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Site Address :	32 South Street, Worthing, BN11 3AA
Report no:	2324-307
Date of Report:	12/12/2023
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Scope of Work:	Baseline Noise Survey and Impact Assessment for proposed ground floor flat.

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1. Introduction

1.1 REDFAN Solutions have been instructed to assess the background noise and impact on a proposed new ground floor flat at 32 South Street, Worthing, BN11 3AA.

1.2 This report outlines the background noise levels at the site as well also provides any acoustic performance specifications that are required to enable the internal noise criteria to be achieved.

1.3 Monitoring of the prevailing background noise was undertaken over a 3-day period to cover both weekdays and weekends.

2. Criteria

BS8233:2014

2.1 Local Authorities usually stipulate internal noise criteria for residential buildings use levels based on British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'.

2.2 BS 8233:2014 provides references and guideline values for desirable indoor ambient noise levels for dwellings as shown in Table 2.8 below.

2.3 BS 8233:2014 Desirable Internal Ambient Noise Levels for Dwellings

Table 4 **Indoor ambient noise levels for dwellings**

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	—
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	—
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

2.4 The table is noted to apply to external noise as it affects the internal acoustic environment from sources without a specific character.

2.5 The above internal ambient noise levels are therefore considered appropriate within this assessment.

2.6 BS 8233:2014 states that 'for traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed an upper guideline value of 55dB LAeq, which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances…in higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited'.

Changes in noise level

2.7 The Institute of Environmental Management and Assessment (IEMA) 'Guidelines for Environmental Noise Impact Assessment' provides guidance on the sensitivity of receptors to changes in noise levels. Changes in noise levels of less than 3dBA are not perceptible under normal conditions and changes of 10dB are equivalent to a doubling of loudness. This guidance has been accepted by Inspectors, at Inquiry, to encompass changes in noise levels in the index LAeq,T.

2.8 The following table summarises the response to changes in noise level (known as the Semantic Scale).

Table 2: Change in noise level – response and impact.

Change in noise level LAeqT dB	Response	Impact
<3	Imperceptible	None
3 - 5	Perceptible	Slight
6 - 10	Up to a doubling	Significant
11 – 15	More than a doubling	Substantial
> 15	-	Severe

2.9 BS 7445:2003 "Description and measurement of environmental noise"

Part 1 of BS 7445 establishes guidelines to quantities and procedures for environmental noise measurements. Guidance provided on instrumentation and calibration, measurement positions, meteorological effects, and information to be recorded.

- All equipment shall be calibrated and the configuration for calibration shall be in accordance with the manufacturer's instructions.

- A comprehensive recalibration at certain time intervals may be prescribed by authorities responsible for the use of measurement results.
- A field check shall be made by the user at least before and after each series of measurements, preferably including an acoustic check of the microphone.
- "Outdoor measurements near buildings": these measurements shall be carried out at places where the noise to which a receiver is exposed is of interest. If not otherwise specified, the preferred measurement positions are 1m to 2m from the façade and 1.2 to 1.5m above the ground.

2.10 BS 4142: 2014+A1:2019 "Method for rating and assessing industrial and commercial sound"

This British Standard describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

- sound from industrial and manufacturing processes;
- sound from fixed installations which comprise mechanical and electrical plant and equipment;
- sound from the loading and unloading of goods and materials at industrial and/or commercial premises;
- sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

The significance of sound impact is to be determined according to the following summary process:

- Determine the background sound levels, in terms of the index LA90, at the receptor locations of interest.
- Determine the specific sound level of the source being assessed, in terms of its LAeqT level (T = 1 hour for day or 15 minutes for night), at the receptor location of interest.
- Apply a rating level acoustic feature correction if the source sound has tonal, impulsive, intermittent, or other characteristics which attract attention.
- Compare the rating sound level with the background sound level; the greater the difference between the two, the higher the likelihood of adverse impact.
- A difference (rating – background) of around +10 dB is an indication of significant adverse impact, depending on the context; a difference of +5 dB is an indication of an adverse impact, depending on the context. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending upon context.

2.11 BS 4142 introduced the concept of 'context' to the process of identifying noise impact. Section 11 of BS 4142: 2014+A1:2019 explains "The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs" (our emphasis). An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound

occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context" (our emphasis).

There are many context points to consider when undertaking an assessment of sound impact including:

- The absolute level of sound;
- The character and level of the specific sound in the context of the existing noise climate; for example, is the sound to occur in a location already characterised by similar activities as those proposed?
- The sensitivity of the receptors;
- The time and duration that the specific sound is to occur;
- The conclusions of assessments undertaken using alternative assessment methods, for example, WHO guidelines noise values or change in noise level;

2.12 It is therefore entirely possible that whilst the numerical outcome of a BS:4142:2014+A1:2019 assessment is indicative of adverse or significant adverse impact, when the proposal is considered in context the significance of the impact is reduced to an acceptable level.

2.13 WHO Guidelines for Community Noise

2.13.1 The WHO Guidelines (1999) recommends indoor nighttime guidelines in order to avoid sleep disturbance, the document states these to be 30dB (LAeq)and 45dB (LAfmax) for continuous and individual noise events respectively.

2.13.2 The document states that the number of noise events should also be considered and that individual noise events should not exceed 45dB (LAfmax) more than 10 – 15 times per night.

2.14 The unattended survey was undertaken on 01/12/2023 between 07:00 and 07:00 on 04/12/23. This time period allows for measurements covering both weekends and weekdays. The monitoring equipment was placed at what will be the front façade of the proposed dwelling, closest to the main road. Measurements taken were (LAeq), (LA90), (LcfMax) and (LcfMax)

3. Site Description and Observations

3.1 The proposed construction area hereafter referred to as 'the site', is a proposed new ground floor flat to the rear of 32 South Street, Worthing, BN11 3AA. The site is situated near to the sea front and beach in Worthing with access from Marine Place. The property has a small terrace which is situated on Marine Place. Marine Place is a one-way, slow traffic road which is mainly used as access to the rear entrances of shops and restaurants, there is also a covered car parking area further along. The site is approximately 120m from the main sea front and Marine Parade. Marine Parade is busy but a slow-moving road with pedestrian lights and round abouts.

3.2 The site is a mix of commercial and residential spaces and is sited in a busy shopping area.

3.3 The noise survey was unmanned; therefore, a subjective assessment of background and ambient noise sources could not be undertaken for the whole monitoring duration. While

onsite the dominant noise source was road traffic, the sea, sea birds and pedestrians. Secondary noise was from local businesses and other residences.

3.4 Red lines outline approximate site and yellow dot shows positions tested.



4. Environmental Noise Survey

4.1 The unmanned Environmental Noise Survey was undertaken on 01/12/2023 between 07:00 and 07:00 on 04/12/23.

4.2 Ambient (L_{Aeq}), (L_{A90}), (L_{cfMax}) and (L_{cfMax}) level measurements were taken for a continuous 1-hour period in 5- and 15-minute increments.

4.3 The recordings were taken in 5 minute and 15-minute intervals to prevent any other single noises that would be seen as not representational from affecting the measurements. Prior knowledge of any out of the ordinary potential noise was limited and could have had an impact on the test.

4.4 The sound level meter was positioned as for an outdoor free field measurement more than 4m from the façade of any buildings and 1.2m to 1.5m above the ground. The position was chosen to best represent the ambient noise environment.

4.5 Equipment used for the survey.

Item	Make/Model	Serial no	Calibration Cert no
Calibrator	Norsonic 1255	125525488	U45621
Sound Level Meter	Norsonic 140	11404818	U39909
Microphone	Norsonic 1225	149539	39908

4.6 The Noise Survey and measurements were conducted as BS 7445:2003 establishes guidelines to quantities and procedures for environmental noise measurements.

4.7 Weather conditions throughout the unmanned survey where classed as overcast with light to heavy rain at times, temperature of between 2-12°C and wind had no set direction throughout the test and speeds ranged from 5m/h – 15m/h, cloud cover varied throughout testing.

4.8 The noise monitoring equipment used was calibrated before and after both the noise survey periods. No significant drift was recorded for either. Equipment calibration certificates can be provided upon request.

5. Uncertainty

5.1 All measurements onsite were taken with a sound level meter manufacturer's margin of uncertainty at typically +/- 1.1dB. It is due to the tolerances associated with Class 1 sound level meters and calibrator equipment used to measure background noise.

6. Results

6.1 The table below gives the Baseline Noise Survey readings taken at site.

Date	Time Period	Sound pressure level dB (L_{Aeq})
01/12/23	Daytime (07:00-23:00hrs)	50dB
	Nighttime (23:00-07:00hrs)	44dB
02/12/23	Daytime (07:00-23:00hrs)	51dB
	Nighttime (23:00-07:00hrs)	44dB
03/12/23	Daytime (07:00-23:00hrs)	50dB
	Nighttime (23:00-07:00hrs)	43dB

6.2 The average ambient (L_{Aeq}) noise levels at the measurement position during the survey has been based on an analysis of the monitored data.

6.3 The daytime (07.00-23.00hrs) loudest ambient noise level is 51dB (L_{Aeq}) 1hr with a nighttime (23.00-07.00hrs) loudest ambient noise level is 44dB (L_{Aeq}) 15min.

6.4 There were not more than 5 nighttime single incident noises that would be considered more than 45dB after the consideration of glazing attenuation.

7. Conclusions

7.1 Condensed results of testing performed.

Time Period	Average Sound pressure level dB (L_{Aeq})
Daytime (07:00-23:00hrs)	51dB
Nighttime (23:00-07:00hrs)	44dB

7.2 The assessment outlined national and local guidance, and considers this in relation to the likely operational activity and use of the building.

7.3 To comply with standards detailed in BS 8233: a sound attenuation of 16dB is required. Any external wall that is constructed soundly and with due care will prevent noise intrusion of these levels. Windows will require an attenuation of 16dB, generally standard windows will be able to achieve this level however it is important that the window supplier has test data or modelled predictions for the window system proposed to show compliance with the attenuation detailed. This is critical to ensuring that the sound insulation requirements will be met. Good levels of workmanship are required throughout the build.

7.4 The outside space will have a brick wall surround to 180cm and will almost be completely screened from the local roads and other noise sources. Given that the noise levels recorded are below those outlined in BS 8233:2014, the area being screened will decrease the noise levels in these outside spaces.

7.5 Residential properties must comply with approved document F Ventilation, there are 3 main systems used;

1. Natural Ventilation
2. Continuous Mechanical Extract Ventilation
3. Mechanical Extract Ventilation with Heat Recovery

7.6 All types of ventilation are acoustically able to be considered for this construction.

8. Re-sited ASHP

8.1 Planning Condition 10

"The sound level from the re-sited ASHP shall not exceed 35dB LAeq, 15 mins at both full duty and when in reverse mode, measured or predicted at any noise sensitive façade of any neighbouring residential premises."

8.2 The ASHP installed is aU-140PZ3E5 with a dB(A) of 56 heating and cooling at 1m.

	Mark 2
E5	**U-140PZ3E5**
40	220 - 230 - 240
5.00	20.40-19.50-18.70
2.00	15.60-14.90-14.30
	89 / 83
	56 / 56
	74 / 74
70	996 x 980 x 370
	94
	3/8 (9.52)
)	5/8 (15.88)
	5 ~ 50
	30
	20

8.3 Given the unit is around 1m from the patio windows, this level will be used for the calculation.

8.4 An attenuation of 21dB is required to meet requirements set out in planning condition 10.

8.5 The unit is completely enclosed within a brick enclosure. A standard 100mm brick wall without plaster will have a sound reduction of 40-42dB. The partition is capable of achieving the attenuation required. There is an opening for ventilation which faces onto the courtyard area, this opening will require an acoustic louvre to be fitted or the opening will need to be relocated, if relocated the opening should be in the wall that does not open into the courtyard area.

8.6 A product similar to below

https://www.titon.com/uk/products/ventilation-systems/wall-vents/airliner/

8.7 Bespoke products are availible, the supplier should have test data or modelled predictions for the system proposed.

9. Conclusions

9.1 The assessment outlined national guidance and considers this in relation to the likely operational activity and use of the building.

9.2 The assessment demonstrates that no extra acoustic mitigation measures will be required to ensure that with windows closed the internal noise levels as stated within BS8233:2014 are achieved.

9.3 No specific boundary treatment will be required for traditional external areas to comply with BS8233:2014.

9.4 This report is designed to be used in conjunction with the full planning application submitted. It only identifies the ambient noise environment and does not include any specific design advice for the construction of the building other than the levels outlined in BS8233: 2014. If any amendments are made to the planning application, then further acoustic testing may be required.

Appendices

A. These are the main noise indices in use in the UK.

- dB(A): The human ear does not hear all frequencies with the same intensity. It is most sensitive to sounds in the 500Hz-8kHz range. Above and below this range the ear becomes progressively less sensitive. To compensate for this, sound level meters incorporate electronic filtering to correspond with the varying sensitivity of the ear. This filtering is called A-weighting and Sound Pressure Levels obtained with this weighting are referred to as A-weighted and signified as dB(A).

- LA90: The sound level (in dBA) exceeded for 90% of the time. This unit gives an indication of the sound level during the quieter periods of time in any given sample. It is used to describe the “background noise level” of an area.

- LAeq,T: The equivalent continuous sound pressure level over a period of time, T; (in dBA) This unit may be described as “the notional steady noise level that would provide, over a

period, the same energy as the varying noise in question". In other words, the energy average level. This unit is now used to measure a wide variety of different types of noise of an industrial or commercial nature, as well as road traffic, aircraft and trains.

- LA1: The sound pressure level (in dBA) exceeded for 1% of the time. This unit can give an indication of a regular maximum noise level from such activities as dance music.

- LAe: The sound exposure level, (previously denoted SEL) is the noise level of an event, such as a train or aircraft event, normally expressed in a 1 second time period.

- LAmin: The minimum sound pressure level (in dBA) measured over the time period.

- LAmax: The maximum level of sound (in dBA), i.e. the peak level of sound measured in any given period. This unit is used to measure and assess transient noises, i.e. gun shots, individual vehicles, etc.

- LArT : sound rating level, the a-weighted, leq sound level of an industrial noise during a specified time period, adjusted for tonal character and impulsiveness

B. Overheating Guide states

1. Approved Document O: Overheating

2. The ANC (Acoustics & Noise Consultants) and IOA (Institute of Acoustics) have produced the Acoustics Ventilation and Overheating Residential Design Guide. This guide is approved by the Government.

3. This Acoustics, Ventilation and Overheating Guide ('AVO Guide') is intended to be used by acoustics practitioners as well as all those involved in the planning, development, design, and commissioning of new dwellings. It recommends an approach to acoustic assessments for new residential developments that take due regard of the interdependence of provisions for acoustics, ventilation, and overheating.

4. When a window is opened for ventilation, it will only give 13dB reduction in noise. Should windows require opening to achieve levels required in ADO the BS 8233 standards nighttime will be exceeded by 2-3dB.

5. This Acoustics, Ventilation and Overheating Guide states

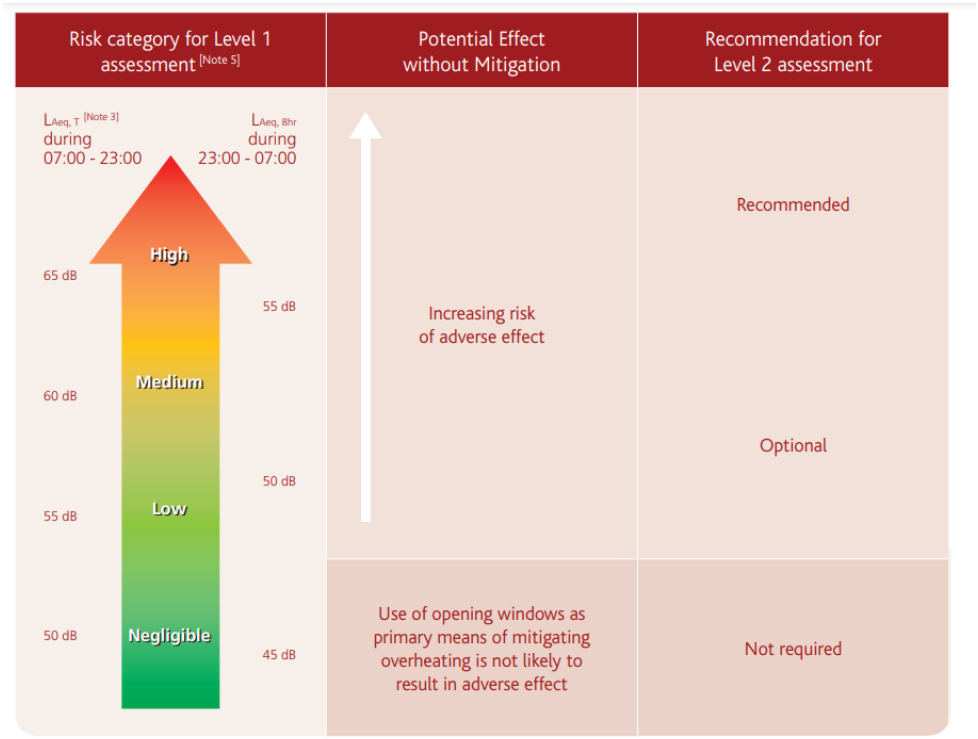
   3.9 It is suggested here that the desirable internal noise standards within Table 4 of BS 8233:2014 should be achieved when providing adequate ventilation as defined by ADF whole dwelling ventilation. However, it is considered reasonable to allow higher levels of internal ambient noise from transport sources when higher rates of ventilation are required in relation to the overheating condition.

   3.10 The basis for this is that the overheating condition occurs for only part of the time. During this period, occupants may accept a trade-off between acoustic and thermal conditions, given that they have some control over their environment. In other words, occupants may, at their own discretion, be more willing to accept higher short-term noise levels in order to achieve better thermal comfort. The importance of control is relevant to

daytime exposure, but not to nighttime exposure where the consideration is sleep disturbance.

3.11 It is important to note that there is no specific research available to support this view regarding human response to combined exposure to heat and noise. However, the notion that control over one's environment moderates the response to exposure is well established in the field of thermal comfort and underpins the adaptive thermal comfort model.

6. Figure 3-1 of the document introduces a 2-level noise risk assessment procedure from transport noise which is the primary noise at the site. This development is considered to present a "low" risk and should be considered a level 1 assessment of noise. The diagram below shows the risk in relation overheating.



3. Leq (1hr) from test.

Time	LAeq
08:00	50
09:00	53
10:00	51
11:00	51
12:00	53
13:00	52
14:00	53
15:00	53
16:00	50
17:00	48
18:00	48
19:00	48
20:00	48
21:00	50
22:00	52
23:00	55
00:00	48
01:00	48
02:00	44
03:00	43
04:00	41
05:00	43
06:00	41
07:00	44
08:00	51
09:00	53
10:00	53
11:00	53
12:00	53
13:00	52
14:00	51
15:00	49
16:00	51
17:00	51
18:00	52
19:00	53
20:00	52
21:00	48
22:00	51
23:00	50
00:00	46
01:00	43
02:00	44
03:00	43
04:00	43
05:00	44
06:00	45
07:00	46
08:00	53
09:00	52
10:00	53
11:00	52
12:00	52
13:00	50
14:00	49
15:00	50
16:00	49
17:00	49
18:00	51
19:00	50
20:00	49
21:00	49
22:00	50
23:00	49
00:00	44
01:00	43
02:00	42
03:00	42
04:00	41
05:00	43
06:00	46
07:00	47