

13 Noise and Vibration

13.1 Introduction

- 13.1.1 This chapter assesses the noise and vibration impacts of the proposed development. In particular it considers:
- The potential effects of noise and vibration from the construction phase of the proposed development on existing sensitive receptors;
 - The potential impact of changes in noise at existing sensitive receptors during the operational phase of the development;
 - The potential impact of existing noise, and proposed sources of noise on the proposed noise sensitive areas of the development; and,
 - The potential impact of entertainment noise from adjacent leisure facilities on proposed noise sensitive areas of the development.
- 13.1.2 The chapter describes the methods used to assess the noise and vibration impacts, the current baseline conditions at and in the vicinity of the proposed development, the potential direct and indirect impacts of the development arising from noise and vibration, the mitigation measures required to prevent, reduce, or offset the impacts and the residual impacts. It has been written by Wardell Armstrong LLP.

13.2 Assessment Approach

Methodology

13.2.1 The assessment considers the following potential noise impacts:

- The potential impact of noise and vibration from construction phase activities on existing sensitive receptors located in the vicinity of the proposed development. The potential impact of the construction phase has been assessed in accordance with British Standard 5228:2009 "Code of Practice for noise and vibration control on construction and open sites – Parts 1&2" (BS5228) and BRE Controlling particles, vapour and noise pollution from construction sites, Parts 1 to 5, 2003.
- The potential impact of noise from development-generated vehicles on existing and future sensitive receptors on and in the vicinity of the proposed development. 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 calculation procedures set out in the Department of Transport's memorandum, "Calculation of Road Traffic Noise" (CRTN), 1988.
- The potential impact of existing and future sources of noise across the existing and proposed noise sensitive areas of the site. The potential impacts of the existing and future sources of noise, on the existing and proposed residential area of the development, have been assessed with reference to 'National Planning Policy Framework 2012' (NPPF), Noise Policy Statement for England (2010) (NPSE), British Standard 8233:1999 "Sound Insulation and Noise Reduction for Buildings – Code of Practice" (BS8233), the World Health Organisation Guidelines for Community Noise 1999 (WHO), the Acoustic Performance Standards for the Priority Schools Building Programme (DfE, 2012), and "Building Bulletin 93: Acoustic Design of Schools" (BB93), as appropriate.
- The potential impact of entertainment noise from the adjacent leisure facilities have been assessed following guidance in IOA Good Practice Guide on the Control of Noise from Pubs and Clubs March 2003.

Criteria for Significance of Impact

13.2.2 The significance of an environmental impact will be determined not only by the magnitude of the impact but also by the sensitivity of the receptor, as shown in Table 13.1.

Table 13.1 Methodology for Determining Sensitivity

Sensitivity	Description
High	The receptor/resource has little ability to absorb change without fundamentally altering its present character, or is of international or national importance.
Moderate	The receptor/resource has moderate capacity to absorb change without significantly altering its present character, or is of high importance.
Low	The receptor/resource is tolerant of change without detriment to its character, is of low or local importance.

13.2.3 The sensitivity of the receptor locations have been determined in Table 13.2 below;

Table 13.2 Noise Magnitude of Effects

Sensitivity	Receptor Type
High	Groups of 10 or more properties, schools, or SSSI
Medium	Individual residential properties
Low	Residential properties, where occupants have an interest in the development, commercial and business uses, and amenity
Negligible	Industrial premises

13.2.4 The significance of an environmental impact for both construction noise, road traffic noise and on site operational noise is determined by the interaction of magnitude and sensitivity. The Impact Significance Matrix used in this assessment is shown in Table 13.3.

Table 13.3 Impact Significance Matrix

Magnitude	Sensitivity		
	High	Moderate	Low
Major	Major Adverse	Major – Moderate Adverse	Moderate – Minor Adverse
Moderate	Major – Moderate Adverse	Moderate – Minor Adverse	Minor Adverse
Minor	Moderate – Minor Adverse	Minor Adverse	Minor - Negligible
Negligible/Not Significant	Negligible	Negligible	Negligible

Noise from Earthworks and Construction Phase Activities

13.2.5 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.

13.2.6 Guidance on the prediction and assessment of noise from development sites is given in British Standard 5228 -1:2009 "Code of Practice for noise and vibration control on construction and open sites – Part 1: Noise" (BS5228-1), and BRE Controlling particles, vapour and noise pollution from construction sites, Parts 1 to 5, 2003.

- 13.2.7 Construction noise can have disturbing effects on the surrounding neighbourhood. The effects are varied and are complicated further by the nature of the site works, which will be characterised by noise sources which will change location throughout the construction period. The duration of site operations is also an important consideration. Higher noise levels may be acceptable if it is known that the levels will occur for a limited period.
- 13.2.8 For the purposes of this assessment, the occupants of residential properties in the vicinity of the site are considered to be the receptors most likely to be affected by the construction phases of the development. Details of the receptors are set out in Table 13.4, and shown on Figure 10.1.

Table 13.4: Existing Noise Sensitive Receptor Locations

Receptor		Bearing from Site	Distance to Receptor Boundary
ESR1	Manor Farm, Bennetts Road, South	North East	50m
ESR2	97A Bennetts Road, South	East	18m
ESR3	The Beechwood Inn	South East	36m
ESR4	Britannia Royal Court Hotel	South	10m
ESR5	11 Tamworth Road	South West	28m
ESR6	Keresley Manor	West	95m
ESR7	62 Fivefield Road	North West	185m

- 13.2.9 The enabling and construction works will be restricted to daytime hours; typically hours of work are restricted to between 0800 and 1700 hours Monday to Friday and 0800 to 1200 hours on a Saturday, with no work permitted on Sundays or Bank Holidays. The appropriate category value has been determined for the sensitive receptors in the immediate vicinity of the site, based on the ambient noise levels measured during the daytime period, as detailed in Table 13.14. Details of the noise survey carried out at the sensitive receptors are set out in this chapter
- 13.2.10 In addition to the guidance from the local authority, the Control of Pollution Act 1974 (COPA 1974) gives the local authority power to serve a notice under Section 60 imposing requirements as to the way in which works are to be carried out. This could specify times of operation, maximum levels of noise which should be emitted and the type of plant which should or should not be used
- 13.2.11 Under Section 60 of the COPA 1974 Act the local authority has the power to serve a notice which could impose requirements as to the way in which works are to be carried out. This could specify times of operation, maximum levels of noise which should be emitted and the type of plant which should or should not be used. This is a common way of enforcing reasonable levels of construction noise.

- 13.2.12 However it might be preferable for the chosen contractor to obtain prior consent under Section 61 of COPA 1974. Section 61, enables anyone who intends to carry out works to apply to the local authority for consent. Under Section 61 the local authorities and those responsible for construction work, have an opportunity to settle any problems, relating to the potential noise, before work starts.
- 13.2.13 In addition to COPA 1974, BS5228-1 provides guidance on significance criteria for assessing the potential noise impacts associated with the construction phase of large projects. For the purposes of this noise assessment, the noise likely to be generated by the earthworks and construction phase, have been assessed against significance criteria established, using the BS5228-1 ABC method.
- 13.2.14 The ABC method for determining significance criteria requires the ambient noise levels at existing sensitive receptors to be determined. The ambient noise levels at each existing receptor location are then rounded to the nearest 5dB(A) to determine the appropriate threshold value in accordance with the category value, A B or C, as detailed in Table 13.5.

Table 13.5 Thresholds of Significant Impact from Construction Noise at Residential Receptors in accordance with the ABC Method of BS5228-1

Assessment Category and Threshold Value Period (L _{Aeq})	Threshold Value, in decibels (dB)		
	Category A ^{*1}	Category B ^{*2}	Category C ^{*3}
Daytime (0700 to 1900 hours) and Saturdays (0700 to 1300 hours)	65	70	75
*1 Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than this value.			
*2 Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as Category A values.			
*3 Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than Category A values.			

- 13.2.15 The noise level likely to be generated at the receptor during the construction phase, i.e. the ambient noise level plus construction noise, is then compared to the appropriate category value. If the noise level is greater than the appropriate category value, a significant noise impact may be registered.
- 13.2.16 For the purposes of this chapter it is possible to estimate the degree of impact from the site works (earthworks and construction), according to the suggested standards, by reference to the time periods during which noise levels may occur in excess of the quoted values. These levels can be seen in Table 13.6.

Table 13.6: Construction Noise Assessment Significance Criteria

Magnitude of Impact	Criteria for assessing Construction Noise Impact
Major	Noise levels exceed the Assessment Category threshold level for the duration of the construction works.
Moderate	Noise levels exceed the Assessment Category threshold level for periods of more than one month, but for significantly less than the whole duration of the construction works.
Minor	Noise levels exceed the Assessment Category threshold level for periods of less than one month.
Negligible / Not significant	Noise levels do not exceed the Assessment Category threshold level during any period.

13.2.17 The daytime measured noise levels, from the baseline noise survey representative of the existing sensitive receptors have been provided below in Table 13.7.

Table 13.7 Construction Noise Assessment Criteria

Receptor	Average Measured Noise Levels (dB LAeq 20 minutes)	Ambient Noise Level Rounded to the nearest 5dB(A) (dB LAeq 20 minutes)	Appropriate Category Value A, B or C in accordance with BS5228-1	Noise Level above which activities of the Construction Phase may cause a significant impact at the Receptor (dB LAeq)
ESR1	55.9	55	A	65
ESR2	44.7	45	A	65
ESR3	43.2	45	A	65
ESR4	49.9	50	A	65
ESR5	52.9	55	A	65
ESR6	52.9	55	A	65
ESR7	43.6	45	A	65

13.2.18 The noise assessment for the construction phase, details baseline daytime noise levels measured at sensitive receptor locations and outlines the main construction activities that could give rise to noise impacts at receptors in the vicinity of the proposed development. It also sets out details of 'best practice' management and control measures to ensure that impacts are minimised as far as possible.

Noise from Construction Vehicles

- 13.2.19 In addition to the earthworks and construction activities, vehicle movements to and from the proposed development have the potential to generate noise at existing sensitive receptors, in the immediate vicinity of the local road network.
- 13.2.20 At this stage, detailed traffic data relating to the likely numbers of construction vehicles is not available. However, the number of construction vehicles is not considered to be significant, relative to the existing flows on the major road links surrounding the development site. It is therefore considered that the level of road traffic noise at sensitive receptor locations will not change significantly, due to construction vehicles during the construction phases of the development, and this impact has therefore not been considered further.

Vibration from Construction Vehicles Machinery and Plant

- 13.2.21 Work involving heavy plant on an open site is likely to generate vibration, which may, in certain circumstances, propagate beyond the boundary of the site. In situations where particularly heavy plant, vibrating compaction equipment or piling rigs are being used close to the site boundary, nearby properties may experience ground-borne vibration.
- 13.2.22 The existing sensitive receptors most likely to be affected by vibration generated by the earthworks and construction phase works of the development are detailed in Table 13.4.
- 13.2.23 Guidance on the assessment of vibration from development sites is given in British Standard 5228 -2:2009 "Code of Practice for noise and vibration control on construction and open sites – Part 2: Vibration" (BS5228-2). BS5228-2 2009 indicates that vibration can have disturbing effects on the surrounding neighbourhood; especially where particularly sensitive operations may be taking place. The significance of vibration levels which may be experienced adjacent to a site is dependent upon the nature of the source.
- 13.2.24 It is not possible to mitigate vibration emissions from an open site. It is important therefore to examine the proposed working method to ascertain what, if any, operations would be likely to cause unacceptable levels of vibration at nearby sensitive locations. It is possible that these operations could be modified to reduce their vibration impacts.
- 13.2.25 BS5228-2 indicates that the threshold of perception is generally accepted to be between a peak particle velocity (PPV) of 0.14 and 0.3mm/sec. In an urban situation it is unlikely that such vibration levels would be noticed. BS5228 also indicates that it is likely that vibration of 1.0 mm/s in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents. The standard also indicates that 10 mm/s is likely to be intolerable for any more than a very brief exposure to this level.
- 13.2.26 The Highways Agency Research report No. 53 "Ground Vibration caused by Civil Engineering Works" 1986 suggests that, when vibration levels from an unusual source exceed the human threshold of perception, complaints may occur. The onset of complaints due to continuous vibration is probable when the PPV exceeds 3mm/sec.
- 13.2.27 British Standard BS6472: 2008 "Guide to Evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting" (BS6472-1) suggests that adverse comments or complaints due to continuous vibration are rare in residential situations below a PPV of 0.8mm/sec. Continuous vibration is defined as "vibration which continues uninterrupted for either a daytime period of 16 hours or a night-time period of 8 hours". The proposed earthworks and construction works at the site will not cause continuous vibration as defined in BS6472-1.
- 13.2.28 Human perception of vibration is extremely sensitive. People can detect and be annoyed by vibration before there is any risk of structural damage. Cases where damage to a building has been attributed to the effects of vibration alone are extremely rare; even when vibration has been considered to be intolerable by the occupants.

- 13.2.29 It is not possible to establish exact vibration damage thresholds that may be applied in all situations. The likelihood of vibration induced damage or nuisance will depend upon the nature of the source, the characteristics of the intervening solid and drift geology and the response pattern of the structures around the site. Most of these variables are too complex to quantify accurately and thresholds of damage, or nuisance, are therefore conservative estimates based on a knowledge of engineering.
- 13.2.30 Where ground vibration is of a relatively continuous nature, there is a greater likelihood of structural damage occurring, compared to transient vibration; for example that caused by transiting vehicles.
- 13.2.31 BS5228-2 2009 suggests that the onset of cosmetic damage is 15mm/sec (15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz for residential or light commercial type buildings).
- 13.2.32 The magnitude of impacts are assessed against the categories set out in Table 13.8

Table 13.8: Construction Vibration Assessment Significance Criteria

Magnitude of Impact	Criteria for Assessing Construction Vibration impact
Major Adverse	> 10mm per sec. Vibration likely to be intolerable for more than brief exposure. Approaching the level at which cosmetic damage may occur in light structures.
Moderate Adverse	5mm - 10mm per second. Tolerance less likely even with prior warning and explanation.
Minor Adverse	1 mm – 5mm per second. Complaints are likely, but can be tolerated if prior warning and explanation given.
Negligible	<1mm per second. Below level at which complaints are likely.

Road Traffic Noise and Existing Sensitive Receptors

- 13.2.33 The operational phase of the development will generate additional traffic movements on the existing road network. Development proposals include a new road through the development. 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.
- 13.2.34 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 SoundPLAN computer modelling software, which uses the calculation procedures set out in CRTN, to predict the noise from road traffic. 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.
- 13.2.35 The procedures outlined in SoundPLAN assume typical traffic and noise propagation conditions that are consistent with moderately adverse wind velocities and directions during specified periods. In SoundPLAN, all noise levels can be expressed in terms of the index $L_{A10,18Hour}$.
- 13.2.36 For this noise assessment, CRTN has been used to determine the noise levels at existing sensitive receptors detailed in Table 13.4.

- 13.2.37 The traffic information for the development has been derived from the work undertaken by Phil Jones Associates and has been provided as 18 hour AAWT flows. HGV percentage flows and speed limits have also been provided.
- 13.2.38 Impacts will also be felt at receptors adjacent to and beyond those listed above. However impacts at these receptors will be less than at the listed receptors
- 13.2.39 The changes in road traffic noise levels, have been assessed against a set of significance criteria. The criteria shown in Table 13.9 are based upon guidance contained within the Design Manual for Roads and Bridges, Volume 11, Section 3, Part 7, 2011 (DMRB) for the assessment of changes in road traffic noise. The criteria do not relate to the actual existing noise levels (i.e. traffic noise due to the current residential development) but only the predicted changes .

Table 13.9: Road Traffic Noise Assessment Significance Criteria

Magnitude of Impact	Criteria for Assessing Road Traffic Noise
Major Adverse	> 10.0 dB increase in traffic noise (equating to a clearly perceptible increase in the loudness of noise).
Moderate Adverse	5.0 – 9.9 dB increase in traffic noise (equating to an increase in the loudness of the noise which is at or about the threshold of perception)
Minor Adverse	3.0 – 4.9 dB increase in traffic noise
Negligible	0.1 – 2.9 dB increase in traffic noise.

Road Traffic Noise and Proposed Sensitive Receptors

- 13.2.40 In addition to existing sensitive receptors, a road traffic noise assessment has been carried out for proposed sensitive receptors to assess the noise impact of the existing and development led traffic on proposed receptors.
- 13.2.41 The future traffic noise levels at a number of proposed sensitive receptors with the development in place, have also been predicted using SoundPLAN computer modelling software, which uses the calculation procedures set out in CRTN, to predict the noise from road traffic.
- 13.2.42 Noise from development led traffic has been predicted using the methodology described for the proposed sensitive receptors described in Table 13.10 below, and shown on Figure 10.1.

Table 13.10 Proposed Sensitive Receptor Locations

Receptor	Receptor Type	Location	Grid Ref	
			Easting	Northing
PSR1	Residential	South West	431133	283140
PSR2	Residential	North	431241	283795
PSR3	Residential	East	431773	283366
PSR4	Residential	South East	431861	282978
PSR5	Residential	South East	431711	282993
PSR6	Education	East	431851	283344

British Standard 8233: 2014: “Sound Insulation and Noise Reduction for Buildings - Code of Practice” (BS8233):

- 13.2.43 Coventry City Council (CCC) has indicated that appropriate internal noise levels across the developed site should be set in accordance with British Standard 8233: 1999 'good' wherever possible. The guidelines have since been superseded by British Standard 8233:2014 "Guidance on sound insulation and noise reduction for buildings". Therefore this assessment will be conducted under the new guidance.
- 13.2.44 The assessment of the existing and future noise sources at the proposed residential areas of the development is discussed in detail within this chapter.
- 13.2.45 BS8233 provides recommendations for the control of noise in and around buildings and suggests appropriate criteria and internal noise limits for resting, dining and sleeping for different area types, for example in living room and bedroom areas. These are outlined in Table 13.11.

Table 13.11: BS8233 Noise Limits Corresponding for Resting and Sleeping in Bedrooms, Dining Rooms and Living Rooms (as per Table 4 of BS8233)

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB LAeq, 16hour	-
Dining	Dining room/area	40 dB LAeq, 16hour	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq, 16hour	30 dB LAeq, 8hour
<p>NOTE 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or LAmax,F, depending on the character and number of events per night. Sporadic noise events could require separate values.</p>			

13.2.46 For areas such as external living areas BS8233 states: *“For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise levels does not exceed 50 dB LAeq,T, with an upper guideline value of 55 dB LAeq,T which would be acceptable in noisier environments.*

13.2.47 For the purpose of this assessment the internal noise levels in habitable rooms have been assessed against the following criteria:

- 35dB LAeq, 16hour during the daytime in living room areas (0700-2300)
- 40dB LAeq, 16hour during the daytime in dining room areas (0700-2300)
- 35dB LAeq, 16hour during the night-time in bedroom room areas (0700-2300)
- 30dB LAeq, 8hour during the night-time in bedroom room areas (2300-0700)
- 45dB LAfmax during the night-time in bedroom areas (As detailed within World Health Organisation Guidance)
- 50dB LAeq, 16hour within outdoor living areas were possible, with an upper limit of 55dB LAeq, 16hour

13.2.48 An assessment of the noise sources at the proposed noise sensitive areas of the development is discussed in greater detail in this chapter.

British Standard 4142:1997 (BS4142), Method for rating industrial noise affecting mixed residential and industrial areas:

13.2.49 Where existing industrial noise is dominant, BS4142 is used to assess the impact of the noise;

13.2.50 The purpose of the BS4142 assessment procedure is to assess whether noise levels from factories, industrial premises, fixed installations or sources of noise of an industrial nature in commercial premises are likely to give rise to complaints from people residing nearby.

- 13.2.51 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 activities associated with the existing and proposed industrial premises. The 'specific noise' levels, of the existing industrial premises that have been measured are detailed in this chapter.
- 13.2.52 BS4142 assesses the likelihood of complaints by comparing the specific noise levels (which in this case are measured) to the background noise levels (L_{A90}) (measured in the absence of the source during the noise survey). Details of the noise survey undertaken are provided in the baseline conditions section of this chapter.
- 13.2.53 Certain acoustic features can increase the likelihood of complaints over that expected from a simple comparison between the specific noise level and the background noise level. In particular BS4142 identifies noise that contains discrete impulses and/or audible tonal qualities and in these cases recommends that a +5dB correction be added to the specific noise level. The specific noise level along with any applicable correction is referred to as the 'rating level'.
- 13.2.54 The greater the increase in noise level between the rating level and the background noise level, the greater the likelihood of complaints. The assessment criteria given by BS4142 are as follows:
- A difference of +10dB indicates that complaints are likely.
 - A difference of around +5dB is of marginal significance.
 - If the rating level is more than 10dB below the measured background noise level, this is a positive indication that complaints are unlikely.
- 13.2.55 During the daytime, BS4142 requires that noise levels are assessed over 1-hour periods. However, during the night-time, because sleep disturbance is the important issue and individual noise events are therefore more important, noise levels are assessed over 5-minute periods.
- 13.2.56 CCC have requested that the 'specific noise' does not exceed the lowest measured 'background noise' L_{A90} , by more than 3dB during the daytime (0700-2300), and the night time (2300-0700) periods.

Proposed Primary School

- 13.2.57 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. DfE, 2012 presents a revision to Section 1 of BB93, providing revised parameters for the internal acoustics.
- 13.2.58 The potential impacts of the existing and future sources of noise at the proposed primary school site has been assessed with reference to the Acoustic Performance Standards for the Priority Schools Building Programme (DfE, 2012) and BB93. The documents provide detailed guidance on recommended external and internal noise levels to be achieved at school development sites.
- 13.2.59 For new school developments, DfE, 2012 and BB93 recommend that the following daytime noise levels should be achieved:
- An upper limit of 60 dB $L_{Aeq,30min}$ at the boundary of external premises used for teaching and recreation;
 - 55 dB $L_{Aeq,30min}$ in unoccupied playgrounds, playing fields and other outdoor areas;
 - 50 dB $L_{Aeq,30min}$ in at least one area of the unoccupied playgrounds, playing fields and other outdoor areas to ensure suitable noise levels for outdoor teaching; and
 - Indoor ambient noise limits in schools of between 30 and 50 dB $L_{Aeq,30min}$ depending on the use of the room.

IOA Good Practice Guide on the Control of Noise from Pubs and Clubs March 2003,

13.2.60 The good practice guide has been provided to assess noise arising

- Music;
- Singing and speech;
- Rowdy behavior;
- Use of car parks and access roads; and,
- Deliveries and storage activities.

13.2.61 The guidance contains useful information for local authorities and business owners on practical ways to control noise from entertainment venues.

13.2.62 The IOA guidance produced in March 2003, did not include any guideline limits, however later that year a follow-up article published in the IOA Acoustics Bulletin Vol 28 No.6 Nov/Dec 2003, did contain guidance noise levels and has been used widely since, as it is considered to be appropriate for the assessment of noise from pubs and clubs.

13.2.63 A summary of the guidance from the Acoustic Bulletin for venues where entertainment takes place more than once per week is as follows;

- **Noise from Gardens and Play Areas**

If noise levels produced outside a noise-sensitive property due to general use of gardens and play areas regularly exceed 55dB $L_{Aeq,5min}$ when measured at least 3.5m from a building façade (or in external amenity areas) this may indicate that unacceptable disturbance is occurring.

- **Noise from Rowdy Behavior**

If noise from rowdy behavior regularly produces L_{Amax} levels in excess of 70dB 1m outside windows of a noise sensitive property between 2300 and 0700 hours, then this may be an indication that unacceptable disturbance could occur or is occurring. It is worth noting that noise of this nature can contain an element of intimidation resulting in a reaction which is greater than the measured noise level may suggest.

Policy Framework

'National Planning Policy Framework' (NPPF)

13.2.64 In March 2012 the 'National Planning Policy Framework' (NPPF) was introduced as the current planning policy guidance within England. Paragraph 123 of the NPPF states:

- *'Planning policies and decisions should aim to:*
- avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

13.2.65 In terms of 'adverse effects' the NPPF refers to the 'Noise Policy Statement for England' (NPSE), which defines three categories, as follows:

- **NOEL – No Observed Effect Level**
This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- **LOAEL – Lowest Observed Adverse Effect Level**
This is the level above which adverse effects on health and quality of life can be detected.
- **SOAEL – Significant Observed Adverse Effect Level**
This is the level above which significant adverse effects on health and quality of life occur.'

13.2.66 However, whilst the above terms are provided in NPSE, paragraph 2.22 acknowledges that these terms require further research in order to establish what is meant in terms of 'adverse impact'

'2.22 It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.'

- Having identified SOAEL the Statement sets out three aims:
- **The first aim of the Noise Policy Statement for England**
Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development.
- **The second aim of the Noise Policy Statement for England**
Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur.
- **The third aim of the Noise Policy Statement for England**
Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
This aim seeks, where possible, positively to improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim."

13.2.67 The National Planning Practice Guidance states that noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. In both cases, the potential noise impact needs to be addressed. Opportunities should also be taken, where possible, to achieve improvements to the acoustic environment.

Scoping Criteria

13.2.68 Prior to carrying out the site monitoring, the noise monitoring locations, monitoring times, and the assessment methodology have been agreed via e-mail correspondence, with Frances Taylor, Environmental Health Officer at CCC, dated 11th July 2013.

13.2.69 The main noise sources across, and in the vicinity of the site are likely to be road traffic, construction noise associated with proposed development and noise associated with the existing hotels, restaurants, and golf driving range adjacent to the site.

13.2.70 The noise assessment will consider the following impacts:

- An assessment of construction noise associated with the development of the site for existing sensitive receptors in accordance with BS5228: 1997 'Noise and Vibration control on construction and open sites'.
- Baseline noise surveys will be carried out in liaison with the Local Authority to the agreed noise survey methodology.
- Impact of the existing noise climate on the development site taking into account the noise impact of the existing highway network, the adjoining hotel and leisure facilities.
- An assessment of the effect on existing sensitive receptors from the change in road traffic due to the development in future years assessed using the Calculation of Road Traffic Noise: 1988 (CRTN) methodology to enable the impact to be determined.
- Noise impact of the proposed development on existing and proposed residential areas during the operational stages in accordance with appropriate and relevant guidance and standards.

Limitations

13.2.71 The extent of the site caused limitations on the time periods and locations of the monitoring which could be carried out.

13.2.72 Despite the limitations stated, the assessment is considered to be suitably robust.

13.3 Baseline Conditions

Site Description and Context

- 13.3.1 The site currently comprises existing open farmland to the south west of Keresley. The site is bound to the north by open farm land and an existing farmstead. To the east the site is bound by Bennetts Road South and the rear gardens of residential properties fronting onto Bennetts Road South. To the south east, the site is bound by a Wyndon Motors car body shop, PFS (petrol filling station) and the Beechwood Inn with associated function area and restaurant. To the south the site is bound by a golf driving range, and the Britannia Royal Court Hotel. To the south west the site is bound by B4098 Tamworth Road. To the west, and north the site is bound by open agricultural land.
- 13.3.2 Information provided by the client indicates that the master plan comprises a development of 800-1000 residential dwellings with a potential for open space areas, local centre areas, and a primary school.
- 13.3.3 For the purposes of this assessment, the occupants of residential properties in the vicinity of the site are considered to be the receptors most likely to be affected by the construction and operational phases of the development. Details of the receptors are set out in Table 13.4.

Baseline Survey Information

Desk Study

- 13.3.4 The potential major sources of noise contributing to baseline conditions were identified through a desktop study of the development site and surrounding land uses using available maps and aerial photography. The potential existing sensitive locations and the proposed locations for onsite noise measurement were identified as those most likely to be affected by the proposed development.
- 13.3.5 Monitoring location positions and time periods were agreed with CCC prior to the measurements being carried out.

Baseline Noise Survey

- 13.3.6 On the 18th and 19th July 2013 Wardell Armstrong LLP carried out a noise survey to assess noise levels across the development site.
- 13.3.7 Attended noise monitoring was carried out during the following periods:
- Between 0305 and 1120hrs on Thursday 18th July;
 - Between 0536 and 1111hrs on Friday 19th July; and
 - Between 2204 and 2331hrs on Friday 19th July 2013.
- 13.3.8 The attended noise measurements were carried out over various time periods during the survey, Appendix 13.1 details time periods fully.
- 13.3.9 Table 13.12 details the grid reference for each monitoring location of each monitoring location.

Table 13.12 Monitoring Location Grid Reference

Monitoring Location	Grid Ref	
	Easting	Northing
ML1	431258	283182
ML2	431820	282984
ML3	431868	282980
ML4	431847	283446
ML5	431237	283807
ML6	430968	283396
HOTEL1	431355	283236
HOTEL2	431212	283183

13.3.10 Noise measurements were taken at six monitoring locations; considered to be representative of existing and proposed noise sensitive receptors. The monitoring locations are as follows; and are shown on Drawing 13.1:

- Monitoring Location 1: In the south of the site at the rear of the Britannia Royal Court Hotel on the site boundary. The location was chosen to represent noise from the kitchen extract at the hotel, and be representative of the noise at proposed sensitive receptors in the vicinity of the monitoring location.
- Monitoring Location 2: In the south east of the site at the rear of The Beechwood Inn and Wyndon Motors. The location was chosen to represent any industrial noise from the hotel and Wyndon Motors, and be representative of the proposed sensitive receptors in the south west of the site.
- Monitoring Location 3: In the south east of the site at the rear of the properties fronting onto Bennett's Road South at the site boundary. The location was chosen to be representative of the existing and proposed sensitive receptors in the south east of the site
- Monitoring Location 4: In the north east of the site close to Bennett's Road South at the site boundary. The location was chosen to be representative of the existing and proposed sensitive receptors in the north west of the site.

- Monitoring Location 5: In the north of the site in open farm land at the site boundary. The location was chosen to provide representative levels of noise from the M6 motorway, and Prologis Park Coventry at proposed sensitive receptors in the north of the site.
- Monitoring Location 6: In the west of the site at the site boundary close to Tamworth Road. The location was chosen to be representative of the existing and proposed sensitive receptors in the west of the site.

13.3.11 Monitoring at two additional locations has been carried out to measure the noise from Britannia Royal Court Hotel. Measurements have been carried out as described below; and are shown on drawing ST11713/TBC:

- HOTEL1: This location was chosen to provide representative levels of noise at the north eastern boundary of the Britannia Royal Court hotel
- HOTEL2: This location was chosen to provide representative levels of noise from patrons using outdoor areas of the complex, and the car parking area on the north western boundary of Britannia Hotel.

13.3.12 The noise measurements were made using a Type 1, integrating sound level meter. The sound level meter was mounted vertically on a tripod 1.2m above the ground and more than 3.5 metres from any other reflecting surfaces.

13.3.13 All noise monitoring took place during dry conditions with wind speeds of less than 5m/s. The sound level meter was calibrated to a reference level of 94dB at 1kHz both before, and on completion of, the noise survey. No drift in the calibration during the survey was noted.

13.3.14 For the purpose of this assessment daytime hours are taken to be 0700 to 2300 hours and night-time hours to be 2300 to 0700 hours.

13.3.15 The attended noise measurements were taken over various measurement periods representative of the noise source, during the survey. A-weighted¹ L_{eq} ² were measured to comply with the requirements of NPPF and BS8233, together with A-weighted L_{90s} ³ to comply with the requirements of BS4142. The maximum and minimum sound pressure levels were also measured to provide additional information. The measured noise levels are set out in full in Appendix 13.1.

13.3.16 Noise monitoring has been carried out over 2 sections of the night time period, 0300-0500hrs and 0500-0700hrs. The measurement time 0300-0500hrs includes what is generally regarded to be the quietest period of the night. The measured noise level is used for night time BS4142 assessments, and ensures a robust assessment.

13.3.17 The night-time noise monitoring carried out between 0500 and 0700hrs does not include what is normally considered to be the louder hours for all monitoring locations and consequently the average noise levels described in Table 13.13 for the measurement period are over-estimated. Based on the results obtained, a robust assessment can be made of the noise levels at the site and of the mitigation necessary to achieve the required internal night-time noise levels at the development.

13.3.18 Attended noise monitoring allows observations and detailed notes to be made of the significant noise sources which contribute to each of the measured levels. The observations identified the significant noise sources at the site to be as follows:

Road Traffic: Noise from road traffic on Bennett's Road South, Sandpits Lane, Tamworth Road, the M6 motorway, and surrounding road network was audible in all measurement locations. A drop in the level of road traffic noise was noted during the night-time period.

¹ A' Weighting An electronic filter in a sound level meter which mimics the human ear's response to sounds at different frequencies under defined conditions

² L_{eq} Equivalent continuous noise level; the steady sound pressure which contains an equivalent quantity of sound energy as the time-varying sound pressure levels.

³ L_{90} The noise level which is exceeded for 90% of the measurement period.

Commercial and Industrial Noise: During the daytime and night-time, commercial noise from the Britannia Hotel was audible in measurement locations ML1, HOTEL1, and HOTEL2. Some industrial noise was audible from Wyndon Motors in measurement locations 2 and 3. Wyndon Motors operating hours are 0800 to 1800hrs Monday to Friday, and 0930 to 1230hrs Saturday. Some distant industrial noise from an unknown source was audible in monitoring locations 4 and 5 during the daytime and night time.

Birdsong: Birdsong was occasionally audible at all locations during various measurements taken during the daytime and night-time period.

Air Traffic: Noise from air traffic was audible in all locations during the daytime and night time.

13.3.19 Table 13.13 summarises measured noise levels during the baseline noise survey. Full details of the measured noise levels can be found in Appendix 13.1

Table 13.13: Average Daytime and Night-time Noise Levels

Monitoring Location	Time	Average Measured Noise Level L_{eq} (dB(A))	Lowest Measured Background Noise Level $L_{90,20min}$ (dB(A))
1	0700-2300	49.9	43.9
	2300-0700	51.4	47.0
2	0700-2300	43.2	39.6
	2300-0700	44.8	40.7
3	0700-2300	44.7	38.0
	0300-0500	35.4	33.3
	0500-0700	44.7	38.4
4	0700-2300	55.9	41.2
	0300-0500	41.7	38.4
	0500-0700	57.7	45.3
5	0700-2300	43.6	35.1
	2300-0700	45.9	43.8
6	0700-2300	52.9	40.5
	0300-0500	51.1	36.5
	0500-0700	54.7	38.4
HOTEL1	0700-2300 2300-0700	54.4 ---	48.6 ---
HOTEL2	0700-2300 2300-0700	41.6 43.7	39.6 42.1

13.3.20 The maximum noise levels measured during each night-time period of the survey, at each of the monitoring locations, are summarised in Table 13.14.

Table 13.14: Summary of the Maximum Night-time Noise Levels

Monitoring Location	Maximum Measured Noise Level L_{max} (dB(A))
1	57.4
2	58.5
3	54.9
4	75.7
5	59.0
6	76.0
HOTEL1	---
HOTEL2	48.3

13.4 Key Impacts & Likely Significant Effects

Construction Phase Assessment

Noise from Earthworks and Construction Phase Activities

- 13.4.1 During the earthworks and construction phase, any work carried out at the proposed development is likely to generate noise that may propagate beyond the proposed development boundary.
- 13.4.2 At this stage, detailed information regarding the nature and timescales of activities likely to take place during the earthworks and construction phase are not known. Activities on the site, which could give rise to construction noise impacts include (but are not limited to):
- Site preparation i.e. ground excavation, levelling of ground, trenching, trench filling, unloading and levelling of hardcore and compacting filling; and
 - Construction of the proposed redevelopment including piling, construction of access roads, fabrication processes e.g. planing, sanding, routing, cutting, drilling and laying foundations.
- 13.4.3 In addition to the earthworks and construction activities, vehicle movements to and from the proposed development have the potential to generate noise at existing sensitive receptors, in the immediate vicinity of the local road network.
- 13.4.4 At this stage, detailed traffic data relating to the likely numbers of construction vehicles is not available. However, the number of construction vehicles is not considered to be significant relative to the existing flows on the major road links within and surrounding the development site. It is therefore considered that the level of road traffic noise at sensitive receptor locations will not change significantly, due to construction vehicles, during the construction phases of the development, and this impact has not therefore been considered further.
- 13.4.5 The contractor undertaking the enabling and construction works has not yet been appointed. However, it is considered that the enabling and construction works are likely to be restricted to daytime hours, i.e. between 0800 and 1700 hours Monday to Friday and 0800 to 1200 hours on a Saturday, with no work on Sunday and Bank Holidays. Based on the ambient noise levels measured during the daytime period, the appropriate category value has been determined for each of the sensitive receptors, as detailed in Table 13.7.
- 13.4.6 The earthwork and construction phase activities have the potential to generate short term increases in noise levels, above those recommended in BS5228-1. The levels of noise received at the receptors closest to the proposed development would depend on the sound power levels of the machines used, the distance to the properties, the presence of screening or reflecting surfaces and the ability of the intervening ground to absorb the propagating noise.
- 13.4.7 The nearest noise sensitive receptors to the development, as detailed in Table 13.4, will vary depending on the phase of the development under construction. Given the potentially small distances between the construction activities and residential dwellings, noise levels at the receptors may occur above those detailed in Table 13.7. Proposed receptors which become habited before the completion of the construction phase of the development would experience a similar noise impact. The noise generated by the earthworks and construction phases of the development may therefore exceed Category A in BS5228 at the existing and proposed sensitive receptors located in the immediate vicinity of the construction phases of the development.
- 13.4.8 The noise impact of the construction phase on existing and proposed residential properties is non permanent **moderate to minor adverse**.
- 13.4.9 It is therefore recommended that mitigation measures be put in place that will reduce the scale of the potential effect. Details can be found in the mitigation section of this chapter.

Vibration from Earthworks and Construction

- 13.4.10 The earthworks and construction works have the potential to increase vibration levels at residential properties in the vicinity of construction phases of development during the proposed working hours.
- 13.4.11 Wardell Armstrong's archives contain field trial measurements of ground vibration associated with types of plant likely to be used at the proposed development. The representative, measured levels, made by Wardell Armstrong using a Vibrock B801 Digital Seismograph, are set out in Table 13.15.

Table 13.15: Measured Vibration Levels of Plant Under normal Operating Conditions

Plant Type	Distance from Source		
	10m (m m /s)	20m (mm/s)	30m (mm/s)
25-30 tonne excavator	0.175	0.075	Background
25 tonne dumptruck (Volvo A25) Loaded	1.000	0.150	Background
Empty	0.225	0.050	Background
Dozer	1.050	0.400	Background
Vibrating roller Drum			
Vibrator on	4.470	3.270	2.350
Vibrator off	0.500	0.150	0.050
Loading shovel	1.025	0.150	Background

- 13.4.12 The nearest sensitive properties to the proposed construction works, as detailed in Table 13.4 of this chapter, will vary depending on the phase of the development under construction. The sensitive receptors could include proposed dwellings which become habited before the completion of the construction phase of the development. As a worst case scenario, earthworks and construction works may potentially take place at a distance of approximately 10 metres from existing or proposed residential properties.
- 13.4.13 At this distance, it is possible that vibration due to the operation of various construction plant, and in particular a vibratory roller, may be above the threshold of complaint. However, the vibration levels are highly unlikely to be above the threshold of structural damage. It is possible that residential properties would therefore potentially experience some adverse impact. However this would occur for only limited periods during the works, i.e. when activities take place at the development phase boundaries.
- 13.4.14 In addition to the earthworks and construction works described, it is possible that piling will be required. At this time, the type(s) of piling which would be used at various locations across the site, is not known and it is likely that the contractor responsible for undertaking the works at the site would decide the method of piling.
- 13.4.15 BS5228-2 recognises that the most common form of vibration associated with piling is the intermittent type derived from conventional driven piling. The intensity of vibration disturbance, which may be registered at a receptor, will be a function of many factors. These are set out in BS5228-2 and include:

- Energy per blow or cycle;
- Distance between source and receptor;
- Soil structure interaction i.e. nature of connection between soil and structure being monitored; and

- Construction of structure and location of measuring points e.g. soil surface, building foundation and internal structural element.

13.4.16 As the responsible contractor has not yet been appointed, detailed information regarding the above is not known. It is not therefore possible to assess the potential impacts of vibration generated by piling.

13.4.17 The vibration impact of the construction works at existing and proposed residential receptors is non permanent **minor to moderate adverse**.

13.4.18 The receptors likely to be affected by piling will vary depending of the phase of the development under construction. Once the precise building locations, ground conditions for each location and type(s) of piling are confirmed, vibration levels could be estimated and recommendations for control made as appropriate. Mitigation measures are discussed within the mitigation section of this chapter.

Operational Phase Assessment

Road Traffic Noise and Existing Sensitive Receptors

13.4.19 CRTN predictions using SoundPLAN noise modelling software have been carried out to assess any potential changes in road traffic noise at existing receptor locations due to the operation of the development.

13.4.20 Traffic data has been provided by Phil Jones Associates by e-mail on the 10th June 2014.

13.4.21 The changes in noise levels at each of the receptors considered have been assessed by comparing the noise levels predicted for the "With Committed Developments" scenario with the "With Committed and Proposed Development" scenario in 2022. The results are shown in Table 13.16.

13.4.22 The committed development included within the traffic data is the development at Beake Avenue/Swallow Road at the former Dunlop site for 135 residential dwellings.

Table 13.16: SoundPLAN Predictions for the 2013 and 2022 "Without Development" and "With Development" Scenarios and Changes in Predicted Road Traffic Noise Levels

Existing Sensitive Receptor Number	Predicted L _{10 18hour} dB(A) at the façade of the Receptor			Change in Predicted Road Traffic Noise Levels in 2022 (Figures in dB(A))
	2013 Without Development (Scenario 1)	2022 Without Development (Scenario 2)	2022 With Development (Scenario 3)	
ESR1	51.4	52.7	53.7	+1.0
ESR2	63.8	65.1	66.9	+1.8
ESR3	51.6	52.2	51.3	-0.9
ESR4	57.2	58.2	58.1	-0.1
ESR5	61.9	62.8	64.3	+1.5
ESR6	60.1	60.9	61.1	+0.2

13.4.23 The changes in noise levels have been assessed against the significance criteria contained in Table 13.9. The results show that the highest increase will be 1.8dB(A) at ESR2 when comparing scenarios 2 and 3. In accordance with the significance criteria detailed within Table 13.9, this increase in road traffic noise will be negligible at the existing receptors. The change in noise level at all other existing sensitive receptors considered in this assessment, in 2023 will be less than 1.8dB and therefore the impact will be **negligible** at all existing sensitive receptors.

13.4.24 The inclusion of the proposed road through the site will cause a reduction in road traffic noise at ESR3 and ESR4 when comparing “With Development” scenario to the “Without Development” scenario. In accordance with the significance criteria in Table 13.9, the resultant change will be **negligible**.

13.4.25 The following noise contour plots have been produced for each of the following scenarios and can be found in Figures 13.1 to 13.6;

- Figure 13.1 – Baseline traffic 2013 dB(A) $L_{10\ 18\text{hour}}$
- Figure 13.2 – Baseline traffic 2022 without proposed development but including committed developments dB(A) $L_{10\ 18\text{hour}}$
- Figure 13.3 – Baseline traffic 2022 Including proposed development and committed developments dB(A) $L_{10\ 18\text{hour}}$
- Figure 13.4 – Baseline traffic 2022 Difference plot with and without proposed development dB(A) $L_{10\ 18\text{hour}}$
- Figure 13.5 – Baseline traffic 2022 Including proposed development and committed development dB(A) $L_{\text{eq}\ 16\text{hour}}$
- Figure 13.6 – Baseline traffic 2022 Including proposed development and committed development dB(A) $L_{\text{eq}\ 8\text{hour}}$

Road Traffic Noise at Proposed Sensitive Receptors

13.4.26 Noise prediction calculations using SoundPLAN have also been carried out to determine the future levels of road traffic noise at the residential areas of the proposed development.

13.4.27 The noise level calculations using SoundPLAN are presented as $L_{A10,18\text{hour}}$. This has been converted to an $L_{A\text{eq},16\text{hour}}$ using the methodology in Transport Research Laboratory (TRL) guidance document.

13.4.28 The results of the prediction calculations for 2022 (with proposed and committed development traffic in place, i.e. Scenario 3) are shown in Table 13.17.

Table 13.17: Sound Plan Predictions for the 2022 “With Development” Scenarios at Proposed Sensitive Receptors.

Proposed Sensitive Receptor Number	Predicted $L_{\text{eq}\ 16\text{hour}}$ dB(A) at the façade of the Receptor
	2022 With Development (Scenario 3)
PSR1	63.0
PSR2	39.2
PSR3	63.6
PSR4	41.8
PSR5	47.7
PSR6*	50.7
*Location of the proposed school	

13.4.29 In addition to the measured noise levels, the calculated noise levels for the proposed sensitive receptors in Table 13.17 will be used to calculate the sound attenuation required to achieve internal and external noise levels in BS8233 and BB93

Delivery Vehicle Noise from the Britannia Royal Court Hotel

13.4.30 Delivery vehicle noise was audible at the north eastern end of the Britannia Hotel, at monitoring location 'HOTEL1' between 0826 and 0828. To assess delivery vehicle noise we make the following assumptions;

- Due to the premises being a hotel, deliveries will not take place during the night time, or early hours of the morning to avoid noise for guests;
- A maximum of one delivery will take place per hour;
- The measured noise level of 59.0dB(A) measured at monitoring location 'HOTEL1' is representative of a 'typical' delivery; and,
- Deliveries will last a approximately 15 minutes.

13.4.31 Based on the assumption stated above, noise from deliveries at the north western part of the Britannia Hotel is 53.0dB(A) $L_{eq,1hour}$ at the location of outdoor living areas of the nearest proposed residential dwellings.

External Daytime Noise Levels at Proposed Residential Properties

13.4.32 The development description includes a new highway infrastructure. The parameters plan indicates proposed residential dwellings in the vicinity of existing and proposed road links. New residential properties are therefore likely to be affected by existing and proposed noise sources.

13.4.33 Noise levels in external living areas of the proposed dwellings have been assessed in accordance with the requirements of BS8233 for external living areas. The BS8233 criterion for external living areas is:

- 55dB $L_{Aeq,T}$ should be considered as an upper limit for external living areas.

13.4.34 Table 13.18. details the attenuation required at proposed dwellings closest to major sources of noise, in order to achieve 55dB(A) in outdoor living areas. Daytime noise levels are taken from Table 13.17, 2023 scenario 3.

Table 13.18 Calculated Daytime Noise Levels in Outdoor Areas of Proposed Sensitive Receptors.

Proposed Sensitive Receptor	Predicted / Measured Noise Level ($L_{eq,16hour}$) dB(A)	Attenuation Required to Achieve 50dB(A) (dB(A))	Attenuation Required to Achieve 55dB(A) (dB(A))
ML1	49.9	0	0.0
ML2	43.2	0	0.0
ML3	44.7	0	0.0
ML4	55.9	5.9	0.9
ML5	43.6	0	0.0
ML6	52.9	2.9	0.0
HOTEL1 (Delivery Vehicle Noise)	53.0	3.0	0.0
PSR1	63.0	13.0	8.0
PSR2	39.2	0	0.0
PSR3	63.6	13.6	8.6

Proposed Sensitive Receptor	Predicted / Measured Noise Level (Leq,16hour) dB(A)	Attenuation Required to Achieve 50dB(A) (dB(A))	Attenuation Required to Achieve 55dB(A) (dB(A))
PSR4	41.8	0	0.0
PSR5	47.7	0	0.0

13.4.35 The noise impact of the operational phase on outdoor living areas of the proposed residential properties with without mitigation is long term **minor to moderate adverse**

13.4.36 Mitigation measure are therefore required to attenuate existing noise sources in external living areas at proposed sensitive receptors in the vicinity of ML4, ML6, PSR1, and PSR 3. These are detailed in the mitigation section of this chapter.

Internal Daytime Noise Levels at Proposed Residential Properties

13.4.37 The daytime noise levels in noise sensitive rooms of the proposed dwellings have been assessed in accordance with the requirements of BS8233 for living room areas.

13.4.38 The predicted daytime noise levels have been used to determine the noise levels likely at the façades of the properties in the vicinity of the proposed noise sensitive parts of the development, during the daytime period.

13.4.39 Before internal noise levels can be calculated 2.5dB(A) must be added to the free-field measured levels to allow for the reflection of noise from the proposed housing façades when the buildings are in place.

13.4.40 The calculated noise levels at the façades of the proposed dwellings, together with the level of attenuation required to achieve 30dB LAeq in the living room areas and 35 dB LAeq in the bedroom areas, are summarised in Table 13.19.

Table 13.19 Façade Noise Level at Properties in the Vicinity of the Monitoring Locations and Level of Attenuation Required to Achieve the Internal Daytime Noise Limit

Proposed Sensitive Receptor	Noise Level at the Façade of the Property Living Room Leq,16hour (dB(A))	Noise Level at the Façade of the Property Bedroom Leq,16hour (dB(A))	Daytime Level of Attenuation Needed To Achieve 30dB LAeq in Accordance with BS8233 (dB(A))	Night-time Level of Attenuation Needed To Achieve 35dB LAeq in Accordance with BS8233 (dB(A))
ML1	52.4	52.4	22.4	17.4
ML2	45.7	45.7	15.7	10.7
ML3	47.2	47.2	17.2	12.2
ML4	58.4	58.4	28.4	23.4
ML5	46.1	46.1	16.1	11.1
ML6	55.4	55.4	25.4	20.4

Proposed Sensitive Receptor	Noise Level at the Façade of the Property Living Room $L_{eq,16hour}$ (dB(A))	Noise Level at the Façade of the Property Bedroom $L_{eq,16hour}$ (dB(A))	Daytime Level of Attenuation Needed To Achieve 30dB L_{Aeq} in Accordance with BS8233 (dB(A))	Night-time Level of Attenuation Needed To Achieve 35dB L_{Aeq} in Accordance with BS8233 (dB(A))
HOTEL1 (Delivery Vehicle Noise)	55.5	55.5	25.5	20.5
PSR1	65.5	67.5	35.5	32.5
PSR2	41.7	41.8	11.7	7.3
PSR3	66.1	67.6	36.1	32.6
PSR4	44.3	45.7	14.3	10.7
PSR5	50.2	51.4	20.2	16.4

13.4.41 The facades of the buildings further into the site will be protected by the buildings themselves and/or screened by other buildings and topography. It is considered that the noise levels at these facades, and therefore the level of attenuation the facades would need to provide, to achieve noise limits in accordance with BS8233, will be less than those detailed in Table 13.19.

13.4.42 The noise impact of the operational phase on the living rooms of proposed residential properties without mitigation is long term **minor to moderate adverse**.

13.4.43 Mitigation measures and glazing recommendations are discussed further in the mitigation section of this Chapter.

Internal Night Time Noise Levels at Proposed Residential Properties

13.4.44 In accordance with the requirements of BS8233, the acceptable night-time noise levels within bedroom areas are:

- An internal noise limit of 30dB L_{Aeq} wherever possible; and
- Individual noise events should not normally exceed 45dB L_{Amax} .

13.4.45 The measured night-time noise levels have been used to determine the noise levels likely, at the facades of the properties in the vicinity of the proposed receptors, during the night-time period.

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

13.4.47 The L_{Amax} value is taken from measured noise levels at representative monitoring locations

13.4.48 The calculated noise levels at the façades of the dwellings, together with the level of attenuation required to achieve 30dB L_{Aeq} in the bedrooms, are summarised in Table 13.20.

Table 13.20: Façade Noise Level at Properties in the Vicinity of the Monitoring Locations and Level of Attenuation Required to Achieve the Internal Night-time Noise Limit

Proposed Sensitive Receptor	Noise Level at the Façade of the Property $L_{eq,8hour}$	Measured L_{Amax} Value (dB(A))	Level of Attenuation Needed To Achieve Night-time noise limits in Accordance with BS8233
ML1	53.9	57.4	23.9
ML2	47.3	58.5	17.3
ML3	47.3	54.9	17.3
ML4	60.2	75.7	30.7
ML5	48.4	59.0	18.4
ML6	57.2	76.0	31.0
HOTEL1 (Delivery Vehicle Noise)	55.5	63.9	25.5
PSR1	52.9	76.0	31.0
PSR2	31.5	59.0	14.0
PSR3	53.5	75.7	30.7
PSR4	33.9	54.9	9.9
PSR5	39.2	58.5	13.5

13.4.49 The facades of dwellings facing into the site will be protected by the building itself and/or screened by other buildings and topography. It is considered that the noise levels at these facades and therefore the level of attenuation the facades would need to provide to achieve the 30dB L_{Aeq} and 45dB L_{Amax} in the bedrooms will be less than those detailed in Table 13.20.

13.4.50 Mitigation measures will be required in the final design, and are detailed within the mitigation section of this chapter

Assessment of Existing Industrial Noise Sources

13.4.51 Observations made during the noise survey indicate that the operations of Britannia Hotel, are dominant in the south western part of the site closest to the Britannia Hotel (i.e. monitoring locations ML1, 'HOTEL1', and 'HOTEL2'), during the daytime and night time periods. Noise from the Beechwood Inn was not audible in the south eastern part of the site. Industrial noise from Wyndon Motors was occasionally dominant in the south eastern part of the site.

13.4.52 In accordance with BS4142, it is considered that 5dB should be added to the specific noise levels where a tonal, impulsive or irregular character was audible to obtain the 'rating level' for that period. The residual noise level (i.e. the level of noise in the absence of the specific noise) has been subtracted from the ambient noise where appropriate, to derive the specific noise level.

13.4.53 The noise generated by the Britannia Hotel, and Wyndon Motors is referred to as the 'specific noise' by BS4142 and this term is used in this report.

13.4.54 Observations made during the noise survey indicated that noise from the Britannia Hotel did not include tonal, impulsive or irregular characters. However, noise from pressure washers at Wyndon Motors did contain irregular characters, therefore a 5dB(A) weighting will be applied. Noise from Wyndon Motors was observed to occur for approximately 15 minutes in every 1 hour, therefore a time weight of -6dB(A) is applied to allow for this.

13.4.55 The noise levels generated by the industrial sources will vary depending upon their workload. However, the activities associated with the premises, audible at the following monitoring locations, over the periods stated, are deemed to be representative.

13.4.56 Where required the industrial noise has been obtained from the main measurement period to provide the best indication of the typical industrial noise from the respective premises. The measurement times below are representative of the noise level used in the assessment.

- Monitoring Location 1: The noise levels measured between 0532 and 0534hrs are considered representative of the maximum measured noise from the kitchen extract of the Britannia Hotel at measurement location ML1. For the purpose of the assessment the noise level (L_{Aeq}), of 52.8dB, has been used.
- HOTEL1: The noise levels measured between 0826 and 0828hrs are considered representative of the maximum measured industrial noise from Britannia Hotel at measurement location 'HOTEL1'. For the purpose of the assessment the noise level (L_{Aeq}), of 59.0dB, has been used.
- Monitoring Location 3: The noise levels measured between 0734 and 0740hrs are considered representative of the maximum measured industrial noise from Wyndon Motors in the south eastern part of the site. For the purpose of the assessment the noise level (L_{Aeq}), of 47.0dB, has been used.

13.4.57 The noise levels during these periods have therefore been taken to be representative of the specific noise level.

13.4.58 The noise levels measured during the following periods are considered to be representative of the background noise levels at the boundary with the Britannia Hotel, and Wyndon Motors. (i.e. in the absence of the specific noise):

- Daytime Period: Over the period 0755 to 0818hrs (19/07/2013) at Monitoring Location 2. For the purpose of the assessment the lowest measured night time background noise level ($L_{A90, 20min}$), of 40.4dB, has been used.
- Night time Period: Over the period 0419 to 0440 (19/07/2013) at Monitoring Location 6. For the purpose of the assessment the lowest measured night time background noise level ($L_{A90, 5min}$), of 36.5dB, has been used.

13.4.59 The specific noise level has been calculated based upon the distances between the existing industrial noise source and the location of the proposed residential development, based upon the masterplan.

13.4.60 In accordance with BS4142 the specific noise level in the vicinity of the proposed residential dwellings within the site has been compared with the measured background noise level, as shown in Tables 10.21, 10.22 and 10.23.

Table 13.21: Night Time BS4142 Assessment of the Existing Industrial Sources at Proposed Sensitive Receptors – Residential Dwellings South of the Site

	Proposed Residential dwellings at the boundary with the Britannia Hotel (Figures in dB(A))	
	ML1	HOTEL1

Measured ambient noise level (including specific noise)	-	-
Residual noise level (without specific noise)	-	-
Specific Noise i.e. noise level of the operational activities of the surrounding industrial premises	44.8*	47.3*
Acoustic Feature Correction	+0	+0
Rating Level	44.8	47.3
Lowest Background Noise Level	36.5	36.5
Excess of rating over background level	+8	+11
*Noise level at site boundary calculated including distance correction, on-time correction and screening as appropriate		

Table 13.22: Daytime BS4142 Assessment of the Existing Industrial Premises at Proposed Sensitive Receptors – Residential Dwellings South of the Site

	Proposed Residential dwellings at the boundary with the Britannia Hotel (Figures in dB(A))	
	<i>MLI</i>	<i>HOTEL1</i>
Measured ambient noise level (including specific noise)	-	-
Residual noise level (without specific noise)	-	-
Specific Noise i.e. noise level of the operational activities of the surrounding industrial premises	44.8*	47.3*
Acoustic Feature Correction	0	0
Rating Level	44.8	47.3
Lowest Background Noise Level	40.4	40.4
Excess of rating over background level	+4	+7
*Noise level at site boundary calculated including distance correction, on-time correction and screening as appropriate		

Table 13.24: Daytime BS4142 Assessment of the Existing Industrial Premises at Proposed Sensitive Receptors – Residential Dwellings South East of the Site

	Proposed Residential dwellings at the boundary with the Wyndon Motors (Figures in dB(A))
	<i>South eastern boundary</i>
Measured ambient noise level (including specific noise)	47.0
Residual noise level (without specific noise)	45.4
Specific Noise i.e. noise level of the operational activities of the surrounding industrial premises	35.9*
Acoustic Feature Correction	+5
Rating Level	40.9
Lowest Background Noise Level	40.4
Excess of rating over background level	+1
*Noise level at site boundary calculated including distance correction, on-time correction and screening as appropriate	

- 13.4.61 The results of the BS4142 assessment in Table 13.21 indicate that with no mitigation in place, the noise impact is of marginal significance in the part of the site close to location 'ML1'. Complaints from noise at the location of 'HOTEL1' are considered to be likely during the night time.
- 13.4.62 The results of the BS4142 assessment in Table 13.22 indicate that with no mitigation in place, the noise impact is of marginal significance in the part of the site close to locations 'ML1' and 'HOTEL1' during the day time.
- 13.4.63 The results of the BS4142 assessment in Table 13.23 indicate that with no mitigation in place, the noise impact from Wyndon Motors is of marginal significance at the location of the proposed residential dwellings in the south east of the site during the daytime.
- 13.4.64 Mitigation measures should be incorporated into the proposed site design to ensure noise generated by all individual activities are reduced to acceptable levels for the proposed residential dwellings. These measures are discussed in the mitigation section of this report.

BS4142 Assessment of the Proposed Industrial Noise Sources

- 13.4.65 The latest masterplan indicates some areas of 'Community hub mixed use areas (70% residential, 30% other uses)'.
- 13.4.66 Proposed industrial premises should be located away from existing residential premises, with strategic landscaping and open spaces located between the existing residential premises and proposed mixed uses
- 13.4.67 It is considered that without appropriate mitigation measures, noise from activities at the proposed mixed uses premises may impact upon the proposed residential dwellings.
- 13.4.68 At this stage, Wardell Armstrong does not have any information relating to the location, future activities, ancillary noise sources, opening hours and delivery times associated with the proposed employment premises. It has not therefore been possible to estimate the level of noise, likely to be generated by activities associated with the premises, at the existing and proposed sensitive receptors. A background noise survey has therefore been undertaken at locations considered representative of existing and proposed sensitive receptors in the vicinity of the proposed premises, to determine the background noise level, and appropriate limits recommended in accordance with BS4142.

13.4.69 Coventry City Council has requested that noise levels from any industrial sources be designed to be no more than 3dB(A) above the lowest measured background levels, including an adjustment for any tonal noise. A 3dB(A) increase to the lowest background noise level is considered to be lower than marginal significance.

13.4.70 The appropriate noise level required to achieve a 3dB(A) increase to the lowest background measured background levels, are detailed in Table 13.24. The noise level has been calculated using the daytime and night-time noise levels considered representative of background noise levels at sensitive receptors in accordance with BS4142.

Table 13.24: Appropriate noise level required to achieve 10dB(A) below measured background levels during the daytime and night time

Monitoring Location and Sensitive Receptors	Lowest Background Noise Level in Accordance With BS4142 (L ₉₀ dB(A))		Noise Limit For Noise from the Local Centre to Achieve no More Than 3dB(A) Increase to Measured Background Levels	
	Day (0700-2300)	Night (2300-0700)	Day (0700-2300)	Night (2300-0700)
Monitoring Location 4: (considered representative of the existing and proposed sensitive receptors in the north east of the site.	41.2	38.2	44.2	41.2

13.4.71 The noise limits stated above have been calculated at either the existing or proposed sensitive receptor; therefore no distance attenuation has been included in the calculations.

13.4.72 Mitigation measures will be incorporated into the site design, of the proposed premises, to ensure the noise impacts of the premises are reduced to acceptable levels at the existing and proposed sensitive receptors. The detailed design of the local centre will include mitigation measures to reduce noise levels generated by the local centre to no more than 3dB(A) above the lowest measured background levels wherever practicable.

13.4.73 Due to the low night-time background noise levels it is considered that achieving no more than 3dB(A) above the lowest measured background may not be practicable for all potential future activities and therefore it is recommended to ensure that the internal noise limits detailed in BS8233 are not exceeded due to noise from the proposed development, when assessed at existing and proposed sensitive receptor locations.

Existing Noise Sources on the Proposed School

13.4.74 The current masterplan indicates that, the proposed primary school is located close to the eastern boundary of the development site. Based upon the location of the proposed school, the noise impact assessment is based upon PSR6 in SoundPLAN noise model data.

13.4.75 The development description includes a primary school. A representative location for the school has been selected and this is based on PSR6. The calculated free field noise level at PSR6, from Table 13.17 is 50.7dB(A) L_{eq} which is less than the 60dB(A) L_{eq} suggested as an upper limit at the boundary of external premises used for teaching and resource areas and below the 55dB(A) L_{eq,30min} required in unoccupied playgrounds.

13.4.76 At least one area of outdoor teaching space should have an ambient noise level of 50dB(A) L_{eq,30 minutes}.

13.4.77 Before internal noise levels can be calculated, 2.5dB(A) must be added to the free-field measured levels to allow for the reflection of noise from the proposed housing facades when the buildings are in place.

13.4.78 The internal noise level requirements of teaching spaces is between 30 and 50dB(A) L_{eq,30min}, depending upon the future use of the space. The calculated façade level at the proposed school is 51.2dB(A).

13.4.79 Therefore the building facade must achieve between 21.2 and 1.2dB(A) attenuation to adhere to the requirements of Acoustic Performance Standards for the Priority Schools Building Programme, V1.7 and BB93.

13.4.80 Mitigation will be required to reduce the internal noise levels in teaching areas of the proposed school. Mitigation measures are discussed in further detail in the mitigation section of this chapter.

Noise from Proposed School Premises at Proposed Noise Sensitive Receptors

13.4.81 The development description includes a residential development and a primary school. Therefore external playing areas of the proposed school maybe located adjacent to residential areas of the proposed development.

13.4.82 The noise level from sports lessons and outdoor play from the proposed school can be predicted using Wardell Armstrong (WA) reference data from previous noise assessment surveys on educational establishments. A number of steps are required to calculate the noise from outdoor activities from the proposed school, at the boundary of the school, these are detailed below;

13.4.83 Prediction calculations have been undertaken to determine the $L_{Aeq (16 \text{ hour})}$ noise impact at the proposed development site. To adjust the measured levels to properly account for school noise throughout the 16 hour period, the following steps are taken:

- Firstly, obtain the 'residual' noise levels. Using (WA) reference data, an average daytime residual level of 48.7dB L_{Aeq} is considered to be representative of the daytime noise level at the proposed primary school.
- Secondly, the noise level of short term activities at the proposed school must be also be determined using WA reference data. A noise level of 58.0dB $L_{Aeq 10 \text{ minutes}}$ was measured at a distance of 5m during a football lesson at an existing school, and is considered representative of sports lessons, or outdoor play at the proposed school. The measured noise level of the sports lesson, distance corrected to the site boundary, has been used in the prediction calculations.
- The third step is to determine the total amount of time each outdoor activity will take place during the 16 hour period. To be robust, it has been assumed that there will be a total of 6.5 hours of outdoor teaching and school break times per day, including both outdoor teaching during school hours and after school activities, and that all activities will be undertaken in the vicinity of the proposed development.
- The final step is to combine the results of the previous three steps to obtain noise levels which are inclusive of all school sports activities and break times throughout the 16 hour period, giving a freefield noise level of 54.1dB $L_{Aeq 16 \text{ hour}}$ at the site boundary of the proposed primary school.

13.4.84 The measured and calculated noise levels detailed above indicate that mitigation will not be required to ensure that 55dB $L_{Aeq 16 \text{ hour}}$ taken from BS8233 is achieved in the outdoor living areas of existing and proposed residential properties closest to the proposed primary school.

Noise from Outdoor areas of Adjacent Leisure Facilities

13.4.85 Noise from patrons and vehicle movements an outdoor seating area at the Britannia Hotel was audible at the site boundary at monitoring location 'HOTEL2'. Noise from the outdoor area and carpark can be assessed against criteria in the IOA pubs and clubs guidance.

13.4.86 The IOA guidance suggests that noise from gardens and play areas should not exceed 55dB $L_{Aeq,5min}$ when measured at least 3.5m from the boundary of a building facade. This is also in-line with BS8233 guidance noise levels.

13.4.87 The measured noise level at monitoring location 'HOTEL2', at 2229hrs and 2329hrs is 41.6, and 43.7 L_{eq} , respectively, less than the 55dB IOA criteria.

13.4.88 Noise from outdoor areas of the bar at the Britannia Hotel are negligible, and no mitigation measures are required.

13.5 Mitigation, Enhancement and Residual Effects

13.5.1 This section describes the measures which are required to mitigate any significant environmental impacts.

Construction Phase Assessment

Noise from Earthworks and Construction

13.5.2 To reduce the potential impact of noise levels generated by the construction phase of the development, at existing receptor locations in the immediate vicinity of the site, mitigation measures will be required.

13.5.3 Best working practice will be implemented during each phase of the earthworks and construction works at the site. The construction works will follow the guidelines in BS5228-1 and the guidance in BRE Controlling particles, vapour and noise pollution from construction sites, Parts 1 to 5, 2003.

13.5.4 The following measures will be put in place to minimise noise emissions:

- When works are taking place within close proximity to those sensitive receptors identified, screening of noise sources by temporary screen may be employed;
- All plant and machinery should be regularly maintained to control noise emissions, with particular emphasis on lubrication of bearings and the integrity of silencers;
- Site staff should be aware that they are working adjacent to a residential area and avoid all unnecessary noise due to misuse of tools and equipment, unnecessary shouting and radios;
- A further measure to reduce noise levels at the sensitive receptors would include, as far as possible, the avoidance of two noisy operations occurring simultaneously in close proximity to the same sensitive receptor;
- Adherence to any time limits imposed on noisy works by the Local Authority;
- Implement set working hours during the week and at weekends;
- Ensure engines are turned off when possible; and
- Should earthworks/earthworks and construction activities need to be carried out during night-time hours, the local authority could include a planning condition which requests advance notice and details of any night working to provided.

13.5.5 Once the best working practices detailed in the mitigation section of this chapter are implemented the residual noise impacts associated with the earthworks and construction phase will be **negligible**, with only brief periods of **minor adverse impacts** likely in the short term at local level.

Vibration from Earthworks and Construction

13.5.6 BS5228-2 recognises that the most common form of vibration associated with piling is the intermittent type derived from conventional driven piling.

13.5.7 To minimise the potential for vibration to be generated by piling it is recommended that careful consideration is given to the type of piling to be used. For example auger bored piles would be preferable to driven piles with regards to a reduced potential for noise and vibration to be generated. However, it is recognised that the piling process will need to be selected on the basis of the strata to be encountered, the loads to be supported and the economics of the system.

13.5.8 The receptors likely to be affected by piling will vary depending of the phase of the development under construction. Once the precise building locations, ground conditions for each location and type(s) of piling are confirmed, vibration levels could be estimated and recommendations for control made as appropriate.

13.5.9 To keep ground borne vibration to a minimum the following measures, as referred to in BS5228-2, should be put in place:

- Substitution: Where reasonably practicable, plant and or methods of work likely to cause significant levels of vibration at the receptors identified, should be replaced by less intrusive plant/methods of working; and
- Vibration Isolation of plant at source: This may prove a viable option where the plant is stationary (e.g. a compressor, generator) and located close to a receptor.

13.5.10 There are a number of measures which can be implemented, depending upon the type of piling chosen. BS5228-2 indicates that mitigation might include: use of alternative methods, removal of obstructions, provision of cut-off trenches, reduction of energy input per blow, reduction of resistance to penetration. Continuous flight augering would cause minimal vibration even very close to the piling operation.

13.5.11 As the construction programme and methodologies become more defined it is suggested that earthworks and construction vibration be reconsidered and that a detailed strategy for control be implemented.

13.5.12 Once the best working practices detailed in the mitigation section of this chapter are implemented, the residual vibration impacts associated with the earthworks and construction phase will be non permanent **minor adverse** at local level.

Operational Phase Assessment – Existing Sensitive Receptors

13.5.13 The changes in road traffic noise due to the development generated traffic have been assessed at a number of existing sensitive receptors. The assessment confirms that in accordance with the significance criteria included Table 11.9, the increase in road traffic noise in 2023, i.e. Scenario 2 and Scenario 3, at the existing sensitive receptors ESR1 to 6, will be **negligible** in the long term. Mitigation measures are therefore not considered necessary for these receptors.

Operational Phase Assessment – Proposed Receptors

13.5.14 To mitigate noise generated by the existing and proposed road network, it is recommended that the following measures are incorporated into the design of the development;

- External living areas of the proposed dwellings should be orientated away from major sources of noise at the perimeter of the site (i.e. major road network and delivery areas of the Britannia Royal Court Hotel). Local close boarded fencing should be used where outdoor living areas cannot be orientated away from major noise sources; and,
- Any fencing should be at least 2.0m high close-boarded and a minimum density of 7kg/m²; also
- Local fencing should be installed around potential sources of noise in the local centre, or where properties cannot be orientated away from existing sources of noise.

13.5.15 Noise from the externally mounted industrial equipment in the north west of the Britannia Hotel site will be required to be attenuated by 10dB(A) or more at proposed receptors close to the north western boundary of the Britannia Hotel. The equipment, which requires attenuation, is thought to be the large air handling unit approximately the size of half a shipping container located in the service area of the Britannia Hotel. The equipment has 4 large intakes/exhaust on top which are considered to be the main source of noise.

13.5.16 The attenuation required can be provided using one of the following methods;

- Provide a 70m stand-off from the north western boundary of the Britannia Hotel;
- Construct a 2m bund, with a 2m close boarded fence on top; or,

- Provide mitigation to the source of the noise through liaison with the Britannia Hotel, this could be done with specific attenuators, or a fence constructed around the source of the noise. The fence must be constructed such that no part of the equipment is visible at 1st floor windows of the proposed residential properties.

External Living Areas

13.5.17 Prediction calculations indicate that, with the implementation of the mitigation measures proposed in this chapter, outdoor living areas will achieve the required daytime noise levels of 55dB L_{Aeq} across the site.

Glazing Requirements

Daytime Living Rooms and Bedrooms

- 13.5.18 When assessing daytime noise levels in noise sensitive rooms, the noise attenuation provided by the overall building facade should be considered. To mitigate noise levels, the composition of the building facade can be designed to provide the level of attenuation required. Glazing is generally the building element which attenuates noise the least, so the proportion of glazing in a building facade is an important consideration when assessing overall noise attenuation.
- 13.5.19 In the absence of design details for the building facades, it has been assumed that the glazing to noise sensitive rooms would comprise about 25% of the facade area. To calculate the overall attenuation provided by this percentage of glazing in a brick or block facade, a non-uniform partition calculation can be used.
- 13.5.20 The calculation combines the different degrees of attenuation of the wall element and the window element. A facade element comprising a solid brick or blockwork, will attenuate by 45-50dB (British Standard 8233:2014) whereas standard thermal double glazing will attenuate traffic noise by 26-29 dB(A) (BRE Digest 379 "Double glazing for heat and sound insulation). The overall noise attenuation provided by this combination is, therefore, between 31.9 dB(A) and 34.9dB(A).
- 13.5.21 A number of types of glazing would be able to achieve between 26-29 dB(A). For example 6/12/6 glazing would generally achieve 26 dB(A) attenuation and 10/12/4 glazing would achieve 29 dB(A) attenuation.
- 13.5.22 The noise attenuation requirements for noise sensitive living rooms across the site are summarised in Table 13.18. Table 13.18 indicates that standard thermal double glazing would ensure that internal noise levels in living room and bedroom areas of proposed dwellings meet the standard in accordance with BS8223 dwellings.
- 13.5.23 With windows open, the attenuation provided by the façade will be approximately 15dB(A). This would allow the recommended internal noise limit to be exceeded in some living room and bedroom areas.
- 13.5.24 On occasions this may be acceptable to the occupant, but when quiet conditions are required, the occupant should be able to close the windows whilst maintaining adequate ventilation. Therefore some form of acoustic ventilation will need to be installed in noise sensitive rooms across the proposed development site.
- 13.5.25 At this stage, a detailed site layout has not yet been confirmed. Detailed glazing requirements will need to be confirmed on a plot by plot basis once a detailed design layout is available.
- 13.5.26 The facades of the buildings further into the site will be protected by the buildings themselves and/or screened by other buildings and topography. It is considered that the noise levels at these facades, and therefore the level of attenuation the facades would need to attenuate, to achieve noise limits in accordance with BS8233, will be less than those detailed in Table 13.18.
- 13.5.27 The residual impact of the operational phase of the proposed residential for living rooms is **negligible** in the long term.

Night-time Bedroom Areas

- 13.5.28 The noise attenuation requirements for bedrooms are summarised in Tables 10.19. Table 13.19 indicates that standard thermal double glazing would ensure that internal noise levels in bedroom areas at the proposed dwellings meet the 'good' standard in accordance with BS8233 in proposed residential dwellings with windows closed, using the assumptions stated in paragraphs 11.5.17 to 11.5.19.
- 13.5.29 With windows open the attenuation provided by the facade will fall to approximately 15dB(A). This would allow the recommended internal noise limits to be exceeded in some bedrooms.
- 13.5.30 On occasions this may be acceptable to the occupant, but when quiet conditions are required, the occupant should be able to close the windows whilst maintaining adequate ventilation. Therefore some form of acoustic ventilation will need to be installed in noise sensitive rooms across the proposed development site.
- 13.5.31 Therefore some form of acoustic ventilation will be required to achieve the required internal night-time noise levels for proposed dwellings.
- 13.5.32 The facades of the dwellings facing into the site will be protected by the building itself and/or screened by other buildings and topography, particularly at ground floor level. It is considered that the noise levels at these facades, and therefore the level of attenuation the facades would require to achieve noise limits in accordance with BS8233, will be less than those detailed in Table 13.20.
- 13.5.33 Glazing requirements can be confirmed on a plot by plot basis, once a detailed design layout is available.
- 13.5.34 The residual impact of the operational phase of the proposed residential in bedrooms is **negligible** in the long term.

Proposed Primary School

- 13.5.35 Mitigation measures will be incorporated into the building facade of the proposed primary school to mitigate against external noise, and reduce internal noise levels to acceptable limits detailed in BB93. The building facade should be designed to achieve between 9.8 and 29.8dB(A) depending upon the future use of the internal space. To aid with the design process, noise sensitive teaching spaces, could be orientated away from main noise sources.
- 13.5.36 The residual impact of the operational phase of the proposed primary school is **negligible** in the long term.

Acoustic Ventilation Requirements

- 13.5.37 It is recommended that the acoustic ventilation proposed at the site should, as a minimum, comply with Building Regulations 2010 Approved Document F1 Means of Ventilation and British Standard BS5925 1991: "Code of Practice for Ventilation Principles and Designing for Natural Ventilation".
- 13.5.38 The implementation of the recommended glazing together with acoustic ventilation should ensure that the required internal daytime and night-time noise limits in proposed dwellings, and daytime noise limits in the proposed primary school, with a direct line of sight of existing noise sources, are met.

13.5.39 The façades of some of the proposed buildings may be protected by the buildings themselves and/or screened by other buildings depending upon the final site layout. Acoustic ventilation may not need to be installed in the living room areas, bedrooms, and/or teaching spaces within the school, of these buildings.

13.5.40 The requirement for acoustic ventilation would need to be confirmed once a detailed design layout is available.

Existing Industrial Premises

13.5.41 Existing industrial noise source should be reassessed, following the mitigation measures detailed in paragraph 10.5.14.

13.5.42 Tables 10.25, and 10.26 detail a BS4142 assessment of the existing industrial noise, from the kitchen extract at monitoring location ML1, and industrial noise in the north eastern part of the Britannia Hotel site, at monitoring location 'HOTEL1', during the night time and daytime respectively.

Table 13.25: Night Time BS4142 Assessment of the Existing Industrial Premises at Proposed Sensitive Receptors – Residential Dwellings South of the Site (Figures in dB(A))

	Proposed Residential dwellings at the boundary with the Britannia Hotel	
	ML1	HOTEL1
Measured ambient noise level (including specific noise)	-	-
Residual noise level (without specific noise)	-	-
Specific Noise i.e. noise level of the operational activities of the surrounding industrial premises	34.8*	37.3*
Acoustic Feature Correction	+0	+0
Rating Level	34.8	37.3
Lowest Background Noise Level	36.5	36.5
Excess of rating over background level	-2	+1
*Noise level at site boundary calculated including distance correction, on-time correction and screening as appropriate		

Table 13.26: Daytime BS4142 Assessment of the Existing Industrial Premises at Proposed Sensitive Receptors – Residential Dwellings South of the Site (Figures in dB(A))

	Proposed Residential dwellings at the boundary with the Britannia Hotel	
	<i>ML1</i>	<i>HOTEL1</i>
Measured ambient noise level (including specific noise)	-	-
Residual noise level (without specific noise)	-	-
Specific Noise i.e. noise level of the operational activities of the surrounding industrial premises	34.8*	37.3*
Acoustic Feature Correction	0	0
Rating Level	44.8	47.3
Lowest Background Noise Level	40.4	40.4
Excess of rating over background level	-6	-3
*Noise level at site boundary calculated including distance correction, on-time correction and screening as appropriate		

13.5.43 Following mitigation measures implemented, the noise impact about noise from the Britannia hotel is of less than marginal significance at proposed residential properties in the vicinity of the Britannia hotel and adheres to CCC requirements.

Proposed Local Centre

13.5.44 Mitigation measures, which could comprise, local fencing, and standoff areas may need to be incorporated into the final design to reduce the noise from the proposed premises impacting upon the surrounding residential development. Suitable measures would be confirmed at detailed design stage.

13.6 Summary

Introduction

- 13.6.1 This chapter assesses the noise and vibration impacts of the proposed development. It considers the potential impacts generated by the earthworks, construction phase and operational phases of the proposed development.

Baseline Conditions

- 13.6.2 To establish baseline noise levels, at a number of sensitive receptors and across the proposed development, attended noise surveys have been carried out. In addition, the future traffic noise levels at a number of sensitive receptors and across the proposed development have been predicted using the CRTN prediction method in SoundPLAN noise modelling software.
- 13.6.3 Sources of noise on the site are road traffic on the existing road network, hotels, restaurants, golf driving range, and air traffic noise. Noise from birdsong was also noted during the baseline survey.

Likely Significant Effects

Construction

- 13.6.4 The activities carried out during the earthworks and construction phase of the development will have the potential to generate short term increases in noise levels above the recommended noise limits, set in accordance with current guidance, at existing and proposed sensitive receptors surrounding the site. The use of heavy plant associated with the earthworks and construction works also has the potential to give rise to groundborne vibration.
- 13.6.5 Given the small distances between the construction activities and the nearest proposed sensitive receptors, some sensitive receptors may experience **minor adverse** noise and vibration impacts in the short term. This would occur temporarily and only for short periods.

Road Traffic Noise and Existing Sensitive Receptors

- 13.6.6 Changes in road traffic noise as a result of development led road traffic will be **negligible** in the long term. Mitigation measures are therefore not considered necessary for existing receptors.

Proposed Sensitive Receptors and Noise

- 13.6.7 The proposed noise sensitive areas of the development, i.e. the residential areas and primary school, will be subjected to noise from existing and proposed sources. The dominant source of noise at the sensitive areas of the proposed development is road traffic on the major road links in the vicinity of the development site, existing leisure facilities adjacent to the south and south eastern site boundary and Wyndon Motors. The residential receptors in the eastern part of the site may experience noise from the proposed primary school. In addition to the existing sources of noise, development generated vehicle movements on the local road network have the potential to increase noise levels across the proposed development.

Mitigation and Enhancement

Construction Phase

- 13.6.8 To minimise the potential impact of construction works, mitigation measures would be put in place. These will include restrictions on working hours, the implementation of temporary screening where possible, and best working practices.
- 13.6.9 In addition to earthworks and construction it is possible that piling will be required. At this stage detailed information regarding the type of piling has not been confirmed. To minimise the potential for vibration to be generated by piling it is recommended that careful consideration be given to the type of piling used.

13.6.10 With the implementation of best working practice and restriction on working hours, the noise and vibration impacts of earthworks and construction phases, will be generally **negligible**, with only brief periods of **minor to moderate adverse** impacts likely in the short term at local level.

Proposed Sensitive Receptors and Noise

13.6.11 To meet the external daytime, and internal daytime and night-time noise limits, mitigation measures will need to be incorporated as detailed within this chapter.

13.6.12 Mitigation measures will need to be incorporated into some parts of the proposed primary school to reduce internal noise levels to the criteria detailed in DfE 2013 and BB93. The level of attenuation required will vary dependent upon the future usage of the space.

13.6.13 To ensure that noise from the proposed primary school is reduced to a suitable level at proposed residential properties it is recommended that school playground areas are located away from noise sensitive receptors with areas of open spaces between.

13.6.14 Mitigation measures will be incorporated into the site design of the local centre and employment area to ensure the noise impacts of the premises are reduced to acceptable levels at the proposed sensitive receptors. It is considered that mitigation measures may include an appropriate glazing and acoustic ventilation specification and/or local close boarded fencing.

13.6.15 With mitigation measures in place it is considered that the impact of the existing and proposed noise sources on the proposed noise sensitive areas of the development will be **negligible** in both the long and short term.

13.7 Conclusions

Construction Phase Assessment – Noise and Vibration

- 13.7.1 The significance of noise and vibration effects from, earthworks and construction is considered to be **negligible**, with site specific mitigation measures in place. However, the construction operations may have a short term, **minor to moderate adverse** impact at sensitive receptors located in the immediate vicinity of the construction phases over the development sites.

Operational Phase Assessment

Existing Receptors

- 13.7.2 The increase in road traffic noise in 2023, 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**. Mitigation measures are therefore not considered necessary.

Proposed Residential Receptors

- 13.7.3 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 major roads and the proposed development access roads, existing industrial, and leisure facilities, will meet all the required internal and external noise standards.

Proposed Primary School

- 13.7.4 Mitigation measures will be incorporated into the final design of the proposed primary school to achieve internal noise levels detailed in DfE 2013, and BB93.
- 13.7.5 Prediction calculation carried out demonstrates that the proposed primary school will have a **negligible** effect on existing and proposed sensitive receptors with mitigation measures implemented as detailed within this chapter.

Proposed Local Centre

- 13.7.6 Mitigation measures will be incorporated into the final design to reduce the noise impact of the proposed local centre on proposed and existing sensitive receptors.