



Land Allocation Ltd

Land East of Yapton Lane, Walberton BN18 0AN

Noise Impact Assessment

DC3463-R1v2

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Limitations to this Report

This report entails a physical investigation of the site with a sufficient number of sample measurements to provide quantitative information concerning the type and degree of noise affecting the site. The objectives of the investigation have been limited to establishing sources of noise material to carrying out an appropriate assessment.

The number and duration of noise measurements have been chosen to give reasonably representative information on the environment within the agreed time, and the locations of measurements have been restricted to the areas unoccupied by building(s) that are easily accessible without undue risk to our staff.

As with any sampling, the number of sampling points and the methods of sampling and testing cannot preclude the existence of “hotspots” where noise levels may be significantly higher than those actually measured due to previously unknown or unrecognised noise emitters. Furthermore, noise sources may be intermittent or fluctuate in intensity and consequently may not be present or may not be present in full intensity for some or all of the survey duration.

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1.0 INTRODUCTION

1.1 Details of Instruction

Land Allocation Ltd has appointed Dragonfly Consulting to carry out a Noise Impact Assessment in support of a planning application for a proposed residential development on Land East of Yapton Lane, Walberton BN18 0AN.

The noise assessment has been conducted with reference to with the National Planning Policy Framework, the district Local Plan and relevant British Standards and guidance documents.

This report therefore describes a noise survey of the site and the subsequent analysis to determine the noise environment of the proposed development. It then compares the results with the adopted criteria. Recommendations are also made with respect to the design of the development.

Measurement of external noise levels have been completed for the proposed development to allow demonstration by calculation that suitable internal noise levels will be achieved within the most noise exposed rooms.

A glossary of technical terminology has been included at Appendix A to support this document.

1.2 Site Description

1.2.1 Existing Site Conditions

The existing site is currently vacant greenfield land, east of the B2132, Yapton Lane, Walberton. Immediately across Yapton Lane, to the west of the site, is a large number of existing residential properties. Approximately 350 meters to the south is a singular residential property. Approximately 250 meters to the east of the site is St Mary's Church and approximately 720 meters to the north is the A27 Dual Carriageway Road.

1.2.2 Proposed Site Conditions

It is proposed to submit a planning application for outline permission to develop the site for residential use. The application is at outline stage only; the client has requested a noise impact assessment be completed following a pre-app consultation with the Local Authority.

In addition to the existing site, it is requested that the proposed A27 bypass, which is understood to run across the northern edge of the development site, be included in the assessment, so to account for the likely noise levels incident upon the site once the bypass is complete.

2.0 GUIDANCE

2.1 Consultation with Local Authority

Arun District Council (ADC) has not been directly consulted with respect to this application. However, Dragonfly Consulting has undertaken a number of similar assessments nationally and is aware of aims and objectives of a large number of local councils regarding the assessment of noise in this context.

2.2 Local Planning Guidance

The NPPF guides that Local Authorities should create a 'Local Plan'. In creating their plan, the NPPF guides that the planning policies created should *"avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development"*.

Arun Local Plan 2011 to 2031 was adopted by ADC on 18th July 2011. The documents set out a number of Core Policies and Development Policies with respect to development within the local area; the policy of which is considered most relevant to this assessment is shown below:

Policy QE DM1

Noise pollution

1. New noise sensitive development

Residential development likely to experience noise from road, rail or air, in particular development in close proximity to:

- *A284/A259 Wick roundabout*
- *Stretches of the A27 around Arundel and Fontwell*
- *Sections of the A29 and A259 in Bognor Regis*
- *A284 in Littlehampton and*
- *The stretch of railway line that runs through Barnham station*

must:

a. Be supported by a noise exposure category (NEC) assessment and designed to ensure that residents will not be adversely affected by noise.

b. Consider both the likely level of exposure at the time of application and any increase that might be reasonably expected in the foreseeable future.

To safeguard the continued use of existing industrial and commercial uses and to protect amenity, noise sensitive development should not normally be permitted where:

c. High levels of noise will continue throughout the night, especially during the hours when people are normally sleeping.

d. There is a likelihood of complaints about noise from industrial development."

For reference, Tables 21.1 and 21.2 from this section of the document, detailing the NEC assessment matrix identified, are replicated in Tables 2.1 and 2.2 of this report below:

Table 2.1
Noise Exposure Categories for Residential Development (Table 21.1 of Arun Local Plan 2011-2031)

NEC	Description
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

Table 2.2
Noise Exposure Categories for Residential Development (Table 21.2 of Arun Local Plan 2011-2031)

Noise Source	Noise Exposure Categories			
	A	B	C	D
Road Traffic				
07.00-23.00	<55	55-63	63-72	>72
23.00-0700 ⁽⁷⁷⁾	<45	45-57	57-66	>66
Rail Traffic				
07.00-23.00	<55	55-66	66-74	>74
23.00-0700 ⁽⁷⁸⁾	<45	45-59	59-66	>66
Air Traffic ⁽⁷⁹⁾				
07.00-23.00	<57	57-66	66-72	>72
23.00-0700	<48	48-57	57-66	>66
Mixed Sources ⁽⁸⁰⁾				
07.00-23.00	<55	55-63	63-72	>72
23.00-0700	<45	45-57	57-66	>66

The following notes are included with reference to the above tables:

76 The noise level(s) ($L_{Aeq,T}$) used when deciding the NEC of a site should be representative of typical conditions.

77 Night-time noise levels (23.00-07.00): sites where individual noise events regularly exceed 82dB L_{Amax} (5 time weighting) several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq, 8h}$ (except where the $L_{Aeq, 8h}$ already puts the site in NEC D).

78 Night-time noise levels (23.00-07.00): sites where individual noise events regularly exceed 82dB L_{Amax} (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq, 8h}$ (except where the $L_{Aeq, 8h}$ already puts the site in NEC D).

79 Aircraft Noise: daytime values accord with the contour values adopted by the Department for Transport which relate to levels measured 1.2m above open ground. For the same amount of noise energy, contour values can be up to 2dM(A) higher than those of other sources because of ground reflection effects.

80 This refers to any combination of road, rail, air and industrial noise sources. The "mixed source" NECs should only be used where no individual noise source is dominant.

2.3 National Planning Guidance

2.3.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) does not provide any specific or quantified guidance with respect to noise and has withdrawn all previous guidance documents on the assessment of noise for planning purposes, which was detailed in Planning and Policy Guidance 24 (PPG24). Instead, the NPPF places the onus on a local authority to develop a suitable local development plan, within which noise is addressed, taking account of the guidance within the NPPF.

However, much of the previous guidance within PPG24 related to the assessment of noise using other guidance or standards specific to the type or nature of the noise being assessed. These guidance documents and referenced British Standards have not been withdrawn and remain relevant to the assessment of noise impact on a proposed residential development.

Dragonfly Consulting has referred to the guidance detailed in the NPPF and the Noise Policy Statement for England for guidance on assessment of acceptable impact in terms of noise. These documents contain no quantitative guidance with respect to noise.

The NPPF requires at Paragraph 185 that:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life⁶⁵;*
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."*

2.3.2 Noise Policy Statement for England

The document 'Noise Policy Statement for England' sets out the following vision for ongoing noise policy:

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

This vision should be achieved through the following Noise Policy Aims:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.”*

To achieve this vision, the Noise Policy Statement sets 3 noise levels to be defined by the assessor:

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.

The Noise Policy Statement considers that noise levels above the SOAEL would be seen to have, by definition, significant adverse effects and would be considered unacceptable. Where the assessed noise levels fall between the LOAEL and the SOAEL noise levels, the Policy Statement requires that:

“...all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development... This does not mean that such adverse effects cannot occur.”

Where noise levels are below the LOAEL, it is considered there will be no adverse effect. Once noise levels are below the NOEL, there will be no observable change.

2.4 British Standards and Guidance Documents

2.4.1 BS7445-1:2003

The assessment of noise impact for this development has been undertaken by measuring external noise levels in accordance with the guidance detailed in BS7445-1:2003 *Description and Measurement of Environmental Noise – Part 1: Guide to Quantities and Procedures*.

This document defines the basic quantities to be used for the description of noise in community environments and describes basic procedures for the determination of these quantities.

The methods and procedures described in this British Standard are intended to be applicable to sounds from all sources, individually and in combination, which contribute to the total noise at a site. This British Standard does not specify limits for environmental noise.

2.4.2 British Standard 8233

The scope of British Standard 8233:2014: Sound insulation and noise reduction for buildings is the provision of guidance for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations; the primary intention of these is to guide the design of new buildings or refurbished buildings undergoing a change of use rather than to assess the effect of changes in the external noise climate. The standard suggests suitable internal noise levels within different types of buildings, including residential dwellings, as shown in Table 2.4.

Table 2.4
Indoor Ambient Noise Levels in Spaces When They Are Unoccupied

Activity	Typical Situations	Design Range $L_{Aeq,T}$ dB	
		0700h to 2300h	2300h to 0700h
Resting	Living rooms	35	--
Dining	Dining Room / Area	40	--
Sleeping	Bedrooms	35	30

BS8233 states in Note 4 that:

“Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,f}$ depending on the character and number of events per night. Sporadic noise events could require separate values.”

As such, it has been considered appropriate to define a limit for regular maximum noise levels of 45dB(A) with sporadic events not exceeding 50dB(A).

BS8233 also suggests noise limits for external areas or a property such as gardens or balconies. It states that:

“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 guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized 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.”

2.4.3 ProPG: Planning and Noise

The document ‘ProPG: Planning & Noise - Professional Practice Guidance on Planning & Noise’ provides advice for Local Planning Authorities, developers and their respective advisors and compliments government planning, noise policy and guidance. The document seeks to:

- Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- Encourage the process of good acoustic design in around new residential developments;
- Outline what should be taken into account in deciding planning applications for new noise sensitive developments;
- Improve understanding of how to determine the extent of potential noise impact and effect;
- Assist in the delivery of sustainable development.

Following the guidance in paragraph 17 of the NPPF, planning should always seek to secure high quality design and a good standard of amenity for all existing and future occupants of land and buildings. ProPG describes an acoustic design process which seeks to deliver the best acoustic outcome for the site.

It should be noted that the document states:

“The scope of this ProPG is restricted to the consideration of new residential development that will be exposed predominantly (see Section 2) to airborne noise from transport sources (noting that good professional practice should have regard to any reasonably foreseeable changes in existing and/or new sources of noise). New apartments, flats and houses are the most common type of new residential development, however the guidance can also be applied to other types of residential developments such as residential institutions, care homes etc. Some of the content is relevant to other types of noise-sensitive development and to other sources of noise. However, detailed consideration of other noise sensitive development (such as schools and hospitals), other sources of noise (such as dominant noise from industrial, commercial or entertainment premises) and of ground-borne noise and vibration, is outside the scope of this document.”

It is the opinion of Dragonfly Consulting that, in the context of this site that is not intended for long-term residential use, the guidance within this document should be viewed in an advisory, rather than regulatory, capacity.

Good Acoustic Design Objectives

With reference to the guidance set out within the ProPG, the following design objectives are considered to represent good acoustic design and are recommended for this site:

- Full consideration of the acoustic environment from the earliest possible stage of the development process;
- An integrated approach should be taken to achieve optimal acoustic conditions, both internally (inside noise sensitive parts of the building) and externally (in spaces to be used for amenity purposes);
- The basis of good acoustic design should avoid ‘unreasonable’ acoustic conditions and prevent ‘unacceptable’ acoustic conditions as defined by the ProPG. Necessary design compromises should ideally not adversely affect living conditions and the quality of life of inhabitants;
- Using fixed unopenable glazing for sound insulation purposes is generally unsatisfactory and should be avoided;

- Solely relying on sound insulation of the building envelope to achieve acceptable acoustic conditions in new residential development, when other methods could reduce the need for this approach, is not regarded as good acoustic design;
- Evidence should be provided that good acoustic design processes have been followed.

The ProPG empowers the assessing acoustician to assess the acceptability of any noise impact and to establish the need for acoustic mitigation measures by considering the guidance detailed in BS8233:2014 (see Section 3.4) whilst also giving consideration to the context of the site, along with other non-acoustic factors that may affect the need to bring forward a site that is not acoustically ideal.

However, in determining what acoustic conditions would be ‘unreasonable’ and ‘unacceptable’, the ProPG also sets out the following guidance:

“The more often internal LAeq levels start to exceed the internal LAeq target levels by more than 5dB, the more that most people are likely to regard them as “unreasonable”. Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal LAeq levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as “unacceptable” by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing “unacceptable” noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form”.

Additionally, ProPG makes an addendum to Note 4 of the internal noise level guidelines as stated in BS8233:2014 (Figure 2 in the ProPG document), referring to the acceptability of internal night time LAFMax noise levels:

“...In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB LAmax,F more than 10 times a night...”

2.4.4 Calculation of Road Traffic Noise

The Calculation of Road Traffic Noise (CRTN) document provides a method for assessing noise from road traffic in the UK and a method of calculating noise levels from the Annual Average Weekday Traffic (AAWT) flows and from measured noise levels. Since published in 1988 this document has been the nationally accepted standard in predicting noise levels from road traffic. The calculation methods provided include correction factors to take account of variables affecting the creation and propagation of road traffic noise, accounting for the percentage of heavy goods vehicles, different road surfacing, inclination, screening by barriers and relative height of source and receiver.

2.4.5 PR/SE/45/02 – Converting the UK Traffic Noise Index $L_{A10,18h}$ to EU Noise Indices for Noise Mapping (TRL Ltd, 2002)

The TRL document provides a calculation methodology for the conversion of $L_{A10,18h}$ to EU noise indices, including L_{day} , $L_{evening}$, L_{night} and L_{den} , for both motorway and non-motorway sources. Where night-time traffic flow data is not available it is possible to apply the conversion described within this methodology to obtain a reasonable estimation of noise effects during the night-time period.

3.0 ASSESSMENT METHODOLOGY

3.1 Potential Sources of Environmental Noise

The following sources of environmental noise have been considered within this assessment:

Table 3.1
Assessed Sources of Environmental Noise

Potential Noise Source	Relevant Assessment Methodology
Road / Pedestrian Noise	BS 8233:2014

3.2 Selection of Assessment Criteria

Following the guidance set out within the NPPF, ProPG and the aforementioned applicable methodologies, the following assessment criteria has been determined as appropriate for this assessment.

With reference to the guidance in Section 2, the predicted internal levels have been assessed against the following criteria:

- $L_{Aeq,16h}$ (Daytime) – internal levels must not exceed 35dB(A) within living rooms and communal resting areas;
- $L_{Aeq,8h}$ (Night-Time) – internal levels must not exceed 30dB(A) within bedrooms;
- L_{AFMax} (Typical) – internal levels must not exceed 45dB(A) within bedrooms.

These criteria are set as internal noise levels and are based on the criteria detailed in the above table. In addition, the ProPG addendum to Note 4 of the internal noise level guidelines within BS8233:2014 (Figure 2 in the ProPG document), states:

“...In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night...”

As such, it has been deemed appropriate to consider the ‘Typical L_{AFMax} ’ as the 10th highest L_{AFMax} value measured throughout any given night-time period for the duration of the survey.

4.0 ENVIRONMENTAL NOISE SURVEY

Daytime and night-time measurements were undertaken from the 30th to the 31st of March 2021. The noise measurements established typical external ambient and background noise levels at the site.

4.1 Survey Methodology

The equipment used during the survey is detailed in Appendix B. The sound level meters were calibrated before and after the measurements and no significant calibration drifts were found to have occurred (>0.2dB). All of the noise monitoring equipment had been calibrated to a traceable standard within the twenty-four months preceding the survey. Calibration certificates are available on request.

Three measurement locations were surveyed in order to establish the typical ambient and background noise levels at the proposed development site. The measurement locations are hereby referred to in this report as follows:

- 'Location 1' – sound level meter positioned approximately 1.5m from the ground at the north-western corner of the site, adjacent to Yapton Lane.
- 'Location 2' – sound level meter positioned approximately 1.5m from the ground at the south-western corner of the site, adjacent to Yapton Lane.
- 'Location 3' – sound level meter positioned approximately 1.5m from the ground at the south-eastern corner of the site.

The measurement locations are shown in Appendix C.

4.2 Survey Results

The weather during the unattended survey was suitable for the noise measurements, it being dry with low wind speeds.

Summaries of the measured noise levels are given in Table 4.1 below and are available in full upon request.

Table 4.1
Summary of Measured Noise Levels – 30/03/2021 to 31/03/2021 – free field, dB

Location	Date	Period	Time (h)	L _{Aeq, T}	L _{A10}	L _{A90}	L _{AFMax}
1	30/03/2021	Daytime	1400-2300	58.2	59.1	38.7	81.9
	30/03/2021-31/03/2021	Night-time	2300-0700	52.9	43.4	27.8	79.1
	31/03/2021	Daytime	0700-1300	60.3	64.1	43.2	86.5
2	30/03/2021	Daytime	1300-2300	59.8	60.8	39.9	90.5
	30/03/2021-31/03/2021	Night-time	2300-0700	53.5	45.1	27.0	84.1
	31/03/2021	Daytime	0700-1200	61.8	64.6	45.3	88.1
3	30/03/2021	Daytime	1300-2300	43.7	42.8	33.7	81.6
	30/03/2021-31/03/2021	Night-time	2300-0700	40.8	37.4	27.5	71.1
	31/03/2021	Daytime	0700-1200	47.7	47.2	39.8	80.8

4.3 Observations and Comments

During the attended portions of the survey, the acoustic environment at Location 1 and Location 2 predominantly consisted of road traffic noise from the local road network. At Location 3, sporadic noise was audible from the nearby golf course in the form of impact noise from golf clubs striking balls. It was also noted that Location 3 was impacted by road traffic noise but not to the same degree as Locations 1 and 2.

Additionally, it was noted that a moderate number of aircraft noise events took place above the site throughout the attended portions of the survey, it was not noted whether these were commercial, private or military aircraft events.

For both the daytime and night-time assessments, it is considered that the levels measured are representative of the typical acoustic environments at the survey locations.

5.0 ASSESSMENT

5.1 Creation of Noise Model

5.1.1 Data Sources

Modelling calculations were undertaken based on the spatial settings and data sources identified below:

- Development Layout Plans from NW-Architects:
 - 17069-T100C – Site Layout (Feb 21);
 - 17069-T110B – Elevations (sheet 1) (Jun 21);
 - 17069-T111B – Elevations (sheet 2) (Jun 21);
 - 17069-T112 – Elevations (sheet 3) (Jun 21).
- Ground Heights – LiDAR Digital Terrain Model (DTM), 2.0m resolution.
- Reflections – 1st order reflections have been accounted for within the noise model.
- Ground Absorption – Assumed to be hard ground on site and in the surrounding area.

5.1.2 Source Noise Assumptions

With respect to the existing and proposed A27 roads to the north of the site, Average Annual Daily Traffic (AADT) counts were provided by the Department for Transport and the Project Transport Consultant, respectively. These were subsequently converted into Average Annual Weekday Traffic (AAWT) counts, with which the noise indices, $L_{Aeq,16h}$ (0700-2300) and $L_{Aeq,8h}$ (2300-0700) were calculated.

The following equations are taken from the TRL Ltd document “*Converting the UK traffic noise index $L_{A10,18h}$ to EU noise indices for noise mapping*” are utilised to determine the $L_{Aeq,8h}$ between the hours of 2300h and 0700h:

$$L_{day} = 0.98 \times L_{A10,18h} + 0.09$$

$$L_{evening} = 0.89 \times L_{A10,18h} + 5.08$$

$$L_{night} = 0.87 \times L_{A10,18h} + 4.24$$

N.B. L_{day} is defined as the average level between 0700h and 1900h; $L_{evening}$ is evaluated between 1900h and 2300h. It is understood that the $L_{Aeq,16h}$ can be calculated using a logarithmic average of both values and is therefore utilised within this assessment.

The calculated figures are shown in Table 5.1:

Table 5.1
Calculation of $L_{Aeq,16h}$ (0700-2300) and $L_{Aeq,8h}$ (2300-0700) from AADT – A27 (Both Directions)

Scenario	AADT	% HGV	AAWT	$L_{A10,18h}$ (0600-0000)	$L_{Aeq,16h}$ (0700-2300)	$L_{Aeq,8h}$ (2300-0700)
Existing	31962	5.2	29725	79.0	76.6	73.0
Proposed*	45624	7.0	42430	78.8	76.4	72.8

*It should be noted that the nature of the proposed bypass and its proximity to the development site warranted its inclusion into the calculation model as two separate roads. As such, the figure shown in Table 5.1 was halved and duplicated to replicate noise from each separate carriageway.

Following implementation of the 'Existing' scenario A27, noise from the surrounding local road network, comprising Yapton Lane to the west and Binstead Lane to the East, was modelled as a road source and validated against measured data at each of the three locations.

For the model including the proposed A27 bypass, the validated model was consequently used with the exception of the 'Proposed' scenario A27 replacing the 'Existing' scenario.

For maximum event levels, L_{AFMax} , the local road network was converted to a line source and validated against the measured data at 'Location 1', in addition to the nearest carriageway of the proposed A27.

Noise contour maps of the development site for the daytime and night-time period, including noise from the proposed A27 bypass, are shown in Figures 5.1 and 5.2.

An indicative noise map of maximum event levels incident upon the façades of the proposed development site is shown in Figure 5.3. Note that the colour scheme is indicative of the relevant assessment criteria and Figure 5.3 differs from Figures 5.1 and 5.2.

Figure 5.1
Contour Map of Daytime Ambient Levels – 4m Above Ground Level (AGL), dB L_{Aeq,16h}

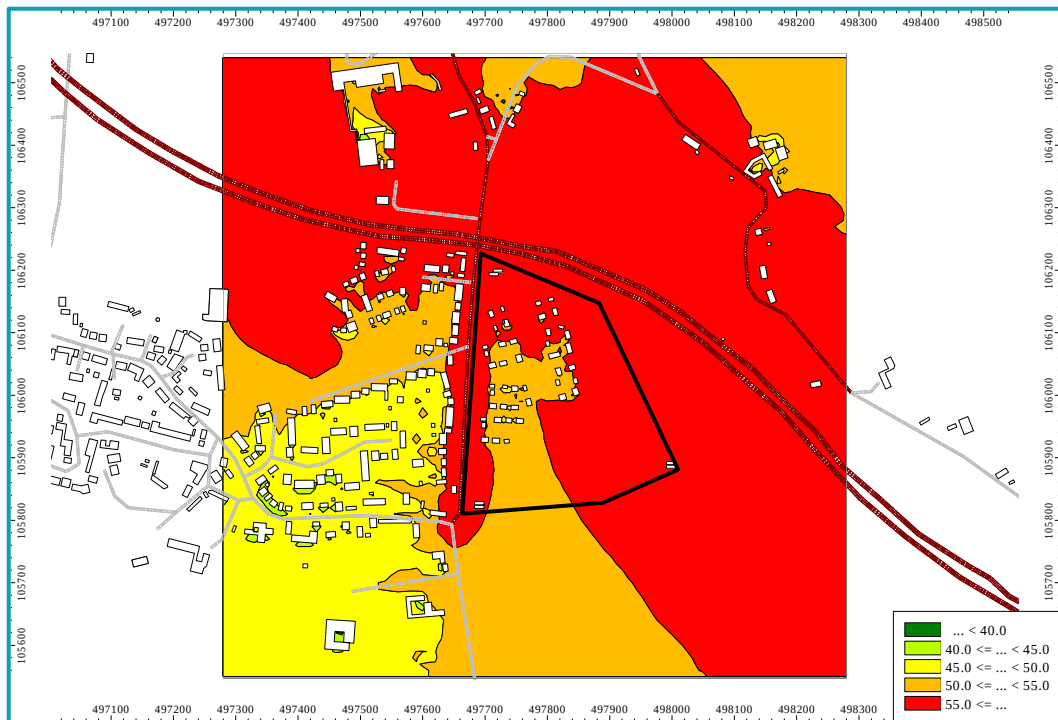


Figure 5.2
Contour Map of Night-Time Ambient Levels – 4m AGL, dB L_{Aeq,8h}

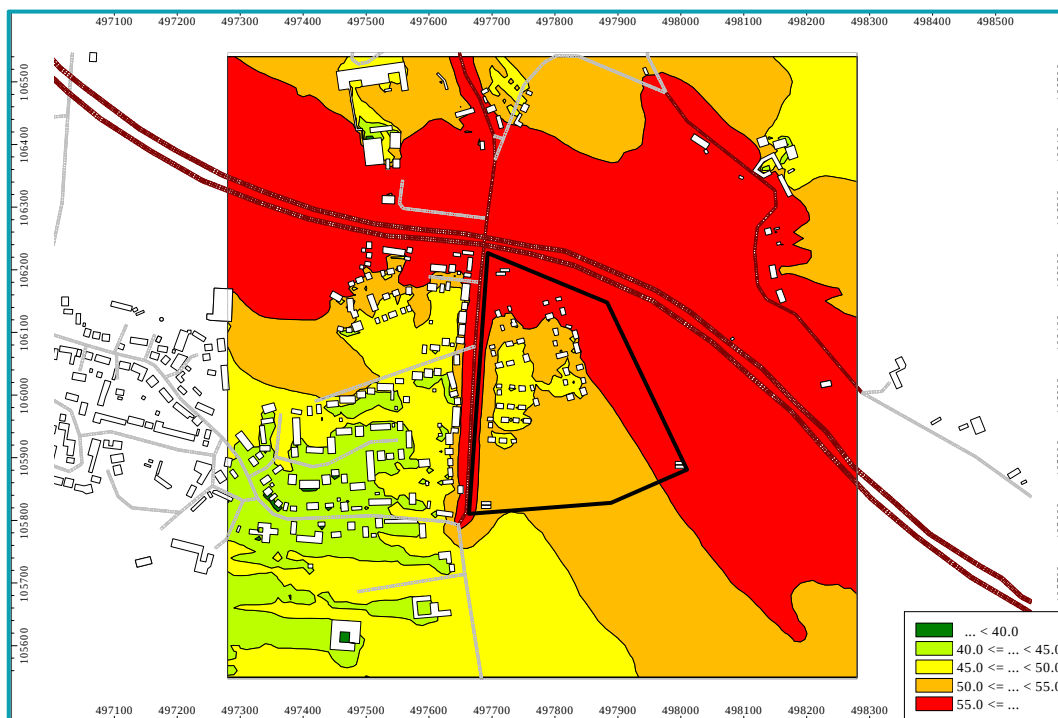
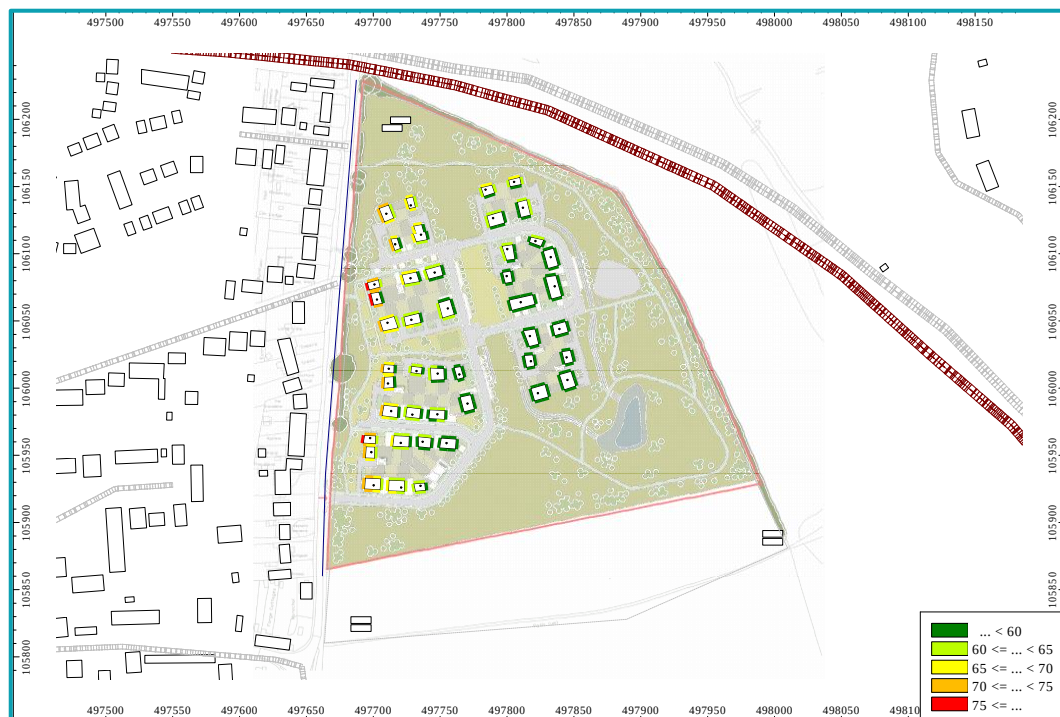


Figure 5.3
Indicative Noise Map of Maximum Event Levels – 4m AGL, dB L_{AFMax} (Typical)



5.2 Site Noise Risk Assessment

5.2.1 Probability

During both daytime and night-time periods, the noise model concluded road traffic noise along the A27 across the northern and eastern boundary to be the dominant noise source due to the high volume of vehicles and high vehicle speeds.

In addition, maximum noise events associated with Yapton Lane to the west were noted as being readily distinctive against the acoustic environment at the measurement locations during the attended portions of the survey.

5.2.2 Potential Impact

The ambient daytime noise levels, $L_{Aeq,16h}$ (0700-2300), were shown to exceed 65dB(A) in the areas nearest to the A27 at the northern and eastern edges of the site and to Yapton Lane to the western edge of the site, decreasing to within the range 50-55dB(A) toward the centre of the development.

Similarly, the ambient night-time noise levels, $L_{Aeq,8h}$ (2300-0700), were shown to be within the range 60-65dB(A) in the areas nearest to the A27 at the edges of the site, decreasing to within the range 45-55dB(A) toward the centre of the development.

The maximum event levels during the night-time period, L_{AFMax} (2300-0700), were shown to exceed 75dB(A) for those building façades overlooking Yapton Lane, decreasing to below 60dB(A) towards the south-eastern corner of the site.

It is therefore considered that this site is subject to noise which generates a high risk of an adverse effect.

A high risk suggests that detailed consideration should be given to how noise affects the site and any future development. Development should take account of that noise risk and reflect good acoustic design principles in the layout of dwellings and the use of space. Based on current information, existing noise levels will likely have a tangible impact upon the design, project cost or programme.

It should be noted that, whilst specific planning of site layout and mitigation will be required to manage noise impacts across the site, the level of noise does not represent an obstruction to residential development.

5.3 Assessment of Noise Exposure Categories for Residential Development

Further to the guidance detailed in Table 21.1 of Arun Local Plan 2011-2031, the noise levels shown in the previous section have been quantified against the Noise Exposure Categories identified in Section 2.

For properties along the outer edges of the development site, both daytime and night-time predicted noise levels fall under Category C. For properties toward the centre of the site, this falls to Category B for both the daytime and night-time periods, with areas falling further into Category A for the daytime assessment.

Category C states *“Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.”*

Category B states *“Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.”*

5.4 Mitigation Assessment

For all areas of the site, there is a risk of a specific glazing and ventilation scheme being required to address average and maximum noise levels from road traffic during both daytime and night-time periods. The level of risk will range from ‘High’ in the outer edges of the site, adjacent to the A27 and Yapton Lane, to ‘Medium’ in the areas further into the centre of the development site.

5.4.1 Site Layout and Design

Following completion of the A27 bypass, it is considered that the main sources of noise influencing the site will be from the bypass to the north and Yapton Lane to the west. It is therefore considered good practice that, when setting a site layout, consideration should be given to focusing non-residential uses towards these sides of the site and habitable rooms for residential use such as bedrooms and living rooms should ideally be placed away from the northern and western site boundaries.

However, it is acknowledged that the size and shape the development site will likely make it difficult to create significant separation between habitable rooms and the relevant noise sources. For such rooms and where applicable, it may be considered appropriate to focus on façade design to achieve suitable indoor ambient noise levels. It is also recognised that inclusion of such structures will act as

an effective noise barrier to mitigate against noise levels across the remainder of the site, as indicated in the noise contour maps above.

5.4.2 In-Façade Mitigation

Based on the results of the noise model, it is considered that an external façade design would be required for all bedrooms without the need to open windows for ventilation purposes. The calculated range of sound reduction required from the external façade is between 19 and 32dB $R_w + C_{tr}$.

For the purpose of this assessment, the area of external façade that is glazed and unglazed has been based on the following assumptions:

- Living Room dimensions of 5m (length) x 4m (width) x 2.3m (height);
- Bedroom dimensions of 3m (length) x 4m (width) x 2.3m (height);
- Double glazed window dimensions of 1m (width) x 1.8m (height).

These assumptions have been based upon typical room sizes of modern family houses. It has been assumed that the most exposed façade would be 4m x 2.3m (9.2m²), unglazed, and 7.4m² with the aforementioned glazing, for both the Living Room and Bedroom.

It is considered that a typical 4/12/4 double glazed window unit and 2 no. typical “hit and miss” trickle vents, with reference to the above dimensions, would permit a composite sound reduction index for the external façade of 32dB $R_w + C_{tr}$. However, it should be noted that these figures are indicative only and are not intended for procurement purposes.

5.4.3 External Noise Levels

BS 8233 suggests noise limits for external areas or a property such as gardens or balconies. It states that:

“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 guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable.”

The predicted noise levels toward the northern and eastern edges of the site are shown to exceed 55dB(A). On this basis, it is considered that further mitigation would be required in the form of an acoustic barrier along the site boundary.

It is considered that the barrier must be of suitable construction i.e. made of material with suitable mass per unit area, have no holes or gaps and must be flush fitting to the ground so as to minimise noise transfer through or under the structure. Further to this, the barrier must be of a sufficient height and length to suitably occlude passing vehicles along the A27 to the external amenity spaces.

At this stage of the development, no detailed information has been provided to Dragonfly Consulting by Highways England with respect to the proposed topography of the bypass. As such, it is not considered appropriate to specify barrier dimensions within this assessment until the road scheme has been finalised.

5.5 Recommendation to Decision Makers

The ProPG recommends that the acoustician make one of the following recommendations to a decision maker when considering the suitability in noise terms of a site for residential development. The recommendations are as follows:

1. Planning consent may be granted without any need for noise conditions;
2. Planning consent may be granted subject to the inclusion of suitable noise conditions;
3. Planning consent should be refused on noise grounds in order to avoid significant adverse effects (“avoid”); or
4. Planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects (“prevent”).

Based on the assessment of noise risk, the subsequent detailed noise impact assessment and taking account of the recommended mitigation measures, it is the recommendation of Dragonfly Consulting that:

“planning consent be granted subject to the inclusion of suitable noise conditions.”

5.6 Uncertainty of the Assessment

Following current good practice, an appraisal of the uncertainty within both the on-site noise survey and the prediction calculations has been completed.

The following negative factors have been noted in considering the uncertainty of the on-site noise survey:

- Sound level meter located at head height level for NSRs;
- Monitoring period of less than 24 hours.

The following positive factors have been noted in considering the uncertainty of the on-site noise survey:

- Low winds and no precipitation.

As such, it is considered that the uncertainty for the on-site noise survey element of the work is $\pm 2\text{dB}$.

It is considered that the uncertainty for the prediction elements of the work should be considered in line with the normal use of ISO 9613-2 based point source propagation calculations and, as such, is defined as $\pm 3\text{dB}$.

Using the root sum of squares method, this gives a combined uncertainty for this assessment of $\pm 3.6\text{dB}$.

5.7 Assertion of Competence

This assessment has been completed by Daniel Vallis, Senior Acoustic Consultant with responsibility for completing acoustic reports on behalf of Dragonfly Consulting. I hold a Bachelor of Science in Music Technology, with Honours, from the University of York and the Institute of Acoustics Diploma in Acoustics and Noise Control. I have over seven years of experience within the field of acoustics and I am a Full Member of both the Institute of Acoustics and the Institution of Environmental Sciences.

I have completed several assessments under BS 8233:2014 and I assert that I am competent to undertake this assessment.

6.0 CONCLUSIONS

Land Allocation Ltd has appointed Dragonfly Consulting to carry out a Noise Impact Assessment in support of a planning application for a proposed residential development on Land East of Yapton Lane, Walberton BN18 0AN.

The noise assessment has been conducted in accordance with the National Planning Policy Framework.

This report therefore describes a noise survey of the site and the subsequent analysis to determine the noise environment of the proposed development. It then compares the results with the adopted criteria. Recommendations are also made with respect to the design of the development.

Measurement of external noise levels have been completed for the proposed development to allow demonstration by calculation that suitable internal noise levels will be achieved within the most noise exposed rooms.

6.1 Risk Assessment

Following completion of the A27 bypass, it is considered that this site is subject to noise which generates a high risk of an adverse effect.

A high risk suggests that detailed consideration should be given to how noise affects the site and any future development. Development should take account of that noise risk and reflect good acoustic design principles in the layout of dwellings and the use of space.

6.2 Summary of Mitigation Measures

6.2.1 Site Layout and Design

It is considered that the main sources of noise influencing the site will be from the bypass to the north and east and Yapton Lane to the west. It is therefore considered good practice that, when setting a site layout, consideration should be given to focusing non-residential uses towards the edges of the site and habitable rooms for residential use such as bedrooms and living rooms should ideally be placed away from the site boundaries.

However, it is acknowledged that the size and shape of the development site will likely make it difficult to create significant separation between habitable rooms and the relevant noise sources. For such rooms and where applicable, it may be considered appropriate to focus on façade design to achieve suitable indoor ambient noise levels. It is also recognised that inclusion of such structures will act as an effective noise barrier to mitigate against noise levels across the remainder of the site, as indicated in the noise contour maps above.

6.2.2 In-Façade Mitigation

Based on the results of the noise model, it is considered that an external façade design would be required for all bedrooms without the need to open windows for ventilation purposes. The calculated range of sound reduction required from the external façade is between 19 and 32dB $R_w + C_{tr}$.

It is considered that a typical 4/12/4 double glazed window unit and 2 no. typical “hit and miss” trickle vents, with reference to the above dimensions, would permit a composite sound reduction index for

the external façade of 32dB $R_w + C_{tr}$. However, it should be noted that these figures are indicative only and are not intended for procurement purposes.

6.2.3 External Noise Levels

The predicted noise levels toward the northern and eastern edges of the site are shown to exceed 55dB(A). On this basis, it is considered that further mitigation would be required in the form of an acoustic barrier along the site boundary.

It is considered that the barrier must be of suitable construction i.e. made of material with suitable mass per unit area, have no holes or gaps and must be flush fitting to the ground so as to minimise noise transfer through or under the structure. Further to this, the barrier must be of a sufficient height and length to suitably occlude passing vehicles along the A27 to the external amenity spaces. It is considered that a further assessment to determine the appropriate height and length of said barrier would be completed at a later date when information of the finalised road scheme becomes publicly available.

Appendix A – Glossary of Terminology

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0dB (the threshold of hearing) to over 120dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

Table A-1
Sound Levels Commonly Found in the Environment

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

Acoustic Terminology

dB (decibel) The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2×10^{-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} This is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.

L₁₀ & L₉₀ 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 L₁₀ is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L₉₀ is the 'average minimum level' and is often used to describe the background level. It is common practice to use the L₁₀ index to describe traffic noise.

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.

Appendix B – Monitoring Equipment

Table B-1
Noise Monitoring Equipment

Equipment	Serial Number
01dB Cube Sound Level Meter	10889
G.R.A.S 40CD Microphone	231555
01dB PRE22N Preamplifier	1610358
01dB Fusion Sound Level Meter	11860
G.R.A.S 40CD Microphone	331802
01dB PRE22N Preamplifier	1707207
01dB Fusion Sound Level Meter	12298
G.R.A.S 40CD Microphone	332011
01dB PRE22N Preamplifier	1936193
Castle GA607 Acoustic Calibrator	039063

Appendix C – Measurement Locations

Figure C-1
Measurement Location Plan



-  Measurement Locations
-  Development Site