.5dB(A) must be added to the predicted noise levels to allow for the reflection of noise from the proposed housing facades when the buildings are in place.

7.5.28 The noise modelling for the future year 2031 (Scenario 5), with the development in place, indicates that the level of road traffic noise at the proposed school facade, will be 52dB  $L_{Aeq}$  16hour. The impact of road traffic noise at proposed receptors is moderate.

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## 7.6 MITIGATION MEASURES

7.6.1 Mitigation measures reported in the original ES remain relevant. Post-completion stage

### ***Road Traffic Noise and Sensitive Receptors***

7.6.1 The noise levels predicted at the existing receptors locations, for the “Without Development” and “With Development” scenarios, in 2031, have been compared.

7.6.2 The results indicate that any change in road traffic noise at receptors CRTN1 to CRTN4 will be below the threshold of perception and will not be significant. Mitigation measures are therefore not necessary for these receptor locations.

### ***Proposed Sensitive Receptors and Noise***

#### *Road Traffic Noise at Proposed Residential Areas*

#### External Daytime Noise Levels

7.6.3 To meet the outdoor requirements of WHO 1999 during the daytime, i.e. 55dB  $L_{Aeq}$  16hour, mitigation measures will need to be incorporated along the boundaries of the residential areas located immediately adjacent to the A361 and link road.

7.6.4 The Land Use Plan (drawing number JJG043-035 P) indicates that the proposed residential areas will be approximately 20m from the carriageway of A361 and 10m from the link road.

7.6.5 At this stage a detailed layout showing the individual plots is not available. To reduce the level of road noise in the proposed outdoor living areas of the development, it is recommended that the following mitigation measures are considered for inclusion in the detailed site design:

- The residential buildings proposed on the site, adjacent to the A361 and link road, could be constructed to act as a barrier themselves. For example a row of semi-detached properties at the boundary of the residential areas, located nearest to the A361 would protect properties further into the site;

- Positioning of garden areas on the shielded side of buildings away from the A361; and
- Local mitigation measures, i.e. 1.8m to 2.0m high wall or close boarded fence, could be constructed at garden areas with a line of sight of the A361, link road and local centre areas.

7.6.6 Figure 7.11 provided in Appendix 6b shows a SoundPLAN model output for the daytime period of Scenario 5 - 2031 "With Development". The drawing indicates that the noise levels in proposed garden areas reduces when moving into the site. As these dwellings will also be immediately behind the proposed residential properties located nearest to, and with a direct line of sight of, the A361 and link road, they are likely to achieve the required noise limit of 55dB  $L_{Aeq, 16hour}$  with the additional distance attenuation and screening.

#### Internal Daytime Noise Levels

7.6.7 In accordance with the requirements of WHO 1999, the daytime noise levels, from external sources, in living rooms should not exceed 35dB  $L_{Aeq, 16 hour}$ .

7.6.8 The noise attenuation provided by the overall building façade, for each property, has been considered to determine likely internal daytime noise levels. Subject to the provision of detailed building and design information it would be reasonable to assume that the design of the Proposed Development would include glazing to living room areas comprising about 25% of the façade area. To calculate the overall attenuation provided by this percentage of glazing in a brick or block façade, a non-uniform partition calculation can be used.

7.6.9 The calculation combines the different degrees of attenuation of the wall element and the window element. A façade comprising solid brick or blockwork, will attenuate by between 45-50 dB (BRE Digest 338 "Insulation against external noise") whereas standard thermal glazing will attenuate traffic noise by 26-29dB(A) (BRE Digest 379 "Double glazing for heat and sound insulation"). The overall noise attenuation provided by the above combination is between 31.9dB(A) and 34.9dB(A).

- 7.6.10 Standard double glazing in a solid brick or blockwork façade will be required for proposed dwellings located adjacent to the A361 and link road, would be sufficient to achieve the internal daytime noise levels, with windows closed.
- 7.6.11 However, with windows open the attenuation provided by the façade will be approximately 15dB(A). This would allow the recommended internal noise limits to be exceeded in some living room areas, located nearest to and with a direct line of sight of the A361 and link road. To remove the need to open a window, and hence maintain the attenuation provided by the double glazing, acoustic ventilation will need to be installed. The acoustic ventilation proposed at the site will, as a minimum, comply with Building Regulations 2000 Approved Document F1 Means of Ventilation and British Standard BS5925 1991: "Code of Practice for Ventilation Principles and Designing for Natural Ventilation".
- 7.6.12 The implementation of the recommended glazing together with acoustic ventilation should ensure that the required internal daytime noise limits are met in those areas of the site where the external noise levels are greater than 50dB  $L_{Aeq\ 16\text{-hour}}$ . Alternatively, noise sensitive living areas could be positioned away from the A361 and link road on the screened sides of buildings.

#### **Internal Night-time Noise Levels**

- 7.6.13 In accordance with the requirements of WHO 1999, the night-time noise levels, from external sources, in bedrooms should not exceed 30dB  $L_{Aeq\ 8\ \text{hour}}$  and 45dB  $L_{Amax}$ .
- 7.6.14 The results of the noise modelling indicates that standard thermal glazing in a solid brick or blockwork facade (as detailed in paragraph 7.6.18) would be sufficient to achieve the internal night-time noise levels, with windows closed.
- 7.6.15 However, with windows open the attenuation provided by the façade will be approximately 15dB(A). This would allow the recommended internal noise limits to be exceeded in some bedrooms, located nearest to and with a direct line of sight of the A361 and link road. To remove the need to open a window and hence maintain the attenuation provided by the double glazing, acoustic ventilation will need to be installed.

7.6.16 The implementation of glazing together with acoustic ventilation should ensure that the required internal night-time noise limits are met in those areas of the site where the external noise levels are greater than 45dB  $L_{Aeq\ 8\ Hour}$  and 60dB  $L_{Amax}$ . Alternatively, bedrooms could be positioned away from the A361 and link road on the screened sides of buildings.

### **Road Traffic Noise at the Proposed School Site**

#### **External Daytime Noise Levels**

7.6.17 Mitigation measures are not required to achieve external daytime limits at the proposed school.

#### **Internal Daytime Noise Levels**

7.6.18 The level of noise attenuation that the facades of the school will need to provide, to achieve the more stringent internal noise level of 30dB  $L_{Aeq\ 30\ minutes}$ , during the daytime period (as required by BB93), will be between 20dB(A) and 25dB(A).

7.6.19 At this stage a detailed layout showing the design of the proposed school sites is not available. The level of attenuation the building facades will need to attenuate will therefore be dependent on the proposed use of the classroom.

7.6.20 Some of the building facades of proposed schools, located nearest to and with a direct line of sight of local roads, may require higher specification glazing should the more stringent internal noise limit of 30dB  $L_{Aeq\ 30\ minutes}$  need to be achieved. The glazing unit will need to attenuate traffic noise by up to 30dB(A) to ensure that the overall noise attenuation provided by the façade (i.e. the combined wall and window) is 36dB(A) with windows closed.

7.6.21 Standard double glazing will be sufficient to achieve the internal daytime noise levels of 40dB  $L_{Aeq\ 30\ minutes}$ , with windows closed.

7.6.22 In those areas of the site where noise levels at the school building facades exceed 45dB  $L_{Aeq\ 30\ minutes}$ , noise will only be attenuated adequately provided the windows remain closed. To remove the need to open a window and hence maintain the



attenuation provided by the double glazing, acoustic ventilation will need to be installed in the building facades.

7.6.23 The implementation of glazing together with acoustic ventilation should ensure that the required internal noise limits are met in proposed school buildings.

**Operational Noise and Sensitive Receptors**

7.6.24 A noise assessment will be required for each unit at the local centre once the proposed activities are known. This will take into account actual levels of activity and plant and recommendations will be made for mitigation as appropriate.

## **7.7 RESIDUAL EFFECTS**

### **Construction stage**

- 7.7.1 Residual effects arising from the construction stage are negligible as previously reported in the original ES.

### **Post-completion stage**

#### *Road Traffic Noise and Sensitive Receptors*

- 7.7.2 The increase in road traffic noise in 2031, at the existing sensitive receptors adjacent the local road network in the immediate vicinity of the site, will not be perceptible and the impact will be negligible. Results at receptor CRTN1 indicate that there is a perceivable drop in noise level due to the realignment of the A361 and the inclusion of the proposed junction. Mitigation measures are therefore not considered necessary.

#### *Proposed Sensitive Receptors and Noise*

- 7.7.3 Once the mitigation measures detailed in the mitigation section of this chapter have been implemented the residual impact of road traffic noise from vehicles travelling along the A361, on the proposed residential areas and school site of the development, will be negligible.

### **Summary of effects**

- 7.7.4 The effects remain the same as those presented in the summary of effects table Table 7.14 within the original ES.

## **7.8 CUMULATIVE EFFECTS**

- 7.8.1 The noise assessment also considers the cumulative impacts associated with the Proposed Development; consented; committed; and known development sites in the area of the site.
- 7.8.2 Traffic data for consented, committed and known development sites in the area of the site, together with all phases of the Proposed Development, has been obtained from Jubb Consulting Engineers Limited, the transport consultants for the Proposed Development and incorporated into the information used as a basis for the assessment of road traffic noise.
- 7.8.3 The changes in road traffic noise due to the development generated traffic have been assessed at a number of existing and proposed sensitive receptors. The assessment confirms that in accordance with the significance criteria included in this chapter, the increase in road traffic noise, between 2014 and 2031 with the development and committed developments at the existing sensitive receptors CRTN1 to CRTN4, will be imperceptible and the impact will be negligible. Mitigation measures are not therefore considered necessary.