ScotchPartners
Building Services Engineering | Sustainability | Acoustics

Premier Inn Littlehampton, Anchor Springs

Whitbread PLC

Noise Impact Assessment

Revision 00

03/04/2025

Scotch Partners LLP

Building Services Engineering | Sustainability | Acoustics

Challoner House
London
EC1R 0AA

[redacted]
www.scotchpartners.com

Project Particulars

Client Name: Whitbread PLC

Project Name: Premier Inn Littlehampton, Anchor Springs

Disclaimer

Revision History

Revision	Description	Date	Prepared By	Checked By
00	Initial issue	03/04/2025	Paula Menin BArch BMus MSc AMIOA Joel Mahay BSc AMIOA	Jason Clouston BEng MSc MIOA

Contents

1 Introduction

1.1 Proposals are in place for the construction of a new hotel between Anchor Springs and East Street in Littlehampton, UK. This report presents an assessment of the noise emission from new building services plant associated with the development. Noise intrusion into the new hotel guestrooms has also been assessed within this report.

1.2 An external noise survey has been conducted at the site, and the measurement data have been used to establish the prevailing ambient and background noise levels affecting the site and neighbouring noise-sensitive properties. This data has then been used to assess the noise impact in accordance with Arun District Council's (ADC) requirements.

1.3 Chapter 2 of this report presents the acoustic requirements, Chapter 3 describes the external noise survey, and the assessment of plant noise emission to neighbouring properties is presented in Chapter 4. Plant noise intrusion into existing hotel guestrooms is assessed in Chapter 5, and external environmental noise intrusion into new hotel guestrooms is assessed Chapter 5. Conclusions have been provided in Chapter 6.

1.4 The full measurement data are available on request. Definitions of some of the terminology used throughout the report have been included in Appendix A.

2 Criteria

2.1 Overview

2.1.1 When assessing the impact of noise emission from new building services plant associated with the proposed development, and noise intrusion into the proposed development, consideration has been given to local planning policy, available good practice guidance, and the hotel operator's brand standards. A list of the documents that have been consulted is provided below:

Local Policy

- *Arun Local Plan 2011-2031* (adopted July 2018)
- *Planning Noise Advice Document: Sussex* (September 2021)

Good Practice Guidance

- British Standard 4142:2014+A1:2019 - *Methods for rating and assessing industrial and commercial sound*

Hotel Operator's Brand Standards

- Premier Inn Generic Specification for a Turnkey Development (January 2024 - Edition Rev N)

2.1.2 Summaries of the guidance considered relevant to the proposals are presented within this Chapter.

2.2 Arun Local Plan 2011-2031

2.2.1 The *Arun Local Plan 2011-2031* (adopted July 2018) contains a policy concerning noise pollution that is considered relevant to the proposed development:

" 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.[*]

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 (ISO 1996 - Parts 1,2,3 for noise assessment; BS4142:2014+A1:2019 for building services plant) of the Planning Noise Advice Document: Sussex, and any mitigation measures requires 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."

2.2.2 Notably, a hotel development is not technically considered a residential development, but the principles surrounding a noise sensitive development are considered adequate to be extended to a hotel.

2.3 Planning Noise Advice Document: Sussex

2.3.1 The *Planning Noise Advice Document: Sussex* (September 2021) contains guidance relating to the assessment of industrial and commercial sound sources:

"The rating level of the industrial or commercial sound source should, where practicable, achieve a level no greater than the representative background sound, when measured in accordance with BS 4142:2014+A1:2019. There may be instances, for specific sites, where a rating level below background is deemed appropriate. This can be determined through discussion with the Local Planning Authority (LPA). A rating level below background may be required if there are concerns for potential noise creep, for example in a High Street setting. It is considered that meeting this criterion would avoid adverse noise impacts, in the interests of ensuring a good standard of amenity and protecting human health. Where these criteria are not attainable, the noise report should explain why, and how best practicable means will be implemented to control noise in order to satisfy the LPA that the development is acceptable. At all times the reports shall have regard to the context."

2.4 British Standard 4142

2.4.1 British Standard 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* presents a methodology for comparing the noise level of the new source (the *specific sound level*) with that of the existing background noise level in the area in the absence of the new source (the *background sound level*), and establishing the likely impact of the noise.

2.4.2 The methodology requires consideration to be given to all aspects of the assessment process, and accounts for unusual acoustic features such as tonal, impulsive, or intermittent characteristics of the noise by the addition of various corrections to the specific sound level. The corrected *specific sound level* is the *rating level*.

2.4.3 The *background sound level* is then arithmetically subtracted from the *rating level*. The greater the positive difference between the *rating level* and the *background sound level*, the greater the magnitude of the impact.

- A difference of around +10 dB or more is likely to be an indication of a "significant adverse" impact, depending upon the context.
- A difference of around +5 dB or more is likely to be an indication of an "adverse impact", depending upon the context.
- Where the *rating level* does not exceed the *background sound level*, this is an indication of a "low impact", depending upon the context.

2.4.4 It is proposed to target a BS 4142 *rating level* that is at or below the prevailing *background sound level,* at all times the new plant is to be operating, in order to achieve a "low impact" at the neighbouring noise-sensitive receivers. Character corrections will be applied and are discussed in the assessment section of this report.

2.5 Premier Inn Generic Specification for a Turnkey Development

2.5.1 All new Premier Inn developments and extensions are to be constructed so as to control noise intrusion in line with the requirements of the Premier Inn Generic Specification for a Turnkey Development, hereinafter referred to as the "PI Spec". Revision N (January 2024) of the PI Spec contains internal background noise limits for hotel guestrooms owing to external sources, as presented in Table 2-1.

Period	Noise level
Daytime (07:00-23:00)	≤ 35 dB $L_{Aeq,1hour}$
Night-time (23:00-07:00)	≤ 30 dB $L_{Aeq,1hour}$ ≤ 42 dB L_{AFmax}*

**The maximum criterion applies to all vehicle and railway train passbys and all aircraft flyovers. It also applies to the noise from all street activities including those associated with patrons attending and leaving adjacent, neighbouring or connected entertainment venues; noise associated with commercial and industrial neighbouring premises including delivery activities and process equipment; seagulls and church bells. Genuinely infrequent and unpredictable sources of noise such as car alarms occurring no more than twice a night are excluded.*

Table 2-1: Internal background noise level requirements (Premier Inn brand standards)

2.5.2 The standards have been chosen to complement the Good Night Guarantee offered by Premier Inn, which refunds guests if they have been disturbed by noise while trying to sleep. These standards are more onerous than those recommended in British Standard 8233, the usual guidance adopted for controlling noise intrusion into residential accommodation. It is, therefore, intended to control noise intrusion into the hotel in line with the requirements of the PI Spec. Complying with these requirements can also be expected to satisfy the ADC's Planning requirements for noise intrusion.

2.5.3 The PI Spec also requires that noise emission from all plant associated with the hotel be designed to be at least 5 dB below the lowest measured background sound level at night with all plant operating simultaneously, when assessed at the boundary (assumed to be any normally occupied position) of the nearest noise-sensitive property. This is also expected to satisfy the planning requirements for assessment of commercial noise.

3 External noise survey

3.1 Site description

3.1.1 The site is located on Anchor Springs and Avon Road close to the centre of Littlehampton. To the north of the site are residential dwellings. To the east and south are buildings with commercial use on the ground floor and potential residential use on the upper floors. The buildings directly to the west of the site are understood to be commercial use only.

3.1.2 The main source of noise affecting the site and neighbouring properties was observed to be road traffic from Anchor Springs and East Street. To the south of the site, buses using the numerous stops along Anchor Springs were significant contributors to the noise climate, particularly maximum noise levels. These activities are understood to start from 05:25 and end past 00:05.

3.1.3 Noise at the site from other existing building services was generally imperceptible against the road/rail traffic noise, although may become more audible during lulls in traffic flows and overnight.

3.2 Measurement methodology

3.2.1 Continuous, unattended long-term ("LT") noise level measurements were conducted at the northeastern corner of the site (LT1). The location is shown in Figure 3-1. The microphone was placed at 1.5 m from ground level in free-field conditions.

3.2.2 Attended, short-term ("ST") measurements were also conducted along Anchor Springs, with the microphone walked up and down the pavement nearest to the bus stops there (shown in in Figure 3-1). The measurements at location ST1 were used to characterise the bus stop activity noise levels.

Figure 3-1: Satellite image showing noise measurement locations and nearest noise sensitive receptors (courtesy of Google)

3.2.3 For the long-term measurement, statistical and spectral octave-band levels were recorded in 15-minute samples between 15:51 on Monday, 16 December 2024, and 12:06 on Tuesday, 17 December 2024. The "fast" (125ms) time constant was used.

3.2.4 For the short-term measurement, statistical and spectral octave-band levels were recorded in 1-minute samples between 15:11 and 15:27 on Tuesday, 16 December 2024. The "fast" (125ms) time constant was used.

3.2.5 The data measured are considered representative of the typical and lowest background sound levels experienced at nearby neighbouring properties.

3.2.6 Measurements were undertaken generally in accordance with the procedures advised within British Standard 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* and British Standard 7445-1:2003 (ISO 1996) *Description and measurement of environmental noise.*

3.2.7 The following equipment was used to carry out the measurements:

Location	Type	Model	Serial no.
LT1 and ST1	Class 1 sound level meter	Rion NL-52	00620871

Table 3-1: Noise level measurement equipment

3.2.8 The calibration of the sound level meter and associated microphone was checked prior to and on completion of the survey in accordance with recommended practice. No significant drift in calibration occurred during the survey. The accuracy of the calibrators can be traced to National Physical Laboratory Standards.

3.3 Weather

3.3.1 Weather conditions throughout the survey were varied with some periods of dry, and with average windspeeds typically below 4 m/s.[1]

3.4 Results

3.4.1 Full measurement data are available in digital format on request. A summary of the key data is presented in this report.

3.4.2 Graphs showing the noise level history for the unattended measurements are presented in Figure 3-2.

[1] https://www.wunderground.com/dashboard/pws/ILITTL55/table/2024-12-22/2024-12-22/weekly

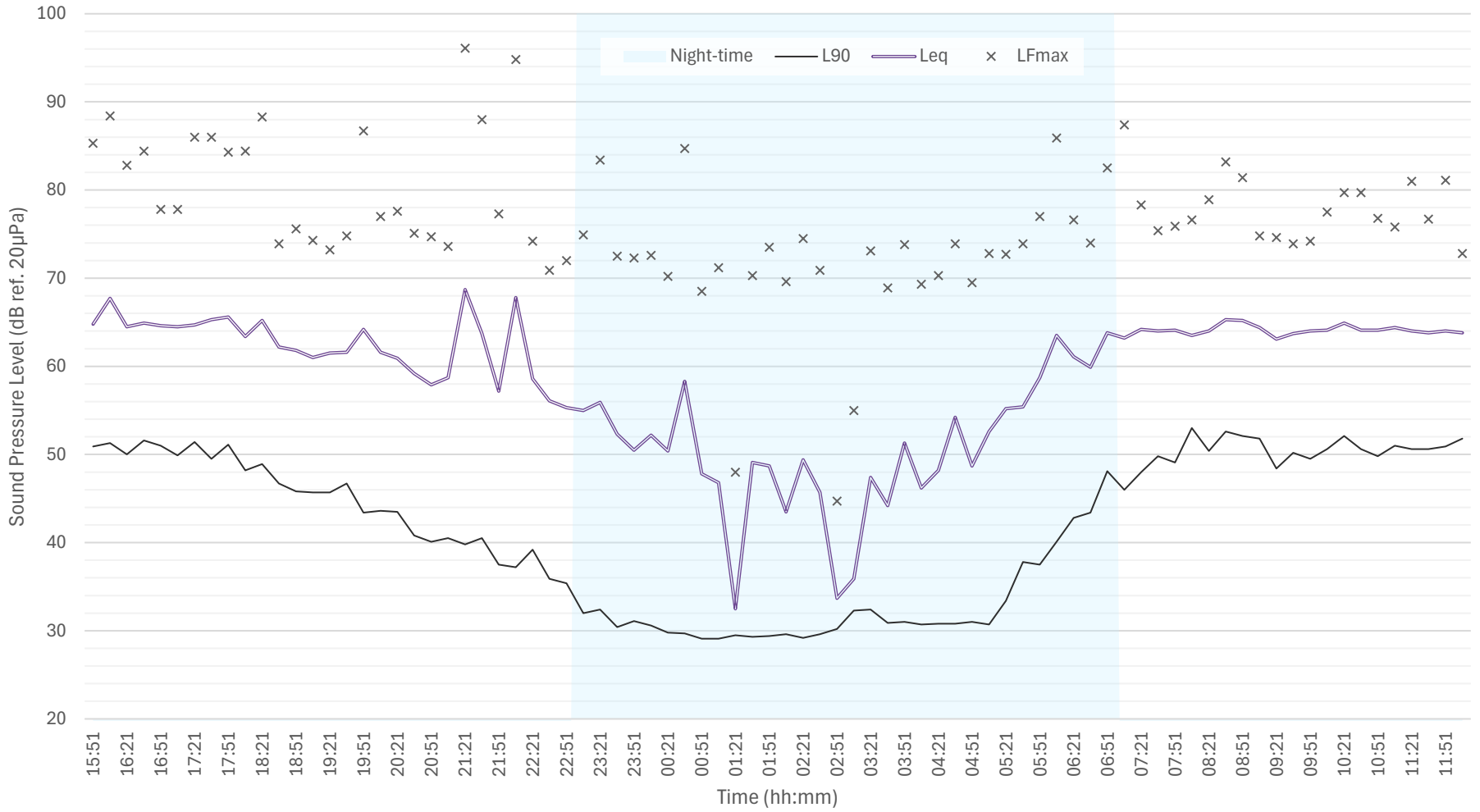

Figure 3-2: Measured noise level history at unattended survey location, 16-17 December 2024

3.4.3 A summary of the measured levels across site is presented in Table 3-2. The overall values are presented as the logarithmic average for ambient levels ($L_{Aeq,T}$), the typical worst-case maximum levels ($L_{AFmax,15min}$) and typical lowest background levels ($L_{A90,15min}$) for the entire measurement period.

Survey	Period, *T*	$L_{Aeq,T}$ (dB)	$L_{AFmax,15min}$ (dB)	$L_{A90,15min}$ (dB)
LT1	Daytime (15:51-23:00 and 07:00-12:06)	64	96	35
	Night-time (23:00-07:00)	56	86	29
ST1	Daytime(15:11-15:27)	69	83[2]	49[1]

Table 3-2 Summary of measured noise levels

3.4.4 Noise levels can be seen to have generally followed a diurnal pattern, falling to the lowest levels overnight and rising to the highest levels in the morning.

3.5 Background sound levels

3.5.1 Based on the measured data, the typical background sound levels expected to occur during the daytime and night-time at the nearest noise-sensitive receptors (NSRs) are presented in Table 3-3.

NSRs	Measurement location	Time	Typical background sound levels
See Figure 3-1	LT1	Daytime (07:00-23:00)	35 dB $L_{A90,15min}$
		Night-time (23:00-07:00)	29 dB $L_{A90,15min}$

Table 3-3: Typical background sound levels for the nearest NSRs

3.5.2 The noise levels at the measurement position LT1 are considered to be representative of the ambient levels surrounding the site.

[2] Value based on $L_{AFmax,1min}$ samples

4 Plant noise emission to neighbouring properties

4.1 Plant noise emission limits

4.1.1 In order to achieve a "low impact" according to a BS 4142 assessment, and to satisfy the requirements of the Local Authority, the rating level of the proposed building services plant needs to be no greater than the background sound level at the existing neighbouring properties. The background sound level used should reflect the level that is typically expected to occur during times of plant operation.

4.1.2 To represent the worst-case scenario, the typical lowest background sound levels obtained at LT1 during the survey will be used to define the plant noise emission limits at the nearest noise-sensitive receptors (NSRs), as the majority of plant can be expected to operate 24 hours a day. The following limits are based on the results of the noise survey, and are expected to satisfy the requirements of the Local Authority:

NSRs	Time	Plant noise emission limits
See Figure 3-1	Daytime (07:00-23:00)	35 dB L_{Ar}
	Night-time (23:00-07:00)	29 dB L_{Ar}

Table 4-1: Plant noise emission limits at nearest NSRs, based on measurement data

4.2 Plant proposals

4.2.1 The plant proposals are still being developed. We have been advised by the project mechanical engineer of initial selections, based on experience from many other Premier Inn sites.

4.2.2 The proposed plant is anticipated to comprise of 12 No. condenser units serving the new guestrooms and the bar/restaurant room (Mitsubishi PURY EP250YNW-A2), 4 No. water heaters (Mitsubishi Q-ton ESA30EH-25), one supply and extract fan serving the new kitchen, one kitchen split unit, one comms room split, and one beer store unit. The kitchen split unit, comms room unit and beer store unit were assumed to be the outside condenser units Mitsubishi type MUZ-EF50VG. This information is based on guidance from the project's mechanical engineer and Scotch Partners' experience with similar developments.

4.2.3 It is understood that most units will be located on the west side of the rooftop, with the kitchen ventilation plantroom located to the east, as shown in Figure 4-1. As the units will be located externally, they have been included within the noise emission assessment.

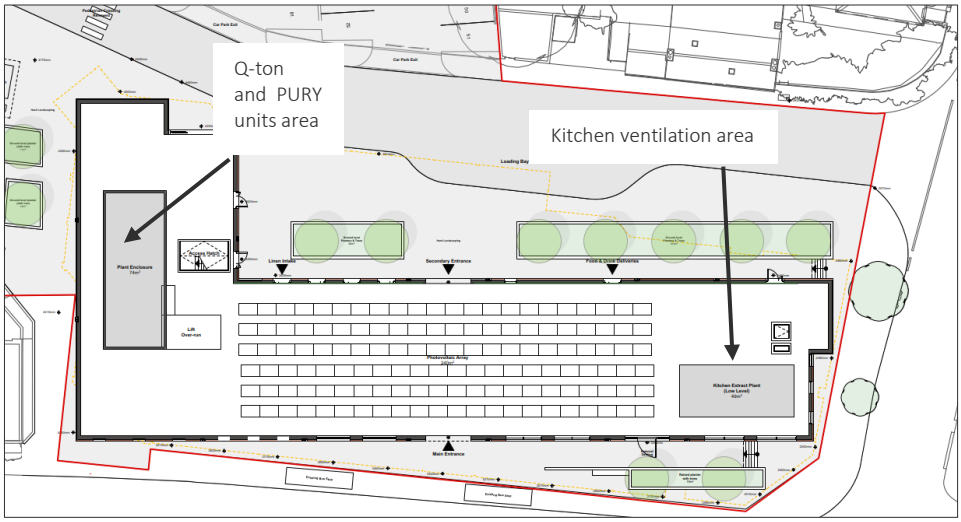

Figure 4-1: Anticipated rooftop plant areas (adapted from drawing no 6122-F7-002 revision B, dated 10/03/25)

4.2.4 Noise from the atmosphere terminations of the kitchen supply and extract fan is expected to be readily controlled by the use of in-duct silencers/attenuators, so noise from the terminations has not been included within the noise emission assessment.

4.2.5 The kitchen ventilation system, and associated silencer/attenuators, are to be reviewed in more depth during the detailed design stage. Silencers/attenuators will need to be selected so that noise from any atmosphere side termination is controlled to not exceed 50 dB L_{pA} at a distance of 1m externally from the termination. This is considered readily achievable in line with typical Premier Inn designs.

4.2.6 The condenser units serving the new guestrooms (Mitsubishi PURY-EP250 units) are able to be controlled to 70% duty during the daytime (07:00-23:00) and to 50% duty overnight (23:00-07:00). The water heaters (Mitsubishi Q-ton ESA30EH) are expected to be required to operate at normal duty during both daytime and night-time hours, along with the new kitchen supply and extract fan.

4.2.7 The sound power levels for the guestroom condenser units and water heaters have been provided by the manufacturer, and are presented in Table 4-2. The equipment is noisier when operating in heating mode, rather than other modes, so only the data for heating mode has been used in the assessment.

4.2.8 It is believed that selections have not yet been made for the kitchen supply and extract fan, so the noise levels for the supply/extract fan presented within this section are based on assumed selections. These selections have been informed by Scotch Partners' experience with similar developments, and are also presented in Table 4-2.

Unit	Linear sound power levels in octave-band centre frequencies (dB in Hz)								
	63	125	250	500	1 k	2 k	4 k	8 k	dBA
PURY-EP250 70% duty	80	76	72	71	69	65	67	61	75
PURY-EP250 50% duty	76	70	64	63	61	57	61	57	67
Q-ton ESA30EH-25	68	63	57	57	60	55	51	45	63
Kitchen split unit	58	55	52	51	46	44	36	28	52
Comms rooms unit	58	55	52	51	46	44	36	28	52
Beer store unit	58	55	52	51	46	44	36	28	52

Table 4-2: Manufacturer provided sound power levels (per unit), (dB ref. 10^{-12} W)

4.2.9 The condenser units serving the bar/restaurant room are expected to be required to operate at normal duty during daytime hours, and at a reduced duty during night-time hours (23:00-07:00), as the duty of each condenser unit will automatically adjust depending on the cooling/heating duty requested by the breakfast room's occupants.

4.3 Mitigation

4.3.1 It is understood that a solid barrier is proposed around the main plant area, with total height of 2.5 m above rooftop level. To allow the required airflow to the equipment, the barrier is to have a 0.4 m gap at the bottom, with 2.1 m above for an imperforate absorptive barrier. The minimum required sound reduction index for the barrier is shown in Table 4-3.

Item	Sound Reduction Index in octave-band centre frequencies (dB in Hz)							
	63	125	250	500	1 k	2 k	4 k	8 k
Absorptive barrier	18	20	26	31	35	39	40	41

Table 4-3: Minimum sound reduction index values in octave bands for the absorptive barrier

4.3.2 One example of a product that can achieve the required sound reduction for the barrier is the acoustic enclosure panel model EP100/UF by Allaway Acoustics.

4.3.3 Additionally, all PURY units are to be fitted with the City Multi 'top only' acoustic kit for PUHY and PURY series units (YJM). This top louvre allows for an overall sound source reduction of up to 4 dBA for each PURY unit and will not go above the barrier's overall height.

4.4 Nearest noise-sensitive receivers

4.4.1 The nearest noise-sensitive receptors to the proposed plant are considered to be the residential properties; highlighted in Figure 4-2.

Figure 4-2: Satellite image showing nearest noise-sensitive receptors (in yellow) and proposed external plant areas in orange (source: Google Earth)

4.4.2 The two most affected receivers are calculated to be 14-16 Anchor Springs, a commercial and residential property to the south-west of the site, and Avon House, a residential dwelling to the north-east of the site on Avon Road.

4.4.3 The noise impact to other neighbouring properties not identified in this report is expected to be less than that presented, because of increased propagation distances. The assessment is, therefore, considered to be representative of a worst-case scenario.

4.5 Calculation methodology

4.5.1 The calculation of the specific sound level for the nearest noise-sensitive receiver has been carried out in accordance with the general calculation methodology outlined in ISO 9613-2:2024, as per typical industry practice. The noise modelling software CadnaA (version 2025) was used to implement this methodology. Calculations have been made for each of the following means of attenuation, where considered to be relevant:

- Geometric divergence – which describes the reduction in sound pressure level as the distance from the source increases.
- Specific attenuation measures – such as reduced operating duties.
- Barrier attenuation measures – such as the effect of brick walls and shielding owing to existing and proposed buildings.

4.5.2 The proposed reduction in operating duties for the guestroom and bar/restaurant room condenser units (to 70% during the day, and to 50% overnight) has been included in the calculations.

4.5.3 The guidance in BS 4142 requires that decibel corrections be added to the specific sound level if the noise contains unusual acoustic characteristics. The corrected sound level is known as the rating level. The following characteristics have been considered:

- Tonality: Noise from the proposed condenser units and water heaters will typically be airflow noise at maximum duty, which is broadband in character (i.e. distributed over a wide frequency range) and, therefore, not expected to contain tonal qualities. However, a precautionary +2 dB correction has been included to allow for a "just" perceptible tonality.
- Impulsivity: When properly maintained, noise from the proposed units are not expected to exhibit impulsive characteristics; therefore, this correction has not been applied.
- Intermittency: The duty of each individual condenser unit and water heater will adjust depending on the cooling/heating duty requested by the occupants, and the duty of the kitchen supply and extract system will adjust depending on the kitchen's operation. The equipment is, however, expected to operate with gradual stop/starts, so it is unlikely that an intermittent characteristic would be experienced at the neighbouring properties. However, a precautionary +3 dB correction has been included.
- Other: The unit is not expected to emit any other characteristics that would be readily distinctive against the existing acoustic environment; therefore, no correction has been applied.

4.5.4 The BS 4142 rating level will, therefore, be 5 dB higher than the specific sound level at the nearest noise-sensitive receptors.

4.6 Predicted noise levels

4.6.1 The specific sound levels of the proposed plant at the assessment location are presented in Table 4-4 below, along with the associated rating levels. The levels are inclusive of the proposed reductions in operating duty for the condenser units.

4.6.2 BS 4142 makes it clear that consideration of the context and uncertainty are important, before concluding an impact.

4.7 Context and uncertainty

4.7.1 With regard to the context, the new noise sources are considered to have a similar character to the existing plant. The corrections applied for the BS 4142 rating level are considered precautionary, as any unusual acoustic features are unlikely to be perceptible at the assessment locations. The inclusion of such corrections is, therefore, considered representative of the worst-case scenario.

4.7.2 With regard to the uncertainty of the assessment, there is some uncertainty in using a simplified model to predict noise emission, due to the complexity of noise propagation. In addition, it is not certain that the noise measurements captured during the survey will reflect the typical noise levels experienced in the surrounding area throughout the year. To account for this, the lowest measured background sound levels have been used. This conservative approach to the assessment is, therefore, considered to sufficiently account for any inherent uncertainty.

4.7.3 Taking the above into account, adjustment for context is considered to be necessary for the daytime assessment. It is therefore concluded that noise from the new plant will not constitute an adverse impact, and would most likely have a "low impact" on the neighbouring properties, based on the guidance presented in BS 4142.

Receiver	Time	Background sound level	Specific sound level	Rating level	BS 4142 assessment of impact
14-16 Anchor Springs	Daytime (07:00-23:00)	35 dB L_{Ar}	29 dB $L_{Aeq,15mins}$	34 dB L_{Ar}	Low
	Night-time (23:00-07:00)	29 dB L_{Ar}	23 dB $L_{Aeq,15mins}$	28 dB L_{Ar}	Low
Avon House, Avon Road	Daytime (07:00-23:00)	35 dB L_{Ar}	28 dB $L_{Aeq,15mins}$	33 dB L_{Ar}	Low
	Night-time (23:00-07:00)	29 dB L_{Ar}	22 dB $L_{Aeq,15mins}$	27 dB L_{Ar}	Low

Table 4-4: Background sound levels and predicted plant noise levels at the assessment locations

5 External noise intrusion into hotel guestrooms

5.1 Reference noise levels

5.1.1 The highest noise levels obtained during the unattended survey at each individual octave-band centre frequency are presented below in Table 5-1, alongside the highest A-weighted values obtained during the survey. Note that the A-weighted values are those reported by the sound level meter, and have not been calculated from the octave-band values in Table 5-1. These levels are considered to represent a reasonable worst-case.

Location	Time	Highest noise levels in octave-band centre frequencies (dB/Hz)								
		63	125	250	500	1 k	2 k	4 k	8 k	dBA
LT	Daytime $L_{eq,\ 15min}$ (07:00-23:00)	65	70	71	69	62	53	45	38	69
	Night-time $L_{eq,}$ 15min (23:00-07:00)	67	64	60	59	61	56	49	43	64
	Night-time $L_{Fmax,}$ 15min (23:00-07:00)	87	91	90	83	74	62	53	51	83
ST	Daytime $L_{eq,\ 1min}$ (07:00-23:00)	75	66	66	65	66	63	57	50	70

Table 5-1: Highest noise levels obtained during the survey at unattended locations

5.1.2 Noise intrusion into the guestrooms has been assessed using all of the measured data obtained during the external noise survey.

5.1.3 The level of external noise intrusion into a space is a function of the volume and surface finishes of the space, and the sound insulation performance provided by the façade. The space with the largest façade area, smallest volume, and highest number of windows is considered to represent the worst-case scenario.

5.2 Recommended façade constructions

5.2.1 The recommended sound insulation performance of façade elements to achieve the criteria presented in Table 2-1 have been determined based on the ratio of glazing to solid façade, and the room sizes shown in the architectural drawings.

5.2.2 The location of the guestrooms is presented in Figure 5-1 for first floor. Calculated rooms are highlighted in blue, and they represent worst-case scenarios for each façade/room geometry configuration.

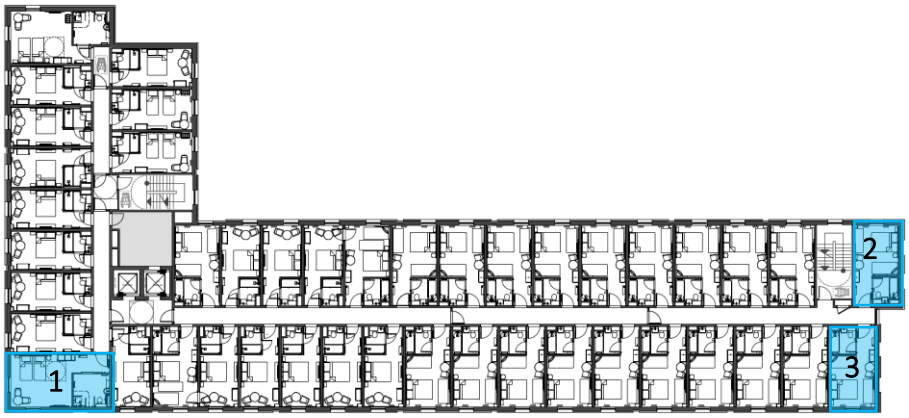

Figure 5-1: Proposed location of guestrooms (first floor) with calculated rooms highlighted in blue

5.2.3 In order for *all rooms* to meet the requirements, the following sound insulation performances are recommended for the façade (as a minimum):

Façade element	Laboratory-rated sound reduction index in octave-band centre frequencies (dB)					
	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
External walls	40	46	51	53	50	50
Windows	27	36	45	51	50	56

Table 5-2: Recommended sound insulation specifications for façade elements

5.2.4 The sound insulation performance for external walls is expected to be achieved by typical masonry constructions, supplemented with internal plasterboard linings and insulation in the cavity. Alternatively, lightweight façade wall systems are considered viable, but may need some form of cementitious board within the build-up.

5.2.5 The sound insulation performance for the windows is expected to be readily achieved by the Abbey Glass' "Premierfon" product or equivalent.

5.2.6 Alternative façade constructions and glazing configurations may also be suitable, so long as they achieve the internal noise level criteria presented in Table 2-1. It is also worth noting that glazing selections have accounted for framing losses up to 3 dB.

6 Conclusions

6.1 A noise impact assessment has been undertaken for a proposed Premier Inn development at the building between Anchor Springs and East Street in Littlehampton, Arun District, Sussex.

6.2 An external noise survey has been conducted at the site, and the measurement data have been used in conjunction with planning guidance from Arun District Council to establish noise emission limits at nearby neighbouring properties.

6.3 In order for the proposed plant to achieve the required noise emission limits, it is recommended that reductions in operating duty are implemented for the condenser units serving the new guestrooms (to 70% during the daytime, and to 50% overnight).

6.4 Provided that the proposed reductions are implemented correctly, noise emission from the proposed plant is expected to have a “low impact” on neighbouring properties, according to British Standard 4142. Noise from the proposal is, therefore, expected to satisfy Arun District Council’s requirements.

6.5 External noise intrusion into hotel guestrooms has also been assessed, and indicative façade specifications expected to meet the Premier Inn requirements have been provided. These specifications are also expected to comply with any reasonable requirements from Arun District Council, as the Premier Inn requirements are more onerous than those found within British Standard 8233, which is the standard usually adopted for residential properties.

Appendix A - Terminology

This appendix provides an explanation of some of the terms used in this report.

A-weighting **L_A or L_{pA}, L_{WA},**	Within its operating limits a precision measurement microphone measures all frequencies the same so the output it produces does not reflect what we would actually hear. The A-weighting is an electronic filter that matches the response of a sound level meter to that of the human ear. When A-weighted the Sound Pressure Level L_p becomes L_{pA} (or L_A) and the Sound Power Level L_W becomes L_{WA}.
L_p	The instantaneous sound pressure level (L_p)
L_{pA} (or L_A)	*The A-weighted instantaneous sound pressure level* (L_{pA} or L_A). This is the root mean square size of the pressure fluctuations in the air. This level can fluctuate wildly even for seemingly steady sounds. To make sound level meters easier to read the values on the display are smoothed or damped out. This is effectively done by taking a rolling average of the previous 0.125s (FAST time constant) or the previous 1s (SLOW time constant).
L_{AF}, L_{AS}	The letters F or S are added to the subscripts in the notation to indicate when the FAST or SLOW time constant has been used. These are often omitted but it is good practice to include them.
L_{max}	The maximum instantaneous sound pressure level (L_{max}),
L_{Amax}	The A-weighted maximum instantaneous sound pressure level *(L_{Amax})*
L_{AFmax}	The A-weighted maximum instantaneous sound pressure level with a FAST time constant *(L_{AFmax})*.
$L_{N,T}$	The percentage exceedance sound pressure level *($L_{N,T}$),*
$L_{AN,T}$ $L_{AFN,T}$ **$_N$ = %age value, 0-100** **$_T$ = measurement time** **eg. L_{A90}, L_{A10}, $L_{AF90,\ 5\ min}$**	The A-weighted percentage exceedance sound pressure level ($L_{AN,T}$), the A-weighted percentage exceedance sound pressure level with a FAST time constant *($L_{AFN,T}$).* This is the sound pressure level exceeded for *N*% of time period *T*. e.g. If an A-weighted level of x dB is exceeded for a total of 6 minutes within one hour, the level will have been above x dB for 10% of the measurement period. This is written as $L_{A10,1hr}$ = x dB. L_{A0} (the level exceeded for 0 % of the time) is equivalent to the L_{Amax} and L_{A100} (the level exceeded for 100 % of the time) is equivalent to the L_{Amin}. It is good practice to include the letter which identifies the time constant used as this can make a significant difference to the value.
$L_{eq,T}$	*The equivalent continuous sound pressure level over period T ($L_{eq,T}$),*
$L_{Aeq,T}$ **$_T$ = measurement time** **eg. $L_{Aeq,5min}$**	The A-weighted equivalent continuous sound pressure level over period *T ($L_{Aeq,T}$).* This is effectively the average sound pressure level over a given period. As the decibel is a logarithmic quantity the L_{eq} is not a simple arithmetic mean value. The L_{eq} is calculated from the raw sound pressure data. It is not appropriate to include a reference to the FAST and SLOW time constants in the notation.