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Consultants in Acoustics, Noise & Vibration

023893-R01-C

11 June 2024

124 Theobalds Road, London

Noise survey and plant noise egress limits

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Version	Date	Comments	Author	Reviewer
A	1 Feb 24		JP	MR
B	6 Jun 24	Updated following comments	KM	MR
C	11 Jun 24	Updated following comments	KM	MR

Summary

This environmental noise survey and noise egress limits report has been prepared by Sandy Brown on behalf of Theobald Investment Ltd ('the Applicant') in support of a full planning application for the refurbishment and extension of the existing commercial building at 124 Theobalds Road, London, WC1X 8RX ("the Site").

An environmental noise survey has been carried out to determine the existing sound levels in the area. The noise survey was carried out between 14:10 on 22 January 2024 and 11:40 on 29 January 2024

The representative background sound levels measured during the survey were $L_{A90,15min}$ 54 dB during the day and $L_{A90,15min}$ 51 dB at night.

Based on the requirements of the Camden Borough 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 $L_{Aeq,15min}$ 45 dB during the day, and $L_{Aeq,15min}$ 42 dB during the night.

These limits are cumulative, and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features, a penalty based on the type and impact of those features will be applied, and the limits will be more stringent than those set.

Contents

1 Introduction

This environmental noise survey and noise egress limits report has been prepared by Sandy Brown on behalf of Theobald Investment Ltd ('the Applicant') in support of a full planning application for the refurbishment and extension of the existing commercial building at 124 Theobalds Road, London, WC1X 8RX ("the Site").

As part of this, an environmental noise survey is required, the purpose of which is to establish the existing background sound levels in the vicinity of nearby noise sensitive premises and to set appropriate limits for noise egress from building services plant.

This report presents the survey method and results, and a discussion of acceptable limits for noise emissions from building services plant.

2 Site description

2.1 The site and its surrounding

The site location in relation to its surroundings is shown in Figure 1. The Site fronts Theobalds Road to the south and is bounded by Boswell Street to the west and New North Street to the east.

The London Underground Piccadilly line runs approximately 120 m west of the site.

Measurement location 'L' shows the measurement position of the unattended measurements of the site. Pins 1-5 show the attended measurement locations, chosen to provide a representative sample of background noise levels surrounding the site.

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

2.2 Adjacent premises

The nearest noise sensitive premises to the site are Boswell House, located approximately 15 m west of the site and Richbell apartments located 15 m northwest of the site (highlighted in orange in Figure 1).

The site is adjacent to Unite and Warner Brothers commercial buildings to the east and west (highlighted in blue in Figure 1). There are commercial offices southeast of the site, opposite Theobalds Road approximately 20 m from the site (highlighted in blue in Figure 1).

3 Development proposals

The proposed project involves the refurbishment and extension of the existing building to provide additional commercial, business and service use (Class E) including external alterations, introduction of a rooftop terrace, new hard and soft landscaping, provision of cycle parking, provision of publicly accessible cafe space, and other associated works.

4 Building services noise egress criteria

4.1 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 or bangs, a penalty is applied based on the type and impact of those features.

4.2 Local Authority criteria

Camden Local Plan 2017 requires noise egress to be assessed in line with BS 4142, with noise rating levels to be 10 dB below the typical background noise levels. Where tonality is present at the receptors, the limits should be reduced by 5 dB. Relevant section of the Local Plan are summarised below.

Appendix 3 Table C specifies target noise egress levels from industrial and commercial sources outside a development in relation 'effect levels' (NOEL: No Observed Effect Level, LOAEL: Lowest Observed Adverse Effect Level, SOAEL: Significant Observed Adverse Effect Level).

The target noise egress levels outside noise sensitive premises are summarised in Table 1, where the 'Rating level' is determined using BS 4142.

Table 1 Summary of Camden Local Plan 2017 Appendix 3 Table C

Location	Period	LOAEL	LOAEL to SOAEL	SOAEL
Garden used for amenity and outside living, dining, bedroom window	Day	'Rating level' 10 dB[1] below background	'Rating level' between 9 dB below and 5 dB above background	'Rating level' greater than 5 dB above background
Outside bedroom window	Night	'Rating level' 10 dB[1] below background and no events exceeding L_{Amax} 57 dB	'Rating level' between 9 dB below and 5 dB above background or noise events between L_{Amax} 57-88 dB	'Rating level' greater than 5 dB above background and/or noise events exceeding L_{Amax} 88 dB

[1] 10 dB should be increased to 15 dB if the noise contains audible tonal elements (day and night).

5 Noise survey method

The survey included unattended and attended noise measurements.

5.1 Unattended measurements

Unattended noise monitoring was undertaken at the site over 7 days.

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

The unattended measurements were taken over 15 minute periods between 14:10 on 22 January 2024 and 11:40 on 29 January 2024

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 2.

Figure 2 Photo of unattended logger location 'L'

This location was chosen to be reasonably representative of noise levels at the site and outside the nearest noise sensitive premises. This measurement was taken approximately 1.2 m above roof level and approximately 1.5 m away from any other reflective surface.

5.2 Attended measurements

Attended sample measurements were taken at 5 locations around the site. These are indicated in Figure 1 as positions 1 to 5. The measurements were carried out on 29 January 2024, over 5 minute periods.

At each position the microphone was mounted on a tripod approximately 1.2 m above the ground level and at least 3 m from any other reflective surface. Details of the equipment used and the noise indices measured are provided in Appendix A.

Dominant noise sources occurring during the measurements were noted. Photographs of attended measurement positions 1 to 5 are set out below.

Figure 3 Photographs showing attended measurement positions 1-2 (left to right)

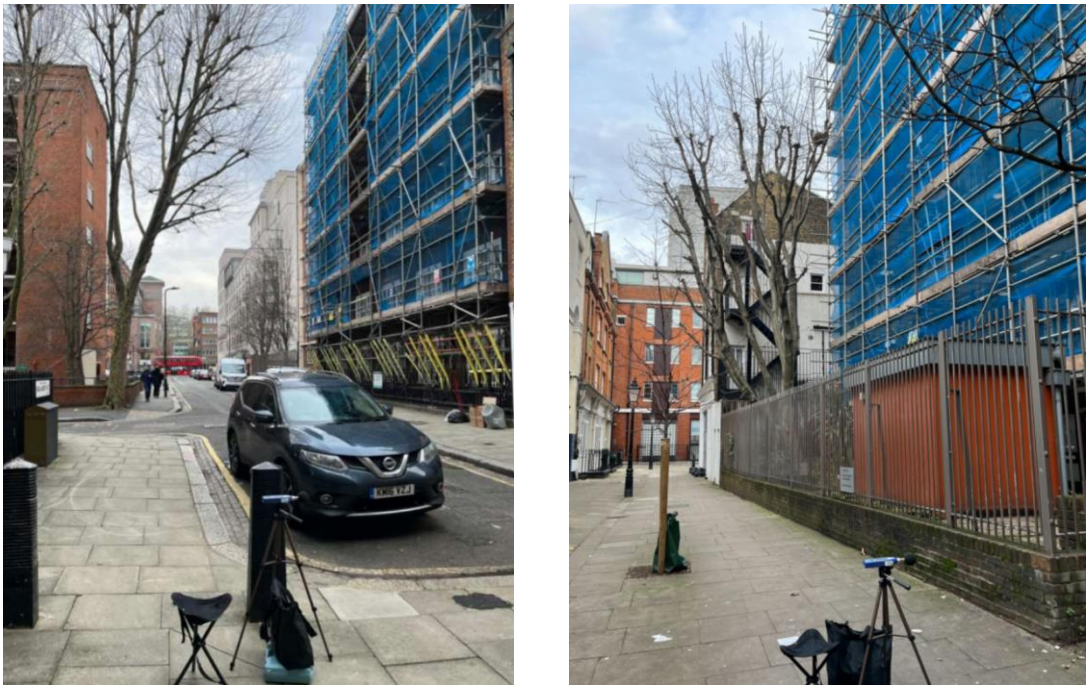


Figure 4 Photographs showing attended measurement positions 3-5 (top row: positions 3 and 4, bottom row: position 5)

5.3 Weather conditions

Weather conditions during the survey are described in Appendix A.

6 Noise survey results

6.1 Observations

The dominant noise sources observed at the site during the survey were from construction works occurring at Boswell House and traffic along Theobalds Road. Though construction noise was a dominant noise source, it was intermittent, and is not expected to significantly impact the measured background noise levels.

Less significant noise sources included traffic along Boswell street and plant noise from other nearby buildings.

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.

Ambient noise levels measured during the unattended survey are presented in Table 2.

Table 2 Ambient noise levels measured during the unattended survey

Date	Day (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Monday 22 January 2024	59[1]	56
Tuesday 23 January 2024	63	63
Wednesday 24 January 2024	61	56
Thursday 25 January 2024	62	60
Friday 26 January 2024	61	56
Saturday 27 January 2024	59	57
Sunday 28 January 2024	58	57
Monday 29 January 2024	62[1]	-
Average	61	58

[2] Measurement not made over full period due to monitoring start and end time (the measurement on 22 January 2024 was over 11 hours, and on 29 January 2024 over 4 hours); not included in the average.

Day and night statistical analysis of representative values for the site are given in Figure 5.

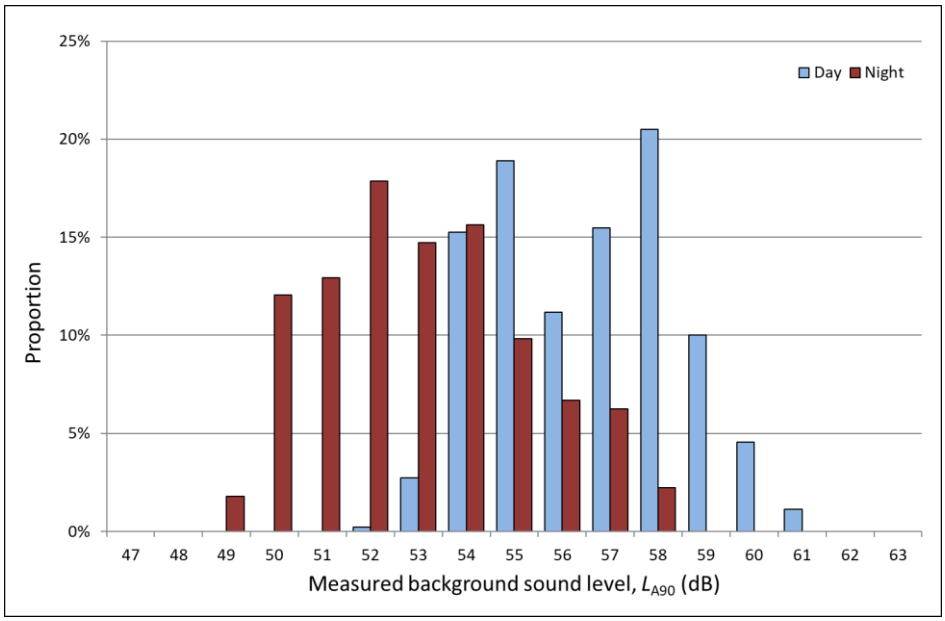


Figure 5 Statistical analysis of background sound level

From this analysis, the representative background sound levels measured during the survey were $L_{A90,15min}$ 55 dB during the day and $L_{A90,15min}$ 52 dB at night.

6.2.2 Attended measurement results

Noise levels and key sources recorded during the attended measurements are summarised in Table 3. All measurements were taken in the free field.

Table 3 Noise levels and key noise sources from attended measurements

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
1	13:55	67	79	62	The dominant source was traffic along Theobalds Road. Intermittent construction noise caused $L_{max.}$
	14:00	66	82	59	
	14:05	72	92	60	
2	15:18	61	75	57	The dominant noise source was noted to be traffic along Theobalds Road. Intermittent construction noise caused L_{max}.
	15:23	60	78	55	
	15:29	62	80	55	
3	14:59	53	66	49	The dominant noise source was noted to be construction works, however this was screened by building massing. Traffic from Theobalds Road was less significant
	15:04	55	71	50	
	15:11	52	69	49	
4	14:42	50	70	46	The dominant source was noted to be construction works from Boswell House. Traffic was less significant.
	14:47	54	71	47	
	14:53	52	67	46	

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
5	14:24	61	74	52	The dominant source was noted to be traffic noise along Theobalds Road. Intermittent construction works caused $L_{max.}$
	14:30	63	75	51	
	14:36	61	87	52	

7 Plant noise egress

7.1 Plant noise egress limits

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 4.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels. In this case these limits would apply at Boswell House and Richbell apartments.

Table 4 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, $L_{Aeq,15min}$ (dB)
Day (07:00-23:00)	45
Night (23:00-07:00)	42

[1] The limits set out in Table 4 do not include any attention catching features. Penalty corrections for attention catching features may be significant and will need to be considered as the building services design progresses. This is discussed in Appendix C.

7.2 Assessment

All building services plant will be designed to achieve the noise limits set out above, including any corrections for attention catching features. At this stage, no information is available in relation to the proposed plant. This will need to be assessed as the design progresses.

8 Conclusion

The representative background sound levels from the noise survey were $L_{A90,15min}$ 54 dB during the day, and $L_{A90,15min}$ 51 dB during the night.

Based on the requirements of the Local Authority, the relevant plant noise limits at the worst affected existing noise sensitive premises are L_{Aeq} 45 dB during the day, and L_{Aeq} 42 dB during the night.

These limits are cumulative, and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features, the limits will be more stringent than those set out above. If plant items contain tonal or attention catching features, a penalty based on the type and impact of those features will be applied.

Appendix A

Survey details

Equipment

The unattended and attended noise measurements were taken using a Rion NL-32 sound level meter and a Brüel & Kjær 2250 sound level meter, respectively.

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	2250/3011195	Brüel & Kjær	2 Dec 24	UCRT22/2430, UCRT22/2431
Microphone	4189/3086746	Brüel & Kjær	2 Dec 24	UCRT22/2430, UCRT22/2431
Pre-amp	ZC0032/25565	Brüel & Kjær	2 Dec 24	UCRT22/2430, UCRT22/2431
Calibrator	4231/3017676	Brüel & Kjær	2 Dec 24	UCRT22/2426
Sound level meter	NL-32/00623769	Rion	10 Nov 25	TCRT23/1827
Microphone	UC-53A/319244	Rion	10 Nov 25	TCRT23/1827
Pre-amp	NH-21/36677	Rion	10 Nov 25	TCRT23/1827
Calibrator	NC-74/34336009	Rion	10 Nov 25	TCRT23/1825

Calibration of the meters used for the measurements is traceable to national standards. Calibration certificates for the sound level meters 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 BS 7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures.*

Weather conditions

During the attended noise measurements, the weather was generally clear and dry with no rain. Wind speeds were measured at each position and varied between 2 m/s and 4 m/s.

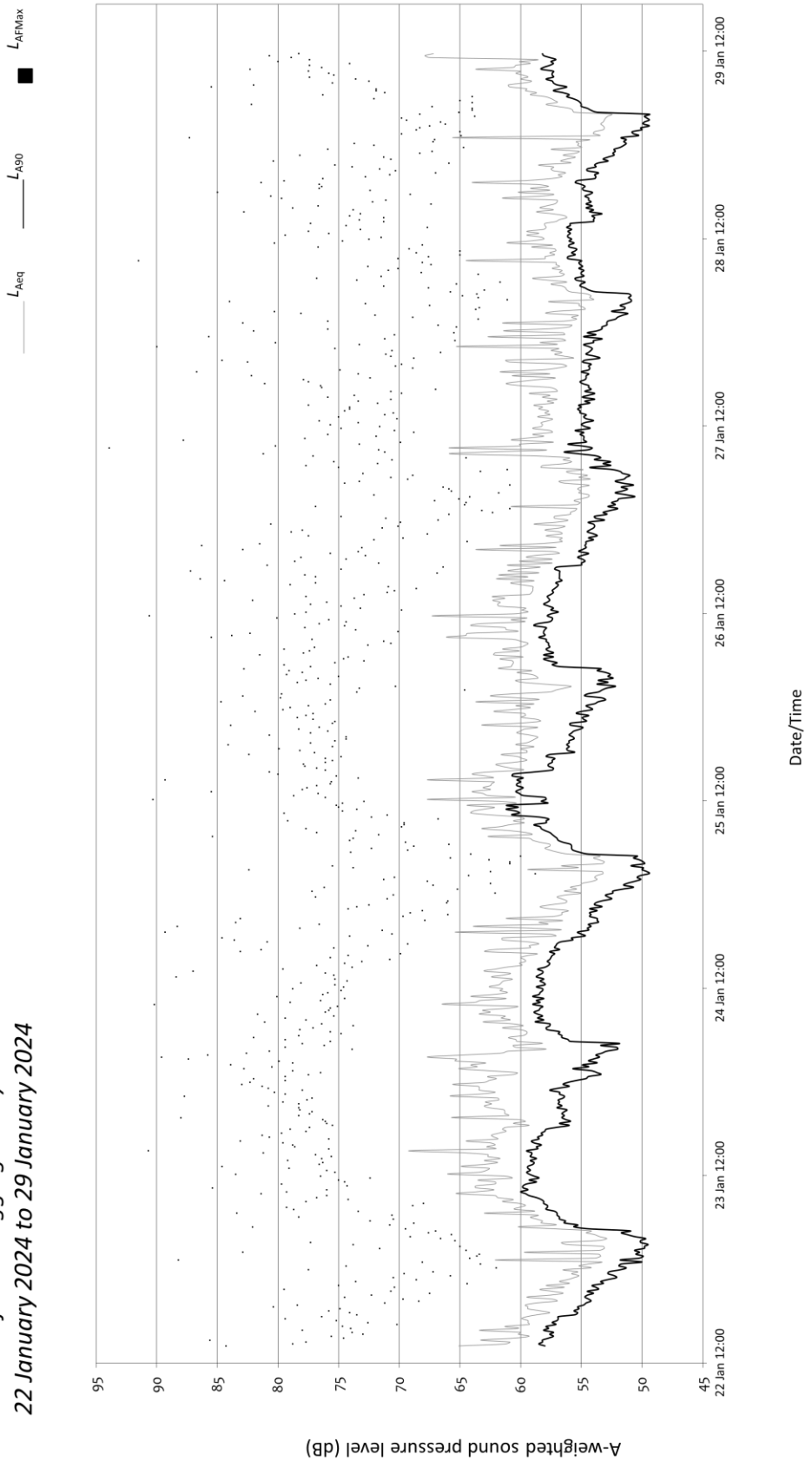
During the unattended noise measurements, weather reports for the area indicated that temperatures varied between -3°C at night and 13°C during the day, and the wind speed was less than 13 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements at Location 'L'

124 Theobalds Road
Results of noise logging survey at 'L'
22 January 2024 to 29 January 2024



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.