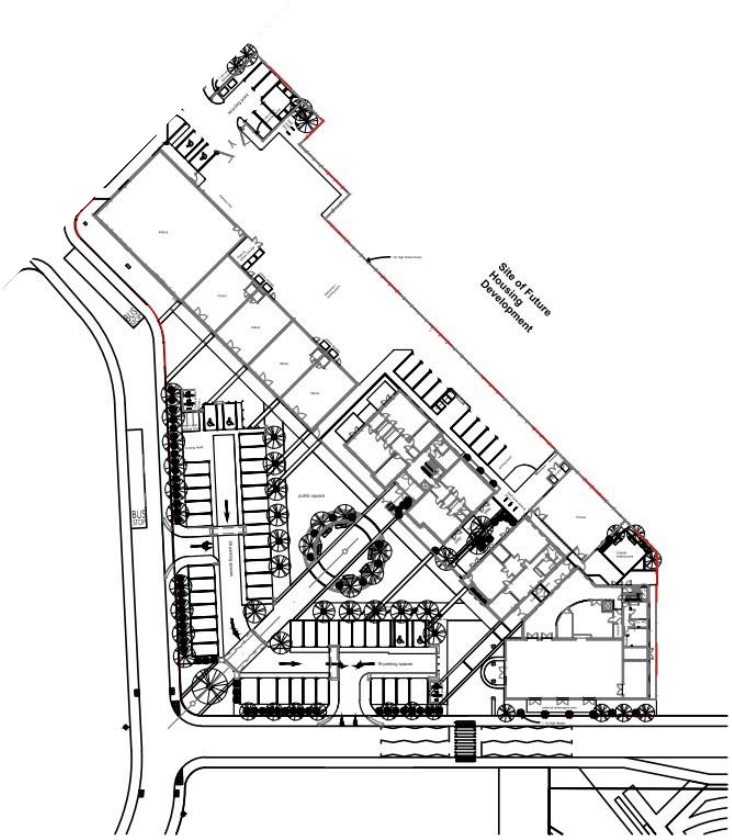
KINGSMERE LOCAL CENTRE

NOISE IMPACT ASSESSMENT REPORT



NOVEMBER 2015

WSP | PARSONS BRINCKERHOFF

KINGSMERE LOCAL CENTRE

NOISE IMPACT ASSESSMENT REPORT

Countryside Properties (Bicester) Ltd

Project no: 11012779
Date: November 2015

WSP | Parsons Brinckerhoff
6 Devonshire Square
London
EC2M 4YE

Tel: +0 (0)20 3116 6093

www.wspgroup.com
www.pbworld.com

QUALITY MANAGEMENT

ISSUE/REVISION	FIRST ISSUE	REVISION 1	REVISION 2	REVISION 3
Remarks	Final Draft	Final Draft	Final Draft	
Date	14/09/2015	03/11/2015	11/11/2015	
Prepared by	Sarah Whydle	Sarah Whydle	Sarah Whydle	
Signature				
Checked by	Chris Wood	Chris Wood	Chris Wood	
Signature				
Authorised by	Chris Wood	Chris Wood	Chris Wood	
Signature				
Project number	11012779	11012779	11012779	
Report number	V01	V02	V03	
File reference	Noise Impact Assessment	Noise Impact Assessment	Noise Impact Assessment	

TABLE OF CONTENTS

APPENDICES

1 INTRODUCTION

1.1.1 WSP | Parsons Brinckerhoff has been commissioned by Countryside Properties (Bicester) Ltd to undertake a noise impact assessment for the proposed Local Centre that forms part of the wider Kingsmere development located to the south-west of Bicester town centre.

1.1.2 This report presents the results of an assessment of the potential operational impacts of the proposed Local Centre on the future dwellings associated with the Kingsmere development. The assessment covers:

- noise arising from employee parking, servicing and the refuse area;
- noise from the youth and nursery outdoor space; and
- noise emanating from the community hall, particularly during parties/functions.

1.1.3 Mitigation measures have been identified with the aim of minimising the potential impact on future occupants of dwellings close to the proposed Local Centre.

1.1.4 A glossary of acoustic terminology is presented in Appendix A.

2 SITE DESCRIPTION

2.1 LOCATION

2.1.1 The proposed Local Centre forms a part of the wider Kingsmere development located to the south-west of Bicester. The Local Centre will be predominantly surrounded by residential development associated with the Kingsmere development; although, a primary school and public square are also proposed to the south of the site.

2.1.2 The site falls under the jurisdiction of Cherwell District Council (CDC).

2.2 PROPOSED DEVELOPMENT

2.2.1 The development proposals for the site include:

- an anchor retail store to the north-west of the site;
- four retail units;
- a community centre; and
- a nursery.

2.2.2 The proposed layout is shown in Appendix B.

3 CONSULTATION WITH CDC AND ACOUSTIC GUIDANCE

3.1 PRE-APPLICATION RESPONSE

3.1.1 Pre-application advice was sought from CDC prior to the planning submission to understand any specific concerns or comments. The response raised a number of points in relation to noise, as follows:

- *Potential noise and disturbance as a result of employee parking and servicing/deliveries all provided along the rear of the development adjacent to future development properties… consideration must be given to providing a buffer between the service area and the residential properties if this arrangement is to be considered appropriate*;
- *Refuse storage along the boundary next to the future residential development properties is potentially anti-social in terms of smell and noise nuisance*;
- *The community building has the youth area at first floor level with open outdoor roof area at first floor level. This will potentially result in…. unacceptable noise and disturbance to those future occupiers. This element must be re-designed to avoid any conflict between the two uses. The roof top proposed to the nursery also has similar issues*; and
- *The main hall to the community building has doors opening out into the public square and to the main street. This is likely to result in noise and disturbance if opened when the building is in use for functions/parties etc. It is likely that conditions will be imposed on any grant of planning permission to ensure that the building is acoustically sound insulated to avoid such disturbances*.

3.1.2 These points are addressed in section 4 of this report, under the subheadings: Servicing and Parking; External Youth and Nursery Space; and Main Hall Functions.

3.1.3 Following consultation with CDC, it is further understood that absolute internal and external noise levels, in line with current best practice, should be achieved for any future dwellings close to the Local Centre. As such, the assessment methodology set out below has been adopted.

3.2 GUIDANCE

3.2.1 BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings* and the WHO *Guidelines for Community Noise* both provide quantitative guidance for internal and external noise levels in and around buildings.

3.2.2 BS 8233:2014 provides appropriate criteria and limits for different situations, including the design of new buildings. The key noise level criteria recommended for residential spaces are summarised in Table 3-1.

Table 3-1 Indoor ambient noise levels for dwellings, BS 8233:2014

ACTIVITY	LOCATION	07:00 - 23:00	23:00 - 07:00
Resting	Living room	35 dB $L_{Aeq,16h}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$

3.2.3 With regards to external amenity areas, BS 8233:2014 recommends that, "*it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments*." The Standard also states that these guideline values are not always achievable in all circumstances and therefore a compromise between elevated noise levels and the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

3.2.4 The WHO *Guidelines* consolidate scientific knowledge on the health effects of community noise and provide guidance to environmental health authorities and professionals trying to protect people from the harmful effects of noise in non-industrial environments. The main sources of community noise are identified as road, rail and air traffic, industries, construction and public work and neighbours.

3.2.5 The effects of noise in dwellings are, typically, sleep disturbance, speech interference and annoyance. Relevant guideline values and the time base over which the individual guideline values apply are summarised in Table 3-2.

Table 3-2 WHO guideline values for community noise in specific environments

SPECIFIC ENVIRONMENT	CRITICAL HEALTH EFFECTS	$L_{Aeq,T}$	TIME BASE (HOURS)*
Outdoor living area	Serious annoyance, daytime and evening	55 dB	16
	Moderate annoyance, daytime and evening	50 dB	16
Dwellings, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35 dB	16
Inside bedrooms	Sleep disturbance, night-time	30 dB	8
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45 dB	8

* These periods are usually taken to be 07:00 – 23:00 (16-hour day) and 23:00 – 07:00 (8-hour night)

3.2.6 It can be seen from Tables 3-1 and 3-2 above that the internal $L_{Aeq,T}$ criteria for day and night-time periods in BS 8233 and the WHO *Guidelines* are the same, and these values will be used in this assessment.

4 NOISE IMPACT ASSESSMENT

4.1 RESIDENTIAL INTERNAL AND EXTERNAL NOISE CRITERIA

4.1.1 This section provides an assessment of the potential noise impact of the proposed Local Centre on future dwellings in the vicinity.

4.1.2 Activities associated with the Local Centre have been assessed to determine whether the adopted internal and external noise criteria, as presented in Table 4-1, will be achieved, and whether any mitigation measures are required. The comments raised by CDC are discussed in turn below.

Table 4-1 Internal and external noise criteria for residential development

	DAYTIME	NIGHT-TIME
	$L_{Aeq,16h}$	$L_{Aeq,8h}$
Internal noise levels	35 dB	30 dB
External noise levels	55 dB	-

4.1.3 It should be noted that the assessment criteria are representative of the full 16-hour day and 8-hour night-time periods, as presented in the relevant guidance. Any activities occurring over a shorter duration, therefore, are time-corrected in order for a like-for-like comparison with the criteria.

4.1.4 The assessments presented below, therefore, addresses the potential noise impact of the various activities when considered in terms of the day or night as a whole. Over shorter periods, noise levels from the sources in question will be higher, but, in all cases, the activities occur for relatively short durations, whereby the noise conditions for the majority of the time, due to the presence of the Local Centre, will be lower than those presented in this report. The levels presented in this report could be described as representing the “average” conditions, taking into account the natural peaks and troughs in activities.

4.2 SERVICING AND PARKING

SERVICING

4.2.1 In order to determine the potential impact of the servicing of the proposed Local Centre on nearby future dwellings, the number of vehicle movements and the distance between the service route and the noise sensitive receptor must be known.

4.2.2 It is understood that there will be no deliveries after 11pm at night, and therefore the assessment has focussed on any potential impact during daytime hours only (07:00 – 23:00).

4.2.3 As the number of vehicle movements during the day is not known at this stage, the following assumptions have been adopted:

- → there will be up to eight deliveries (including one refuse collection) to the various retail units throughout the day (07:00 – 23:00); and
- → the average distance between the service route and the nearest sensitive receptor would be 10m.

4.2.4 Source data from the WSP | Parsons Brinckerhoff acoustic library for a supermarket lorry entering a service yard and manoeuvring to a loading bay have been used for this assessment. The data are presented as sound exposure levels representing the total sound energy of the event normalised to a 1 second period and denoted L_{AE}.

4.2.5 The free-field sound exposure level for the supermarket lorry was measured to be 94 dB L_{AE} at an average distance of 15m. As the nearest sensitive receptor is anticipated to be approximately 10m from the source, the sound exposure level has been corrected for distance by adding 3 dB.

4.2.6 Based on the above assumptions and corrected source level, the noise from supermarket lorries entering and moving around the service yard is predicted to be 57 dB $L_{Aeq,16h}$ during the day at a distance of 10m.

4.2.7 It can be seen that, based on an open window typically providing 15 dB attenuation, the internal noise criteria (as presented in Table 4-1) would be exceeded for the daytime period. In addition, the external noise criterion would be exceeded by approximately 2 dB.

4.2.8 As such, it is proposed to erect a 3m acoustic fence along the boundary of the service yard (as shown in Appendix B). The acoustic fence is predicted to provide approximately 15 dB attenuation for gardens and habitable rooms on the ground floor (i.e. those usually occupied during the day).

4.2.9 It is therefore anticipated that the internal and external noise criteria would be achieved for habitable rooms during the day and any external amenity areas of dwellings close to the service yard.

CAR PARKING

EMPLOYEE CAR PARKING

4.2.10 To assess the potential impact of the employee car parking area (proposed to the north of the retail units and close to the future proposed dwellings), source data from the acoustic library have been used to predict noise levels likely to be experienced by future occupiers. It is assumed that the car park would only be used during the day, with no, or very few, car movements during the night (23:00 – 07:00).

4.2.11 Noise measurements were undertaken at another site during a typical car pass-by, the slam of a car door/boot, and the ignition of a car engine and subsequent manoeuvring out of a car parking space, all at a distance of 10m from the source. These data are presented in the table below in terms of the sound exposure level for each activity.

Table 4-2 Free-field sound exposure levels used for car park noise predictions

ACTIVITY	L_{AE} AT A DISTANCE OF 10m
Car pass-by	70 dB
Slamming/shutting of car boots/doors	73 dB
Ignition of car engines and manoeuvring out of space	64 dB

4.2.12 Based on the Local Centre Site Plan as presented in Appendix B, it has been assumed that 4 car parking spaces are located at a distance of approximately 5m from the nearest future dwellings, and 10 spaces are located at a distance of 10m.

4.2.13 On the assumption that each of these spaces is used once throughout the whole day (i.e. each space is entered and departed from once, with two door slams), the daytime noise level at the nearest future dwellings is predicted to be 40 dB $L_{Aeq,16h}$. As such, it is anticipated that the external and internal noise criteria (with windows open) would be achieved.

4.2.14 In addition, the 3m acoustic fence proposed to minimise the impact of the service yard deliveries (as presented above) will also provide 10-15 dB attenuation for noise associated with the employee car park. Therefore, employee car parking is not considered to be a significant constraint.

LOCAL CENTRE CAR PARKING

4.2.15 To assess the potential impact of the Local Centre car parking area (proposed to the south of the retail units), the same approach has been adopted as above such that source data from the acoustic library have been used to predict noise levels likely to be experienced by future occupiers of dwellings located close by. It is assumed that the car park would only be used during the day, with no, or very few, car movements during the night (23:00 – 07:00).

4.2.16 Based on the Local Centre Site Plan as presented in Appendix B, it has been assumed that 22 car parking spaces are located at a distance of approximately 15m from the nearest future dwellings, and 23 spaces are located at a distance of 25m.

4.2.17 Using the sound exposure levels presented in Table 4-2 and on the assumption that each of these spaces is used once throughout the whole day (i.e. each space is entered and departed from once, with two door slams), the daytime noise level at the nearest future dwellings is predicted to be 42 dB $L_{Aeq,16h}$. As such, it is anticipated that the external and internal noise criteria (with windows open) would be achieved.

4.3 EXTERNAL YOUTH AND NURSERY SPACE

4.3.1 In order to account for any noise associated with the external youth and nursery space at first floor level, source data measured when children were playing in a playground from WSP | Parsons Brinckerhoff's acoustic library have been used.

4.3.2 Noise measurements were undertaken at a distance of 15m and over a 30 minute period when school children were playing in a playground. The free-field noise level during this period was 52 dB $L_{Aeq,30min}$.

4.3.3 Based on the masterplan in Appendix B, the future dwellings are calculated to be approximately 15m from the youth and nursery spaces. Therefore, the source noise level for the playground obtained at the same distance can be considered indicative of the sort of noise levels that may be incident on the future dwellings.

4.3.4 Consequently, it can be seen that, based on the example source data, the internal noise criterion during the day (as presented in Table 4-1), with an open window providing 15 dB attenuation, would be exceeded by 2 dB. The external noise criterion would, however, be achieved.

4.3.5 A barrier will be included around the perimeter of the external areas for safety reasons, which could be designed to achieve worthwhile acoustic attenuation. With the inclusion of such an acoustic barrier, it is anticipated that the internal noise criterion during the day with windows open would be achieved.

4.3.6 Furthermore, this assessment is based on a source level obtained over a 30 minute period, whilst the daytime criteria are in terms of a 16 hour period. If, therefore, the external spaces are used for a total of 2 hours a day, for example, then the correction to the source noise level would be -9 dB. In terms of the noise experienced over a typical day, therefore, both the external and internal (with open windows) noise criteria would be achieved without the need for any screening.

4.3.7 With or without acoustic screening, therefore, it is considered that significant disturbance to the future residents is unlikely. Notwithstanding this, it would be appropriate to provide suitable signage at the Local Centre to ensure the staff and users are aware of the need to minimise noise in outdoor spaces.

4.4 MAIN HALL FUNCTIONS

4.4.1 It is understood from the pre-application response that there are concerns that noise arising from the Local Centre may cause disturbance to those living nearby when the main hall is in use for functions/parties. It is likely that the design of the external building fabric of the main hall will provide sufficient sound insulation performance to minimise any disturbance to nearby dwellings.

5 CONCLUSIONS

5.1.1 WSP | Parsons Brinckerhoff has been commissioned by Countryside Properties (Bicester) Ltd to undertake a noise impact assessment for the proposed Local Centre development at Bicester.

5.1.2 A number of comments were raised by CDC in its pre-application response in terms of the potential impact of the Local Centre on future dwellings nearby. The comments relevant to this report are summarised as follows:

- noise arising from employee parking, servicing and refuse area;
- noise from the youth and nursery outdoor spaces; and
- noise emanating from the main hall during parties/functions.

5.1.3 Each of the points above has been assessed in turn and, where necessary, mitigation measures have been explored to minimise the potential disturbance to residents of the future dwellings nearby.

5.1.4 Based on the assessment of the use of the service yard (see paragraph 4.2.1 for the associated assumptions), it is proposed to include a 3m acoustic barrier around the perimeter of the service yard (as presented in Appendix B) to ensure that internal and external noise levels for the nearby future dwellings can be achieved.

5.1.5 Based on the assessment of the youth and nursery outdoor spaces (see paragraph 4.3.2 for the associated assumptions), no mitigation is considered necessary; however, it would be appropriate to provide signage within the Community Centre notifying the occupants of the need to keep noise to a minimum in the external spaces, whilst some attenuation could be achieved from the use of a solid screen around the perimeter of the external play areas.

5.1.6 In terms of noise arising from the use of the main hall for functions, it is likely that this will be dealt with during the detailed design of the development. Consideration will be given to the design of the building to minimise noise break-out and the potential for disturbance to any nearby residents.

5.1.7 Assuming, therefore, the conditions are as described in the report, and the proposed measures are adopted, it is considered that any effect on the occupants of the future dwellings nearby would not be significant as a result of the use and operation of the Local Centre.

5.1.8 The limitations to this report are detailed in Appendix C.

Appendix A

GLOSSARY OF ACOUSTIC TERMINOLOGY

ACOUSTIC TERMINOLOGY

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq}, L_{A90} etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

An indication of the range of sound levels commonly found in the environment is given in the following table.

Table A-1: Typical sound levels found in the environment

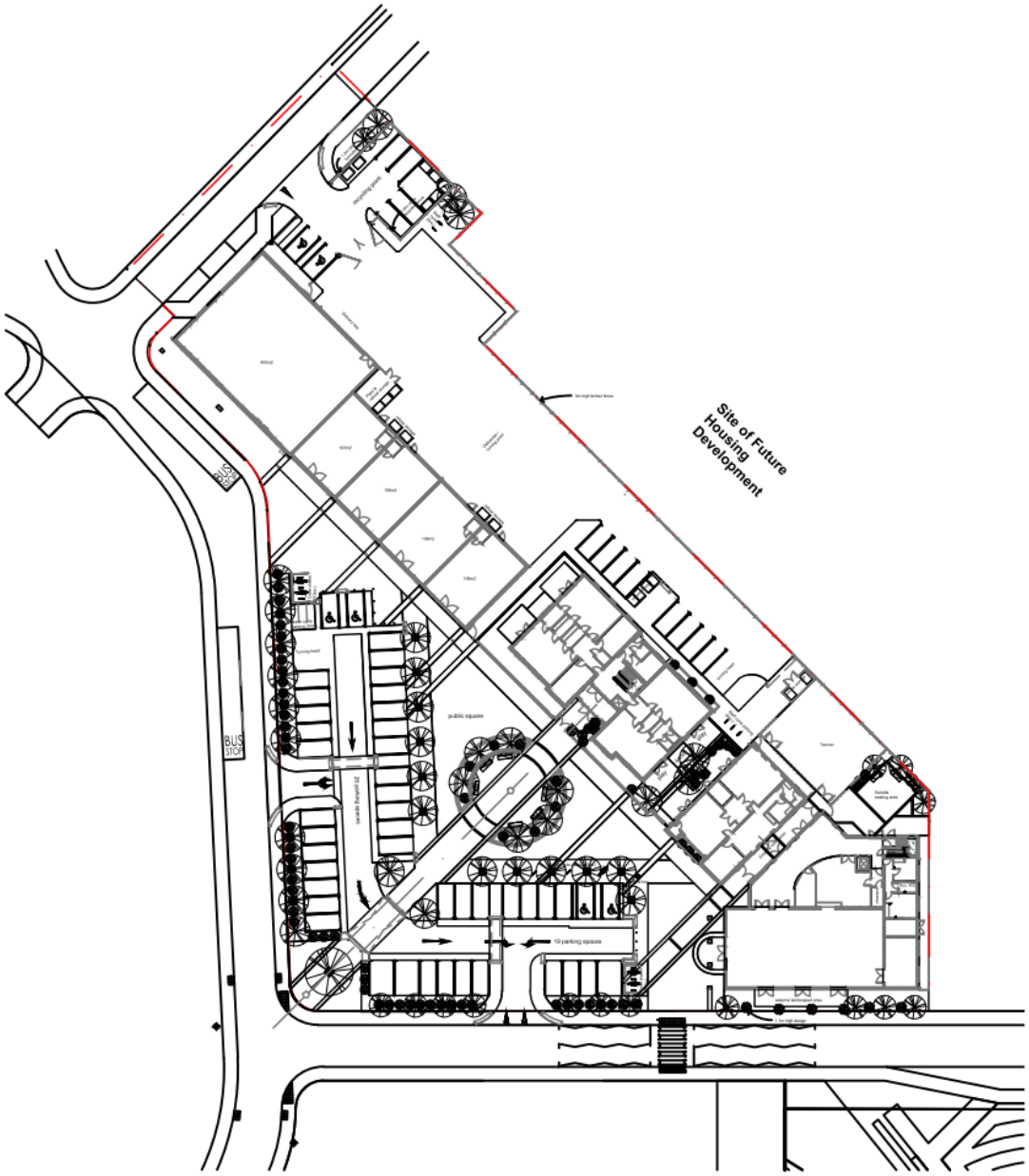
SOUND LEVEL	LOCATION
0 dB(A)	Threshold of hearing
20 to 30 dB(A)	Quiet bedroom at night
30 to 40 dB(A)	Living room during the day
40 to 50 dB(A)	Typical office
50 to 60 dB(A)	Inside a car
60 to 70 dB(A)	Typical high street
70 to 90 dB(A)	Inside factory
100 to 110 dB(A)	Burglar alarm at 1m away
110 to 130 dB(A)	Jet aircraft on take off
140 dB(A)	Threshold of pain

Table A-2: Terminology relating to noise

TERMINOLOGY	DESCRIPTION
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20μPa ($20x10^{-6}$ Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10} (s_1 / s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m.

Appendix B

PROPOSED LAYOUT


Site of Future
Housing
Development
BUS
STOP
public square
110 parking spaces

Appendix C

LIMITATIONS TO THIS REPORT

LIMITATIONS

This report has been prepared for the titled project or named part thereof and should not be used in whole or part and relied upon for any other project without the written authorisation of WSP UK Limited. WSP UK Limited accepts no responsibility or liability for the consequences of this document if it is used for a purpose other than that for which it was commissioned. Persons wishing to use or rely upon this report for other purposes must seek written authority to do so from the owner of this report and/ or WSP UK Limited and agree to indemnify WSP UK Limited for any and all loss or damage resulting therefrom. WSP UK Limited accepts no responsibility or liability for this document to any other party other than the person by whom it was commissioned.

The findings and opinions expressed are relevant to the dates of the site works and should not be relied upon to represent conditions at substantially later dates. Opinions included therein are based on information gathered during the study and from our experience. If additional information becomes available which may affect our comments, conclusions or recommendations WSP UK Limited reserve the right to review the information, reassess any new potential concerns and modify our opinions accordingly.