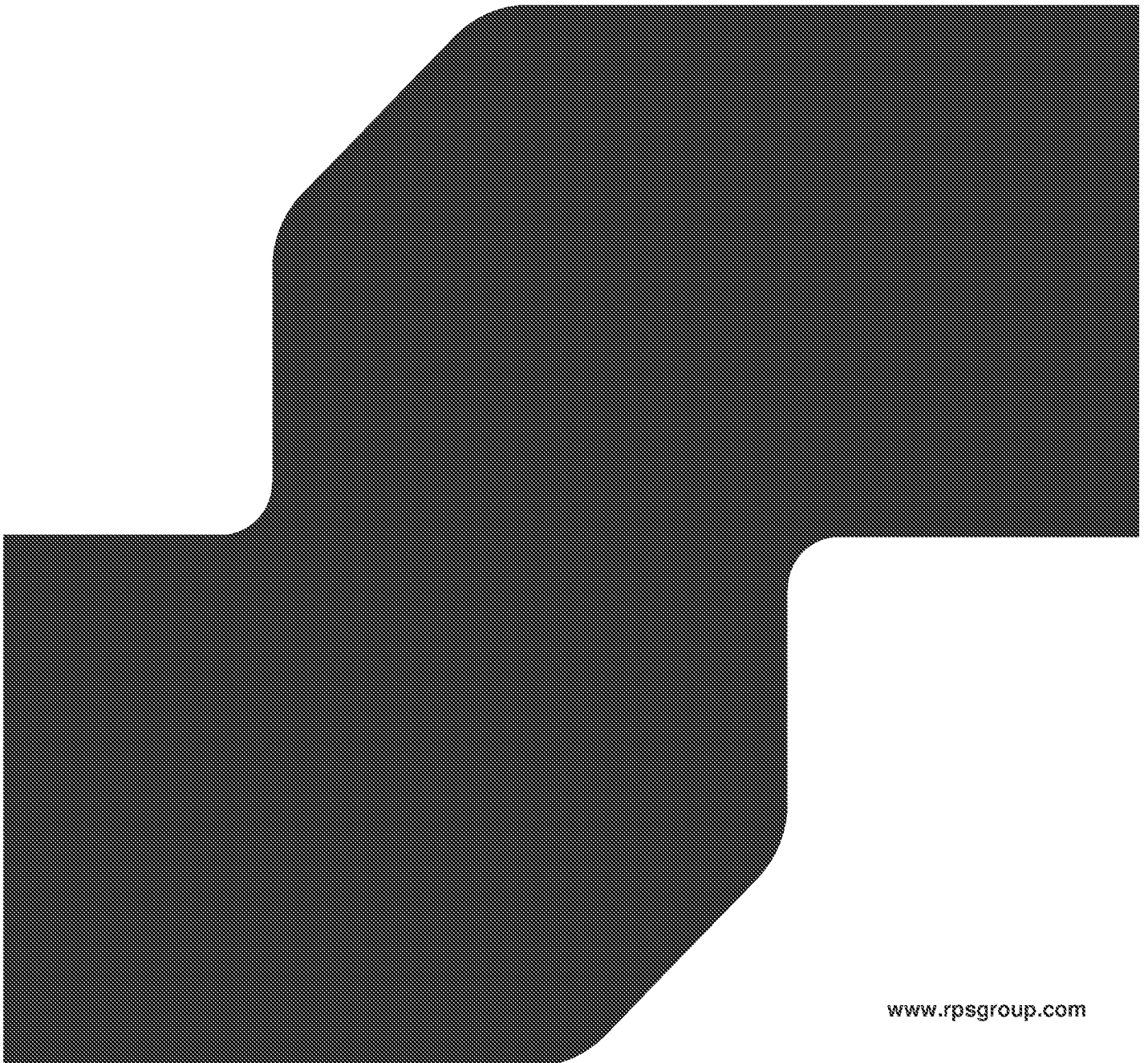


ProPG Assessment

Proposed Development at Bognor Regis Golf Club

For Hallam Land Management



PROPOSED DEVELOPMENT AT BOGNOR REGIS GOLF CLUB

Quality Management

Prepared by	Nicola Stedman BSc (Hons), PG Dip, MSc, MIOA	Principal Consultant – Acoustics	08/12/2021
Reviewed & checked by	Matthew Hyden BEng, CEng, MIOA	Director – Acoustics	08/12/2021
Authorised by	Matthew Hyden BEng, CEng, MIOA	Director – Acoustics	08/12/2021
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Prepared by	Ben Gray BSc (Hons), Affiliate Member IOA	Consultant – Acoustics	17/11/2021
Checked by	Christina Ioannidou MSc Engineering Acoustics, MIOA	Senior Consultant – Acoustics	17/11/2021

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1 Introduction

- 1.1 The Acoustics Team of RPS Environment (RPS) has been appointed by Hallam Land Management to provide a noise assessment to accompany a planning application for a proposed residential development at Bognor Regis Golf Club consisting of circa 500 dwellings. The site is located within the administrative area of Arun District Council (ADC). The structure and content of this report is based upon the requirements of the Professional Practice Guidance on Planning and Noise (ProPG) [1] and provides the Acoustic Design Statement (ADS) for the site.
- 1.2 The impact of noise and vibration generated by the development is examined separately as part of the Environmental Impact Assessment (EIA) for the proposed development. This is described in detail in the noise and vibration chapter of the Environmental Statement (ES).
- 1.3 This report only examines the suitability of the site for residential development by assessing the likely impact of the existing noise climate on the proposed new dwellings in accordance with ProPG.
- 1.4 The assessment has been undertaken based upon appropriate information on the proposed development provided by the project team. RPS is a member of the Association of Noise Consultants (ANC), the representative body for acoustics consultancies, having demonstrated the necessary professional and technical competence. The assessment has been undertaken with integrity, objectivity and honesty in accordance with the Code of Conduct of the Institute of Acoustics (IOA) and ethically, professionally and lawfully in accordance with the Code of Ethics of the ANC.
- 1.5 The technical content of this assessment has been provided by RPS personnel, the majority of whom are corporate (MIOA) or non-corporate, associate members (AMIOA) of the IOA (the UK's professional body for those working in acoustics, noise and vibration). This report has been peer reviewed within the RPS team to ensure that it is technically robust and meets the requirements of our Quality Management System (QMS).

2 National & Local Policy, Standards, Guidance and Assessment Methodology

Basis of the Assessment

- 2.1 The assessment within this ADS has been carried out based on the guidance provided in the ProPG. A Stage 1 risk assessment has been carried out based upon a baseline sound survey. The risk assessment has been used to determine the level of detail required for the subsequent Stage 2 assessment, which has also been carried out based on the ProPG guidance.
- 2.2 In accordance with Stage 2: Element 4 of the ProPG the development has been designed to comply with relevant national guidance in the Noise Policy Statement for England (NPSE) [2], National Planning Policy Framework (NPPF) [3], Planning Practice Guidance on Noise (PPG-N) [4] and local noise planning policy.
- 2.3 The following sections outline the policy, standards and guidance referred to in this assessment.

National Planning Policy

- 2.4 The Noise Policy Statement for England (NPSE), the National Planning Policy Framework (NPPF) and the Planning Practice Guidance (PPG-N) do not contain guidance in terms of numerical noise levels. Guidance is provided descriptively, which may be transposed to numerical noise levels for site-specific situations, using the methods contained within relevant standards and guidance.
- 2.5 Relevant experience and professional judgment are fundamental to all stages of the assessment that leads to the determination of the significance of a noise effect. The non-numeric guidance contained within the PPG-N, based upon the initial advice in the NPSE, is summarised in Table 2.1 below.
- 2.6 The PPG-N states that there are many factors which should be considered when determining if noise is of concern; one factor is the number of noise events and the frequency and pattern of occurrence of the noise.
- 2.7 The PPG-N provides further information on the adverse effects of noise and how it can be mitigated. For noise sensitive development, mitigation measures can include: avoiding noisy locations; designing the development to reduce the impact of noise from the local environment, including noise barriers; and optimising the sound insulation provided by the building envelope.

Table 2.1: Summary of Guidance from NPSE and PPG-N

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not present	No Effect	No Observed Effect	No specific measures required
Present 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 (LOAEL)			
Present 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; 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 (SOAEL)			
Present and disruptive	The noise causes a material change in behaviour and/or attitude, e.g., 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 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
Present 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

2.8 The information in the table above aligns with the NPPF that states that planning policies and decisions should:

“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 quality of life.”

Professional Practice Guidance (ProPG) Planning and Noise – New Residential Development

- 2.9 ProPG provides practitioners with guidance on a recommended approach to the management of noise within the planning system in England for new residential development. The guidance has been produced by the ANC, IOA and Chartered Institute of Environmental Health (CIEH) and is expected to be widely adopted by planning authorities as best practice when considering noise affecting new residential development. The scope of this ProPG is restricted to the consideration of new residential development that will be exposed predominantly to airborne noise from transport sources, though it is considered appropriate to incorporate other sources of noise where they are present but not dominant.

Overview

- 2.10 This ProPG advocates a systematic, proportionate, risk based, two-stage, approach. This encourages early consideration of noise issues, facilitates straightforward accelerated decision making for lower risk sites and assists proper consideration of noise issues where the acoustic environment is challenging. The two sequential stages of the overall approach are:
- Stage 1 – an initial noise risk assessment of the proposed development site; and
 - Stage 2 – a systematic consideration of four key elements.
- 2.11 The four key elements to be undertaken in parallel during Stage 2 of the recommended approach are listed below, with further details in the following sections:
- Element 1 – demonstrating a “Good Acoustic Design Process”;
 - Element 2 – observing “Internal Noise Level Guidelines”;
 - Element 3 – undertaking an “External Amenity Area Noise Assessment”; and
 - Element 4 – consideration of “Other Relevant Issues”.
- 2.12 The approach is underpinned by the preparation and delivery of an ADS. An ADS for a site assessed as high risk should be more detailed than for a site assessed as low risk. An ADS should not be necessary for a site assessed as negligible risk.

Stage 1 Risk Assessment

- 2.13 Table 2.2 summarises the Stage 1 Initial Site Noise Risk Assessment that is provided in Figure 1 of the ProPG, which is based on indicative noise levels derived from current guidance and experience. The indicative noise levels are intended to provide a sense of the noise challenge at a potential residential development site and should be interpreted flexibly having regard to the

locality, the project and the wider context. In the final column, the initial noise risk assessment is aligned with pre-planning application guidance that highlights the increasing importance of good acoustic design as the noise risk increases.

Table 2.2: ProPG External Noise Level Guidelines

Noise Risk Assessment	Potential Effect Without Noise Mitigation	Pre-planning Application Advice
Indicative Daytime Noise Levels L_{Aeq,16hr} Indicative Night-time Noise Levels L_{Aeq,8hr} High Medium Low Negligible 70 dB 65 dB 60 dB 55 dB 50 dB 60 dB 55 dB 50 dB 45 dB 40 dB	↑ Increasing risk of adverse effect	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice. As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development. At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.
	No adverse effect	These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.
Notes: a. Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures. b. Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is “not dominant”. c. L_{Aeq,16hr} is for daytime 07:00 – 23:00, L_{Aeq,8hr} is for night-time 23:00 – 07:00. d. An indication that there may be more than ten noise events at night (23:00 – 07:00) with L_{Amax,F} > 60 dB means the site should not be regarded as negligible risk.		

Stage 2 Element 1 - Good Acoustic Design Process

2.14 The ProPG states that planning applications for new residential development should include evidence that the following have been properly considered:

- Check the feasibility of relocating or reducing noise levels from relevant sources.
- Consider options for planning the site or building layout.
- Consider the orientation of proposed building(s).
- Select construction types and methods for meeting building performance requirements.
- Examine the effects of noise control measures on ventilation, fire regulation, health and safety, cost, CDM (construction, design and management) etc.
- Assess the viability of alternative solutions.
- Assess external amenity area noise.

Stage 2 Element 2 – Internal Noise Level Guidelines

2.15 The internal noise level guidelines provided under Element 2 above in Figure 2 of ProPG are provided in Table 2.3 below. These are based upon the guidance in British Standard (BS) 8233:2014: 'Guidance on sound insulation and noise reduction for buildings' [5].

Table 2.3: ProPG Internal Noise Level Guidelines

Activity	Location	Daytime (07:00 – 23:00 hrs)	Night-time (23:00 – 07:00 hrs)
Resting	Living room	35 dB $L_{Aeq,16r}$	-
Dining	Dining room / area	40 dB $L_{Aeq,16r}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16r}$	30 dB $L_{Aeq,16r}$ 45 dB $L_{Amax,F}$ (Note 4)

2.16 Accompanying Note 4, 5, 6 & 7 from Figure 2 of the ProPG states the following:

"NOTE 4 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. 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 45 dB $L_{Amax,F}$ more than ten times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on

factors such as the source, number, distribution, predictability and regularity of noise events (see Appendix A).

NOTE 5 Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g., trickle ventilators) should be assessed in the “open” position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded, subject to the further advice in Note 7.

NOTE 6 Attention is drawn to the requirements of the Building Regulations.

NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5 dB, 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 L_{Aeq} 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 (see Section 3.D).”

- 2.17 Paragraphs 2.34 to 2.36 of the ProPG contain guidance regarding the use of open windows in relation to ventilation and overheating:

“Where the LPA accepts that there is a justification that the internal target noise levels can only be practically achieved with windows closed, which may be the case in urban areas and at sites adjacent to transportation noise sources, special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort without unduly compromising other aspects of the living environment. In such circumstances, internal noise levels can be assessed with windows closed but with any façade openings used to provide “whole dwelling ventilation” in accordance with Building Regulations Approved Document F [6] (e.g., trickle ventilators) in the open position (see Supplementary Document 2). Furthermore, in this scenario the internal L_{Aeq} target noise levels should not generally be exceeded.

It should also be noted that the internal noise level guidelines are generally not applicable under “purge ventilation” conditions as defined by Building Regulations Approved Document F, as this

should only occur occasionally (e.g., to remove odour from painting and decorating or from burnt food).

In addition to providing purge ventilation, open windows can also be used to mitigate overheating. Therefore, should the LPA accept a scheme is to be assessed with windows closed, but this scheme is reliant on open windows to mitigate overheating, it is also necessary to consider the potential noise impact during the overheating condition. In this case a more detailed assessment of the potential impact on occupants should be provided in the ADS. It should be noted that overheating issues will vary across the country and any specific design solutions will need to be developed alongside advice from energy consultants."

- 2.18 Paragraph 2.38 of the ProPG states the following with respect to mechanical service plant:

Where mechanical services are used as part of the ventilation or thermal comfort strategy for the scheme, the impact of noise generated by these systems on occupants should also be assessed.

Stage 2 Element 3 – External Amenity Area Noise Assessment

- 2.19 The ProPG refers to the design ranges in BS 8233:2014 with respect to the assessment of external amenity, as well as guidance in the PPG-N. Based on these two documents the following guidance is provided with respect to the assessment of noise in external amenity areas:

3(i) "If external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended".

3(ii) "The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB LAeq,16hr."

3(iii) "These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces."

3(iv) "Whether or not external amenity spaces are an intrinsic part of the overall design, consideration of the need to provide access to a quiet or relatively quiet external amenity space forms part of a good acoustic design process."

3(v) "Where, despite following a good acoustic design process, significant adverse noise impacts remain on any private external amenity space (e.g., garden or balcony) then that impact may be partially off-set if the residents are provided, through the design of the development or the planning process, with access to:

- *a relatively quiet facade (containing openable windows to habitable rooms) or a relatively quiet externally ventilated space (i.e., an enclosed balcony) as part of their dwelling; and/or*
- *a relatively quiet alternative or additional external amenity space for sole use by a household, (e.g., a garden, roof garden or large open balcony in a different, protected, location); and/or*
- *a relatively quiet, protected, nearby, external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or*
- *a relatively quiet, protected, publically accessible, external amenity space (e.g., a public park or a local green space designated because of its tranquillity) that is nearby (e.g., within a five-minute walking distance)."*

Stage 2 Element 4 – Other Relevant Issues

2.20 The ProPG states that the following other relevant issues, should be considered, where appropriate:

- 4(i) compliance with relevant national and local policy;
- 4(ii) magnitude and extent of compliance with the ProPG criteria;
- 4(iii) likely occupants of the development;
- 4(iv) acoustic design v unintended adverse consequences; and
- 4(v) acoustic design v wider planning.

Planning Recommendations

2.21 Having followed this approach to its end, it is envisaged that noise practitioners will then have a choice of one of four possible recommendations to present to the decision maker. In simple terms, the choice of recommendations are as follows:

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

Local Planning Policy

2.22 The Arun Local Plan (ALP) 2018 [7] created by ADC:

“sets out a spatial vision, objectives and a sustainable strategy for delivering the needed growth of the District over the period 2011- 2031. The Arun Local Plan 2018 will be used to guide decisions on planning, development and regeneration activity over this period including many other decisions shaping corporate investment plans and strategies, as well as those from external providers, delivering services and infrastructure to the local community.”

2.23 Section 21.2 of the ALP discusses noise pollution, which recognises that

“noise exposure can impact upon quality of life and give rise to adverse health effects.”

2.24 Paragraph 21.2.6 of the ALP states:

“Residential development proposed within First Priority Areas, or in close proximity to noise sources from road, rail and air, should be assessed to determine the noise exposure category (NEC) which the site falls into. This assessment must be carried out at an early stage in order to identify the suitability of the site. Where the NEC assessment has shown that habitable rooms will be exposed to noise levels in excess of NEC A, noise mitigation will be required as part of the design of the development (useful advice is set out in the BRE document 'Sound Control for Homes').”

2.25 Within the section of the document, each of the four noise exposure categories ‘A – D’ are outlined. Table 21.1 outlines the purpose of each category (reproduced below) and Table 21.2 outlines the thresholds, which has been reproduced in part below.

Table 21.1: Noise Exposure Categories for Residential Development

NEC	
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 C sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

Table 21.2: Noise Levels Corresponding to the Noise Exposure Categories for New Dwellings, $L_{Aeq,T}$ dB

NEC	A	B	C	D
[...]				
Mixed Sources				
07:00 – 23:00	< 55	55 – 63	63 – 72	> 72
23:00 – 07:00	< 45	45 – 57	57 – 66	> 66

Note 77: Night-time noise levels (23:00 – 07:00): sites where individual noise events regularly exceed 82 dB L_{Amax} (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq,8hr}$ (except where the $L_{Aeq,8hr}$ already puts the site in NEC D).

2.26 Within this section, a number of further points are discussed, resulting in the creation of Policy QE DM1:

"Policy QE DM1

Noise pollution

1. New noise sensitive development

Residential development likely to experience noise from road, rail or air, in particular developments 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.*

2. *New noise generating development*

Developers proposing new noise generating development must seek advice from an early stage to determine the level of noise assessment required. Proposals will need to be supported by:

- a. *Evidence to demonstrate that there are no suitable alternative locations for the development.*
- b. *A noise report which provides accurate information about the existing noise environment, and the likely impact of the proposed development upon the noise environment. The report must also demonstrate that the development meets appropriate national and local standards for noise, as set out in Annex 1 of the Planning Noise Advice Document: Sussex, and any mitigation measures required to ensure noise is managed to an acceptable level.*
- c. *Evidence to demonstrate that the development will not impact upon areas identified and valued for their tranquillity, including Gaps Between Settlements which are important to the enjoyment of Arun's countryside, its habitats and biodiversity."*

2.27 The ADC Local Plan refers to the Tables 21.1 and 21.2 (above) that outline Noise Exposure Categories (NECs) for residential development. These NECs are based on the guidance in the withdrawn Planning Policy Guidance Note 24 (PPG24). This assessment has been based on the guidance in ProPG which effectively replaces the old PPG24 document but is based on similar concepts.

2.28 Notwithstanding the above, the findings of this assessment will also briefly be compared to the NECs as required by ADC and this is discussed in more detail in Section 6.43 of this report.

Consultation

2.29 As part of the EIA process, the Environmental Health Department (EHD) at ADC was contacted regarding the survey locations and assessment methodology. Comments were received regarding the locations and number of surveys to be deployed, which were incorporated into the baseline survey. Table 2.4 summarises the key consultation that has been undertaken.

Table 2.4: Record of Consultation with the EHD

Consultation date	Method	Summary
13 October 2021	Phone	RPS contacted the EHD to discuss the project and were asked to send the query/request via email.
13 October 2021	E-mail (sent)	RPS sent an e-mail to the EHD outlining the project and the proposed baseline noise monitoring approach for Site A. A plan showing the proposed noise monitoring locations within Site A was included.
13 October 2021	E-mail (received)	RPS received an e-mail from the EHD requesting additional surveys, at additional locations, within Site A.
14 October 2021	E-mail (sent)	RPS sent an e-mail to the EHD confirming that the one of the additional survey locations requested was no longer within the red line boundary for Site A.
19 October 2021	E-mail (sent)	RPS sent an e-mail to the EHD confirming that the one of the additional survey locations requested was no longer within the red line boundary for Site A and that additional surveys were also proposed for Site B. A revised plan showing the proposed noise monitoring locations within Site A and B was included, with an indication of when the site visit was going to take place.

3 Description of site and proposals

- 3.1 This section of the report briefly describes the existing site conditions and the proposed development. A more detailed description of the site and development proposals can be found in the ES for the project.

Site Description

- 3.2 The site of the proposed development is located at Bognor Regis Golf Club, Bognor Regis, West Sussex. The site is bordered by residential dwellings to the southeast; fields to the southwest; Lec Airfield, a railway line, and an industrial estate to the west; and the A259 to the north and northeast.
- 3.3 The sources of noise affecting the site varies depending on location but for the majority of the site the main source of noise is traffic, primarily from the A259. This is of a 'broadband' nature with some individual vehicle sounds. Other sources of noise audible across the site include railway noise (including the use of the train's horn during the daytime), wind noise in the trees, and noise from golfing activities (although this is very quiet and only audible in very close proximity to golfers).
- 3.4 Noise from the Lec Airfield was also occasionally audible when aircraft took off and landed, but this only occurred very occasionally (i.e., approximately twice a day) and based on inspection of the baseline noise data, did not occur at night.
- 3.5 Figure 1 shows the site boundary and the areas proposed for development.

4 Baseline Survey

- 4.1 This section of the report describes the noise survey and prediction exercise undertaken to identify baseline noise conditions across the site.

Establishing Baseline Conditions

Survey Locations

- 4.2 Baseline surveys were carried out on the site to establish the baseline conditions. At the site of the current golf course, four long-term (LT) sound level meters (SLMs) were deployed for a period of one week, with a further 15-minute short-term (ST) measurement taken on collection of the long-term surveys. For each survey listed below, the microphone was set up 1.5 m above ground level (AGL) with an environmental protection kit including windshield. The survey locations can be seen in Figure 1.
- 4.3 Survey location LT1 was located on the western side of the site approximately 5 m in from the redline boundary, next to a tree. Directly to the west is Lec Airfield, used for light aircraft and gliders with the runway approximately 100 m away, as well as the railway line, which is approximately 270 m away at its closest.
- 4.4 Survey location LT2 was located on the southern side of the site, approximately 35 m northwest of 28 Golf Links Road, approximately 10 m inside the redline boundary. This location is representative of noise sensitive receptors (NSRs) on Golf Links Road and Wroxham Way, which are located to the south and southeast of the SLM location. The SLM was positioned next to a tree.
- 4.5 Survey location LT3 was located on the eastern side of the site at the edge of the golf course, approximately 10 m west of the boundary fence with 16 Bridger Close. This location is representative of NSRs on Bridger Close. The SLM was positioned next to some trees.
- 4.6 Survey location LT4 was located at the northern tip of the site in an area of trees by the redline boundary. The A259 is located approximately 90 m to the north with the trainline approximately 150 m at its closest point, to the west.
- 4.7 Survey location ST2 was located at the northeast of the golf course near the redline boundary approximately 420 m southeast of LT4 and 420 m northwest of LT3. This was located approximately 50 m in from the redline boundary due to a patch of trees and bushes.

Instrumentation

4.8 Details of the instrumentation used during the survey are provided in Table 4.1. Calibration certificates of the equipment are available upon request. Calibration of the equipment was carried out before and after measurements with no significant drift ($< \pm 0.5$ dB) observed.

Table 4.1: Baseline Sound Survey Instrumentation

Measurement Location	Make/Model	Internal Reference / Serial Number	Calibration Ref / Calibration Start / Calibration End	Last Calibration Date
LT1	Rion NL52	#147 / 386736	94.0 / 94.0 / 94.0 dB	19/10/2021
LT2	Rion NL52	#148 / 386735	94.0 / 94.0 / 93.9 dB	19/11/2020
LT3	Rion NL52	#168 / 998569	94.0 / 94.0 / 94.0 dB	16/03/2020
LT4	Rion NL52	#167 / 998567	94.0 / 94.0 / 93.6 dB	16/03/2020
ST2	Rion NL52	#167 / 998567	94.0 / 94.0 / 94.0 dB	16/03/2020
Calibrator	Rion NC74	#33 / 34472822	N/A	30/09/2021

Weather Conditions

4.9 The weather conditions at the time of each survey were noted down using a handheld anemometer and are summarised in Table 4.2.

4.10 In addition, an unattended wind logger and rain gauge was deployed at survey location LT2 for the duration of the survey. The data from this station can be seen overlaid on the graphs in Appendix A.

Table 4.2: Weather Conditions

Location	Time	Wind Speed, m/s	Wind Direction	Temperature, °C	Relative Humidity, %	Cloud Cover, Oktas ¹
LT1	Deployment	1.3	SW	14	68	7
	Collection	1.4	SW	17	78	1
LT2	Deployment	1.4	SW	14	65	8
	Collection	0.5	SW	16	81	2
LT3	Deployment	3.2	SW	13	65	3
	Collection	0.5	SW	15	82	6
LT4	Deployment	1.2	SW	14	65	2
	Collection	2.4	SW	15	80	7
ST2	N/A	2.5	SW	15	80	7

Notes: ¹ 0 = clear skies / 8 = complete cloud cover.

Survey Duration

4.11 The following table outlines the measurement start time, finish time and duration at each measurement location:

Table 4.3: Measurement Times and Durations

Location	Start Time	End Time	Duration
LT1	22/10/2021 14:45	28/10/2021 14:30	5d 23h 45m
LT2	22/10/2021 14:15	28/10/2021 13:45	5d 23h 30m
LT3	22/10/2021 12:30	28/10/2021 12:45	6d 0h 15m
LT4	22/10/2021 13:00	28/10/2021 12:00	5d 23h 0m
ST2	28/10/2021 12:27	28/10/2021 12:42	0d 0h 15m

Subjective Description of the Noise Climate

- 4.12 At location LT1 at the time of deployment, the main noise sources included: wind noise in the trees with rustling leaves; broadband traffic sounds primarily from the north; light aircraft movements directly to the west, including one plane taking off from Lec Airfield; occasional trains using their horns; and some golf noises including people talking. At the time of collection, the main noise sources included: wind noise in the trees; light aircraft overhead; some golf noises; and some broadband traffic, mainly from the southwest.
- 4.13 At location LT2 at the time of deployment, the main noise sources included: wind noise in the trees; the occasional train to the west, including the use of the train horn; broadband distant traffic; some golf noises and people talking; and some distant planes overhead (low rumble). At the time of collection, the main noise sources included: wind noise in the trees; some golf noises; distant broadband traffic to the south; some plant noise from the plant building located a few metres away; and a helicopter overhead.
- 4.14 At location LT3 at the time of deployment, the main noise sources included: strong wind noise with leaves in the trees; distinct broadband traffic hum from the north with some distinct engine sounds mainly from the north; and some talking from golf activities nearby. At the time of collection, the main noise sources included: broadband traffic noise; wind in the trees; power tools in use at a house nearby; a grass mower in the distance on the golf course; and light aircraft in the distance.
- 4.15 At location LT4 at the time of deployment, the main noise sources included: wind noise including rustling leaves; broadband traffic noise from the flyover to the north, with some individual engine and tyre noise; an occasional train to the northwest; and occasional talking from the golf course. At the time of collection, the main noise sources included: distinct traffic sounds with broadband and individual characteristics; and wind noise from the leaves in the trees.

- 4.16 At location ST2, the main noise sources included: broadband traffic noise; grass cutting on the golf course; an occasional train passing in the distance; a light aircraft in the distance; and people talking loudly nearby on the golf course.

Noise Measurement Results

- 4.17 The results of the noise surveys are summarised in Table 4.4. Full time history data for each location can be seen in **Appendix A**.

- 4.18 To assess the number of night-time noise events, night-time data was post-processed into one-minute periods for each night-time period. This data was used to determine the maximum ($L_{Amax,F}$) noise level that was exceeded ten times each night.

Table 4.4: Summary of baseline noise survey

Location	Period, T	$L_{Aeq,T}$ (dB) ¹	$L_{A90,T}$ (dB) ²	Maximum noise levels exceeded no more than 10 times a night (dB) ³	Range of Average Level Exceeded Ten Times Per Night (dB) ⁴
LT1	Day, 16hr	50	41	-	
	Night, 8hr	44	36	60	58 – 64
LT2	Day, 16hr	51	40	-	
	Night, 8hr	44	35	59	54 – 62
LT3	Day, 16hr	49	40	-	
	Night, 8hr	43	34	57	54 – 60
LT4	Day, 16hr	59	53	-	
	Night, 8hr	53	36	67	63 – 71
ST2	Day, 15min	50	47	-	

Notes:

¹ With the exception of ST2, the values displayed are the typical daytime and night-time $L_{Aeq,T}$ noise levels. This has been derived by linear averaging the individual daytime 16 hour and night-time 8-hour values for each measurement position, rounded to the nearest whole number.

² Values are the 25th percentile of each 15-minute period, rounded to the nearest whole number. These values have also been reviewed against the time history data to check they provide a reasonable worst-case representation of 'background' noise levels.

³ These values are the typical $L_{Amax,F}$ noise level that is exceeded no more than 10 times per night. This has been derived by linear averaging the maximum noise levels exceeded no more than 10 times on each of the individual night-time measurement periods.

⁴ Values are the range of $L_{Amax,F}$ values exceeded no more than ten times for each night over the survey period.

- 4.19 The values in Table 4.4 have been visually checked against the graphs of the time histories (available in **Appendix A**) and the individual day-by-day values to ensure the values are representative.

Noise Modelling

- 4.20 To predict the spatial spread noise levels across the site and aid the subsequent noise assessment, a 3D noise model was created using SoundPLAN v8.2 acoustic modelling software.
- 4.21 The model was constructed based upon publicly available topographical data (OS Terrain 50, 2020). The base mapping (roads, buildings, attenuation areas etc.) was imported from a connection to Open Street Map (OSM) in SoundPLAN. Extra buildings not included in the OSM data near to the receivers were added in by hand using bitmaps of the local area. Stainton Viaduct's height was adjusted to fit the real-world position. Only roads with CRTN data available were used in the assessment. The road sources were calibrated using CRTN 18-hour data provided by the client and were applied to all roads listed in it. The values were adjusted so that the calculated levels at the receiver positions matched those values measured during the survey. The railway was modelled as a line source, calibrated in line with Extrium rail noise data¹. The level set to 81.0 dB(A) L_w/m with a sound power spectrum set to BS EN 16272-3-2:2014: Normalized Railway, with the time histogram set to -2.5 dB at night (23:00 – 07:00). The receivers were added based on the locations of where the monitors were left during the baseline survey at a height of 1.5 m.
- 4.22 It was established during the site visits that the main sources of noise affecting the site are those from road and rail. As such, these are the only noise sources included in the model.
- 4.23 The results of the noise grid maps for daytime and night-time can be seen in Figure 2 and Figure 3 respectively. The noise maps show that almost all of the site, except for the most northern tip, is likely to be exposed to noise levels during the day of under 55 dB L_{Aeq}, with most of the site being under 50 dB L_{Aeq}. Similarly, at night, almost all of the site is under 50 dB L_{Aeq}, with most of the site being under 45 dB L_{Aeq}. All of the areas within the site currently proposed for development fall within the quieter values listed in this paragraph.

¹ Available at www.extrium.co.uk/noiseviewer.html

5 Stage 1: Initial Noise Risk Assessment from a Baseline Survey

- 5.1 Having completed the baseline assessment and survey, the first stage of the ProPG assessment is to carry out a Stage 1 risk assessment. This gives a broad overview of the site suitability for residential development and determines the required level of detail for the Stage 2 risk assessment (including whether one is required at all).

Risk Levels

- 5.2 When assessed against the ProPG initial risk assessment guidance (reproduced in Table 2.2), every survey location except for LT4 falls into the 'low-risk' category. This is as the daytime level is no greater than 52 dB $L_{Aeq,16h}$ and the night-time level is no greater than 48 dB $L_{Aeq,8hr}$.
- 5.3 Location LT4 would fall into the 'medium-risk' category, as the daytime levels are 59 dB $L_{Aeq,16h}$ and the night-time level is 53 dB $L_{Aeq,8hr}$.
- 5.4 Note D of Table 2.2 specifies that, to be regarded as negligible risk, there should be no more than ten noise events at night (23:00 to 07:00) with $L_{Amax,F}$ levels greater than 60 dB. Night-time data was post-processed into one-minute periods for each night-time period and used as a basis to determine the average noise level that was exceeded ten times each night. On average, each location except LT4 was at 60 dB or below. Although there was some variation, the range of values was small. The level at which ten events occurred each night did occasionally increase above 60 dB $L_{Amax,F}$, so the justification of low and not 'negligible' risk at these locations remains.
- 5.5 In the current version of the land use parameter plan at the time of writing this report, the area of the site close to the position of LT4 is not set to be used for residential development. With this in mind, the site has been found to fall into the 'low-risk' category when assessed against the guidance in the ProPG. While the site has been found to be 'low-risk', a Stage 2 risk assessment is still required according to the guidance in ProPG as outlined below:

"Low Risk

At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development."

6 Stage 2: Acoustic Design Statement (ADS)

- 6.1 The Stage 1 risk assessment determined that a Stage 2 ADS is required.
- 6.2 The ProPG states that:
- “an ADS for new housing should be proportionate to the scale of development and the extent of the noise risk.”*
- 6.3 As discussed in Section 5, the area of site proposed to be developed falls into the ‘low-risk’ category. As such, a high-level of detail in the ADS is not required.
- 6.4 The ProPG recommended that a Stage 2 assessment contains the following four key elements:
- Demonstrate a good acoustic design process;
 - Assessment of internal noise levels;
 - Assessment of external amenity area noise; and
 - Assessment of other relevant issues.
- 6.5 The ProPG also states that planning applications for new residential development should include evidence that the following have been properly considered:
1. Check the feasibility of relocating, or reducing noise levels from relevant sources;
 2. Consider options for planning the site or building layout;
 3. Consider the orientation of proposed building(s);
 4. Select construction types and methods for meeting building performance requirements;
 5. Examine the effects of noise control measures on ventilation, fire regulation, health and safety, cost, CDM (construction, design and management) etc;
 6. Assess the viability of alternative solutions; and
 7. Assess external amenity area noise.
- 6.6 The four key elements and above points are considered in the following sections.

Good Acoustic Design Process

- 6.7 As the main noise sources across the site are from road and rail noise (either close-by or distant depending on the location in question) it would not be possible to reduce noise levels at source.
- 6.8 By increasing the distance between a noise source and a noise sensitive receptor (NSR), the noise level experienced by the NSR decreases. The proposed land use parameter plan (see Figure 1) has the residential dwellings located away from the largest noise sources, namely the A259 at the northern end of the site. By not using the most exposed sections of the site for

residential development the risk of adverse noise impacts is reduced. During the detailed design of the site the orientation of the buildings could potentially be used to further reduce noise levels incident on external areas and sensitive facades, However, noise levels are already relatively low, and any benefit is likely to be limited.

Internal Noise Level Guidelines

6.9 With regard to internal noise levels the ProPG states that design should:

“... principally aim, through the use of good acoustic design, to achieve the internal noise level guidelines in noise sensitive rooms with windows open. Where internal noise levels are assessed with windows closed the justification for this should be included in the ADS.”

And

“Where the LPA accepts that there is a justification that the internal target noise levels can only be practically achieved with windows closed, which may be the case in urban areas and at sites adjacent to transportation noise sources, special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort without unduly compromising other aspects of the living environment. In such circumstances, internal noise levels can be assessed with windows closed but with any façade openings used to provide “whole dwelling ventilation” in accordance with Building Regulations Approved Document F (e.g., trickle ventilators) in the open position (see Supplementary Document 2). Furthermore, in this scenario the internal L_{Aeq} target noise levels should not generally be exceeded.”

6.10 As identified in the initial risk assessment, the existing noise climate at the site presents a ‘low’ risk of adverse noise impacts.

6.11 Therefore, internal noise levels will be assessed with windows open and with windows closed (with measures in place to provide ‘whole dwelling ventilation’).

6.12 The ProPG internal noise level guidelines (INLGs, reproduced in Table 2.3) are based on the guidance in BS 8233:2014 and suggest that for desirable internal noise conditions residential dwellings be designed such that internal daytime noise levels not exceeding of 35 dB $L_{Aeq,16hr}$ (daytime) and 30 dB $L_{Aeq,8hr}$ (night-time) can be achieved within habitable rooms.

6.13 In relation to internal noise levels from maximum noise events, the ProPG INLGs note 4 of Figure 2 in the ProPG explains that:

“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 45 dB $L_{Amax,F}$ more than ten times a night. However, where it is not reasonably practicable to achieve this guideline then the

judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events."

- 6.14 With reference to the current government planning policies, these levels are generally considered to represent the LOAEL for normal transportation noise, and therefore by achieving these levels adverse effects from noise would not be expected and the aims of the NPPF and NPSE should be met.
- 6.15 The specific level of acoustic performance required from façade, glazing and ventilation systems will be dependent on the exact layout of the buildings, room sizes, wall and roof designs etc. However, at this outline stage, simplified calculations of internal ambient noise level have been carried out based on typical room geometry assumptions.
- 6.16 Calculations have been undertaken to predict internal ambient noise levels inside dwellings based on the measured noise levels and the use of standard façade materials. These calculations have been based on the following assumptions:
- Calculations have been based on habitable rooms on the facades exposed to the highest level of external noise predicted at the location of the proposed dwellings and therefore represent a worst-case assumption. The level of noise incident on these facades has been taken from the noise mapping. Notwithstanding the above, it is important to note that the majority of dwellings will be located in areas where noise levels are less than these values (as they are located further from sources and will be afforded noise screening attenuation by the other buildings on site).
 - The following two 'worst case' scenarios have been assessed:
 - ~ the most exposed element of the residential development located on the northern portion of the site (i.e., north facing facades; refer to Figure 1); and
 - ~ the most exposed element of the residential development area located on the southern portion of the site (refer to Figure 1).
 - Calculations have been carried out based on the guidance contained within Annex G of BS 8233:2014. Internal noise levels (with windows closed) have been predicted using the following simplified equation:

$$L_{in} = L_{ex} - R + 3$$

Where:

L_{in} = Predicted internal noise level;

L_{ex} = External free-field noise level incident on building façade; and

R = Sound insulation of the façade, in this case assumed as the performance of the glazing in terms of $R_w + C_{tr}$.

- Assuming the entire façade offers the same sound reduction of the glazing is a worst-case assumption. In reality, the composite sound insulation of the façade (taking account of external walls etc.) is likely to be significantly higher.
- For calculations with windows partly open (e.g., to help provide relief from overheating) it has been assumed that a 13 dB external to internal noise reduction will be achieved.
- All calculations are based on broadband A-weighted noise data and standard glazing and ventilator solutions.

6.17 Table 6.1 summarises the results of the predicted internal noise levels inside the 'worst case' proposed residential dwellings.

Table 6.1: Predicted Internal Noise Levels

Assessment Period	External Noise Level – dB(A)	Façade Assumptions	Predicted Internal Noise Level – Windows Closed – dB(A)	Predicted Internal Noise Level – Windows Open – dB(A)
Scenario 1 – Most exposed element of residential development (northern portion of the site)				
Daytime – Living room or bedroom – $L_{Aeq,T}$	52 ¹	Standard thermal double glazing providing (6/16/6): 27 dB $R_w + C_{tr}$ Standard trickle ventilator providing: 33 dB $D_{n,e,w}$	28	39
Night-time – bedroom – $L_{Aeq,T}$	46 ¹		22	33
Night-time bedroom – L_{max}	60 ²		36	47
Scenario 2 – Most exposed element of residential development (southern portion of the site)				
Daytime – Living room or bedroom – $L_{Aeq,T}$	51	Standard thermal double glazing providing (6/16/6): 27 dB $R_w + C_{tr}$ Standard trickle ventilator providing: 33 dB $D_{n,e,w}$	27	38
Night-time – bedroom – $L_{Aeq,T}$	44		20	31
Night-time bedroom – L_{max}	60		36	47
Notes:				
¹ The values were chosen based on the predicted noise grid maps in Figure 2 and Figure 3, which suggested that the sound levels would be approximately 3 dB higher than those measured at survey location LT3 nearby. A comparison of the $L_{Aeq,T}$ values for locations ST2 and LT3 showed similar levels, so a worst-case + 3 dB scenario has been applied.				

² The night-time $L_{Amax,F}$ levels at the residential development in the northern part of the site have been predicted based on the level difference between the measured daytime $L_{Amax,F}$ at location LT3 and ST2.

- 6.18 The results of the calculations show that with windows closed, but ventilators open to provide 'whole dwelling ventilation', internal ambient noise levels are predicted to easily meet the ProPG internal noise level guidelines (and therefore also the BS 8233:2014 desirable internal noise levels) using standard façade materials and ventilation solutions.
- 6.19 When windows are open it has been found that noise levels slightly exceed the ProPG / BS 8233:2014 INLGs in the most exposed locations of the proposed development. However, in the majority of dwellings noise levels are likely to be less than those predicted and are therefore likely to meet the ProPG INLG.
- 6.20 Even in the most exposed locations assessed it has been found that 'reasonable' internal noise levels are likely to be achieved with windows open (i.e., predicted levels will be within +5 dB of the INLGS with reference to note 7 of Figure 2 of the ProPG).
- 6.21 There are two main reasons that windows are likely to be opened:
- to provide purge ventilation; or
 - to provide relief from overheating.
- 6.22 Both of these scenarios are discussed in more detail in the following section.

Ventilation and overheating

- 6.23 It is a requirement that of Building Regulations Part F [8] that the following types of ventilation are provided:
- whole dwelling ventilation (previously referred to as 'background' ventilation);
 - extract ventilation (in kitchens and bathrooms); and
 - purge ventilation.
- 6.24 The likely acoustic impact of each type of ventilation is discussed in the following sections.

Whole dwelling ventilation

- 6.25 If façade openings (such as trickle ventilators) are used to provide the minimum 'whole dwelling' ventilation rates under Building Regulations Part F, they should not increase internal noise levels above the INLG values when in their open position. The calculations above have shown that by using a ventilation opening that provides 33 dB $D_{n,e,w}$ (this level of performance is likely to be provided by most standard acoustic trickle ventilator in the open position) the ProPG internal noise

criteria should be met. It is likely that vents offering less sound insulation performance could also achieve the ProPG INLGs, however, this would need to be verified through calculation.

- 6.26 However, it is important to note that this performance assumes that only one ventilation opening is required. Should more than one ventilation opening be required in a space to meet the requirements of Approved Document F (equivalent area requirements), the required acoustic performance in terms of $D_{n,e,w}$ will need to be increased by $+ 10 \log N$, where N is the number of vents required. For example, if two vents are required to provide sufficient equivalent area the performance of each vent will need to be increased by 3 dB.
- 6.27 At this stage of the design the ventilation strategy for the project has not been confirmed. Therefore, it may be that a mechanical ventilation and heat recovery system (MVHR) type solution may be implemented. Should this be the case, passive façade openings (such as trickle vents) will not be required. MVHR system's intake and exhausts are ducted to the façade and the systems themselves inherently provide a high level of sound insulation (much more than a trickle vent) and therefore significant noise intrusion via this type of system is considered very unlikely. If required, intakes and exhausts can be attenuated but this is only normally required on developments subject to very high noise levels and is very unlikely to be the case for this site.

Extract Ventilation

- 6.28 Extract ventilation is required in rooms where most pollutants or water vapour are generated i.e., kitchens (cooker hoods etc.) and bathrooms (bathroom fans). These spaces are not considered habitable rooms and the method used to provide ventilation is unlikely to reduce the sound insulation of the façade (as extract ventilation is provided mechanically). Therefore, it is unlikely that providing extract ventilation in these spaces will result in adverse noise impacts (assuming noise from mechanical equipment is appropriately controlled; this is discussed in Paragraph 6.34).

Purge Ventilation

- 6.29 Purge ventilation is required to allow rapid removal of pollutants released from occasional activities (e.g., burning the toast or when painting) and is normally provided by open windows. It is generally accepted that as purge ventilation is only required occasionally and for short periods, therefore increases in noise level during the purge ventilation condition (e.g., when windows are opened) will not result in adverse noise impacts.
- 6.30 In summary, the above paragraphs show that the ventilation requirements of the Building Regulations can be provided whilst still meeting the ProPG / BS 8233:2014 internal noise level criteria.

Overheating

- 6.31 The normal method of providing relief from overheating is to open windows. When windows are open to provide thermal comfort, it is likely that internal noise levels will increase. The impact that any increased internal noise levels will have will depend on two factors:
- the level of noise inside the dwelling / habitable rooms; and
 - how often windows need to be opened (i.e., how often / long occupants are exposed to increased noise levels).
- 6.32 To reduce any adverse noise impacts the development, where possible, should be designed to reduce the duration of and how often windows are required to be open to avoid overheating. This will in turn reduce adverse noise effects as occupants will be exposed to increased noise levels for a shorter period of time.
- 6.33 At this stage of the design information relating to if and how often the proposed dwellings are likely to overheat is not available. However, even in the most exposed dwellings proposed on site, internal noise levels predicted with windows open have been found to only slightly exceed the ProPG INLGs and still result in 'reasonable' internal conditions. Therefore, it is considered unlikely that significant adverse noise effects will occur when windows are open to provide relief from overheating even if they need to be open for a significant period of time.

Noise from building service systems

- 6.34 Residential building services systems are generally designed to generate low levels of noise. However, based on guidance in Approved Document F (ADF) it is recommended that noise from building services systems, if and where they are used in the development, do not exceed the following noise levels in dwellings when operating under normal conditions (i.e., providing whole dwelling ventilation):
- 30 dB $L_{Aeq,T}$ in living rooms and bedrooms.
- 6.35 Higher levels of noise are likely to be acceptable in less sensitive spaces (i.e., kitchen and bathroom) and when systems are running at temporary boosted levels (i.e., to help mitigate overheating or provide intermittent extract ventilation).

External Amenity Noise Assessment

- 6.36 BS 8233:2014 states that:

"the acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$."

6.37 The standard continues:

“These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces but should not be prohibited.”

6.38 With reference to the representative baseline levels in Table 4.4 and the noise model grid maps in Figure 2 and Figure 3, the external amenity areas are not likely to be subject to levels higher than 50 – 55 dB $L_{Aeq,16hr}$ at any part of the site intended for residential development, with most barely exceeding the lower part of this threshold.

6.39 In addition, shielding from the new buildings will further reduce the external noise levels for all houses, so long as the external amenity areas are placed on the side of the building facing away from the nearest road.

Other Relevant Issues

Occupants of the Development

6.40 Element 4(iii) of the ProPG brings attention to the likely occupants of the development, and states:

“LPAs should bear in mind the extent to which occupants are likely to be able to exercise choice about living with the acoustic conditions in and around the proposed residential development. In addition, certain groups such as families with young children, students and the elderly may all have different requirements and sensitivities as regards to acoustic conditions and, in particular, varying needs for access to quiet external space.”

6.41 The development is proposed to contain normal residential type accommodation. Although it is possible that people more vulnerable to noise may live in the new dwellings, the development is not considered to be any more sensitive to noise than other standard residential development. It has also been shown that adverse impacts as a result of noise are unlikely to occur in the proposed development. In particular, internal noise levels are likely to be below the LOAEL and external noise levels comply with ProPG guidance levels. It is therefore considered the risk of adverse effects is low.

Compliance with National and Local Policy

6.42 On the basis of the above, internal and external sound levels will meet the guideline values contained within the ProPG. Therefore, the assessment has found that significant effects are unlikely to occur as a result of noise and adverse effects have been mitigated through the location of the proposed development on the site and through the use of standard building materials. It is therefore considered that the aims of the NPSE and NPPF have been complied with.

- 6.43 With regard to local ADC policy, when compared to the NECs outlined in Tables 21.1 and 22.2 it can be seen that the areas of site where residential development is proposed (refer to Figure 1) fall within NEC A. Sites that fall in NEC A are subject to the following guidance:

“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.”

Recommendations of the ADS

- 6.44 As described in paragraph 2.21, by following the ProPG approach it is possible to make a recommendation to the decision maker in relation to the suitability of the site and propose design for residential development.
- 6.45 The ProPG assessment above has shown that significant adverse effects on future occupants of the proposed development are unlikely to occur as a result of noise. Internal noise levels are likely to be significantly within the guidelines set out in BS 8233:2014 with windows closed, and only slightly above the guidelines with windows open in the worst-case scenarios modelled. External noise levels are predicted to also be within the guidelines in ProPG / BS 8233:2014.
- 6.46 Therefore, our recommendation to the decision maker is:
- “Planning consent may be granted subject to the inclusion of suitable noise conditions.”*
- 6.47 Although the assessment has found that noise levels incident on the site are at a level where a recommendation to ‘grant without conditions’ is likely to be appropriate, it may be beneficial to include noise related conditions to limit emissions noise from any new plant / equipment that may potentially form part of the development. This type of impact is not covered in this ‘site suitability’ assessment report but is examined in the EIA.

7 Uncertainty

- 7.1 All noise assessments include a measure of uncertainty. Wherever possible, good practice measurement techniques and worst-case assumptions have been employed to reduce the possibility that noise impacts are under-estimated.
- 7.2 The noise measurement data used in this assessment was collected in the later stage of 2021. Whilst there is a risk that reduced noise levels were measured due to the on-going impacts of the Covid-19 pandemic, the majority of activities including road and rail traffic have risen back to levels close to that pre-pandemic. Furthermore, the representative levels are based on data collected over a week to further reduce the uncertainty from day-to-day fluctuations. As such, it is believed that the levels measured can be deemed representative of those occurring on the site.
- 7.3 The prediction of internal and external ambient noise levels are based on measured $L_{Aeq,T}$ and $L_{Amax,F}$ data from the noise survey, as well as through the use of noise modelling software. The internal noise level assessment has been carried out based on the worst-case, most exposed facades comprised of entirely standard glass windows. As such, the façades will likely provide improved sound reduction, and the majority of the site will also experience lower sound levels at the relevant façades. Even using the worst-case assumptions, the internal noise levels in BS 8233:2014 are comfortably met with windows closed and as such this methodology provides a margin to account for any calculation uncertainty.
- 7.4 Although all noise assessments contain some uncertainty, it is not believed that the uncertainty associated with this assessment would significantly alter the findings and recommendations of this report.

8 Summary and Conclusions

- 8.1 A noise survey and assessment based on the guidance provided by the *Professional Practice Guidance on Planning and Noise – ‘New Residential Development’* (ProPG) has been undertaken for the proposed Bognor Regis Golf Club development. The assessment has also taken account of national and local noise policy.
- 8.2 The assessment is focussed on identifying the suitability of the site for residential development. The noise and vibration impacts associated with the proposed development are examined separately as part of the EIA for the project.
- 8.3 The ProPG assessment has been undertaken and resulted in the following recommendation to the decision maker:
- “Planning consent may be granted subject to the inclusion of suitable noise conditions.”*
- 8.4 When compared to Arun District Council (ADC) requirements it has been found that the area of site propose for residential development falls into Noise Exposure Category A. Based on the ADC guidance the following recommendations apply:
- “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.”*
- 8.5 It is therefore considered the proposed site is suitable for residential development with respect to noise.

Figures

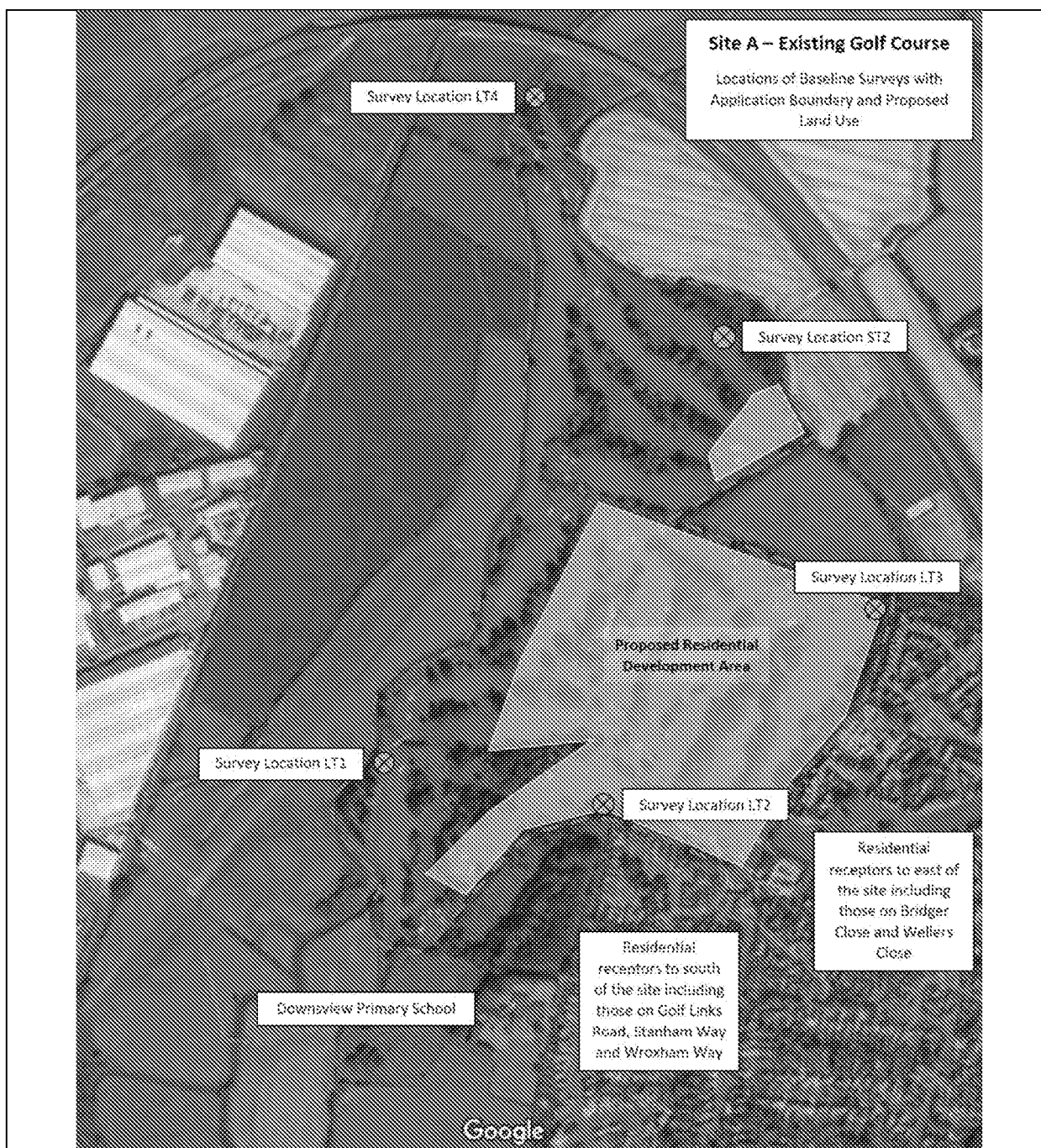


Figure 1: Noise Monitoring Locations with Proposed Land Use

Project Number:	JAJ02792-REPT-01-R2	Project Title	Proposed Development at Bognor Regis Golf Club		
Client:	For Hallam Land Management	Rev :	2	Drawn By:	NS
		Date:	08/12/2021	Checked By:	MH
File location:	"O:\Jobs_2000 - 3000\02792\ProPG\JAJ02792 Site A Noise Monitoring Locations.png"				
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6-7 Lovers Walk
Brighton East Sussex BN1 6AH

T 01273 546800 F 01273 546801
E rpsbn@rpsgroup.com W rpsgroup.com

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Project: Proposed Development at Bognor Regis Golf Club

Job Ref: JAJ02792-REPT-01-R2

File location: "O:\Jobs_2000 - 3000\02792\Model\Grid Noise Map Day Time 20211117.png"

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Rev: 2

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Figure 2: Daytime Noise Grid Map

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6-7 Lovers Walk
Brighton East Sussex BN1 6AH

T 01273 546800 F 01273 546801
E rpsbn@rpsgroup.com W rpsgroup.com

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File location: "O:\Jobs_2000 - 3000\02792\Model\Grid Noise Map NightTime 20211119 CF.png"

Date: 008/12/2021

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Figure 3: Night-time Noise Grid Map

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Appendices

Appendix A: Baseline Survey Time Histories

References

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- 5 British Standards Institution. British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings.
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Contact

RPS Consulting Services Ltd
6-7 Lovers Walk
Brighton

