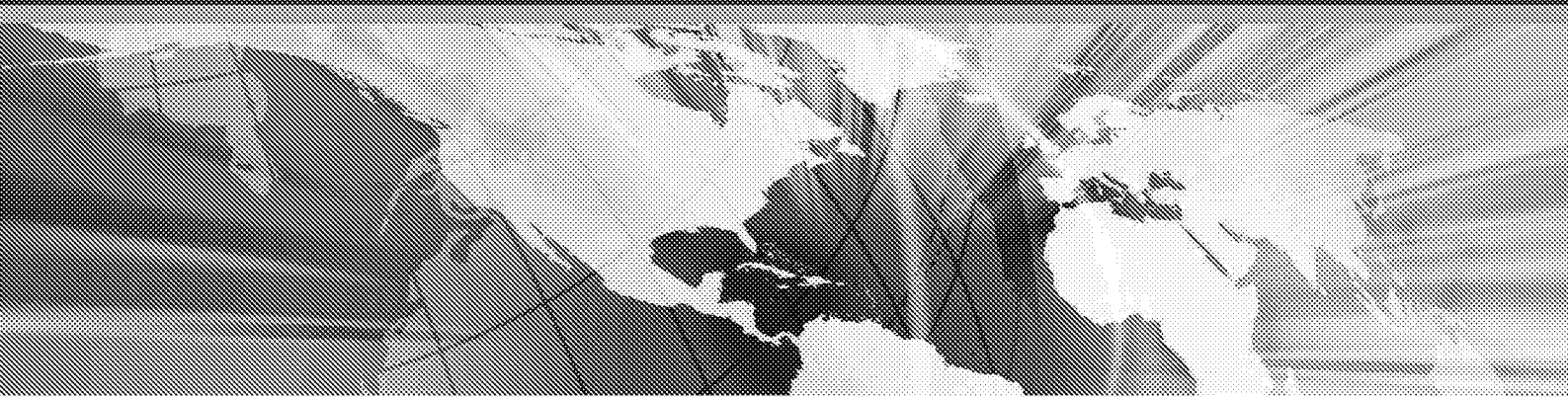




GLADMAN DEVELOPMENTS LTD

LAND OFF ARUNDEL ROAD, ANGMERING

NOISE ASSESSMENT REPORT

JANUARY 2018

your earth our world



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GLADMAN DEVELOPMENTS LTD

Land off Arundel Road, Angmering

Noise Assessment Report

January 2018

PREPARED BY:

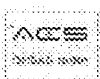
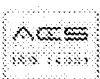
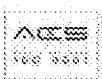
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WASTE RESOURCE MANAGEMENT

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Appendix A	Noise Monitoring Results
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LE14250-001	Noise Monitoring Locations
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1 INTRODUCTION

- 1.1.1 By email instruction from Mr Steve Barker of Gladman Developments Limited, Wardell Armstrong LLP was commissioned to undertake a noise assessment for a proposed residential development at Land off Arundel Road, Angmering, West Sussex.
- 1.1.2 The development proposals comprise up to 200 dwellings with associated open space. The site boundary is shown on drawing LE14250 -001.
- 1.1.3 To the north, the site is bordered by open land and woodland, with the A27 approximately 200m beyond the northern boundary. To the east, the site is bordered by Arundel Road and open land, with woodland and Acorns Campsite beyond. To the south, the site is bordered by a recreation ground and sports facilities including buildings of the Angmering Sports and Social Club, with existing residential properties beyond. To the west, the site is bordered by open land.
- 1.1.4 The south eastern section of the site is currently occupied by various commercial units including a garage/automotive supply business, a window supply/double glazing business, a small caravan park, and a small builder's yard located to the south of the current site access road. It is understood that all the commercial units currently located within the site will be removed/relocated, prior to redevelopment.
- 1.1.5 The noise assessment report has been prepared in support of the outline planning application for the proposed residential development. The 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 On the 9th November 2017, the potential impacts of the proposed development and general principles of the assessment methodology were sent to Ms Carol Reynolds, Senior Environmental Health Officer at Arun District Council.

2.1.2 Due to time constraints, the noise survey had to be carried out before a response was received. The survey was carried out on the 28th November 2017.

2.1.3 On the 5th December 2017 a response was received from Ms Reynolds. A copy of Ms Reynolds email is included within Appendix B, and a summary is detailed below:

- Survey should include potential noise from Angmering Sports and Social Club to the south of the site, and Hammerpot Garage and Oakhurst wood yard to the north;
- Survey should include noise from the existing commercial units within the development site, as noise nuisance might ensue should closure of any of the units fail to materialise;
- Noise survey should be carried out over 3 days including 2 weekdays and a Saturday; and
- Survey should include locations in to the east and south.

2.1.4 With regard to the first point, the potential noise sources are addressed within Section 3 of this report.

2.1.5 With regard to the second point, it is understood that the developer will ensure that all units are vacated prior construction of the development. The existing commercial area will need to be demolished completely in order to make way for residential dwellings. Therefore, noise from the commercial units located within the site has not been considered within this assessment.

2.1.6 With regards to the third point, the noise survey was carried out between 0124 and 1303 hours, on Tuesday 28th November. The selected survey duration is considered to be representative and suitably robust for use within the assessment. The chosen duration covers the majority of the night time period, together with the peak night (0500 to 0700) and peak day (0700 to 1000) periods, and a 3 period for use with the CRTN shortened measurement procedure (1000 to 1300).

2.1.7 Furthermore, the survey was carried out with a positive wind vector from the north east (i.e. the direction of the A27 from the site), and therefore presents a worst-case scenario. Therefore, an additional survey (covering the requested period) has not been carried out, as the only noise sources audible at the site was road traffic which is similar each day.

2.1.8 With regards to the last point, audible off-site noise sources surrounding the site are addressed within Section 3 of this report.

2.1.9 The scope of this assessment comprises a consideration of noise at the sensitive areas of the proposed development, i.e. proposed residential areas, specifically in terms of the potential impact of existing transportation and where appropriate, industrial noise.

2.1.10 The noise assessment takes into account current guidance including:

- National Planning Policy Framework, 2012 (NPPF);
- Planning Practice Guidance - Noise, 2014 (PPG);
- Noise Policy Statement for England, 2010 (NPSE);
- The World Health Organisation Guidelines for Community Noise 1999 (WHO);
- British Standard 8233: 2014 Guidance on Sound Insulation and Noise Reduction for Buildings (BS8233); and
- ProPG Planning & Noise: Professional Practice Guidance on Planning and Noise (2017)

2.2 Noise Survey

2.2.1 As part of this assessment, Wardell Armstrong LLP has carried out an attended and unattended 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.

2.3.4 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
		No Observed Effect Level	
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
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, eg turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported 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, eg avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in	Significant Observed Adverse Effect	Avoid

	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.		
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

2.3.5 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.

2.3.6 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

2.3.7 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."

2.3.8 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”.

2.3.9 The PPG 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”.

2.3.10 ProPG Planning and Noise provides professional practice guidance in relation to new residential development exposed to noise from transport sources. It provides practitioners with a recommended approach to the management of noise within the planning system in England.

2.3.11 The guidance reflects the Government’s overarching National Planning Policy Framework, the Noise Policy Statement for England, and Planning Practice Guidance (including PPG-Noise) and draws on other authoritative sources of guidance. It provides advice for Local Planning Authorities and developers, and their professional advisers, on achieving good acoustic design in and around new residential developments.

3 NOISE SURVEY

3.1.1 On Tuesday 28th November 2017 Wardell Armstrong LLP carried out a noise survey at the development site.

3.1.2 Noise measurements were carried out at a single monitoring location, between 0124 and 1303 hours on the 28th November 2017. The monitoring location is detailed in Table 2, and is shown on Drawing Number LE14250-001.

Table 2: Summary of Noise Monitoring Locations		
Monitoring Location Number	Location Description	Monitoring Description
1	In the north eastern part of the site, approximately 10m from Arundel Road.	Partially Attended (with Continuous Audio Recording)

3.1.3 The noise measurements were made using a two Class 1, integrating sound level meter. In accordance with guidance, the microphone was mounted vertically on a tripod 1.5m above the ground and more than 3.5 metres from any other reflecting surfaces.

3.1.4 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.

3.1.5 The weather conditions during the night time were as follows:

- North Westerly winds up to 3m/s;
- Dry ground;
- Temperature approximately +6°C; and,
- Less than 5% cloud cover.

3.1.6 The weather conditions during the daytime were as follows:

- North Westerly winds up to 2m/s;
- Dry ground;
- Temperature approximately +11°C; and,
- Less than 5% cloud cover.

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 measured to comply with the requirements of WHO and BS8233. A-weighted L_{90} ³ and L_{10} ⁴ noise levels, together with the maximum and minimum sound pressure levels, were also measured to provide additional information. The measured noise levels are set out in full in Appendix A.
- 3.1.9 Attended noise monitoring allows observations and detailed notes to be made of the significant noise sources which contribute to each of the measured levels. The observations identified the following:
- Road Traffic Noise:** Noise from road traffic on the A27 was most dominant in the northern part of the site, and occasional road traffic on Arundel Road was audible in the north eastern part of the site. A slight reduction in the level of road traffic noise was noted during the night time.
- Other Sources:** Birdsong was audible during the daytime survey.
- 3.1.10 During the night time and daytime survey, a site walkover was carried out at on-site and off-site locations, to investigate other potential noise sources. However, no other sources of noise were audible.
- 3.1.11 No noise was audible from Hammerpot Garage or Oakhurst Woodyard. Both of these potential noise sources are located 170m beyond the northern boundary, and adjacent to the A27, and it is unlikely that noise from these sources would be audible above the road traffic noise.
- 3.1.12 At the time of the survey, it is believed that no events were taking place at Angmering Sports and Social Club, or on the playing fields, therefore noise from this source was not audible. However, the Sports and Social Club is located approximately 85m beyond the southern site boundary, and there are a large number of existing residential dwellings (on Decoy Drive and Palmer Road), located in close proximity to the building (at least 15m).

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

- 3.1.13 A review of the typical activities and recent events occurring at the venue, indicate that it is a local facility used for small scale events. Additionally, Ms Reynolds did not indicate that there has been a history of noise complaints from the venue. Therefore, it is not envisaged that noise from this source will be an issue.
- 3.1.14 The only noise sources audible during the survey was road traffic on the A27 and Arundel Road, therefore noise monitoring was carried out at a single location in the north eastern part of the site, to reflect the location of the nearest proposed dwellings to the sources of noise. Therefore, the results of the survey are considered to be representative and suitably robust.

4 NOISE IMPACT ASSESSMENT

4.1 Measured Noise Levels

4.1.1 The measured noise levels for the monitoring location, have been divided into daytime (0700-2300 hours) and night time (2300-0700 hours) categories, and are presented in Table 3.

Table 3: Daytime and Night time Noise Levels (Figures in dB L _{Aeq})		
Time	Monitoring Location	Measured Noise Level
0700-2300	1	59
2300-0700		51

4.1.2 At ML1, a daytime noise level of 57.8 dB L_{Aeq} (16 hours) was calculated from 3 consecutive one hour measurements using the CRTN shortened measurement procedure, and the L_{A10} to L_{Aeq} adjustment method. The average measured daytime noise level, including peak hour traffic (0700 to 1000 hours), was 58.5 dB L_{Aeq}. To be robust, the higher level of 58.5 dB L_{Aeq} (rounded to 59 dB L_{Aeq}) has been used in this assessment.

4.1.3 The maximum noise level at the monitoring location, measured during the night time period of the survey, is summarised in Table 4.

Table 4: Summary of the Maximum Night time Noise Levels (Figures in dB L _{Amax})	
Monitoring Location	Maximum Noise Level
1	67

4.1.4 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 noise levels at the development.

4.2 Assessment of Daytime Noise Levels in Outdoor Living Areas

4.2.1 The measured daytime noise levels, as detailed in Table 3, have been used to determine the noise levels likely in outdoor living areas of properties in the vicinity of the noise sources during the daytime period.

4.2.2 The noise levels within garden areas, together with the level of attenuation required to achieve the upper guideline value of 55dB L_{Aeq}, recommended by BS8233 and the WHO Guidelines during the daytime in outdoor living areas, are summarised in Table 5.

Table 5: Noise Levels at Properties in the Vicinity of the Monitoring Locations and Level of Attenuation Required to Achieve the Recommended External Daytime Guideline Value (Figures in dB(A))		
Residential Properties	Noise Level in Outdoor Living Areas	Level of Attenuation Needed To Achieve Noise Guideline Value in Outdoor Living Areas
Residential properties in northern and north eastern parts of the development site, closest to the A27 and Arundel Road i.e. Monitoring Location 1.	59	4

4.2.3 Table 5 shows that during the daytime, the noise levels affecting the northern and north eastern parts of the development site (i.e. nearest to the main off-site noise sources), is above the guideline value of 55dB L_{Aeq} . Therefore, mitigation measures are required.

4.3 Assessment of Daytime Noise Levels in Living Rooms and Bedrooms

4.3.1 The measured daytime noise levels, as detailed in Table 3, have been used to determine the noise levels likely at the facades 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 facades when the buildings are in place.

The calculated noise levels at the facades of the properties, together with the level of attenuation required to achieve 35dB L_{Aeq} during the daytime, in the living room and bedroom areas, are summarised in Table 6.

Table 6: Facade Noise Level at Properties in the Vicinity of the Monitoring Locations and Level of Attenuation Required to Achieve the Internal Daytime Guideline Value (Figures in dB(A))		
Residential Properties	Noise Level at the Facade of the Property	Level of Attenuation Needed To Achieve the Noise Guideline Value in Living Room Areas
Residential properties in northern and north eastern parts of the development site, closest to the A27 and Arundel Road i.e. Monitoring Location 1.	62	27

4.3.3 The facades of properties further into the site will be screened by the intervening 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 35dB L_{Aeq} during the daytime in the living room and bedroom areas, will be less than those detailed in Table 6.

4.4 Assessment of Night Time Noise Levels in Bedrooms

4.4.1 The measured night time noise levels, as detailed in Tables 3 and 4, have been used to determine the noise levels likely at the facades of properties in the vicinity of the monitoring locations, during the night-time period.

4.4.2 To be robust, the noise levels at these facades are based on the highest maximum measured noise levels recorded during the night-time survey. 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 facades 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 7.

Table 7: Facade Noise Level at Properties in the Vicinity of the Monitoring Locations and Level of Attenuation Required to Achieve the Internal Night-time Guideline Values (Figures in dB(A))			
Residential Properties	Noise Level at the Facade of the Property (L_{Aeq})	Maximum Noise Level at the Facade of the Property ($L_{Amax,f}$)	Level of Attenuation Needed To Achieve the Noise Guideline Values in Bedrooms
Residential properties in northern and north eastern parts of the development site, closest to the A27 and Arundel Road i.e. Monitoring Location 1.	54	70	25

4.4.4 The facades of properties further into the site will be screened by the intervening 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 7.

5 NOISE ATTENUATION SCHEME

5.1 Introduction

5.1.1 The results of the noise assessment, for the proposed residential areas of the development, indicate that noise mitigation measures would need to be incorporated into the proposed site design to ensure that the required noise levels are achieved within internal living rooms and bedrooms.

5.2 Daytime Noise Levels in Outdoor Living Areas

5.2.1 The noise levels, as detailed in Table 3, indicate that outdoor living areas nearest to the main sources of noise will not achieve the required daytime noise level of 55dB L_{Aeq} without mitigation measures.

5.2.2 To mitigate noise in outdoor living areas located closest to, and with a direct line of sight of the A27 and Arundel Road, it is recommended that gardens are located on the screened sides of dwellings, i.e. located with no direct line of sight of the main sources of noise.

5.2.3 Alternatively, close boarded fences and/or wall, with a total height of at least 1.8m could be constructed between garden areas of proposed residential dwellings and the main sources of noise.

5.2.4 With the above mitigation measures in place, all plots will meet the guidance level of 55dB L_{Aeq} suggested by WHO for outdoor living areas.

5.2.5 Properties further into the site will be screened by the proposed residential buildings themselves and would therefore be likely to achieve the required external daytime noise levels.

5.2.6 It should be noted that the final height and location of the above mitigation measures will depend upon the final layout of the site, and mitigation requirements can be confirmed on a plot by plot basis, once a detailed design layout is available.

5.3 Glazing Requirements for Living Rooms and Bedrooms during the Daytime

5.3.1 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.

- 5.3.2 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.
- 5.3.3 The calculation combines the different degrees of attenuation of the wall element and the window element. A facade element comprising solid brick or blockwork, will attenuate by 45dB (British Standard 8233: "Guidance on sound insulation and noise reduction for buildings" 2014) 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).
- 5.3.4 The noise attenuation requirements for living rooms in properties in northern and north eastern parts of the site are summarised in Table 6. The requirements indicate that standard thermal double glazing will be sufficient to ensure that internal noise levels are met with the windows closed.
- 5.3.5 With windows open, the attenuation provided by the façade will be approximately 15dB(A). This would allow the recommended noise guideline value in living rooms to be exceeded, in properties in northern and north eastern parts of the development site.
- 5.3.6 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 to meet the noise guideline value.
- 5.3.7 Alternatively, to meet the required daytime noise levels, living rooms and bedrooms could be located on the screened side of the proposed buildings, facing away from the off-site sources of noise.
- 5.3.8 Proposed dwellings further into the site will be screened by the proposed intervening buildings, from the off-site sources, and will therefore not require an alternative means of ventilation.
- 5.3.9 Glazing requirements can be confirmed, on a plot by plot basis, at the detailed application/reserved matters stage.

5.4 Glazing Requirements for Bedroom Areas during the Night Time

- 5.4.1 The noise attenuation requirements for bedrooms in northern and north eastern parts the site areas are summarised in Table 7.
- 5.4.2 The requirements indicate that standard thermal double glazing, as detailed in paragraph 5.3.3, would ensure that the internal noise limits are met for proposed dwellings across the site, with windows closed.
- 5.4.3 However, with windows open, the attenuation provided by the façade will be approximately 15dB(A). This would mean the recommended WHO internal noise guideline value in bedrooms would be exceeded.
- 5.4.4 Some form of acoustic ventilation would therefore need to be installed in some of the bedrooms facing the off-site noise sources. Alternatively, to meet the required noise levels, bedrooms could be located on the screened side of the proposed buildings, away from the off-site sources of noise.
- 5.4.5 Glazing requirements can be confirmed, on a plot by plot basis, at the detailed application/reserved matters stage.

5.5 Acoustic Ventilation Requirements

- 5.5.1 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.
- 5.5.2 The implementation of standard thermal double glazing together with appropriate acoustic ventilation should ensure that the required internal daytime and night-time noise values are achieved.
- 5.5.3 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.
- 5.5.4 The requirement for acoustic ventilation can be confirmed on a plot by plot basis, at the detailed application/reserved matters stage.

6 CONCLUSIONS

- 6.1.1 Wardell Armstrong has carried out a noise assessment for a proposed residential development located at Land off Arundel Road, Angmering, West Sussex.
- 6.1.2 The dominant noise sources, which will potentially affect the residents of the proposed development, is road traffic on the A27 and Arundel Road.
- 6.1.3 Attended and unattended noise monitoring was carried out at a single monitoring location, on the 28th November 2017. The monitoring location represented the proposed dwellings which are nearest the sources of noise.
- 6.1.4 The resultant noise levels have been assessed against the guideline values suggested by the World Health Organisation. It should be remembered that the internal guideline values are health-based and are therefore relatively inflexible; however adequate noise mitigation is relatively straightforward to engineer. The external guideline values are based on amenity and allow noise to be balanced against any benefits which flow from the location of the proposed scheme.
- 6.1.5 The results of the noise survey and assessment indicate that to meet the guideline value of 55dB_{L_{Aeq}} (16 Hour) in outdoor living areas, acoustic mitigation should be provided for those areas located closest to and with a direct line of sight of the off-site sources of noise in northern and north eastern parts of the site.
- 6.1.6 Gardens could be located on the screened sides of dwellings i.e. not located with a direct line of sight to the off-site sources of noise. Alternatively, it is recommended that standard close boarded fencing or walls of 1.8m in height are installed between the gardens and the off-site sources of noise.
- 6.1.7 With regard to indoor noise limits, standard thermal double glazing should ensure that internal noise limits are met in living rooms and bedrooms across the development site, with the windows closed.
- 6.1.8 However, acoustic ventilation would need to be incorporated within living rooms and bedrooms in northern and north eastern parts of the site, to enable the windows to remain closed whilst maintaining adequate ventilation.
- 6.1.9 The facades of the properties further into the site will be screened by intervening buildings and are likely to comply with WHO guidance. Acoustic ventilation would not need to be installed in these properties.
- 6.1.10 The requirement for glazing and acoustic ventilation can be confirmed, on a plot by plot basis, at the detailed application/reserved matters stage.

6.2 Summary

- 6.2.1 This noise report assesses the results of a noise survey carried out in accordance with current national guidance.
- 6.2.2 The report includes recommendations for noise mitigation as appropriate, and demonstrates that the noise impact associated with the proposed development will be acceptable, and noise can be adequately mitigated.
- 6.2.3 Proposed occupiers will not be exposed to unacceptably high noise levels, and the proposed development will meet the appropriate external and internal noise standards, with the use of mitigation, in compliance with national planning policies.

Appendix A

Noise Monitoring Results

Appendix A

Noise Monitoring Results

Monitoring Location 1						
Time	L _{Aeq} (dB)	L _{Amin} (dB)	L _{Amax} (dB)	L _{A90} (dB)	L _{A10} (dB)	Comments
28/11/2017 - Night Time						
0124-0700	50.8	22.0	67.3	32.8	55.6	Noise from distant road traffic on the A27. Occasional road traffic on Arundel Road.
28/11/2017 - Daytime						
0700-1300	58.5	49.8	74.9	54.8	60.5	Noise from distant road traffic on the A27. Occasional road traffic on Arundel Road. Birdsong.
1000-1100	58.3	51.0	79.7	54.4	60.1	CRTN calculated noise level = 57.8 dB L _{Aeq} 16 hours
1100-1200	59.0	49.8	77.5	54.8	61.3	
1200-1300	59.0	50.8	77.7	54.7	61.0	

Appendix B

Copy of EHO Correspondence

From: Carol Reynolds

Sent: 05 December 2017 18:12

To: Carol Reynolds

Subject: RE: Proposed noise assessment methodology for residential development land at land off Arundel Road, Angmering

Dear Nick,

My apologies for not getting back to you sooner at this very busy time. Thank you for phoning me back earlier today in order to discuss my comments which I now provide for your information.

Thank you for providing detail of noise monitoring which you propose to carry out in respect of what you believe will be residential accommodation at this site as defined. Unfortunately, we cannot concur that the only source of potential adverse noise will result from road traffic along the A27. This is because of other identified potential noise sources, such as the existing commercial units and Angmering Sports and Social Club to the south and Hammerpot Garage and Oakhurst wood yard to the north, may also impact the acoustic environment. Although I understand the developer's intention to close the southern commercial units by the time that this accommodation is completed, you will understand that noise nuisance might ensue should such closure fail to materialise. A comprehensive acoustic assessment is therefore required, which encompasses all possible noise sources as described in your E Mail, 9th November 2017 (below), the industrial units to the south and possibly more. Please would you ensure that 24 hour per day noise monitoring is carried over any 3 days consisting 2 days of the week and a Saturday. Such monitoring should be carried out at a time of year when schools would be operational in order to encompass the added loading to roads in this vicinity at this time. In this case it will be necessary to demonstrate that the readings were obtained not just to the north of the proposed site, but also to the east and west. No readings will be necessary west, since this consists open land. The assessment should provide proper description of the acoustic environment together with mitigation methods which may be necessary to demonstrate that noise levels both within the residential units and in the amenity spaces thereto, will conform to guideline values specified within BS8233:2014, Guidance on Sound Insulation and Noise Reduction for Buildings. For your further information I would also advise you of that document 'Planning Noise Advice Document: Sussex, July 2015,' which applies concurrently to the list of references which you provide.

I am sorry that this will not be the reply which you may have anticipated. Should you wish to discuss any item, then please do not hesitate in getting back to me.

Kind regards

Carol Reynolds BSc(Hons) MCIEH

Senior Environmental Health Officer

Carol Reynolds | Senior Environmental Health Officer, Arun District Council | Location: Arun Civic Centre, Maltravers Road, Littlehampton, BN17 5LF

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Drawings

Noise Monitoring Locations



DO NOT SCALE FROM THIS DRAWING

REFERENCE

- SITE BOUNDARY
 NOISE MONITORING LOCATION

REVISION	DETAILS	DATE	DRN	CHG	APPD

CLIENT Gladman Developments

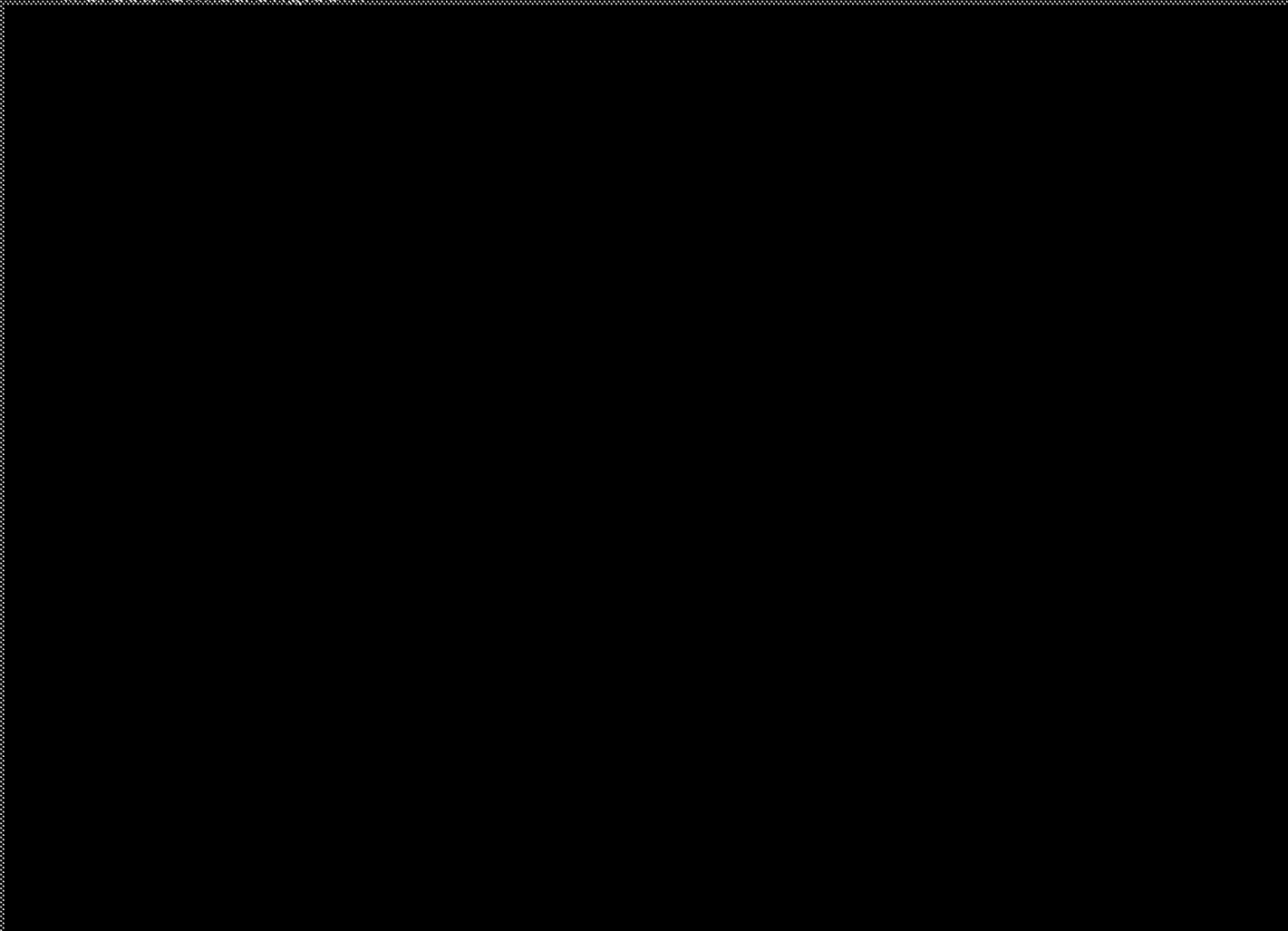
PROJECT Arundel Road
Angmering

DRAWING TITLE Noise Monitoring Locations

DRG No	LE14250-001	REV	A
DRG SIZE	A3	SCALE	1:2500
		DATE	08/01/18
DRAWN BY	SG	CHECKED BY	NA
		APPROVED BY	CMD

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