

## 12.0 NOISE AND VIBRATION/ACOUSTICS: REPLACEMENT CHAPTER

### 12.1 INTRODUCTION AND METHODOLOGY

12.1.1 This replacement Chapter, written by Waterman Energy, Environment & Design (Waterman EED), assesses the environmental effect of the Project in terms of noise and vibration on off-site receptors and noise levels at the Project itself. In particular, it considers the potential effects of noise and vibration during the construction works, and on completion and operation of the Project.

12.1.2 The replacement Chapter describes the methods used to assess the effects and the baseline conditions currently existing at the Site and its surroundings. Potential direct and indirect effects of the Project arising from noise and vibration are identified, together with mitigation measures required to prevent, reduce or offset any significant effects.

12.1.3 Data relating to the noise and vibration assessment is contained within the following Appendices:-

- Appendix 12B: Description of Noise and Vibration Units;
- Appendix 12C: Noise and Vibration Survey Procedures and Results;
- Appendix 12D: Construction Noise and Vibration Assessment; and
- Appendix 12E: Road Traffic Noise Assessment.

#### **Assessment Methodology**

12.1.4 The assessment of potential noise and vibration effects resulting from or impacting upon the Project was based upon the following:

- Identifying potentially sensitive existing and future noise receptors on the Site and within the surrounding area;
- Establishing baseline noise conditions currently existing at the Site and nearby receptor locations through noise surveys and the results of the Leicester and Leicestershire Integrated Transport Model (LLITM);
- Assessing the suitability of the Site for the Project in terms of the prevailing baseline noise conditions;
- Assessing likely noise and vibration levels generated during the construction works associated with the Project;
- Assessing potential changes in noise and vibration due to road traffic flows generated by the Development utilising the information on traffic distribution and modal shift from the results of the LLITM.
- Establishing design aims for plant and services to be located on, or within, the proposed new buildings at the Site;
- Formulating proposals for mitigation, where appropriate; and
- Assessing the significance of any residual effects.

### Establishing Baseline Conditions

- 12.1.5 A desk based study and site walkover was undertaken to identify existing and future noise sensitive receptors (NSRs) that could potentially be affected by noise arising from the construction works and the operation of the Project.
- 12.1.6 Baseline noise surveys were undertaken between the 12<sup>th</sup> April and 15<sup>th</sup> April 2010 with additional surveys being completed on 10<sup>th</sup> September 2010. Monitoring locations were agreed with Blaby District Council to represent both existing potentially sensitive receptors in the vicinity of the proposed Project and proposed potentially sensitive receptors within the Project. The selected monitoring locations are described in Table 12a below and illustrated on Figure 12.1: Noise Monitoring Locations.

**Table 12a: Noise Monitoring Locations**

Monitoring Location (Figure 12.1)	Description	Observations and Predominant Noise Sources
LT 1	Eastern site boundary with M1	Road traffic noise, some limited wildlife noise
LT 2	Southern Site boundary with M69	Road traffic noise, some limited wildlife noise
LT 3*	In front of properties on Beggar's Lane	Road traffic noise, some limited wildlife noise
LT 4	Rear of properties on Priestman Road	Road traffic noise, some limited wildlife noise
ST1	Lawn Cottages	Road traffic noise, some limited wildlife noise
ST2	Hopyard Farm and Abbey Farm	Road traffic noise, some limited wildlife noise
ST3	Warren Farm	Road traffic noise, some limited wildlife noise
ST4	Rear of properties on Yew Close	Road traffic noise, some limited wildlife noise
ST5	Northern area of site approximately 50m from site boundary with Leicester Forest service station	Road traffic noise, some limited wildlife noise

- 12.1.7 Long term unattended noise monitoring was undertaken over a typical 24 hour period at locations LT 1 and LT 2. However, when considering LT 3 and LT 4 secure noise monitoring locations could not be located. As such, noise monitoring was completed in line with the shortened measurement procedure provided in the technical memorandum Calculation of Road Traffic Noise<sup>1</sup>.

<sup>1</sup> Department of Transport. Calculation of Road Traffic Noise. HMSO. 1988.

12.1.8 Short term attended noise measurements were also undertaken on and in the vicinity of the proposed development in order to allow the noise climate on and in the vicinity of the site to be clearly defined.

12.1.9 Further details of the noise monitoring are provided within Appendix 12C.

### **Construction Noise**

12.1.10 Indicative construction noise levels were calculated on the basis of the outline construction information provided within Chapter 2: Development Proposals. Calculations were carried out in accordance with the methodology prescribed within BS 5228-1:2009<sup>2</sup> for each of the major stages of construction, accounting for the typical type of plant and activities expected within the identified major stages of work.

12.1.11 Full details of the predictions and assumptions of the construction noise assessment are contained within Appendix 12D.

### **Vibration**

12.1.12 There are two aspects of vibration effects that need consideration:-

- The effects on people or equipment within buildings; and
- The effects on buildings (or other structures) themselves.

12.1.13 Likely vibration effects generated by the construction works were assessed on the basis of the indicative construction information provided within Chapter 2: Development Proposals. Predictions were carried out based on guidance provided in BS 5228-2:2009<sup>3</sup> and have taken the following factors into consideration:

- The severity of the impact;
- Type and number of plant/equipment;
- Duration of the works;
- The distance between the source and receptor;
- The number of sensitive properties subject to the effects; and
- The number of listed buildings and their vulnerability to damage.

### **Suitability of Site for Noise Sensitive Development**

12.1.14 Planning Policy Guidance 24 (PPG24)<sup>4</sup> is the principal guidance adopted within England for assessing the effect of noise on proposed developments. In relation to residential development, the guidance within PPG24 is presented in terms of four Noise Exposure Categories (NECs), ranging from NEC A, where noise need not normally be considered in determining planning applications, to NEC D, where planning permission should normally be refused on noise grounds.

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<sup>2</sup> British standards institute (2009); British Standard 5228: Part 1 – Code of practice for noise and vibration control on construction and open sites, Part 1:Noise’.

<sup>3</sup> British Standards Institute (2009); ‘British Standard 5228:Part 2 – Code of practice for noise and vibration control on construction and open sites, Part 2:Vibration’

<sup>4</sup> Department of the Environment. Planning Policy Guidance: Planning and Noise (PPG 24). HMSO. 1994.

12.1.15 With regard to commercial or industrial development, PPG24 advises that whilst Local Planning Authorities (LPAs) must ensure that infrastructure developments do not cause unacceptable disturbance, the planning system should not place unjustifiable obstacles in the way of developments which create significant long-term regeneration, employment and social benefits.

12.1.16 The guidance provided in PPG24 is principally aimed at assessing the effect of existing transportation noise on areas of proposed new housing. It is, therefore applicable to the assessment of noise levels for areas of the proposed Project that comprise residential uses. The relevant NEC criteria are presented in Table 12b below.

**Table 12b: Recommended Noise Exposure Categories for New Dwellings near Existing Mixed Sources**

NEC	L <sub>Aeq,T</sub> dB (07:00–23:00)	L <sub>Aeq,T</sub> dB (23:00–07:00)	Advice
A	<55	<45	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.
B	55–63	45–57	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	63–72	57–66	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	>72	>66	Planning permission should normally be refused.

12.1.17 The potential effects on future residents have been assessed against national standards and guidelines, including PPG24, British Standard 8233:1999 'Sound Insulation and Noise Reduction for Buildings Code of Practice'<sup>5</sup> (BS8233:1999) and World Health Organisation (WHO) 'Guidelines for Community Noise'<sup>6</sup> in relation to noise effects. These standards set out guideline internal noise limits for noise sensitive spaces such as residential development. The criteria relevant to the proposed Project are presented in Table 12c below.

<sup>5</sup> British Standards Institute. British Standard 8233: Sound insulation and noise reduction for buildings - Code of practice. 1999.

<sup>6</sup> World Health Organisation, 2000, Guidelines for Community Noise'

**Table 12c: BS 8233:1999 Assessment Criteria**

Criterion	Location	Design Range	
		Good	Reasonable
Reasonable resting/sleeping conditions	Living Room (07:00 to 23:00)	30	40
Reasonable resting/sleeping conditions	Bedrooms (23:00 to 07:00)	30	35

12.1.18 In addition, when considering external living spaces, for example gardens PPG24 recommends that in order to minimise the potential for annoyance to residents, noise levels should not exceed 55dB  $L_{Aeq,T}$  as set out within the WHO guidance.

### Completed Development

#### Assessment of Road Traffic Noise and Vibration (CRTN in relation to existing receptors surrounding the Site)

12.1.19 Road traffic noise levels are typically measured and predicted in units of  $L_{A10, (18 \text{ hour})}$  dB (see the Department of Transport's 'Calculation of Road Traffic Noise' (CRTN)). The  $L_{A10}$  is the A-weighted sound level in decibels exceeded for 10% of the measurement period, which in this case is the 18-hour period between 06:00 and 24:00 hours. This noise index has been shown to correlate well with people's subjective annoyance due to road traffic noise. The potential effects of changes in road traffic noise were evaluated by consideration of the estimated changes in  $L_{A10, (18 \text{ hour})}$  road traffic noise levels on the local highway network as a result of the operation of the proposed Project.

12.1.20 When considering road traffic generated vibration airborne vibration from traffic can be produced by the engines or exhausts of road vehicles with dominant frequencies in the 50-100Hz range. Traffic-induced vibrations from low frequency sound emitted by vehicle engines and exhausts can be a source of annoyance to nearby residents and can occur to some extent along any type of road. Such sound may result in detectable vibrations in building elements e.g. windows and doors.

12.1.21 Ground borne vibration is typically found to be in the 8-20Hz range and is produced by the interaction between rolling wheels and the road surface. Research (cited in DMRB Volume 11, Section 3, Part 7) found no evidence that traffic induced vibration is a source of significant damage to buildings.

12.1.22 Traffic generated vibrations mostly arise where road surfaces are uneven, e.g. on older roads that are damaged or require surfacing, and where they carry a significant proportion of HGVs (the high axle loading passing over a break in the road surface imparts vibrational energy into the ground).

12.1.23 The assessment of vibration impacts was undertaken following the guidance provided within DMRB Volume 11, Section 3, Part 7<sup>7</sup>. The relationship between the percentage of people

<sup>7</sup> Highways Agency, Design Manual for Roads and Bridges, Volume 11, Section 3, Part 7 – Noise and Vibration'

'bothered' by largely airborne vibration is similar to those 'bothered' by exposure to noise (as measured by the  $L_{A10,18\text{-hour}}$  index) except that the percentage 'bothered' by vibration is lower at all exposure levels. For a given level of noise exposure the percentage of people 'bothered' "very much" or "quite a lot" by vibration is 10% lower than the corresponding figure for noise nuisance. For those dwellings at noise exposure levels below 58 dB  $L_{A10,18\text{-hour}}$ , a zero percent change in those bothered by vibration is assumed.

### Assessment of Building Service Plant Noise

- 12.1.24 The guidance provided in BS 4142:1997<sup>8</sup> was used to assess whether noise from sources of an industrial nature (e.g. fixed plant) in commercial premises would be likely to give rise to complaints by residents of nearby dwellings.
- 12.1.25 The standard sets out a methodology whereby the likelihood of complaints about an industrial noise source can be assessed. The measured or predicted noise level from the source in question, the 'specific noise' level, immediately outside of the dwellings is compared with 'background noise' level. Where the noise contains a 'distinguishable discrete continuous note' (whine, hiss, screech, hum, etc.) or if there are distinct impulses in the noise (bangs, clinks, clatters or thumps), or if the noise is sufficiently irregular as to attract attention, then a correction of +5dB is added to the specific noise level to obtain the 'rating noise' level. The likelihood of noise provoking complaints is assessed by subtracting the background noise level from the rating noise level.

### Assessment of Delivery Noise

- 12.1.26 In the absence of guidelines for assessing the effects of noise generated by servicing (deliveries), the potential noise effects were assessed by calculating the increase in ambient noise levels from those currently experienced in the area of the proposed Project. This was based on a review of the potential service yard locations and layout, and published noise levels from the Transportation Noise Reference Book<sup>9</sup>.

### Significance Criteria

#### Construction

##### Noise

- 12.1.27 To assess the potential effects of construction noise on existing NSRs, 'The ABC Method' provided in BS 5228-1:2009 was used. This method defines category threshold values which are determined by the time of day and existing monitored ambient noise levels. The noise level generated by construction activities, corrected to take into account of existing monitored ambient noise levels (the total noise level), is then compared with the 'threshold value'. If the total noise level exceeds the 'threshold value', a significant effect is deemed to occur.

<sup>8</sup> British Standards Institute. British Standard 4142: Method for Rating industrial noise affecting mixed residential and industrial areas. 1997.

<sup>9</sup> T,M Embleton 'The Transportation Noise Reference Book, 1982

12.1.28 To allow greater definition of the significance of the potential effects, the criteria in Table 12d below was adopted. Full details of the BS 5228-1:2009 significance criteria are provided in Appendix 12D.

**Table 12d: Construction Noise Significance Criteria**

Effect Significance	Level above threshold value dB(A)	Definition
Negligible	< 0	The effect is not of concern.
Minor adverse	0.1 to 4.9	The effect is undesirable but of limited concern.
Moderate adverse	5.0 to 9.9	The effect gives rise to some concern but is likely to be tolerable depending on scale and duration.
Substantial adverse	> 10	The effect gives rise to serious concern and it should be considered unacceptable.

### Vibration

12.1.29 Determining the magnitude of significance of vibration effects is complex owing to the highly variable nature and duration of vibration effects arising from construction work.

12.1.30 At this stage in the design process, insufficient detail is available of the methods and equipment to be used during the construction works. Consequently, the significance of vibration effects arising from construction work cannot be assessed quantitatively and was therefore determined using professional judgement based on the following factors:-

- The severity of the impact;
- Type and number of plant/equipment;
- Duration of the works;
- The distance between the source and receptor;
- The number of sensitive properties subject to the effects; and
- The number of listed buildings and their vulnerability to damage.

### Suitability of Site for Noise Sensitive Development

12.1.31 The potential effects of existing noise sources on the residential properties were assessed against the criteria provided within PPG24 as set out in Table 12e below.

**Table 12e: Site Suitability for Residential Uses– Noise Significance Criteria**

NEC	L <sub>Aeq,T</sub> dB (07:00–23:00)	L <sub>Aeq,T</sub> dB (23:00–07:00)	Significance Criteria
A	<55	<45	Negligible

B	55–63	45–57	Minor Adverse
C	63–72	57–66	Moderate Adverse
D	>72	>66	Substantial Adverse

### Completed Development

#### Assessment of Road Traffic Noise and Vibration (CRTN in relation to existing receptors surrounding the Site)

12.1.32 Where noise changes arising from the operation of the Site are to be considered (e.g. noise arising from road traffic) the significance of any effects was assessed in accordance with the criteria detailed in Table 12f below.

**Table 12f: Road Traffic Noise Significance Criteria**

Change in noise levels dB(A)	Definition	Effect Significance
> -10	The effect provides a significant positive gain.	Substantial beneficial
-9.9 to -5.0	The effect provides some gain to the environment.	Moderate beneficial
-4.9 to -3.0	The effect is of minor significance but has some environmental benefit.	Minor beneficial
-2.9 to +2.9	The effect is likely to be imperceptible and is therefore not of concern.	Negligible
3.0 to 4.9	The effect is undesirable but of limited concern.	Minor adverse
5.0 to 9.9	The effect gives rise to some concern but is likely to be tolerable depending on scale and duration.	Moderate adverse
> 10	The effect gives rise to serious concern and it should be considered unacceptable.	Substantial adverse

12.1.33 The criteria provided in Table 12f are derived by considering how changes in noise levels can be categorised by significance based on key benchmarks that relate to human perception of sound. For example, a change in noise levels of 3dB is generally considered to be the smallest change in noise which is perceptible and a 10dB change in noise represents a doubling or halving of the noise level.

12.1.34 It is considered that the descriptions provided in Table 12f are a good indication of the likely significance of changes in noise levels where these are to be permanent, e.g. to occur over extended periods. However, significance is also influenced by the nature of the effect, whether short term or long term, and the significance criteria noted above do not account for this.



Therefore, it is possible that the significance may be tempered where, for example, the effect is known to be temporary.

- 12.1.35 When considering road traffic vibration there are no nationally recognised significance criteria. However for the purpose of this assessment the significance criteria presented in Table 12g which are based upon professional experience have been adopted.

**Table 12g: Road Traffic Vibration Significance Criteria**

<b>Change in people bothered by vibration (%)</b>	<b>Definition</b>	<b>Effect Significance</b>
> -30	The effect provides a significant positive gain.	Substantial beneficial
-29.9 to -20.0	The effect provides some gain to the environment.	Moderate beneficial
-19.9 to -10	The effect is of minor significance but has some environmental benefit.	Minor beneficial
-9.9 to +10	The effect is likely to be imperceptible and is therefore not of concern.	Negligible
10 to 19.9	The effect is undesirable but of limited concern.	Minor adverse
20 to 29.9	The effect gives rise to some concern but is likely to be tolerable depending on scale and duration.	Moderate adverse
> 30	The effect gives rise to serious concern and it should be considered unacceptable.	Substantial adverse

#### **Building Service Plant Noise**

- 12.1.36 When assessing the potential effects of plant noise on nearby NSRs, the criteria presented in Table 12h were used. These are based on the likelihood of complaints criteria as provided in BS 4142:1997.

**Table 12h: Plant Noise Significance Criteria**

<b>Difference in rating and background levels (dB(A))</b>	<b>Significance Criteria</b>
<5	Negligible
5 to 7.5	Minor adverse
7.5 to 10	Moderate adverse
>10	Substantial adverse

## Delivery Noise

12.1.37 In the absence of guidelines for assessing the effects of noise generated by servicing (deliveries) the significance of the potential effects on existing NSRs was based on the criteria provided in Table 12g above.

## 12.2 PLANNING CONTEXT

### National

12.2.1 **Planning Policy Guidance 24 (PPG24)** is the principal guidance adopted within England for assessing the effect of noise on proposed developments. In relation to residential development, the guidance within PPG24 is presented in terms of four Noise Exposure Categories (NECs), ranging from NEC A, where noise need not normally be considered in determining planning applications, to NEC D, where planning permission should normally be refused on noise grounds.

12.2.2 With regard to commercial or industrial development, PPG24 advises that whilst Local Planning Authorities (LPAs) must ensure that infrastructure developments do not cause unacceptable disturbance, the planning system should not place unjustifiable obstacles in the way of developments which create significant long-term regeneration, employment and social benefits.

### Regional

#### **East Midlands Regional Plan (Regional Spatial Strategy), March 2009**

12.2.3 There are no policies of relevance to this Chapter contained within the East Midlands Regional Plan<sup>10</sup>.

#### **Leicestershire, Leicester and Rutland Structure Plan 1996-2016, 2005**

12.2.4 None of the saved policies of the Leicestershire, Leicester and Rutland Structure Plan<sup>11</sup> relate to noise and vibration.

### Local

#### **Blaby District Local Plan, 1999**

12.2.5 The Blaby District Local Plan<sup>12</sup> contains several policies which pertain to noise. The key policies are summarised below:

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10 East Midlands Regional Plan (Regional Spatial Strategy), March 2009

11 Leicestershire, Leicester, and Rutland Structure Plan 1996-2016, Adopted 2005

12 Blaby District Council, Blaby District Local Plan

**Policy E1**

*“Within the primarily employment areas identified, planning permission would be granted for employment development only (business, general, industrial and storage / distribution uses), except where the proposed development would amongst others:-*

*Have an impact on properties that would be significantly detrimental to the amenities enjoyed by the occupiers of those properties, including considerations of vibration, emissions, hours of working, vehicular activity, privacy, light, noise disturbance and an overbearing effect.”*

**Policy E2**

*“Within the primarily residential areas, identified on the proposals map planning permission would be granted for residential development, and residential institutions except were the proposed development would:-*

- *“Have an unsatisfactory relationship with other nearby uses that would be significantly detrimental to the amenities enjoyed by the occupiers of those properties, including consideration of privacy, light, noise, disturbance and an overbearing effect; or*
- *Have an unsatisfactory relationship with other nearby uses that would result in residents of the proposed development being unable to enjoy a reasonable level of residential amenity, including considerations of vibration, emissions, hours of working, vehicular activity, privacy, light, noise, disturbance and an overbearing effect.”*

**Policy T3**

- *“Where the district council is the determining local authority for development involving a new access road, scheme or improvement, planning permission would only be granted if the proposed access, road scheme or improvement incorporates amongst others:-*
- *Safeguards for living and working conditions and the environment in general including considerations of visibility, access, layout, privacy, light, noise, disturbance, emissions, congestion, overbearing effect and the character or appearance of the area.”*

**Blaby District Council Draft Core Strategy (Submission Version) January 2012**

- 12.2.6 Policy 3, ‘Sustainable Urban Extension’, identifies land west of the M1 at Lubbesthorpe as allocated for a Sustainable Urban Extension (SUE). The policy requires the Masterplan for the SUE to include appropriate mitigation measures to mitigate the noise and air quality impacts. Refer to Chapter 3: Planning Policy for a more detailed summary of the current local planning policy position in relation to noise.

**12.3 BASELINE CONDITIONS****Existing and Future Sensitive Receptors**

- 12.3.1 The nearest existing noise and vibration sensitive receptors to the Site are detailed in Table 12i below.

**Table 12i: Sensitive Receptors**

<b>Sensitive Receptor (Figure 12.1)</b>	<b>Description</b>	<b>Location</b>
SR1	Lawn Cottages	Within site adjacent to western site boundary
SR2	Residential receptors on Beggar's Lane	Approximately 10m from the northern site boundary
SR3	Residential receptors on Yew Close	Immediately adjacent to northern site boundary
SR4	Residential receptors on Priestman Road	Approximately 40m north of proposed Meridian Way access route
SR5	Hopyard Farm	Within site boundary
SR6	Abbey Farm	Within site boundary
SR7	Abbey Cottages	Within site boundary
SR8	Residential receptors on Hinckley Road	Adjacent to proposed Baines Lane access route
SR9	Residential receptors adjacent to Baines Lane	Approximately 70m east of proposed Baines Lane access route (approximately 190m from site boundary)

12.3.2 Consideration has also been given to the potential noise and vibration effects upon sensitive receptors which have been proposed as part of the development.

#### **Baseline Noise Levels**

12.3.3 Baseline noise surveys were carried out between 12<sup>th</sup> April and 15<sup>th</sup> April 2010 with additional attended noise surveys being completed in September 2010. The noise measurement locations are illustrated on Figure 12.1: Noise Monitoring and Assessment Locations. Full details of the baseline noise monitoring exercise are provided within Appendix 12C. A summary of the long-term unattended surveys are presented in Table 12i and Table 12j respectively.

Table 12i: Long-term Baseline Noise Measurements

Monitoring Location (Figure 12.1)	Monitoring Period	L <sub>Aeq,T</sub>	L <sub>A10,T</sub>	L <sub>A90,T</sub> <sup>+</sup>	L <sub>Amax</sub> <sup>#</sup>
LT1	Daytime (07:00-23:00)	71.3	72.9	59.7	77.0
	Night-time (23:00-07:00)	68.0	69.9	64.7	85.7
LT2	Daytime (07:00-23:00)	64.9	68.1	44.9	90.4
	Night-time (23:00-07:00)	60.1	64.6	37.4	81.4
LT3	Daytime (07:00-23:00)	65.3	68.3	42.6	83.1
	Night-time (23:00-07:00)	54.9	57.6	39.0	69.0
LT4	Daytime (07:00-23:00)	58.5	61.5	54.3	78.7
	Night-time (23:00-07:00)	47.2	49.4	39.4	70.0

Notes: <sup>#</sup> Maximum monitored noise level during survey period.

<sup>+</sup> Minimum monitored noise level during survey period.

- 12.3.4 The monitored noise levels presented in Table 12i above indicate that during the daytime monitored noise levels ranged between 58.5 and 71.3dB L<sub>Aeq,T</sub>. The surveyor noted that the dominant noise source throughout the survey period at all monitoring locations was road traffic noise.
- 12.3.5 During the night-time period monitored noise levels were typically lower ranging between 47.2 and 68.0 dB L<sub>Aeq,T</sub>. The dominant noise source throughout the night-time period was also noted to be road traffic, although at significantly lower flows.
- 12.3.6 Short-term noise measurements (summarised in Table 12j below) were also undertaken on-site and at the nearest noise sensitive receptors. During the daytime period, noise levels ranged between 59.8 and 67.8dB L<sub>Aeq,1hr</sub>. During the night-time period noise levels ranged from 51.5 and 69.5dB L<sub>Aeq,15min</sub>. The surveyor noted that the dominant noise sources at all locations were road traffic. When considering location ST5 which was located immediately adjacent to Leicester Forest motorway service station the noise climate was also influenced by vehicle movements within the service station itself.

Table 12j: Short-term Baseline Noise Measurements

Monitoring Location (Figure 12.1)	Monitoring Period	L <sub>Aeq,T</sub> <sup>*</sup>	L <sub>A10,T</sub> <sup>*</sup>	L <sub>A90,T</sub> <sup>++</sup>	L <sub>Amax</sub> <sup>#</sup>
ST1	Daytime (07:00-23:00)	67.8	69.2	55.0	78.2
	Night-time (23:00-07:00)	59.7	60.2	42.0	74.0
ST2	Daytime (07:00-23:00)	69.2	71.2	54.6	76.5
	Night-time (23:00-07:00)	59.8	60.5	47.0	69.8
ST3	Daytime (07:00-23:00)	61.2	63.4	49.0	81.0
	Night-time (23:00-07:00)	57.9	60.1	42.0	75.0
ST4	Daytime (07:00-23:00)	59.8	61.2	41.0	79.0
	Night-time (23:00-07:00)	51.5	53.5	37.2	72.5
ST5	Daytime (07:00-23:00)	70.1	72.4	56.8	80.1
	Night-time (23:00-07:00)	69.5	71.0	55.4	80.0

Notes: <sup>#</sup> Maximum monitored noise level during survey period.

<sup>++</sup> Minimum monitored noise level during survey period.

## 12.4 PROJECT DESIGN

### Construction

- 12.4.1 Disturbance due to construction can be defined as a temporary nuisance to people in the area that can occur at any time between the start of demolition works and the opening of the Project. An Environmental Management Plan (EMP) would be produced to mitigate and monitor environmental effects, including noise and vibration during the construction phase. In accordance with standard working practices, the principles of the 'Best Practicable Means' (BPM), as defined in the Control of Pollution Act 1974<sup>13</sup> would be used to reduce emissions throughout the construction period. This would incorporate the use of measures to control noise and vibration that do not unreasonably inhibit the work, and the use of working methods that result in minimum effects compatible with best working practices.
- 12.4.2 Noise control measures such as the siting of fixed plant away from the Site boundary, the use of properly silenced plant, and screening / enclosures where appropriate, would ensure that the daytime construction noise limit is not exceeded at receptors adjacent to the Site. In practice, the degree of noise attenuation due to screening and other measures, such as separation distance and operational times, would likely be greater than 10dB, which would reduce the construction noise levels for the earthmoving, piling, concreting and road construction phases to below the noise limit. Further analysis of the potential noise, and also vibration, effects on local receptor locations would be carried out during the Project's detailed design once more accurate information is available relating to construction methods and plant,

13 Control of Pollution Act 1974

so that appropriate controls can then be agreed with BDC's Environmental Health Department (EHD) and implemented in advance of the works.

12.4.3 Appropriate conditions to minimise noise and vibration would be imposed on the Contractor as part of their contract requirements, and the contractor would also be required to liaise with BDC's EHD to minimise adverse effects at all times. Control measures would be incorporated into an EMP which would be drafted in accordance with BDC's CoCP. The content of the EMP would be finalised prior to the commencement of the works, through liaison with BDC, and would be likely to include the following measures:-

- Selecting inherently quiet plant;
- Using, where necessary and practicable, enclosures and screens around noisy fixed plant;
- Limiting site work where possible to daytime hours; and
- Adhering to relevant British Standards.

12.4.4 Provision would also be made for specific noise and vibration criteria to be adhered to, where feasible, and for suitable plant and working methods to be agreed with BDC prior to commencement of works. On-site monitoring of noise and / or vibration would also be carried out if necessary. This would assist in controlling levels at specific receptors. The option would also exist for an application for 'Prior Consent' to be made to BDC under Section 61 of the Control of Pollution Act. Such an application would provide BDC with the necessary details relating to construction method statements and construction noise and / or vibration effects, thereby enabling BDC to check that BPM are being used and that the noise and vibration controls are acceptable. In authorising an application for prior consent, BDC can apply reasonable conditions where these are considered necessary.

12.4.5 In addition, a Construction Logistics Plan would be developed to minimise the potential effects from construction traffic. Key controls would include:-

- Necessary provision to ensure all unloading is carried out on-site rather than on the adjacent roads;
- Construction vehicles to travel via designated routes. These would be agreed with BDC and other relevant authorities;
- Materials deliveries to be phased and controlled on a 'just-in-time' basis, wherever possible, minimising travel time and traffic congestion around the Site.

12.4.6 The controls listed above are regularly and successfully applied to large scale construction projects in order to minimise noise and vibration effects on local communities. The application of similar control measures during the construction of the Project would likewise ensure that the works proceed with the minimum disturbance to businesses, pedestrians and local residents.

#### **Suitability of Site for Noise Sensitive Development**

12.4.7 The Project and its design has responded to the baseline survey and assessment work and potential effects, in order to establish a project that seeks to minimise any adverse environmental effect, and to maximise environmental benefits.

12.4.8 Following completion of the baseline noise surveys and modelling exercise it was determined that noise associated with the adjacent M1 and M69 were the key planning constraints associated with the site.

12.4.9 In order to minimise the potential effects of these noise sources upon proposed sensitive receptors the following key design measures have been incorporated into the Parameters Plans included at Chapter 2: Development Proposals:-

- Limited numbers of residential units located in close proximity to the M1 And M69;
- Residential units set back a significant distance from the carriageway edge;
- Erection of a 6m minimum acoustic barrier made of a landscaped earth bund. The barrier would run the length of the eastern site boundary with a minimal number of breaks. Breaks in the barrier would occur at the proposed Meridian Way access routes and where the M1 is elevated; and
- Provision of localised 1.3m acoustic barriers located along the top of the 6m bund adjacent to those areas of the site proposed for residential development.

12.4.10 The above design measures would serve to minimise the potential effects of existing noise sources upon the proposed residential dwellings. The attenuation provided by such design measures has been included when determining the effects of existing noise sources upon the Project.

12.4.11 However, given that areas of the development fall into the upper end of NEC B and that with windows open the guideline internal noise limits may be exceeded, mitigation measures may be required for those properties facing directly onto the M1 and M69. To ensure suitable internal and external noise levels are met, a combination of the following mitigation measures should be considered:-

- Incorporation of high specification standard thermal double glazing coupled with acoustically attenuated trickle ventilators for worst effected facades;
- Orientating buildings so that the gable ends face towards the motorways; and
- Locating habitable rooms away from the road / commercial noise sources. For example, rooms less sensitive to noise, such as bathrooms, kitchens and dining rooms should face the adjacent motorway. These would also act as a buffer to habitable rooms.

12.4.12 It is considered that all matters relating to the design of the Project could be dealt with during the detailed design phase and secured by way of a suitably worded planning condition.

### **Completed Development**

#### **Assessment of Building Services Plant Noise**

12.4.13 Plant machinery such as generators or compressors should be positioned as far from noise sensitive locations as possible and ideally in naturally screened positions. All plant equipment should be adequately maintained to minimise noise emission. A suitably worded planning condition is suggested to ensure noise from fixed mechanical plant does not exceed the criteria. The following planning condition is recommended:-



*“With regards to fixed mechanical and refrigeration plant, each phase of the development shall not commence until details of the fixed plant serving the phase of the development hereby permitted, and any mitigation measures to achieve this condition are submitted to and approved in writing by Blaby District Council. The level of noise emitted from the fixed mechanical and refrigeration units associated with the site shall not exceed 5dB(A) below the minimum monitored background noise level during either the daytime (23:00 to 07:00) or night-time (23:00 to 07:00) seven days a week. The noise levels shall be determined by measurement or calculation at the nearest noise sensitive premises. The measurements and assessments shall be made according to BS 4142: 1997.”*

### **Service and Delivery Noise**

12.4.14 A suitably worded planning condition is suggested to ensure noise does not cause disturbance. The following planning condition is recommended:-

*“Before each phase of the development hereby permitted commences, a scheme shall be agreed with the local planning authority which specifies the provisions to be made for the control of noise emanating from the site during the operation of that phase”.*

12.4.15 To minimise the potential for adverse effects, the following measures should be considered at the detailed design stage:-

- Where possible, service yards should be located away from NSRs making use of screening from the commercial buildings themselves;
- Where service yards are in line of sight from NSRs, acoustic barriers could be erected to minimise noise;
- Where practicable, loading and unloading should be carried out in fully enclosed bays; and
- Where practicable, deliveries should be scheduled during the daytime only.

## **12.5 ASSESSMENT OF EFFECTS**

### **Construction Noise**

12.5.1 The construction of the Project is anticipated to commence during 2013/14 and be completed by 2026.

12.5.2 Details of the methods and plant likely to be used during the construction phase are necessarily indicative at this stage and would be likely to change during the Site redevelopment. This makes it difficult to accurately predict the noise levels for direct comparison with the noise criteria described previously. Therefore, a maximum worst case noise scenario over a 1-hour period was estimated, assuming that plant would be operating at the closest point to the nearest NSRs and in the absence of mitigation. In practice, noise levels would tend to be lower owing to greater separation distances and screening effects. They would also tend to reduce over a 12-hour working day owing to periods of plant inactivity.

12.5.3 Calculations were undertaken using the data and procedures set out in BS 5228-1:2009 for the noisiest construction phases, to derive indicative noise levels at selected NSRs. The highest noise levels tend to be associated with plant used during piling, earthmoving,

concreting and road pavement construction. During the fit-out, construction noise would be significantly lower. The calculations assume that plant would be operating at the closest point to the NSR, i.e. the Site boundary, and do not take into account of any existing or proposed screening. The calculated worst case noise levels are provided in full in Appendix 12D.

- 12.5.4 The worst case predicted noise levels suggest that the threshold levels would be exceeded at the closest existing NSRs during earthmoving, excavation of foundations and road paving. As such, mitigation and noise control measures would need to be implemented with a view to mitigating the noise during these phases and controlling noise associated with the works generally. In the absence of mitigation, the assessment indicates that there would be the potential for temporary moderate adverse effects to arise. For the remainder of the works, such as, construction and fit-out at worst temporary minor adverse effects would arise.
- 12.5.5 In addition to construction plant operating on the Site, there would be some movement of material to and from the Site by road. A construction traffic routing plan would be agreed with Blaby Council to minimise the temporary and intermittent adverse effects that construction traffic can cause. However, peak levels of noise or vibration arising from construction vehicles would not be any greater than can presently arise from existing heavy duty vehicle movements on the existing roads, and would be less than those from the main construction works on Site. Nevertheless, without mitigation noise from construction traffic would be likely to give rise to temporary, minor adverse effects on nearby NSRs.
- 12.5.6 Appropriate noise control measures as discussed later in this Chapter would be used to reduce noise during each construction phase and minimise the subsequent disturbance to surrounding NSRs.

### Construction Vibration

- 12.5.7 There are currently no British Standards that provide a methodology for predicting levels of vibration from construction activities other than BS 5228-2:2009, which relates to percussive or vibratory rolling and piling only. However, it is generally accepted that for the majority of people, vibration levels of approximately 0.14mm/s peak particle velocity (ppv) are just perceptible. Based on historical field measurements, Table 12k below details the distance at which certain activities are likely to give rise to a just perceptible level of vibration.

**Table 12k: Distances at which vibration may be just perceptible**

Construction Activity	Distance from Activity when Vibration may just be Perceptible (metres)
Excavation	10 – 15
Heavy vehicles	5 – 10
Augered piling	15 – 20
Rotary Bored piling	20 – 30

- 12.5.8 Details of piling locations, methods and plant likely to be used during the construction phase are necessarily indicative at this stage and would be likely to change during the Site redevelopment. This makes it difficult to accurately predict the vibration levels.

- 12.5.9 Demolition and construction work, and in particular any piling operations, would have the potential to result in the nearest existing vibration sensitive receptors (Table 12k) being exposed to levels of vibration that have undergone little attenuation due to distance. Therefore, appropriate vibration controls and mitigation would be required during all works on the Site within 20m of any sensitive receptors.
- 12.5.10 The use of Continuous Flight Auger (CFA) piling would minimise vibration exposure reducing the likelihood of cosmetic damage and adverse comment from occupiers of neighbouring buildings. However, appropriate controls to minimise vibration would still be required for all works within 20m of the vibration sensitive receptors. Without mitigation, potential vibration effects would likely be moderate adverse at all identified receptors within 20m of the Site.

### Suitability of Site for Noise Sensitive Development

#### PPG 24 Assessment

- 12.5.11 In addition to the monitored noise levels presented in Table 12j, noise contour plots for the site have been generated using the software package CADNA-A (see Figure 12.2 and Figure 12.3). The noise model was constructed using a combination of Ordinance Survey mapping, elevation data and site layout drawings supplied by FPCR. 18hr AAWT road traffic flows supplied by WSP (as detailed in Appendix 12D) were used to calculate the 18hr  $L_{A10}$  noise levels for each link using CRTN methodology. These noise levels were then converted to  $L_{Aeq,16hr}$  daytime and  $L_{Aeq,8hr}$  night-time dB levels using the methodology given in the 2006 Transport Research Laboratory (TRL) Noise Mapping guidance document<sup>14</sup>. The noise contours are presented in terms of PPG24 NEC criteria and take into account the elevation of the local highways, traffic flows and composition, topography of the site and existing and proposed screening.
- 12.5.12 The results of the model have been calibrated by comparing modelled and monitored noise levels in order to give confidence in the accuracy of the modelling results. The model was calibrated by comparing the monitored noise levels at all locations detailed in Table 12i and 12j with measurement points at the same representative location in the model. The CADNA-A predicted noise levels were, on average, 2.9dB(A) over the measured noise levels, ensuring a worst case assessment and prediction of NEC categories for the site.
- 12.5.13 The contour plots indicate that during both the daytime and night-time periods the majority of the proposed development would fall into NEC A and NEC B with some small areas immediately adjacent to the site boundary falling into NEC C during the night-time period. When a site falls into NEC C, PPG24 states:
- 'Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.'*
- 12.5.14 Although the eastern boundary of the site falls into NEC C, with reference to Figure 12.2 and 12.3 it can be seen that there would be no residential receptors located within this zone. As such, existing noise levels are unlikely to affect the amenity of local residents.

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<sup>14</sup> Transport Research Laboratory: Converting the UK traffic noise index  $L_{A10,18h}$  to the EU noise indices for Road Noise Mapping. (st/05/91/AGG04442). 24<sup>th</sup> January 2006.

Notwithstanding the above a small number of residential facades would be exposed to noise levels at the upper end of NEC B. As such, mitigation measures would be required to further minimise the potential effects of existing noise sources upon proposed noise sensitive receptors. In the absence of mitigation, existing noise sources would have the potential to have minor adverse effects upon proposed sensitive receptors.

### Internal Noise Levels

12.5.15 In addition to the PPG24 classification it is also necessary to consider the guideline internal noise limits presented within BS 8233:1999. When considering the level of noise attenuation provided by a building's façade, glazing is in general considered to be the weakest component. PPG24 sets out generic data relating to the typical noise reduction of three different glazing types, namely, single, thermal double and secondary. The performance values for a typical noise spectrum are set out in Table 12l.

**Table 12l: Typical Acoustic Performance of Glazing Types**

Noise Source	Difference between dB(A) levels outside and inside		
	Single Glazing	Thermal Double Glazing	Secondary Glazing
Road Traffic	28	32	34
N.B. The thermal insulation requirements of the Building Regulations require that double glazing be installed as a minimum.			

12.5.16 At this time it is understood that all glazed areas of the proposed Project would utilise standard thermal double glazing, as required by the building regulations, providing a minimum attenuation to noise of 32dB  $R_w$  assuming a double glazed construction comprised of 10mm float pane, 12mm air gap and 4mm float pane. Calculations have been undertaken in order to determine the internal noise levels for the closest proposed dwellings to existing noise sources with windows closed. Noise levels have been calculated at the closest indicative boundaries of the residential areas to both the M1 and the M69 using the software package CADNA-A. The predicted noise levels have been used to determine whether the **BS 8233:1999** 'good' criteria would be met within these properties. The assessment results are presented as **Table 12m** below.

Table 12m: BS 8233:1999 Assessment

Location	Period	Calculated external façade noise level (dB(A))*	Calculated internal noise level (dB(A)) <sup>†</sup>	Internal target noise levels (dB(A))	Design Goal Met
Eastern residential site boundary with M1 (Plot R15 and R17)	Daytime	57.2	26	30	✓
	Night-time	52.3	19	30	✓
Southern residential site boundary with M69 (Plot R 22)	Daytime	50.5	29	30	✓
	Night-time	45.9	24	30	✓
Western residential site boundary with Beggar's Lane	Daytime	59.4	28	30	✓
	Night-time	51.4	20	30	✓
* Monitored noise level +3dB to allow for facade correction					
† Calculated facade noise level minus 33dB attenuation through standard thermal double glazing					

12.5.17 The assessment results presented in Table 12m indicate that assuming standard thermal double glazing, with windows closed the 'good' standard presented within BS 8233:1999 would be met for all of the proposed properties.

12.5.18 However, it should be noted that when windows are partially opened the attenuation provided by glazing would reduce to between 10 and 15dB(A). This would result in the good standard being exceeded in all habitable rooms which are directly facing existing noise sources. As such the detailed design of the Project should ensure that an alternative means of ventilation is provided for all habitable rooms orientated towards existing noise sources in order to minimise the requirement for residents to open windows. Where appropriate, the preferred choice of ventilation is through the use of natural ventilation openings, such as trickle vents, air bricks and passive ventilation systems. Such ventilators can be used to meet the requirements of the Building Regulations Approved Document F for background ventilation. The future occupants would then have the option of keeping windows closed for most of the time and opening windows for rapid ventilation and summer cooling. It is likely that acoustically attenuated trickle ventilators will be suitable to provide air inlet into habitable rooms whilst maintaining suitable internal noise levels.

### External Noise Levels

12.5.19 In addition to the above, consideration has also been given to noise levels in external living spaces, for example gardens. As previously noted, the WHO's 'Guidelines for Community Noise' recommends an external noise level of 55 dB  $L_{Aeq,T}$  to prevent the onset of significant community annoyance. In considering the application of the 55 dB  $L_{Aeq,T}$  criterion for outdoor

living spaces, it is important to take account of the feasibility of achieving such a level. A review of National Physics Laboratory Report CMAM 16<sup>15</sup> reported the following:-

*“Perhaps the main weakness of both WHO inspired documents is that they fail to consider the practicality of actually being able to achieve any of the stated guideline values.....We know from the most recent survey of noise exposure carried out in England and Wales that around 56% of the population are exposed to daytime noise levels exceeding 55 dB  $L_{Aeq,T}$  and that around 65% are exposed to night-time noise levels exceeding 45 dB  $L_{Aeq,T}$  (as measured outside of the house in each case). The percentage exposed above the WHO guideline values could not be significantly reduced without drastic action to virtually eliminate road traffic noise and other forms of transportation noise (including public transport) from the vicinity of the houses. The social and economic consequences of such an action would be likely to be much greater than any environmental advantages of reducing the proportion of the population annoyed by noise. In addition there is no evidence that anything other than a small minority of the population exposed to such noise levels find them to be particularly onerous in the context of their daily lives.”*

12.5.20 A noise contour plot has been generated to illustrate those areas of the site where the 55dB  $L_{Aeq,T}$  criterion would be exceeded. With reference to Table 12b it can be seen that the 55dB  $L_{Aeq,T}$  criterion met for the majority of the site. However, there would be some small areas immediately adjacent to the site boundary where the adopted criterion would be exceeded.

12.5.21 For those small areas where the 55dB  $L_{Aeq,T}$  criterion may be exceeded it is considered that adequate noise levels could be obtained within gardens through careful orientation of the individual properties themselves and provision of adequate garden fencing.

12.5.22 However, in the absence of such mitigation it is considered that existing noise sources would have the potential to have minor adverse effects upon proposed residential dwellings.

12.5.23 However, it is considered that through careful design and use of appropriate mitigation measures, suitable internal noise conditions would be achieved. Potential mitigation and control measures are discussed in the ‘Mitigation Measures’ section below.

## **Completed Development**

### **Assessment of Road Traffic Noise and Vibration**

12.5.24 The ‘worst case’ 18-hour annual average weekday traffic flows (AAWT) for the roads around the Site were used to establish noise changes as a consequence of the proposed Project. Traffic flow data were provided by the Project transport consultants for the ‘with’ and ‘without’ development scenarios for the proposed opening year (2026). The scenarios include traffic associated with committed developments within the wider study area, which enables the noise effect as a direct consequence of the proposed Project to be calculated.

12.5.25 BNLs were calculated for each of the road links covered by the Transport Assessment (refer to Appendix 12E). The calculations used the 18-hour AAWT, Heavy Duty Vehicle (HDV) compositions and vehicle speed for each road link as provided by the transport consultants.

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15 National Physics Laboratory Report CMAM

- 12.5.26 The Institute of Environmental Management & Assessment's (IEMA) Guidance Notes No. 1 'Guidelines for the Environmental Assessment of Road Traffic'<sup>16</sup> recommends assessment where traffic flows would increase by more than 30% (or the number of HDVs would increase by more than 30%), and where specifically sensitive areas experience traffic flow increases of 10% or more. The guidance indicates that projected changes in traffic of less than 10% create no discernible environmental effects.
- 12.5.27 The assessment results presented in Appendix 12D indicate that there would be a maximum increase in noise levels associated with the operation of the proposed Project of 2.2dB(A) along Beggar's Lane. An increase in noise levels of this magnitude would be imperceptible to nearby noise sensitive receptors over an extended period of time and as such would give rise to negligible effects. When considering access along Meridian Way and Baines Lane an increase of 2dB(A) is predicted over the build out of the scheme whilst no change is predicted along Hinckley Road. Again an increase in noise levels of this magnitude would be imperceptible to nearby noise sensitive receptors over an extended period of time and as such would give rise to negligible effects.
- 12.5.28 When considering road traffic vibration and assessment was completed in line with the guidance provided in DMRB Volume 11, Section 7, Part 3. The assessment results presented in Appendix 12D indicate that there would be a maximum increase in the percentage of people bothered by vibration of 5%. This increase would occur along the Beggar's Lane access route to the site. An increase in the percentage of people bothered by vibration of this magnitude would give rise to negligible effects.

#### **Assessment of Building Service Plant Noise**

- 12.5.29 There would be the potential for fixed plant to be included as part of the proposed development within the employment areas, district and local centres and schools.
- 12.5.30 Any items of fixed plant installed as part of the proposed Project would have the potential to generate noise. BS 4142:1997 states that a rating noise level of +5 dB above background is of marginal significance when assessing the likelihood of complaints. However, in order to ensure that there would be no effects upon nearby noise sensitive receptors, noise associated with fixed plant would be controlled to ensure it falls at least 10dB(A) below the lowest monitored  $L_{A90}$  on and in the vicinity of the site.
- 12.5.31 At this stage, details of the nature, type and number of any such plant are unavailable. Nevertheless, in the absence of suitable mitigation, fixed plant and mechanical services noise would have the potential to have a minor adverse impact on nearby existing and proposed NSRs

#### **Assessment of Delivery and Servicing Noise**

- 12.5.32 The proposed commercial uses (B1/B2/B8) and local centre uses (A1–A5/D1/C3) could introduce noise from delivery activities within dedicated service yards. The frequency and times of deliveries would be dependent on the end users. It is recommended that a detailed assessment of noise from service yard and delivery activities is carried out at the detailed

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<sup>16</sup> The Institute of Environmental Management & Assessment's (IEMA) Guidance Notes No. 1 'Guidelines for the Environmental Assessment of Road Traffic

planning stage, to determine the likelihood of disturbance at the nearest NSRs. However, in the absence of mitigation and appropriate noise control measures, the service areas associated with the proposed Project would have the potential to give rise to an adverse impact of moderate significance upon nearby NSRs.

### **Cumulative Effects**

12.5.33 There are number of cumulative schemes located in the proximity of the proposed development these include:-

- Meridian Way;
- Audi Garage, Narborough Road;
- Grove Park;
- Sainsburys, Grove Park Triangle;
- Next car park; and
- Oak Spinney Park, Ratby Lane.
- Topps Tiles, Grove Park
- Thorpe Astley Development
- Taylor Wimpey Development, west of Beggar's Lane
- St Johns, Enderby
- Glenfield Park

12.5.34 There would be the potential for some cumulative effects to arise should the above developments be constructed concurrently with the proposed development. The potential cumulative effects during the construction and operational phases are discussed in the following paragraphs.

### **Construction**

12.5.35 Given the distance of the closest proposed cumulative schemes to the development there would be no cumulative effects associated with the construction phase of the Project.

12.5.36 However, in a 'worst-case' scenario whereby the other cumulative schemes were constructed at the same time as the proposed Project using the same construction traffic routes, there could be temporary, short-term localised noise effects of minor adverse significance associated with road traffic. However, construction traffic routes would be agreed with Leicestershire County Council and thus traffic could be controlled and re-routed to ensure cumulative effects are minimised.

### **Completed Development**

12.5.37 Providing the design criteria and mitigation measures recommended are met for the Project, the combined noise effects with those cumulative schemes located closest to the Site would be negligible. In addition, it is assumed that stringent design aims for building plant and services would be agreed and implemented for all of the cumulative schemes.



12.5.38 With regards to traffic noise, the noise assessment was based on the traffic data used in the TA. The traffic data within the TA include traffic likely to be generated by the 'cumulative schemes'. The likely cumulative noise effects determined for the Project would therefore be as stated, which is negligible.

### **Residual Effects**

#### **Construction**

12.5.39 With the mitigation and design measures previously discussed in place, the construction phase of the Project would have, at worst, temporary minor adverse effects upon nearby noise sensitive receptors.

#### **Suitability of Site for Noise Sensitive Development**

12.5.40 With the mitigation and design measures previously discussed in place, existing noise sources would have negligible effects upon future residents of the Project.

#### **Completed Development**

##### **Assessment of Road Traffic Noise**

12.5.41 Road traffic generated as a result of the operation of the proposed development would give rise to residual effects of negligible significance.

##### **Assessment of Building Services Plant Noise**

12.5.42 Plant machinery such as generators or compressors should be positioned as far from noise sensitive locations as possible and ideally in naturally screened positions. All plant equipment should be adequately maintained to minimise noise emission.

12.5.43 A suitably worded planning condition is suggested to ensure noise from fixed mechanical plant does not exceed the criteria. The following planning condition is recommended:-

*“With regards to fixed mechanical and refrigeration plant, each phase of the development shall not commence until details of the fixed plant serving each phase of the development hereby permitted, and any mitigation measures to achieve this condition are submitted to and approved in writing by Blaby District Council. The level of noise emitted from the fixed mechanical and refrigeration units associated with the site shall not exceed 5dB(A) below the minimum monitored background noise level during either the daytime (23:00 to 07:00) or night-time (23:00 to 07:00) seven days a week. The noise levels shall be determined by measurement or calculation at the nearest noise sensitive premises. The measurements and assessments shall be made according to BS 4142: 1997.”*

12.5.44 A detailed assessment would be carried out at the detailed design stage to ensure the recommended planning condition is met. Therefore, residual effects from building service plant noise would be negligible.

### Service and Delivery Noise

12.5.45 A suitably worded planning condition is suggested to ensure noise does not cause disturbance. The following planning condition is recommended:-

*“Before each phase of the development hereby permitted commences, a scheme shall be agreed with the local planning authority which specifies the provisions to be made for the control of noise emanating from the site during the operation of that phase”.*

12.5.46 To minimise the potential for adverse effects, the following measures should be considered at the detailed design stage:-

- Where possible, service yards should be located away from NSRs making use of screening from the commercial buildings themselves;
- Where service yards are in line of sight from NSRs, acoustic barriers could be erected to minimise noise;
- Where practicable, loading and unloading should be carried out in fully enclosed bays; and
- Where practicable, deliveries should be scheduled during the daytime only.

12.5.47 Given the adoption of the above mitigation measures secured by an appropriately worded planning condition, residual effects from service and delivery noise would be negligible.

## 12.6 STATEMENT OF EFFECTS

12.6.1 An assessment of the potential noise effects of the Project has been undertaken. The assessment included a monitoring survey at the Site to measure the existing noise levels and an assessment of the suitability of noise conditions for new residents. The assessment also considered any potential increase in noise resulting from the Project on local existing and future sensitive receptors.

12.6.2 The most sensitive existing receptors to noise near the Site are residential properties within and immediately adjacent to the site boundaries. Within the completed Project, occupants of the new residential units would also be sensitive to noise.

12.6.3 Noise levels on the site are dominated by road traffic noise from the adjacent M1 and M69.

12.6.4 Demolition and construction activities would inevitably give rise to some noise effects to the receptors closest to the Site. However, steps would be taken to minimise noise, which would be implemented through planning conditions and would form part of the Code of Construction Practice. This would include careful selection of modern and quiet plant and machinery, agreed working hours, traffic management measures and monitoring of demolition and construction noise levels.

12.6.5 The majority of the Site is suitable for noise sensitive development such as residential properties and the schools. However, noise levels at the site boundaries closest to the M1 and M69 are slightly higher. However, if appropriate design considerations are given to noise at the detailed design stage, future residents would be unlikely to be affected by existing noise sources. Appropriate design would also ensure that residential uses within the Project would not be adversely affected by noise from service yards and delivery activities and building service plant noise.