Barratt Homes Manchester

LAND AT HIGGINS BROOK, LONGRIDGE - PHASES 2 & 3

Noise Assessment

70017199-02
OCTOBER 2018

PUBLIC

Barratt Homes **Manchester**

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Noise Assessment

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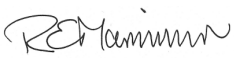
Signature				
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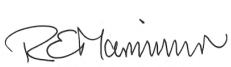
Signature				
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1 INTRODUCTION

1.1.1. WSP has been appointed by Barratt Homes Manchester to undertake a noise assessment for the residential properties of the Phase 2 and 3 parcels of the approved mixed-use development of land at Higgins Brook, east of Chipping Lane, Longridge. The Phase 2 & 3 parcels of the approved mixed-use development are together referred to as the Application Site within this report.

1.1.2. The purpose of this assessment is to establish an appropriate noise mitigation scheme to support the reserved matters application for the Phase 2 and 3 parcels of the development. This assessment has been based on the results of baseline noise surveys and detailed acoustic modelling, which was used as a basis for the noise assessment prepared by WSP in support of the outline application (report reference 00045273-004 dated 18th March 2015) and the reserved matters application for Phase 1 (report reference 70017199-01 dated 11th February 2016). The results of the survey and updated acoustic modelling have been assessed in accordance with applicable standards and guidance. 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 Application Site against the prevailing local noise environment.

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

2 SITE LOCATION AND SETTING

2.1.1. The proposed mixed-use 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. The site boundary of the approved outline planning application boundary and setting, together with the reserved matters application for Phase 1, is presented in **Appendix B**.

2.1.2. The approved mixed-use development 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, Ireland's Garage Ltd, Wash and Dash car wash and existing residential properties on Inglewhite Road, Redwood Drive, Firwood Close and Willows Park Lane. The reserved matters Application Site lies in the southern part of the mixed-use development site.

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 and car park of the supermarket bound the proposed development site. Vehicular access to the service yard and car park is gained via the main entrance of the supermarket, off Inglewhite Road. A single roller shutter door is located on the northern façade of the supermarket. The supermarket's mechanical plant is located on the roof.

2.2 PROPOSED DEVELOPMENT

2.2.1. In October 2015, Ribble Valley Borough Council (RVBC) granted outline consent for the residential-led mixed-use development (application reference 3/2014/0764). The development comprises up to 363 homes, relocation of Longridge Cricket Club (LCC), a new primary school, vehicular and pedestrian access landscaping and public open space.

2.2.2. In February 2016, WSP prepared a subsequent noise impact assessment report for the reserved matters application for Phase 1 of the approved mixed-use development. Phase 1 is located in the south-western part of the site and comprises 118 dwellings and associated gardens, parking, open space and landscaping. This report made recommendations for an appropriate noise mitigation scheme to be incorporated into the site design including the layout configuration of external amenity areas, noise barriers and appropriate building fabric specification to achieve external and internal noise level design criteria. Phase 1 is currently under construction and it is understood that it will be complete prior to the occupation of dwellings within the Phase 2 and 3 parcels of the development.

2.2.3. The Phase 2 and 3 parcels are located in the southern part of the site and together comprise 184 dwellings and associated gardens, parking, open space and landscaping. Existing farmland which bounds the eastern boundary of the Application Site is to be retained in agricultural use, i.e. open fields. The detailed design of the primary school site proposed within the north-western part of the Application Site is to be detailed under a separate, future, application to discharge relevant planning conditions.

2.2.4. The proposed scheme layout for the development prepared by Barratt Homes Manchester, drawing number 459-PL04 Revision 02 dated 15th October 2018, is included in **Appendix C**.

3 PLANNING CONDITIONS AND ASSESSMENT CRITERIA

3.1 PERTINENT PLANNING CONDITIONS

3.1.1. The planning conditions as stipulated in the outline planning approval for the development make reference to the submission and approval of detailed site layouts in Condition 1 and 23. However there are no specific conditions relating to the operational phases of the development and the noise assessment criteria to be achieved within the residential areas of the development which would be relevant to this assessment.

3.1.2. Drawing on previous consultation with Environmental Health of Ribble Valley Borough Council and the assessment methodology adopted as a basis for the noise assessments undertaken as part of the outline application and the reserved matters application for Phase 1, the proposed external and internal noise levels across Phase 1 have been assessed against the criteria set out in BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings* and the World Health Organisation (WHO) 1999: *Guidelines for Community Noise*. A more detailed description of the assessment criteria is presented in Sections 3.2 and 3.3 below.

3.1.3. At this stage, the detailed design for the primary school proposed within the north-western part of the Application Site and the relocation of the cricket club proposed to the north of Phases 1 to 3 are yet to be submitted. The focus of this noise assessment is therefore on the potential noise impacts of existing noise sources Phases 2 and 3 of the outline development. It is considered that the potential noise impacts of the proposed primary school and relocated cricket club on the nearest residential receptors will be dealt with in the support of the discharge of Conditions 1 and 23, which require a detailed scheme for their development to be submitted to and approved by the Local Planning Authority, after consultation with Sport England (with respect to the relocated cricket club).

3.2 BS 8233:2014 GUIDANCE ON SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS

3.2.1. 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.

3.2.2. 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	
		0700 to 2300 Hours, i.e. Daytime	2300 – 0700 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 $L_{Aeq,\ 8\ Hour}$

Whilst BS 8233 recognises that a guideline value may 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, no specific criterion is stipulated. Notwithstanding the internal noise limits stated within BS 8233, reference has also been made in this assessment to the recommendations outlined in the WHO Guidelines with regards to L_{AFmax} noise levels at night.

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 55dB $L_{Aeq,T}$ 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 network, where it may be necessary compromise between elevated noise levels and other factors such as convenience of living, and efficient use of land.

3.3 WORLD HEALTH ORGANISATION GUIDELINES (WHO):1999 GUIDELINES FOR COMMUNITY HEALTH

3.3.1. The internal ambient noise levels L_{Aeq} criteria in BS 8233 is concordant with the guidance contained within the World Health Organisation (WHO) 1999: *Guidelines for Community Noise*. The WHO guidelines also provide guidance on suitable L_{Amax} noise levels during the night-time period. Specifically, it is stated that:

"Indoor guideline values for bedrooms are 30 dB L_{Aeq} for continuous noise and 45 dB L_{Amax} for single sound events."

3.3.2. The L_{AFmax} criterion detailed within this document 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".

4 ENVIRONMENTAL NOISE SURVEY

4.1.1. To inform the assessment undertaken in support of the outline application and determine the current prevailing noise climate at the site, the following numerous detailed baseline noise surveys were undertaken:

- 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 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 Men's 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 informal practice on the Friday, Men's Team match on the Saturday, an end of season party held at the Pavilion on the Saturday evening and a Women's 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 Men's Team's 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 Sainsbury's supermarket.

4.1.2. WSP 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, i.e. within Phase 1 of the development. However, the Application Site is situated at a minimum distance of approximately 110m from the service yard, and will be screened from the operational activities by the boundary noise mitigation measures and the Phase 1 buildings. Activities associated with the existing LCC will also be screened by the Phase 1 buildings. Future activities of the relocated cricket club will be screened by Phase 1 buildings and the proposed primary school.

4.1.3. The results of the baseline noise surveys are set out in full in Section 4 of the noise assessment submitted in support of the outline planning application (WSP report reference 00045273-004 dated 18th March 2015). This includes details of all the measurement locations adopted throughout the surveys, measurement equipment used, meteorological conditions during the surveys and the measurement results. A brief summary of the measurement results relevant to this assessment is presented in Sections 4.2 and 4.3 below.

4.2 MEASUREMENT LOCATIONS

4.2.1. The primary measurement locations adopted throughout the survey and relevant to this assessment 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.

- Representative of the Application Site:
    - 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 level 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 MEASUREMENT RESULTS

4.3.1. A summary of the longer term continuous measurements of road traffic noise, measured at locations 1, 2 and 8, during the daytime and night-time periods, are presented within Table 2.

Table 2 - Summary of internal ambient noise levels to be achieved in habitable rooms when assessed in accordance with BS 8233

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
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.

5 ACOUSTIC MODELLING AND ASSESSMENT

5.1 OVERVIEW

5.1.1. 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 produced 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 ISO 9613-2: 1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation* (ISO 9613-2) for the assessment of commercial activities. 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. The assumptions with respect to the operational activities of the commercial noise sources have remained unchanged from those adopted as part of the noise assessment prepared in support of the outline application and detailed in Section 5.3 of WSP report reference 00045273-004 dates 18th March 2015.
- 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 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 online photography.
- The acoustic model includes the latest site layout for Phase 1 and the proposed site layout for Phases 2 and 3, as prepared by Barratt Homes and included in Appendix C. The proposed residential buildings themselves (two-storey assumed to be 7 m high), garages (assumed to be 3.5m high) and localised barriers associated with outdoor living areas of Phase 1 (assumed to be 1.8m high, unless otherwise stated).
- The proposed mitigation measures recommended as part of the Phase 1 reserved matters application are assumed to be incorporated into the proposed site design. These include an acoustic barrier along the southern 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.

5.1.2. The predicted free-field noise levels at the closest sensitive areas of the Application Site are summarised in Table 3. Predictions based on the measured levels set out in Table 2, have been used to establish the maximum noise level (L_{AFmax}) at the proposed residential properties within the Application Site.

Table 3 - Predicted Daytime and Night-time Noise Levels at Sensitive Areas of Phases 2 and 3 With Mitigation Measures and Phase 1 in Place, Free-Field, dB(A)

Proposed Sensitive Receptor Location	Location	Period	Predicted Noise Level, $L_{Aeq,T}$	Predicted Maximum Noise Level, L_{AFmax}
Plot 182, i.e. nearest to Inglewhite Road	Garden	Daytime – 16 Hour	33	-
	Façade		35	-
	Façade	Night-time – 8 Hour	43	50
Plots 13 to 17, i.e. nearest to Chipping Lane and the car park of the Sainsbury's Supermarket	Garden	Daytime – 16 Hour	40	-
	Façade		49	-
	Façade	Night-time – 8 Hour	38	48

5.2 EXTERNAL NOISE LEVELS

5.2.1. The scheme layout indicates that the proposed dwellings will be situated a minimum of 245m from the edge of the carriageway of Inglewhite Road, a minimum of 150m from the edge of the carriageway of Chipping Lane and a minimum of 20m from the car park of the Sainsbury's supermarket. The majority of gardens have been orientated to be located on the screened side of the proposed residential buildings so are screened from road traffic and vehicle movements within the Sainsbury's supermarket car park.

5.2.2. The survey data in Table 2 indicate that the prevailing noise levels within the Application Site in the absence of screening provided by the development of Phase 1 (i.e. measurement location 8) meet the external daytime noise criterion in gardens of 50 dB $L_{Aeq,16hour}$ agreed with RVBC. The results in Table 3, which include the proposed mitigation and screening provided by Phase 1, indicate that the noise levels in garden areas would be no higher than 40dB $L_{Aeq,16\ hour}$.

5.2.3. The results of the baseline noise survey and updated modelling therefore demonstrates that with the proposed mitigation measures in place the external noise level criterion of 50 dB $L_{Aeq,16hour}$ will be comfortably met in all gardens across the Application Site.

5.3 INTERNAL NOISE LEVELS

5.3.1. The following internal design criteria apply:

- 35 dB $L_{Aeq,16hour}$ for living rooms during the daytime,
- 30 dB $L_{Aeq,8hour}$ for bedrooms during the
- 45 dB L_{AFmax} should not normally be exceeded in bedrooms during the night-time period.

5.3.2. BS 8233 states:

"If partially open window were relied upon for background ventilation, the insulation [of windows, and any trickle ventilators] would be reduced to approximately 15 dB"

5.3.3. Therefore, where external façade noise levels are more than around 15 dB higher than the internal noise targets, open windows should not be relied upon as the sole means of ventilation and some form of acoustically attenuated ventilation would be required.

5.3.4. Assuming an attenuation of 15 dB for a partially open window, the following key equivalent external assessment criteria apply at the proposed building facades:

- Daytime 50 dB $L_{Aeq,16hour}$;
- Night time 45 dB $L_{Aeq,8hour}$; and
- Night time 60 dB L_{AFmax}.

5.3.5. The results in Table 3 indicate that these equivalent external assessment criteria would be met, and in turn the internal noise criteria would be met with windows open. As the internal noise level criteria can be achieved with open windows, there is no need for any of the Phase 2 & 3 buildings to have acoustic specifications for either windows or ventilators.

6 CONCLUSIONS

6.1.1. WSP has been commissioned by Barratt Homes Manchester to undertake an environmental noise assessment for the Phase 2 and 3 parcels of the proposed Higgins Brook residential development at land to the east of Chipping Lane in Longridge.

6.1.2. This assessment has been based upon the results of numerous baseline noise measurements conducted over weekday and weekend periods and acoustic modelling carried out as part of the noise assessment undertaken in support of the outline planning application for the wider mixed-use development. The acoustic modelling has been updated to include the proposed scheme layout and establish the prevailing noise levels across the Phase 2 and 3 parcels 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 of the Application Site from the surrounding environment.

6.1.3. The assessment has demonstrated that appropriate external and internal criteria, agreed with RVBC as part of the outline application for the mixed-use development and appropriate for residential occupation, can be achieved. In summary, it has been identified how the amenity of the future residents of the development can be appropriately protected.

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.

Table 4 - Range of sound levels commonly found in the environment

Sound levels	Location
0 dB(A)	Threshold of hearing
20 to 30 dB(A)	Quiet bedroom at night
30 to 4 0dB(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

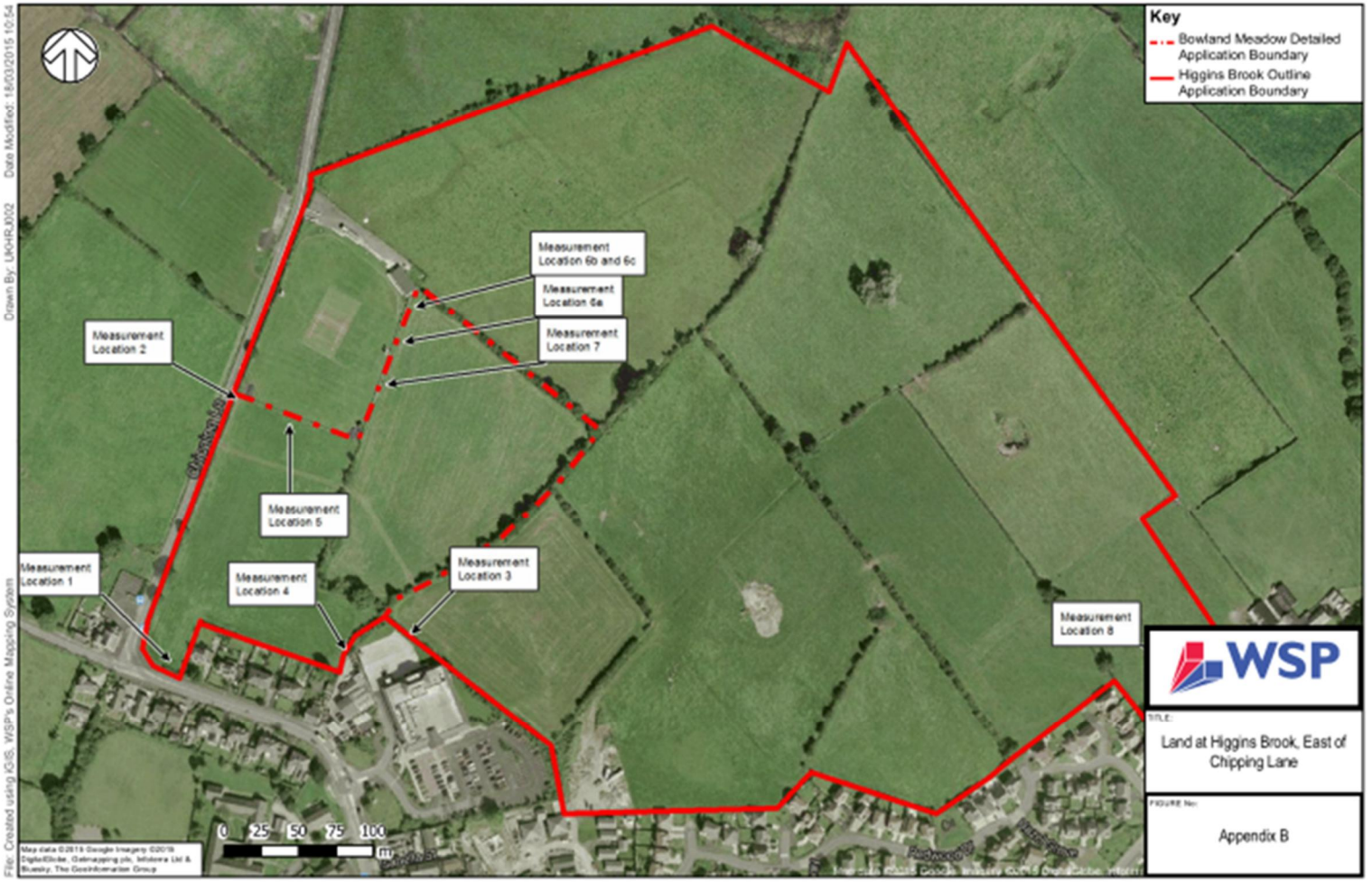
ACOUSTIC TERMINOLOGY

Table 5 - Acoustic terminology

Terminology	Meaning
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.

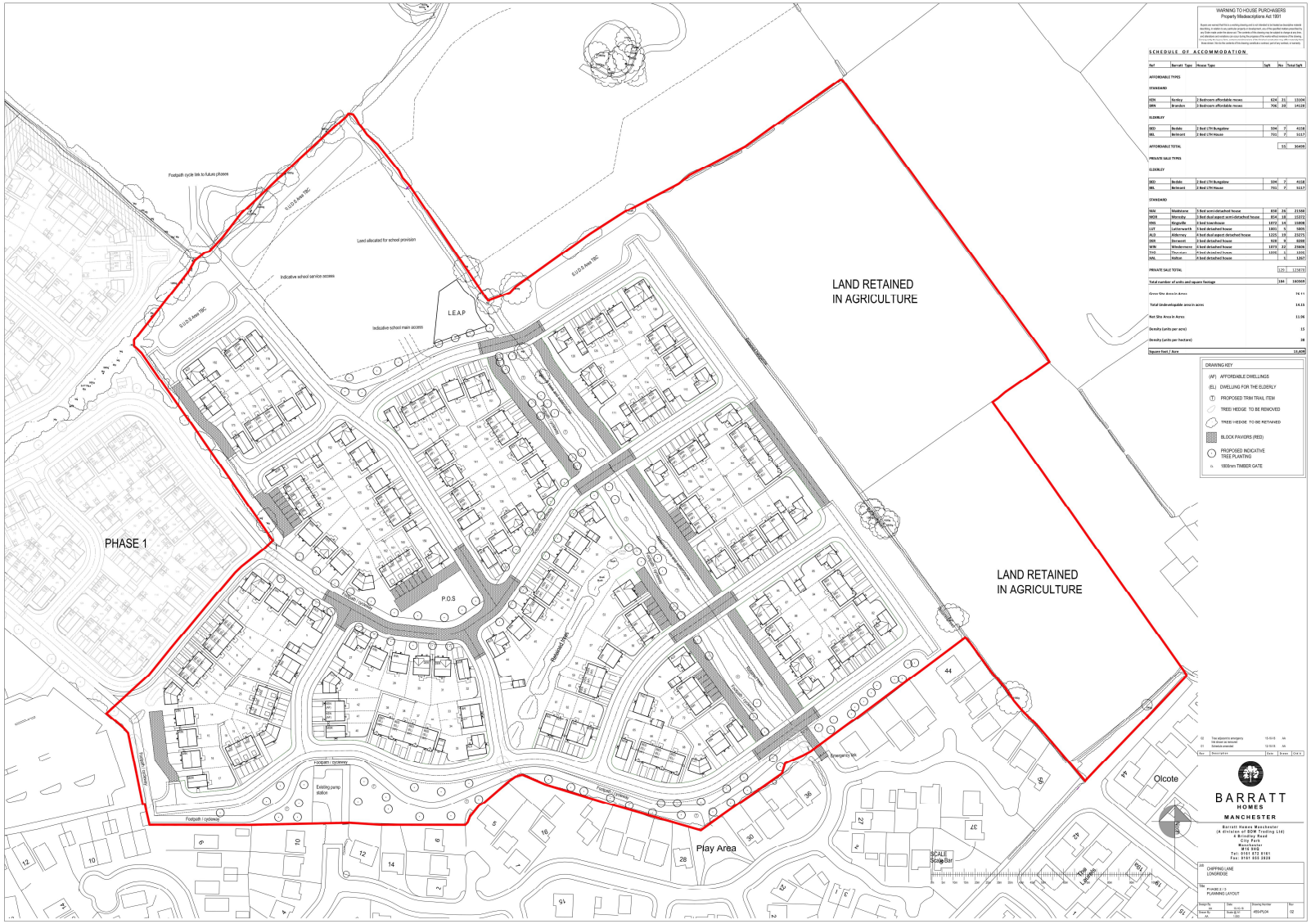
Appendix B

EXISTING SITE AND MEASUREMENT LOCATIONS


Key
Bowland Meadow Detailed Application Boundary
Higgins Brook Outline Application Boundary
Measurement Location 1
Measurement Location 2
Measurement Location 3
Measurement Location 4
Measurement Location 5
Measurement Location 6a
Measurement Location 6b and 6c
Measurement Location 7
Measurement Location 8
WSP
Land at Higgins Brook, East of Chipping Lane
Appendix B
0 25 50 75 100 m

Appendix C

PLANNING LAYOUT


LAND RETAINED
IN AGRICULTURE
LAND RETAINED
IN AGRICULTURE
PHASE 1
L.E.A.P
P.O.S
Play Area
Olcote
BARRATT
HOMES
MANCHESTER
SCHEDULE OF ACCOMMODATION
DRAWING KEY

Appendix D

LIMITATIONS

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

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

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