



Premier Inn, Llanelli Central East

Whitbread plc

Noise Impact Assessment

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Project Particulars

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1 Introduction

- 1.1 Proposals are in place to refurbish and develop the existing Premier Inn Hotel at Llanelli Central East to provide more hotel accommodation by converting the existing Brewer's Fayre restaurant.
- 1.2 An external noise survey has been conducted at site, and the measurement data have been used to establish the prevailing ambient and background sound levels affecting the site and neighbouring noise-sensitive properties.
- 1.3 The data from the external noise survey have been used to assess the impact of noise emission from the proposed plant on neighbouring properties, as well as noise intrusion into the guestrooms.
- 1.4 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. An assessment of external noise intrusion into hotel guestrooms is assessed in Chapter 5. Conclusions have been provided in Chapter 6.
- 1.5 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. Existing outline planning conditions for the wider site have also been considered. A list of the documents that have been consulted is provided below:

Local Policy

- Carmarthenshire County Council *Local Development Plan 2006-2021* (understood to still be in effect)

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 Carmarthenshire County Council

- 2.2.1 The Local Authority's website states that the 2006-2021 Local Development Plan will remain in place for all planning decisions at time of writing.

- 2.2.2 Policy EP2 Pollution from the 2006-2021 Local Development Plan states the following:

Proposals for development should wherever possible seek to minimise the impacts of pollution. New developments will be required to demonstrate that they:

- Do not conflict with National Air Quality Strategy objectives, or adversely affect to a significant extent, designated Air Quality Management Areas (permitted developments may be conditioned to abide by best practice);*
- Do not cause a deterioration in water quality;*
- Ensure that light and noise pollution are where appropriate minimised;***
- Ensure that risks arising from contaminated land are addressed through an appropriate land investigation and assessment of risk and land remediation to ensure its suitability for the proposed use.*

- 2.2.3 The *Local Development Plan* does not give quantitative criteria for assessment, and so these have been derived from best practice guidance and industry standards. It is expected that the local authority will want assurance that noise emission from the proposed development will not give rise to an adverse impact to existing neighbouring properties.

2.3 British Standard 4142

- 2.3.1 British Standard 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* presents a method for predicting noise impact on noise-sensitive neighbours. This is done by comparing the noise level of a source (the *specific* sound level) with the existing background noise level in the area, in the absence of the source (the *background* sound level).
- 2.3.2 The methodology requires consideration be given to all aspects of the assessment process and it must also account for any unusual acoustic features, such as tonal, impulsive, and intermittency characteristics. These are accounted for by the addition of various decibel corrections to the specific sound level. This corrected level is the *rating* level.
- 2.3.3 The greater the positive difference between the rating level and the background level, the greater the magnitude of the impact. BS 4142 gives the following descriptions with regards to the potential 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 Premier Inn Generic Specification for a Turnkey Development

- 2.4.1 The Premier Inn Generic Specification for a Turnkey Development (January 2024 – Edition Rev N) provides objective criteria for external noise ingress into hotel bedrooms; these criteria are presented in Table 2-1.

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

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

*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.

- 2.4.2 These limits apply to all external noise sources, including road, rail and air traffic, and noise from activities outside the hotel and any adjacent premises, when measured in any hotel bedroom with windows closed.
- 2.4.3 The document also provides objective criteria for noise emission to neighbouring properties, intended to minimise the risk of complaint where local authorities do not provide objective criteria:

“Noise emission from all plant associated with the hotel shall be designed so as to be at least 5 dB below the lowest measured L90 background noise level at night with all plant operating simultaneously at full duty, when measured at the boundary of the nearest noise sensitive property.”

3 External noise survey

3.1 Site description

- 3.1.1 The Premier Inn is located on the outskirts of Park Pemberton Retail Park, Llanelli.
- 3.1.2 To the north of the site are residences on Llandafen Road, to the west is a dual carriageway (A4138) and to the south is the Retail Park. The site is reasonably close to the Parc y Scarlets rugby stadium; it is not believed that games were played during the survey.
- 3.1.3 The main source of continuous noise affecting the site was observed to be road traffic on A4138, with some passbys on the road to the south of the site.
- 3.1.4 The carpark to the rear of the Premier Inn includes some high voltage power equipment, which was observed to make a continuous crackling/humming noise at low level.

3.2 Measurement methodology

- 3.2.1 Continuous, unattended noise level measurements were conducted at two ground floor locations on the hotel premises. Both locations are identified in Figure 3-1. The microphone was securely fixed to a heavyweight tripod positioned to give a measurement location approximately 1.5m above local ground level in both cases. The measured data are considered representative of free-field values.
- 3.2.2 The measurement positions are shown on a satellite image in Figure 2-1, along with the locations of the sound source(s) and receptors.
- 3.2.3 The measurement locations were selected for the following reasons:
 - Measurement location A was considered to provide a good estimate of noise levels at neighbouring properties that are set back away from the A4138 and are subject to noise from the HV equipment.
 - Measurement location B was considered to represent the highest noise levels from road traffic that may be incident on the façades of the new hotel rooms.
- 3.2.4 Statistical and octave-band spectral data were recorded in 15-minute samples. The Fast (125ms) time constant was used.

Figure 3-1 Satellite image (courtesy of Google) with measurement location, nearby noise sources, and noise-sensitive receivers highlighted



3.2.5 The following equipment were used for the survey:

Table 3-1 Noise level measurement equipment

Type	Model	Serial No.
Class 1 Sound level meter	Norsonic 131	1312766
Environmental microphone	Norsonic 1227	170606
Portable sound calibrator	Norsonic 1251	34926

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

3.3 Weather

3.3.1 Weather conditions throughout the survey were considered to be calm and dry. The measurement data are therefore not believed to have been significantly affected by the weather.

3.4 Results & commentary

- 3.4.1 A level-history graph of the results is presented in Figure 3-2, and the results summarised in Table 3-2.

Table 3-2 Summary of external noise survey results

Time period	Location A	Location B
Daytime (0700-2300)	60 dB $L_{Aeq,0700-2300}$	69 ² dB $L_{Aeq,0700-2300}$
	42 dB $L_{A90,15min}$	48 dB $L_{A90,15min}$
Night-time (2300-0700)	Typically up to 84 dB L_{AFmax} ²	Typically up to 85 dB L_{AFmax}
	53-60 dB $L_{Aeq,2300-0700}$	58 dB $L_{Aeq,2300-0700}$
	40 dB $L_{A90,15min}$	31 dB $L_{A90,15min}$

¹A full 16 hour daytime period was not measured, however the presented value is expected to be representative of a 16 hour average.

²One of the measured maxima reached a level of 102 dB L_{AFmax} . Analysis of the spectral data indicates that this may be due to an unbaffled sports car/bike exhaust passing by the site. None of the other measured overnight maxima exceeded a level 18 dB below this maxima, and so it is believed that the maxima may be considered *genuinely infrequent and unpredictable* and so may be omitted from the noise intrusion assessment as it occurred less than two times a night.

- 3.4.2 The noise level data can be seen to follow a diurnal pattern, with a maximum during the day and a minimum overnight. This is typical for sites exposed to noise from road traffic.
- 3.4.3 It is noted that the background sound level during the daytime was lower at location A than location B, likely due to the reduced level of traffic noise. However, the overnight background sound level was quieter at Location B when the road traffic on the A4138 reduced. This is expected to be the influence of the HV equipment, the noise from which is expected to have been continuous during the survey.

Figure 3-2 Measured sound level history at measurement location A between 19:30 Saturday 27/07/24 and 10:15 Monday 29/07/24

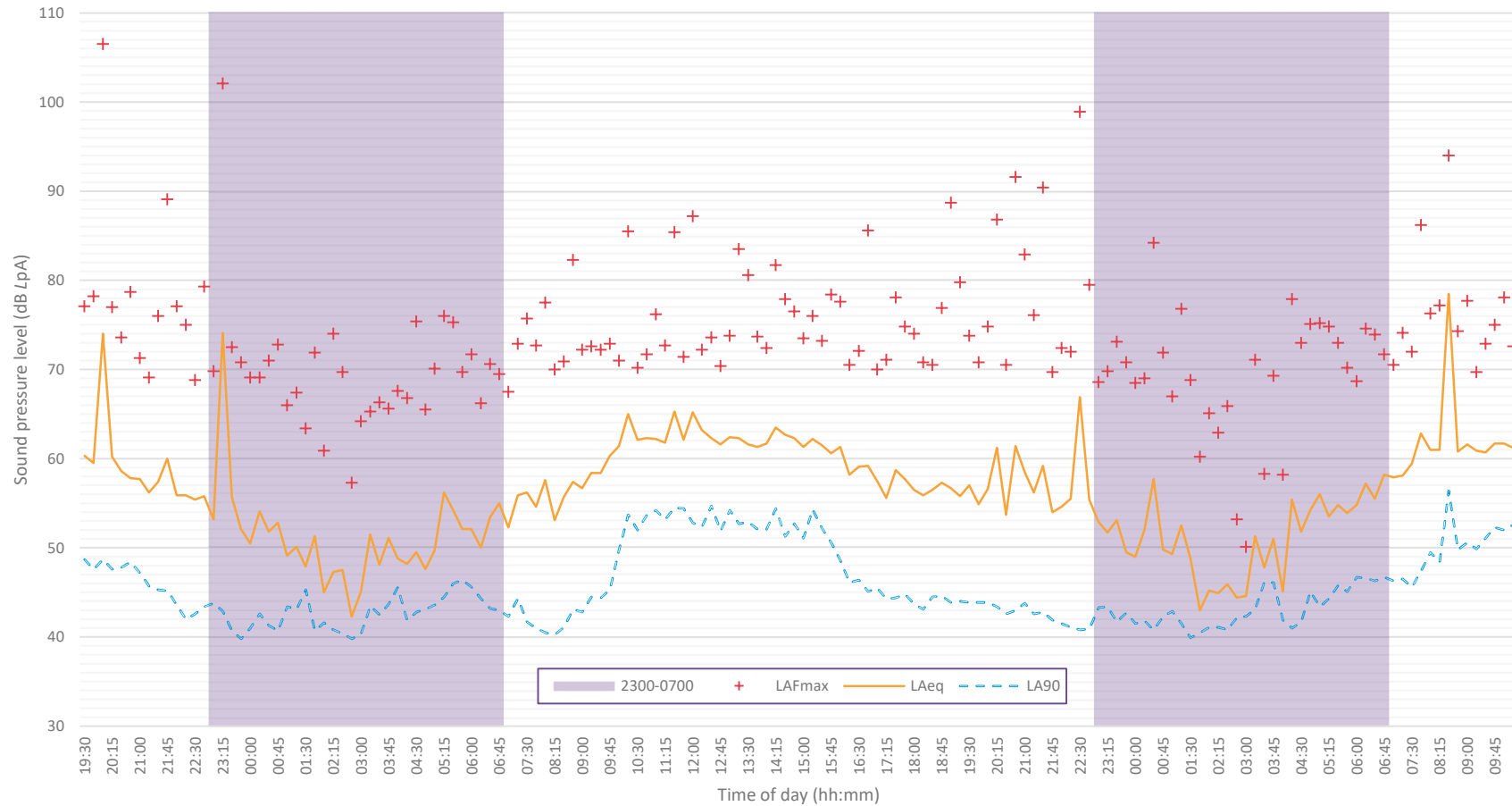
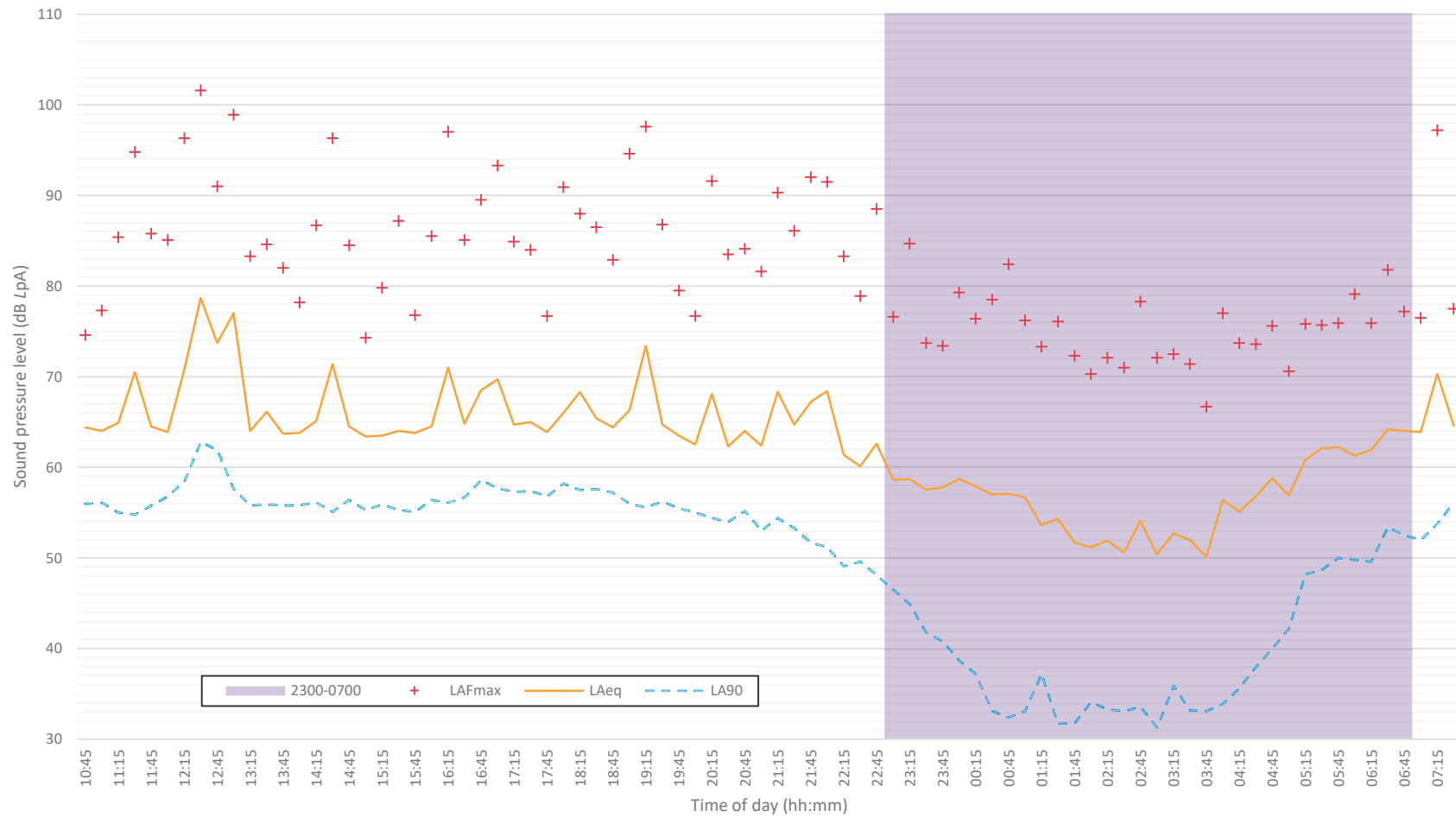


Figure 3-3 Measured sound level history at measurement location B between 10:45 Monday 29/07/24 and 07:30 Tuesday 30/07/24



4 Plant noise emission to neighbouring properties

4.1 Plant proposals

- 4.1.1 The following externally located building services plant is proposed, along with levels of noise emission provided by the manufacturer:

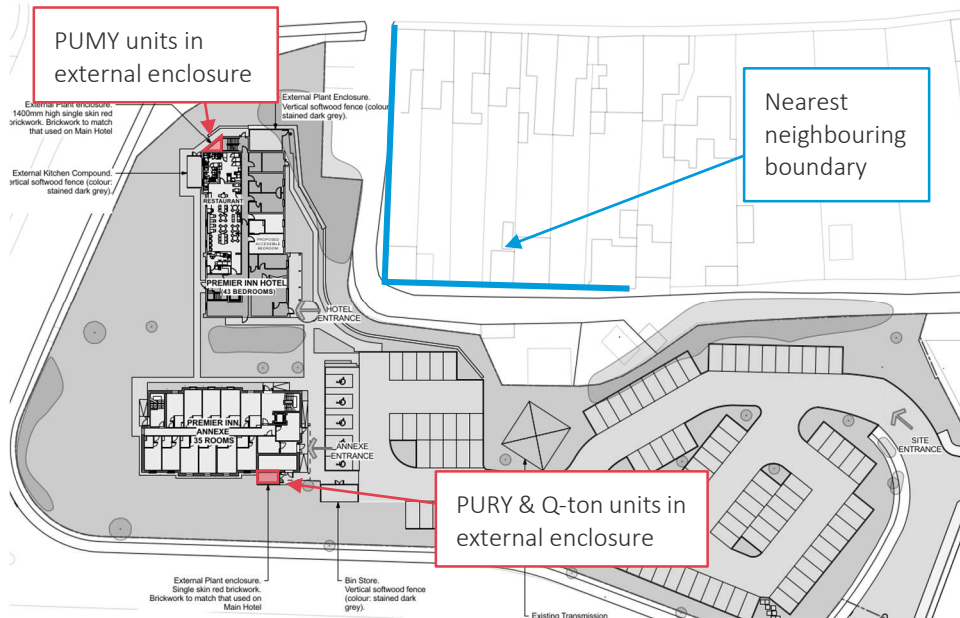
Table 4-1 Plant proposals

Model	Qty	Noise emission (per unit)
Mitsubishi PURY EP200 YNW-A2	3	71 / 63 dB L_{WA} *
Mitsubishi Q-ton ESA30EH-25	2	73 dB L_{WA}
Mitsubishi PUMYSP140YKM(E)4	2	73 dB L_{WA}
Kitchen extract (internally located)	1	50 dB L_{pA} at 1m from termination

- 4.1.2 * The level of noise emitted by the PURY units will vary depending on the usage of the hotel. Based on experience with other Premier Inn hotels and designed-in redundancy to the system the equipment will run at no more than 70% duty during the day and 50% duty overnight.
- 4.1.3 The PUMY units and kitchen extract will serve the breakfast room, the PURY units will provide climate control to the new hotel bedrooms, and the Q-ton units will provide domestic hot water across the scheme.
- 4.1.4 The PUMY units are assumed to run at 100% duty between 0600 and 2300, and will not operate outside of these times.
- 4.1.5 The plant will be installed in open-top enclosures with imperforate sides. The weight of the sides will be at least 10 kg m^{-2} , and are tall enough to block line-of-sight between the equipment and the neighbouring properties.
- 4.1.6 It is noted that the nearest noise sensitive boundary (properties on Llandafen Road) do not have line of sight to the proposed plant due to the hotel building itself.

- 4.1.7 The plant locations are shown in Figure 4-1. The boundary to the residences to the north-east of the site will not have line-of-sight to the plant.

Figure 4-1 Proposed external plant locations



4.2 Nearest noise-sensitive receivers

- 4.2.1 The lowest measured background sound levels from the external noise survey are considered representative of the worst-case background sound levels experienced at the neighbouring properties. These are as follows:

- 42 dB L_{A90} during the daytime (0700-2300)
- 31 dB L_{A90} overnight (2300-0700)

- 4.2.2 As the nearest neighbouring properties are closer in proximity to the HV equipment than the measurement locations, it might reasonably be considered that the higher overnight background sound level of 40 dB L_{A90} measured at Location A would be more representative of the background sound level at the neighbouring properties. However, the lower level has been used to ensure a more robust, worst-case noise emission assessment.

4.3 Calculation methodology

4.3.1 The calculation of the specific sound level for each 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. 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.
- **Screening** – which describes the attenuation provided when the line-of-sight between source and receiver is obscured by an impermeable object with a surface mass of at least 10 kg/m².

4.3.2 The guidance in BS 4142:2014+A1:2019 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 air-conditioning units and air-to-water heat pumps 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. The noise from the proposed kitchen supply and extract system is, however, expected to contain “just perceptible” tonal qualities, therefore a +2 dB correction has been applied to the specific sound level.
- **Impulsivity** – When properly maintained, noise from the proposed units not expected to exhibit impulsive characteristics, therefore this correction has not been applied.
- **Intermittency** – The duty of each individual unit will adjust depending on the load requirements. While this is not expected to result in a distinct intermittency characteristic at the neighbouring boundary, a precautionary +3 dB correction has been applied.
- **Other** – The units are not expected to emit any other characteristics that would be readily distinctive against the existing acoustic environment, therefore no correction has been applied.

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

4.4 Predicted noise levels

- 4.4.1 The specific sound level of the proposed plant at each assessment location is presented below in Table 4-2, along with each associated rating level. The levels include the effects of acoustic screening and attenuation:

Table 4-2: Predicted plant noise levels at each assessment location

Time	Background sound level	Receiver	Specific sound level	Rating level	BS 4142 assessment of impact
Daytime (07:00-23:00)	42 dB L_{A90}	Gyncoed Terrace	26 dB L_{pA} (16 dB below background)	31 dB L_{Ar} (11 dB below background)	Low
Night-time (23:00-07:00)	31 dB L_{A90}		23 dB L_{pA} (8 dB below background)	28 dB L_{Ar} (3 dB below background)	Low
Daytime (07:00-23:00)	42 dB L_{A90}	Llandafen Road	24 dB L_{pA} (18 dB below background)	29 dB L_{Ar} (13 dB below background)	Low
Night-time (23:00-07:00)	31 dB L_{A90}		18 dB L_{pA} (13 dB below background)	23 dB L_{Ar} (8 dB below background)	Low

- 4.4.2 Provided that the recommended mitigation measures are designed and implemented correctly, noise emission from the proposed plant is expected to have a **“low impact”** on the neighbouring properties, based on the guidance presented in BS 4142:2014+A1:2019. This is consequently expected to be acceptable to the Local Authority.
- 4.4.3 Furthermore, the predicted *specific sound level* is at least 5 dB below the background sound level in all cases, which would be expected to satisfy the requirements from Premier Inn.

5 External noise intrusion into hotel guestrooms

5.1 Reference noise levels

- 5.1.1 The following reference noise levels have been established from the external noise survey data:

Table 5-1 Reference external noise levels used in assessment

Time	Highest noise levels in octave-band centre frequencies								
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8kHz	dB(A)
Daytime L_{eq} (07:00-23:00)	72 dB	70 dB	65 dB	63 dB	64 dB	62 dB	57 dB	56 dB	69 dB
Night-time L_{eq} (23:00-07:00)	66 dB	64 dB	61 dB	59 dB	57 dB	50 dB	43 dB	35 dB	61 dB
Night-time L_{Fmax} (23:00-07:00)	87 dB	92 dB	91 dB	84 dB	75 dB	69 dB	63 dB	47 dB	86 dB

- 5.1.2 The level of 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.
- 5.1.3 As discussed in section 3.4.3, the loudest measured overnight maxima has been discounted from the assessment as it is considered that this was *genuinely infrequent and unpredictable*.

5.2 Recommended façade constructions

- 5.2.1 Calculations of noise intrusion have been completed based on standard architectural data for Premier Inn bedrooms. At this stage, it is recommended that the façade elements be specified to achieve the following sound insertion losses – in order to meet the PI specification.

Table 5-2 Recommended specifications for façade constructions

Frequency (Hz)	63	125	250	500	1k	2k	4k
Opaque façade elements (dB)	30	40	46	51	53	50	50
Glazing (including framing loss, dB)	30	35	46	46	46	56	65

- 5.2.2 The requirement for opaque façade elements may be readily met using standard masonry constructions. Lightweight alternatives are also possible, subject to the provision of a sufficiently heavy layer of cementitious board and an independent plasterboard lining roomside.
- 5.2.3 The requirement for glazing will necessitate the use of a secondary glazing configuration, comprising acoustic double glazing externally and an additional 6mm thick pane of glass installed at least 200mm from the primary glazing. Absorbent material should be located in the reveals.
- 5.2.4 Alternative façade constructions and glazing configurations may also be suitable, provided they are sufficient to achieve the indoor ambient noise level requirements.

6 Conclusions

- 6.1 Noise emission and noise intrusion assessments have been conducted in relation to the proposals at Premier Inn Llanelli Central East. The assessments have been informed by the results of an external noise survey conducted at the site.
- 6.2 The noise emission assessment has found that the proposals are expected to result in a “low impact” according to BS 4142. It is expected that this will be satisfactory to Carmarthenshire County Council.
- 6.3 The noise intrusion assessment has found that the Premier Inn criteria may be achieved using a secondary glazing solution similar to that used on other sites and already in use at the existing hotel.

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	<i>The instantaneous sound pressure level (L_p)</i>
L_{pA} (or L_A)	<i>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).</i>
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}	<i>The maximum instantaneous sound pressure level (L_{max}),</i>
L_{Amax}	<i>The A-weighted maximum instantaneous sound pressure level (L_{Amax})</i>
L_{AFmax}	<i>The A-weighted maximum instantaneous sound pressure level with a FAST time constant (L_{AFmax}).</i>
$L_{N,T}$	<i>The percentage exceedance sound pressure level ($L_{N,T}$),</i>
$L_{AN,T}$, $L_{AFN,T}$ N = %age value, 0-100 T = measurement time eg. L_{A90} , L_{A10} , L_{AF90} , 5 min	<i>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.</i>
$L_{eq,T}$	<i>The equivalent continuous sound pressure level over period T ($L_{eq,T}$),</i>
$L_{Aeq,T}$ T = measurement time eg. $L_{Aeq,5min}$	<i>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.</i>

