HARBOUR VIEW BRISTOL

Proposed Rooftop Terrace

(Revision to planning permission ref: S62A/2024/0053)

Noise Impact Assessment

March 2025

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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Harbour View, Bristol

Planning noise impact assessment

London, Manchester, Edinburgh, Birmingham, Belfast, Leeds

post@sandybrown.com
www.sandybrown.com

Sandy Brown Ltd
Registered in England & Wales No. 13227735

Registered Office: 55 Charterhouse Street, London EC1M 6HA

Version	Date	Comments	Author	Reviewer
A	27 Feb 23		Ellen Crockett	Anthony Harper

Summary

Sandy Brown has been commissioned by Canada Life Asset Management to provide acoustic advice in relation to a proposed rooftop food and drink venue at Harbourside, Bristol.

An environmental noise survey has been carried out to determine the existing sound levels at the resident's dwellings to determine suitable building services plant limits for the proposed items of plant. The noise survey was carried out between 11:50 on 19 January 2022 and 11:00 on 21 January 2022.

The lowest background sound levels measured during the survey were $L_{A90,5min}$ 53 dB during the daytime and $L_{A90,5min}$ 53 dB at night.

Based on the requirements of Bristol City Council and on the results of the noise survey, all plant must be designed such that the cumulative noise level at 1 m from the worst affected windows of the nearby noise sensitive premises does not exceed L_{Aeq} 51 dB during the daytime and night. However, as a result of the contribution of existing building services noise to the acoustic climate at the site, we propose a more onerous criteria of approximately L_{Aeq} 46 dB during both the daytime and at night.

At the time of writing the report, full details of the proposed rooftop plant are not known as these will be selected by the tenant. It is considered that this could be controlled by a suitably worded planning condition attached to the Decision Notice.

An assessment of the proposed use of the rooftop terrace has been undertaken using 3D noise modelling software. Mitigation measures and noise management practices have been recommended to control the noise impact on existing residents to a suitable level. Predicted noise levels are 9 dB below the background noise level, and are therefore considered appropriate.

Contents

1 Introduction

Sandy Brown has been commissioned by Canada Life Asset Management to provide an assessment of noise associated with the proposed rooftop food and drink venue at Building 11, Harbourside.

An environmental noise survey has been carried out to establish background sound levels around the site and by nearby noise sensitive premises.

The background sound levels measured during the survey are used as the basis for setting limits for noise emission from proposed building services plant. These limits are set in accordance with the requirements of the Bristol City Council.

This report presents the survey method and results, a discussion of the relevant noise limits, an assessment of patron noise and plant noise egress and recommended mitigation measures to achieve the limits.

2 Site description

2.1 The site and its surrounding

The site location in relation to its surroundings is shown in Figure 1. The nearest noise sensitive development is located at Waverley House, Cathedral Walk, highlighted in blue and the site which is part of Building 11 is highlighted in red. Building 8, is highlighted in yellow.

The Waverly House development is comprised of commercial uses at ground level with noise sensitive flats above.

Building 11 is comprised of various commercial units, including a number of restaurants and cafes, casinos, a gym, and recreational uses as well as car parking facilities.

Building 8 to the north is comprised of several commercial units, in addition to a hotel.

Further to the east of the site beyond Millenium Square, lie a number of additional bars and restaurants, including Pryzm nightclub.

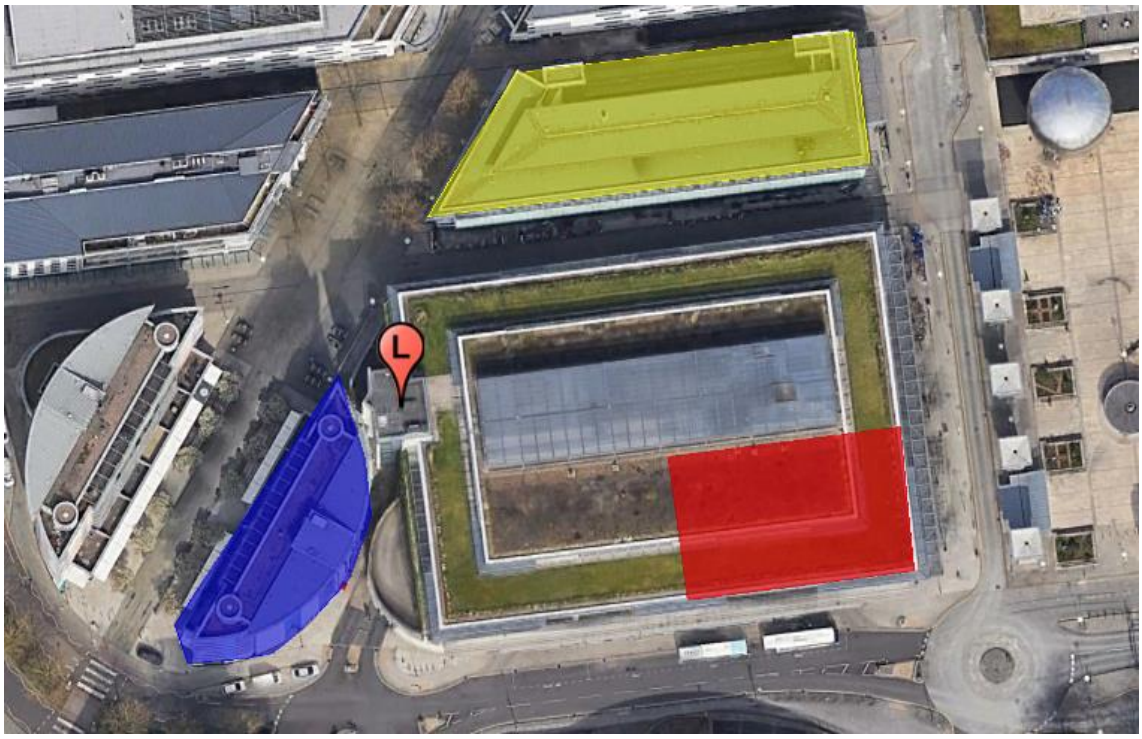


Figure 1 Aerial view of site (courtesy of Google Earth Pro)

3 Development proposals

The project comprises splitting one of the large existing units at the site into two smaller units, to be occupied by a new bar and restaurant. As part of these works, a new rooftop terrace will be created on the lower rooftop at Building 11.

The proposed layout of the new Level 3 mezzanine floor (including the terrace) is shown in Figure 2.

As a new tenant is to be introduced, additional plant will need to be provided at rooftop level.

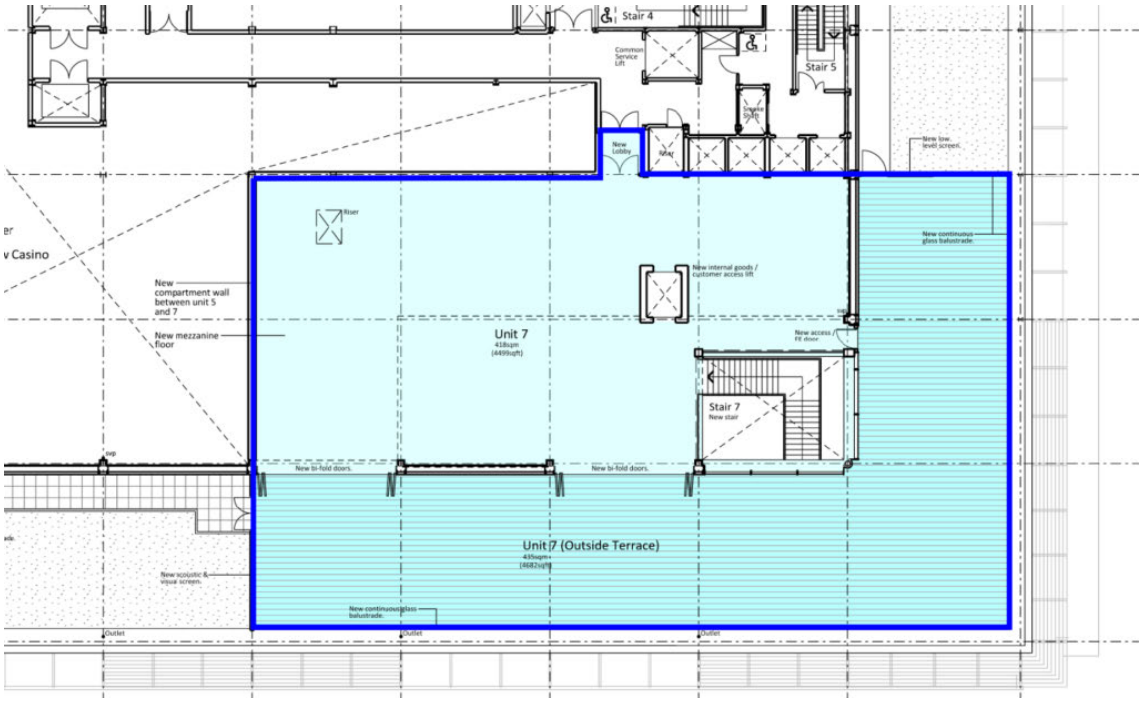


Figure 2 Proposed Level 3 mezzanine layout.

4 Noise egress criteria

4.1 NPPF and NPSE

The National Planning Policy Framework, July 2021 (NPPF) sets out the UK government's planning policies for England. It supersedes previous guidance notes such as PPG24. No specific noise criteria are set out in the NPPF, or in the Noise Policy Statement for England (NPSE) to which it refers.

The NPPF states:

> *'Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> - *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life.*
> - *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.'*

and

> *'Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.'*

The NPSE states that its aims are as follows:

> *'Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*
>
> - *Avoid significant adverse impacts on health and quality of life*
> - *Mitigate and minimise adverse impacts on health and quality of life and*
> - *Where possible, contribute to the improvement of health and quality of life.'*

As such, neither document sets out specific acoustic criteria for new residential developments, but they require consideration of the effect of existing noise on the new development and the effect of noise from the development on the surroundings.

4.2 Building services noise egress

4.2.1 Standard guidance

BS 4142:2014:+A1:2019 *Methods for rating and assessing industrial and commercial sound* (BS 4142) provides a method for assessing noise from items such as building services plant against the existing background sound levels at nearby noise sensitive premises.

BS 4142 suggests that if the noise level is 10 dB or more higher than the existing background sound level, it is likely to be an indication of a significant adverse impact. If the level is 5 dB above the existing background sound level, it is likely to be an indication of an adverse impact. If the level does not exceed the background sound level, it is an indication of having a low impact.

If the noise contains 'attention catching features' such as tones, bangs etc, a penalty, based on the type and impact of those features, is applied.

4.2.2 Local Authority criteria

It is understood that Bristol City Council typically require that for new plant installations, the rating noise level of building services is 5 dB below the existing background noise level.

4.3 Patron and entertainment noise

4.3.1 Standard guidance

The Institute of Acoustics' (IOA) *Good Practice Guide on the Control of Noise from Pubs and Clubs* provides discussion of the need for adequate control of noise impact on future residential demises. It does not, however, provide quantitative criteria against which an assessment should be undertaken.

A separate IOA article was published in the IOA *Acoustics Bulletin Nov/Dec 2003*. This article does provide an assessment methodology for impact of pubs and clubs on residential, the relevant guidance from which is as follows:

> *'Venues where entertainment takes place more than once per week or continues after 23:00 hours*
>
> *Criteria applicable for both internal and external assessment at noise sensitive properties:*
>
> - *The L_{Aeq} of the entertainment noise should not exceed the representative background noise level L_{A90} (without entertainment noise) and,*
> - *The L_{A10} of the entertainment noise should not exceed the representative background noise level L_{A90} (without entertainment noise) in any 1/3 octave band between 40 Hz and 160 Hz'*
>
> *If the above criteria are met entertainment noise will virtually be inaudible inside noise sensitive property.'*

Notwithstanding the above, given the presence of existing building services noise affecting the dwellings, it is considered that a more onerous standard would be appropriate.

5 Noise survey method

5.1 Noise survey method

The survey included unattended noise measurements.

5.1.1 Unattended measurements

Unattended noise monitoring was undertaken at the site over 2 days.

Details of the equipment used and the noise indices measured are provided in Appendix A.

The unattended measurements were taken over 5-minute periods between 11:50 on 19 January 2022 and 11:00 on 21 January 2022. The equipment was installed by Martyn Ludlow and collected by Adil Hussain.

The measurement position used during the survey is indicated in Figure 1, denoted by the letter 'L'. A photograph showing the measurement location is provided in Figure 3. This location was chosen to be reasonably representative of noise levels at the site and is outside the nearest noise sensitive premises.

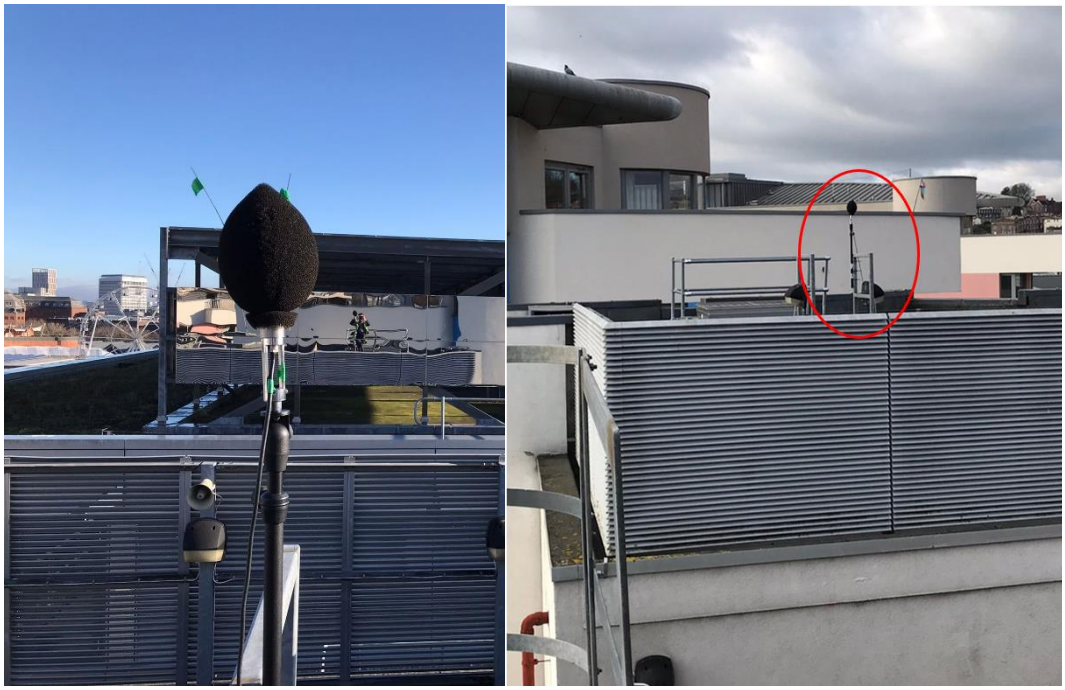


Figure 3 Photographs showing the unattended measurement location

5.2 Weather conditions

Weather conditions during the survey are described in Appendix A.

6 Measurement results

6.1 Observations

The dominant noise sources observed at the site during the survey at the unattended measurement location were building services noise and pedestrian activity around Cathedral Walk and Millennium Promenade, to the north of the measurement position. Less significant noise sources included bird song and distant road traffic.

6.2 Noise measurement results

6.2.1 Unattended measurement results

A graph showing the results of the unattended measurements is provided in Appendix B.

Day and night-time ambient noise levels measured during the unattended survey are presented in Table 1.

Measured minimum background sound levels are given in Table 2.

Table 1 Ambient noise levels measured during the unattended survey

Date	Daytime (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Wednesday 19 January 2022	58[1]	57
Thursday 20 January 2022	59	54
Average	59	56

[1] Measurement not made over full period due to monitoring start time and not included in the average.

Table 2 Minimum background sound levels measured during the unattended survey

Date	Daytime (07:00 – 23:00) $L_{A90,5min}$ (dB)	Night (23:00 – 07:00) $L_{A90,5min}$ (dB)
Wednesday 19 January 2022	54[1]	53
Thursday 20 January 2022	53	53

[1] Measurement not made over full period due to monitoring start and end time.

6.3 Basic limits

6.3.1 Building services

As discussed in Section 4.2.2, Bristol City Council typically require the rating noise level of any proposed building services plant to be designed to 5 dB below the existing background noise level at the nearest noise sensitive receptor.

As the existing noise climate in the vicinity of the receptors is dominated by existing items of building services plant (associated with Building 11 and other sources around the site), it is proposed that a more stringent criterion of 10 dB below the minimum background sound level is adopted.

Based on the above criteria and the measurement results, the cumulative noise level from the operation of all new plant should not exceed the limits set out in Table 3.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels. These have been corrected relative to the measured free-field background noise levels by the addition of 3 dB.

Table 3 Plant noise limits at 1 m from the nearest noise sensitive premises

Time of day	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,5min}$ (dB)
Daytime (07:00-23:00)	46
Night-time (23:00-07:00)	46

6.3.2 Patron and entertainment noise

As discussed in Section 4.3.1, it is considered that designing entertainment noise levels to a level approximately 10 dB below the existing background sound level would provide a suitable level of protection to existing residents. Based on the results of the survey, this would result in a level of approximately L_{Aeq} 46 dB at the nearest noise sensitive receptor.

6.3.3 Comment on cumulative impact

No assessment of cumulative noise impact is considered necessary on the basis that the noise climate at the site is dominated by existing building services noise, and designing the proposed plant to 10 dB below this level should render it virtually inaudible and not result in any further creep in background sound level.

7 Patron noise assessment

A 3-dimensional computer model for the site has been produced using an acoustic modelling software package, CadnaA, to assess the impact of patron noise from the development. CadnaA predicts the propagation of sound from sources at defined locations on a site, accounting for the geometry of buildings and the land topography, as well as distance and air absorption of sound, following calculation procedures specified in ISO 9613-2.

The proposed site along with nearby buildings have been incorporated into the model.

The assessment of noise impact has been based on a peak external occupancy scenario, with approximately 160 patrons seated on the terrace. This has been agreed as a representative number of patrons, following discussions with the design team. The assessment considers the noise from patrons on the roof terrace and noise breakout from the unit with the bi-fold doors in an open position.

The doors will be closed after 23:00, with the only access outside being for smoking, with a designated area to the east of the unit, fully screened from the dwellings to the north by the building massing. Access to this area is to be via a lobbied single doorset, and this space will be managed to ensure it is not used as an external drinking area at night.

For the purpose of the assessment, it has been assumed that 25 percent of people will be talking simultaneously on the terrace, equating to approximately 40 patrons talking. 5 percent of patrons are assumed to speak using a moderate voice effort (representative of tables of 2) and 20 percent of patrons are robustly assumed to speak using a raised voice effort (a person speaking to a larger group of people). The octave band spectra for a raised voice effort level is provided in Table 4 and are based on sound pressure levels at 1 m from the speaker's lips, taken from 'Building Bulletin 93: *Acoustics of schools: A Design Guide'* November 2015. The adopted octave band spectra for a moderate voice effort has been taken to be 5 dB lower, and is also provided in Table 4.

It should be noted that the above assessment has been based on background music being provided within the unit only.

Table 4 Sound pressure levels for raised voices

	Octave-band centre frequency (Hz)						
	125	250	500	1k	2k	4k	dBA
Raised voice effort, L_P @ 1 m (dB)	51	62	66	62	57	51	67
Moderate voice effort, L_P @ 1 m (dB)	46	57	61	57	52	46	62

The patrons are modelled as omnidirectional point sources and are placed at a height of 1.2 m from the finished floor level to simulate the seated head height of each patron.

As previously identified in Section 2.2, the noise sensitive receptors with the greatest potential to be impacted by patron noise are the noise sensitive flats at Waverley House, Cathedral Walk to the west. Controlling patron noise egress at these receptors will ensure that the limits will be achieved at all other surrounding noise sensitive receptors.

7.1 Mitigation measures

It is recommended that a 2.9 m high barrier is provided to the west side of the terrace to provide acoustic screening to the adjacent noise sensitive premises at Waverley House (barrier A).

A 1.8 metre high barrier should be provided to the north of the terrace, to provide screening to the hotel to the north (barrier B). The recommended locations of these barriers are shown in red on Figure 4.

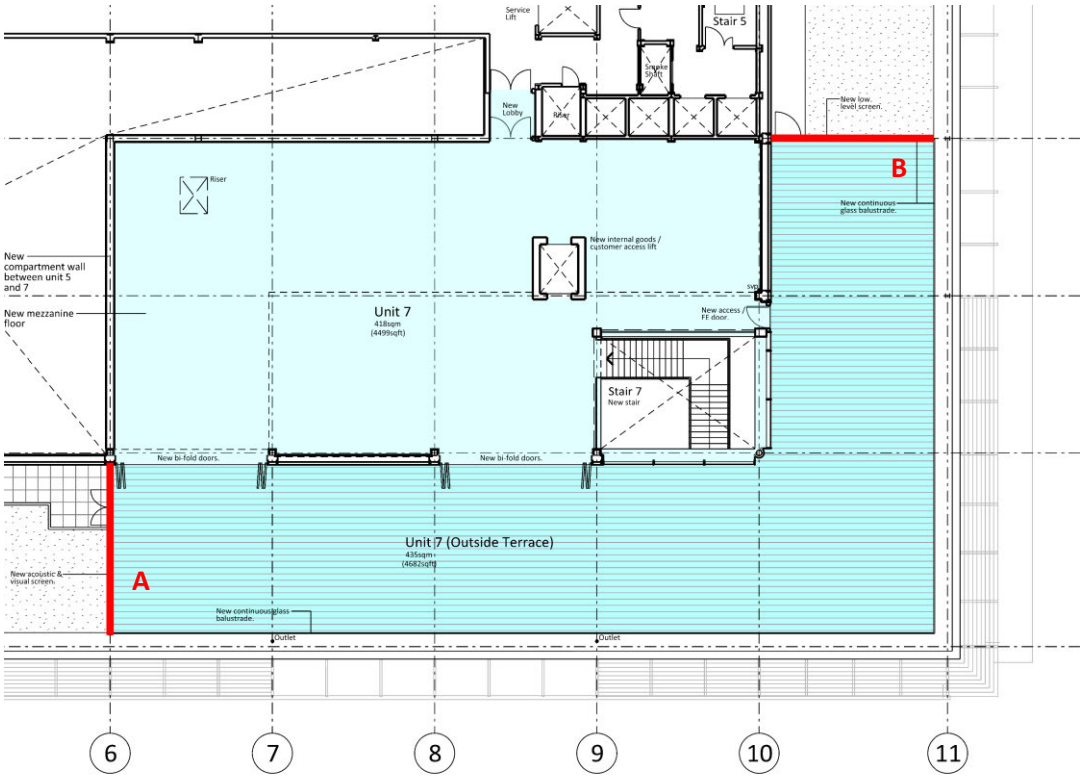


Figure 4 Recommended location of noise barriers

The barriers are required to have a minimum mass of 10 kg/m^2 and there should be no gaps beneath the screen or between any elements that comprise it. The barriers must also have an acoustically absorptive face on the terrace side, this should have a minimum class C absorption rating.

In addition, internal noise levels within the upper floor bar must not exceed $L_{Aeq,15min}$ 68 dBA when the doors are open. This is considered to represent background music noise levels only.

7.2 Resultant noise levels with mitigation

Figure 5 and Figure 6 presents the predicted noise levels at the facades of the nearest noise sensitive receptors with the recommended barriers in place. As shown in the images, the highest predicted noise level at the worst affected façade of Waverley House to the west and Building 8 to the north of the site are L_{Aeq} 47 dB and L_{Aeq} 43 dB, respectively. The predicted noise levels significantly reduce at lower levels of the building.

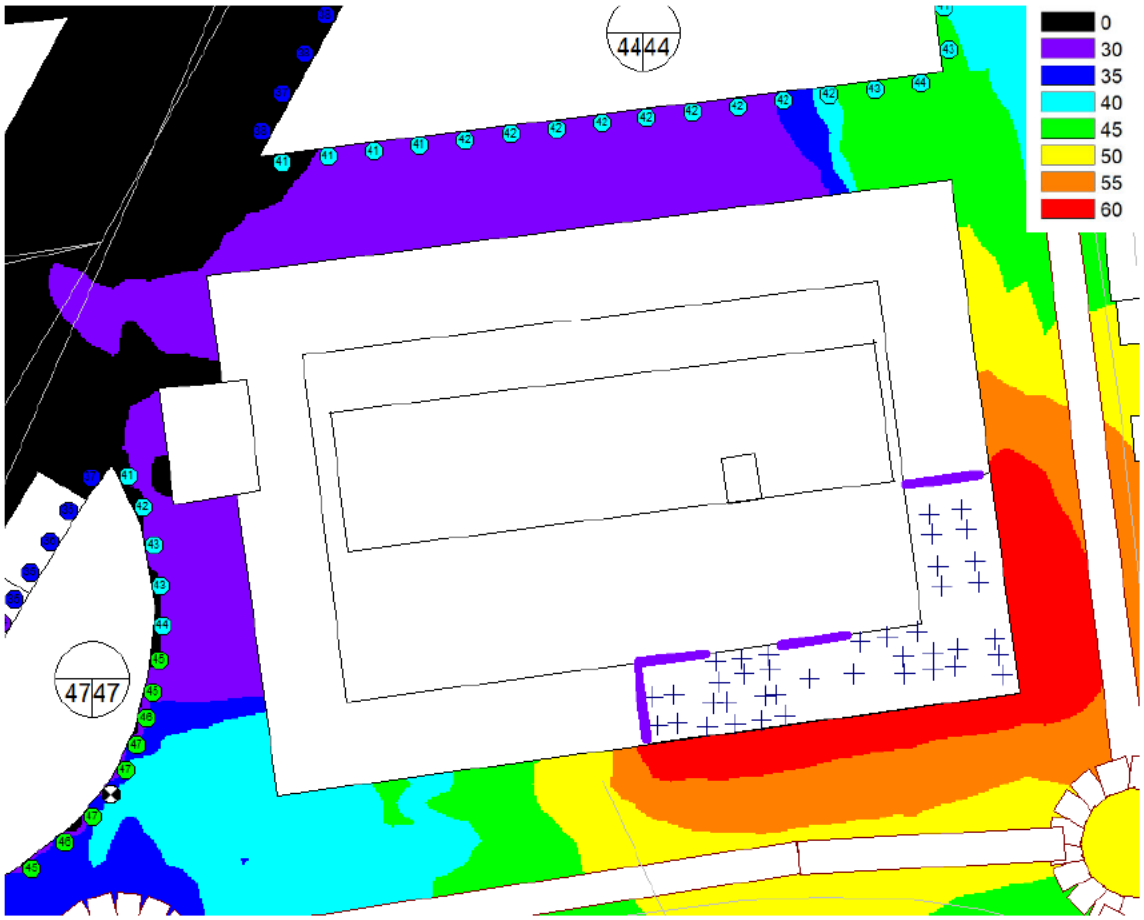


Figure 5 Contour distribution map of patron noise broadband levels - $L_{Aeq,15min}$ (with mitigation)

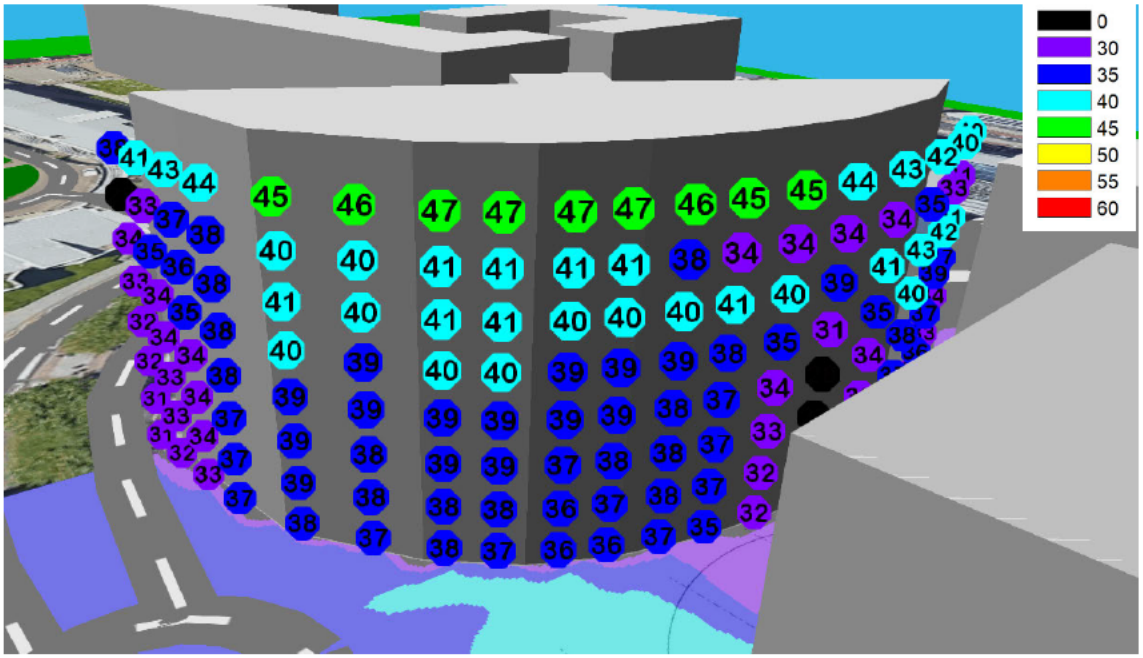


Figure 6 Distribution of patron noise broadband levels at Waverley House

Based on a worst case facade noise level of L_{Aeq} 47 dB, noise associated with the use of the terrace is predicted to be 9 dB below the existing background sound level. This represents a 9 dB betterment of the IOA guidance and it is therefore considered that the impact of the terrace will be suitably controlled through the provision of the mitigation measures proposed.

8 Plant noise assessment

It is understood that allowance for tenant plant is to be provided approximately 50 metres from the nearest noise sensitive receptor, considered to be Waverley House, to the west.

At the time of writing the report, details of proposed items of plant are not known, as these will be selected by the tenant.

All plant will need to be selected and suitably attenuated in order to meet the noise limits outlined in Table 3. It is considered that this can be controlled through a suitably worded planning condition attached to the decision notice.

9 Conclusion

A noise survey has been undertaken to determine the background noise levels to inform the determination of plant noise limits for new plant and patron noise associated with a proposed food and drink venue in Building 11, Harbourside, Bristol.

The minimum measured free field background sound levels were $L_{A90,5min}$ 53 dB during the day, and $L_{A90,5min}$ 53 dB during the night. Based on the requirements of Bristol City Council and on the results of the noise survey, all plant must be designed such that the cumulative noise level at 1 m from the worst affected windows of the nearby noise sensitive premises does not exceed L_{Aeq} 51 dB. However, as a result of the existing noise climate being dominated by existing building services noise, a more onerous criterion of $L_{Aeq,15min}$ 46 dB has been proposed.

An assessment has been undertaken to determine noise mitigation measures to control the noise impact on existing residents. Provided these are incorporated, the impact of the terrace should be acceptable.

At the time of writing, details of proposed items of building services plant are unknown, the tenant will need to carry out an assessment of their proposed plant once further details are known in order to determine required mitigation measures. It is considered that noise egress from tenant plant can be controlled through a suitably worded planning condition attached to the Decision Notice.

Appendix A

Survey details

Equipment

The unattended and attended noise measurements were taken using a Rion NL-52 sound level meter.

Calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Sound level meter	NL-52/00242702	Rion	22 Feb 23	TCRT21/1125
Microphone	UC-59/06185	Rion	22 Feb 23	TCRT21/1125
Pre-amp	NH-25/32730	Rion	22 Feb 23	TCRT21/1125
Calibrator	CAL200/4499	Larson Davis	19 Feb 23	TCRT21/1121

[1] Calibration of the meters used for the measurements is traceable to national standards. Calibration certificates for the sound level meter used in this survey are available upon request.

Calibration checks were carried out on the meters and their measurement chains at the beginning and end of the survey. No significant calibration deviation occurred.

Noise indices

Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period, T, with a fast time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures.*

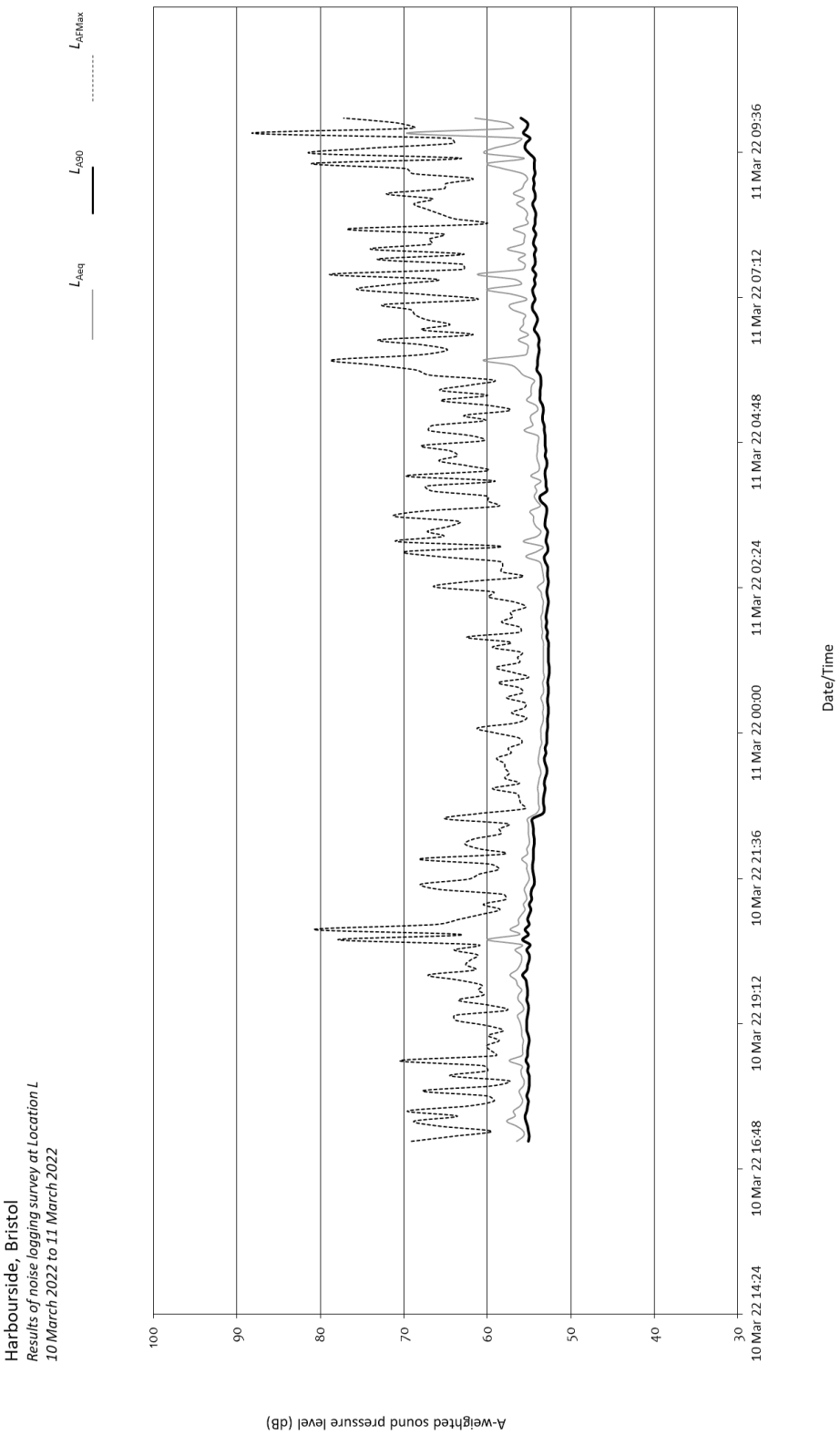
Weather conditions

During the noise measurements, the weather was clear and dry and no rain occurred. Wind speeds were measured noted to be typically less than 5 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements at Location L


Harbourside, Bristol
Results of noise logging survey at Location L
10 March 2022 to 11 March 2022
L_{Aeq}
L_{A90}
L_{AFMax}
A-weighted sound pressure level (dB)
100
90
80
70
60
50
40
30
10 Mar 22 14:24
10 Mar 22 16:48
10 Mar 22 19:12
10 Mar 22 21:36
11 Mar 22 00:00
11 Mar 22 02:24
11 Mar 22 04:48
11 Mar 22 07:12
11 Mar 22 09:36
Date/Time

Appendix C

BS 4142 corrections for attention catching features

The following applies where plant noise is assessed in accordance with BS 4142:2014+A1:2019.

If the proposed plant noise contains attention catching features (such as tonal elements, whines, whistles, bangs etc), penalty corrections should be applied based on the type and impact of the features.

If appropriate, a subjective assessment of the plant features can be adopted. Where the plant noise contains tonal elements, the following corrections can be made depending on how perceptible the tone is at the noise receptor:

- 0 dB where the tone is not perceptible
- 2 dB where the tone is just perceptible
- 4 dB where the tone is clearly perceptible
- 6 dB where the tone is highly perceptible.

Where the plant noise is impulsive, the following corrections can be made depending on how perceptible the impulsivity is at the noise receptor:

- 0 dB where the impulse is not perceptible
- 3 dB where the impulse is just perceptible
- 6 dB where the impulse is clearly perceptible
- 9 dB where the impulse is highly perceptible.

For noise which is equally both impulsive and tonal, then both features can be accounted for by linearly summing the corrections for both characteristics.

If the plant has other distinctive characteristics, such as intermittency, then a 3 dB correction can be made.

If a subjective assessment of tonality is not appropriate, an objective assessment can be made by analysis of time-averaged, third-octave band sound pressure levels. A noise source is deemed to be tonal if the level in a third-octave band exceeds the level in adjacent third-octave bands by the level differences given below:

- 15 dB in the low frequency third-octave bands (25 Hz to 125 Hz)
- 8 dB in the mid frequency third-octave bands (160 Hz to 400 Hz)
- 5 dB in the high frequency third-octave bands (500 Hz to 10000 Hz).

If an objective assessment identifies the plant noise to be tonal then a 6 dB correction must be made.