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MACBRYDE HOMES

Gateacre Garden Centre

Noise Impact Assessment

February 2015

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BELLWAY HOMES

Gateacre Garden Centre

Noise Impact Assessment

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1 INTRODUCTION

- 1.1.1 By email instruction dated the 9th January 2015, from Mr Phillip Palmer of Macbryde Homes, Wardell Armstrong LLP was commissioned to undertake a noise assessment to support a planning application for a proposed residential development at the Gateacre Garden Centre, Liverpool.
- 1.1.2 The proposed development site is located in Gateacre, Liverpool. The site comprises a garden centre and is bound to the north by residential properties off Gateacre Brow. To the east and south the site is boarded by residential properties off Glenville Close and Hunts Cross Avenue. Acrefield Road bounds the site to the west, beyond which lie further residential properties.
- 1.1.3 The proposed development is shown on the Proposed Site Layout prepared by Macbryde Homes Ltd, and submitted as part of the planning application (Drawing Number GL-SL01). The proposed development will compromise approximately 10 dwellings.
- 1.1.4 Wardell Armstrong were originally commissioned by Bellway Homes Ltd to undertake a noise impact assessment of the proposed residential development at the Gateacre Garden centre site in March 2014. The noise impact assessment was prepared in support of a planning application.
- 1.1.5 Macbryde Homes Ltd have now taken control of the site and have submitted a planning application for a re-structured residential development. By email confirmation on the 19th December 2014 Bellway Homes Ltd agreed to allow Macbryde Homes Ltd to use any previous data collected in relation to the previous application in support of the current planning application.
- 1.1.6 This report assesses the results of a noise survey carried out in accordance with current guidance and includes recommendations for noise mitigation as appropriate.

2 ASSESSMENT METHODOLOGY

2.1 Consultation and Scope of Works

- 2.1.1 Prior to carrying out the noise assessment a request was made to Liverpool City Council to discuss the noise assessment methodology, however at the time of writing we have had no response to our request.
- 2.1.2 The scope of the noise assessment is based upon our experience of similar developments and includes consideration of noise at the sensitive areas of the proposed development, i.e. proposed residential areas, specifically in terms of the potential impact of the existing transportation infrastructure as well as any industrial activities in the vicinity might impose on the proposed development.
- 2.1.3 The noise assessment takes into account current guidance including the following:
- National Planning Policy Framework, 2012;
 - Noise Policy Statement for England, 2010;
 - Planning Practice Guidance - Noise, 2014;
 - The World Health Organisation Guidelines for Community Noise 1999 (WHO 1999); and,
 - British Standard 8233: 2014 Guidance on Sound Insulation and noise reduction for buildings (BS8233).
- 2.1.4 The potential noise impacts that have been addressed as part of this assessment includes noise from road traffic on Acrefield Road, Hunts Cross Avenue and the surrounding road network. No noise of an industrial nature was noted at the site during the site visit.

2.2 Noise Survey

- 2.2.1 As part of this assessment, Wardell Armstrong LLP has carried out an attended noise survey to assess the current ambient noise levels at proposed receptor locations. The noise survey is discussed in Section 3 of this report.

2.3 Guidance

National Planning Policy Framework

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

'Planning policies and decisions should aim to:

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

- 2.3.2 With regard to 'adverse impacts' the NPPF refers to the 'Noise Policy Statement for England' (NPSE), which defines three categories, as follows:

'NOEL – No Observed Effect Level

- This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

- This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

- This is the level above which significant adverse effects on health and quality of life occur’.

2.3.3 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided. The second aim refers to the situation where the impact lies somewhere between LOAEL and SOAEL, and it requires that all reasonable steps are taken to mitigate and minimise the adverse effects of noise. However, this does not mean that such adverse effects cannot occur.

The Planning Practice Guidance (PPG) provides further detail about how the effect levels can be recognised. Above the NOEL noise becomes noticeable, however it has no adverse effect as it does not cause any change in behaviour or attitude. Once noise crosses the LOAEL threshold it begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. Increasing noise exposure further might cause the SOAEL threshold to be crossed. If the exposure is above this level the planning process should be used to avoid the effect occurring by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused. At the highest extreme the situation should be prevented from occurring regardless of the benefits which might arise. Table 1 summarises the noise exposure hierarchy.

Table 1 National Planning Practice Guidance noise exposure hierarchy			
Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed adverse Effect	No specific measures required
Table 1 National Planning Practice Guidance noise exposure hierarchy (continued)			

Perception	Perception	Perception	Perception
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows for some of the time because of the noise. Potential for non-awakening sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. having to keep windows closed most of the time, avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

2.3.4 The Noise Policy Statement for England refers to the World Health Organisation (WHO) when discussing noise impacts. The WHO Guidelines for Community Noise 1999 suggest guideline values for internal noise exposure which take into consideration the identified health effects and are set, based on the lowest effect levels for general populations. Guideline values for annoyance which relate to external noise exposure are set at 50 or 55 dB(A), representing day time levels below which a majority of the adult population will be protected from becoming moderately or seriously annoyed respectively.

The following guideline values are suggested by WHO:

- 35 dB L_{Aeq} (16 hour) during the day time in noise sensitive rooms
- 30 dB L_{Aeq} (8 hour) during the night time in bedrooms
- 45 dB L_{Amax} (fast) during the night time in bedrooms
- 50 dB L_{Aeq} (16 hour) to protect majority of population from becoming moderately annoyed
- 55 dB L_{Aeq} (16 hour) to protect majority of population from becoming seriously annoyed

2.3.5 British Standard 8233 “Guidance on sound insulation and noise reduction for buildings” 2014 bases its advice on the WHO Guidelines. In addition, for internal noise levels it states;

“Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.”

2.3.6 Furthermore, with regard to external noise, the Standard states;

“For traditional external areas that are used for amenity space such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq, T}$ with an upper guidance value of 55 dB $L_{Aeq, T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited”.

2.3.7 The NPPG summarises the approach to be taken when assessing noise. It accepts that noise can override other planning concerns, but states:

“Neither the Noise Policy Statement for England nor the National Planning Policy Framework (which reflects the Noise Policy Statement) expects noise to be considered in isolation, separate from the economic, social and other environmental dimensions of proposed development”.

3 NOISE SURVEY

- 3.1.1 On the 18th and 19th March 2014 Wardell Armstrong LLP carried out a noise survey to assess the noise levels across the development site.
- 3.1.2 Access to the proposed development site was not available during any period of the survey. Alternative monitoring locations were therefore selected at locations considered representative of the proposed development, including receptors adjacent to Acrefield Road.
- 3.1.3 Attended noise measurements were taken at two monitoring locations considered to be representative of proposed residential receptors. The monitoring locations are as follows, and are shown on Drawing Number LE12813-001:
- Monitoring Location 1: Approximately 180 metres to the south of the site, approximately 3.5m from Acrefield Road. This location was selected to be representative of proposed dwellings in the western part of the site, closest to Acrefield Road.
 - Monitoring Location 2: In the southern part of the site, approximately 5m from the southern site boundary with Hunts Cross Avenue. This location was selected to be representative of proposed dwellings in the southern and eastern part of the site, closest to Hunts Cross Avenue and further away from Acrefield Road.
- 3.1.4 Attended noise monitoring was carried out during the following periods:
- Between 04:10 and 07:00 hours on the 18th March 2014. This time period is considered to be representative of the highest levels of transportation noise during the night-time period; and
 - Between 16:00 and 18:30 hours on the 19th March 2014. This time period is considered to be representative of the evening peak hour transportation noise and therefore the highest levels of transportation noise during the daytime period.
- 3.1.5 The noise measurements were made using a Class 1, integrating sound level meter. The sound level meter was mounted vertically on a tripod 1.5m above the ground and more than 3.5 metres from any other reflecting surfaces.

- 3.1.6 All noise monitoring took place during dry conditions with wind speeds of less than 5m/s. The sound level meter was calibrated to a reference level of 94dB at 1kHz both before, and on completion of, the noise survey. No drift in the calibration during the survey was noted.
- 3.1.7 For the purpose of this assessment, daytime hours are taken to be 0700 to 2300 hours and night-time hours to be 2300 to 0700 hours.
- 3.1.8 A-weighted¹ L_{eq} ² noise levels were recorded to comply with the requirements of WHO 1999. A-weighted L_{90} ³ and L_{10} ⁴ noise levels, together with the maximum and minimum sound pressure levels, were also recorded to provide additional information. The measured noise levels are set out in full in Appendix A.
- 3.1.9 Observations and detailed notes were made throughout the attended survey, to allow the significant noise sources which contributed to each of the measured levels to be identified. The observations identified the following significant noise sources at the site:

Road Traffic Noise: Road traffic on Acrefield Road was the dominant source of noise at monitoring location 1 and noise from both Gateacre Brow and Acrefield Road was audible at monitoring location 2.

Birdsong: Birdsong was audible at all locations during the daytime and night-time periods.

¹ A' Weighting	An electronic filter in a sound level meter which mimics the human ear's response to sounds at different frequencies under defined conditions
² L_{eqs}	Equivalent continuous noise level; the steady sound pressure which contains an equivalent quantity of sound energy as the time-varying sound pressure levels.
³ L_{90}	The noise level which is exceeded for 90% of the measurement period.
⁴ L_{10}	The noise level which is exceeded for 10% of the measurement period.

4 NOISE IMPACT ASSESSMENT

4.1 Existing Noise Levels

4.1.1 The measured noise levels for each monitoring location have been divided into daytime (0700-2300 hours) and night-time (2300-0700 hours) categories. The individual levels have been arithmetically averaged to give a single daytime and night-time level for each location. The results for each of the monitoring locations are presented in Table 2.

Table 2: Average Daytime and Night-time Noise Levels (Figures in dB L _{Aeq})		
Time	Monitoring Location	Average Measured Noise Level
0700-2300	1	71
2300-0700		66
0700-2300	2	53
2300-0700		47

4.1.2 Based on the results obtained, a robust assessment can be made of the noise levels at the site, and of the mitigation necessary to achieve the required internal night-time noise levels at the development.

4.1.3 The maximum noise levels recorded during each night-time period of the survey, at each of the monitoring locations, are summarised in Table 3.

Table 3: Summary of the Maximum Night-time Noise Levels (Figures in dB L _{Amax})	
Monitoring Location	Maximum Measured Noise Level
1	83
2	65

4.2 Assessment of Daytime Noise Levels in Outdoor Living Areas

- 4.2.1 Table 2 shows that during the daytime, noise levels affecting the development site would be between 53.3dB L_{Aeq} and 71.1dB L_{Aeq} at the southern and western boundaries respectively.
- 4.2.2 The eastern area of the site is screened from Gateacre Brow by existing properties to the north and therefore the primary noise source is considered to be Acrefield Road. Noise levels will decrease across the site proportionally to the distance from Acrefield Road. Noise measurements made at Monitoring Location 2, adjacent to the southern site boundary are therefore considered to be representative of the eastern part of the site also. Therefore noise levels in the eastern part of the site will meet the upper guideline value presented in WHO and BS8233 of 55dB $L_{Aeq(16 \text{ hour})}$.
- 4.2.3 Noise levels along the western boundary, adjacent to Acrefield Road, will be above 55dB $L_{Aeq(16 \text{ hour})}$ therefore mitigation will be required for dwellings closest to and with direct line of sight of Acrefield Road.

4.3 Assessment of Daytime Noise Levels in Living Rooms and Bedrooms

- 4.3.1 The measured daytime noise levels, as detailed in Table 2, have been used to determine the noise levels likely at the façades of properties in the vicinity of the monitoring locations during the daytime period.
- 4.3.2 Before internal noise levels can be calculated 3dB(A) must be added to the freefield measured levels to allow for the reflection of noise from the proposed housing façades when the buildings are in place.
- 4.3.3 The calculated noise levels at the façades of the properties, together with the level of attenuation required to achieve 35dB L_{Aeq} in the living room and bedroom areas, are summarised in Table 4.

Table 4: Façade Noise Level at Properties in the Vicinity of the Monitoring Locations and Level of Attenuation Required to Achieve the Internal Daytime Noise Limit (Figures in dB(A))		
Residential Properties	Noise Level at the Façade of the Property	Level of Attenuation Needed To Achieve Noise Limit in Living Room and Bedroom Areas
Residential properties in the western part of the site nearest to Acrefield Road, i.e, Monitoring Location 1	68*	33
Residential properties in the eastern part of the site, i.e, Monitoring Location 2	56	21

* Measured noise level has been distance corrected to the proposed residential façades, to determine the noise levels representative of the residential areas in the western part of the site, located nearest to Acrefield Road according to the Proposed Site Layout provided by Macbryde Homes Limited (Drawing Number GL-SL01).

- 4.3.4 The façades of the properties further into the site will be protected by the buildings themselves and/or screened by other buildings. It is considered that the noise levels at these façades, and therefore the level of attenuation the façades would need to provide to achieve 35dB L_{Aeq} in the living room and bedroom areas, will be less than those detailed in Table 4.

4.4 Assessment of Night-time Noise Levels in Bedrooms

- 4.4.1 The calculated and measured night-time noise levels, as detailed in Tables 2 and 3, have been used to determine the noise levels likely at the façades of properties in the vicinity of the monitoring locations, during the night-time period.
- 4.4.2 Before internal noise levels can be calculated 3dB(A) must be added to the freefield measured levels to allow for the reflection of noise from the proposed housing facades when the buildings are in place.
- 4.4.3 The calculated noise levels at the façades of properties, together with the level of attenuation required to achieve 30dB L_{Aeq} and 45dB $L_{Amax,f}$ in the bedrooms, are summarised in Table 5.

Table 5: Façade Noise Level at Properties in the Vicinity of the Monitoring Locations and Level of Attenuation Required to Achieve the Internal Night-time Noise Limit (Figures in dB(A))			
Residential Properties	Noise Level at the Façade of the Property (L_{Aeq})	Maximum Noise Level at the Façade of the Property (L_{Amax})	Level of Attenuation Needed To Achieve the Noise Limits in Bedrooms
Residential properties in the western part of the site nearest to Acrefield Road, i.e, Monitoring Location 1	62*	73*	32
Residential properties in the eastern part of the site, i.e, Monitoring Location 2	50	68	23

* Measured noise level has been distance corrected to the proposed residential facades, to determine the noise levels representative of the residential areas in the western part of the site, located nearest to Acrefield Road according to the Proposed Site Layout provided by Macbryde Homes Limited (Drawing Number GL-SL01).

- 4.4.4 The facades of the properties further into the site will be protected by the buildings themselves and/or screened by other buildings. It is considered that the noise levels at these facades, and therefore the level of attenuation the facades would need to provide to achieve the 30dB L_{Aeq} and 45dB $L_{Amax,f}$ in the bedrooms, will be less than those detailed in Table 5.

5 NOISE ATTENUATION SCHEME

5.1 Outdoor Living Areas

- 5.1.1 The existing noise levels in outdoor living areas, as detailed in Table 2 and section 4.2 of this Report, indicate that the outdoor living areas in the southern and eastern areas of the site, will achieve 55dB L_{Aeq} , as stated in the WHO guidelines and BS8233:2014.
- 5.1.2 The results of the noise survey together with prediction calculations indicate that the recommended daytime noise guideline value of 55dB L_{Aeq} will be exceeded in outdoor living areas located nearest to, and with a direct line of sight of, Acrefield Road therefore mitigation measures are required.
- 5.1.3 The construction of a noise barrier in the form of close boarded fencing at least 1.8 metres high with a density of at least 10kg/m², along the western and northern site boundaries adjacent to plots 1, 2 and 3 (see Proposed Site Layout GL-SL01), as detailed in table 6, will provide sufficient attenuation of road traffic noise, to ensure that noise levels in the central part of outdoor living areas are below the upper WHO guideline value of 55dB L_{Aeq} , at Plots 1, 2 and 3.
- 5.1.4 The provision of this specific noise barrier is required to ensure that the central part of the outdoor living area at the most exposed dwelling, Plot 1, meets the upper guideline value of 55dB L_{Aeq} . This noise barrier will also have the beneficial effect of reducing the noise levels in outdoor living areas at Plots 2 and 3 to below the lower WHO guideline value of 50dB L_{Aeq} .

Table 6: Noise Level Within Outdoor living Areas, Including Barrier Mitigation, Closest to and With Direct line of Sight of Acrefield Road (Figures in dB(A))			
Central Outdoor Living Area at:	Plot 1 (10m)	Plot 2 (30m)	Plot 3 (45m)
Noise level adjacent to Acrefield Road (measured at 3.5m), (L_{Aeq})	71		
Barrier Attenuation (1.8m high, close boarded fence along western and northern site boundaries)	14	14	14
Distance attenuation.	5	9	11
Predicted noise level within the central part of outdoor living areas, (L_{Aeq})	52	48	46

- 5.1.5 Properties further into the site will be screened by the proposed residential buildings themselves and would therefore be likely to achieve the required daytime noise levels.
- 5.1.6 The exact location of the proposed noise barriers are shown in Appendix B, It should be noted that the final height and location of noise barriers will depend upon the final layout of the site.

5.2 Glazing Requirements for Living Room and Bedroom Areas during the Daytime

- 5.2.1 When assessing daytime noise levels in living rooms the noise attenuation provided by the overall building facade should be considered. To mitigate noise levels, the composition of the building facade can be designed to provide the level of attenuation required. Glazing is generally the building element which attenuates noise the least, so the proportion of glazing in a building facade is an important consideration when assessing overall noise attenuation.
- 5.2.2 In the absence of design details for the building facades, it has been assumed that the glazing to noise sensitive rooms would comprise about 25% of the facade area. To calculate the overall attenuation provided by this percentage of glazing in a brick or block facade, a non-uniform partition calculation can be used.
- 5.2.3 The calculation combines the different degrees of attenuation of the wall element and the window element. A facade element comprising a solid brick or blockwork, will attenuate by 45-50dB (British Standard 8233: "Sound insulation and noise reduction for buildings – Code of practice" 1999) whereas standard double glazing will attenuate road traffic noise by 26-29dB(A) (BRE Digest 379 "Double glazing for heat and sound insulation"). The overall noise attenuation provided by this combination is, therefore, between 32dB(A) and 35dB(A).
- 5.2.4 The noise attenuation requirements for living rooms in properties in different areas of the site are summarised in Table 4. The requirements indicate that standard thermal double glazing would ensure that internal noise levels are met with the windows closed. However, with windows open, the attenuation provided by the façade will be approximately 15dB(A). This would allow the recommended internal noise limit in some living rooms located nearest to, and with a direct line of sight of Acrefield Road.

- 5.2.5 On occasions this may be acceptable to the resident, but when quiet conditions are required, the resident should be able to close the windows whilst maintaining adequate ventilation. Some form of acoustic ventilation would therefore need to be installed in some of the living rooms. Alternatively, to meet the required noise levels, sensitive rooms could be located on the screened side of the proposed buildings, away from the main source of noise.
- 5.2.6 Proposed dwellings further into the site will be protected by the buildings themselves and/or screened by other buildings, from the main source of noise to the west and north, Acrefield Road and Gateacre Brow. These façades are likely to achieve 35dB L_{Aeq} in living rooms which can be provided by standard thermal double glazing, even with windows open.
- 5.2.7 Glazing requirements can be confirmed, on a plot by plot basis, before commencement of the development.

5.3 Glazing Requirements for Bedroom Areas during the Night Time

- 5.3.1 The noise attenuation requirements for bedrooms across the site areas are summarised in Table 5. The requirements indicate that standard thermal double glazing, as detailed in paragraph 5.2.3, would ensure that the internal noise limits are met with windows closed at the proposed bedroom locations.
- 5.3.2 However, with windows open, the attenuation provided by the façade will be approximately 15dB(A). This would allow the recommended internal noise limit to be exceeded in some bedrooms located nearest to Acrefield Road.
- 5.3.3 Some form of acoustic ventilation would therefore need to be installed in bedrooms to the west of the site. Alternatively, to meet the required noise levels, bedrooms could be located on the screened side of the proposed buildings, away from the main source of noise, Acrefield Road.
- 5.3.4 Glazing requirements can be confirmed, on a plot by plot basis, before commencement of the development.

5.4 Acoustic Ventilation Requirements

- 5.4.1 It is recommended that the acoustic ventilation proposed at the site should, as a minimum, comply with Building Regulations 2000 Approved Document F1 Means of Ventilation and British Standard BS5925 1991: "Code of Practice for Ventilation Principles and Designing for Natural Ventilation". Acoustic ventilation is only recommended for noise sensitive rooms, which are bedrooms and living rooms.
- 5.4.2 The implementation of the recommended glazing together with appropriate acoustic ventilation should ensure that the required internal daytime and night-time noise limits are achieved.
- 5.4.3 The façades of some of the properties further into the site will be protected by the buildings themselves and/or screened by other buildings. Therefore, acoustic ventilation may not be required for these plots. The requirement for acoustic ventilation can be confirmed on a plot by plot basis, before commencement of the development.

6 CONCLUSIONS

- 6.1.1 Wardell Armstrong has carried out a noise assessment for the proposed residential development located at Gateacre Garden Centre, Liverpool.
- 6.1.2 The dominant noise source, which will potentially affect the residents of the proposed residential development, is road traffic on Acrefield Road and Gateacre Brow.
- 6.1.3 The results of the noise survey and assessment indicate that to achieve the guideline value of 55dB_{L_{Aeq} (16 Hour)} in outdoor living areas, acoustic mitigation would be required for those areas located nearest to, and with a direct line of sight to Acrefield Road in the form of close boarded fencing along the western and northern boundaries of plots 1, 2 and 3 as shown in Appendix B. Where gardens are located further into the site, it is unlikely that any further noise mitigation will be required.
- 6.1.4 The implementation of the standard thermal insulating glazing should ensure that internal noise levels are met in living rooms and bedroom areas across the development with the windows closed.
- 6.1.5 Acoustic ventilation would need to be incorporated within bedrooms located nearest to, and with a direct line of sight to Acrefield Road, to enable the windows to remain closed whilst allowing necessary ventilation.
- 6.1.6 The facades of the properties further into the site will be protected by the buildings themselves and/or screened by other buildings. Acoustic ventilation would not necessarily need to be installed in the living rooms and/or bedrooms of these properties. However, the requirement for glazing and acoustic ventilation can be confirmed, before commencement of the development.

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Appendix A

Noise Monitoring Results

Monitoring Location 1 - 3.5m from Acrefield Road						
Time	L _{Aeq} (dB)	L _A min (dB)	L _A max (dB)	L _{A90} (dB)	L _{A10} (dB)	Comments
18/03/2014 - Night time						
0410-0425	57.2	30.1	80.1	33.1	51.4	Occasional road traffic along Acrefield Road. Birdsong.
0524-0536	66.6	40.0	82.1	45.5	71.3	Frequent road traffic along Acrefield Road. Birdsong.
0607-0622	67.8	40.7	80.9	44.9	73.3	Frequent road traffic along Acrefield Road. Birdsong.
0646-0701	70.3	44.6	83.0	51.8	74.7	Near Constant road traffic along Acrefield Road. Birdsong.
19/03/2014 - Day time						
1602-1617	70.9	52.8	84.1	61.8	74.1	Near Constant road traffic along Acrefield Road. Birdsong.
1659-1714	71.6	52.8	85.5	63.4	74.3	Near Constant road traffic along Acrefield Road. Birdsong.
1751-1806	70.9	48.3	81.5	62.0	74.2	Frequent road traffic along Acrefield Road. Birdsong. Wind in trees.

Monitoring Location 2 - Huts Cross Avenue						
Time	L _{Aeq} (dB)	L _A min (dB)	L _A max (dB)	L _{A90} (dB)	L _{A10} (dB)	Comments
18/03/2014 - Night time						
0448-0503	47.2	34.6	63.9	38.8	50.3	Distant road traffic from the north east. Birdsong.
0545-0602	47.0	38.7	65.4	41.1	49.8	Distant road traffic from the north east. Birdsong.
0626-0641	47.2	41.0	62.3	43.6	49.1	Distant road traffic from the north east. Birdsong.
19/03/2014 - Day time						
1630-1645	51.1	45.8	61.2	47.6	53.2	Occasional road traffic on Acrefield Road. Distant road traffic from the north east. Birdsong.
1727-1742	56.4	46.9	69.2	48.1	61.9	Occasional road traffic on Acrefield Road. Distant road traffic from the north east. Birdsong.
1811-1826	52.4	46.6	74.0	48.6	54.5	Occasional road traffic on Acrefield Road. Distant road traffic from the north east. Birdsong. Wind in trees.

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REFERENCE

— SITE BOUNDARY

⊗ NOISE MONITORING LOCATION



A	First Issue		02/02/15	EG	MTW
REVISION	DETAILS	DATE	ISSUED	BY	APP'D
CLIENT	Machryde Homes Limited				

PROJECT	Gateacre Garden Centre				
DRAWING TITLE	Noise Monitoring Locations				

DRG No.	SCALE	DATE
LE12813-001	1:2500 @ A3	16/01/15
DRAWN BY	CHECKED BY	APPROVED BY
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<input type="checkbox"/> STONE-ON-TRENT	<input type="checkbox"/> CANOE	TEL 0203 2072 9191
<input type="checkbox"/> (HEAD OFFICE)	<input checked="" type="checkbox"/> LEIGH	TEL 01942 280701
<input type="checkbox"/> NEWCASTLE UPON TYNE	<input type="checkbox"/> SHEFFIELD	TEL 0114 245 6244
<input type="checkbox"/> WEST BROMWICH	<input type="checkbox"/> ENNIBURGH	TEL 0131 555 3311
<input type="checkbox"/> LONDON	<input type="checkbox"/> LIVERPOOL	TEL 0151 434 4431



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