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WSP

LAND AT HIGGINS BROOK, EAST OF CHIPPING LANE, LONGRIDGE

Barratt Homes (Manchester)

Noise Assessment

18/03/2015

Institute of Acoustics sponsoring organisation

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Land at Higgins Brook, East of Chipping Lane, Longridge

Barratt Homes (Manchester)

18/03/2015

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1 Introduction

1.1.1 WSP UK has been appointed by Barratt Homes (Manchester) to undertake an environmental noise assessment for the proposed Higgins Brook residential development at land east of Chipping Lane, in Longridge.

1.1.2 In August 2014, WSP prepared a noise assessment report (reference 00045273-002) to support the outline application for the development (application reference 3/2014/0764). Following the submission of the outline application, the development proposals and scheme layout have been amended. The environmental noise assessment has been updated to consider the latest scheme layout, and this report therefore supersedes the assessment report initially submitted.

1.1.3 The updated environmental noise assessment has been based on the results of detailed baseline noise measurements undertaken over the course of typical weekday and weekend periods. The results of the noise survey have been assessed in accordance with applicable standards and guidance, and in line with the assessment requirements of Ribble Valley Borough Council (RVBC).

1.1.4 Where appropriate, consideration has been given to noise mitigation measures to demonstrate how a commensurate level of protection could be afforded to the future noise sensitive receptors of the development against the prevailing local noise environment.

1.1.5 This report is necessarily technical in nature, so to assist the reader, a glossary of acoustic terminology is provided in **Appendix A**.

2 Site Setting

2.1 Site Location and Setting

2.1.1 The proposed development site currently comprises open fields used for agricultural purposes and the existing Longridge Cricket Club (LCC), situated to the north of the residential area of Longridge.

2.1.2 The site is bound to the west by Chipping Lane, beyond which lies open land, the Longridge Town Football Club (LTFC) and the Alston Arms Public House. The south-western part of the proposed development site is screened from the football pitch by an approximately 2m high landscaped bund which runs parallel to, and on the far side of, Chipping Lane. To the north, the site is bound by open fields. To the east, the site is bound by Willows Farm and further open fields used for agricultural purposes. To the south, the site is bound by Sainsbury's Supermarket, Irelands Garage Ltd, Wash and Dash car wash and existing residential properties on Inglewhite Road, Redwood Drive, Firwood Close and Willows Park Lane. The site boundary and setting is presented in **Appendix B**.

2.1.3 The opening hours of the Sainsbury's Supermarket are understood to be 07:00 to 22:00 hours Monday to Friday, 07:00 to 21:00 hours on Saturdays and 10:30 to 16:30 hours on Sundays. The service yard of the supermarket bounds the proposed development site. Vehicular access to the service yard is gained via the main entrance of the supermarket, off Inglewhite Road, and the designated access for deliveries along the west side of the supermarket building. A single roller shutter door is located on the northern façade of the supermarket. The ancillary plant of the supermarket is located on the roof of the supermarket building.

2.1.4 Irelands Garage Ltd is a car repair garage including tyre fitting and a MOT Testing Station. The opening hours of Irelands Garage Limited are between 08:30 to 17:30, Monday to Friday and 09:00 to 13:00 hours on Saturdays. From WSP's observations during a number of site visits, and discussions with staff of Irelands Garage Ltd, it is understood that vehicles are worked on within the

main building and the smaller single storey annex to the north of the main building. Both buildings are accessed via the south-west facing facades and these doors are kept open throughout the working day. There is no direct line of sight to the operational activities undertaken within these premises from the proposed development site. The area located immediately to the north of the buildings of the garage, and immediately adjacent to the proposed development site, is gated and used for parking staff and customer vehicles as necessary.

2.1.5 There is also a hand-car wash which operates on the former petrol forecourt of the garage. The opening hours of the Wash and Dash car wash are between 08:30 to 17:00 hours Monday to Friday and between 10:00 hours and 16:00 hours on Saturdays and Sundays. The buildings of Irelands Garage Limited and existing residential properties on Inglewhite Road screen the proposed development site from the car wash activities on the former petrol forecourt.

2.1.6 The existing LCC is located within the western part of the development site. Cricket matches are regularly held at the club during evenings and weekends between the calendar months of April to September. The Cricket Club also has an entertainments license and it is understood that functions are currently held within the Pavilion in the northern part of the existing LCC site on weekends throughout the calendar year. These activities will continue to take place at the existing club before being relocated as part of the development proposals to the new pitch in the northern part of the development site.

2.1.7 Willows Farm is located to the east of the development site and comprises approximately 23 acres, not including for that which currently falls within the development site. There are two existing out buildings associated with the residential farm property off Chaigley Road, off Willows Park Road, situated to the east of the development site. These are used for the storage of silage and, from time to time, cattle. There are no HGV or tanker movements to or from this farm property.

2.2 Proposed Development

2.2.1 The latest illustrative masterplan layout for the development prepared by Escapes Urbanists, drawing number 013-008-R008 Revision F dated February 2015, is included in **Appendix C**. The proposed development will continue to be accessed via Chipping Lane and will comprise the following:

- Up to 363 residential dwellings, including affordable housing and housing for the elderly;
- Relocation of the existing LCC to provide a new cricket ground, pavilion, car park and associated facilities in the northern part of the development site;
- A primary school;
- Vehicular and pedestrian accesses; and
- On-site landscaping, public open space and ecological enhancement measures.

2.2.2 In addition to the Higgins Brook development, it should be noted that in April 2014 Barratt Homes initially submitted a detailed planning application for the Bowland Meadow residential development (application reference 3/2014/0438). The detailed application site was to form the first phase of this wider development site, situated immediately to the east of Chipping Lane and the existing LCC as shown in **Appendix B**. In August 2014, following the submission of the outline planning application, RVBC decided to refuse the detailed planning application for a number of reasons, including the proximity of the proposed dwellings to the existing LCC and the potential for noise disturbance.

2.2.3 The development proposals have been revised and the masterplan layout amended to address RVBC's concerns with the current outline application, as well as the reasons for refusal for the detailed planning application. The existing LCC will be relocated to the proposed pitch in the northern part of the development. The potential noise impacts of activities associated with the LCC at the

existing pitch, and the proposed pitch once relocated, on the future residents of the development have been considered. As a minimum a 30 m stand-off from the cricket pitch boundary, an 80 m stand-off to the existing cricket square of the LCC and a 60 m stand-off to the existing Pavilion will be incorporated between the existing LCC and proposed residential areas of the development occupied before the existing LCC is relocated to the new pitch. Once relocated to the new pitch in the northern part of the development, a 90 m stand-off between the proposed cricket square and a 70 m stand-off between the proposed Pavilion and the residential areas of the development has been incorporated into the masterplan layout.

3 Legislation and Guidance

3.1 Introduction

3.1.1 The noise assessment considers the potential impacts of the prevailing local noise environment at the proposed residential properties of the development. There is no specific all-encompassing guidance relating to the standards associated with these noise emissions/noise impacts on residential development. It is therefore necessary that the noise assessment draws upon a number of different national planning policies, British Standards and guidance documents as follows:

- Noise Policy Statement For England, 2010 (NPSE);
- National Planning Policy Framework 2012 (NPPF);
- Planning Practice Guidance 2014 (P Prac G);
- British Standard 8233: 2014 Guidance on sound insulation and noise reduction for buildings (BS 8233);
- World Health Organisation (WHO): 1999 Guidelines for Community Noise.
- British Standard 4142: 2014 Methods for rating and assessing industrial and commercial sound (BS 4142);
- Good Practice Guide (GPG) on the Control of Noise from Pubs and Clubs, 2003;
- The Noise Act 1996 as amended by Anti-Social Behaviour Act 2003 and the Clean Neighbourhoods and Environment Act, 2005;
- The Department for Environment Food and Rural Affairs (DEFRA) Noise from Pubs and Clubs (Phase II) Final Report, 2006;
- The Permitted Level of Noise (England) Directions 2008 and
- Building Bulletin 93 (BB93) Acoustic Design of School 2003; and
- Building Bulletin 93 (BB93) Acoustic Design of Schools: Performance Standards 2014.

3.1.2 A summary of the planning policies and guidance relevant to the noise assessment are summarised below:

3.2 Noise Policy Statement for England (NPSE)

3.2.1 The Noise Policy Statement for England (NPSE) was published on 15th March 2010. It sets out the long term vision for government noise policy, to promote good health and a good quality of life through the management of noise.

3.2.2 The policy ensures that noise issues are considered at the right-time during the development of policy and decision making, and not in isolation. It highlights the underlying principles on noise management already found in existing legislation and guidance. The NPSE should apply to all forms of noise, including environmental noise.

3.2.3 It sets out the long term vision of Government noise policy as follows:

> *"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."*

3.2.4 This long term vision is supported by the following aims:

> *"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*
>
> - *Avoid significant adverse impacts on health and quality of life;*
> - *mitigate and minimise adverse impacts on health and quality of life; and*
> - *where possible, contribute to the improvement of health and quality of life."*

3.2.5 To assist in the understanding of the terms "significant adverse" and "adverse", the NPSE acknowledges that there were two concepts being applied to noise impacts, for example, by the World Health Organisation. They are:

- 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.

3.2.6 The NPSE introduces a third concept:

- SOAEL - Significant Observed Adverse Effect Level - This is the level above which significant adverse effects on health and quality of life occur.

3.2.7 However, the NPSE goes on to state that:

> *"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."*

3.3 National Planning Policy Framework (NPPF)

3.3.1 Published in March 2012, this document sets out the Government's planning policies for England and supersedes a number of previous Planning Policy Guidance Notes and Planning Policy Statements (amongst other documents), including Planning Policy Guidance Note 24: Planning and Noise. In contrast to PPG 24, reference to noise is scant within the new NPPF. However it does make the following references to noise in the section entitled Conserving and enhancing the natural environment:

> *"The planning system should contribute to and enhance the natural and local environment by…* [a number of points including]*…preventing both new and existing development from*

contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability".

3.3.2 And

"*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."*

3.4 Planning Practice Guidance (P Prac G)

3.4.1 Last updated on the 24th December 2014, this is a web based resource issued for use by the Department for Communities and Local Government (DCLG). It is stated that the guidance is to complement the NPPF and provide advice on how to deliver its policies. The P Prac G replaced the former *"in beta"* version which was launched on the 14 October 2013 for testing and comment under the title '*National Planning Practice Guidance"*.

3.4.2 The section on noise includes a table that summarises "*the noise exposure hierarchy, based on the likely average response*" which offers "*examples of outcomes*" relevant to the NOEL, LOAEL and SOAEL effect levels described in the NPSE (see above). These outcomes are in descriptive form and there is still no numerical definition of the NOEL, LOAEL and SOAEL, or detailed advice regarding methodologies for their determination. There is also no reference to the further research that was identified as necessary in the NPSE in 2010.

3.5 BS 8233:2014: Guidance on sound insulation and noise reduction for buildings

3.5.1 This standard provides guidance for the control of noise in and around buildings. The guidance provided within the document is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building.

3.5.2 The guidance provided includes appropriate internal and external noise level criteria which are applicable to dwellings exposed to steady external noise sources. It is stated that it is desirable that the internal ambient noise level does not exceed the following criteria set out in Table 1.

Table 1: Summary of Internal Ambient Noise Levels to be achieved in Habitable Rooms when assessed in accordance with BS 8233

Activity	Location	Period	
		07:00 to 23:00 Hours, i.e. Daytime	23:00 to 07:00 Hours, i.e. Night-time
Resting	Living Room	35 dB $L_{Aeq, 16\ Hour}$	-
Dining	Dining Room/area	40 dB $L_{Aeq, 16\ Hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16\ Hour}$	30 dB $L_{Aeq, 8\ Hour}$

3.5.3 Whilst BS 8233 recognises that a guideline value may also be set in terms of SEL or L_{AFmax} for the assessment of regular individual noise events that can cause sleep disturbance during the night-time, a specific criteria is not stipulated. Accordingly, reference has been made in this assessment to the World Health Organisation (WHO) 1999: *Guidelines for Community Noise* document.

3.5.4 With respect to external amenity space such as gardens and patios it is stated that it is desirable that the 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. It is then confirmed that higher external noise criteria may be appropriate under certain circumstances such as within city centres urban areas, and locations adjoining the strategic transportation network, where it may be necessary to compromise between elevated noise levels and other factors such as convenience of living, and efficient use of land resource.

3.6 World Health Organisation (WHO) 1999: Guidelines for community noise

3.6.1 This is a wide ranging document describing the effects of community noise. It provides information about the effects of noise that may occur at certain levels of exposure. For dwellings, the critical effects of noise are taken to be sleep disturbance, annoyance and speech interference.

3.6.2 The external and internal ambient noise level L_{Aeq} criteria in BS 8233 are concordant with those contained within the World Health Organisation (WHO) 1999: *Guidelines for Community Noise*. Accordingly, for the purpose of this assessment, and in absence of any specific L_{AFmax} criterion being detailed within BS 8233, the WHO 45 dB L_{AFmax} criterion has been adopted.

3.6.3 This criterion draws upon guidance from Vallet and Vernet, which states:

> *"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10-15 times per night".*

3.6.4 Therefore, for the purpose of assessing night-time L_{AFmax} noise events, it is considered appropriate to adopt the 10^{th} highest L_{AFmax} noise event occurring in a typical night-time (23:00 – 07:00) period.

3.7 British Standard 4142: 2014 Methods for rating and assessing industrial and commercial sound (BS 4142)

3.7.1 The BS 4142 Standard describes methods for rating and assessing the following:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;

- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train movements on or around an industrial and/or commercial site.

3.7.2 The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

3.7.3 If appropriate, the specific sound level of the source ($L_{Aeq,T}$) is corrected, by the application of one or more corrections for acoustic features such as tonal qualities and/or distinct impulses, to give a 'rating' level ($L_{Ar,Tr}$).The Standard effectively compares and rates the difference between the rating level of the specific sound and the typical background sound level ($L_{A90,T}$) in the absence of the specific sound.

3.7.4 The Standard advises that the time interval ('T') of the background sound measurement should be sufficient to obtain a representative or typical value of the background sound level at the time(s) the source in question operates or is proposed to operate in the future.

3.7.5 Comparing the rating level with the background sound level, BS 4142 states:

- *"Typically, the greater this difference, the greater the magnitude of impact.*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."*

3.7.6 The Standard states that it is assessment methodology is applicable for the assessment of industrial and/or commercial sound at proposed new dwellings. However the guidance also states:

> *"NOTE Where a new noise-sensitive receptor is introduced and there is extant industrial and/or commercial sound, it ought to be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise mitigation."*

3.8 Good Practice Guide (GPG) on the Control of Noise from Pubs and Clubs, 2003

3.8.1 The GPG provides guidance on the assessment and control of noise from pubs, clubs and similar premises affecting noise-sensitive properties. The guidance summarises the sources of noise associated with pubs, clubs and similar premises which have the potential to cause disturbance. The main sources of noise considered include music, singing, public address (PA) systems; people in general and car parks.

3.8.2 The purpose of the GPG is to set out the responsibilities of Local Authorities and businesses running pubs, clubs and similar premises; assist local authority officers and venue management in the prevention of noise disturbance; and the investigation and resolution of noise complaints. However, it should be noted that since the GPG was released there have been changes to the licensing laws bought about by the implementation of the Licensing Act 2003 in late 2005.

3.8.3 The GPG provides general advice on a number of matters including undertaking noise measurements for the purpose of assessing the nature of a noise disturbance; setting noise limits to prevent disturbance; determining acceptable noise levels for planning and/or licensing purposes; determining compliance with any noise limit; recording reference sound levels at a venue following action to limit the output of a venues sound system; and/or gathering information for a prosecution. Generic advice on control measures to reduce the potential noise generated by the main sources of noise associated with pubs, clubs and similar premises is also provided.

3.8.4 The GPG was also intended to assist with the planning and licensing of proposed or existing premises. However, the guidance does not include objective noise criteria to assess and control noise from all the main sources of noise that can be present at pubs, clubs and similar premises.

3.9 The Noise Act 1996 as amended by Anti-Social Behaviour Act 2003 and the Clean Neighbourhoods and Environment Act, 2005

3.9.1 Under the Noise Act 1996 Local Authorities in England have powers to deal with night noise emanating from dwellings and licensed premises and sets a "permitted level" within residential dwellings. Night-time hours are defined to be between 23:00 and 07:00 hours. The Act does not include objective noise criteria for what is considered to be the "permitted level" as this should be determined by Directions made, in the case of England, by the Secretary State in writing and are discussed in Section 3.11 of this report.

3.9.2 Schedule 1 of the Clean Neighbourhoods and Environment Act 2005 inserted a subsection into the Noise Act 1996 such that a complaint by someone within a dwelling about noise from *"any premises in respect of which a premises licence or a temporary event notice has effect"* i.e. bringing licensed premises within the Scope of the Noise Act 1996. "Premises licence" has the same meaning as in the Licensing Act 2003 and means a licence granted by a licensing authority under Part III of the Licensing Act 2003, authorising one or more licensable activities in respect of any premises. For example, playing live or recorded music. 'Premises' includes any land or place which is specified in the premises licence (or in the temporary event notice). This could include land within the curtilage of premises that is outdoors, but this must be specified in the premises licence.

3.10 The Department for Environment Food and Rural Affairs (DEFRA) Noise from Pubs and Clubs (Phase II) Final Report, 2006

3.10.1 The Licensing Act 2003 brought licensed premises within the Scope of the Noise Act 1996. The Noise Act 1996 uses a noise protocol for calculating the accepted level and a procedure for the seizure and forfeiture of noise making equipment. It is an offence to cause noise at night above the permitted level once a warning has been issued. The initial noise protocol was developed for domestic noise at night; however noise from licensed premises may be of a different nature and therefore a different noise protocol may be more appropriate.

3.10.2 Defra instructed research to consider the assessment methods and criteria for assessment of entertainment noise from licensed premises. The objective of the study was to identify which of the methodologies and criteria tested were best suited for assessment of entertainment noise from pubs and clubs late at night.

3.10.3 The results of the study in their homes indicated that for the majority of the public the onset of audibility of the entertainment noise did not equate to a threshold for enforcement of acceptability for intrusive entertainment noise late at night. The majority of Environmental Health Practitioners also reported that for more regular occurrences (i.e. once a week) the onset of audibility of the

entertainment noise did not equate to a threshold for enforcement action for intrusive entertainment noise.

3.10.4 The results of the study indicated the best noise metrics and assessment method options which include an assessment of the absolute L_{Aeq} noise level over a 5-minute period. The document states:

> *"In the context of this study's objective to determine criteria that represent a clearly unacceptable situation, the noise levels at which test subjects felt the noise was "just unacceptable" for a one off event within a habitable room with windows closed was at 34 dB $L_{Aeq,5\ minute}$."*

3.11 The Permitted Level of Noise (England) Directions 2008

3.11.1 In 2008, the Secretary of State made Directions exercised by the powers conferred by Section 5 of the Noise Act 1996, including details on the "permitted level" of noise referred to in the Noise Act 1996. The Directions state the permitted level of noise to be as follows:

> ***"The permitted level***
>
> *3. The permitted level of noise which may be emitted during night hours from an offending dwelling or from offending premises shall be—*
>
> *(a) where the underlying level of noise does not exceed 24 dB, 34 dB;*
>
> *(b) where the underlying level of noise exceeds 24 dB, 10 dB in excess of that underlying level of noise."*

3.12 Building Bulletin 93 (BB93) Acoustic Design of School 2003 and BB93 Acoustic Design of Schools: Performance Standards 2014

3.12.1 BB93, together with the recently published BB93 Acoustic Design of Schools: performance standards dated December 2014 which supersedes Section 1 of BB93, provides acoustic guidance on the design of schools that seeks to facilitate clear communication of speech between teacher and student (and between students) and that seeks to ensure noise environments that do not interfere with study activities.

3.12.2 This document presents a series of maximum noise level design criteria for both internal and external teaching and learning spaces. These design criteria are specified in terms of the $L_{Aeq,30\ minute}$ and $L_{A1,30\ minute}$ noise level. Internal design criterion is also provided for new build and refurbished teaching spaces. The stipulated noise criteria are applicable within the teaching/learning spaces without the noise contribution from pupils, teachers, equipment and playgrounds. A selection of the stipulated noise level criteria is presented in the table:

Table 2: BB93 Noise Criteria for Teaching Spaces

Teaching Space	Upper Limit for Ambient Noise Level in New Build Schools $L_{Aeq, 30\ minute}$
Classrooms for hearing impaired pupils, performance / recital rooms, ensemble rooms, recording studios	30 dB(A)
Nursery School: playrooms and quiet rooms Primary School: classrooms, class bases, general teaching areas, small group rooms Secondary School: classrooms, general teaching areas, seminar rooms, tutorial rooms and language laboratories, quiet library study areas	35 dB(A)
Open plan teaching areas and resource areas, design and technology areas, art rooms, indoor sports halls, dance studios, gymnasiums	40 dB(A)
Outdoor teaching areas	Noise levels in unoccupied playgrounds, playing fields and other outdoor areas should not exceed 55 dB $L_{Aeq,30minute}$ and there should be at least one area suitable for outdoor teaching activities where noise levels are below 50 dB $L_{Aeq,30minute}$. Where this is not possible, due to the lack of suitably quiet sites, BB93 states that acoustic screening should be employed to reduce noise levels in these areas as far as is practicable.

3.12.3 The requirements for external noise levels are not mandatory, and the recommendations given in Building Bulletin 93 (BB93) are to be viewed as good practice. The requirements for internal noise levels are mandatory and set out minimum performance standards for demonstrating compliance with the Building Regulations Approved Document E – Resistance to the passage of sound, 2010.

3.12.4 With regard to ventilation in noisy areas BB93 states the following:

"When external noise levels are higher than 60 dB $L_{Aeq,30mins}$, simple natural ventilation solutions may not be appropriate as ventilation openings also let in noise. However, it is possible to use acoustically attenuated natural ventilation rather than full mechanical ventilation when external noise levels are high but do not exceed 70 dB $L_{Aeq,30mins}$."

3.13 Consultation with the Environmental Health Department of Ribble Valley Borough Council

3.13.1 Consultation discussions were held with Mr James Russell, Head of Environmental Health Services of RVBC at the outset of the project in April 2014 to discuss and agree the scope of the noise assessment and criteria to be adopted for both the detailed and outline planning applications. The noise assessments prepared in support of both the previous detailed planning application and the pending outline planning application, considered the operational phase of the development and

focuses on the suitability of the site for residential use. It was agreed with RVBC at this stage that the potential noise and vibration impacts associated with the construction phase of the development could be controlled via planning condition.

3.13.2 The prevailing noise environment at the site is dominated by noise from traffic on the local road network, i.e. Chipping Lane and Inglewhite Road. In addition, noise from operational activities associated with the Sainsbury's supermarket and Irelands Garage Ltd have the potential to effect the southern part of the site. In absence of any guidance on appropriate noise assessment methods within the NPPF and P Prac G, it was agreed that the prevailing noise environment be assessed with reference to BS 8233 and the WHO Guidelines for Community Noise.

3.13.3 In summary, the proposed noise levels against which the scheme is to be assessed were therefore agreed as follows:

- 50 dB $L_{Aeq,\ 16\text{-}Hour}$ in gardens in the daytime 07:00 - 23:00 hour period,
- 35 dB $L_{Aeq\ 16\text{-}Hour}$ in living rooms and bedrooms in the daytime 07:00 - 23:00 hour period,
- 40 dB $L_{Aeq\ 16\text{-}Hour}$ in dining rooms in the daytime 07:00 - 23:00 hour period,
- 30 dB $L_{Aeq,8\text{-}Hour}$ inside bedrooms in the night-time 23:00 - 07:00 hour period; and
- 45 dB L_{AFmax} not regularly exceeded, i.e. more than 10-15 times per night, inside bedrooms in the night-time.

3.13.4 Following refusal of the previous detailed planning application a telephone conference was held on the 2nd September 2014 between Miss Hannah Jones of WSP UK Ltd, Ms Heather Coar the dealing Environmental Health Officer and Ms Daniela Ripa the Planning Case Officer, to discuss RVBC's on-going concerns with regards to noise for the outline planning applications. It was agreed that the existing and proposed noise sources which require consideration are as follows:

- Road traffic on the local road network including Chipping Lane and Inglewhite Road.
- Operational activities associated with the service yard of the Sainsbury's supermarket.
- Operational activities associated with Ireland's Garage Ltd, including tyre fitting, and the Wash and Dash car wash.
- Cumulative impact of the operational activities of the service yard of Sainsbury's supermarket, Ireland's Garage Ltd and the Wash and Dash car wash.
- Typical cricket activities (including matches, pre-match training/warm up and weekday training) and entertainment events to be held at the relocated cricket pitch.
- Typical cricket activities at the existing LCC prior to its relocation to the new pitch.
- Entertainment events held at the existing Pavilion of the LCC, including car park activity, prior to its relocation to the new pitch.
- Operational activities associated with Willow Farm.
- Potential noise sources associated with the proposed primary school site.

3.13.5 During this telephone conference it was agreed that further attended weekday measurements of the operational activities of Ireland's Garage Ltd and Wash and Dash car wash should be undertaken. In addition, any operational activities at the service yard of the Sainsbury's supermarket during these attended measurements should be noted and the previous assessment updated where necessary. The noise modelling carried out thus far should be updated to reflect the latest attended measurements as appropriate and the predicted cumulative noise levels at sensitive areas of the development site assessed in accordance with the external and internal criteria set out in BS 8233 and the WHO Guidelines.

3.13.6 It was also agreed that further detailed noise measurements should be carried out in the immediate vicinity of the LCC. These measurements should comprise attended weekday evening measurements during training practice, together with a combination of attended and unattended weekend measurements when both a typical cricket match is played and a function is held within the Pavilion of the LCC. Based on the results of the measurements, the level of noise generated during typical cricket activities at both the existing and proposed new pitch should be predicted at noise sensitive areas of the proposed development and assessed in accordance with the daytime external and internal criteria set out in BS 8233.

3.13.7 During the telephone conference it was agreed that the potential noise impacts of functions to be held within the new Pavilion proposed as part of the development proposals could be controlled by an appropriately wording planning condition. However RVBC requested the potential noise impacts of functions held at the existing pavilion on future residents of the development, prior to its relocation to the proposed cricket pitch, be considered as part of the noise assessment. Following completion of the weekend measurements, WSP provided Environmental Health of RVBC details of the proposed approach to the assessment of the potential impact of entertainment noise associated with functions held within the existing Pavilion of the LCC prior to the relocation to the new purpose-built pavilion. In the absence of any specific criteria for the assessment of entertainment noise for residential receptors, details of the internal noise limits to be adopted for sensitive areas of the development nearest to the existing Pavilion were proposed. These were based on the permitted noise level set within the Noise Act 1996 as amended by Anti-Social Behaviour Act 2003 and the Clean Neighbourhoods and Environment Act 2005, as supported by the findings of the DEFRA research document(s). However, from Environmental Health's response it is understood that the acceptability of the proposed internal noise limits would not be commented on prior to the submission of the noise assessment report.

3.13.8 Following the telephone conference of the 2nd September 2014, *British Standard 4142:2014 Methods for rating and assessing industrial and commercial sound* (BS 4142:2014) has since been released. The scope of the latest guidance now specifically includes the assessment of sound from industrial and manufacturing processes (i.e. Irelands Garage Ltd) and loading and unloading of goods and materials at industrial and/or commercial premises (i.e. the service yard of the Sainsbury's supermarket). Furthermore, the new Standard is appropriate for assessing sound at proposed as well as existing dwellings. In addition to the BS 8233 assessment, the potential noise impacts associated with operational activities at Irelands Garage Ltd and within the service yard of Sainsbury's supermarket have therefore been assessed in accordance with the guidance contained within the latest version of BS 4142.

4 Environmental Noise Survey

4.1 Existing Noise Sources

4.1.1 To inform the assessment and determine the current prevailing noise climate at the site, numerous detailed baseline noise surveys have been undertaken, as follows:

- Continuous baseline noise survey measurements over a 24 hour period commencing at approximately 11:30 hours on Tuesday 1st April 2014 and concluding at approximately 14:00 hours on the Wednesday 2nd April 2014. These measurements were taken during a typical weekday period outside of the season of typical cricket activities associated with LCC.
- Continuous baseline noise survey measurements over a 46 hour period commencing at approximately 10:00 hours on Saturday 6th September 2014 and concluding at approximately

08:00 hours on Monday 8th September 2014. These weekend measurements were taken during LCC's cricket season and included measurements of the Mens First Team match on the Saturday and the Boys Under 13 Cup Final match on the Sunday.

- Continuous baseline noise survey measurements over a 62 hour period commencing at approximately 18:00 hours on Friday 12th September 2014 and concluding at approximately 08:00 hours on Monday 15th September 2014. These weekend measurements were taken during LCC's cricket season and included measurements of an in-formal practice on the Friday, Mens Team match on the Saturday, an end of season party held at the Pavilion on the Saturday evening and a Womans Team match on the Sunday.
- Short term fully attended measurements between approximately 18:45 and 20:00 hours on Wednesday 9th September 2014. This measurement period included the Mens Teams evening training practice.
- Short term attended measurements between approximately 09:50 and 12:15 hours on Tuesday 25th November 2014. This measurement period included the operational activities of Ireland's Garage Ltd, Wash and Dash car wash and the service yard of Sainsburys supermarket.

4.1.2 WSP Acoustics visited the site and found the environmental noise across the site to be dominated by traffic on the local road network surrounding the site, i.e. Chipping Lane and Inglewhite Road. Operational activities associated with the service yard of the Sainsbury's supermarket also contribute to the prevailing noise environment in the south-western part of the site. However, the noise generated by the operational activities of Irelands Garage Ltd (with the doors of both buildings open) and the Wash and Dash car wash were only barely audible during lulls in the road traffic at the south-western site boundary of the development site. Activities associated with the existing LCC, including typical cricket activities between the calendar months of April to September and entertainment noise associated with functions held within the Pavilion throughout the year, may also contribute to the prevailing noise environment in the western part of the site prior to its relocation to the new cricket pitch as part of the development proposals.

4.2 Measurement Locations

4.2.1 The measurement locations adopted throughout the survey are shown in **Appendix B**, and can be described as follows:

Road Traffic:

- Measurement Location 1: In the south-western part of the site situated approximately 8.5 m from the edge of the carriageway of Inglewhite Road and 28 m from the edge of Chipping Lane. This measurement location was positioned at a height of 1.5m above the local ground level and in free-field conditions. This area of the site is approximately 0.5 m above Inglewhite Road. Unattended longer term measurements were carried out at this location during the April 2014 survey.
- Measurement Location 2: In the western part of the site situated approximately 8 m from the edge of the carriageway of Chipping Lane and immediately to the south of LCC. This measurement location was positioned at a height of 1.5 m above the local ground level and in free-field conditions. Unattended longer term measurements were carried out at this location during the April 2014 survey.

Commercial Premises:

- Measurement Location 3: In the southern part of the site situated at the boundary of the existing service yard of the Sainsbury's Supermarket. This measurement location was positioned at a height of 2.0 m above the local ground level and in free-field conditions. The height of the existing service yard is approximately 0.5 m above site level, i.e. the measurement location had a direct line of sight of the operational activities in the yard of the Sainsbury's Supermarket. The measurement location was selected to ensure representative

measurement data of operational activities in the yard of the Sainsbury's supermarket were obtained. Attended and unattended longer term measurements were carried out at this location during the April 2014 survey.

- Measurement Location 4: At the south-western site boundary which adjoins the premises of Ireland's Garage Ltd and in the immediate vicinity of the existing service yard of the Sainsbury's Supermarket. This measurement location was positioned at a height of 1.5 m above the local ground level and in free-field conditions. It should be noted that at the site boundary, the existing premises of Ireland's Garage Ltd and the service yard of Sainsbury's supermarket are approximately 0.5 m above the typical site levels. Fully attended shorter term measurements were carried out at this location during the November 2014 survey.
- Off-site source measurements were also undertaken to establish the source noise levels generated by typical operational activities of Ireland's Garage Ltd and Wash and Dash car wash during the November 2014 survey. The fully attended source measurements were positioned at a height of 1.5 m above local ground and in free-field conditions.

Typical Activities Associated with the LCC:

- Measurement Location 5: In the western part of the site, situated approximately 38 m from the edge of the carriageway of Chipping Lane and immediately to the south of LCC. This measurement location was positioned at a height of 1.5 m above the local ground level and in free-field conditions. Attended and unattended longer term measurements were carried out at this location during the September 2014 surveys.
- Measurement Location 6a: In the western part of the site, situated immediately to the east of LCC and approximately 20 m from the Pavilion of LCC. This measurement location was positioned at a height of 1.5 m above the local ground level and in free-field conditions. Attended and unattended longer term measurements were carried out at this location during the 6th to the 8th September 2014 survey.
- Measurement Locations 6b and 6c: In the western part of the site, situated immediately to the east of LCC and approximately 10 m and 5 m from the Pavilion of LCC respectively. These measurement locations were positioned at a height of 1.5 m above the local ground level and in free-field conditions. Unattended longer term measurements were carried out at location 6b during the 12th to the 15th September 2014 survey, whilst fully attended shorter term measurements were carried out during the evening of Saturday 13th September 2014 at measurement location 6c.
- Measurement Location 7: In the western part of the site, situated immediately to the east of LCC. These measurement locations were positioned at a height of 1.5 m above the local ground level and in free-field conditions. Fully attended shorter term measurements were carried out at this location during the weekday evening September 2014 survey.

Willow Farm:

- Measurement Location 8: In the south-eastern part of the site, situated at the site boundary with Willows Park Lane. This measurement location was positioned at a height of 1.6m above the ground level at the site boundary, which in turn is 1.6m above the local ground levels in this area of the development site and in free-field conditions. Unattended longer term measurements were carried out at this location during the April 2014 survey.

4.3 Meteorological Conditions

4.3.1 Over the course of all the baseline noise surveys, meteorological conditions remained ideal for environmental noise measurements remaining dry with winds typically below 5 m/s.

4.4 Measurement Equipment

4.4.1 The baseline noise survey measurements were undertaken using the following Class 1 specification noise measuring equipment:

Table 3: Noise Measurement Equipment

Measurement Location	Equipment	Make and Model	Serial Number
April 2014 Survey			
1	Sound Level Meter	01dB-METRAVIB Solo Master	65303
	Pre-amplifier	01dB-Stell PRE 21 S	15976
	Microphone	Microtech Gefell GmbH MCE212	142812
	Calibrator	01dB-Stell Cal 21	34213780
2	Sound Level Meter	01dB-METRAVIB Solo Master	65806
	Pre-amplifier	01dB-Stell PRE 21 S	16461
	Microphone	Microtech Gefell GmbH MCE212	166412
	Calibrator	01dB-Metravib Cal 21	34323904
3	Sound Level Meter	01dB-METRAVIB Solo Master	65469
	Pre-amplifier	01dB-Stell PRE 21 S	15983
	Microphone	Microtech Gefell GmbH MCE212	142646
	Calibrator	01dB-Metravib Cal 21	35113822
8	Sound Level Meter	01dB-METRAVIB Solo Master	10966
	Pre-amplifier	01dB-Stell PRE 21 S	13599
	Microphone	Microtech Gefell GmbH MCE212	94014
	Calibrator	01dB-Metravib Cal 21	35293349
September 2014 Survey			
5 (6th – 8th September 2014)	Sound Level Meter	01dB-Stell Solo Master	11810
	Pre-amplifier	01dB-Stell PRE 21 S	12495
	Microphone	Microtech Gefell GmbH MCE212	67311
	Calibrator	01dB-Stell Cal 21	34323996
5 (12th – 15th September 2014)	Sound Level Meter	01 dB-Metravib DUO	10330
	Pre-amplifier	01 dB Metravib PRE 22	10335
	Microphone	GRAS 40CD	141157
	Calibrator	01 dB-Stell CAL 21	50441999
6a (6th – 8th September 2014)	Sound Level Meter	01dB-Stell Solo Master	60845
	Pre-amplifier	01dB-Stell PRE 21 S	13164
	Microphone	Microtech Gefell GmbH MCE212	67302
	Calibrator	01dB-Stell Cal 21	51031216
6b (12th – 15th September 2014) and 7	Sound Level Meter	01dB-Stell Solo Master	65303
	Pre-amplifier	01dB-Stell PRE 21 S	15976
	Microphone	Microtech Gefell GmbH MCE212	142812

Measurement Location	Equipment	Make and Model	Serial Number
	Calibrator	01dB-Stell Cal 21	34213780
6c (13th September 2014)	Sound Level Meter	01dB-Stell Solo Master	65469
	Pre-amplifier	01dB-Stell PRE 21 S	15983
	Microphone	Microtech Gefell GmbH MCE212	142646
	Calibrator	01dB-Stell Cal 21	35113822
November 2014 Survey			
4	Sound Level Meter	01dB-Stell Solo Master	65469
	Pre-amplifier	01dB-Stell PRE 21 S	15983
	Microphone	Microtech Gefell GmbH MCE212	142646
	Calibrator	01dB-Stell Cal 21	35113822
Source Measurements	Sound Level Meter	01dB-Stell Solo Master	65804
	Pre-amplifier	01dB-Stell PRE 21 S	16471
	Microphone	Microtech Gefell GmbH MCE212	175391
	Calibrator	01dB-Stell Cal 21	34323996

4.4.2 The sound level meters and associated measurement chains were calibrated to traceable standards within the preceding two years and the portable calibrators within the preceding 12 months. The sound level meters were calibrated both prior to and upon completion of the survey. No significant drift was noted.

4.5 Measurement Results

4.5.1 A summary of the longer term continuous measurements of road traffic, commercial noise and activities associated with Willows Farm, measured at locations 1 to 3 and 8, during the daytime and night-time periods, are presented within Table 4.

Table 4: Summary of Long Term Continuous Noise Measurements at Locations 1 to 3, Free-field (dB(A))

Measurement Location	Period	Time Period	$L_{Aeq,T}$	Typical $L_{AFmax,T}$[1]
1	Daytime	16 Hour (12:30 – 23:00, 07:00 – 12:30)	63.5	-
	Night-time	8 Hour (23:00 – 07:00)	55.4	77.8
2	Daytime	16 Hour (11:30 – 23:00, 07:00 – 11:30)	58.9	-
	Night-time	8 Hour (23:00 – 07:00)	48.9	71.8
3	Daytime	16 Hour (13:00 – 23:00, 07:00 – 13:00)	52.2	-
	Night-time	8 Hour (23:00 – 07:00)	48.1	72.9
8	Daytime	16 Hour (13:45 – 23:00, 07:00 – 13:45)	49.9	-
	Night-time	8 Hour (23:00 – 07:00)	45.2	70.9

[1] Typical L_{AFmax} noise level taken as the 10th highest L_{AFmax} during the night-time in accordance with guidance referenced by the WHO.

4.5.2 The site was attended during the installation and removal of the longer term continuous measurements of the April 2014 survey. During the attended measurements it was noted that the

dominant source of noise at the site was road traffic on the local road network. Sheep grazing in the open fields were also occasionally audible.

4.5.3 During WSP's attendance during the April 2014 survey, limited activities associated with the service yard of the Sainsbury's Supermarket and Ireland's Garage Ltd were observed. The ancillary plant associated with the Sainsbury's supermarket was barely audible at the development site boundary. Notwithstanding this the continuous monitoring data at Measurement Location 3 has been reviewed to identify potential events considered to be associated with typical activities of a supermarket service yard. For example, the arrival and/or departure of vehicles. The noise levels measured during potential events considered to be associated with activities of the existing service yard at Measurement Location 3 are presented within Table 5.

4.5.4 To address the requirements of RVBC, additional fully attended measurements have also been carried out at the south-eastern boundary of the development which adjoins with the premises of Ireland's Garage Ltd and Wash and Dash car wash and is in the immediate vicinity of the service yard of Sainsbury's supermarket. Table 5 also presents the commercial noise levels as determined at measurement location 5.

Table 5: Summary Noise Measurements of Potential Events of Activities Associated with the Existing Service Yard of Sainsbury's Supermarket at Measurement Locations 3 and 4, Free-field (dB(A))

Date	Start Time (HH:MM)	Approximate Duration of Potential Event (HH:MM)	Measured $L_{Aeq,T}$	Comments
April 2014 Survey – Long Term Continuous Measurements at Location 3				
01/04/2014	14:10	00:50	55.9	Period of increased activity, including a potential arrival and departure of vehicle with possible unloading activities.
01/04/2014	17:32	00:15	55.7	Possible vehicle movement.
01/04/2014	22:36	00:20	56.3	Period of increased activity, including a potential arrival and departure of vehicle with possible unloading activities
02/04/2014	03:12	00:09	55.7	Period of increased activity, including a potential arrival of vehicle with possible unloading activities
02/04/2014	03:31	00:06	57.9	Period of increased activity, including a potential arrival/departure from the service yard (as detailed in above line of the table) with possible unloading activities.
02/04/2014	04:20	00:12	51.3	Period of increased activity, including a potential arrival and departure of vehicle with possible unloading activities
02/04/2014	05:59	00:31	55.4	Period of increased activity, including a potential arrival and departure of vehicle with possible unloading activities
November 2014 Survey – Fully Attended Measurements at Location 4				
25/11/2014	09:52	01:06	48.8	Road traffic noise on Chipping Lane and Inglewhite Road the dominant source of noise. Occasional noise from the jet wash of the Wash and Dash car wash, and very occasional bang from the direction of Ireland's Garage Ltd, was

Date	Start Time (HH:MM)	Approximate Duration of Potential Event (HH:MM)	Measured $L_{Aeq,T}$	Comments
				barely audible during lulls in the traffic. No activities within the service yard of the Sainsbury's supermarket. Occasional noise from roller on the LTFC pitch during lulls in traffic.
25/11/2014	11:07	01:10	53.3	Road traffic noise on Chipping Lane and Inglewhite Road. Noise generated by unloading/loading activities at the service yard of the Sainsbury's supermarket, including 3 vehicle movements to and from the site. Ireland's Garage Ltd and Wash and Dash car wash operating through measurement period but only barely audible during lulls in traffic and service yard activities.
25/11/2014	11:08	00:03	57.2	Vehicle arriving at the service yard of Sainsbury's supermarket.
25/11/2014	12:17	00:02	59.1	Vehicle departing and another vehicle arriving at the service yard of the Sainsbury's supermarket.
25/11/2014	11:11	00:10	52.6	General loading and unloading activities at the service yard of the Sainsbury's supermarket.

4.5.5 A summary of the attended off-site source measurements of typical activities associated with Ireland's Garage Ltd and the Wash and Dash Car Wash during the November noise survey are presented within Table 6 below.

Table 6: Summary of the Source Noise Measurements of Operational Activities of Ireland's Garage Ltd and Wash and Dash Car Wash during the October 2014, Free-field (dB(A))

Date	Approximate Duration of Potential Event (MM:SS)	Measured $L_{Aeq,T}$	Comments
25/11/2014	02:34	65.4	Measurement of pre-wash spray guns at a distance of approximately 5m.
25/11/2014	01:43	70.3	Measurement of pre-wash and polish spray guns at a distance of approximately 5m and 11m respectively.
25/11/2014	26:20	60.8	Measurement of operational activities within the main building of Ireland's Garage Ltd and the Wash and Dash car wash. Measurements taken at a distance of approximately 1m from the open door in the south-western façade of the main building of Ireland's Garage Ltd.
25/11/2014	02:38	65.8	Measurement of diagnostic test at a distance of approximately 1m from the open door in the south-western façade of the main building of Ireland's Garage Ltd.
25/11/2014	01;18	63.9	Measurement of exhaust emission test at a distance of approximately 1m from the open door in the south-western façade of the main building of Ireland's Garage Ltd.

4.5.6 A summary of the longer term continuous weekend measurements in the immediate vicinity of LCC measured at locations 5, 6a and 6b, during the daytime periods when typical cricket activities were taking place at the club, are presented within Table 7. Table 7 also presents the measured levels of road traffic on Chipping Lane during a weekend daytime period in the absence of cricket activities.

Table 7: Summary of Long Term Continuous Noise Measurements at Locations 5, 6a and 6b, Free-field (dB(A))

Measurement Location	Date	Period	Time Period	$L_{Aeq,T}$
5	06/09/2014	Daytime	12 Hour (11:00 – 23:00)	52.2[1]
	07/09/2014	Daytime	16 Hour (07:00 – 23:00)	52.5
	13/09/2014	Daytime	16 Hour (07:00 – 23:00)	53.1
	14/09/2014	Daytime	16 Hour (07:00 – 23:00)	48.3[1]
	14/09/2014	Daytime (Residual)	9 Hour (07:00 – 12:00, 17:00 – 23:00)	47.7
6a	06/09/2014	Daytime	12 Hour (11:00 – 23:00)	61.4[1]
	07/09/2014	Daytime	16 Hour (07:00 – 23:00)	58.7
6b	13/09/2014	Daytime	16 Hour (07:00 – 23:00)	51.0
	14/09/2014	Daytime	16 Hour (07:00 – 23:00)	49.6
	14/09/2014	Daytime (Residual)	9 Hour (07:00 – 12:00, 17:00 – 23:00)	43.1

[1] Anomalous events not in-keeping with the observations of typical cricket activities and/or road traffic on Chipping Lane have been removed from the measurement periods.

4.5.7 The site was attended during typical cricket activities between approximately 10:00 hours and 14:00 hours on Saturday 6th September 2014. During this period noise generated by intermittent movements of the tractor used to prepare the square ahead of the match, pre-match warm up and match activities were audible. The noise generated during the preparation of the cricket square including a tractor with roller slowly moving up and down the square and voices as the protective cover sheet was removed from the square. The LCC Men's first team pre-match warm up included practise batting of short balls along the eastern boundary of LCC and immediately to the south of the Pavilion, followed by practise catching and wicket keeping in the south-western part of LCC. Whilst the Mens first team were warming-up in the south-western part of LCC the Mens Away Team were noted to be warming up along the eastern boundary. During the Mens first match, the dominant source of noise was voices of the teams in and around the cricket square and spectators typically congregated in the vicinity of the Pavilion.

4.5.8 The continuous monitoring data at the measurement locations in the immediate vicinity of LCC been reviewed to establish the noise levels generated by typical cricket activities. The short term noise levels measured during typical cricket activities are presented within Table 8. Table 8 also presents the noise levels measured at location 7 during the Mens Teams evening training practice.

Table 8: Summary Noise Measurements During Typical Cricket Activities Associated with LCC at Measurement Location 5, 6a, 6b and 7, Free-field (dB(A))

Activity	Measurement Location	Date	Start Time (HH:MM)	Approximate Duration of Potential Event (HH:MM)	Measured $L_{Aeq,T}$
Tractor preparing square for match[1]	5	06/09/2014	10:23	00:10[1]	57.1
	6a	06/09/2014	10:08	00:06[1]	58.9
Pre-match Warm Up	5	06/09/2014	11:50	01:00	57.4
	6a	06/09/2014	11:50	01:00	67.3
Cricket Match	5	06/09/2014	13:00	06:00	53.3[2]
	5	07/09/2014	13:00	06:00	55.4
	5	13/09/2014	13:00	06:00	53.0
	5	14/09/2014	13:00	06:00	51.5[2]
	6a	06/09/2014	13:00	06:00	58.1[2]
	6a	07/09/2014	13:00	06:00	62.7
	6b	13/09/2014	13:00	06:00	56.3
	6b	14/09/2014	13:00	06:00	51.1
Mens Weekday Training	7	09/09/2014	18:43	01:18	52.4

[1] Measurements were obtained with the tractor operating intermittently for this duration between 10:00 and 11:00 hours.
[2] Anomalous events not in-keeping with the observations of typical cricket activities and/or road traffic on Chipping Lane have been removed from the measurement periods.

4.5.9 The site was also attended during the End of Season' party held in the Pavilion of LCC between approximately 22:00 and 23:00 hours on the 13th September 2014. It was noted that some of the upper windows on the southern façade of the Pavilion and the changing rooms on the eastern façade of the Pavilion were open but, with the exception of people entering and exiting the Pavilion, the main doors remained closed. The recorded music being played within the Pavilion was audible at the site boundary and in close proximity to the Pavilion. The level of noise emanating from within the Pavilion appeared to increase through the attended measurement period. The noise from bottles being emptied to the north of the Pavilion was occasionally audible. A freight container is stored immediately to the north of the Pavilion preventing vehicles from parking in this area of the LCC, however, occasional vehicle movements were noted within the western area of the car park. These movements were barely audible and in-keeping with the noise generated by vehicle movements on Chipping Lane. Voices of people outside of the entrance of the Pavilion were occasionally audible. In addition, loud voices from people shouting within the changing rooms to people immediately outside of the changing room window and kicking of the fire door was also audible for a short duration. This latter activity is not considered to be representative of typical entertainment functions being held at LCC.

4.5.10 Table 9 presents a summary of the noise levels determined at measurement location 6a on the 6th September 2014 and measurement locations 6b and 6c during the End of Season party held within the Pavilion on the 13th September 2014.

Table 9: Summary Noise Measurements of Entertainment Noise Associated with LCC at Measurement Location 6a, 6b and 6c, Free-field (dB(A))

Activity	Measurement Location	Time Period	$L_{Aeq,T}$	$L_{AFmax,T}$
Emptying of Bottles to the north of the Pavilion	6c	1 minute (22:00 – 23:00)	59.4	71.4
Entertainment Noise	6a	5 minutes (20:00 - 01:30)[1]	40.5 – 51.6	-
	6b	5 minutes (20:00 - 01:30)[1]	35.4 – 59.6	-
	6c	5-minutes (22:00 - 23:00)	32.5 – 39.6	-

[1] From a review of continuous measurements it is considered that the entertainment events may have continued up until 01:30 hours on Sunday 7th September and Sunday 14th September 2014. However, it should be noted that LCC's license only permits recorded music to be played up until 01:00 hours on Fridays and Saturdays.

5 Noise Assessment

5.1 Overview

5.1.1 In order to determine the suitability of the site for residential development it is necessary to determine the existing sources of noise affecting the site. The dominant source of existing noise is road traffic on Chipping Lane and Inglewhite Road. The existing operational activities of the service yard of the Sainsbury's Supermarket contribute to the prevailing noise environment in the south-eastern part of the site; whilst the operational activities at Ireland's Garage Ltd and the Wash and Dash car wash are barely audible during lulls in existing road traffic. Activities associated with the LCC, including typical cricket activities and entertainment noise associated with functions held within the Pavilion also contribute to the prevailing noise environment in the north-western part of the site.

5.1.2 Drawing on the results of the baseline noise survey, a detailed acoustic model of the site has been created to calculate the level of noise across the development site during the daytime and night-time periods. The model has been generated using CadnaA® noise mapping software including for moderate downwind propagation. The noise model has taken the following into consideration:

- The model was set up to apply the prediction methodology set out in the 1988 Department of Transport and the Welsh Office document *Calculation of Road Traffic Noise* (CRTN) for the prediction of road traffic noise.
- The levels of road traffic noise from Chipping Lane and Inglewhite Road affecting the development site have been modelled and calibrated drawing on the results of the baseline noise survey at measurement locations 1 and 2.
- The model was set up to apply the prediction methodology set out in the International Standard ISO9613-2: 1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation* (ISO9613-2) for the assessment of commercial activities and entertainment noise. The model was set up to include second order reflected noise from solid structures for industrial and/or commercial noise sources.
- The level of noise generated by commercial noise sources (including Ireland's Garage Ltd, Wash and Dash car wash and the service yard of Sainsbury's supermarket) have been modelled and calibrated drawing on the results of the baseline noise survey at measurement locations 3 and 4 and the attended off- site source measurements in the immediate vicinity of the operational activities of Ireland's Garage Ltd and Wash and Dash car wash. The measured octave band frequency data were used as a basis for preparing the noise model

- Mapping of the site and the surrounding area was based on known Ordnance Survey grid reference points.
- The noise modelling has been based on the existing topographical information across the site and proposed finished floor heights provided by Barratt Homes. Topography of the surrounding area has been based on spot height information, freely available from Ordnance Survey data and observations made during the site visits.
- Off-site buildings which would provide screening to the site, such as the existing residential properties on Inglewhite Road, have been incorporated as reflective facades with heights informed by observations made during the site visits and Street View on-line photography.
- The proposed residential buildings themselves (single storey assumed to be 5m high and two-storey assumed to be 7 m high), garages (assumed to be 4.5m high) and localised barriers associated with outdoor living areas of the development (assumed to be 2m high, unless where otherwise stated), are based on the masterplan layout prepared by Escapes Urbanists on behalf of Barratt Homes, as included in **Appendix C**.
- The proposed mitigation measures as shown in the annotated drawing included in **Appendix D** are assumed to be incorporated into the proposed site design. The proposed mitigation measures include a barrier along the south-eastern boundary which adjoins the service yard of Sainsbury's Supermarket and Ireland's Garage ranging between 2.5 m and 3.5 m high.
- During the daytime periods the receiver height is taken as 1.5m above local ground (i.e. ground floor) and during the night-time the receiver height is taken as 4.0m above the local ground height (i.e. first floor).
- Ground absorption was typically set to G = 0.5 (50% hard ground and 50% acoustically absorptive ground) to reflect the intervening ground cover between sources and receivers. To be robust, the ground absorption was set to G = 0 (100% hard ground) for the yard and car park associated with Sainsbury's supermarket, as well as the yard of Ireland's Garage Ltd and Wash and Dash car wash.

5.2 Road Traffic Noise

5.2.1 During the baseline noise surveys, road traffic on Chipping Lane and Inglewhite Road was typically the dominant source of noise across the site during the daytime and night-time periods. The existing levels of road traffic noise across the development site have been modelled using the calculation procedures set out in CRTN. The memorandum was prepared to enable entitlement under the Noise Insulation Regulations 1975 to be determined, but it is stated in CRTN that the guidance is also appropriate for the calculation of road traffic noise for land use planning purposes.

5.2.2 The results of the noise modelling exercise for existing road traffic noise levels across the site with the proposed development in place, for the daytime and night-time periods, are included in Figures E.1 and E.2 of **Appendix E** of this report respectively. The predicted noise levels at sensitive areas of the development, i.e. the proposed residential properties nearest to Chipping Lane and Inglewhite Road, are also summarised in Table 10 below.

Table 10: Predicted Daytime and Night-time Road Traffic Noise Levels at Closest Sensitive Areas of the Proposed Development to Inglewhite Road and Chipping Lane, Free-Field, dB(A)

Proposed Sensitive Receptor Location	Location	Period	Predicted Noise Level, $L_{Aeq,T}$	Predicted Maximum Noise Level, L_{AFmax}
Residential Properties in the South-Western Part of Site, i.e. nearest to	Garden	Daytime – 16 Hour	57.0	-
	Façade		59.2	-

Proposed Sensitive Receptor Location	Location	Period	Predicted Noise Level, $L_{Aeq,T}$	Predicted Maximum Noise Level, L_{AFmax}
Inglewhite Road	Façade	Night-time – 8 Hour	52.4	73.3 [1]
Residential Properties in the Western Part of the Site, i.e. nearest to Chipping Lane	Garden	Daytime – 16 Hour	49.0	-
	Façade		56.5	-
	Façade	Night-time – 8 Hour	49.5	68.0 [2]

[1] Based on measurements taken at measurement location 1.
[2] Based on measurements taken at measurement location 2.

5.2.3 The results in Table 10 indicate that further mitigation measures will need to be incorporated into the proposed site design to ensure the required external noise limits are achieved at sensitive areas of the development located nearest to and with a direct line of sight of Inglewhite Road. Further consideration has been given to the need for mitigation to ensure the external and internal noise levels are achieved in Section 6 of this report.

5.3 Operational Activities of Commercial Premises

5.3.1 The noise generated by operational activities associated with Sainsbury's supermarket, Ireland's Garage Ltd and Wash and Dash car wash has been assessed at the residential dwellings in the south-eastern part of the site. Based on observations made during the site visits, together with discussions held with the staff of Ireland's Garage Ltd and Wash and Dash car wash, it is considered that:

Service Yard of Sainsbury's Supermarket:

- Deliveries have the potential to take place during daytime and night-time hours.
- Deliveries will typically range between 15 and 30 minutes;
- There is only one loading bay at the Sainsburys supermarket and therefore deliveries take place successively; and
- Up to three deliveries potentially take place over a 1-hour period during the daytime period, including three vehicle movements to and from the service yard.
- Only one delivery would take place over a 15-minute period during the night-time, i.e. including one vehicle movement to and from the service yard.
- The measured noise levels of activities within the service yard of Sainsbury's supermarket at Measurement Location 4, as detailed in Table 4, have been used to prepare the detailed noise model. It should be noted that the predicted noise levels at the boundary of the service yard of Sainsbury's supermarket are also concordant with the potential events at the off-site measurements taken at location 3.

Car Park of Sainsbury's Supermarket:

- Public vehicle movements to and from the Sainsbury's supermarket customer car park have the potential to contribute to the noise levels in the south-eastern part of the site.
- Vehicle movements to and from the customer car park will typically be during store opening times, i.e. 07:00 to 22:00 hours Monday to Friday, 07:00 to 21:00 hours on Saturdays and 10:30 to 16:30 hours on Sundays
- Up to three car movements to each car park space would take place over a 1-hour period during the daytime.

- Historic noise level measurements of car movement activities conducted previously by WSP's Acoustics Team have been used, as detailed in Table 15.

Ireland's Garage Ltd:

- Operational activities take place during daytime hours only, i.e. 08:30 to 17:30 hours Monday to Friday and 09:00 to 13:00 hours on Saturdays.
- The doors on the south-western facades of the buildings of the garage remain open throughout the working day.
- The worst-case off-site source measurements of activities and noise break-out from the garage, as detailed in Table 5, have been used to prepare the detailed noise model. It is assumed that the diagnostic tests would be carried out in both the main building and the smaller single storey annex building for up to 10 minutes out of a 1-hour daytime period.
- At the time of the October 2014 survey no tyre fitting had been booked in and therefore no source noise measurements of this activity could be undertaken. From the information provided by Ireland's Garage Ltd it is understood that this activity is undertaken in the smaller single storey annex building and the nosiest activity is the riveting to remove/tighten the wheel nuts, the actual changing of the tyre does not generate any significant noise. In order to inform the assessment historic noise level measurements of tyre fitting conducted previously by WSP's Acoustic team have been used. A measured level of the riveting of wheel nuts of 61.9 dB $L_{Aeq,1\text{-}minute}$ at a distance of approximately 18m from the open door of a commercial unit within which tyre fitting was taking place has been adopted. It is assumed that the riveting of wheel nuts would be carried out for up to 5 minutes out of a 1-hour daytime period.

Wash and Dash Car Wash:

- Operational activities take place during daytime hours only, i.e. 08:30 to 17:00 hours Monday to Friday and 10:00 to 16:00 hours on Saturdays on Sundays.
- The worst-case off-site source measurements of activities of the car wash, as detailed in Table 5, have been used to prepare the detailed noise model. Based on observations it is understood that a pre-wash takes approximately 3 minutes and the polish takes approximately 2 minutes. It is assumed that up 10 cars would use the car wash during a 1-hour daytime period.

5.3.2 The modelled contour plots of the operational activities associated of the Sainsbury's Supermarket, Ireland's Garage Ltd and Wash and Dash car wash are included in Figures E.4 to E.6 of **Appendix E**. The predicted free-field noise levels at the closest sensitive areas of the development (i.e. residential dwellings), denoted as Receptors A to D in Figures E.4 to E.6, are also summarised in Table 11 below. It is should be noted that there will be no external habitable areas associated with Receptor A.

Table 11: Predicted Daytime and Night-time Commercial Noise Levels at Sensitive Areas of the Proposed Development, Free-Field, dB(A)

Proposed Sensitive Receptor Location	Period	Predicted Noise Levels Generated of Operational Activities Associated with Adjacent Commercial Premises $L_{Aeq,}$				
		Sainsbury's Supermarket			Ireland's Garage Ltd and Wash and Dash Car Wash	Cumulative Noise Level
		Unloading / loading at Service Yard	Vehicle Movements to and From Service Yard	Car Park Movements		
Receptor A	Daytime – 1 Hour	24.7 – 34.4	24.1 – 34.6	21.4 – 28.3	21.1 – 37.7	31.1 – 39.5
Receptor B		24.4 – 27.2	23.3 – 27.2	21.5 – 25.1	31.1 – 39.7	32.7 – 40.3
Receptor C		21.4 -22.4	24.4 – 25.6	32.6 – 39.6	17.1 – 19.9	33.6 – 39.8

Proposed Sensitive Receptor Location	Period	Predicted Noise Levels Generated of Operational Activities Associated with Adjacent Commercial Premises $L_{Aeq,}$				
		Sainsbury's Supermarket			Ireland's Garage Ltd and Wash and Dash Car Wash	Cumulative Noise Level
		Unloading / loading at Service Yard	Vehicle Movements to and From Service Yard	Car Park Movements		
Receptor D		15.7 – 24.8	16.2 – 25.2	34.9 – 35.9	16.0 – 16.5	35.0 – 36.3
Receptor A	Night-time – 15 minutes	28.4 – 41.7	28.6 – 40.9	-	-	31.5 – 44.3
Receptor B		29.9 – 35.1	30.3 – 34.1	-	-	33.1 – 37.7
Receptor C		39.9 – 42.3	29.4 – 40.1	-	-	40.2 – 44.1
Receptor D		27.3 – 31.0	16.4 – 20.4	-	-	27.6 – 31.3

5.3.3 The results in Table 11 indicate, with the proposed mitigation measures in place, the cumulative noise levels generated by the operational activities of the commercial premises to the south of the development site are, at worst, up to 40 dB $L_{Aeq,\ 1\text{-hour}}$ during the daytime and up to 44 dB $L_{Aeq,\ 15\text{-minutes}}$ during the night-time period. The predicted noise levels are significantly below the external daytime noise criterion in gardens of 50 dB $L_{Aeq\ 16\text{-hour}}$ agreed with RVBC.

BS 4142 Assessment of Commercial Premises

5.3.4 The sound from the operational activities of the commercial premises to the south-west of the site (i.e. the service yard of Sainsbury's supermarket, Ireland's Garage Ltd and Wash and Dash car wash), , have also been assessed according to BS 4142[2]. This assessment has considered the nearest proposed residential dwellings, i.e. Receptors A to C. At Receptor D, the dominant source of noise from the operational activities of the commercial premises is generated by public vehicle movements in the car park and therefore this receptor has not been considered further as part of the BS 4142 assessment.

5.3.5 Statistical analysis of the background sound levels, measured at location 3 during the April survey and in the absence of the service yard activities at the Sainsbury's Supermarket, has been undertaken in accordance with the example method set out in Section 8.1 of BS 4142. For the purpose of this assessment, the representative background sound levels adopted are 42 dB $L_{A90,1\ hour}$ during the daytime period and 36 dB $L_{A90,\ 15\text{-minutes}}$ during the night-time period.

5.3.6 Vehicle movements and unloading/loading activities at the service yard of the Sainsbury's supermarket are audible at the development site boundary. Vehicle movements at the service yard are intermittent and a correction to the predicted $L_{Aeq,T}$ noise levels of +3 dB is therefore warranted as part of the subjective method in Section 9.2 of BS 4142. However, it is considered that the character of the sound of vehicles departing is typically in keeping with the sound generated by vehicle movements on the local road network, which dominate the prevailing environment across the site and based on our observations include a number of heavy good vehicles, buses and tractors. The third octave band results of the baseline survey measurements at the site boundary also indicate the vehicle movements and activities of the service yard of Sainsbury's supermarket have a high-frequency tonal character, in the 8kHz and 10 kHz frequency bands. With the proposed mitigation

[2] Unlike most other Standards and guidance, BS 4142:2014 takes great care to differentiate between "sound" and "noise". Sound can be measured by a sound level meter or other measuring system. Noise is related to a human response and is routinely described as unwanted sound, or sound that is considered undesirable or disruptive.

measures in place this tonal character may just be perceptible and therefore a correction to the predicted $L_{Aeq,T}$ noise levels of +2 dB has been applied in accordance with the subjective method in Section 9.2 of BS 4142.

5.3.7 The sound generated by the operational activities of Ireland's Garage Ltd and Wash and Dash car wash were only barely audible at the development site boundary during lulls in road traffic. The activities are intermittent and a correction to the predicted $L_{Aeq,T}$ noise levels of +3 dB is therefore warranted as part of the subjective method in Section 9.2 of BS 4142. Vehicle movements within the forecourt of Ireland's Garage Ltd and the parking area to the north-west of the garage buildings (albeit that this is used relatively infrequently) are in keeping with the character of the sound generated by vehicle movements on the local road network.

5.3.8 The results of the BS 4142 assessment for the daytime and night-time operational activities of the commercial premises to the south-east of the site (i.e. the service yard of the Sainsbury's Supermarket, Ireland's Garage Ltd and Wash and Dash car wash) are detailed in Tables 12 to 14 respectively. It should be noted that only the service yard of the Sainsbury's supermarket operates during the night-time period.

Table 12: BS 4142 Assessment of Operational Activities Associated with the Commercial Premises to the South-West of the Site (including the service yard of the Sainsbury's Supermarket, Ireland's Garage Ltd and Wash and Dash Car Wash) For Receptor A

Result Descriptor	Result Quantity	Relevant Clause (ref. BS 4142:2014)	Commentary
Background sound level	Day: $L_{A90,1hour}$ 42 dB Night: $L_{A90,15min}$ 36 dB	8.1.3 8.2	Based on the continuous measurements at measurement location 3 during the April 2014 survey and in the absence of potential events at the service yard of Sainsbury's supermarket.
Specific sound level of activities of the service yard of Sainsbury's supermarket, Ireland's Garage Ltd and the Wash and Dash Car Wash.	Ground Floor Day: 31 to 40 dB $L_{Aeq,1\ hour}$ First Floor Night: 32 to 44 dB $L_{Aeq,15\ minutes}$	7.3.6	Established from detailed noise modelling and set out in Table 11.
Acoustic feature correction	+2dB for tonality of and +3dB for intermittency of activities as appropriate (see comments)	9.2	The activities and vehicle movements to and from the service yard of the Sainsbury's supermarket are deemed to have a high frequency tonal character which may just be perceptible with the proposed mitigation measures in place. The vehicle movements to and from the service yard of Sainsbury's supermarket, as well as the activities of Ireland's Garage Ltd and Wash and Dash Car Wash, are deemed to be intermittent.
Rating level	Ground Floor Day: 36 to 45 dB First Floor Night: 37 to 49 dB	9.2	Taking account of the high frequency tonal content and intermittent nature of activities.

Result Descriptor	Result Quantity	Relevant Clause (ref. BS 4142:2014)	Commentary
Excess of rating over background sound	Ground Floor Day: -6 to +3 dB First Floor Night: +1 to +17 dB	11	
Assessment		11	Day: Assessment indicates that the specific sound source ranging between a low impact and approaching to an adverse impact. Night: Assessment indicates that the specific sound source will range between approaching an adverse impact and significant adverse impact at first floor habitable rooms.
Uncertainty of the assessment		10	The potential for uncertainty in the measurements and predictions have been minimised. Including background sound levels measured over a 24-hour survey duration; similar measurements of specific sound levels made during a number of visits to the site; and noise modelling carried out in accordance with current prediction methodology.

Table 13: BS 4142 Assessment of Operational Activities Associated with the Commercial Premises to the South-East of the Site (including the service yard of the Sainsbury's Supermarket, Ireland's Garage Ltd and Wash and Dash Car Wash) For Receptor B

Result Descriptor	Result Quantity	Relevant Clause (ref. BS 4142:2014)	Commentary
Background sound level	Day: $L_{A90,1hour}$ 42 dB Night: $L_{A90,15min}$ 36 dB	8.1.3 8.2	Based on the continuous measurements at measurement location 3 during the April 2014 survey and in the absence of potential events at the service yard of Sainsbury's supermarket.
Specific sound level of activities of the service yard of Sainsbury's supermarket, Ireland's Garage Ltd and the Wash and Dash Car Wash.	Ground Floor Day: 33 to 40 dB $L_{Aeq,1\ hour}$ First Floor Night: 33 to 38 dB $L_{Aeq,15\ minutes}$	7.3.6	Established from detailed noise modelling and set out in Table 11.
Acoustic feature correction	+2dB for tonality and +3dB for intermittency of activities as appropriate (see comments)	9.2	The activities and vehicle movements to and from the service yard of the Sainsbury's supermarket are deemed to have a high frequency tonal character. The vehicle movements to and from the service yard of Sainsbury's supermarket, as well as the activities

Result Descriptor	Result Quantity	Relevant Clause (ref. BS 4142:2014)	Commentary
			of Ireland's Garage Ltd and Wash and Dash Car Wash, are deemed to be intermittent.
Rating level	Ground Floor Day: 38 to 45 dB $L_{Aeq,1\ hour}$ First Floor Night: 38 to 43 dB $L_{Aeq,15\ minutes}$	9.2	Taking account of the high frequency tonal content and intermittent nature of activities.
Excess of rating over background sound	Day: -4 to +3 dB Night: +2 to +11 dB	11	
Assessment		11	Day: Assessment indicates that the specific sound source is likely to be ranging between a low impact and approaching an adverse impact. It should be noted that for the daytime periods the absolute specific and rating levels are below the external noise limit of 50 dB for gardens when assessed in accordance with BS 8233. Night: Assessment indicates that the specific sound source will be an adverse impact.
Uncertainty of the assessment		10	The potential for uncertainty in the measurements and predictions has been minimised. Including background sound levels measured over a 24-hour survey duration; similar measurements of specific sound levels made during a number of visits to the site; and noise modelling carried out in accordance with current prediction methodology.

Table 14: BS 4142 Assessment of Operational Activities Associated with the Commercial Premises to the South-East of the Site (including the service yard of the Sainsbury's Supermarket, Ireland's Garage Ltd and Wash and Dash Car Wash) For Receptor C

Result Descriptor	Result Quantity	Relevant Clause (ref. BS 4142:2014)	Commentary
Background sound level	Day: $L_{A90,1hour}$ 42 dB Night: $L_{A90,15min}$ 36 dB	8.1.3 8.2	Based on the continuous measurements at measurement location 3 during the April 2014 survey and in the absence of potential events at the service yard of Sainsbury's supermarket.
Specific sound level of activities of the service yard of Sainsbury's supermarket, Ireland's Garage Ltd and the	Ground Floor Day: 27 dB $L_{Aeq,1\ hour}$ First Floor	7.3.6	Established from detailed noise modelling and set out in Table 11.

Result Descriptor	Result Quantity	Relevant Clause (ref. BS 4142:2014)	Commentary
Wash and Dash Car Wash.	Night: 40 to 44 dB $L_{Aeq,15\ minutes}$		
Acoustic feature correction	+2dB for tonality and +3dB for intermittency of activities as appropriate (see comments)	9.2	The activities and vehicle movements to and from the service yard of the Sainsbury's supermarket are deemed to have a high frequency tonal character. The vehicle movements to and from the service yard of Sainsbury's supermarket, as well as the activities of Ireland's Garage Ltd and Wash and Dash Car Wash, are deemed to be intermittent.
Rating level	Ground Floor Day: 32 dB $L_{Aeq,1\ hour}$ First Floor Night: 45 to 49 dB $L_{Aeq,15\ minutes}$	9.2	Taking account of the high frequency tonal content and intermittent nature of activities.
Excess of rating over background sound	Day: -10 dB Night: +9 to +17 dB	11	
Assessment		11	Day: Assessment indicates that the specific sound source is likely to be a low impact. It should be noted that for the daytime periods the absolute specific and rating levels are below the external noise limit of 50 dB for gardens when assessed in accordance with BS 8233. Night: Assessment indicates that the specific sound source will range between an adverse and significant adverse impact.
Uncertainty of the assessment		10	The potential for uncertainty in the measurements and predictions has been minimised. Including background sound levels measured over a 24-hour survey duration; similar measurements of specific sound levels made during a number of visits to the site; and noise modelling carried out in accordance with current prediction methodology.

5.3.9 In summary, when assessing the margin by which the rating level of a specific sound source exceeds the background noise level, the results in Tables 12 to 14 indicate that the predicted rating levels generated by the daytime operational activities of the commercial premises are likely to range between being a low impact and approaching an adverse impact. During the night, the operational activities of the commercial premises may range between being an adverse impact and a significant adverse impact, depending on context.

5.3.10 However, in assessing the significance of sound of an industrial and/or commercial nature in accordance with the BS 4142, the context in which the sound occurs should also be taken into account by consideration of the following factors:

- The absolute level of the industrial and/or commercial sound;
- The character and level of residual sound compared to the character and level of the specific sound; and
- The sensitivity of the receptor and measures which have and/or are to be incorporated into the design of the residential dwellings to secure good internal and/or outdoor acoustic conditions.

5.3.11 The cumulative absolute levels generated by the daytime activities of the service yard of Sainsbury's Supermarket, Ireland's Garage and Wash and Dash car wash, as set out in Table 11, range between 31 and 40 dB $L_{Aeq,\ 1\ hour}$ in gardens during the daytime. Even taking account of the acoustic features of the commercial sound, i.e. correction for tonality and intermittent nature of the noise generated by the operational activities, the predicted rating levels in gardens are at worst 43 dB $L_{Aeq,1\text{-}hour}$. The absolute and rating levels are significantly below the agreed external daytime criterion of 50 dB $L_{Aeq,\ 16\ hour}$ for gardens of the nearest residential properties. It should also be noted that there are no outdoor gardens associated with Receptor A.

5.3.12 The prevailing environment across the site, and the character of the residual noise levels in the southern part of the site, is dominated by road traffic on Chipping Lane and Inglewhite Road. Based on observations, the vehicular composition on Chipping Lane and Inglewhite Road includes a number of heavy good vehicles, buses and tractors. It is considered that the character of the sound generated by vehicle movements to and from the service yard of the Sainsbury's Supermarket and the vehicle movements within the forecourt of Ireland's Garage Ltd is typically in keeping with the sound generated by vehicle movements on the local road network, which dominate the prevailing environment across the site.

5.3.13 It must also be recognised that the BS 4142 assessment does not consider the noise attenuation that could be afforded by the building fabric of the proposed residential properties. This is of particular importance for the night-time period when residents can be assumed to be residing indoors, and would therefore benefit from the noise attenuation through the façade make-up etc.

5.3.14 As set out in paragraph 3.7.6, the Standard goes on to state that other guidance and criteria can inform the appropriateness of and extent of required noise mitigation for proposed residential developments in the vicinity of existing industrial and/or commercial premises. Further consideration has been given to the need for mitigation to ensure the internal noise levels can comply with the appropriate criteira adopted from with BS 8233, and as agreed for use with the Environmental Health Department of RVBC, in Section 6 of this report.

5.4 Activities of the Longridge Cricket Club (Existing and Proposed)

Typical Cricket Activities

5.4.1 The illustrative masterplan layout indicates that the nearest residential receptors will be situated to the south-west of the proposed cricket pitch and 90 m from the square of the pitch. The construction timescales for the relocation cricket pitch are not known and it is possible that the construction of the first phase of residential properties in the south-western part of the site may commence prior to the relocation of the existing LCC. A stand-off between the existing LCC and the nearest receptor of the first phase of the development has therefore been incorporated into the proposed illustrative masterplan. Taking account of the proposed stand-off from the existing cricket square, the nearest proposed residential receptors will be situated a minimum distance of 30m from the LCC site

boundary and 80m from the square of the cricket pitch. The illustrative masterplan also indicates that the majority of the gardens of the nearest residential dwellings are situated on to the east or south of the properties, i.e. screened from the proposed or existing cricket pitch as appropriate. The proposed dwellings will themselves act as a barrier and will further reduce any noise generated during cricket matches in outdoor living areas.

Existing LCC

5.4.2 Calculations have been carried out, based on the results of the noise survey as detailed in Table 8, to predict the noise levels generated by typical cricket activities in gardens of the first phase of the development nearest to the existing LCC. The noise generated by the typical cricket activities could be considered to be attenuating at 6 dB per doubling of distance from an assumed effective source, i.e. the square of the cricket pitch or the LCC site boundary depending on the activity. The calculations have taken into account the distance and soft ground between the assumed effective source. Based on the acoustic barrier performance calculation methodology, to be conservative, it has been assumed that a barrier partially or fully obscuring the line of sight will provide noise reductions of at least 5 dB or 10 dB, respectively. The predicted noise levels in gardens of the first phase of the residential development, nearest to the existing LCC, are summarised in Table 15.

Table 15: Predicted Daytime Noise Levels of Typical Cricket Activities at Sensitive Areas of the Proposed Development, Free-Field, dB(A)

Activity	Proposed Sensitive Receptor Location	Period	Predicted Noise Level, $L_{Aeq,T}$
Tractor preparing square for match	Properties to the south of LCC	00:10	44.6
	Properties to the east of LCC	00:06	40.6
Pre-match Warm Up	Properties to the south of LCC	01:00	30.9
	Properties to the east of LCC	01:00	34.3
Cricket Match	Properties to the south of LCC	06:00	42.9
	Properties to the east of LCC	06:00	44.4
Mens Weekday Training	Properties to the east of LCC	01:18	34.1

5.4.6 The results in Table 14 indicate that the level of noise generated by typical daytime activities associated with the existing LCC are significantly below the agreed external daytime criterion of 50 dB $L_{Aeq,\ 16\ hour}$ for gardens of the nearest residential properties of the first phase of the residential development. Given the attenuation afforded by the proposed 80m stand-off from the cricket square of existing LCC, together with the proposed buildings or localised barriers, it is considered that the noise generated by typical cricket activities would not impact on the amenity of the future residents located nearest to the existing LCC prior to its relocation to the new cricket pitch.

Proposed Relocation Cricket Pitch

5.4.7 The illustrative masterplan layout indicates that the nearest residential receptors to the proposed cricket pitch will be situated at a minimum distance of 90 m from the square of the pitch, i.e. a greater stand-off than that between the square of the existing LCC and the nearest properties of the first phase of the residential development. The noise generated by typical cricket activities at the proposed cricket pitch on the nearest noise sensitive receptors in the northern part of the development will be no greater than those presented in Table 14 above. It should also be noted that the pre-match warm up and training activities could be carried out in the northern and/or eastern boundaries of the proposed cricket pitch, which in turn would be at even greater distance from the proposed residential receptors.

Entertainment Events

5.4.8 In addition to typical cricket activities LCC holds an entertainment licence. The existing entertainment licence held by the cricket club enables the following:

- A performance of live music (indoors) between 19:00 and midnight on Fridays and Saturdays;
- Any playing of recorded music (indoors and outdoors) between 19:00 and 01:00 on Fridays and Saturdays and between 13:00 hours and 23:00 hours on Sundays; and
- The supply of alcohol between 11:00 and midnight on Sundays to Thursdays and between 11:00 and 01:00 on Fridays and Saturdays.

5.4.9 The Conditions of the entertainment licence, included in Annex 2, also state:

"ANNEX 2 - CONDITIONS CONSISTENT WITH THE OPERATING SCHEDULE

1. All external doors and windows shall be kept closed when regulated entertainment is being provided, except in the event of emergency.

2. The licence holder or his representative shall on every occasion the premises are used for regulated entertainment check external noise levels at regular intervals to ensure that sound levels are reasonable and not affecting noise sensitive premises. Appropriate steps should be taken to reduce the level of noise where it is likely to cause a disturbance to local residents. Where a complaint is made either to the Management or via the Local Authority, a written record shall be made of those noise assessments in a log book for a period of three months following the complaint. The details recorded shall include the time and date of the checks, the person making them and the results, including any remedial action. This written log shall be available for inspection by the Local Authority.

3. There shall be visible and clear notices requiring customers to leave the premises and the area quietly, placed at all exits.

4. Customers should be reminded to leave quietly by regular announcements from the DJ during entertainment events and by door supervisors or members of staff as they are leaving the premises.

5. Outdoor regulated entertainment, such as a DJ or live music (either amplified or not), must be controlled in accordance with Condition Number 2. above and in no circumstances shall be permitted in this area after 11pm. (However, in most circumstances, the Council will discourage any recorded, including piped background, or live music in outside areas.)"

Existing LCC

5.4.10 Taking account of the proposed stand-off from the existing LCC, the nearest receptors of the first phase of the residential development will be situated a minimum distance of 60 m from the pavilion of

the existing LCC. The attended and unattended measurements of the "End of Season Party" held within the Pavilion of LCC have been used to prepare a detailed noise model to predict the potential cumulative impacts of entertainment noise from the existing LCC at the nearest receptors of the first phase of the development. Sound pressure levels, together with octave band frequency data, of the noise sources associated with the entertainment events were recorded and used as a basis for preparing the noise model.

5.4.11 Based on observations made during the attended measurements, and in accordance with the conditions of the licence:

- The potential noise break-out of amplified music from within the Pavilion of LCC has been based on the worst-case (i.e. the highest measured noise level) and the typical (i.e. the logarithmic average) 5-minute measurements taken during the End of Season Party, as detailed in Table 7.
- It is considered that music may be played at entertainment events being held within the Pavilion during evening and night-time hours on Fridays, Saturdays and Sundays only. From a review of the continuous measurements it is considered that the End of Season party may have continued up until 01:30 hours on Sunday 14th September 2014. However, it should be noted that LCC is only licensed to serve alcohol and play recorded music between 19:00 and 01:00 hours on Fridays and Saturdays and up to 23:00 hours on Sundays.
- Condition 1 of Annex 2 of the LCC's entertainment licence states that all windows and doors shall be kept closed except in the event of an emergency. During the attended measurements it was noted that some of the windows on the eastern and southern façades of the Pavilion were open. It is considered that with windows closed the noise break-out of music from within the Pavilion would have been reduced.
- It is assumed that the activity of emptying glass bottles takes place twice during a 1-hour evening assessment period and once during any 5-minute night-time assessment period.

5.4.12 In addition to the entertainment noise, RVBC has requested consideration of the potential noise generated by vehicle movements to and from the car park at the existing LCC. During the attended night-time measurements the vehicle movements within the car park of existing LCC were just audible and in keeping with the character of the vehicle movements on Chipping Lane. In order to inform the assessment of the potential noise impact of vehicle movements in the car park of LCC on the nearest residential dwellings of the development, historic noise level measurements of car movements and activities conducted previously by WSP's Acoustic team have been used. The noise data used are provided in Table 16. For the purpose of the entertainment noise assessment up to 24 car movements per 1-hour evening assessment period and two car movements per 5-minute night-time assessment period have been included in the detailed noise model.

Table 16: Source Noise Level Data For Car Movement and Activities Within A Car Park

Activity	$L_{Aeq,T}$ at 10m from the receiver, dB	Typical Duration (s)
Car door slams	65	1
Car starting engine	60	3
Car manoeuvre in/out of car-parking space	60	10
Car pulling away	62	3

5.4.13 The worst-case and typical modelled contour plots of the cumulative impact of the entertainment noise from the existing LCC for the first phase of the residential development are included in Figures E.7 and E.8 of **Appendix E** respectively. The predicted free-field first-floor noise levels at the residential properties of the first phase of the residential development, i.e. situated nearest to the existing Pavilion, are also summarised in Table 17.

Table 17: Predicted First-Floor Noise Levels of Activities Associated with the Entertainment Licence of the Existing LCC at the Nearest Receptors of the First Phase of the Residential Development, Free-Field, dB(A)

Activity	Period	Predicted Noise Level, $L_{Aeq, T}$
Worst-case noise break-out of amplified music from within the Pavilion [1]	Evening (1-hour)	50.2 – 53.1
Typical noise break out of amplified music from within the Pavilion [1]		44.0 – 46.9
Emptying of glass bottles x 2		36.4 – 39.9
Vehicle movements within car park x 12		21.5 – 28.3
Cumulative noise of typical noise break out of amplified music, emptying glass bottles and vehicle movements		45.4 – 47.5
Worst-case noise break-out of amplified music from within the Pavilion	Night-time (5-minutes)	50.2 – 53.1
Typical noise break out of amplified music from within the Pavilion		44.0 – 46.9
Emptying of glass bottles x 1		44.2 – 47.7
Vehicle movements within car park x 2		20.5 – 29.2
Cumulative noise of typical noise break out of amplified music, emptying glass bottles and vehicle movements		48.4 – 49.8

[1] For the purpose of this assessment it is assumed that the worst-case and typical noise break out of amplified music measured over a 5-minute period may be generated throughout a 1-hour evening period.

5.4.14 The predicted noise levels generated by the entertainment events held within the existing Pavilion of LCC have been assessed in accordance with the permitted level set out in the Noise Act 1996 Amended. The Noise Act 1996 Amended states a permitted level of 34dB $L_{Aeq, 5\text{-minutes}}$ if the underlying level of noise is no more than 24dB(A), or 10dB(A) above the underlying level of noise where this exceeds 24 dB(A), within any dwelling in the vicinity of the licensed premises. In the absence of any criteria for entertainment noise, it follows that if the night-time limits can be met a daytime limit of 35dB $L_{Aeq,16\ hour}$ for habitable rooms of residential dwellings, when assessed in accordance with BS 8233:2014, will also be met during the evening period, as this is less onerous.

5.4.15 For the purpose of this assessment, it is assumed that underlying internal noise level within the proposed residential properties would be less than 24dB $L_{Aeq, 8\ hour}$ and therefore the internal noise limit of 34dB $L_{Aeq, 5\ minutes}$ has been adopted for the assessment of night-time noise emanating from the entertainment events held at the existing Pavilion of LCC. The results in Table 15 indicate that the building fabric of the facades of properties located nearest to and with a direct line of sight of the existing LCC Pavilion would need to achieve a minimum sound insulation value of 19.1dB(A) to ensure the permitted noise level of 34dB $L_{Aeq, 5\ minutes}$ is met.

5.4.16 In addition, the potential maximum noise levels generated by the emptying of glass bottles to the north of the existing Pavilion during an entertainment event have been assessed in accordance with the internal maximum noise level limit of 45dB L_{AFMAX} as set out in the WHO Guidelines for Community Noise. Based on the results of the noise survey, as set out in Table 8, the maximum noise level generated during the emptying of glass bottles at the nearest property, which will be screened from the storage area to the north of the existing Pavilion, are predicted to be 58.7dB L_{AFMAX}. The building fabric of the proposed residential properties would therefore need to achieve a

minimum sound insulation value of 13.7dB(A) to ensure the maximum noise levels are met in bedrooms.

5.4.17 Further consideration has been given in Section 6 of this report to the need for mitigation to ensure the internal noise levels are achieved in the properties of the first phase of the residential development and situated nearest to the existing Pavilion of LCC prior to its relocation as part of the development proposals.

Proposed Relocation Cricket Pitch

5.4.18 The illustrative masterplan indicates that the nearest residential properties will be located at a minimum distance of 70m from the pavilion of the proposed cricket pitch. At this stage, the detailed design of the proposed Pavilion is not available. It is considered that the proposed building would be designed to minimise noise break-out of live and recorded music from within the Pavilion. A noise-volume-limiting device could be installed to control the maximum noise levels generated by live and amplified music within the Pavilion, where necessary. The maximum noise level limit could be set in co-operation with the Licensing Department and/or Environmental Health department of RVBC to ensure the potential for disturbance at the nearest proposed residential receptors is minimised.

5.4.19 Any designated outdoor external areas in the immediate vicinity of the Pavilion, such as external drinking and/or smoking areas, will be situated furthest from the nearest proposed residential receptors where possible. Where necessary, screening around the perimeter of the external area(s) could incorporated into the proposed design of the Pavilion to ensure the potential for disturbance at the nearest proposed residential receptors are minimised.

5.4.20 The detailed design of the proposed Pavilion will be dealt with at a reserved matters stage. Should the outline planning application be granted consent, it is considered that an appropriate worded condition could be attached to ensure the potential noise impacts of entertainment events to be held within the Pavilion, at the nearest proposed residential receptors, are minimised.

5.5 Activities at Willow Farm

5.5.1 The Environmental Health Department of RVBC have raised concerns with regards to the potential noise generated by activities at Willow Farm located immediately to the east of the development site.

5.5.2 Based on information provided by the Land Owner of Willow Farm, it is understood that the farm holdings comprise of approximately 23 acres and not accounting for that which currently falls within the development site. There are two existing out buildings associated with the residential farm property situated to the east of the development site. These are used for the storage of silage and, from time to time, cattle.

5.5.3 Access to the residential farm house and outbuildings is gained via Chaigley Road, which in turn is accessed by travelling through the north-western residential area of Longridge via either Willows Park Road or Higher Road. The access road to the farm house and out buildings is a single lane narrow track. It is understood that there are no HGV or tanker movements to or from this farm property and/or the out buildings. Animal feed is collected by the farmer during daytime hours using their own tailor as necessary.

5.5.4 The results in Table 4 indicate that prevailing noise environment in the south-western part of the site, i.e. measurement location 8, are relatively low and meet the external daytime noise criterion in gardens of 50 dB $L_{Aeq\ 16\text{-}hour}$ agreed with RVBC.

5.5.5 Based on the results of the baseline noise survey and the information provided by the Land Owner, it is considered that the potential noise impact of the activities at Willow Farm on the proposed residential receptors of the development would be negligible.

5.6 Proposed Primary School Site

Prevailing Noise Environment at the Proposed School Site

5.6.1 Based on the results of the baseline noise survey and modelled levels of road traffic noise, it is considered that at a setback of 230 m from Chipping Lane, the prevailing noise environment at the school site would met the recommended external noise limit for outdoor teaching areas of 55 dB $L_{Aeq,\ 30\ minutes}$.

5.6.2 At this stage, the detailed design of the proposed school site has not yet been confirmed. Further assessment of the required external and internal noise limits to be achieved at the proposed school site, in accordance with BB93, can be carried out at a reserved matters stage and to ensure the detailed design of the proposed primary school site will comply with Part E of the Building Regulations 2000 once constructed.

Proposed Noise Impact Associated with the Playground and Playing Fields of the Proposed School Site

5.6.3 Based on historic noise level measurements of existing playgrounds and playing fields of existing primary school sites, previously conducted by WSP, consideration has been given to the potential noise impacts associated with the use of the playground and playing field of the proposed school site on future dwellings in the northern part of the residential area of the site.

5.6.4 Historic measurements in the vicinity of a primary school were taken over a typical 1-hour daytime period, which included 30 minutes of lunchtime activity and 20 minutes of an outdoor school lesson. A noise level of 48dB $L_{Aeq,\ 1hour}$ was measured at 15 m from the boundary of the primary school playing field. This is considered to be representative of the future noise levels likely to be generated by the proposed primary school site.

5.6.5 The nearest residential dwellings of the development will be located approximately 25 m from the playing fields of the proposed school site. Given that at this distance the playground noise could be considered to be attenuating at 6 dB per doubling of distance from an assumed effective source approximately 25 m into the playground, at the nearest residential receptors, the level of noise likely to be generated will be 44 $L_{Aeq,\ 1hour}$. As this is below the external daytime criterion of 50 dB $L_{Aeq,\ 16\ hour}$ it is considered that noise from playground activity would not impact on the amenity of the future residents.

5.6.6 The illustrative masterplan layout also indicates that the gardens of these residential dwellings are likely to be screened from the proposed school site by the buildings of proposed dwellings. Therefore, the proposed dwellings will themselves act as a barrier to enable the external daytime criteria of 50 dB $L_{Aeq,\ 16\ hour}$ to be met by a greater margin. No further consideration of this noise source is considered warranted at this stage.

6 Proposed Mitigation Measures

6.1 Proposed Scheme Layout

6.1.1 The illustrative masterplan prepared on behalf of Barratt Homes is included in **Appendix C**. Mitigation measures proposed to meet the RVBC external and internal criteria are discussed further in the following sections.

6.2 External Noise Levels

6.2.1 The assessment of the prevailing noise environment at the site indicates that mitigation measures will be necessary to meet the external daytime noise criterion in gardens of 50 dB $L_{Aeq\ 16\text{-}hour}$ agreed with RVBC. The proposed location of the recommended mitigation measures are shown in **Appendix D**.

Road Traffic Noise

6.2.2 The scheme layout indicates that the proposed residential dwellings will be situated a minimum of 15m from the edge of the carriageway of Chipping Lane and 13m from edge of the carriageway of Inglewhite Road. The majority of gardens have been orientated to be located on the eastern and screened side of the proposed residential buildings and so screened from road traffic. The garden of the property in the south-western corner of the site has a potential direct line of sight of Inglewhite Road and Chipping Lane. To ensure the lower external noise limit of 50 $L_{Aeq,\ 16\text{-}Hour}$ is achieved in this gardens, it is recommend that a 2.5m high barrier is constructed along the southern and western perimeter boundaries of this property. The contour plot showing the modelled daytime levels of road traffic noise across the site, with the proposed mitigation in place, is included in Figure E.3 of **Appendix E** of this report. The results of the modelling indicates that with the proposed mitigation measures in place the external noise level criterion of 50 dB $L_{Aeq,\ 16\ hour}$ will be met in all gardens nearest to the local road network.

Operational Activities of Commercial Premises

6.2.3 To protect the amenity of residents in the southern part of the development, it is recommended that a 3.5 m high barrier be constructed along the southern site boundary adjoining the service yard of the Sainsbury's Supermarket, Ireland's Garage Ltd and Wash and Dash car wash. It should be noted that there are no gardens associated with the residential property proposed nearest to the service yard of the Sainsbury's Supermarket, Ireland's Garage Ltd and Wash and Dash car wash. The majority of rear gardens immediately to the north of the service yard and car park of Sainsbury's supermarket are also generally situated to the north of the dwelling and screened from the operational activities of the supermarket and by the proposed building.

6.2.4 The attenuation afforded by the proposed mitigation measures, building of the proposed dwellings and localised barriers will be sufficient to ensure the external daytime noise limits will be met in gardens of the dwellings closest to the operational activities of the Sainsbury's supermarket. The modelled contour plots of the operational activities associated with the Sainsbury's Supermarket, with the proposed mitigation measures in place, are included in Figures E.4 of **Appendix E** and summarised in Table 11. With the mitigation measures in place, the cumulative levels of noise generated by the operational activities of the service yard of Sainsbury's supermarket, Ireland's Garage Ltd and Wash and Dash car wash, in the gardens of the nearest residential dwellings will range between 31 dB $L_{Aeq,\ 1\ Hour}$ and 40 dB $L_{Aeq,\ 1\ Hour}$. The levels of noise generated by the vehicle movements in the car park of the Sainsbury's supermarket in gardens of the nearest residential dwellings will range between 35 dB $L_{Aeq,\ 1\ Hour}$ and 36 dB $L_{Aeq,\ 1\ Hour}$ with the proposed mitigation measures, including localised barriers, in place. The proposed mitigation measures would be sufficient to ensure the cumulative daytime noise levels are well below the external lower criterion of 50 dB L_{Aeq} in gardens of dwellings in the southern part of the site located nearest to the commercial premises.

Existing LCC (i.e. prior to its relocation to the proposed cricket pitch as part of the development proposals)

6.2.5 The illustrative masterplan indicates a minimum stand-off of 80m between the square of the existing LCC and nearest properties of the first phase of the residential development. Whilst the square of the proposed cricket pitch will be located at a minimum of 90m from the nearest residential properties in the northern part of the development. The results of the assessment indicate that with the proposed mitigation measures in place the level of noise generated by typical daytime activities associated with the existing and proposed LCC are significantly below the external daytime noise level limit of 50 dB $L_{Aeq,\ 16\ hour}$ in gardens.

6.2.6 To ensure the acoustic integrity of any acoustic barriers, they should be continuous, imperforate (i.e. no holes/perforations), sealed at the base and have a mass per unit area of 10-15 kg/m^2. Such a construction would typically be achievable with the use of a close boarded timber fence of appropriate thickness (thickness based on the selected timber mass, according to the stated mass per unit area). For example, a close boarded timber fence with a mass per unit area of 12.5 kg/m^2 can be achieved with 22 mm thick marine grade plywood.

6.3 Internal Noise Levels

6.3.1 In order to consider compliance with the adopted internal noise level criteria, it is appropriate to consider the attenuation that can be afforded by the sound insulation performance of the proposed building facades.

6.3.2 Table 18 below presents the predicted free-field noise levels at a sample of the closest proposed dwellings to each of the considered noise sources. Also detailed is the internal noise level criteria adopted, as appropriate for the incident source, and the minimum required sound insulation performance determined in accordance with the simple calculation method detailed within BS8233, which is described further below.

6.3.3 Following the 'simple calculation' method given in BS 8233, single figure values can be used in lieu of a full spectral noise break-in analysis. This provides adequate information about the suitability of the design at the outline application stage although the sound reduction performance of the façade should be investigated in more depth as part of the detailed design. BS 8233 notes that the simple method can underestimate the R_W requirement by up to 5 dB, and so a 5 dB allowance has been included in the calculations. The simple method uses free-field external noise levels and so no façade reflection correction has been required.

Table 18: Required Sound Insulation Performance for Noise Sensitive Areas of the Development

Façade Location	Period	Noise Index	Internal Target Level (dB) [1]	Predicted External Noise Level	Required Sound Insulation Performance (dB R_w) [2]	Minimum Required Sound Insulation Performance (dB R_w) [2]
Residential properties in the south-western part of the site, i.e. nearest to Inglewhite Road	Day	$L_{Aeq\ 16\text{-}hour}$	35	59	29	33
	Night	$L_{Aeq\ 8\text{-}hour}$	30	53	28	
		L_{AFmax}	45	73	33	
Residential properties in the western part of the Site, i.e. nearest to Chipping Lane	Day	$L_{Aeq\ 16\text{-}hour}$	35	57	27	28
	Night	$L_{Aeq\ 8\text{-}hour}$	30	50	25	

Façade Location	Period	Noise Index	Internal Target Level (dB) [1]	Predicted External Noise Level	Required Sound Insulation Performance (dB R_w) [2]	Minimum Required Sound Insulation Performance (dB R_w) [2]
		L_{AFmax}	45	68	28	
Residential properties in the southern part of site, i.e. nearest to the service yard of Sainsbury's supermarket, Ireland's Garage Ltd and Wash and Dash car wash	Day	$L_{Aeq\ 1\text{-}hour}$	35	55	25	25
	Night	$L_{Aeq\ 15\text{-}minutes}$	30	48	23	
		L_{AFmax}	45	62	17	
Residential properties in the north-western part of the site, i.e. nearest to existing LCC prior to its relocation to the new pitch	Day	$L_{Aeq\ 16\text{-}hour}$	35	50	19	24
	Night	$L_{Aeq\ 5\text{-}minutes}$	34	53	24	
		L_{AFmax}	45	59	19	
Residential properties in the south-eastern part of the site, i.e. nearest to Willow Farm	Day	$L_{Aeq\ 16\text{-}hour}$	35	50	20	31
	Night	$L_{Aeq\ 8\text{-}hour}$	30	45	20	
		L_{AFmax}	45	71	31	

[1] To be robust, the lower internal noise limit for living rooms and bedrooms has been used as the internal target for the daytime period.

[2] Includes +5dB allowance in line with BS 8233 simple calculation method.

6.3.4 British Standard 12354-3:2000 *Building Acoustics - Estimation of acoustic performance of buildings from the performance of elements - Part 3: Airborne sound insulation against outdoor sound* (BS12354-3) sets out data relating to the typical noise reduction performance of different glazing systems including when the dominant source of noise is road traffic noise. A selection of these performances is set out below.

Table 19: Typical Sound Reduction Properties of Insulating Glass Units

Glass / Cavity Width / Glass (mm)	Sound Reduction (R_w dB)
4 mm glass / 6 – 16 mm air gap / 4 mm glass	29
6mm glass/ 6 – 16 mm air gap / 4 mm glass	32
8 mm glass / 6 – 16 mm air gap /4 mm glass	33
10 mm glass / 6 – 16 mm air gap /4 mm glass	35

[1] *All data extracted from BS12354-3:2000.*

6.3.5 Comparing the sound insulation performance requirements in Table 18, with the typical sound insulation performance values of those different glazing systems presented in Table 19, it can be seen that a double glazing system with a 8 mm glass / 6 - 16 mm air gap / 4 mm glass build up would achieve the internal requirements in the south-western part of the development site, i.e. dwellings nearest to Inglewhite Road, with windows closed. It should be noted that a lower specification glazing may be used in living rooms, dining rooms and bedrooms across the rest of the site and screened from road traffic noise.

6.3.6 The above glazing calculations are intended to be for planning purposes only and are based on a full glazed facade. Lesser specifications will be required after accounting for the improved performance through the brick / block wall elements. More detailed calculations should therefore be undertaken prior to procurement of the glazing units, once the site layout and housing floor plans / elevations have been finalised, to ensure that the units are not over specified.

6.3.7 The above calculations do not make any allowance for the incorporation of permanent ventilation to the dwellings. On ventilation, BS 8233 advises that:

> *"The Building Regulations' supporting documents on ventilation [48, 49, 50] recommend that habitable rooms in dwellings have background ventilation. Where openable windows cannot be relied upon for this ventilation, trickle ventilators can be used and sound attenuating types are available. However, windows mat remain openable for rapid or purge ventilation, or at the occupant's choice."*

6.3.8 Where appropriate, the preferred choice of ventilation is through the use of natural ventilation openings such as trickle vents, air-bricks and passive ventilation devices. Such ventilators can be used to meet the requirements of the Building Regulations Approved Document F for background ventilation. The future occupants would then have the option of keeping windows closed for most of the time and opening windows for rapid ventilation and summer cooling.

6.3.9 Passive through wall ventilators are available that meet the requirements of the Building Regulations Approved Document F for background ventilation and also provide a sound insulation performance that meets or exceeds that required from the glazing elements. It should be noted that window mounted trickle vents may be used for those proposed dwellings screened away from road traffic noise.

7 Conclusions

7.1.1 WSP UK has been commissioned by Barratt Homes (Manchester) to undertake an environmental noise assessment for the proposed Higgins Brook residential development at land to the east of Chipping Lane in Longridge. This environmental noise assessment considers the latest illustrative masterplan layout for the development, and therefore supersedes the report initially submitted in support of the outline application (reference 00045273-002 dated 6th August 2014).

7.1.2 This assessment has been based upon the results of numerous detailed baseline noise measurements conducted over weekday and weekend periods. Acoustic modelling has been carried out to establish the prevailing noise levels across the development site for assessment against the external and internal noise level criteria. The results of the noise assessment have been used to ascertain the need for, and degree of, mitigation measures required to offer a commensurate level of protection against noise to the future occupants of the proposed dwellings from the surrounding environment.

7.1.3 The majority of gardens in the western and central parts of the site will be protected from road traffic on the local road network by the proposed residential buildings themselves and/or screened by localised barriers as appropriate. To ensure the external noise levels of 50 dB $L_{Aeq,16\text{-}hour}$ are met in the south-western part of the site it is recommended that that a 2.5m high barrier be constructed along the southern and western perimeter boundaries of the garden in the south-western corner of the development, i.e. nearest to and with a direct line of sight of Inglewhite Road/Chipping Lane. This would be sufficient to ensure compliance with appropriate criteria for the entire development.

7.1.4 To protect the amenity of residents in the southern part of the development, it is recommended that a barrier be constructed along the southern site boundary adjoining the service yard of Sainsbury's

Supermarket service yard, Ireland's Garage Ltd and Wash and Dash car wash ranging between 2.5 m and 3.5 m in height. The majority of gardens immediately to the north of the supermarket are generally situated, to the north of the proposed dwellings, i.e. screened from the service yard, ancillary plant and vehicle movements within the car park by the building of the proposed dwelling, however the installation of the proposed barrier would ensure compliance with appropriate criteria for all proposed garden areas.

7.1.5 The nearest residential receptors of the development to the cricket square of the existing LCC will be at a minimum set-back distance of 80 m. In addition, the majority of the gardens are proposed to the south and south-east of the properties i.e. screened from the proposed cricket pitch. It has been demonstrated that noise levels from existing LCC activities will be below the adopted assessment criteria for external living spaces, with no requirement for mitigation beyond the incorporated set-back distances. Once relocated, as part of the development, the LCC cricket pitch would be located at an even greater set-back distance from the closest proposed residential dwellings, and the design is again such that the majority of gardens would be screened form this facility.

7.1.6 With regard to noise levels within internal habitable spaces, a detailed noise modelling exercise has been undertaken including for noise from each considered source. It has been identified that, at the closest proposed residential dwelling to each source, appropriate internal noise level criteria can be achieved through means of appropriate building fabric specification (e.g. appropriate specification of the acoustic requirements for the residential glazing and ventilation products to be installed). This assessment has included road traffic noise, industrial / commercial operations associated with the Sainsburys service yard, Irelands Garage, the Wash and Dash carwash, Willow Farm, the existing LCC cricket facilities, including pavilion.

7.1.7 The relocation of the LCC would include a building of a brand new Pavilion. The proposed pavilion will be situated immediately to the north of the proposed cricket pitch, i.e. furthest from the proposed residential dwellings and much further than the cricket pitch and the separation distance to the current pavilion location. The construction of the new pavilion also allows incorporation of mitigation measures 'at source' for entertainment events. For example, the proposed building can be designed to minimise noise break-out and, where necessary, a noise-volume-limiting device could be installed to control the maximum noise levels generated by live and amplified music within the Pavilion. It is considered that an appropriate worded condition could be attached to an outline planning consent to ensure the residential amenity is not adversely affected at the proposed development.

7.1.8 In summary, it has been identified how the amenity of the future residents of the development can be appropriately protected, by means of achieving both internal and external noise level criteria across the full development, which are appropriate for residential occupation.

7.1.9 Where necessary planning conditions could be used to ensure that the detail of the mitigation measures identified, are both appropriate and delivered in practice.

Appendices

Appendix A – Glossary of Acoustic Terminology

NOISE

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.

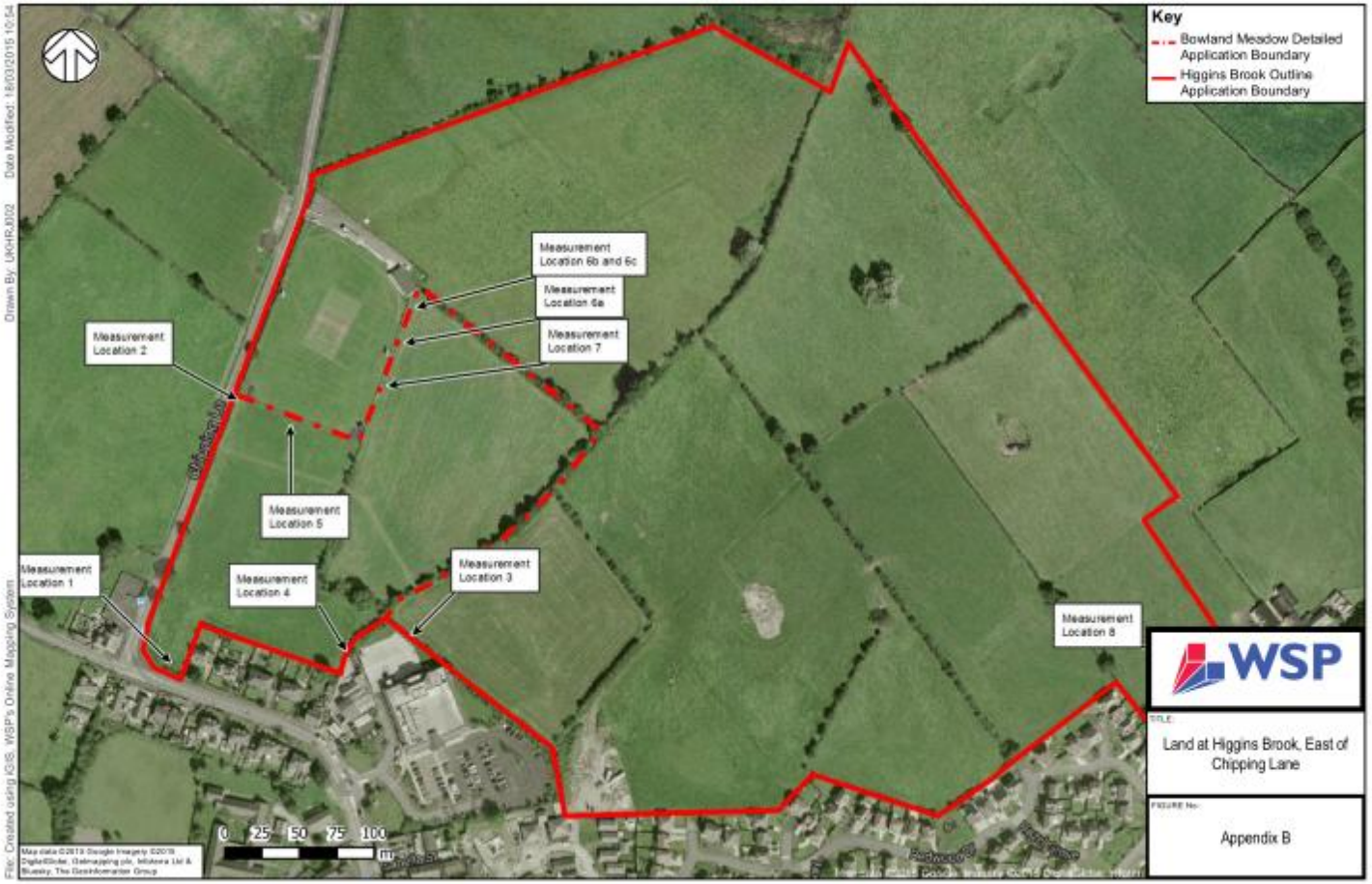
An indication of the range of sound levels commonly found in the environment is given in the following table.

Sound Level	Location
0 dB(A)	Threshold of hearing
20 to 30 dB(A)	Quiet bedroom at night
30 to 40dB(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

ACOUSTIC TERMINOLOGY

dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2x10^{-5}$Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{10} and L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time, and the L_{90} is the level exceeded for 90% of the time.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Façade Level	A sound field determined at a distance of 1m in front of a large sound reflecting object such as a building façade.

Appendix B – Site Location and Setting



Appendix C – Masterplan Layout

Appendix D – Proposed Mitigation Measures

Appendix E – Modelled Noise Levels of Existing Noise Sources

Figure E.1 – Modelled Ground Floor Daytime Road Traffic Noise Levels With the Development in Place (Figures in dB $L_{Aeq, 16\text{-}hour}$)

Figure E.2 – Modelled First Floor Night-time Road Traffic Noise Levels With the Development in Place (Figures in dB $L_{Aeq,\ 8\text{-}hour}$)

Figure E.3 – Modelled Ground Floor Daytime Road Traffic Noise Levels With Development and Mitigation Measures in Place (Figures in dB $L_{Aeq, 16\text{-}hour}$)

Figure E.4 – Modelled Ground Floor Daytime Noise Levels for Operational Activities Associated With Sainsbury's Supermarket, Ireland's Garage and Wash and Dash Car Wash, Without Mitigation Measures in Place (Figures in dB $L_{Aeq, 1hour}$)

Figure E.5 – Modelled Ground Floor Daytime Noise Levels for Operational Activities Associated With Sainsbury's Supermarket, Ireland's Garage and Wash and Dash Car Wash, With Mitigation Measures in Place (Figures in dB $L_{Aeq, 1hour}$)

Figure E.6 – Modelled First Floor Night-time Noise Levels for Operational Activities Associated with Sainsbury's Supermarket With Mitigation Measures in Place (Figures in dB $L_{Aeq,\ 15\text{-}minutes}$)

Figure E.7 – Modelled First Floor Night-time Noise Levels at the First Phase of the Residential Development for Worst-Case Entertainment Noise Associated with Functions held within the Pavilion of the Existing LCC, With Mitigation Measures in Place (Figures in dB $L_{Aeq,\ 5\text{-minutes}}$)

Figure E.9 – Modelled First Floor Night-time Noise Levels at the First Phase of the Residential Development for Typical Entertainment Noise Associated with Functions held within the Pavilion of LCC, With Mitigation Measures in Place (Figures in dB $L_{Aeq,\ 5\text{-minutes}}$)

Appendix F – 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 accept 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.

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